The wargame package

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Abstract

This package provides tools to typesetting manuals, board, and counters for wargames using LaTeX.

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1 Introduction

This package provides tools for typesetting classic, hex-based wargames. The package allows an author to design a board, or map, comprised of hex, using a relatively simple interface. Units are typeset using a similar interface. Unit types are identified using the NATO Joint Military Symbology [2] standard.

This document is meant as a reference manual (although far from complete). A separate tutorial is available, and may be the best starting point.

2 Hex Boards

The package provides a number of facilities to set-up a board comprised of hexagon fields ("hexes").

2.1 Placing hexes

A hex can be added to the current `tikzpicture` using the macro `\hex`. It takes up to 4 arguments

`\hex[⟨key-value-pairs⟩](⟨location⟩)(⟨name⟩)`

The ⟨*key-value-pairs*⟩ specify the hex. Valid options are

`terrain=`⟨***terrain-keys***⟩ specifies the terrain of the hex. More on in this in Section 2.5.

`ridges=`⟨***ridges-keys***⟩ specifies where ridges are drawn in the hex. Section 2.6.

`label=`⟨***label-keys***⟩ specifies the how to output the hex label, if any. This is expanded upon in Section 2.7.

`town=`⟨***town-keys***⟩ specifies that a town (or similar) is present in the hex. The various keys are described in Section 2.8.

`bevel=`⟨***bevel-keys***⟩ specifies that a bevel should be added to the hex. The various keys are described in Section 2.2.

`extra=`⟨***extra-keyx***⟩ **and** `extra clipped=`⟨***extra-keyx***⟩ allows the user to put custom graphics in the hexes. See also Section 2.9 for more.

`row=`⟨***row***⟩ **and** `column=`⟨***column***⟩ Keys to set hex coordinates. Mainly used when using `\node` rather than `\hex`. These coordinates should be specified in the `hex cs` coordinate system (Section 2.4).

any style key defined for Ti*k*Z pictures.

The ⟨*location*⟩ argument specifies the coordinates, in the hex coordinate system where to put the hex. More about the coordinate system is given in Section 2.4. Note, the numbers by default starts from the lower–left corner, but can be changed via options.

The elements are rendered in the following order

1. The terrain, clipped to the hex shape.
2. The hex, including circumference and fill
3. The ridges, if any
4. The label, if any
5. Extra graphics clipped to the hex
6. Bevel if selected
7. Town, if any
8. Extra graphics which may extend beyond the confines of the hex.

Figure 1 illustrates some of the components of a hex. The hexes are 2 unit lengths wide. Typically, the unit length is one centimetre, which means the hexes are roughly 2 cm × 1.86 cmm — or roughly 3/4” × 3/4” — big. This allows the hexes to fit chits (see Section **??**) of size 12 mm × 12 mm — or roughly 1/2” × 1/2” — nicely. If one wants larger chits or hexes one should take care to scale both by a similar amount.

Note that the macro `\hex` is really a short hand for Ti*k*Z's `\node` macro, but with preset options. An alternative to using the `\hex` macro is to do

```
\node[hex={⟨key-value-pairs⟩}] (⟨name⟩) at (⟨location⟩);
```

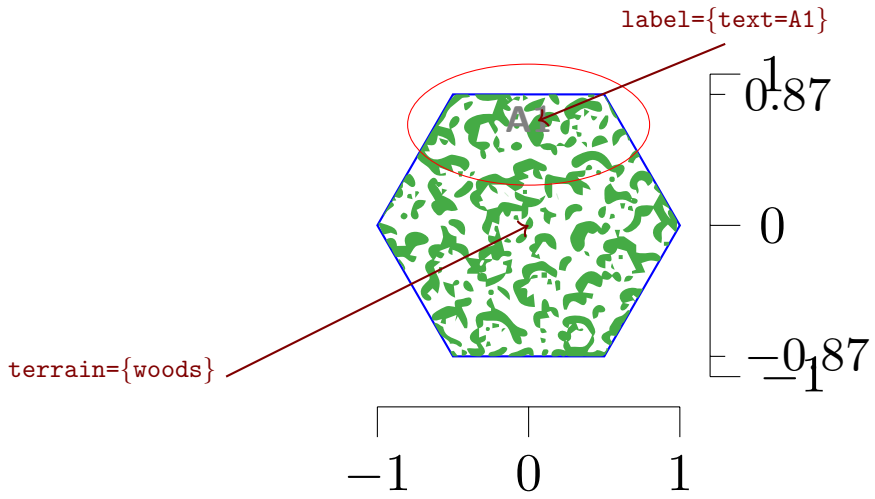


Figure 1: Hex parts. The bar on the bottom and to the right indicate two units of length.

This can be useful when placing explanatory graphics or the like. The main difference between using `\hex` and the raw `\node[hex=...]` is that the former can automatically generate labels and set shape coordinates in the picture. If you want that for your board, it is recommended to use `\hex`. For example, if one does

```
\begin{tikzpicture}[
  every hex={label={auto=alpha column}},
  hex/labels is name=true]
  \hex(c=1,r=1);
\end{tikzpicture}
```

then one can refer to the location of the hex by its label i.e., `(A1)`. Since the hex is really a Ti*k*Z `node`, we can also use anchors defined for `hex` node shape, such as `(A1.west)`, `(A1.north edge)`, and so on. This is not possible if one uses the `\node` macro.

2.2 Hex bevels

A bevel (or "shadow-effect") can be added to hexes using the key `bevel`, with a value that specifies where the light comes from (e.g., north west or NW). The percentage of the half width of a chit of the bevel can be specified by the key `bevel fraction` (default 10%).

2.3 Styling hexes

Typical Ti*k*Z options can be passed to the `\hex` macro. For example, if you want to draw the hex borders in red, simply pass `draw=red` in the `[`⟨*optional*⟩`]` arguments to `\hex`. Individual parts of the hexes can be styled separately. the default style used by `\hex` is `tikz/hex/hex`. Users can redefine this style to suit their needs. If one does not want to change the default style, or pass the same argument to all `\hex`s one can define the style `tikz/every hex`. For

example, if one wants to auto label all hexes, one can do

```
\begin{tikzpicture}
  \begin{scope}[every hex/.style={label=auto}]
    % Hexes
  \end{scope}
\end{tikzpicture}
```

For example, to render only the corners of the hexes, as popular among some designers, one can do

```
every hex/.style={
  dash pattern=on .2cm off .6cm on .2cm off 0cm
},
```

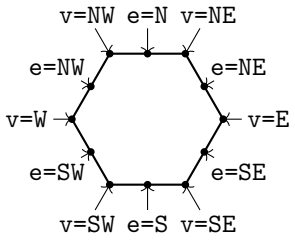
Note that the dash pattern should be 1cm long and the last element should be `off 0cm` so the dash pattern is started afresh on each hex edge.

2.4 Hex coordinate system

The package defines a coordinate system based on hexes. The centre of a hex is specified as ⟨*column*⟩-⟨*row*⟩ pairs, while vertexes and mid-point on edges can be specified separately. The syntax of the coordinates is

`(hex cs:row=`⟨*hex-row*⟩`,column=`⟨*hex-column*⟩`,vertex=`⟨*vertex*⟩`,edge=`⟨*edge*⟩`)`

where ⟨*vertex*⟩ and ⟨*edge*⟩ are optional. The hex row and column defaults both to 0 and can be decimal numbers. The `row`, `column`, `vertex`, and `edge` keywords may be shortened to `r`, `c`, `v`, and `e`, respectively. Possible vertexes and edges are listed in Table 1.



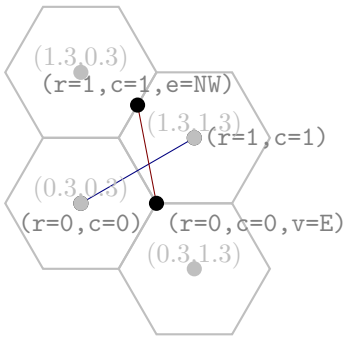
vertex=		Angle	edge=		Angle
east	E	0°	north east	NE	30°
north east	NE	60°	north	N	90°
north west	NW	120°	north west	NW	150°
west	W	180°	south west	SW	210°
south west	SW	240°	south	S	270°
south east	SE	300°	south east	SE	330°

Table 1: Vertex and edge positions

In Figure 2 is an example of a picture drawn in this coordinate system.

Important: When the horizontal distance to the centre of a hex becomes less than $-\cos 60°$ or larger than $b-\cos 60°$ we effectively have a new hex column, and the coordinates are shifted upward or downward for smaller or larger numbers. Figure **??** illustrates. this. This can make it a little hard to specify coordinates relative to a hex centre. Alternatively one may use vertex or edge specifications together with a relative offset in those directions. If one require even more flexibility, one can use the Ti*k*Z library `calc` to add arbitrary offsets, e.g.,

```
\coordinate at ($(hex cs:c=1,r=10)+(.2,.2)$);
```



Hexes and lines drawn with

```
\hex(0,0)\hex(0,1)\hex(1,0)\hex(1,1)
\draw[blue!50!black] (hex cs:r=0,c=0) --
                     (hex cs:r=1,c=1);
\draw[red!50!black]  (hex cs:r=0,c=0,vertex=E) --
                     (hex cs:r=1,c=1,edge=NW);
\fill[lightgray](hex cs:r= .3,c= .3) circle(0.1);
\fill[lightgray](hex cs:r=1.3,c= .3) circle(0.1);
\fill[lightgray](hex cs:r=0.3,c=1.3) circle(0.1);
\fill[lightgray](hex cs:r=1.3,c=1.3) circle(0.1);
```

Figure 2: Hex coordinate system

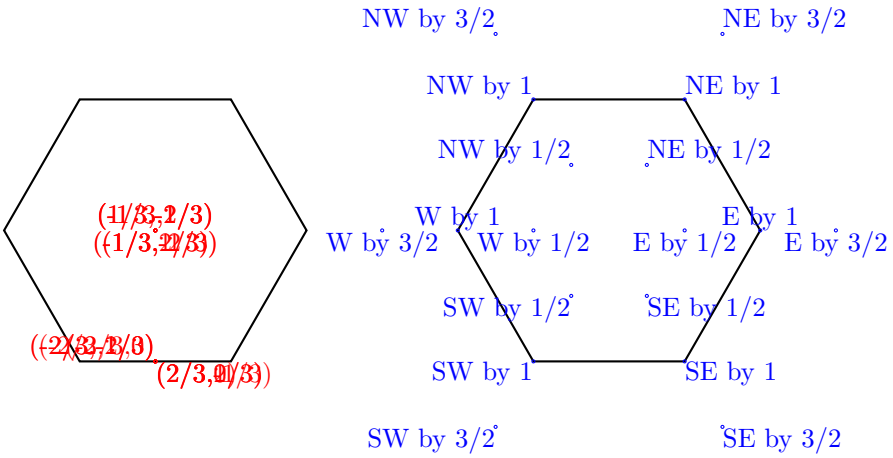


Figure 3: Relative coordinates

2.5 Terrains

Terrains are rendered using tile images or Ti*k*Z `pictures`. The available terrains are shown in Tables 2 and 3. Users can provide their own tile images and select those via `terrain={image=`⟨*image*⟩`}` or defined Ti*k*Z `pictures` and select those via `terrain={pic=`⟨*pic-name*⟩`}`. In all cases, the terrain graphics is clipped to the hex.

The terrain of a hex is selected via the multi-valued key `terrain`. Sub-keys of this key are

`image=`⟨***graphics-file***⟩ Specifies terrain tile image ⟨*graphics-file*⟩.

`pic=`⟨***picture-key***⟩ Specifies terrain tile Ti*k*Z `picture`.

`code=`⟨***tikz-code***⟩ Any valid Ti*k*Z code

`clip=`⟨***path(s)***⟩ Ti*k*Z path specification to clip the terrain within the hex.

`random rotation` Applies a random rotation to the terrain image or picture. This will create an effect where the hexes look less alike.

`rotate=`⟨***angle***⟩ Applies a rotation by ⟨*angle*⟩ to the terrain image or picture. Note that the ⟨*angle*⟩ should most likely be multiples of 60°.

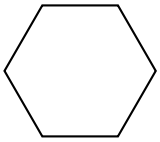
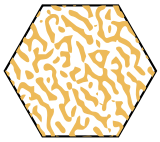
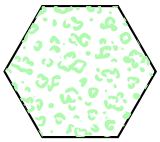
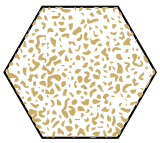
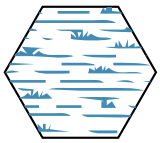
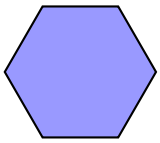
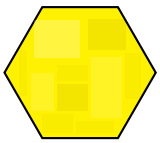
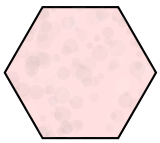
Symbol	Name	terrain={image=⟨*image*⟩}	Symbol	Name	terrain={image=⟨*image*⟩}
	Clear			Beach	{beach}
	Light woods	{light_woods}		Woods	{woods}
	Rough	{rough}		Swamp	{swamp}
	Mountains	{mountains}		Sea	{sea}
	Fields	{fields},fill=yellow		Fields	{speckle},fill=hostile

Table 2: Terrains specified via tile images

The terrain can be clipped by the sub-key `clip`. This can be useful if the game specifies movement costs in terms of hex-edge crossing, for example *First Blood* [1]. In that case, a hex may be, for example, a jungle hex, but some edges a

Symbol	Name	terrain={pic=⟨*image*⟩}
	Mountains	{pic=hex/terrain/mountain,line width=3pt}

Table 3: Terrains specified via Ti*k*Z pictures

clear. Thus movements across such an edge would count as moving into clear territory while moving over other edges will count as moving into a jungle. This is, of course, not how most games count movement costs, but this package nonetheless facilitates such rules. Table 4 shows a few examples of predefined clippings of terrain.

Users can define Ti*k*Z pictures that specify clipping paths as needed. For example, one could add clipping to the terrain to ensure that other graphics in the hex stands out.

2.5.1 Styling terrains

Terrains use the key `tikz/hex/terrain` to render the terrains. This is mainly useful for terrains made from Ti*k*Z pictures.

2.6 Ridges

Ridges, or hill or mountain slopes, can be added to a hex via the keyword `ridges`. The keyword takes a list of hex edges and generates symbology for the ridge on the chosen edges. Note that the edges does not have to be continuous, as illustrated in the bottom right of Table 5, nor in any particular order. The edges are specified as compass direction

```
north east, north, north west, south west, south, south east.
NE, N, NW, SW, S, SE
```

Table 5 shows some examples.

2.6.1 Styling ridges

Every ridge is drawn with the style `tikz/hex/ridges`. Users can customise this style. The default is to draw thin black wave lines (Ti*k*Z decoration `waves`). The default style also takes care to auto scale line widths.

2.7 Labels

Labels can be placed on the hexes via the keyword `label`. The label can either be auto-generated or given explicitly. Table 6 shows the various choices.

The option `auto=inv y x plus 1` will label the rows inversely, and add one to the column number. This requires that the key `tikz/max hex row` has been set to the largest row number used.

In addition to the sub-keys `none`, `auto`, and `text`, one can also specify the following keys

`place`=⟨***coordinates***⟩ specifies the Location of label within the hex. The anchor point of the text will be placed at this point.

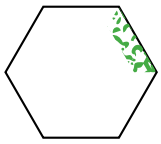
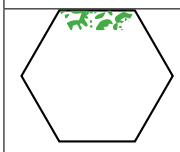
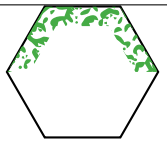
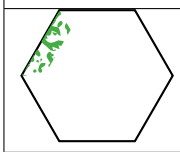
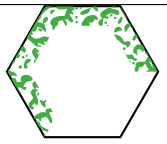
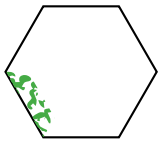
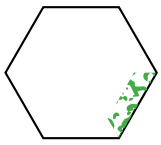
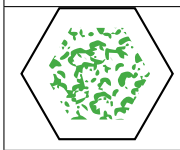
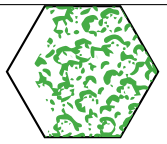
Symbol	terrain={clip=,...}	Symbol	terrain={clip=,...}
	{hex/sextant=NE}		{hex/large sextant=NE,hex/large sextant=N}
	{hex/sextant=N}		{hex/sextant=NE, hex/sextant=N, hex/sextant=NW}
	{hex/sextant=NW}		{hex/sextant=NE, hex/sextant=N, hex/sextant=NW, hex/sextant=SW}
	{hex/sextant=SW}		{hex/sextant=NE, hex/sextant=N, hex/sextant=NW, hex/sextant=SW, hex/sextant=S}
	{hex/sextant=S}		{hex/sextant=NE, hex/sextant=N, hex/sextant=NW, hex/sextant=SW, hex/sextant=S, hex/sextant=SE}
	{hex/sextant=SE}		{hex/sextant=NE, hex/sextant=N, hex/sextant=NW, hex/sextant=SW, hex/sextant=S, hex/sextant=SE, hex/sextant=C}
	{hex/sextant=C}		{hex/sextant=NE, hex/sextant=N, hex/sextant=S, hex/sextant=SE, hex/sextant=C}

Table 4: Terrain clipped via `clip` sub-key

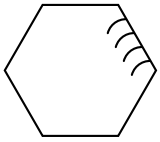
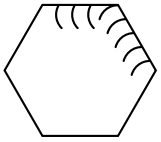
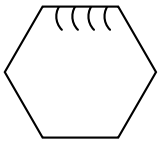
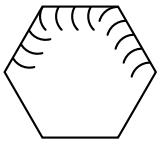
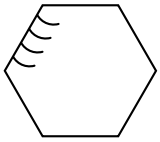
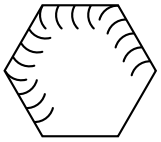
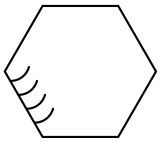
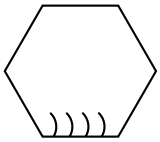
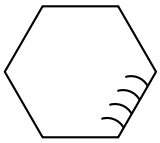
Symbol	ridges=	Symbol	ridges=
	NE		NE,N
	N		NE,N,NW
	NW		NE,N,NW,SW
	SW		NE,N,NW,SW,S,line width=3pt
	S		NE,N,NW,SW,S,SE,color=brown!70!black
	SE		N,S,NW,SE

Table 5: Ridges

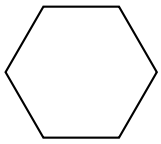
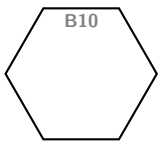
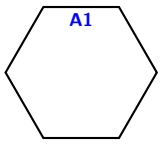
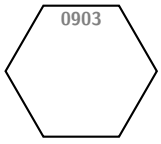
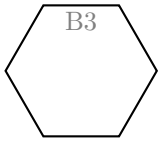
Symbol	Name	Column/Row	label=
	No label	n/a	none
	User specified	n/a	text=B10
	User specified	n/a	{color=blue,text=A1}
	Two-digit, zero padded numbers	9/3	auto
	Column letter, number row	2/3	{auto=alpha column,font=\noexpand\rmfamily} †
	Two letter column, two digit row	6/24	{auto=alpha 2 column,anchor=north east}

Table 6: Labels

†When specifying macros as key values in the options, for example the value `\rmfamily` for the key `font` above, we have to put a `\noexpand` in front if the macro. This is to prevent early expansion of the macro, which would cause errors. A minor nuisance.

`[`⟨/⟩`]`**options** `]` at the start of the option (but inside braces `{...}`) can be used to give additional style options.

2.7.1 Styling labels

All labels use the style `tikz/hex/label`. By default, this places the label at the top of the hex, and renders the text as gray script sized text. Users can customise this style. If a user does not want to change the default style, or want to pass the same option to all labels, then one can set the key `tikz/every label` to those options.

2.8 Towns

Towns in hexes are made via the key `town`. This key takes several sub-keys, as illustrated in Table 7

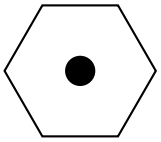
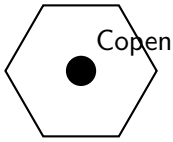
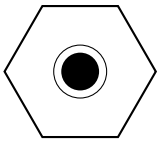
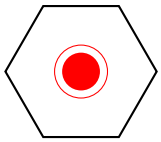
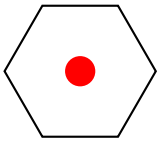
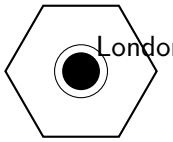
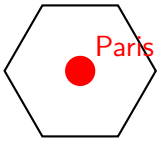
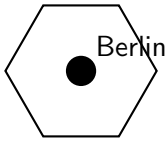
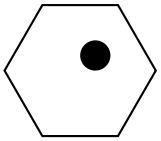
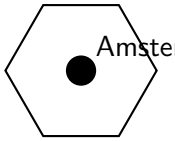
Symbol	town=	Symbol	town=
			{name=Copenhagen}
	{pic=hex/town/city}		{red,pic=hex/town/city}
	{fill=red}		{name=London}
	{red,name=Paris}		{above=0.8,name=Berlin}
	{place={(.2,.2)}}		{font=\noexpand\itshape,name=Amsterdam} †

Table 7: Towns
†When specifying macros as key values in the options, for example the value `\rmfamily` for the key `font` above, we have to put a `\noexpand` in front if the macro. This is to prevent early expansion of the macro, which would cause errors. A minor nuisance.

The sub-keys available for the `town` key are

`pic=`⟨***town-pic***⟩ The name of a Ti*k*Z `pic`ture. Currently defined are `hex/town/town` and `hex/town/city`. Users can provide alternate definitions or new types by defining Ti*k*Z `pic`tures.

`place=`⟨***coordinates***⟩ Location of label within the hex. The anchor point of the text will be placed at this point.

`name=`⟨***name***⟩ Name of town

2.8.1 Styling towns

Towns uses two styles: `tikz/hex/town` for the town graphics, and `tikz/hex/town name` for the name of the town. In addition, a user may set the key `tikz/every hex town` to contain options to be passed to all towns.

2.9 Extra graphics for hexes

Additional graphics for hexes can be added by the two keys `extra` and `extra clipped`. The difference between the two are that graphics specified by `extra clipped` are clipped (restricted) to the hex, while graphics given by `extra` may extend beyond the hex. Both keys accept a comma separated list of arguments, where each element has the syntax

`[`⟨*options*⟩`](`⟨*placement*⟩`)`⟨*picture*⟩

Both ⟨*options*⟩ and ⟨*placement*⟩ are optional, and specifies keys to draw ⟨*picture*⟩ with and the relative location in the hex, respectively. The required argument ⟨*picture*⟩ must name a Ti*k*Z `pic`ture, for example `hex/fortress`. This can be useful for marking hexes on the board. For example to mark a set-up hex for one faction of the game.

One could for example define the following pictures to define set-up points for a Sovjet and German faction

```
  setup/sovjet/.pic={
    \path[fill=red,draw=yellow,pic actions]
      ( 90:.4)--(126:.15)--
      (162:.4)--(198:.15)--
      (234:.4)--(270:.15)--
      (306:.4)--(342:.15)--
      ( 18:.4)--( 54:.15)--cycle;},
  setup/german/.pic={
    \path[fill,pic actions]
      (-.4, -.1) rectangle(.4,.1)
      (-.1, -.4) rectangle(.1,.4);
    \path[draw,pic actions]
      (-.4,-.2) -- (-.2,-.2) -- (-.2,-.4)
      (-.4, .2) -- (-.2, .2) -- (-.2, .4)
      ( .4, .2) -- ( .2, .2) -- ( .2, .4)
      ( .4,-.2) -- ( .2,-.2) -- ( .2,-.4);}
  foo/large/.pic={
    \path[fill=gray,pic actions] (-1,-.5) rectangle(1,.5);},
}
```

We can place extra graphics in hexes as shown in Table 8.

To finish off this part on hexes and what we can do with those, we generate a map in Figure 4.

2.10 Rivers, borders, and roads

Rivers and borders follow the hex sides and are added to the current `tikzpicture` using `\river` and `\border` macros respectively. They are specified as regular Ti*k*Z paths. It is useful to utilise the hex coordinate system for this.

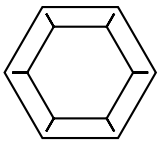
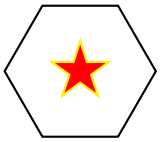
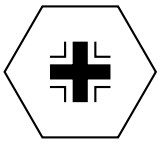
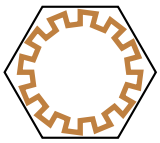
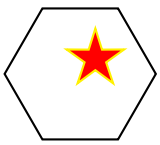
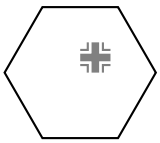
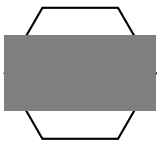
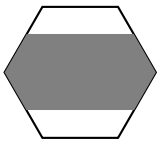
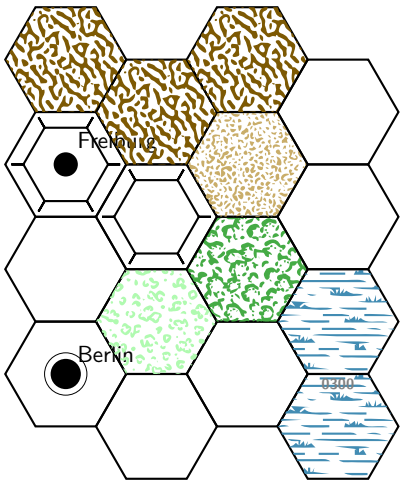
Symbol	extra=
	`hex/fortress`
	`setup/sovjet`
	`setup/german`
	`{setup/german,hex/fortress}`[†]
	`{[{line width=2pt,brown}] fortress 2}`[‡]
	`{[shift={(.2,.2)}]setup/sovjet}`[‡]
	`{[{shift={(.2,.2)},scale=.5,color=gray}] setup/german}`[‡]
	`foo/large`
Symbol	`extra clipped=`
	`foo/large`

Table 8: Hex extra graphics. Note that in the last line we use the graphics `foo/large` with `extra clipped` (compare to line just above) to restrict the graphics to the hex.
[†]When specifying more than one item, the list must be enclosed in braces ({...})
[‡]When an item in the list of `extra` contains a comma (`,`), for example in a list of graphics options, then we need to enclose the inner list *and* the whole list in braces ({...}) to protect against unwanted expansion.




```
\hex[town={pic=hex/town/city,name=Berlin}]    (r=0,c=0)
\hex[]                                        (r=0,c=1)
\hex[]                                        (r=0,c=2)
\hex[terrain={swamp},label=auto]              (r=0,c=3)
\hex[]                                        (r=1,c=0)
\hex[terrain={light woods}]                   (r=1,c=1)
\hex[terrain={woods}]                         (r=1,c=2)
\hex[terrain={swamp}]                         (r=1,c=3)
\hex[town={name=Freiburg},extra=hex/fortress](r=2,c=0)
\hex[extra=hex/fortress]                      (r=2,c=1)
\hex[terrain={rough}]                         (r=2,c=2)
\hex[]                                        (r=2,c=3)
\hex[terrain={mountains}]                     (r=3,c=0)
\hex[terrain={mountains}]                     (r=3,c=1)
\hex[terrain={mountains}]                     (r=3,c=2)
\hex[]                                        (r=3,c=3)
```

Figure 4: Placing hexes

```
\river[⟨options⟩] ⟨path⟩;
\border[⟨options⟩] ⟨path⟩;
```

Rivers are essentially borders, but are randomized to giver a more aesthetically pleasing output.

Roads and railroads typically go from hex–center to hex–center, and are added using the macro `\road`. The road or railroad is specified via a regular Ti*k*Z path.

```
\road[⟨options⟩] ⟨path⟩;
\railroad[⟨options⟩] ⟨path⟩;
```

Towns and cities conveniently serve as places to split up a road at.

2.10.1 Styling paths

Rivers, roads, railroads, and borders are styled by `hex/river`, `hex/road`, `hex/railroad`, and `border`, respectively, and the keys `every hex river`, `every hex road`, `every hex railroad`, and `every hex border` will also be applied. The latter can be defined by the user.

2.11 Board clipping and frame

In the river, border, and road example above, the roads extend beyond the hexes, which does not look very nice. One way to deal with this, is to draw a clipping box around the hexes

This technique works fine for examples in a manual, it has a somewhat displeasing effect for a full board. The package therefor defines the macro `\boardclip` which clips the graphics according to the defined hexes.

```
\boardclip(⟨lower-left⟩)(⟨upper-right⟩){⟨options⟩}
```

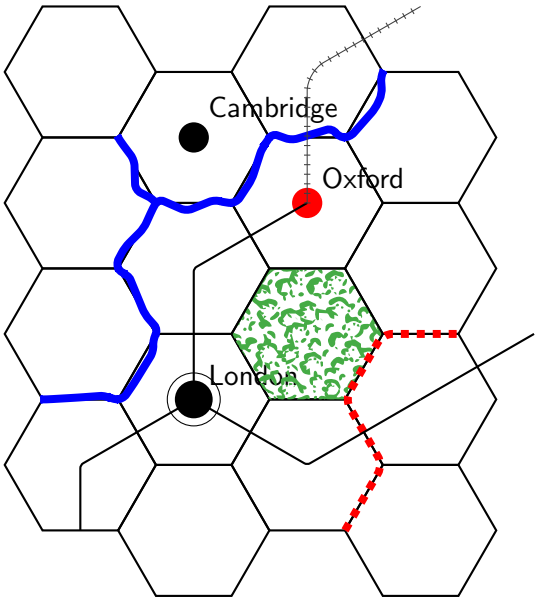


Figure 5: Adding rivers, boarders, and roads

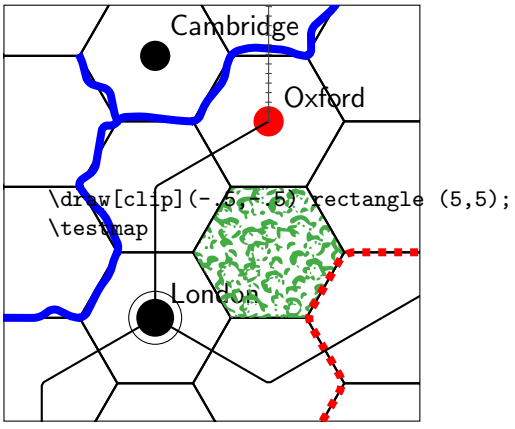
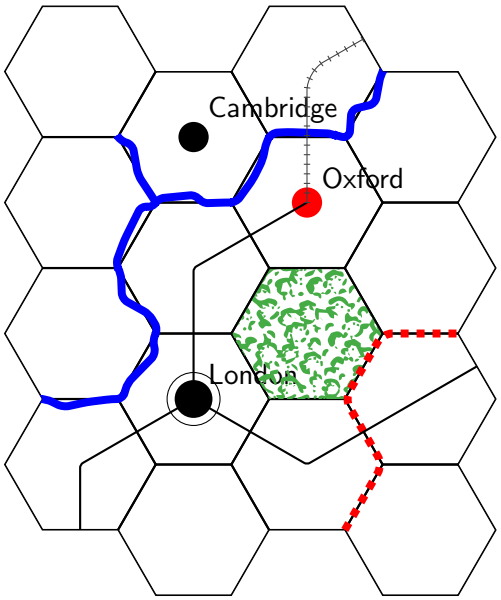


Figure 6: Clipping for a manual using a Ti*k*Z `\draw[clip]` command.

A clipping path of that spans from the hex at ⟨*lower-lest*⟩ to ⟨*upper-right*⟩. Note, that both of these arguments should only specify the column and row keys. If ⟨*options*⟩ is non-empty, then the clipping path is drawn with those options.




```
\begin{scope}
  \boardclip(c=0,r=0)(c=3,r=3){}
  \testmap
\end{scope}
```

Figure 7: Snug–fit clipping of board using the macro `\boardclip`

This is particularly useful together with the `\boardframe` macro. This macro will put a frame around the board, optionally with a margin.

`\boardframe[`⟨*margin*⟩`](`⟨*lower-left*⟩`)upper-right`

where ⟨*lower-left*⟩ and ⟨*upper-right*⟩ are as for `\boardclip`. The ⟨*margin*⟩ must be a number, and specifies an optional margin around the hexes, The argument ⟨*options*⟩ specifies how the frame is drawn. The idea is to first draw the frame, then the clipping shape, and then the hexes. One should take care to use the ⟨*options*⟩ argument to `\boardclip` to specify a default background color. The frame is drawn with the style `hex/board frame`

The `\boardframe` macro prints the position of the rectangle to the log output, if one needs to do some more stuff around the board.

2.12 Constructing the physical board

If the board is not too large, so that it may fit on a paper format that can easily be printed (say A4, A3, Letter, or Tabloid), one can simply print the board and glue it onto a sturdy surface (say $1\frac{1}{2}$ mm poster carton). However, if the board is large, meaning it does not fit on a piece of printable paper, then one has two options.

Either scale the board down so that it fits. Use the Ti*k*Z key `scale=`⟨*factor*⟩ as an argument to the `tikzpicture` environment in which you create the board. In this case, you should make sure you also scale the chits by the same ⟨*factor*⟩, again via the `scale` key.

Or you can split the board over several pages. The package provides a number of tools to help with this.

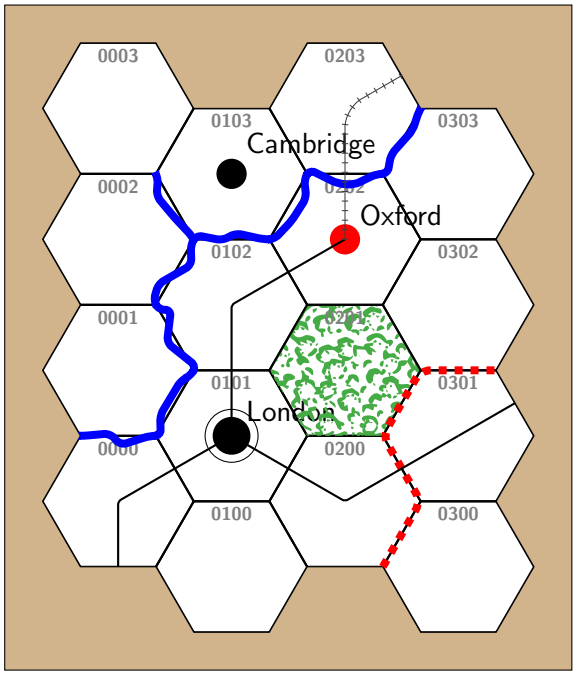


Figure 8: Combining a frame and clipping

2.12.1 Split the board over multiple sheets

First, make sure you produce a standalone PDF of the board only.

```
\documentclass{standalone}
\usepackage{wargame}
\begin{tikzpicture}[scale=SCALE]
  % Define the board here.
\end{tikzpicture}
```

and that you have created this PDF — say `board.pdf`.

Next, prepare another document in which we will do the calculations. For example

```
\documentclass[11pt]{standalone}
\usepackage{wargame}
\begin{document}
\splitboard{paper=letter,margin=.7,ncol=2,nrow=2,overlap=1}
\end{document}
```

to calculate the split of `board.pdf` over 2×2 letter paper sheets, with a non-printable margin of 7mm, and an overlap between the segments of 1cm.

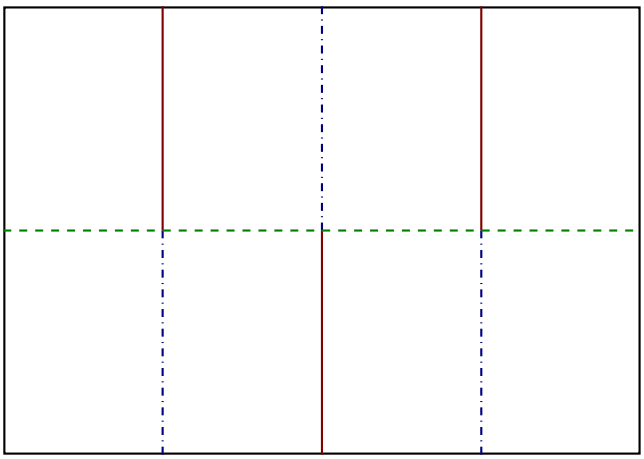
The possible keys for the `\splitboard` macro are

- `paper`=⟨*format*⟩: Specifies the paper format. One of `a4`, `a3`, `letter`, `tabloid`. Default is `a4`.
- `landscape`: Sets the paper format to be in landscape mode (default is portrait).
- `margin`=⟨*size in centimetres*⟩: Size of margins on each sheet in centimetres *without* unit. That is put `0.6` for 6mm, *not* `6mm`. Default is `0.6`. This should be *slightly* larger (by roughly 5%) than the *least* margin required by the printer used. *Must* be given *before* `paper` to have any effect.
- `ncol`=⟨*number of columns*⟩: Sets the number of columns of sheets.
- `nrow`=⟨*number of rows*⟩: Set the number of rows of sheets.
- `overlap`=⟨*size in centimetres*⟩: Sets the size of the overlap between sheets in centimetres *without* unit. That is put `2` for 2cm, *not* `2cm`. Default is `2`.
- `image`=⟨*image file name*⟩: File name of the board image (a PDF). Default is `board`
- `output`=⟨*output file name*⟩: File name (without `.tex` ending) to write calculated split to.
- `standalone`: Boolean flag. If true, then output file will be a standalone document (i.e., has a `\documentclass`).
- `scale`=⟨*scale*⟩: Set scale of board.

The macro will produce a file named ⟨*output file name*⟩`.tex` which can be included in another document to generate the split board PDF. Crop marks will be added to the board segments to make it easier to align the parts.

2.12.2 Foldable board

To make a fold-able board use for example the below template to create grooves and cuts.



Cut through carton
Cut groove ($\frac{1}{2}$ through) in carton on *back* side
Cut groove ($\frac{1}{2}$ through) in carton on *front* side

This will fold the board down to a fourth of the size of the full map. For example, if the board is A1 (84 cm × 59.4 cm) it will fold down to A4 (21 cm × 29.7 cm) for easier storage.

3 Chits

Chits, or playing counters[1], can be made with the macro `\chit`. The syntax for rendering a chit is

```
\chit[⟨key-value-pairs⟩](⟨location⟩)(⟨name⟩)
```

Figure 9 shows an example of a chit.

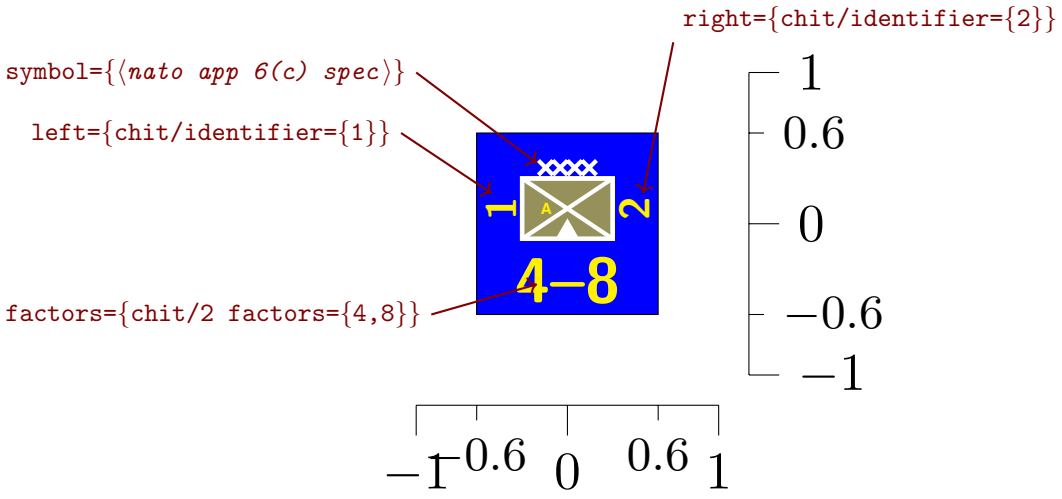


Figure 9: An example of a chit. The lines below and to the right shows two unit lengths. Other global options used are `color=white` to set the foreground colour, `fill=blue` for the background, and `text=yellow` to set the font colour to yellow. The `symbol` key also contains `frame={fill=yellow!50!black` to set the frame fill colour, and `ultra thick` to set the line width of the NATO App6(C) symbol. Note that the line width is automatically scaled.

The example in Figure 9 shows an infantry mountaineer army unit with attack factor 4, and movement factor 8. The NATO App6(c) symbol is given in terms of keywords for the `\natoapp` macro (see Section 4). The other parts of the chit (`factors`, `left`, `right`, and `below`) are rendered onto the chit via Ti*k*Z `pictures`. This allows for a great deal of flexibility in generating chits. For example, above we use the `pictures` `chit/identifier` and `chit/2 factors` to render the left- and right-hand identifiers, and the factors, respectively.

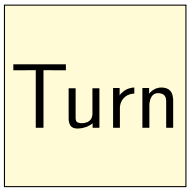
Full frame chits — that is chits which are not typically designating units or faction specific chits, e.g., a turn marker — can be made by using the key `full`. In that case, all other keys (`symbol`, `factors`, `left`, `right`, and `below`) are ignored. Figure 10 shows such an example.

The size of the chits are 1.2×1.2 unit lengths squared. This is tuned so that the chits will fit within the hexes produced by the `\hex` command (see Section). In Figure 11 we illustrate this. Typically the unit is one centimetre. which means the chits are 12 mm × 12 mm — or roughly 1/2" × 1/2", which is a fairly good size for most games.

Just as `\hex` is really a wrapper around Ti*k*Z's `\node` macro, so it is with `\chit`. This means that an alternative way of making a chit is to do

```
\node[chit={⟨key-value-pairs⟩}] (⟨name⟩) at (⟨location⟩);
```

[1] Since TEX has the concept of counters as in '`\count`' and LATEX's '`\newcounter`', we choose the name 'chit' for playing pieces instead.



chit made with

```
\tikzset{
  wg/big text/.pic={
    \node[font=\sffamily\fontsize{18}{0}%
          \selectfont]{#1};}}
 \tikz{
  \chit[full={wg/big text={Turn}},
        black,fill=yellow!20!white](0,0)}
\end{tikzpicture}
```

Figure 10: An example of a full-frame chit.

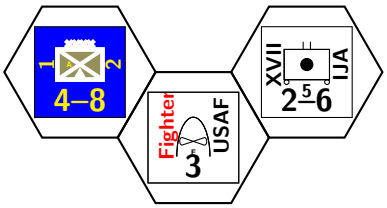


Figure 11: Example of chits fit within hexes.

Since chits are really Ti*k*Z `nodes` we can use anchors on the chit. Unlike for `\hex` where there are additional features available when using the dedicated macro, there really isn't much difference between `\chit` and `\node[chit=...]`.

3.1 Styling chits

Typical Ti*k*Z options can be passed to the `\chit` macro. For example, if you want to draw the chit with a red foreground, simply pass `draw=red` in the `[`⟨*optional*⟩`]` arguments to `\chits`. Individual parts of the hexes can be styled separately.

Important: To set the colours of the various elements,

one should use

`color=`⟨***foreground and text***⟩ Selects the foreground colour of lines, text, and so on, including for the NATO App6(C) symbol.

`fill=`⟨***background***⟩ Selects the background colour of the full chit. By default this is transparent.

`text=`⟨***text foreground***⟩ Selects the colour used for text in the chit. This overrides `color` for text.

`draw=`⟨***foreground***⟩ This sets the colour for foreground elements, excluding text.

Ti*k*Z allows one to pass a ⟨*colour*⟩ as arguments for drawing and understands that as giving the foreground and text colours. However, that key is *deprecated* for this library, as it does not properly propagate through[2].

The styles used by the `left`, `right`, `setup`, `factors`, and `symbol` elements are `tikz/chit/left`, `tikz/chit/right`, `tikz/setup`, `tikz/factors`, and `tikz/symbol` respectively. A user can redefine these to change the appearance of

[2]The colour `pgfstrokecolor` is not modified by that.

the chits. For example, one could make the symbol larger by setting a different `scale`, move the factors to the side by changing `shift`, and so on.

Pictures used by these elements are also styled by similar keys. For example, the picture `chit/identifier` is styled by `tikz/chit/identifier`.

A bevel (or "shadow-effect") can be added to chits using the key `bevel`, with a value that specifies where the light comes from (e.g., north west or NW). The percentage of the half width of a chit of the bevel can be specified by the key `bevel fraction` (default 10%). This can be used for both symbol or full chits.

In addition, one can define the key `tikz/every chit` to be the default options for all chits.

By default, the outer "frame" of a chit is drawn with the same graphics options as the chit it self (i.e., same fill and stroke colour). To change that, one can pass `frame={`⟨*options*⟩`}` as part of the chit options.

3.2 Defining preset chit types

One can conveniently pre-define some chit styles. For example, given the style definition

```
\tikzset{
  my chit/.style={/chit/symbol={[
      faction=friendly,
      command=land,
      main=armoured]},
    /chit/left={chit/identifier={Mine}},
    /chit/factors={chit/2 factors={2,4}}}}
```

We can use that to make different chits with some commonalities defined by that style. For example

where, in the second example, we have passed additional options to `\chit`. Note that we *must* give the full path to the `chit` keys when defining a style like this.

3.3 Kriegspiel chits

By passing the option `kriegspiel` to the `\chit` command or in a `chit` node, the shape of the chits will be changed from square to rectangular.

Important Not all NATO symbols have been adapted to facilitate that shape.

Here are some examples

These are produced by

```
\begin{tikzpicture}[
  chit/factor/.append style={font=\sffamily\bfseries\small},
```

```
 /chit/.cd,
 hex/.style={lower right={#1}},
 turn/.style={lower left={#1}}]
 \chit[symbol={main=infantry,echelon=corps,faction=friendly,command=land},
   factors={chit/2 factors={4,3}},
   parent={chit/small identifier={II}},
   unique={chit/small identifier={4}},
   turn={chit/small identifier={2}},
   hex={chit/small identifier={0120}},
   kriegspiel,
   color=black,
   fill=hostile](0,0);
\chit[symbol={
     main={[fill=pgfstrokecolor]artillery},%
     echelon=corps,faction=friendly,command=land},
   factors={chit/2 factors artillery={4,3,2}},
   parent={chit/small identifier={II}},
   unique={chit/small identifier={4}},
   turn={chit/small identifier={2}},
   hex={chit/small identifier={0120}},
   kriegspiel,
   color=black,
   fill=friendly,
   kriegspiel
 ](2.5,0);
 \chit[
    frame={black},
    symbol={
      main=reconnaissance, echelon=corps,command=land,faction=friendly,
      color=black,
      fill=hostile,
    },
    factors={chit/2 factors={4,3}},
    parent={chit/small identifier={II}},
    unique={chit/small identifier={4}},
    turn={chit/small identifier={2}},
    hex={chit/small identifier={0120}},
    color=white,
    fill=unknown!50!black,
    kriegspiel](5,0);
\chit[
    frame={black},
    symbol={
      main={reconnaissance artillery},
      echelon=corps,command=land,faction=friendly,fill=friendly,
    },
    factors={chit/2 factors artillery={4,3,2}},
    parent={chit/small identifier={II}},
    unique={chit/small identifier={4}},
    turn={chit/small identifier={2}},
    color=white,
    fill=neutral!50!black,
    kriegspiel](7.5,0);
```

```
\end{tikzpicture}
```

4 NATO App 6(c) symbols

The NATO markers are designed to fit within the template shown in Figure 12. The template is serves as a placement guide of the the various parts of the NATO marker as illustrated in Figure 13.

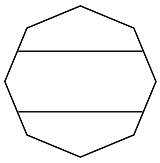


Figure 12: Template for NATO symbols

`\natoapp[`⟨*key-value-pairs*⟩`](`⟨*location*⟩`)(`⟨*name*⟩`)`

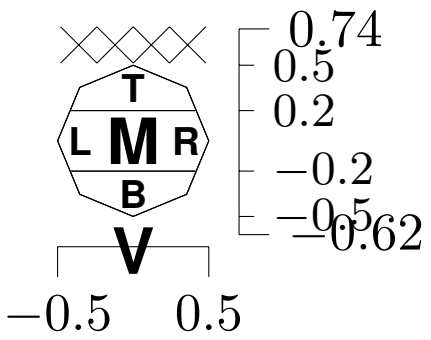
where all arguments are optional. Keys are defined to fill in the various parts of the markers. These keys are

`faction=`⟨***faction***⟩ Selects the faction used for the symbol. See also Section 4.1.

`command=`⟨***command***⟩ Selects the command used for the symbol. See also Section 4.1.

`main=`⟨***mains***⟩ Specifies the main symbol(s). This can be a comma separated list of specifiers (delimited by braces `{`⟨*first,second,...*⟩`}`), and each symbol can be preceeded by an optional argument to shift, scale, rotate, etc., the individual symbols. .

`left=`⟨***lefts***⟩, `right=`⟨***rights***⟩, `top=`⟨***tops***⟩, `bottom=`⟨***bottoms***⟩, `below=`⟨***belows***⟩ Specifies the left-, right-hand, top, bottom, and lower symbol(s). The format of the arguments ⟨*lefts*⟩, ⟨*rights*⟩, ⟨*tops*⟩, ⟨*bottoms*⟩, and ⟨*belows*⟩ has the same format as ⟨*mains*⟩.



The figure is typeset by

```
\natoapp[faction=none,
         command=base,
         echelon=army,
         main={text=M},
         top={text=T},
         bottom={text=B},
         left={text=L},
         right={text=R},
         below={text=V}]
```

Figure 13: Main keys of `\natoapp`. The bottom and right hand bars indicate one unit of length.

Other keys are available to further customise the appearance of the symbols

`echelon=`⟨***size***⟩ The size of the unit described. Possible values are `team`, `squad`, `section`, `platoon`, `company`, `battalion`, `regiment`, `brigade`, `division`, `corps`, `army`, `army group`, `theatre`, and `command`.

`frame=`⟨***keys***⟩ Extra keys for frame.

4.1 Faction and Command Selection

Table 9 shows the various bases used for the various *faction/command* combinations. Also shown in the table is the base template for main identifiers.

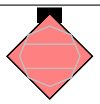
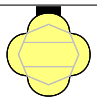
⟨*command*⟩	⟨*faction*⟩ `friendly`	`hostile`	`neutral`	`unknown`
`air`				
`land`				
`equipment`				
`installation`				
`sea surface`				
`sub surface`				
`space`				
`activity`				
`dismounted`				

Table 9: Frames for various combinations of ⟨*faction*⟩ and ⟨*command*⟩ combinations. These are drawn with the `pic` given by `natoapp6c/`⟨*faction*⟩`/`⟨*command*⟩ with the options `draw=blue,fill=`⟨*faction*⟩. If no `fill` is specified, then the background will be transparent. Note, the template for main identifiers is also shown on top of each frame.

The fill color of the frame is set by the key `frame`. If this is or contains the special value `faction`, then the frame fill colour will be the standard for the faction as illustrated in figure 14.

Elements of the frame can be controlled by the key `frame`.

`frame=`⟨***keys***⟩ Additional keys to pass to the frame drawing. The special option `faction` will make the frame be filled with the standard faction color.

Table 10 illustrates this.

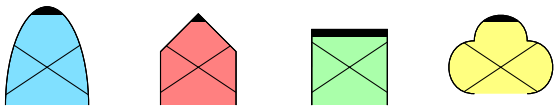


Figure 14: Illustration of using the special value `faction` for the `frame` key

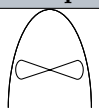
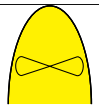
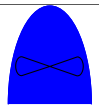
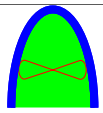
Example	`frame={color,...}`	`frame={fill,...}`	`frame={draw,...}`	`frame={line width,...}`
				
	red			thick
		yellow		thin
			blue	
		pink	magenta	
	red	green	blue	ultra thick

Table 10: Illustration of frame colour choices

4.2 Unit Size (`echelon`)

The size of a unit a marker represents is given by the `echelon` keyword. Table 11 shows the various markers and approximate unit sizes.

4.3 Unit type identification

See Table 12.

References

[1] Hanover,C., Hendrix,C.E., & Llewelyn,S., *First Blood*, 1997, https://grognard.com/fb/. See also implementation using this package at https://gitlab.com/wargames_tex/firstblood_tex.

[2] *NATO Joint Military Symbology*, APP-6(C), May 2011, https://en.wikipedia.org/wiki/NATO_Joint_Military_Symbology.

[3] *NATO Joint Military Symbology*, APP-6(D), October 2017, https://nso.nato.int/nso/nsdd/main/standards/ap-details/1912/EN

[4] milsymb package, https://www.ctan.org/pkg/MilSymb.

5 Implementation

5.1 The `wargame` package

First, package identification

```
\ProvidesPackage{wargame}
```

Then needed packages

```
\RequirePackage[svgnames]{xcolor}
\RequirePackage{tikz}
```

A switch to include terrain pictures (which take a lot of memory for some reason).

```
\@ifundefined{ifhex@terrain@pic}{%
  \newif\ifhex@terrain@pic
  \hex@terrain@picfalse}{}
```

Options

```
\DeclareOption{noterrainpic}{%
  \hex@terrain@picfalse}
\DeclareOption{terrainpic}{%
  \hex@terrain@pictrue}
\ProcessOptions\relax
```

Finally, the used Ti*k*Z libraries

```
\usetikzlibrary{wargame.hex,wargame.natoapp6c,wargame.chit}
```

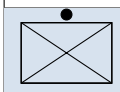
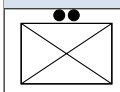
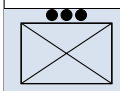
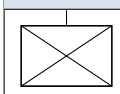
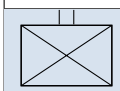
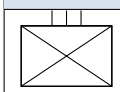
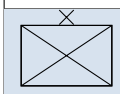
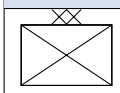
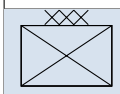
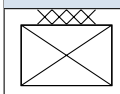
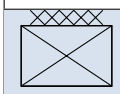
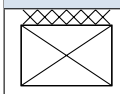
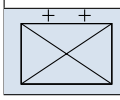
Example	echelon	Approx. size	Sub-units	Officer
	team	3–5	none	Corporal or Sergeant
	squad	5 10	1–2 teams	Sergeant
	section	7–13	2–3 teams	Sergeant
	platoon	25 40	Several squads/sections	Second Lieutenant
	company	60–250	Several platoons	Captain
	battalion	300 1 000	2–6 companies	Lieutenant colonel
	regiment	500–2 000	3–7 battalions	Colonel
	brigade	2 000 5 000	Several battalions	Colonel
	division	10 000–20 000	Several brigades/regiments	Major General
	corps	30 000 60 000	Several divisions	Lieutenant General
	army	100 000	Several corps (5–10 divisions)	General
	army group	120 000 500 000	Several armies	Field Marshal
	theatre	250 000+	Several army groups	Field Marshal
	command	Not a unit size, but designator		

Table 11: Illustration of echelon values. Approximate sizes and command officer titles are typical modern day United States of America army values and identifiers. Historically the unit sizes have changed, as has officer titles. Furthermore, both the unit sizes, names, and command officer titles may vary from country to country, even across command.

Symbol	Type & Abbreviation	
	Air assault	AA
	Air defence	ADA
	Airborne	AB
	Amphibious	AM
	Anti tank/armoured	AT
	Armoured	AR
	Chemical biological radiological nuclear	CB
	Combined arms	CAR
	Engineer	ENG
	Field artillery	FA
	Infantry	IN[3]
	Mechanised infantry	M
	Mountaineer	MTN
	Naval	N
	Reconnaissance	REC
	Special Operations Forces	SOF
Symbol	**Echelon & Abbreviation**	
	Army group	AG
	Army	A
	Corps	-
	Division	D[4]
	Brigade	BD
	Regiment	REGT
	Battalion	BN
	Company	COY
	Platoon	PLT
	Section	
	Squad	

Table 12: Some abbreviations of unit type identifications

5.2 The `wargame.util` Ti*k*Z library

This library contains some utilities for use in the other libraries.

5.2.1 Miscellaneous macros

`\wargamelogo`

This will produce the logo for this package.


```
\tikzset{
  wargame logo text/.style={
    font=\sffamily\bfseries\fontsize{12}{14}\selectfont,
    scale=2.8,
    inner sep=0,
    text width=1.8cm,
    transform shape,
    align=center},
  wargame logo text content/.store in=\wg@logo@text@content,
  wargame logo text content={{\huge\LaTeX} wargame},
  wargame logo chit/.style={
    chit={symbol={[
        faction=friendly,
        command=land,
        echelon=division,
        main=infantry]},
      factors={chit/2 factors={4,3}},
      left={chit/identifier=III},
      right={chit/small identifier={10\textsuperscript{th}}},
      color=white,
      fill=red!50!black
    }
  },
  wargame logo/.style={
    transform shape,
    every hex/.style={fill=gray!5!white,draw=gray!75!black},
    hex/first row is=0,
    hex/first column is=0,
```

```
    hex/short top columns=none,
    hex/short bottom columns=none,
    hex/row direction is=normal,
    hex/column direction is=normal
  }
}
\newcommand\wargamelogo[1][]{%
  \begin{scope}[wargame logo,#1]
    \node[hex={fill=gray!30!white}] (logo center)      at (hex cs:c=0,r=0) {};
    \node[hex={terrain=light woods}](logo light woods) at (hex cs:c=0,r=1) {};
    \node[hex={terrain=city}]       (logo city)        at (hex cs:c=0,r=-1){};
    \node[hex={terrain=woods}]      (logo woods)       at (hex cs:c=-1,r=0){};
    \node[hex={terrain=mountains}]  (logo mountains)   at (hex cs:c=-1,r=1){};
    \node[hex={terrain=beach}]      (logo beach)       at (hex cs:c=1,r=1) {};
    \node[hex={terrain=swamp}]      (logo swamp)       at (hex cs:c=1,r=0) {};
    \node[wargame logo chit]        (logo chit)        at (hex cs:)        {};
    \node[wargame logo text]        (logo text) {\wg@logo@text@content};
  \end{scope}}
```

\wg@dbg

Debugging support. The counter `\wargamedbglvl` sets the debug level. The package code then uses `\wg@dbg` to print out debugging messages. This macro takes two arguments — the first is the *least* debug level at which the message is printed, and the second is the message it self.

```
\newcount\wargamedbglvl\wargamedbglvl=0
\def\wg@dbg#1#2{%
  \ifnum#1>\wargamedbglvl\relax\else\message{^^J#2}\fi}
```

\wg@addto@macro

The macro `\wg@addto@macro{`⟨*macro*⟩`}{`⟨*other*⟩`}` adds the definition of the macro ⟨*other*⟩ to the macro ⟨*macro*⟩. This uses the `\toks` trick of storing the *tokens* of the definition of a ⟨*macro*⟩ and ⟨*other*⟩ into `@` and expanding that token into the definition of ⟨*macro*⟩. Effectively, this means that the top-level definition of ⟨*macro*⟩ and ⟨*other*⟩ are expanded (i.e., macros used in the definition of either macro is *not* expanded) and then that becomes the new definition of ⟨*macro*⟩.

We will use this macro to do *shallow* definitions of macros to contain keys and such.

```
\long\def\wg@addto@macro#1#2{%
  \begingroup
  \toks@\expandafter\expandafter\expandafter{\expandafter#1#2}%
  \xdef#1{\the\toks@}%
  \endgroup}
```

\wg@nchor

```
\def\wg@nchor#1#2{% shape name, anchor
  \wg@dbg{10}{Get `#2' in `#1'}%
  \expandafter\csname pgf@anchor@#1@#2\endcsname%
```

```
  \wg@dbg{10}{Got `\pgf@x',`\pgf@y'}
}
```

`\wg@sub@nchor`

Get anchor from sub node. We cannot use `\pgfpointanchor` since that returns the anchor coordinates in the global coordinate system.

```
\newif\ifwg@ignore@sub@nchor\wg@ignore@sub@nchorfalse%
\def\wg@sub@nchor#1#2{%
  \wg@dbg{10}{^^JGet `#2' in `#1'}%
  \@ifundefined{pgf@sh@ns@#1}{%
    \ifwg@ignore@sub@nchor%
      \wg@dbg{0}{WARNING: Shape `#1' not defined, anchor `#2' unknown}
    \fi
    \pgf@x=0cm\pgf@y=0cm}{%
    \pgf@process{%
      \csname pgf@sh@ma@#1\endcsname% MW
      \csname pgf@sh@np@#1\endcsname%
      \pgf@sh@reanchor{\csname pgf@sh@ns@#1\endcsname}{#2}}}%
  \wg@dbg{10}{-> \the\pgf@x,\the\pgf@y}%
}
```

Scratch dimensions

```
\newdimen\wg@tmpa
\newdimen\wg@tmpb
\newdimen\wg@tmpc
\newdimen\wg@tmpd
```

Macro to easy restore a saved path

```
\def\settosave#1{
  \pgfsyssoftpath@setcurrentpath{#1}}
```

5.2.2 Pictures in compound nodes

`\wg@pic`

The macro `\wg@pic` will render a `pic`. This is used by the `natoapp6cs`, `chit`, and `hex` node shapes extensively.

The arguments are

1. Prefix
2. Position
3. Fixed options
4. User options
5. Picture.

That is, the macro expects calls like

`\wg@pic[⟨options⟩]⟨picture⟩\@endwg@pic{⟨prefix⟩}{⟨position⟩}{⟨options⟩}`

Note the `\@endwg@pic` at the end of the call to swallow up ⟨*picture*⟩. Typically this macro is used as

`\edef\args{⟨something⟩} \expandafter\wg@pic\args\@endwg@pic{⟨prefix⟩}(⟨position⟩){⟨options⟩}`

where ⟨*something*⟩ typically expands to `[`⟨*user option*⟩`]`⟨*picture*⟩

First, the top-level macro `\wg@pic` that looks for user options.

```
\def\wg@pic{%
  \@ifnextchar[{\wg@@pic}{\wg@@pic[]}%]
}
```

This macro then forwards to `\wg@@pic` to gobble up ⟨*picture*⟩.

1. User options
2. Arguments

```
\def\wg@@pic[#1]#2\@endwg@pic{%
  \wg@dbg{2}{Options: `#1', picture: `#2'}%
  \wg@@@pic{#1}{#2}%
}
```

1. User options
2. Arguments
3. Prefix
4. Coordinates
5. Fixed options

```
\def\wg@@@pic#1#2#3#4#5{%
  \ifx|#2|\wg@dbg{3}{No picture given}%
  \else%
    \wg@dbg{3}{^^JWG Pic:
      ^^J  User options:  #1
      ^^J  Picture:       #2
      ^^J  Prefix:        #3
      ^^J  Coordinates:   #4
      ^^J  Fixed options: #5}%
    % \wg@dbg{2}{\string\pic[#5,#1] at (#4) {#3#2}}%
    \pic[#5,#1] at (#4) {#3#2};%
    \ifwg@s@ve%
      \pgf@relevantforpicturesizetrue%
      \begin{getbbl}%
        \pic[draw=none,fill=none,transform shape] at (#4) {#3#2};%
      \end{getbbl}%
      \wg@dbg{5}{Clipping to local bounding box}%
      \clip (L.south west) rectangle (L.north east);%
```

```
      \pgf@relevantforpicturesizefalse \global\wg@s@vefalse%
    \fi
  \fi%
  \wg@dbg{3}{End of WG Pic}
}
```

`\wg@pic@all`

This macro sets all pictures in a list.

1. List
2. Prefix
3. Position
4. Styles

```
\def\wg@pic@all#1#2#3#4{%
  \wg@dbg{2}{WG picture loop
    ^^J  List:    \meaning#1
    ^^J  Prefix:  `#2'
    ^^J  Position: `#3'
    ^^J  Styles:   `#4'}
  \foreach \p in #1{%
    \wg@dbg{2}{WG picture element: \meaning\p}%
    \expandafter\wg@pic\p\@endwg@pic {#2}{#3}{#4}%
  }%
}
```

5.2.3 Nodes in compound nodes

`\wg@node`

The macro `\wg@node` will render a `node`. This can be used by the `natoapp6cs`, `chit`, and `hex` node shapes.

The arguments are

1. Prefix
2. Position
3. Fixed options
4. User options
5. Body.

That is, the macro expects calls like

`\wg@node[`⟨*options*⟩`]`⟨*body*⟩`\@endwg@node{`⟨*prefix*⟩`}{`⟨*position*⟩`}{`⟨*options*⟩`}`

Note the `\@endwg@node` at the end of the call to swallow up ⟨*body*⟩. Typically this macro is used as

`\edef\args{`⟨*something*⟩`} \expandafter\wg@node\args\@endwg@node{`⟨*prefix*⟩`}(`⟨*position*⟩`){`⟨*options*⟩`}`

where ⟨*something*⟩ typically expands to `[`⟨*user option*⟩`]`⟨*body*⟩

First, the top-level macro `\wg@node` that looks for user options.

```
\def\wg@node{%
  \@ifnextchar[{\wg@@node}{\wg@@node[]}%]
}
```

This macro then forwards to `\wg@@node` to gobble up ⟨*body*⟩.

1. User options
2. Arguments

```
\def\wg@@node[#1]#2\@endwg@node{%
  \wg@dbg{2}{Options: `#1', body: `#2'}%
  \wg@@@node{#1}{#2}%
}
```

1. User options
2. Arguments
3. Prefix
4. Coordinates
5. Fixed options

```
\def\wg@@@node#1#2#3#4#5{%
  \ifx|#2|\wg@dbg{3}{No body given}%
  \else%
    \wg@dbg{3}{^^JWG Pic:
      ^^J  User options:  #1
      ^^J  Body:          #2
      ^^J  Prefix:        #3
      ^^J  Coordinates:   #4
      ^^J  Fixed options: #5}%
    % \wg@dbg{2}{\string\pic[#5,#1] at (#4) {#3#2}}%
    \node[#5,#1] at (#4) {#3#2};%
  \fi%
  \wg@dbg{3}{End of WG Node}
}
```

`\wg@node@all`

This macro sets all pictures in a list.

1. List
2. Prefix

3. Position

4. Styles

```
\def\wg@node@all#1#2#3#4{%
  \wg@dbg{2}{WG picture loop
    ^^J  List:    \meaning#1
    ^^J  Prefix:  `#2'
    ^^J  Position: `#3'
    ^^J  Styles:   `#4'}
  \foreach \p in #1{%
    \wg@dbg{2}{WG picture element: \meaning\p}%
    \expandafter\wg@node\p\@endwg@node {#2}{#3}{#4}%
  }%
}
```

5.2.4 Bounding boxes

Bounding box dimensions

```
\newdimen\wg@bb@minx
\newdimen\wg@bb@miny
\newdimen\wg@bb@maxx
\newdimen\wg@bb@maxy
```

Enable or disable bounding box tracking

```
\newif\ifwg@notrelevantforpathsize\wg@notrelevantforpathsizefalse
```

`wg@resetbb`

Reset the bounding box tracking dimensions

```
\def\wg@resetbb{%
  \global\wg@bb@minx=16000pt\relax%
  \global\wg@bb@miny=16000pt\relax%
  \global\wg@bb@maxx=-16000pt\relax%
  \global\wg@bb@maxy=-16000pt\relax%
}
```

`\old@pgf@protocolsize`

Save PGF's bounding box algorithm

```
\let\old@pgf@protocolsize\pgf@protocolsizes
```

`\wg@protocolsizes`

Our bounding box algorithm

```
\def\wg@protocolsizes#1#2{%
  \old@pgf@protocolsize{#1}{#2}
  \ifwg@notrelevantforpathsize\else%
  \ifdim#1<\wg@bb@minx\global\wg@bb@minx#1\fi%
  \ifdim#1>\wg@bb@maxx\global\wg@bb@maxx#1\fi%
  \ifdim#2<\wg@bb@miny\global\wg@bb@miny#2\fi%
  \ifdim#2>\wg@bb@maxy\global\wg@bb@maxy#2\fi%
  \fi
}
```

Environment that tracks the local bounding box

```
\newenvironment{getbbl}{%
  \wg@resetbb%
  \wg@notrelevantforpathsizefalse%
  \global\let\pgf@protocolsizes\wg@protocolsizes}{%
  \gdef\pgf@sh@ns@L{rectangle}
  \gdef\pgf@sh@np@L{%
    \def\southwest{\pgfqpoint{\the\wg@bb@minx}{\the\wg@bb@miny}}%
    \def\northeast{\pgfqpoint{\the\wg@bb@maxx}{\the\wg@bb@maxy}}%
  }
  \gdef\pgf@sh@nt@L{{1}{0}{0}{1}{0pt}{0pt}}
  \gdef\pgf@sh@pi@L{\pgfpictureid}
  \global\let\pgf@protocolsizes\old@pgf@protocolsize
}
```

Environment to track global bounding box

```
\newenvironment{getbb}{%
  \wg@resetbb%
  \wg@notrelevantforpathsizefalse%
  \global\let\pgf@protocolsizes\wg@protocolsizes}{%
  \gdef\pgf@sh@ns@M{rectangle}
  \gdef\pgf@sh@np@M{%
    \def\southwest{\pgfqpoint{\the\wg@bb@minx}{\the\wg@bb@miny}}%
    \def\northeast{\pgfqpoint{\the\wg@bb@maxx}{\the\wg@bb@maxy}}%
  }
  \gdef\pgf@sh@nt@M{{1}{0}{0}{1}{0pt}{0pt}}
  % \pgfgettransform\pgf@temp%
  % \xdef\pgf@sh@nt@M{\pgf@temp}
  % \pgfgettransformentries{\wg@tmp@a}{\wg@tmp@b}{\wg@tmp@c}{\wg@tmp@d}{\pgf@temp}{\pgf@temp}
  % \message{^^JTransform of M: \meaning\pgf@temp}
  % \xdef\pgf@sh@nt@M{{\wg@tmp@a}{\wg@tmp@b}{\wg@tmp@c}{\wg@tmp@d}{0pt}{0pt}}%
  % \message{^^JTransform of M: \meaning\pgf@sh@nt@M}
  \gdef\pgf@sh@pi@M{\pgfpictureid}
  \global\let\pgf@protocolsizes\old@pgf@protocolsize
}
```

5.2.5 Some utilities to get bounding boxes and the like

All coordinates, and such are recorded in centimetres. It is worth remembering that the Tikz coordinate system has the y axis point upward, while typical image software has the y axis point down. `pdftocairo` typically assumes a 150 PPI (pixels-per-inch) resolution.

That means that scaling factor becomes

$$\frac{150\text{pixel}}{2.54\text{cm}} = 59.055\frac{\text{pixel}}{\text{cm}}$$

Since we want to write all dimensions in centimetres, we need to be able to convert `pt` dimensions to centimetres. We make two macros to do that for us.

The exact definition of 1pt is

$$1\,\text{pt} = \frac{249}{250}12\text{”}\frac{1}{864} = \frac{83}{6000}1\text{”} = 0.035136\overline{6}$$

```
% 2.54 / 72.27 = .03514598035145980351
% \def\wg@pt@to@cm#1{\pgfmathparse{#1 * 0.0351460}}
\def\wg@pt@to@cm#1{\pgfmathparse{#1 * 0.0351367}}
\def\ptpoint@to@cm#1#2{%
  \wg@pt@to@cm{#1}\edef\x{\pgfmathresult}%
  \wg@pt@to@cm{#2}\edef\y{\pgfmathresult}}
```

The next macro gets an anchors coordinates and stores them (in units of centimetres) in `\tmp@x` and `\tmp@y`

```
\def\wg@get@nchor#1#2{%
  \wg@dbg{2}{Get anchor coordinates #1.#2}
  \pgfpointanchor{#1}{#2}%
  \wg@dbg{2}{ `\the\pgf@x',`\the\pgf@y'}
  \pgfgetlastxy\tmp@x\tmp@y%
  \wg@dbg{2}{ `\tmp@x',`\tmp@y'}
  \wg@pt@to@cm{\tmp@x}\edef\tmp@x{\pgfmathresult}
  \wg@pt@to@cm{\tmp@y}\edef\tmp@y{\pgfmathresult}
}
```

This does the same as above, but transform to the global coordinate system.

```
\def\wg@get@global@nchor#1#2{%
  \pgfpointanchor{#1}{#2}%
  \pgfgetlastxy\tmp@x\tmp@y%
  \pgfpointtransformed{\pgfpoint{\tmp@x}{\tmp@y}}
  \pgf@xa=\pgf@x
  \pgf@ya=\pgf@y
  %% \message{^^JAnchor #1.#2 @ (\the\pgf@xa,\the\pgf@ya)}
  \wg@pt@to@cm{\the\pgf@xa}\edef\tmp@x{\pgfmathresult}
  \wg@pt@to@cm{\the\pgf@ya}\edef\tmp@y{\pgfmathresult}
}
```

This records the bounding box given by a named node. The result is stored in the macros `\llx`, `\lly`, `\urx`, and `\ury`.

```
\def\wg@get@bb#1{%
  \wg@get@nchor{#1}{south west}
  \edef\llx{\tmp@x}
  \edef\lly{\tmp@y}
  \wg@get@nchor{#1}{north east}
  \edef\urx{\tmp@x}
  \edef\ury{\tmp@y}
}
```

```
\def\wglogbb#1{%
  \wg@get@bb{#1}%
  \message{^^J‘#1’ BB: (\llx,\lly) x (\urx,\ury)^^J}}
```

5.2.6 Other Tikz utilities

`tikz/reverseclip`

A reverse clipping path. This is used to cut out stuff outside of path defined.

```
\tikzstyle{reverseclip}=[insert path={(current bounding box.north east) --
  (current bounding box.south east) --
  (current bounding box.south west) --
  (current bounding box.north west) --
  (current bounding box.north east)}]
```

`tikz/clip even odd rule`

A reverse clipping path

```
\tikzset{
  clip even odd rule/.code={\pgfseteorule}, % Credit to Andrew Stacey
}
```

`tikz/invclip`

Inverse clipping. This should be an option *after* the path to do the inverse clipping by. This works by adding a *large* (page) path to the current path, and then use that as clipping.

```
\tikzset{
  invclip/.style={
    clip,insert path=
    [clip even odd rule]{
      [reset cm](-\maxdimen,-\maxdimen)rectangle(\maxdimen,\maxdimen)
    }
  },
}
```

`save clip`

An option for use with sub-elements of NATO App 6(c) or chit nodes. This will save the current path as a clipping path for the next paths to be drawn in the sub-element

```
\newif\ifwg@s@ve\wg@s@vefalse
\tikzset{
  save clip/.is choice,
  save clip/true/.code={\global\wg@s@vetrue},
  save clip/false/.code={\global\wg@s@vefalse},
  save clip/.default={true},
```

```
  save clip/.initial={false},
}
```

scale line widths

Scales any line width specified in the node options.

Use like

```
\tikzset{
  some/.style={
    scale line widths,
    line width=1pt}
}
```

Note that the order is important.

```
%      Save pgf rounded corners macro
%      \let\wg@pgfsetcornersarced\pgfsetcornersarced
\def\wg@setcornersarched#1{%
  \def\arg{#1}%
  \let\isarched\relax%   Cannot set \ifpgf@arccorners directly inside
                     %   other \if
  \ifx\arg\@empty\else%
    \edef\pgf@corner@arc{{#1}{#1}}%
    \let\isarched\pgf@arccornerstrue%
    \ifdim#1=0pt%
      \let\isarched\pgf@arccornersfalse%
    \fi%
  \fi%
  \isarched}
\newdimen\wg@lw@scaled\wg@lw@scaled=1pt
\def\wg@getscale{%
  \pgfgettransformentries{%
    \wg@jaca}{%
    \wg@jacb}{%
    \wg@jacc}{%
    \wg@jacd}{%
    \wg@tmp}{%
    \wg@tmp}%
  \pgfmathsetmacro{\wg@jac}{sqrt(abs(\wg@jaca*\wg@jacd-\wg@jacb*\wg@jacc))}%
  \wg@dbg{4}{Scale is \wg@jac}
  \xdef\wg@scale{\wg@jac}}
\def\wg@scaled#1{%
  \wg@getscale%
  \wg@dbg{4}{Scaling #1 by \wg@scale}
  \pgfmathsetmacro{\wg@tmp}{\wg@scale*#1}%
  \xdef\wg@tmp{\wg@tmp}%
  \xdef\wg@lw@scale{\wg@tmp}%
  \wg@dbg{4}{Scaled #1 -> \wg@tmp}}
%% \message{^^JRounded corners: \meaning\pgfsetcornersarced}
\tikzset{
```

```
  %% Get current scale and store in \wg@scale
  get scale/.code={\wg@getscale},
  scale line widths/.style={%
    /utils/exec=\def\tikz@semiaddlinewidth##1{%
      \wg@scaled{##1}
      \wg@lw@scaled=\wg@tmp pt
      \tikz@addoption{\pgfsetlinewidth{\wg@lw@scaled}}%
      \wg@dbg{4}{Added scaled option \wg@tmp}
      \pgfmathsetlength\pgflinewidth{\wg@tmp pt}
      \wg@dbg{4}{Did set line width \wg@tmp pt}
    }
  },
  scale rounded corners/.style={%
    /utils/exec=\def\pgfsetcornersarced##1{%
      \pgf@process{##1}%
      \pgf@xa=\pgf@x%
      \wg@scaled{\the\pgf@xa}%
      % \tikz@addoption{\wg@setcornersarched{\wg@tmp pt}}%
      \wg@dbg{4}{Scaled rounded corners: \the\pgf@xa -> \wg@tmp}%
      \wg@setcornersarched{\wg@tmp pt}%
    }
  },
  relative line width/.style={%
    /utils/exec=\def\tikz@semiaddlinewidth##1{%
      \wg@dbg{4}{Relative line width #1 times ##1}%
      \pgfmathsetmacro{\wg@lv}{#1*##1}%
      \tikz@addoption{\pgfsetlinewidth{\wg@lw pt}}%
      \pgfmathsetlength\pgflinewidth{\wg@lw pt}}}
}
```

sub pic actions

This is key that propagates actions to sub pictures of pictures. The normal `pic actions` cannot be used as it causes an infinite loop.

```
\tikzset{
  sub pic actions/.code={%
    \tikz@picmode%
    \edef\opts{%
      \iftikz@mode@draw draw,\else draw=none,\fi
      \iftikz@mode@fill fill\else fill=none\fi}
    \wg@dbg{5}{^^JSub Mode: \meaning\tikz@picmode  \meaning\opts}
    \pgfset{/tikz/.cd}
    \pgfkeysalsofrom{\opts}
  }}
```

wg/debug show

Show debugging information

```
\tikzset{
```

```
  wg/debug show/.code={%
    \extractcolorspec{pgfstrokecolor}{\wg@tmp@fg}
    \def\wg@tmp@bg{none}
    \@ifundefinedcolor{pgffillcolor}{}{
      \extractcolorspec{pgffillcolor}{\wg@tmp@bg}}
    \begingroup
    \tikz@mode
    \wargamedbglvl=#1
    \wg@dbg{3}{Drawing with w/stroke `\wg@tmp@fg'
      (\tikz@strokecolor,\iftikz@mode@draw\else not\space\fi drawing)
      and fill `\wg@tmp@bg' (\tikz@fillcolor,\iftikz@mode@fill\else
      not\space\fi  filling)}
    \endgroup
  }
}
```

5.2.7 Random IDs

This macro sets the macro `\wg@uuid` to some random hex number.

```
\def\wg@r@ndom@id{%
  \def\wg@uuid{}
  \foreach \i in {1,...,8}{%
    \pgfmathparse{Hex(random(0,15))}
    \xdef\wg@uuid{\wg@uuid\pgfmathresult}}}
```

5.2.8 VASSAL icons

Some icons that may be useful in VASSAL. We put them here so they may be used in manuals and the like too. First, the line style

```
\tikzset{
  trash can line/.style={scale line widths,scale rounded corners,
    line width=.5mm,->},
}
```

Then, the body and lid of a trash can.

```
\tikzset{
  trash can body/.pic={%
    \path[fill=black,scale line widths,scale rounded corners,
    rounded corners=.05cm]
    (-.3,.2) --++(.6,0) --++(-.1,-.7) --++(-.4,0) --cycle;
    \path[fill=white]
    (-.025,-.4) arc(180:360:.025) --++(   0,.5) arc(0:180:.025)   --cycle;
    \path[fill=white]
    (-.125,-.4) arc(180:360:.025) --++(-.07,.5) arc(0:180:.025) --cycle;
    \path[fill=white]
    ( .075,-.4) arc(180:360:.025) --++( .07,.5) arc(0:180:.025) --cycle;
  },
  trash can lid/.pic={%
    \path[fill=black,scale line widths,scale rounded corners,
```

```
    rounded corners=.05cm]
    (-.35,.23)--++(.7,0)--++(-.07,.07)--++(-.56,0)--cycle;
    \path[fill=black]
    (-.15,.3) --++(.05,0) --++(0,.05) --++(.2,0) --++(0,-.05)
    --++(.05,0) --++(0,.05) arc(0:90:.05) --++(-.2,0) arc(90:180:.05)
    --cycle;
  },
}
```

Then, a closed and open trash can

```
\tikzset{
  trash can/.pic={
    \pic{trash can body};
    \pic{trash can lid};
  },
  trash can open/.pic={
    \pic{trash can body};
    \pic[rotate=-30] at (0,.1) {trash can lid};
  },
}
```

Now we can use that to generate some useful icons.

```
\tikzset{
  eliminate icon/.pic={
    \pic{trash can open};
    \draw[trash can line,color=red!50!black]
    (-.5,.2) to[looseness=1.5] (-.1,.23);
  },
  restore icon/.pic={
    \pic{trash can open};
    \draw[trash can line,<-,color=green!50!black]
    (-.5,.2) to[looseness=1.5] (-.1,.23);
  },
  pool icon/.pic={
    \pic{trash can};
  },
}
```

These icons does not use the trash can picture.

```
\tikzset{
  flip icon/.pic={
    \draw[scale line widths,scale rounded corners,
    line width=1mm,->,color=blue!50!black]
    (-.5,-.5) arc(180:0:.5);% (.5,-.5);
  },
  pics/oob icon/.style n args={2}{code={%
      \begin{scope}[box/.style args={##1,##2,##3,##4}{
          minimum width=##1cm,
          minimum height=##2cm,
          fill=##3,
          anchor=##4,
```

```
          draw=gray!50!black,
          scale line widths,
          line width=.5pt,
          transform shape},
        under/.style={
          below=.05cm of ##1}
        ]
        \node[box={.5,.2,#1,north west,fill=#1}] (r1) at (.05,.45) {};
        \node[under=r1.south west,box={.3,.25,#1,north west}] (r2) {};
        \node[under=r2.south west,box={.2,.3, #1,north west}] (r3) {};
        \node[box={.2,.4,#2,north east}] (l1) at (-.05,.45) {};
      \end{scope}
    }
  }
}
```

5.3 The wgexport class

This document class is used for exporting game component to be used in a VASSAL module libraries.

Class identification and load `wargame` package

```
\ProvidesClass{wgexport}
\PassOptionsToClass{multi=tikzpicture,varwidth=false}{standalone}
\DeclareOption{noterrainpic}{%
  \PassOptionsToPackage{\CurrentOption}{wargame}}
\DeclareOption{terrainpic}{%
  \PassOptionsToPackage{\CurrentOption}{wargame}}
\DeclareOption*{%
  \PassOptionsToClass{\CurrentOption}{standalone}}
\ProcessOptions\relax
\LoadClass{standalone}
\RequirePackage{wargame}
```

We need a few utilities before we get to the actual environment. First, we need a tools to write out literal left and right curly braces. We do a bit of catcode hackery to accomplish that.

```
\begingroup
\catcode`\^^I=12
\def\@tabchar{^^I}
\catcode`<=1 \catcode`>=2
\catcode`{=12 \catcode`}=12
\gdef\@lbchar<{>
\gdef\@rbchar<}>
\endgroup
```

Above, we temporarily set the tab, and left and right curly brace characters to be regular letters (12), and the catcodes of less than and greater than to be those of left and right curly braces respectively. We then define the macros `\@tabchar`, `\@lbchar`, and `\@rbchar` to produce literal characters. LaTeXalready has `\@percentchar`.

Everything we do should go inside this environment. The single optional argument is the file name stem of the output JSON file.

```
\newenvironment{imagelist}[1][\jobname]{%
```

```
  \newwrite\mk@out%
  \def\mk@i{}%
  \def\mk@w{\immediate\write\mk@out}%
  \immediate\openout\mk@out=#1.json
  \mk@w{[}
}{
  \mk@w{\mk@i \@lbchar "name":"End of list", "category": "<<eol>>",
      "subcategory": "" \@rbchar }
  \mk@w{]}
  \immediate\closeout\mk@out
}
```

Preceed all images (tikzpicture) with this command

First argument is the name of the image. This can be anything. Note that for counters, if the name ends in `flipped` then it is considered the backside of a counter.

Second argument is the type of image. Recognised types are

- `board` for boards
- `oob` for OOBs
- `chart` for charts
- `counter` for counters
- `front` for front page

Other types can be used, and the images will be exported, but the Python script pays no particular attention to those then. Use for example to prepare images for help or the like.

The third argument is the sub type. This is most relevant for the counters. Sub types can be anything, but since the counters will receive different prototypes based on the sub type, it makes sense to divide into sub types a la

- factions
- common markers

The faction sub types should just be the name of the faction. E.g., Allies, Axis, Soviet, NATO, Warsaw Pact. Spaces should not matter.

For common markers, there are a few names that are recognised specifically by the Python script. These are

- `common`
- `all`
- `marker`
- `markers`

Counters that has these sub-types will no be considered to belong to any faction.

Note that the Python script uses the faction names to guess the players of the game, and uses them in several places.

```
\def\info{%
  \@ifstar{\@@info{,}}{\@@info{\@rbchar,}}}
\def\@@info#1#2#3#4{%
  \chit@dbg{2}{Making image `#2' of type `#3'/`#4' on page \thepage}%
  \mk@w{ \@lbchar}%
  \mk@w{ \space "name": "#2",}%
  \mk@w{ \space "category": "#3",}%
  \mk@w{ \space "subcategory": "#4", }%
  \mk@w{ \space "number": \thepage #1}%
  \let\oldmk@i\mk@i%
  \ifx#1,\relax\edef\mk@i{\mk@i\space\space}\fi}
\def\endinfo{%
  \let\mk@i\oldmk@i%
  \mk@w{ \space \@rbchar,}}
```

Make separate images for each counter (single sided).

First optional argument is the group to put the chits into. Second optional argument is options to give to each Tikz picture environment. Third, mandatory, argument is the list of chit identifiers to render.

```
\def\wg@add@drop@margin{%
  \@ifundefined{wg@drop@margin}{}{
    \dimen0=\wg@drop@margin
    % \ifwg@chit@drop
    \ifdim\dimen0>0pt%
      \path ($(current bounding box.north east)+(45:\wg@drop@margin)$)
      -- ($(current bounding box.south west)+(225:\wg@drop@margin)$);
    \fi}}
\def\chitimages{%
  \@ifnextchar[{\@chitimages}{\chitimages[]}%]
}%
\def\@chitimages[#1]{%
  \@ifnextchar[{\@@chitimages[#1]}{\@@chitimages[#1][]}%]
}%
\def\@@chitimages[#1][#2]#3{%
  \begingroup%
  \let\chit@report\do@chit@report%
  \let\natoapp@report\do@natoapp@report%
  \chit@dbg{2}{chits to make images of `#3'}%
  \foreach[count=\ti from 0] \t/\x in #3{%
    \chit@dbg{2}{^^JRow: `\t' (`\x')}
    \ifx\t\empty\else% Ignore empty rows
      \chit@dbg{5}{^^JSubcategory: `\x' (default `#1')}
      % Take sub-category or default
      \ifx\t\x\def\x{#1}\else\ifx\x\empty\def\x{#1}\fi\fi
      \foreach \u/\m in \t{%
        \ifx\u\empty\else% Ignore empty cells
          \ifx\u\chit@blank\else%
            \ifx\u\chit@oob@vspacer\else%
              \ifx\u\chit@oob@spacer\else%
                \chit@dbg{2}{Next chit `\u' with possible multiplicity
                  `\m'}%
                \chit@dbg{1}{Next chit `\u' not `\chit@blank',
                  `\chit@oob@vspacer', `\chit@oob@spacer'}
```

```
                \ifx\m\@empty\def\m{1}\fi% If no multiplicity defined
                \ifx\u\m\def\m{1}\fi% If the same as unit
                \chit@dbg{2}{Next chit `\u' multiplicity `\m'}%
                %% We only make one copy of the chit, since we can duplicate
                %% it in VASSAL
                \begin{info}*{\u}{counter}{\x}
                  \nopagecolor%
                  \gdef\wg@drop@margin{0pt}%
                  \begin{tikzpicture}[chit has drop=false,#2]
                    \chit[\u=\ti]%
                    \wg@add@drop@margin%
                  \end{tikzpicture}
                \end{info}%
                %% \foreach \n in {1,...,\m}{% Make a number of copies
                %% \ifx\u\chit@blank%
                %%   \chit@dbg{3}{Ignoring blank chit:\u}%
                %% \else%
                %%   \info{\u}{counter}{#2}
                %%   \begin{tikzpicture}
                %%     \chit[\u=\ti](\c,\r)%
                %%   \end{tikzpicture}
                %% \fi%
                %% }%
              \fi%
            \fi%
          \fi%
        \fi%
      }%
      \chit@dbg{2}{End of inner loop}%
    \fi%
  }%
  \chit@dbg{2}{End of outer loop}%
  \endgroup%
}
```

Make separate images for each counter (double sided). The back-side counters must be defined by append ` flipped' the front face name.

First optional argument is the group to put the chits into. Second optional argument is options to give to each Tikz picture environment. Third, mandatory, argument is the list of chit identifiers to render.

```
\def\doublechitimages{%
  \@ifnextchar[{\@doublechitimages}{\doublechitimages[]}%]
}%
\def\@doublechitimages[#1]{%
  \@ifnextchar[{\@@doublechitimages[#1]}{\@@doublechitimages[#1][]}%]
}%
\def\@@doublechitimages[#1][#2]#3{%
  \begingroup%
  \let\chit@report\do@chit@report%
  \let\natoapp@report\do@natoapp@report%
  \foreach[count=\ti from 0] \t/\x in #3{%
    \ifx\t\empty\else% Ignore empty rows
      \chit@dbg{5}{^^JSubcategory: `\x' (default `#1')}
```

```
      % Take sub-category or default
      \ifx\t\x\def\x{#1}\else\ifx\x\empty\def\x{#1}\fi\fi
      \foreach \u/\m in \t{%
        \ifx\u\empty\else% Ignore empty cells
          \ifx\u\chit@blank\else%
            \ifx\u\chit@oob@vspacer\else%
              \ifx\u\chit@oob@spacer\else%
                \chit@dbg{2}{Next chit `\u' with possible multiplicity `\m'}%
                \ifx\m\@empty\def\m{1}\fi% If not multiplicity defined
                \ifx\u\m\def\m{1}\fi% If the same as unit
                \chit@dbg{2}{Next chit `\u' multiplicity `\m'}%
                %% Flipped chit
                \edef\s{\u\space flipped}%
                %% We only make one copy of the chit, since we can duplicate
                %% it in VASSAL
                \begin{info}*{\u}{counter}{\x}%
                  \nopagecolor%
                  \gdef\wg@drop@margin{0pt}%
                  \begin{tikzpicture}[chit has drop=false,#2]%
                    \chit[\u=\ti]%
                    \wg@add@drop@margin%
                  \end{tikzpicture}%
                \end{info}%
                \begin{info}*{\s}{counter}{\x}%
                  \nopagecolor%
                  \begin{tikzpicture}[chit has drop=false,#2]%
                    \chit[\s=\ti]%
                    \wg@add@drop@margin%
                  \end{tikzpicture}%
                \end{info}%
                %% \foreach \n in {1,...,\m}{% Make a number of copies
                %% \ifx\u\chit@blank%
                %%   \chit@dbg{3}{Ignoring blank chit:\u}%
                %% \else%
                %%   \info{\u}{counter}{#2}
                %%   \begin{tikzpicture}
                %%     \chit[\u=\ti](\c,\r)%
                %%   \end{tikzpicture}
                %% \fi%
                %% }%
              \fi%
            \fi%
          \fi%
        \fi%
      }%
    \fi%
  }%
  \endgroup%
}
```

Special for boards, we have the environment boardimage. Like `\info` we must specify the name and sub-category of the board, but the category is assumed to be `board` (though the optional argument can specify a different category). Within this environment some specific styles are defined that allows the user to specify VASSAL zones on the board.

For this to work properly, the parent tikzpicture *must* have the style `zoned`. This style will record the bounding box of the picture which we will need to calculate VASSAL coordinates later on.

Other styles are `zone scope`, to be applied to `scope`s in the picture, and `zone path` to be applied to `path`s (or `\draw`, `\fill`, or the like) in the picture. These will record coordinates of these elements in side the picture. The Python script will then define VASSAL zones based on these coordinates.

For `zone scope` applied to a `scope`, what is recorded are

- The current coordinate transformation matrix
- The current translation
- The bounding box, within the current transformation and translation.

To define a zone in the board, simply enclose it in a

```
\begin{scope}[zone scope=name]
  ...
\end{scope}
```

The ⟨*name*⟩ will be the name of the scope. If this contains the sub-string `hex` (upper, lower, or mixed case), then the zone will get a hex grid with numbering attached to it.

If the ⟨*name*⟩ contains the sub-string `turn` (any case), then it is assumed to be a turn track and a rectangular grid will be attached. The column and row separator will be set to `T`, so that it won't collide with the main zone. Similar if ⟨*name*⟩ contains `oob`, except the separator is set to `O`.

If ⟨*name*⟩ contains the sub-string `pool`, then it is assumed to be a pool of counters, and *no* grid is attached.

For `zone path` applied to a `path`, what is recorded is the path coordinates (as straight line segments) in the global coordinate system.

Both styles take one argument — the name of the zone. If that name contains the sub-string `hex` anywhere in the name, then the zone is assumed to contain a hex grid. Otherwise, a rectangular grid (of fixed size) will be applied to it.

The environment `boardimage` also records the coordinate options currently in use (keys `hex/first row is`, `hex/row direction is`, and so on), as well as the current label option (as defined by `every hex` or `every hex node`).

The information extracted is written to the `\jobname.json` file as a sub-object (with name given by the first optional argument) of the image object. In that way, we can later on easily get the information from our catalogue of images.

Note, the styles `zoned`, `zone scope`, and `zone path` are defined in `wargame` to be dummies so that one can have them in the definition of the board without impact.

```
\def\mk@transform{%
  \pgfgettransformentries{\mxx}{\mxy}{\myx}{\myy}{\ptdx}{\ptdy}
  \wg@pt@to@cm{\ptdx}\edef\dx{\pgfmathresult}
  \wg@pt@to@cm{\ptdy}\edef\dy{\pgfmathresult}
  \mk@w{ \mk@i "xx": \mxx,}
  \mk@w{ \mk@i "xy": \mxy,}
  \mk@w{ \mk@i "yx": \myx,}
  \mk@w{ \mk@i "yy": \myy,}
  \mk@w{ \mk@i "dx": \dx,}
  \mk@w{ \mk@i "dy": \dy,}
}
```

```
\def\mk@bb#1{%
  \wg@get@bb{#1}
  \mk@w{ \mk@i "lower left":  [\llx,\lly],}
  \mk@w{ \mk@i "upper right": [\urx,\ury],}
  \begingroup
   \wg@get@global@nchor{#1}{south west}
   \mk@w{ \mk@i "global lower left":  [\tmp@x,\tmp@y],}
   \wg@get@global@nchor{#1}{north east}
   \mk@w{ \mk@i "global upper right": [\tmp@x,\tmp@y]}
 \endgroup
}
\def\mk@pos#1(#2){%
  \wg@dbg{10}{^^JMarking `#2' with `#1' - start}
  \coordinate[transform shape] (tmp) at (#2) {};
  \wg@get@nchor{tmp}{center}
  \wg@dbg{3}{^^JMarking `#2' with `#1' - `\tmp@x',\tmp@y'}
  \tikzset{zone point={#1}{\tmp@x}{\tmp@y}}
}
```

For the key `zone path` to work, we need to be able to record the path as it moves along. To that end, we make a custom decoration that will do that for us, and, once the path is finished, write the path to our JSON file.

```
\pgfdeclaredecoration{record path construction}{initial}{%
  \state{initial}[width=0pt,next state=more]{
    \begingroup
      \pgf@decorate@inputsegment@first
      \ptpoint@to@cm{\the\pgf@x}{\the\pgf@y}
      \xdef\wg@path{[\x,\y]}
    \endgroup
  }%
  \state{more}[width=\pgfdecoratedinputsegmentremainingdistance]{%
    \begingroup
      \pgf@decorate@inputsegment@last
      \ptpoint@to@cm{\the\pgf@x}{\the\pgf@y}
      \xdef\wg@path{\wg@path,[\x,\y]}
    \endgroup
  }
  \state{final}{%
    \begingroup
      \pgf@decorate@inputsegment@last
      \ptpoint@to@cm{\the\pgf@x}{\the\pgf@y}
      \xdef\wg@path{\wg@path,[\x,\y]}
    \endgroup
    \mk@w{ \mk@i "zone path \wg@record@path@name": \@lbchar}
    \mk@w{ \mk@i\space "path": [\wg@path] \@rbchar,}
  }
}%
```

Now we can make our environment

The first thing we do is to use the `\info` macro to mark the image. Then we open our JSON file. We make a short-hand macro for writing to that file. The macro `\bd@i` records the current indention (which is important in JSON)

```
\newenvironment{boardimage}[3][board]{%
  \def\bd@n{#2}
  \newcount\mk@point
  \mk@point=0
  \let\oomk@i\mk@i%
  \let\markpos\mk@pos%
```

Then, to extract the label option, we make a dummy `node` with the styles `every hex` and `every hex node`, so we can extract that option.

```
  \info{dummy}{<<dummy>>}{}%
  %\tikz{}%
  \tikz{\scoped[%
    every hex/.try,every hex node/.try,
    ]{%
      \def\hex@col{0}%
      \def\hex@row{0}%
      \node[hex,inner sep=0,outer sep=0]{%
        %\message{^^JHex label: `\meaning\hex@label'}%
        \global\let\mk@label\hex@label}}%
```

The next thing we do is to make an object. The first things we put in are the units used ("cm"), and the grid options.

```
  \info*{#2}{#1}{#3}%
  \mk@w{ \mk@i "zones": \@lbchar}%
  \edef\mk@i{\mk@i\space}
  %% Everything is made into centimeters
  \mk@w{ \mk@i "units": "cm",}
  \hex@dbg{3}{Label: `\meaning\mk@label'}
  \@ifundefined{mk@label}{}{\mk@w{ \mk@i "labels": "\mk@label",}}
  %% Write out coordinate options as "coords" object
  \mk@w{ \mk@i"coords": \@lbchar}%
  \mk@w{ \mk@i "row": \@lbchar}%
  \mk@w{ \mk@i\space "offset": \hex@coords@row@off,}%
  \mk@w{ \mk@i\space "factor": \hex@coords@row@fac \@rbchar,}%
  \mk@w{ \mk@i "column": \@lbchar}%
  \mk@w{ \mk@i\space "offset": \hex@coords@col@off,}%
  \mk@w{ \mk@i\space "factor": \hex@coords@col@fac,}%
  \mk@w{ \mk@i\space "top short": "\hex@top@short@col",}%
  \mk@w{ \mk@i\space "bottom short": "\hex@bot@short@col" \@rbchar}%
  \mk@w{ \mk@i\@rbchar,}%
```

We then monkey-patch `\boardframe` to also output coordinates to our JSON file. Note that this will probably be embedded in a different object.

```
  %%
  \let\oldbo@rdframe\bo@rdframe%
  \def\bo@rdframe[##1](##2)(##3){%
    \oldbo@rdframe[##1](##2)(##3)%
    \mk@w{ \mk@i"board frame": \@lbchar}
    \mk@w{ \mk@i\space "lower left": [\llx,\lly],}
    \mk@w{ \mk@i\space "upper right": [\urx,\ury],}
    \mk@w{ \mk@i\space "margin": \margin,}
    \mk@w{ \mk@i\space "width": \w,}
    \mk@w{ \mk@i\space "height": \h \@rbchar,}}%
```

Next, we make the style `zoned` to be applied to the `tikzpicture` environment. This records the bounding box of the full picture.

```
\tikzset{
  zoned/.code={% Apply to whole picture
    \pgfkeys{%
      % This needs to be done in the picture!
      /tikz/execute at end picture={%
        \mk@w{ \mk@i "zoned": \@lbchar}
        \mk@transform%
        \mk@bb{current bounding box}
        \mk@w{ \mk@i \@rbchar,}
      }
    }
  },
```

The next style is the `zone scope`. At the start of the scope we record the current transformation matrix. Then we install a handler to extract the bounding box at the end of the scope. Note that we increase indention here.

```
  zone scope/.code={%
    \mk@w{ \mk@i"zone scope ##1": \@lbchar}
    \let\omk@i\mk@i
    \edef\mk@i{\mk@i\space}
    \mk@transform%
    %\bd@w{ \@rbchar,}
    \gdef\wg@export@box{##1}%
    \pgfkeys{%
      /tikz/local bounding box=wg export box,
      /tikz/execute at end scope={
        \mk@bb{wg export box}
        \let\mk@i\omk@i
        \mk@w{ \mk@i\@rbchar,}},
    } % pgfkeys
  }, % zone scope
```

The next style gets the global coordinates of the current (0,0) point - f.ex. in a node - and outputs that

```
  zone point/.code n args={3}{
    \pgf@xa=##2 cm
    \pgf@ya=##3 cm
    \pgfpointtransformed{\pgfpoint{\pgf@xa}{\pgf@ya}}
    % \pgfpointtransformed{\pgfpoint{0pt}{0pt}}
    \pgf@xa=\pgf@x
    \pgf@ya=\pgf@y
    \wg@pt@to@cm{\the\pgf@xa}\edef\px{\pgfmathresult}
    \wg@pt@to@cm{\the\pgf@ya}\edef\py{\pgfmathresult}
    \advance\mk@point1
    \global\mk@point=\mk@point
    \mk@w{ \mk@i "point\the\mk@point": \@lbchar "name": "##1", "type": "point", "coords":  [\px,\py]
      \@rbchar, }
    %\message{^^JZone point \the\mk@point\space ##1: ##2,##3 -> \px,\py}
  },
  zone oob point/.code n args={3}{
    \pgf@xa=##2 cm
```

```
      \pgf@ya=##3 cm
      \advance\pgf@xa.1cm
      \advance\pgf@ya.1cm
      \pgfpointtransformed{\pgfpoint{\pgf@xa}{\pgf@ya}}
      % \pgfpointtransformed{\pgfpoint{0pt}{0pt}}
      \pgf@xa=\pgf@x
      \pgf@ya=\pgf@y
      \wg@pt@to@cm{\the\pgf@xa}\edef\px{\pgfmathresult}
      \wg@pt@to@cm{\the\pgf@ya}\edef\py{\pgfmathresult}
      \advance\mk@point1
      \global\mk@point=\mk@point
      \mk@w{ \mk@i "point\the\mk@point": \@lbchar "name": "##1",
        "parent": "\wg@export@box", "type": "point", "coords":  [\px,\py]
        \@rbchar, }
      %\message{^^JZone point \the\mk@point\space ##1: ##2,##3 -> \px,\py}
    },
    zone global point/.code n args={3}{
      \advance\mk@point1
      \global\mk@point=\mk@point
      \mk@w{ \mk@i "point\the\mk@point": \@lbchar "name": "##1", "type": "point", "coords":  [\px,\py]
        \@rbchar, }
    },
```

The `zone path` style is a bit more simple, but only because the bulk of the work is done in a decoration. We need to be able to pass a name to that decoration, s we make a key for that. The user need not think about that though.

```
    /pgf/decoration/record path name/.store in=\wg@record@path@name,
    zone path/.style={%
      postaction={decorate,decoration={
          record path construction,
          record path name=##1}}
    } % zone path
  }% tikzset
}
```

That finishes the first part of the environment. At the end of the environment, we simple write the name of the picture, and close our JSON output.

```
{%
  \mk@w{ \mk@i "name": "\bd@n" }%
  \let\mk@i\oomk@i%
  \mk@w{ \mk@i\@rbchar}%
  \endinfo%
}
```

Make battle markers. Mandatory argument is how many markers, optional is the group to add the markers to.

```
\def\wg@gennumberm@rkers#1#2#3#4{
  \chit@dbg{2}{Numbered markers: Type=‘#1’ Max=‘#2’ Category=‘#3’}
  \def\markers{}
  \def\keys{}
  \foreach \i in {1,...,#2}{%
    \xdef\keys{/tikz/#1 \i/.style={/tikz/#1=\i},\keys}
    \xdef\markers{\markers,#1 \i}}
```

```
  {%
    \nopagecolor\pgfkeysalsofrom{\keys}\chitimages[#3][#4]{\markers}}}%
\tikzset{
  wg hidden unit/.pic={},
  wg hidden unit/.style={
    chit={
      no chit drop,
      frame={draw=none,fill=none},
      full=wg hidden unit}}}
%
% First optional argument are extra styles
% Second is category
% Third is number of markers
%
\def\battlemarkers{%
  \@ifnextchar[{\@battlemarkers}{\battlemarkers[]}%]
}%
\def\@battlemarkers[#1]{%
  \@ifnextchar[{\@@battlemarkers[#1]}{\battlemarkers[#1][BattleMarkers]}%]
}%
\def\@@battlemarkers[#1][#2]#3{%
  \wg@gennumberm@rkers{battle marker}{#3}{#2}{#1}%
  \chit@dbg{1}{Make a hidden unit and add to Markers category}
  {%
    \nopagecolor%
    \chitimages[Markers]{{wg hidden unit}}%
    %
    \info{battle-marker-icon}{icon}{}%
    \tikz[scale=.7,transform shape,auto icon more/.try]{%
      \pic{battle marker=0};}%
    \info{clear-battles-icon}{icon}{}
    \tikz[scale=.4,transform shape,auto icon more/.try]{%
      \pic{eliminate icon};
      \pic[scale=.7,transform shape] at (-.3,0) {battle marker=0};}%
  }%
}
```

Make odds markers. Mandatory argument is a list of odds and fill colours. Optional is the group to add the markers to.

```
\def\wg@gencolorm@rkers#1#2#3#4{%
  \def\markers{}
  \def\keys{}
  \foreach \o/\f/\n [count=\i] in {#2}{%
    \ifx\n\f\def\n{\o}\fi%
    \ifx\o\f\def\f{white}\fi%
    \chit@dbg{3}{Colour no `\i' marker `#1 \n' w/fill `\f' text `\o'}%
    \protected@xdef\keys{/tikz/#1 \n/.style={/tikz/#1={\o,\f}},\keys}
    \xdef\markers{\markers,#1 \n}
  }%
  {%
    \nopagecolor%
    \pgfkeysalsofrom{\keys}%
    \chitimages[#3][#4]{\markers}%
```

```
  }%
}%
%
% First optional argument are extra styles
% Second is category
% Third is marker list
%
\def\oddsmarkers{%
  \@ifnextchar[{\@oddsmarkers}{\oddsmarkers[]}%]
}%
\def\@oddsmarkers[#1]{%
  \@ifnextchar[{\@@oddsmarkers[#1]}{\oddsmarkers[#1][OddsMarkers]}%]
}%
\def\@@oddsmarkers[#1][#2]#3{%
  \wg@gencolorm@rkers{odds marker}{#3}{#2}{#1}%
  \info{odds-battles-icon}{icon}{}
  \tikz[scale=.5,transform shape,auto icon more/.try]{%
    \pic{odds marker={?:?,white}}}
  \info{resolve-battles-icon}{icon}{}
  \tikz[scale=.3,transform shape,auto icon more/.try]{%
    \pic{dice};
    \pic[scale=1.2,transform shape] at (-.2,-.2) {battle marker=0};}%
}
```

Make results markers. Mandatory argument is a list of results and fill colours. Optional is the group to add the markers to.

First optional argument are extra styles Second is category Third is marker list

```
\def\resultmarkers{%
  \@ifnextchar[{\@resultmarkers}{\resultmarkers[]}%]
}%
\def\@resultmarkers[#1]{%
  \@ifnextchar[{\@@resultmarkers[#1]}{\resultmarkers[#1][ResultMarkers]}%]
}%
\def\@@resultmarkers[#1][#2]#3{%
  \wg@gencolorm@rkers{result marker}{#3}{#2}{#1}}%
```

Common icons used by many modules

```
\DeclareRobustCommand\commonicons[3][]{%
  \begingroup%
  \nopagecolor%
  \tikzset{auto icon/.style={scale=.4,transform shape,#1}}%
  %
  \info{pool-icon}{icon}{}
  \tikz[auto icon,auto icon more/.try]{\pic{pool icon};}
  %
  \info{oob-icon}{icon}{}%
  \tikz[auto icon,auto icon more/.try]{\pic{oob icon={#2}{#3}};}%
  %
  \info{flip-icon}{icon}{}%
  \tikz[auto icon,auto icon more/.try]{\pic{flip icon};}%
  %
  \info{eliminate-icon}{icon}{}%
```

```
  \tikz[auto icon,auto icon more/.try]{\pic{eliminate icon};}%
  %
  \info{restore-icon}{icon}{}%
  \tikz[auto icon,auto icon more/.try]{\pic{restore icon};}%
  %
  \info{dice-icon}{icon}{}%
  \tikz[auto icon,scale=.9,auto icon more/.try]{\pic{dice};}%
  %
  \info{unit-icon}{icon}{}%
  \tikz[auto icon,scale=.7,auto icon more/.try]{%
    \chit[fill=#2,
    symbol={[
      scale line widths,
      line width=1pt,
      faction=friend,
      command=land,
      main=infantry,
      scale=1.3](0,-.15)}]}%
  %
  \info{layer-icon}{icon}{}%
  \begin{tikzpicture}[scale=.25]
    \foreach \i in {-1,0,1}{
      \scoped[shift={(0,\i*.15)}]{
        \draw[black,fill=white] (-.5,0)
        --(0,.3)--(.5,0)--(0,-.3)--cycle;
      }
    }
    \end{tikzpicture}%
    %
    \info{los-icon}{icon}{}
    \begin{tikzpicture}[scale=.25]
      \draw[scale line widths,line width=2pt,fill=white](-.5,0)
      to[out=70,in=110] (.5,0)
      to[out=-110,in=-70] cycle;
      \begin{scope}[even odd rule]
        \clip circle(.2);
        \fill circle(.2) (125:.18) circle(.1);
      \end{scope}
    \end{tikzpicture}%
  %
  \endgroup%
}
```

5.3.1 Making dice

`\dice[⟨tikz-options⟩][⟨node-options⟩]{⟨name⟩}{⟨name⟩}{⟨list⟩}`

1. ⟨*tikz-options*⟩
2. ⟨*node-options*⟩
3. ⟨*name*⟩ - an identifier - e.g., the same as ⟨*shape*⟩.

4. ⟨*shape*⟩ - one of `d4`, `d6`, `d8`, `d10`, `d12`, or `d20`.
5. ⟨*list*⟩ - list of pairs ⟨*value*⟩/⟨*printed*⟩, where ⟨*value*⟩ is the value, and ⟨*printed*⟩ is the shown value. If ⟨*printed*⟩ is left out, then ⟨*value*⟩ is used.

```
\def\dice{%
  \@ifnextchar[{\wg@dice}{\wg@dice[]}%]
}
\def\wg@dice[#1]{%
  \@ifnextchar[{\wg@@dice{#1}}{\wg@@dice{#1}[]} %]
}
\def\wg@@dice#1[#2]#3#4#5{%
  \foreach \v/\p in {#5}{%
    \info{#3-\v}{die-roll}{#3}
    \tikz[#1]{
      %\node[shape=#4,transform shape,draw=none,fill=black,opacity=.5]
      %at (.05,-.03){};
      \node[shape=#4,#2,transform shape,
      chit drop,
      node contents={\p}
      ]{};\wg@add@drop@margin{}}}}
```

5.3.2 Hooks into chits, etc.

TO BE DONE: We could add hook the `hex` shape that would allow us to write out the settings for each of these. This would allow us to make data files that contain the information available in the LaTeX code.

If one then assumed that for example the upper left corner holds the start-up hex, then one could use that information.

The code below exports the chit information to the JSON file. Together with the battle, odds, and result markers stuff above, this allows the exporter to almost automatically set up battle odds and result calculations. The fields exported are

- Left and right identifiers
- Upper left, upper right, lower left, and lower right identifiers. (some care must be taken if these contains graphics and not just text.)
- Factors
- NATO symbol
  - Faction, command, echelon
  - Mains
  - Left, right, top, and bottom attributes and modifiers
  - Below attribute

The exporter can set up prototypes for NATO types, echelons, etc. The exporter can also set factors as marks on the units.

```
\tikzset{
  zone turn/.store in=\zone@turn,
  zone mult/.store in=\zone@mult
```

```
}
\def\@chit@rep@line#1#2{%
  \@ifundefined{#2}{}{
    \edef\wg@chit@tmp{\csname #2\endcsname}
    {\escapechar=‘/
      \xdef\tmp{\detokenize\expandafter{\wg@chit@tmp} \@empty}}
    % \message{^^J\meaning\@tmp -> \meaning\tmp}
    \mk@w{ \mk@i\space "#1": "\tmp",}}}

\def\do@chit@report{%
  \chit@dbg{3}{Start of Chit Report}
  \mk@w{ \mk@i "chit": \@lbchar}
  \chit@dbg{3}{Report - ID}
  \@ifundefined{id}{}         {\mk@w{ \mk@i\space "id":      "\id", }}%
  \chit@dbg{3}{Report - Symbol: ‘\meaning\chit@symbol’}
  \@ifundefined{chit@symbol}{}{\mk@w{ \mk@i\space "symbol":  "true", }}%
  \chit@dbg{3}{Report - Full: ‘\meaning\chit@full’}
  \@chit@rep@line{full}{chit@full}
  \chit@dbg{3}{Report - Factors: ‘\meaning\chit@factors’}
  \@chit@rep@line{factors}{chit@factors}%
  \chit@dbg{3}{Report - Left: ‘\meaning\chit@left’}
  \@chit@rep@line{left}{chit@left}%
  \chit@dbg{3}{Report - Right: : ‘\meaning\chit@right’}
  \@chit@rep@line{right}{chit@right}%
  \chit@dbg{3}{Report - Upper left: ‘\meaning\chit@upper@left’}
  \@chit@rep@line{upper left}{chit@upper@left}%
  \chit@dbg{3}{Report - Lower left: ‘\meaning\chit@lower@left’}
  \@chit@rep@line{lower left}{chit@lower@left}%
  \chit@dbg{3}{Report - Upper right: ‘\meaning\chit@upper@right}
  \@chit@rep@line{upper right}{chit@upper@right}%
  \chit@dbg{3}{Report - Lower right: ‘\meaning\chit@lower@right’}
  \@chit@rep@line{lower right}{chit@lower@right}%
  \chit@dbg{3}{Report - End comma}
  \mk@w{ \mk@i\space "end": 0}
  \@ifundefined{chit@symbol}{
    \mk@w{ \mk@i \@rbchar }
  }{
    \mk@w{ \mk@i \@rbchar, }% NATOAPP6c will follow
  }%
  \chit@dbg{3}{End of Chit Report}
}
```

Report out NATO App6 symbol settings

```
\def\do@natoapp@report{%
  \mk@w{ \mk@i "natoapp6c": \@lbchar}
  \@chit@rep@line{id}{\id}
  \@chit@rep@line{faction}{natoapp@fac}
  \@chit@rep@line{command}{natoapp@cmd}
  \@chit@rep@line{echelon}{natoapp@ech}
  \@chit@rep@line{main}{natoapp@main}
  \@chit@rep@line{left}{natoapp@left}
  \@chit@rep@line{right}{natoapp@right}
  \@chit@rep@line{upper}{natoapp@upper}
```

```
  \@chit@rep@line{lower}{natoapp@lower}
  \@chit@rep@line{below}{natoapp@below}
  \mk@w{ \mk@i\space "end": 0}
  \mk@w{ \mk@i \@rbchar}
}
\tikzset{
  chit drop margin/.store in=\wg@drop@margin,
  chit drop shadows/.code={
    \pgfkeysalso{%
      /tikz/every chit node/.prefix style={chit drop={#1}},
      /tikz/chit has drop=true}
  },
  chit drop shadows/.default=,
  marker drop shadows/.code={
    \pgfkeysalso{%
      /tikz/every battle marker/.prefix style={chit drop={#1}},
      /tikz/every odds marker/.prefix style={chit drop={#1}},
      /tikz/every result marker/.prefix style={chit drop={#1}},
      /tikz/auto icon more/.prefix style={no chit drop}}},
  marker drop shadows/.default={
    chit has drop=false,
    shadow xshift=0.04cm,
    shadow yshift=-0.04cm,
    shadow blur radius=0.04cm}
}
```

5.4 The wargame.hex TikZ library

Used TikZ libraries

```
\RequirePackage{alphalph}
\usetikzlibrary{calc}
\usetikzlibrary{arrows.meta}
\usetikzlibrary{arrows}
\usetikzlibrary{shapes.geometric}
\usetikzlibrary{shapes.symbols}
\usetikzlibrary{shapes.arrows}
\usetikzlibrary{decorations}
\usetikzlibrary{decorations.pathmorphing}
\usetikzlibrary{decorations.pathreplacing}
\usetikzlibrary{decorations.markings}
\usetikzlibrary{wargame.util}
```

`\@ifempty`

This is a utility macro we will use below.

```
\def\@ifempty#1{\def\temp{#1}\ifx\temp\@empty}
```

5.4.1 Debugging

The counter `\hexdbglvl` sets the debug level, and the macro `\hex@dbg` prints out (conditionally) debug messages.

```
\hexdbglvl
\hex@dbg
```

```
\newcount\hexdbglvl\hexdbglvl=\wargamedbglvl
\def\hex@dbg#1#2{%
  \ifnum#1>\hexdbglvl\relax\else\message{^^J#2}\fi}
```

5.4.2 Suppress terrain pictures

```
\@ifundefined{ifhex@terrain@pic}{%
  \newif\ifhex@terrain@pic
  \hex@terrain@pictrue}{}
\def\markpos#1(#2){}
```

5.4.3 Hex coordinate system

```
\hex@xx
\hex@yy
```

Some offsets along x and y due to offset of every second hex column.

$$\delta_x = \cos 60^\circ$$
$$\delta_y = \sin 60^\circ$$

These numbers are calculated once here and then used several times in the following code.

```
\pgfmathparse{cos(60)}        \xdef\hex@xx{\pgfmathresult}
\pgfmathparse{sin(60)}        \xdef\hex@yy{\pgfmathresult}
\pgfmathparse{\hex@yy*cos(30)}\xdef\hex@e@xx{\pgfmathresult}
\pgfmathparse{\hex@yy*sin(30)}\xdef\hex@e@yy{\pgfmathresult}
\newdimen\hex@radius\hex@radius=1cm
\newdimen\hex@dx    \expandafter\hex@dx=\hex@xx cm
\newdimen\hex@dy    \expandafter\hex@dy=\hex@yy cm
\newdimen\hex@e@dx  \expandafter\hex@e@dx=\hex@e@xx cm
\newdimen\hex@e@dy  \expandafter\hex@e@dy=\hex@e@yy cm

```

Some code we need for some options

```
\newif\ifhex@label@is@name\hex@label@is@namefalse
\def\hex@short@col{isfalse}
\def\hex@got@short{isfalse}
\pgfmathdeclarefunction{isfalse}{1}{%
  \begingroup
  \def\pgfmathresult{0}%
```

```
  \pgfmath@smuggleone\pgfmathresult
  \endgroup}
\pgfmathdeclarefunction{istrue}{1}{%
  \begingroup
  \def\pgfmathresult{1}%
  \pgfmath@smuggleone\pgfmathresult
  \endgroup}
```

What follows is a way to configure the hex coordinate system. For example, if the rows goes down, then we can flag that, but still add hexes straightforwardly. Similar for columns. We can also specify that the first row or column has number 1 (instead of 0). Since this is dealt with a the coordinate level, it means most of the rest of the code is agnostic to these choices.

Which is the first coordinate (0 or 1)

```
\tikzset{
  hex/first row is/.is choice,
  hex/first row is/0/.code={\def\hex@coords@row@off{0}},
  hex/first row is/1/.code={\def\hex@coords@row@off{-1}},
  hex/first row is=0,
  hex/first column is/.is choice,
  hex/first column is/0/.code={\def\hex@coords@col@off{0}},
  hex/first column is/1/.code={\def\hex@coords@col@off{-1}},
  hex/first column is=0,
  hex/first row and column are/.is choice,
  hex/first row and column are/0/.style={
    hex/first row is=0,%
    hex/first column is=0},
  hex/first row and column are/1/.style={
    hex/first row is=1,%
    hex/first column is=1},
```

Which way does the column and row numbers go

```
  hex/row direction is/.is choice,
  hex/row direction is/normal/.code={\def\hex@coords@row@fac{1}},
  hex/row direction is/reversed/.code={\def\hex@coords@row@fac{-1}},
  hex/row direction is/up/.style={hex/row direction is=normal},
  hex/row direction is/down/.style={hex/row direction is=reversed},
  hex/row direction is/positive/.style={hex/row direction is=normal},
  hex/row direction is/negative/.style={hex/row direction is=reversed},
  hex/row direction is=normal,
  hex/column direction is/.is choice,
  hex/column direction is/normal/.code={\def\hex@coords@col@fac{1}},
  hex/column direction is/reversed/.code={\def\hex@coords@col@fac{-1}},
  hex/column direction is/right/.style={hex/column direction is=normal},
  hex/column direction is/left/.style={hex/column direction is=reversed},
  hex/column direction is/positive/.style={hex/column direction is=normal},
  hex/column direction is/negative/.style={hex/column direction is=reversed},
  hex/column direction is=normal,
```

Make labels names of shapes of the hexes so we can use labels to place stuff

```
  hex/label is name/.is if=hex@label@is@name,
```

If we have uneven number of rows in some columns.

```
  hex/short bottom columns/.is choice,
  hex/short bottom columns/odd/.code={%
    \def\hex@bot@short@col{isodd}
    \def\hex@got@bot@short{istrue}
    \hex@dbg{4}{Short columns (odd): \meaning\hex@bot@short@col}},
  hex/short bottom columns/even/.code={
    \def\hex@bot@short@col{iseven}
    \def\hex@got@bot@short{istrue}
    \hex@dbg{4}{Short column (even): \meaning\hex@bot@short@col}},
  hex/short bottom columns/none/.code={
    \def\hex@bot@short@col{isfalse}
    \def\hex@got@bot@short{isfalse}
    \hex@dbg{4}{Short columns (none): \meaning\hex@bot@short@col}},
  hex/short bottom columns=none,
  hex/short columns/.forward to=hex/short bottom columns,
  hex/short top columns/.is choice,
  hex/short top columns/odd/.code={%
    \def\hex@top@short@col{isodd}
    \def\hex@got@top@short{istrue}
    \hex@dbg{4}{Short columns (odd): \meaning\hex@top@short@col}},
  hex/short top columns/even/.code={
    \def\hex@top@short@col{iseven}
    \def\hex@got@top@short{istrue}
    \hex@dbg{4}{Short column (even): \meaning\hex@top@short@col}},
  hex/short top columns/none/.code={
    \def\hex@top@short@col{isfalse}
    \def\hex@got@top@short{isfalse}
    \hex@dbg{4}{Short columns (none): \meaning\hex@top@short@col}},
  hex/short top columns=none,
}
\message{^^JInitial hex coordinate setup:
  Rows: factor=\hex@coords@row@fac, offset=\hex@coords@row@off
  Columns: factor=\hex@coords@col@fac, offset=\hex@coords@col@off}
```

`hex/coords/column`
`hex/coords/row`
`hex/coords/vertex`
`hex/coords/edge`
`hex/coords/offset`

We define the keys for hexagon coordinates. These are the `row`, `column`, possible `vertex` or `edge`. Vertexes and edges are defined as multiple-choice. `offset` specifies the offset from the centre in the direction of a vertex or edge. By default, the offset is one, meaning all the way to the vertex or edge.

The key `inverse row` specifies that the rows are given from the top down, but coordinates should be calculated as if the row was negative. This (should) allow us to design boards where rows increase downward, while still keeping the interface and remaining code somewhat reasonable and agnostic.

Similarly, the key `column 1`, will allow us to start the columns with 1.

```
\tikzset{
```

```
  /hex/coords/.cd,
  column/.store in=\hex@col,
  c/.store in=\hex@col,
  row/.store in=\hex@row,
  r/.store in=\hex@row,
  offset/.store in=\hex@off,
  o/.store in=\hex@off,
  vertex/.is choice,
  vertex/none/.code={\global\let\hex@vtx\@empty},
  vertex/east/.code={\def\hex@vtx{0}},
  vertex/north east/.code={\def\hex@vtx{60}},
  vertex/north west/.code={\def\hex@vtx{120}},
  vertex/west/.code={\def\hex@vtx{180}},
  vertex/south west/.code={\def\hex@vtx{240}},
  vertex/south east/.code={\def\hex@vtx{300}},
  vertex/E/.code={\def\hex@vtx{0}},
  vertex/NE/.code={\def\hex@vtx{60}},
  vertex/NW/.code={\def\hex@vtx{120}},
  vertex/W/.code={\def\hex@vtx{180}},
  vertex/SW/.code={\def\hex@vtx{240}},
  vertex/SE/.code={\def\hex@vtx{300}},
  vertex/.default=none,
  v/.forward to=/hex/coords/vertex=#1,
  edge/.is choice,
  edge/none/.code={\global\let\hex@edg\@empty},
  edge/north east/.code={\def\hex@edg{30}},
  edge/north/.code={\def\hex@edg{90}},
  edge/north west/.code={\def\hex@edg{150}},
  edge/south west/.code={\def\hex@edg{210}},
  edge/south/.code={\def\hex@edg{270}},
  edge/south east/.code={\def\hex@edg{330}},
  edge/NE/.code={\def\hex@edg{30}},
  edge/N/.code={\def\hex@edg{90}},
  edge/NW/.code={\def\hex@edg{150}},
  edge/SW/.code={\def\hex@edg{210}},
  edge/S/.code={\def\hex@edg{270}},
  edge/SE/.code={\def\hex@edg{330}},
  edge/.default=none,
  e/.forward to=/hex/coords/edge,
}
```

\hex@coords@reset

This macro resets the hex coordinates to default values. That is row and column 0, no vertex or edge.

```
\def\hex@coords@reset{%
  \tikzset{%
    /hex/coords/.cd,
    column=0,
    row=0,
    edge=none,
    vertex=none,
    offset=1}}
```

The following calculates the Cartesian coordinates from Hex coordinates

`(cs:hex column=⟨C⟩,row=⟨R⟩,vertex=⟨V⟩,edge=⟨E⟩)`

Given the hexagon column C and row R with hexagon radius r, the centre of the hexagon is at

$$\begin{aligned} x &= 2C\frac{3}{4}r \\ y &= r(R - (C\%2)\sin 60^\circ) \end{aligned}$$

If $\langle V \rangle$ or $\langle E \rangle$ are given, then these are added to the centre point.

Note, C and R may be fractional numbers, which will specify a point inside a hex.

We set-up the translation to Cartesian coordinates. First thing is to reset keys in `/hex/coords`, and then parse out the keys given.

```
\def\hex@coords@conv#1{%
  \hex@coords@reset%
  \tikzset{/hex/coords/.cd, #1}%
```

Then we calculate the x coordinate and set the dimension `\pgf@x`. We do this by

$$x = c_e\frac{3}{2} \quad ,$$

where

$$c_e = f_c(c + o_c) \quad ,$$

is the effective column (stored in `\hex@eff@col`) calculated from is the direction factor f_c (set by `hex/column direction is`) and the offset o_c (set by `hex/first column is`).

```
  \pgfmathparse{int(\hex@coords@col@fac*(\hex@col+\hex@coords@col@off))}%
  \xdef\hex@eff@col{\pgfmathresult}%
  \hex@dbg{2}{Effective column: \hex@coords@col@fac * (\hex@col +
    \hex@coords@col@off) -> \hex@eff@col}%
  \pgfmathparse{\hex@eff@col*1.5}%
  \xdef\hex@x{\pgfmathresult}%
```

And then for the y coordinate and set the dimension `\pgf@y`.

$$y = 2\left(r_e - c_e \bmod 2\right)\cos 60^\circ \quad ,$$

where

$$r_e = 2f_r(r + o_r) - (c + o_c) \bmod 2 \quad ,$$

is the effective row (stored as `\hex@eff@row`) calculated from the the direction factor f_r (set by `hex/row direction is`) and the offset o_r (set by `hex/first row is`).

```
  \pgfmathparse{int(\hex@coords@row@fac*(\hex@row+\hex@coords@row@off))}%
```

```
  \xdef\hex@eff@row{\pgfmathresult}%
  \hex@dbg{2}{Effective row: \hex@coords@row@fac * (\hex@row +
    \hex@coords@row@off) -> \hex@eff@row}%
  %\pgfmathparse{(2*\hex@eff@row-mod(round((\hex@col+\hex@coords@col@off)),2))*\hex@yy}%
  \pgfmathparse{(2*\hex@eff@row-mod(abs(round(\hex@col+\hex@coords@col@off)),2))*\hex@yy}%
  \xdef\hex@y{\pgfmathresult}%
```

If we have a vertex specification add that location to the current coordinates. If not, set the point.

```
  \ifx\hex@vtx\@empty\else%
    \pgfmathparse{\hex@x+\hex@off*cos(\hex@vtx)}\xdef\hex@x{\pgfmathresult}
    \pgfmathparse{\hex@y+\hex@off*sin(\hex@vtx)}\xdef\hex@y{\pgfmathresult}
  \fi%
  % \ifx\hex@vtx\@empty\pgfpointxy{\hex@x}{\hex@y}\else%
  % \pgfpointadd{\pgfpointxy{\hex@x}{\hex@y}}{%
  %   \pgfpointscale{\hex@off}{\pgfpointpolarxy{\hex@vtx}{1}}}\fi%
```

If we have an edge specification add that location to the current coordinates.

```
  \ifx\hex@edg\@empty\else%
    \pgfmathparse{\hex@x+\hex@off*\hex@yy*cos(\hex@edg)}%
    \xdef\hex@x{\pgfmathresult}%
    \pgfmathparse{\hex@y+\hex@off*\hex@yy*sin(\hex@edg)}%
    \xdef\hex@y{\pgfmathresult}%
  \fi%
  % \ifx\hex@edg\@empty\else%
  % \pgfpointadd{\pgfpointxy{\hex@x}{\hex@y}}{%
  %   \pgfpointscale{\hex@off}{\pgfpointpolarxy{\hex@edg}{\hex@yy}}}\fi
```

For debugging, we can print out stuff.

```
  \pgfpointxy{\hex@x}{\hex@y}
  \hex@dbg{2}{Hex coordinates: #1
    ^^J c=‘\hex@col’
    ^^J r=‘\hex@row’
    ^^J v=‘\hex@vtx’
    ^^J e=‘\hex@edg’
    ^^J o=‘\hex@off’
    ^^J x=‘\hex@x’
    ^^J y=‘\hex@y’}%
  \global\let\hex@x\hex@x%
  \global\let\hex@y\hex@y%
  \global\let\hex@row\hex@row%
  \global\let\hex@col\hex@col%
}
\tikzdeclarecoordinatesystem{hex}{%
  \hex@coords@conv{#1}}
```

5.4.4 Hexes

In this part, we make macros etc. for the hexes.

A hex shape. We make a node of this shape if we are to give a name to the hex added. We add a bunch of anchors to it so we may easily refer to it. This is also where we actual fill stuff into the hex, such as terrain and so on.

```
\tikzset{%
  /hex/.cd,
  bev/.store in=\hex@bevel,               bev/.initial=,
  bevel fraction/.store in=\hex@bevel@frac,bevel fraction/.initial=10,
  bevel/.is choice,
  bevel/none/.style       = {/hex/bev=},
  bevel/north west/.style = {/hex/bev=1},
  bevel/north east/.style = {/hex/bev=2},
  bevel/south west/.style = {/hex/bev=3},
  bevel/south east/.style = {/hex/bev=4},
  bevel/NW/.style         = {/hex/bev=1},
  bevel/NE/.style         = {/hex/bev=2},
  bevel/SW/.style         = {/hex/bev=3},
  bevel/SE/.style         = {/hex/bev=4},
  bevel/.default          = {north west},
}
\def\hex@bevel@frac{10}
\tikzset{
  hex/bevel highlight/.style={fill=white,opacity=.25},
  hex/bevel shadow/.style={fill=black,opacity=.25},
}

\newdimen\wg@tmpe
\newdimen\wg@tmpf
\newdimen\wg@tmpg
\def\hex@bevel@path#1{%
  \scope[#1]
  \wg@tmpe=\wg@tmpa\multiply\wg@tmpe by \hex@bevel@frac
  \wg@tmpf=\wg@tmpb\multiply\wg@tmpf by \hex@bevel@frac
  \wg@tmpg=\wg@tmpc\multiply\wg@tmpg by \hex@bevel@frac
  \divide\wg@tmpe100
  \divide\wg@tmpf100
  \divide\wg@tmpg100
  % Start
  \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  % Left
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
  % Left-down
  \pgfpathlineto{\pgfqpoint{\wg@tmpc}{\wg@tmpd}}%
  % Right down
  \wg@tmpa=-\wg@tmpa%
  \wg@tmpb=-\wg@tmpb%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  % Up, in
  \advance\wg@tmpa\wg@tmpe%
  \advance\wg@tmpb\wg@tmpf%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  % Left-down, in
  \advance\wg@tmpc-\wg@tmpg
  \pgfpathlineto{\pgfqpoint{\wg@tmpc}{\wg@tmpd}}%
  % Left, down in
  \advance\wg@tmpb-\wg@tmpf\wg@tmpb-\wg@tmpb%
  \advance\wg@tmpb-\wg@tmpf
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
```

```
  % Start, down in
  \advance\wg@tmpa-\wg@tmpe\wg@tmpa-\wg@tmpa%
  \advance\wg@tmpa-\wg@tmpe
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  % %
  \pgfclosepath%
  \pgfusepath{fill}
  \endscope}%

\hex@dbg{5}{Base vertex: \hex@xx,\hex@yy}
\hex@dbg{5}{Base edges: \hex@e@xx,\hex@e@yy}
\pgfdeclareshape{hex/hex}{%
  \saveddimen\radius{\pgf@x=\hex@radius}
  \savedanchor{\east}{         \pgfqpoint{ \hex@radius}{0cm}}
  \savedanchor{\west}{         \pgfqpoint{-\hex@radius}{0cm}}
  \savedanchor{\northeast}{    \pgfqpoint{ \hex@dx}{ \hex@dy}}
  \savedanchor{\northwest}{    \pgfqpoint{-\hex@dx}{ \hex@dy}}
  \savedanchor{\southwest}{    \pgfqpoint{-\hex@dx}{-\hex@dy}}
  \savedanchor{\southeast}{    \pgfqpoint{ \hex@dx}{-\hex@dy}}
  \savedanchor{\northedge}{    \pgfqpoint{     0cm}{ \hex@dy}}
  \savedanchor{\southedge}{    \pgfqpoint{     0cm}{-\hex@dy}}
  \savedanchor{\northeastedge}{\pgfqpoint{ \hex@e@dx}{ \hex@e@dy}}
  \savedanchor{\northwestedge}{\pgfqpoint{-\hex@e@dx}{ \hex@e@dy}}
  \savedanchor{\southwestedge}{\pgfqpoint{-\hex@e@dx}{-\hex@e@dy}}
  \savedanchor{\southeastedge}{\pgfqpoint{ \hex@e@dx}{-\hex@e@dy}}
  \savedmacro\init{%
    \def\hexpath{%
      \pgfpathmoveto{\east}%
      \pgfpathlineto{\northeast}%
      \pgfpathlineto{\northwest}%
      \pgfpathlineto{\west}%
      \pgfpathlineto{\southwest}%
      \pgfpathlineto{\southeast}%
      \pgfpathclose}
  }
```

These are the actual user callable anchors. We make anchors for each vertex and mid points on each edge.

```
%%
  \anchor{center}{         \pgfpointorigin}
  \anchor{east}{           \east}
  \anchor{west}{           \west}
  \anchor{north east}{     \northeast}
  \anchor{north west}{     \northwest}
  \anchor{south west}{     \southwest}
  \anchor{south east}{     \southeast}
  \anchor{north edge}{     \northedge}
  \anchor{south edge}{     \southedge}
  \anchor{north east edge}{\northeastedge}
  \anchor{north west edge}{\northwestedge}
  \anchor{south west edge}{\southwestedge}
  \anchor{south east edge}{\southeastedge}
```

Next we make some short hand aliases for each of these anchors.

```
\anchor{E}{      \east}
\anchor{W}{      \west}
\anchor{NE}{     \northeast}
\anchor{NW}{     \northwest}
\anchor{SW}{     \southwest}
\anchor{SE}{     \southeast}
\anchor{N edge}{ \northedge}
\anchor{S edge}{ \southedge}
\anchor{NE edge}{\northeastedge}
\anchor{NW edge}{\northwestedge}
\anchor{SW edge}{\southwestedge}
\anchor{SE edge}{\southeastedge}
```

The next part is commented out because its not obvious we'll use these.

```
%%
\savedanchor{\chitnorth}{    \pgfqpoint{ 0cm}{   0.6cm}}
\savedanchor{\chitsouth}{    \pgfqpoint{ 0cm}{  -0.6cm}}
\savedanchor{\chiteast}{     \pgfqpoint{ 0.6cm}{ 0cm}}
\savedanchor{\chitwest}{     \pgfqpoint{-0.6cm}{ 0cm}}
\savedanchor{\chitnortheast}{\pgfqpoint{ 0.6cm}{ 0.6cm}}
\savedanchor{\chitnorthwest}{\pgfqpoint{-0.6cm}{ 0.6cm}}
\savedanchor{\chitsouthwest}{\pgfqpoint{-0.6cm}{-0.6cm}}
\savedanchor{\chitsoutheast}{\pgfqpoint{ 0.6cm}{-0.6cm}}
%
\anchor{chit north}{\chitnorth}
\anchor{chit south}{\chitsouth}
\anchor{chit east}{\chiteast}
\anchor{chit west}{\chitwest}
\anchor{chit north east}{\chitnortheast}
\anchor{chit north west}{\chitnorthwest}
\anchor{chit south west}{\chitsouthwest}
\anchor{chit south east}{\chitsoutheast}
%
\anchor{chit N}{\chitnorth}
\anchor{chit S}{\chitsouth}
\anchor{chit E}{\chiteast}
\anchor{chit W}{\chitwest}
\anchor{chit NE}{\chitnortheast}
\anchor{chit NW}{\chitnorthwest}
\anchor{chit SW}{\chitsouthwest}
\anchor{chit SE}{\chitsoutheast}
%
```

The background path. This path may be drawn when the node is drawn. However, we will do most of the work in the `\behindbackgroundpath` which gets drawn *after* this path.

```
\backgroundpath{\init\hexpath}
```

The *behind* background path, where we do most of the work.

```
\behindforegroundpath{%
  \hex@dbg{2}{Hex behind foreground path:
    ^^JTerrain:       `\meaning\hex@terrain'
```

```
      ^^JRidges:         ‘\meaning\hex@ridges’
      ^^JTown:           ‘\meaning\hex@town’
      ^^JExtra clipped: ‘\meaning\hex@extra@clip’
      ^^JLabel:          ‘\meaning\hex@label’
      ^^JExtra:          ‘\meaning\hex@extra’
      ^^JLast node name:‘\meaning\tikzlastnode’
      ^^JHex row:        ‘\meaning\hex@row’
      ^^JHex col:        ‘\meaning\hex@col’
    }%
    \init%
```

We start a scope and clip to the hex path first.

```
    \scope%
      \hexpath%
      \pgfusepath{clip}%
```

Anything inside this scope is clipped to the hex path. The next step is to see if we have a specified terrain for the hex.

```
      \@ifundefined{hex@terrain}{\let\hex@terrain\empty}{}%
      \ifx\hex@terrain\empty\else\hex@do@terrain\fi%
```

This concludes the processing of the terrain of the hex. Next, we must see if the user specified ridges.

```
      \@ifundefined{hex@ridges}{\let\hex@ridges\empty}{}%
      \ifx\hex@ridges\empty\else\hex@do@ridges\fi%
```

This concludes the processing of the ridges of the hex. Next, we should process any extra (clipped) stuff specified. The user may pass options to each `pic`ture by preceding it with `[`⟨*options*⟩`]`.

```
      \@ifundefined{hex@extra@clip}{\let\hex@extra@clip\empty}{}
      \ifx\hex@extra@clip\empty\else%
         \hex@dbg{5}{Extra clipped: ‘\meaning\hex@extra’}
         \pgfpointorigin\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
         \wg@pic@all{\hex@extra@clip}{}{\the\wg@tmpa,\the\wg@tmpb}{}%
      \fi%
```

This concludes the extra stuff put in the hex. Next, we should place the label is specified. Note, we may know the hex row and column at this point, stored in `\hex@row` and `\hex@column`, respectively. We may want to name the generated node from these if the user specified that option (perhaps use `\pgfnoderename` or similar).

```
      \@ifundefined{hex@label}{\let\hex@label\empty}{}
      \ifx\hex@label\empty\else\hex@do@label\fi%

    \@ifundefined{hex@bevel}{\let\hex@bevel\empty}{}
    \ifx\hex@bevel\empty\else%
      \northeast
      \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
      \west
      \wg@tmpc=\pgf@x\wg@tmpd=\pgf@y%
      \ifcase\hex@bevel\relax
      \or%1
      \or\wg@tmpa=-\wg@tmpa\wg@tmpc=-\wg@tmpc%2
      \or\wg@tmpb=-\wg@tmpb\wg@tmpd=-\wg@tmpd%3
      \or% 4
```

```
1433          \wg@tmpa=-\wg@tmpa\wg@tmpc=-\wg@tmpc%
1434          \wg@tmpb=-\wg@tmpb\wg@tmpd=-\wg@tmpd%
1435        \fi
1436        \hex@bevel@path{chit/bevel highlight}
1437        \northeast
1438        \wg@tmpa=-\pgf@x\wg@tmpb=-\pgf@y%
1439        \west
1440        \wg@tmpc=-\pgf@x\wg@tmpd=-\pgf@y%
1441        \ifcase\hex@bevel\relax
1442        \or%1
1443        \or\wg@tmpa=-\wg@tmpa\wg@tmpc=-\wg@tmpc%2
1444        \or\wg@tmpb=-\wg@tmpb\wg@tmpd=-\wg@tmpd%3
1445        \or% 4
1446          \wg@tmpa=-\wg@tmpa\wg@tmpc=-\wg@tmpc%
1447          \wg@tmpb=-\wg@tmpb\wg@tmpd=-\wg@tmpd%
1448        \fi
1449        \hex@bevel@path{chit/bevel shadow}
1450      \fi

1451      \endscope%
```

This concludes the label processing, and stuff that should be clipped to the hex shape. If the user specified a town, we can now make that.

```
1452      \@ifundefined{hex@town}{\let\hex@town\empty}{}
1453      \@ifundefined{hex@c@pic}{\let\hex@c@pic\empty}{}
1454      \ifx\hex@town\empty\else\hex@do@town\fi%
```

We can now add extra (non-clipped) stuff. We assume that extra stuff is `pic`tures. The user may pass options to each `pic`ture by preceding it with `[`⟨*options*⟩`]`.

```
1455      \@ifundefined{hex@extra}{\let\hex@extra\empty}{}
1456      \ifx\hex@extra\empty\else%
1457         \hex@dbg{5}{Extra: `\meaning\hex@extra'}
1458         \pgfpointorigin\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
1459         \wg@pic@all{\hex@extra}{}{\the\wg@tmpa,\the\wg@tmpb}{}%
1460      \fi%
1461    }
1462 }
```

```
/hex/terrain
/hex/town
/hex/label
/hex/ridges
/hex/extra
/hex/extra clipped
```

Next, we set up the name space for hex keys. This is the top level name space for hexes. Sub keys `terrain`, `ridges`, `town`, `extra`, `label`, and `extra clipped`, store their arguments in macros and we expand these later on. This allows us to scope some of the keys given to those specific parts.

Define keys for hexagon options. These are

Name	Description
terrain	Terrain
label	Label on hex
town	Town in hex. Optionally with a name
ridges	Ridge markings on hex
extra	More
extra clipped	More clipped to hex

```
\tikzset{%
  /hex/.search also={/tikz},%
  /hex/.cd,%
  terrain/.store in=\hex@terrain,%
  ridges/.store in=\hex@ridges,%
  town/.store in=\hex@town,%
  extra/.store in=\hex@extra,%
  label/.store in=\hex@label,%
  extra clipped/.store in=\hex@extra@clip%
}
```

`hex`

The next key is the real work horse of the show. Specifying the `hex` key to a node effectively creates a hex for us. Now, there are some things we cannot do outright in the node shape code. For example, we cannot set the name of the node created from the shape code. Therefore, the use of `\hex` is often the right choice.

```
\tikzset{%
  hex/hex/.style={
    transform shape,
    anchor=center,
    draw=pgfstrokecolor,
    fill=none,
    thick,
    solid},
  hex/.code={%
    \hex@dbg{1}{=== Hex with options: ‘#1’}%
    \pgfkeys{/tikz/transform shape,/tikz/shape=hex/hex}
    \pgfkeys{/hex/.cd,/tikz/hex/hex,/tikz/every hex/.try,#1}}}
```

The first thing is to set the default graphics options. The key `every hex` can be set to hex options to be used for all hexes. For example, if one want to label all hexes with an auto-generated label, one can do

```
\tikzset{every hex/.style={label={auto=numbered}}}
```

This, coupled with the `hex/label is name` option allows us to set up the board with really minimal effort. We can then use the board coordinates when placing units, and other things.

Now we have set up these tools we can go on and define the user facing macro.

```
\hex
\hex@
\hex@@
```

This will add a hex to the output graphics. Note, the macro need not be followed by a semi-colon (;). First argument is optional options.

```
\def\hex{%
  \@ifnextchar[{\hex@}{\hex@[]}%]
}
```

Second optional argument is the coordinates. These should be given in the hex coordinate system.

```
\def\hex@[#1]{%
  \@ifnextchar({\hex@@{#1}}{%
    \hex@@{#1}(c=0,r=0)}%)
}
```

Third argument is the name to be used.

```
\def\hex@@#1(#2){%
  \@ifnextchar({\hex@@@{#1}{#2}}{\hex@@@{#1}{#2}()}%)
}
```

Now for the real work-horse. First thing is to reset keys and parse them out from the arguments.

```
%      Third argument is name
\def\hex@@@#1#2(#3){%
  \node[hex={#1}] (tmp) at (hex cs:#2) {};%
  \hex@dbg{8}{=== Label text: `\meaning\hex@l@text'}
  \ifx|#3|\relax%
    \@ifundefined{hex@l@text}{%
      \hex@dbg{8}{=== Label text of hex (#2) not defined}%
      \let\hex@l@text\empty%
    }{}
    \ifhex@label@is@name%
      \hex@dbg{5}{=== Use label text of hex (#2) as name}%
      \ifx\hex@l@text\@empty%
        \hex@dbg{8}{=== Argh! Label text is empty! `\meaning\hex@l@text'}
      \else%
        \hex@dbg{3}{=== Renaming hex to label text `\hex@l@text'}
        \pgfnoderename{\hex@l@text}{tmp}%
      \fi%
    \fi%
  \else%
    \hex@dbg{3}{=== Renaming hex to user defined name `#3'}%
    \pgfnoderename{#3}{tmp}%
  \fi%
  \@ifnextchar;{\@gobble}{}%
}
```

5.4.5 Terrain

With the above main routine for making hexes, we turn to decorating a hex with a terrain.

```
hex/terrain/image
hex/terrain/pic
hex/terrain/code
hex/terrain/clip
```

We make the namespace `/hex/terrain` to hold the specific terrain keys. Keys used by terrain identifiers are

Name	Description
`image`	Terrain tile image
`pic`	Terrain Ti*k*Z `pic`ture
`code`	Arbitary Ti*k*Z code
`clip`	Ti*k*Z path to clip terrain

Now, we have the keys we'll need for selecting the terrain. These live in the namespace `/hex/terrain`, and we can select between `pic`tures or `image`s (external graphics files) for making the terrain. We define some short hands to easily select the common terrains.

```
\newif\if@hex@t@rot\@hex@t@rotfalse%
\tikzset{%
  /hex/terrain/.search also={/tikz},%
  /hex/terrain/.cd,%
  pic/.store in=\hex@t@pic,%
  image/.store in=\hex@t@image,%
  code/.store in=\hex@t@code,%
  clip/.store in=\hex@t@clip,%
  random rotation/.is if=@hex@t@rot,
  rotate/.store in=\hex@t@s@angle,
  pic/.default=,
  image/.default=,
  code/.default=,
  clip/.default=,
  rotate/.default=,
}
\iffalse
\tikzset{
  /hex/terrain/.cd,%
  beach/.style={pic=hex/terrain/beach},
  fields/.style={pic=hex/terrain/fields},
  speckle/.style={pic=hex/terrain/speckle},
  light woods/.style={pic=hex/terrain/light woods},
  woods/.style={pic=hex/terrain/woods},
  swamp/.style={pic=hex/terrain/swamp},
  rough/.style={pic=hex/terrain/rough},
  mountains/.style={pic=hex/terrain/mountains},
  village/.style={pic=hex/terrain/village},
  town/.style={pic=hex/terrain/town},
  city/.style={pic=hex/terrain/city},
}
\else
\tikzset{
  /hex/terrain/.cd,%
  beach/.style={image=wargame.beach},
  fields/.style={image=wargame.fields},
  speckle/.style={image=wargame.speckle},
```

```
  light woods/.style={image=wargame.light_woods},
  woods/.style={image=wargame.woods},
  swamp/.style={image=wargame.swamp},
  rough/.style={image=wargame.rough},
  mountains/.style={image=wargame.mountains},
  village/.style={image=wargame.village},
  town/.style={image=wargame.town},
  city/.style={image=wargame.city},
}
\fi
```

Before we go on, we define the macro that actually generates the terrain of a hex.

\hex@do@terrain

If we do have a terrain specified, we start a new scope, this time to clip the terrain by the clipping path specified by `hex={terrain={clip=...}}`. The first thing into the new scope is to process the keys specified in `hex={terrain=...}`. This will set the terrain and the clipping of the terrain.

```
\def\hex@do@terrain{%
  \hex@dbg{5}{Terrain: \meaning\hex@terrain}%
  \edef\hex@t@tmp{[/hex/terrain/.cd,\hex@terrain]}%
  \expandafter\scope\hex@t@tmp% Scope for terrain clipping.
    \hex@dbg{5}{Terrain:
      ^^J  pic:   \meaning\hex@t@pic
      ^^J  image: \meaning\hex@t@image
      ^^J  code:  \meaning\hex@t@code
      ^^J  clip:  \meaning\hex@t@clip}
```

We check to see if we have any clipping pictures. If so, we process these in turn and append the soft path to a macro. Once this is done, we use the soft path as a clipping path for the rest of the (terrain) scope.

```
    \@ifundefined{hex@t@clip}{\let\hex@t@clip\empty}{}
    \ifx\hex@t@clip\empty\else%
      \edef\hex@t@cc{\hex@t@clip}%
      \def\hex@t@c{}
      \foreach \c in \hex@t@cc{%
        \hex@dbg{5}{Clipping to `\c'}
        \expandafter\wg@pic\c\@endwg@pic {}{\wg@tmpa,\wg@tmpb}{%
          save path=\hex@t@tmp}%
        \wg@addto@macro\hex@t@c\hex@t@tmp % Append to clippping
      }%
      \pgfsyssoftpath@setcurrentpath{\hex@t@c}% Set path
      \clip;% Clip to the path
    \fi % End of clipping terrain
```

We're new ready to make the terrain. First, we check to see if the relevant storage macros are undefined and if so, `\let` them to `\empty` so that we can deal more easily with the various cases.

```
    %% Now switch between how to draw the terrain.  If some of the
    %% macros are undefined, define them to be empty
    \@ifundefined{hex@t@pic}{\let\hex@t@pic\empty}{}
    \@ifundefined{hex@t@image}{\let\hex@t@image\empty}{}
```

```
    \@ifundefined{hex@t@code}{\let\hex@t@code\empty}{}
    \@ifundefined{hex@t@code}{\let\hex@t@code\empty}{}
```

Possible make rotation. We define a scope and rotate within that.

```
    \def\hex@t@angle{0}%
    \if@hex@t@rot%
      \pgfmathrandominteger{\hex@t@angle}{0}{5}
      \pgfmathparse{int(60*\hex@t@angle)}\edef\hex@t@angle{\pgfmathresult}%
    \else%
      \@ifundefined{hex@t@s@angle}{}{
        \ifx\hex@t@s@angle\@empty%
        \else%
          \edef\hex@t@angle{\hex@t@s@angle}%
        \fi}%
    \fi%
    \hex@dbg{5}{Will rotate terrain by `\hex@t@angle'}%
```

If we have specified code for the terrain, then execute that.

```
    \scope[rotate=\hex@t@angle]%
      \ifx\hex@t@code\empty\else\hex@t@code\fi%
    \endscope% End rotate code
```

First we check if we have not got terrain images, but terrain pictures. If we have that, we process these in turn. Note, the user can give options to each terrain picture by preceding the `pic`ture name with `[`⟨*options*⟩`]`.

```
    % If we have no image, check if we have pictures.
    \ifx\hex@t@image\empty%
      \hex@dbg{8}{No terrain images}%
      \ifx\hex@t@pic\empty\else%
        % We have pictures
        \hex@dbg{5}{Terrain pictures}%
        \pgfpointorigin\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
        \foreach \i in \hex@t@pic{%
          \wg@pic@all{\i}{}{\the\wg@tmpa,\the\wg@tmpb}{%
            rotate=\hex@t@angle,
            transform shape}}%
      \fi% We have pictures.
```

If the user specified images rather than `pic`tures, then we process these in turn. Again, the user can specify options to each terrain image by preceding the image file name with `[`⟨*options*⟩`]`.

```
      \else % We have images
        \hex@dbg{5}{Terrain images}%
        \pgfpointorigin\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
        \foreach \i in \hex@t@image{%
          \hex@dbg{10}{Terrain image: `\meaning\i'}
          \expandafter\wg@node{%
            \includegraphics[width=2cm]{\i}}\@endwg@node %
          {}{\wg@tmpa,\wg@tmpb}{%
            rotate=\hex@t@angle,%
            shape=rectangle,%
            anchor=center,%
            transform shape,%
```

```
            draw=none}%
        }
    \fi%
  \endscope% End of terrain scope
}% End of terrain
```

Next, we define some example clippings of the terrain images. Specifcally, we make clippings to sextants. We do this by first defining a macro.

`\hex@make@sextants`

When executed this macro will generate some paths that will clip to sextants. The first argument is the inner radius of the sextant and the second argument is the (possible empty) prefix to put in front of the `sextant` name.

```
\def\hex@x@r{.7}
\def\hex@make@sextants#1#2{%
  \tikzset{%
    pics/hex/#2sextant/.is choice,
    pics/hex/#2sextant/north east/.style={
      code={
        \path[pic actions](  0:1)--( 60:1)--( 60:#1)--(  0:#1)--cycle;}},
    pics/hex/#2sextant/north/.style={
      code={
        \path[pic actions]( 60:1)--(120:1)--(120:#1)--( 60:#1)--cycle;}},
    pics/hex/#2sextant/north west/.style={
      code={
        \path[pic actions](120:1)--(180:1)--(180:#1)--(120:#1)--cycle;}},
    pics/hex/#2sextant/south west/.style={
      code={
        \path[pic actions](180:1)--(240:1)--(240:#1)--(180:#1)--cycle;}},
    pics/hex/#2sextant/south/.style={
      code={
        \path[pic actions](240:1)--(300:1)--(300:#1)--(240:#1)--cycle;}},
    pics/hex/#2sextant/south east/.style={
      code={
        \path[pic actions](300:1)--(360:1)--(360:#1)--(300:#1)--cycle;}},
    pics/hex/#2sextant/center/.style={
      code={
        \path[pic actions]
        (0:#1)--
        (60:#1)--
        (120:#1)--
        (180:#1)--
        (240:#1)--
        (300:#1)--cycle;}},
    pics/hex/#2sextant/NE/.style=hex/#2sextant/north east,
    pics/hex/#2sextant/NE/.style=hex/#2sextant/north east,
    pics/hex/#2sextant/N/.style=hex/#2sextant/north,
    pics/hex/#2sextant/NW/.style=hex/#2sextant/north west,
    pics/hex/#2sextant/SW/.style=hex/#2sextant/south west,
    pics/hex/#2sextant/S/.style=hex/#2sextant/south,
    pics/hex/#2sextant/SE/.style=hex/#2sextant/south east,
    pics/hex/#2sextant/C/.style=hex/#2sextant/center,
```

```
  }%
}

\hex@make@sextants{.7}{}
\hex@make@sextants{.3}{large }
\hex@make@sextants{0}{full }
```

Next, we define some styles for styling the terrain pictures. Users can change these styles (e.g., by appending to them) to change say the colour of the terrain graphics.

hex/terrain/beach

The style for beach hexes. The pattern is filled with a yellowish colour, and drawing of the outline is disabled.

```
\tikzset{
  hex/terrain/beach/.style={%
    fill={rgb,100:red,93;green,73;blue,35},%
    draw=none%
  }%
}
```

hex/terrain/beach

Now for the actual patterns. We go in the same order as above — i.e, we start with the beach pattern. This is rather long.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/beach/.pic={
    \path[hex/terrain/beach,pic actions,draw=none]
    (-0.4931, 0.8848)
    -- (-0.4998, 0.8734)
    .. controls (-0.4908, 0.8731) and (-0.4813, 0.8762) .. (-0.4762, 0.8847)
    --cycle
    (-0.4032, 0.8841)
    .. controls (-0.4004, 0.8804) and (-0.3988, 0.8794) .. (-0.3956, 0.8745)
    .. controls (-0.3760, 0.8443) and (-0.3811, 0.8330) .. (-0.3456, 0.8112)
    .. controls (-0.3250, 0.7986) and (-0.2712, 0.7770) .. (-0.2531, 0.8032)
    .. controls (-0.2294, 0.8375) and (-0.2984, 0.8503) .. (-0.3193, 0.8690)
    .. controls (-0.3243, 0.8735) and (-0.3281, 0.8785) .. (-0.3321, 0.8835)
    --cycle
    (-0.2462, 0.8828)
    .. controls (-0.2425, 0.8681) and (-0.2383, 0.8546) .. (-0.2293, 0.8461)
    .. controls (-0.2102, 0.8280) and (-0.1892, 0.8390) .. (-0.1859, 0.8669)
    .. controls (-0.1854, 0.8711) and (-0.1871, 0.8772) .. (-0.1875, 0.8822)
    --cycle
```

```
    (-0.0997, 0.8815)
    .. controls (-0.0971, 0.8706) and (-0.0941, 0.8597) .. (-0.0907, 0.8493)
    -- (-0.0570, 0.8578)
    .. controls (-0.0570, 0.8629) and (-0.0560, 0.8730) .. (-0.0553, 0.8812)
    --cycle
    ( 0.0213, 0.8805)
    .. controls ( 0.0222, 0.8725) and ( 0.0235, 0.8650) .. ( 0.0262, 0.8587)
    .. controls ( 0.0391, 0.8281) and ( 0.0706, 0.8199) .. ( 0.0917, 0.7894)
    .. controls ( 0.1112, 0.7609) and ( 0.1058, 0.7286) .. ( 0.1050, 0.6961)
    -- ( 0.1731, 0.7216)
    -- ( 0.1203, 0.8649)
    -- ( 0.1097, 0.8797)
    --cycle
    ( 0.2978, 0.8781)
    .. controls ( 0.2985, 0.8773) and ( 0.3002, 0.8756) .. ( 0.3008, 0.8749)
    .. controls ( 0.2854, 0.8687) and ( 0.2549, 0.8572) .. ( 0.2421, 0.8487)
    .. controls ( 0.2026, 0.8224) and ( 0.1905, 0.7567) .. ( 0.2046, 0.7132)
    .. controls ( 0.2146, 0.6819) and ( 0.2330, 0.6680) .. ( 0.2394, 0.6280)
    .. controls ( 0.2413, 0.6160) and ( 0.2468, 0.5527) .. ( 0.2446, 0.5437)
    .. controls ( 0.2396, 0.5232) and ( 0.2211, 0.5122) .. ( 0.2231, 0.4913)
    .. controls ( 0.2261, 0.4603) and ( 0.2686, 0.4388) .. ( 0.2891, 0.4194)
    .. controls ( 0.3020, 0.4071) and ( 0.3136, 0.3895) .. ( 0.3281, 0.3799)
    .. controls ( 0.3688, 0.3533) and ( 0.3905, 0.3863) .. ( 0.4199, 0.3902)
    .. controls ( 0.4350, 0.3921) and ( 0.4560, 0.3849) .. ( 0.4710, 0.3812)
    -- ( 0.4795, 0.4067)
    -- ( 0.4965, 0.4067)
    .. controls ( 0.5008, 0.3961) and ( 0.5009, 0.3893) .. ( 0.5112, 0.3811)
    .. controls ( 0.5112, 0.3811) and ( 0.6172, 0.3385) .. ( 0.6481, 0.3037)
    .. controls ( 0.6729, 0.2758) and ( 0.6641, 0.2532) .. ( 0.6667, 0.2206)
    -- ( 0.7004, 0.2206)
    .. controls ( 0.7839, 0.2118) and ( 0.7047, 0.0740) .. ( 0.7057, 0.0568)
    .. controls ( 0.7067, 0.0396) and ( 0.7865,-0.0424) .. ( 0.8032,-0.0520)
    .. controls ( 0.8251,-0.0644) and ( 0.8703,-0.0686) .. ( 0.8572,-0.0293)
    .. controls ( 0.8518,-0.0131) and ( 0.7996, 0.0474) .. ( 0.7843, 0.0564)
    .. controls ( 0.7724, 0.0633) and ( 0.7645, 0.0636) .. ( 0.7518, 0.0664)
    .. controls ( 0.7688, 0.1093) and ( 0.7993, 0.1905) .. ( 0.7930, 0.2362)
    .. controls ( 0.7869, 0.2804) and ( 0.7252, 0.2982) .. ( 0.6946, 0.3268)
    .. controls ( 0.6664, 0.3531) and ( 0.6746, 0.3662) .. ( 0.6323, 0.3966)
    .. controls ( 0.5760, 0.4371) and ( 0.5386, 0.4324) .. ( 0.5250, 0.4601)
    .. controls ( 0.5090, 0.4927) and ( 0.5578, 0.6035) .. ( 0.5969, 0.5911)
    .. controls ( 0.6199, 0.5839) and ( 0.6224, 0.5471) .. ( 0.6341, 0.5291)
    .. controls ( 0.6488, 0.5064) and ( 0.7020, 0.4614) .. ( 0.7263, 0.4493)
    -- ( 0.7373, 0.4768)
    -- ( 0.6866, 0.5671)
    -- ( 0.6756, 0.5720)
    -- ( 0.6766, 0.5850)
    -- ( 0.6331, 0.6627)
    .. controls ( 0.6280, 0.6613) and ( 0.6239, 0.6599) .. ( 0.6157, 0.6589)
    -- ( 0.5646, 0.6589)
    .. controls ( 0.5375, 0.6557) and ( 0.5277, 0.6432) .. ( 0.4965, 0.6489)
    .. controls ( 0.4716, 0.6520) and ( 0.4306, 0.6774) .. ( 0.4104, 0.6489)
    .. controls ( 0.3809, 0.6093) and ( 0.4627, 0.6240) .. ( 0.4837, 0.5772)
    .. controls ( 0.4958, 0.5502) and ( 0.4652, 0.4811) .. ( 0.4429, 0.4648)
```

```
    -- ( 0.3523, 0.4350)
    .. controls ( 0.3178, 0.4372) and ( 0.3207, 0.4766) .. ( 0.3153, 0.5004)
    .. controls ( 0.3090, 0.5282) and ( 0.2968, 0.5398) .. ( 0.2922, 0.5684)
    .. controls ( 0.2896, 0.6035) and ( 0.3061, 0.6276) .. ( 0.2922, 0.6621)
    .. controls ( 0.2756, 0.6961) and ( 0.2422, 0.7190) .. ( 0.2525, 0.7640)
    .. controls ( 0.2650, 0.8188) and ( 0.3165, 0.7932) .. ( 0.3324, 0.8417)
    .. controls ( 0.3359, 0.8522) and ( 0.3385, 0.8648) .. ( 0.3399, 0.8778)
    --cycle
    ( 0.4261, 0.8770)
    -- ( 0.4333, 0.8493)
    -- ( 0.4845, 0.7440)
    .. controls ( 0.4963, 0.7304) and ( 0.5450, 0.6930) .. ( 0.5630, 0.6989)
    .. controls ( 0.5735, 0.7024) and ( 0.5838, 0.7169) .. ( 0.5932, 0.7337)
    -- ( 0.5612, 0.7909)
    .. controls ( 0.5537, 0.7875) and ( 0.5468, 0.7852) .. ( 0.5403, 0.7864)
    .. controls ( 0.5078, 0.7926) and ( 0.5191, 0.8406) .. ( 0.5145, 0.8567)
    .. controls ( 0.5121, 0.8651) and ( 0.5076, 0.8710) .. ( 0.5025, 0.8764)
    --cycle
    ( 0.3773, 0.8153)
    .. controls ( 0.3625, 0.7892) and ( 0.2993, 0.7161) .. ( 0.3316, 0.6877)
    .. controls ( 0.3432, 0.6774) and ( 0.3866, 0.6728) .. ( 0.4029, 0.6706)
    -- ( 0.3973, 0.7472)
    -- ( 0.4029, 0.8153)
    --cycle
    (-0.4224, 0.8088)
    .. controls (-0.4416, 0.8077) and (-0.4585, 0.7826) .. (-0.4275, 0.7562)
    -- (-0.3971, 0.7387)
    .. controls (-0.4780, 0.6942) and (-0.4752, 0.6640) .. (-0.4591, 0.5855)
    .. controls (-0.4391, 0.4887) and (-0.4527, 0.5347) .. (-0.4103, 0.4493)
    .. controls (-0.3870, 0.4026) and (-0.4070, 0.3747) .. (-0.3460, 0.3642)
    -- (-0.3352, 0.4823)
    .. controls (-0.3409, 0.5024) and (-0.3617, 0.5113) .. (-0.3739, 0.5281)
    -- (-0.4164, 0.6287)
    .. controls (-0.4188, 0.6375) and (-0.4186, 0.6444) .. (-0.4164, 0.6528)
    .. controls (-0.4067, 0.6807) and (-0.3521, 0.7255) .. (-0.3274, 0.6931)
    .. controls (-0.3070, 0.6694) and (-0.3336, 0.6432) .. (-0.3274, 0.6221)
    .. controls (-0.3249, 0.6055) and (-0.3059, 0.6028) .. (-0.2950, 0.6162)
    .. controls (-0.2867, 0.6265) and (-0.2838, 0.6558) .. (-0.2829, 0.6692)
    .. controls (-0.2775, 0.7444) and (-0.3333, 0.7652) .. (-0.3955, 0.7472)
    .. controls (-0.3950, 0.7586) and (-0.3916, 0.7684) .. (-0.3955, 0.7803)
    .. controls (-0.3986, 0.8016) and (-0.4109, 0.8096) .. (-0.4224, 0.8088)
    --cycle
    (-0.1391, 0.8077)
    .. controls (-0.1634, 0.8024) and (-0.1582, 0.7647) .. (-0.1487, 0.7492)
    .. controls (-0.1306, 0.7190) and (-0.1004, 0.7270) .. (-0.0652, 0.7073)
    -- (-0.0226, 0.6801)
    -- ( 0.0282, 0.6560)
    .. controls ( 0.0622, 0.6331) and ( 0.0955, 0.5639) .. ( 0.1219, 0.5259)
    .. controls ( 0.2125, 0.5714) and ( 0.1427, 0.6114) .. ( 0.1219, 0.6453)
    -- ( 0.1054, 0.6768)
    .. controls ( 0.0862, 0.7028) and ( 0.0448, 0.7080) .. ( 0.0115, 0.7299)
    .. controls (-0.0377, 0.7622) and (-0.0173, 0.7726) .. (-0.0822, 0.7918)
    .. controls (-0.0961, 0.7958) and (-0.1270, 0.8103) .. (-0.1391, 0.8077)
```

```
--cycle
(-0.5460, 0.7940)
-- (-0.5911, 0.7166)
.. controls (-0.5649, 0.7015) and (-0.5397, 0.7188) .. (-0.5308, 0.7556)
.. controls (-0.5251, 0.7788) and (-0.5335, 0.7873) .. (-0.5460, 0.7940)
--cycle
(-0.2382, 0.7423)
.. controls (-0.2453, 0.7424) and (-0.2512, 0.7383) .. (-0.2550, 0.7274)
.. controls (-0.2635, 0.7026) and (-0.2353, 0.6726) .. (-0.2229, 0.6536)
.. controls (-0.2031, 0.6234) and (-0.2020, 0.6105) .. (-0.1928, 0.5770)
.. controls (-0.1763, 0.5803) and (-0.1499, 0.5890) .. (-0.1342, 0.5831)
.. controls (-0.1112, 0.5745) and (-0.1047, 0.5481) .. (-0.0866, 0.5338)
-- (-0.0397, 0.5102)
-- ( 0.0664, 0.4219)
.. controls ( 0.0874, 0.3954) and ( 0.0785, 0.3655) .. ( 0.1070, 0.3502)
.. controls ( 0.1367, 0.3343) and ( 0.1690, 0.3592) .. ( 0.1732, 0.3899)
.. controls ( 0.1755, 0.4075) and ( 0.1545, 0.4554) .. ( 0.1475, 0.4748)
.. controls ( 0.0838, 0.4666) and ( 0.0509, 0.4836) .. ( 0.0454, 0.5515)
.. controls (-0.0576, 0.5778) and (-0.0955, 0.6323) .. (-0.1754, 0.6949)
.. controls (-0.1861, 0.7034) and (-0.2171, 0.7418) .. (-0.2382, 0.7423)
--cycle
(-0.5068, 0.6706)
.. controls (-0.5119, 0.6724) and (-0.5194, 0.6726) .. (-0.5299, 0.6701)
.. controls (-0.5512, 0.6413) and (-0.5242, 0.6333) .. (-0.5102, 0.6400)
.. controls (-0.4981, 0.6457) and (-0.4916, 0.6653) .. (-0.5068, 0.6706)
--cycle
(-0.6356, 0.6402)
-- (-0.6681, 0.5845)
-- (-0.6588, 0.5684)
.. controls (-0.6473, 0.5521) and (-0.6323, 0.5371) .. (-0.6265, 0.5174)
.. controls (-0.6174, 0.4865) and (-0.6614, 0.4161) .. (-0.6950, 0.4206)
.. controls (-0.7111, 0.4226) and (-0.7174, 0.4376) .. (-0.7460, 0.4507)
-- (-0.7632, 0.4212)
.. controls (-0.7629, 0.4042) and (-0.7611, 0.3875) .. (-0.7546, 0.3789)
.. controls (-0.7424, 0.3626) and (-0.7129, 0.3612) .. (-0.6966, 0.3297)
.. controls (-0.6823, 0.3022) and (-0.6963, 0.2741) .. (-0.6808, 0.2598)
.. controls (-0.6602, 0.2410) and (-0.6495, 0.2720) .. (-0.6484, 0.2878)
.. controls (-0.6461, 0.3229) and (-0.6488, 0.4046) .. (-0.6080, 0.4204)
.. controls (-0.5750, 0.4330) and (-0.4980, 0.3514) .. (-0.4929, 0.3217)
.. controls (-0.4895, 0.3019) and (-0.5044, 0.2671) .. (-0.4860, 0.2550)
.. controls (-0.4691, 0.2439) and (-0.4582, 0.2679) .. (-0.4535, 0.2796)
.. controls (-0.4450, 0.3015) and (-0.4273, 0.3562) .. (-0.4401, 0.3771)
.. controls (-0.4495, 0.3922) and (-0.5019, 0.4172) .. (-0.5296, 0.4507)
.. controls (-0.5656, 0.4941) and (-0.5734, 0.5631) .. (-0.5973, 0.6021)
.. controls (-0.6099, 0.6226) and (-0.6226, 0.6316) .. (-0.6356, 0.6402)
--cycle
( 0.2242, 0.6110)
-- ( 0.1816, 0.6025)
-- ( 0.1816, 0.5855)
.. controls ( 0.2117, 0.5815) and ( 0.2140, 0.5821) .. ( 0.2242, 0.6110)
--cycle
( 0.3924, 0.6049)
.. controls ( 0.3895, 0.6048) and ( 0.3860, 0.6036) .. ( 0.3820, 0.6011)
```

```
    .. controls ( 0.3535, 0.5835) and ( 0.3670, 0.5238) .. ( 0.3773, 0.5004)
    -- ( 0.3944, 0.5004)
    -- ( 0.4061, 0.5429)
    .. controls ( 0.4082, 0.5540) and ( 0.4130, 0.6056) .. ( 0.3924, 0.6049)
    --cycle
    (-0.2864, 0.5940)
    .. controls (-0.2904, 0.5793) and (-0.2950, 0.5676) .. (-0.2919, 0.5518)
    .. controls (-0.2769, 0.4768) and (-0.1616, 0.5041) .. (-0.2162, 0.5623)
    .. controls (-0.2236, 0.5702) and (-0.2346, 0.5747) .. (-0.2443, 0.5790)
    --cycle
    (-0.7010, 0.5280)
    -- (-0.7269, 0.4835)
    .. controls (-0.7207, 0.4876) and (-0.7144, 0.4952) .. (-0.7081, 0.5094)
    --cycle
    (-0.0992, 0.4748)
    -- (-0.2099, 0.4556)
    -- (-0.2888, 0.3790)
    -- (-0.3460, 0.3557)
    -- (-0.3389, 0.3218)
    .. controls (-0.3310, 0.2959) and (-0.3026, 0.2636) .. (-0.2781, 0.2927)
    .. controls (-0.2745, 0.2971) and (-0.2504, 0.3947) .. (-0.1948, 0.3764)
    .. controls (-0.1607, 0.3651) and (-0.1697, 0.2984) .. (-0.1588, 0.2536)
    -- (-0.1503, 0.2536)
    -- (-0.1503, 0.2450)
    -- (-0.1163, 0.2366)
    .. controls (-0.0968, 0.3059) and (-0.1262, 0.3371) .. (-0.1239, 0.3982)
    .. controls (-0.1229, 0.4261) and (-0.1067, 0.4484) .. (-0.0992, 0.4748)
    --cycle
    (-0.1503, 0.2450)
    -- (-0.1588, 0.2536)
    .. controls (-0.2292, 0.2544) and (-0.2730, 0.2893) .. (-0.2677, 0.2195)
    -- (-0.2609, 0.1855)
    .. controls (-0.2393, 0.1890) and (-0.2005, 0.2039) .. (-0.1909, 0.1753)
    .. controls (-0.1709, 0.1163) and (-0.2582, 0.0953) .. (-0.2387, 0.0533)
    .. controls (-0.2275, 0.0292) and (-0.1430, 0.0537) .. (-0.1361, 0.0692)
    .. controls (-0.1250, 0.0859) and (-0.1359, 0.1083) .. (-0.1361, 0.1259)
    .. controls (-0.1437, 0.1788) and (-0.1186, 0.1766) .. (-0.1503, 0.2450)
    --cycle
    ( 0.7348, 0.4408)
    .. controls ( 0.7113, 0.3774) and ( 0.7569, 0.3513) .. ( 0.7901, 0.3824)
    -- ( 0.7585, 0.4390)
    --cycle
    ( 0.2071, 0.4153)
    .. controls ( 0.1984, 0.3706) and ( 0.2118, 0.3204) .. ( 0.2582, 0.3046)
    .. controls ( 0.2685, 0.3631) and ( 0.2706, 0.3931) .. ( 0.2071, 0.4153)
    --cycle
    (-0.0567, 0.3982)
    .. controls (-0.0558, 0.3230) and (-0.0460, 0.3456) .. (-0.0210, 0.2876)
    -- ( 0.0067, 0.1940)
    .. controls ( 0.0180, 0.1513) and ( 0.0026, 0.1332) .. ( 0.0454, 0.1089)
    -- ( 0.0767, 0.1940)
    -- ( 0.0546, 0.2621)
    -- ( 0.0406, 0.3185)
```

```
    -- (-0.0258, 0.3896)
    --cycle
    (-0.7969, 0.3634)
    -- (-0.8570, 0.2602)
    .. controls (-0.8515, 0.2550) and (-0.8469, 0.2514) .. (-0.8414, 0.2450)
    .. controls (-0.8020, 0.1990) and (-0.8201, 0.1971) .. (-0.7629, 0.1540)
    .. controls (-0.7462, 0.1414) and (-0.7054, 0.1023) .. (-0.6834, 0.1181)
    .. controls (-0.6662, 0.1304) and (-0.6813, 0.1625) .. (-0.6882, 0.1768)
    .. controls (-0.7213, 0.2456) and (-0.7865, 0.2417) .. (-0.8004, 0.2965)
    .. controls (-0.8052, 0.3154) and (-0.7990, 0.3413) .. (-0.7969, 0.3634)
    --cycle
    ( 0.8244, 0.3214)
    .. controls ( 0.8136, 0.3128) and ( 0.8080, 0.2984) .. ( 0.8114, 0.2706)
    .. controls ( 0.8314, 0.2739) and ( 0.8424, 0.2735) .. ( 0.8526, 0.2710)
    --cycle
    ( 0.5015, 0.3207)
    .. controls ( 0.4943, 0.3196) and ( 0.4861, 0.3171) .. ( 0.4766, 0.3130)
    .. controls ( 0.4611, 0.2827) and ( 0.4839, 0.2747) .. ( 0.5028, 0.2521)
    -- ( 0.5376, 0.1972)
    .. controls ( 0.5529, 0.1772) and ( 0.5728, 0.1698) .. ( 0.5845, 0.1426)
    .. controls ( 0.5979, 0.1115) and ( 0.5837, 0.0732) .. ( 0.5987, 0.0532)
    .. controls ( 0.6095, 0.0384) and ( 0.6236, 0.0428) .. ( 0.6350, 0.0532)
    .. controls ( 0.6681, 0.0842) and ( 0.6456, 0.1087) .. ( 0.6482, 0.1429)
    .. controls ( 0.6481, 0.1614) and ( 0.6596, 0.1802) .. ( 0.6482, 0.1967)
    .. controls ( 0.6390, 0.2131) and ( 0.5992, 0.2239) .. ( 0.5768, 0.2483)
    .. controls ( 0.5547, 0.2722) and ( 0.5524, 0.3288) .. ( 0.5015, 0.3207)
    --cycle
    (-0.5678, 0.3115)
    .. controls (-0.5832, 0.3118) and (-0.6140, 0.2810) .. (-0.6269, 0.2706)
    .. controls (-0.6185, 0.2412) and (-0.5926, 0.1953) .. (-0.5973, 0.1685)
    .. controls (-0.6029, 0.1373) and (-0.6320, 0.1239) .. (-0.6369, 0.0996)
    .. controls (-0.6406, 0.0816) and (-0.6303, 0.0652) .. (-0.6237, 0.0493)
    .. controls (-0.6147, 0.0275) and (-0.6000,-0.0443) .. (-0.5641,-0.0258)
    .. controls (-0.5134,-0.0018) and (-0.5902, 0.0606) .. (-0.5641, 0.1074)
    .. controls (-0.5332, 0.1697) and (-0.4913, 0.1444) .. (-0.4481, 0.1593)
    .. controls (-0.3913, 0.1792) and (-0.3439, 0.2446) .. (-0.3545, 0.3046)
    -- (-0.4568, 0.2201)
    -- (-0.5588, 0.2201)
    .. controls (-0.5549, 0.2390) and (-0.5305, 0.3109) .. (-0.5678, 0.3115)
    --cycle
    ( 0.2243, 0.2813)
    -- ( 0.1631, 0.2450)
    -- ( 0.0965, 0.2281)
    -- ( 0.1689, 0.1131)
    -- ( 0.2065, 0.0861)
    .. controls ( 0.2453, 0.0564) and ( 0.2384, 0.0410) .. ( 0.2923, 0.0323)
    -- ( 0.2988,-0.0188)
    .. controls ( 0.2994,-0.0695) and ( 0.2657,-0.0796) .. ( 0.2249,-0.0579)
    .. controls ( 0.1337,-0.0093) and ( 0.1545, 0.0219) .. ( 0.1102, 0.0744)
    .. controls ( 0.0914, 0.0967) and ( 0.0807, 0.1010) .. ( 0.0539, 0.1089)
    .. controls ( 0.0562, 0.0613) and ( 0.0756,-0.0434) .. ( 0.0403,-0.0825)
    .. controls ( 0.0293,-0.0948) and (-0.0336,-0.1168) .. (-0.0567,-0.1294)
    .. controls (-0.0615,-0.1087) and (-0.0777,-0.0729) .. (-0.0703,-0.0546)
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    .. controls (-0.0586,-0.0251) and ( 0.0562, 0.0040) .. (-0.0152, 0.0389)
    -- (-0.0397, 0.0480)
    -- (-0.0737, 0.0578)
    .. controls (-0.0806, 0.0391) and (-0.0849, 0.0192) .. (-0.1018, 0.0068)
    .. controls (-0.1154,-0.0032) and (-0.1352,-0.0018) .. (-0.1438,-0.0212)
    .. controls (-0.1562,-0.0491) and (-0.1117,-0.1243) .. (-0.0874,-0.1373)
    .. controls (-0.0745,-0.1434) and (-0.0687,-0.1394) .. (-0.0567,-0.1373)
    .. controls (-0.0358,-0.2033) and (-0.0062,-0.1612) .. ( 0.0370,-0.1500)
    -- ( 0.1050,-0.1379)
    .. controls ( 0.0882,-0.0871) and ( 0.0808,-0.0999) .. ( 0.0965,-0.0443)
    .. controls ( 0.1454,-0.0619) and ( 0.1336,-0.0743) .. ( 0.1664,-0.0940)
    .. controls ( 0.1897,-0.1081) and ( 0.2226,-0.1052) .. ( 0.2361,-0.1388)
    .. controls ( 0.2495,-0.1724) and ( 0.2245,-0.1963) .. ( 0.2412,-0.2584)
    .. controls ( 0.2526,-0.2569) and ( 0.2622,-0.2548) .. ( 0.2735,-0.2584)
    .. controls ( 0.2987,-0.2708) and ( 0.3225,-0.3241) .. ( 0.3212,-0.3506)
    .. controls ( 0.3203,-0.3711) and ( 0.3053,-0.3950) .. ( 0.3008,-0.4443)
    -- ( 0.2497,-0.4187)
    .. controls ( 0.2599,-0.4479) and ( 0.2621,-0.4475) .. ( 0.2905,-0.4528)
    .. controls ( 0.2877,-0.4715) and ( 0.2799,-0.4998) .. ( 0.2905,-0.5182)
    .. controls ( 0.2991,-0.5392) and ( 0.3228,-0.5357) .. ( 0.3346,-0.5182)
    .. controls ( 0.3506,-0.4943) and ( 0.3355,-0.4515) .. ( 0.3532,-0.4203)
    .. controls ( 0.3716,-0.3881) and ( 0.4096,-0.3844) .. ( 0.4084,-0.3499)
    .. controls ( 0.4074,-0.3241) and ( 0.3866,-0.3087) .. ( 0.3728,-0.2897)
    -- ( 0.3426,-0.2337)
    -- ( 0.2989,-0.1879)
    .. controls ( 0.2810,-0.1587) and ( 0.2976,-0.1327) .. ( 0.3187,-0.1323)
    .. controls ( 0.3342,-0.1319) and ( 0.3489,-0.1451) .. ( 0.3603,-0.1541)
    .. controls ( 0.3817,-0.1712) and ( 0.4026,-0.1894) .. ( 0.4144,-0.2146)
    .. controls ( 0.4299,-0.2477) and ( 0.4289,-0.2977) .. ( 0.4712,-0.3110)
    .. controls ( 0.4957,-0.3188) and ( 0.5167,-0.3024) .. ( 0.5044,-0.2753)
    .. controls ( 0.4967,-0.2585) and ( 0.4769,-0.2471) .. ( 0.4676,-0.2227)
    .. controls ( 0.4582,-0.1981) and ( 0.4681,-0.1743) .. ( 0.4488,-0.1492)
    .. controls ( 0.4286,-0.1227) and ( 0.3809,-0.1095) .. ( 0.3621,-0.0696)
    .. controls ( 0.3402,-0.0230) and ( 0.3896, 0.0270) .. ( 0.3092, 0.0408)
    -- ( 0.3532, 0.1933)
    -- ( 0.3944, 0.2536)
    -- ( 0.3433, 0.2765)
    --cycle
    ( 0.2497, 0.2450)
    -- ( 0.2782, 0.2025)
    .. controls ( 0.2843, 0.1911) and ( 0.2884, 0.1815) .. ( 0.2900, 0.1685)
    .. controls ( 0.3021, 0.0654) and ( 0.1495, 0.1479) .. ( 0.2135, 0.2245)
    .. controls ( 0.2246, 0.2378) and ( 0.2346, 0.2396) .. ( 0.2497, 0.2450)
    --cycle
    ( 0.8836, 0.2157)
    .. controls ( 0.8688, 0.2061) and ( 0.8571, 0.1889) .. ( 0.8687, 0.1736)
    .. controls ( 0.8785, 0.1608) and ( 0.8967, 0.1613) .. ( 0.9161, 0.1578)
    --cycle
    (-0.3035, 0.1940)
    .. controls (-0.3340, 0.1390) and (-0.3508, 0.1491) .. (-0.3624, 0.1300)
    .. controls (-0.3738, 0.1112) and (-0.3588, 0.0896) .. (-0.3288, 0.0972)
    .. controls (-0.2842, 0.1084) and (-0.2392, 0.1714) .. (-0.3035, 0.1940)
    --cycle
```

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    ( 0.4710, 0.1940)
    .. controls ( 0.4330, 0.1525) and ( 0.3961, 0.1447) .. ( 0.4114, 0.0833)
    .. controls ( 0.4294, 0.0897) and ( 0.4596, 0.1056) .. ( 0.4776, 0.0984)
    .. controls ( 0.5010, 0.0888) and ( 0.5182, 0.0420) .. ( 0.4925, 0.0231)
    .. controls ( 0.4698, 0.0064) and ( 0.4500, 0.0299) .. ( 0.3944, 0.0153)
    .. controls ( 0.4243,-0.0189) and ( 0.4618,-0.0333) .. ( 0.4765,-0.0621)
    .. controls ( 0.4928,-0.0939) and ( 0.4729,-0.1183) .. ( 0.4881,-0.1406)
    .. controls ( 0.4977,-0.1549) and ( 0.5241,-0.1630) .. ( 0.5425,-0.1894)
    .. controls ( 0.5557,-0.2085) and ( 0.5562,-0.2282) .. ( 0.5657,-0.2485)
    -- ( 0.6122,-0.3251)
    .. controls ( 0.6335,-0.3720) and ( 0.6160,-0.3973) .. ( 0.6323,-0.4443)
    .. controls ( 0.6532,-0.5042) and ( 0.6754,-0.5231) .. ( 0.6973,-0.5440)
    -- ( 0.7289,-0.4899)
    .. controls ( 0.7138,-0.4739) and ( 0.6992,-0.4579) .. ( 0.6886,-0.4358)
    -- ( 0.6489,-0.2690)
    .. controls ( 0.6485,-0.2445) and ( 0.6654,-0.2180) .. ( 0.6598,-0.2002)
    .. controls ( 0.6522,-0.1752) and ( 0.6202,-0.1899) .. ( 0.5938,-0.1612)
    .. controls ( 0.5619,-0.1263) and ( 0.5907,-0.0980) .. ( 0.5797,-0.0720)
    .. controls ( 0.5714,-0.0525) and ( 0.5434,-0.0441) .. ( 0.5374,-0.0184)
    .. controls ( 0.5319, 0.0056) and ( 0.5522, 0.0300) .. ( 0.5533, 0.0578)
    .. controls ( 0.5548, 0.0943) and ( 0.4981, 0.1701) .. ( 0.4710, 0.1940)
    --cycle
    (-0.9001, 0.1862)
    -- (-0.9386, 0.1201)
    .. controls (-0.9374, 0.1181) and (-0.9371, 0.1158) .. (-0.9356, 0.1139)
    .. controls (-0.9242, 0.0996) and (-0.9046, 0.0893) .. (-0.8911, 0.0660)
    .. controls (-0.8684, 0.0268) and (-0.8960, 0.0297) .. (-0.8592,-0.0296)
    .. controls (-0.8262,-0.0830) and (-0.8655,-0.1092) .. (-0.7971,-0.1209)
    -- (-0.7875, 0.0068)
    -- (-0.8579, 0.1174)
    --cycle
    (-0.4453, 0.0979)
    .. controls (-0.4922, 0.0916) and (-0.4988, 0.0347) .. (-0.4759, 0.0116)
    .. controls (-0.4491,-0.0149) and (-0.4165, 0.0208) .. (-0.3900, 0.0116)
    .. controls (-0.3555,-0.0011) and (-0.3800,-0.0410) .. (-0.3751,-0.0698)
    -- (-0.3537,-0.1294)
    .. controls (-0.3428,-0.1879) and (-0.4042,-0.1777) .. (-0.3801,-0.2656)
    .. controls (-0.3617,-0.2531) and (-0.3352,-0.2292) .. (-0.3122,-0.2330)
    .. controls (-0.2845,-0.2375) and (-0.2669,-0.2694) .. (-0.2543,-0.2911)
    .. controls (-0.2183,-0.3533) and (-0.2004,-0.3613) .. (-0.2184,-0.4358)
    .. controls (-0.3300,-0.4097) and (-0.2723,-0.5065) .. (-0.2483,-0.5549)
    -- (-0.2129,-0.6314)
    .. controls (-0.2017,-0.6508) and (-0.1900,-0.6661) .. (-0.1670,-0.6712)
    .. controls (-0.1211,-0.6813) and (-0.1100,-0.6527) .. (-0.1163,-0.6145)
    .. controls (-0.1327,-0.6119) and (-0.1427,-0.6118) .. (-0.1568,-0.6009)
    .. controls (-0.1780,-0.5845) and (-0.2123,-0.5041) .. (-0.2042,-0.4783)
    .. controls (-0.1947,-0.4484) and (-0.1575,-0.4121) .. (-0.1333,-0.3932)
    -- (-0.1527,-0.3251)
    -- (-0.1588,-0.2656)
    .. controls (-0.2187,-0.2715) and (-0.2083,-0.2536) .. (-0.2457,-0.2163)
    .. controls (-0.2684,-0.1935) and (-0.2911,-0.1886) .. (-0.2996,-0.1546)
    -- (-0.2996,-0.1209)
    -- (-0.3232,-0.0698)
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    .. controls (-0.3283,-0.0435) and (-0.3124,-0.0260) .. (-0.3175,-0.0041)
    .. controls (-0.3251, 0.0283) and (-0.3891, 0.0917) .. (-0.4227, 0.0973)
    .. controls (-0.4311, 0.0987) and (-0.4386, 0.0989) .. (-0.4453, 0.0979)
    --cycle
    (-0.1163,-0.6145)
    -- (-0.0812,-0.6009)
    -- (-0.0509,-0.4868)
    -- (-0.0567,-0.4528)
    .. controls (-0.1227,-0.4845) and (-0.1350,-0.5483) .. (-0.1163,-0.6145)
    --cycle
    ( 0.9165, 0.0573)
    .. controls ( 0.8982, 0.0512) and ( 0.8800, 0.0260) .. ( 0.8880,-0.0013)
    .. controls ( 0.8973,-0.0334) and ( 0.9330,-0.0408) .. ( 0.9466,-0.0703)
    .. controls ( 0.9528,-0.0838) and ( 0.9514,-0.0964) .. ( 0.9506,-0.1091)
    -- ( 1.0000,-0.0243)
    .. controls ( 0.9816,-0.0179) and ( 0.9678,-0.0119) .. ( 0.9563, 0.0077)
    .. controls ( 0.9465, 0.0244) and ( 0.9476, 0.0488) .. ( 0.9340, 0.0564)
    .. controls ( 0.9288, 0.0593) and ( 0.9227, 0.0593) .. ( 0.9165, 0.0573)
    --cycle
    (-0.7064, 0.0069)
    .. controls (-0.7128, 0.0077) and (-0.7187, 0.0075) .. (-0.7237, 0.0061)
    .. controls (-0.7255, 0.0030) and (-0.7310, 0.0025) .. (-0.7316,-0.0115)
    .. controls (-0.7321,-0.0230) and (-0.7071,-0.1058) .. (-0.6984,-0.1096)
    .. controls (-0.6872,-0.1176) and (-0.6721,-0.1116) .. (-0.6609,-0.1096)
    .. controls (-0.6502,-0.1046) and (-0.6316,-0.0986) .. (-0.6242,-0.0900)
    .. controls (-0.5901,-0.0507) and (-0.6615, 0.0017) .. (-0.7064, 0.0069)
    --cycle
    (-1.0000, 0.0068)
    -- (-1.0000, 0.0020)
    -- (-0.9548,-0.0788)
    .. controls (-0.9170,-0.0310) and (-0.9342,-0.0158) .. (-1.0000, 0.0068)
    --cycle
    (-0.2643, 0.0054)
    .. controls (-0.2853,-0.0295) and (-0.2523,-0.0713) .. (-0.2182,-0.0843)
    .. controls (-0.2024,-0.0902) and (-0.1781,-0.0944) .. (-0.1687,-0.0757)
    .. controls (-0.1530,-0.0441) and (-0.2378, 0.0095) .. (-0.2643, 0.0054)
    --cycle
    ( 0.6299,-0.0102)
    .. controls ( 0.6155,-0.0145) and ( 0.6071,-0.0342) .. ( 0.6128,-0.0510)
    .. controls ( 0.6198,-0.0721) and ( 0.6440,-0.0790) .. ( 0.6606,-0.0986)
    .. controls ( 0.6738,-0.1143) and ( 0.6761,-0.1328) .. ( 0.6948,-0.1437)
    .. controls ( 0.7092,-0.1520) and ( 0.7311,-0.1484) .. ( 0.7401,-0.1664)
    .. controls ( 0.7461,-0.1784) and ( 0.7351,-0.2363) .. ( 0.7348,-0.2570)
    .. controls ( 0.7336,-0.3524) and ( 0.7289,-0.3324) .. ( 0.7620,-0.4187)
    .. controls ( 0.7631,-0.4216) and ( 0.7642,-0.4246) .. ( 0.7652,-0.4275)
    -- ( 0.8003,-0.3672)
    .. controls ( 0.7976,-0.3636) and ( 0.7942,-0.3606) .. ( 0.7918,-0.3568)
    .. controls ( 0.7778,-0.3349) and ( 0.7645,-0.2537) .. ( 0.7970,-0.2417)
    .. controls ( 0.8206,-0.2330) and ( 0.8347,-0.2671) .. ( 0.8432,-0.2822)
    -- ( 0.8469,-0.2872)
    -- ( 0.8787,-0.2326)
    -- ( 0.8594,-0.1993)
    .. controls ( 0.8496,-0.1847) and ( 0.7996,-0.1314) .. ( 0.7847,-0.1281)
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    .. controls ( 0.7712,-0.1229) and ( 0.7642,-0.1268) .. ( 0.7518,-0.1281)
    .. controls ( 0.7451,-0.1148) and ( 0.7397,-0.1014) .. ( 0.7293,-0.0886)
    -- ( 0.6461,-0.0117)
    .. controls ( 0.6402,-0.0090) and ( 0.6347,-0.0087) .. ( 0.6299,-0.0102)
    --cycle
    (-0.5178,-0.0844)
    .. controls (-0.5451,-0.0820) and (-0.5852,-0.0947) .. (-0.5902,-0.1144)
    .. controls (-0.6007,-0.1557) and (-0.5621,-0.1731) .. (-0.5414,-0.1997)
    .. controls (-0.5274,-0.2177) and (-0.5229,-0.2355) .. (-0.5044,-0.2525)
    .. controls (-0.4888,-0.2669) and (-0.4706,-0.2705) .. (-0.4543,-0.2923)
    .. controls (-0.4420,-0.3087) and (-0.4220,-0.3707) .. (-0.4141,-0.3932)
    .. controls (-0.3620,-0.3875) and (-0.3060,-0.4031) .. (-0.3060,-0.3592)
    .. controls (-0.3060,-0.3272) and (-0.3358,-0.3272) .. (-0.3716,-0.3008)
    .. controls (-0.4367,-0.2529) and (-0.4253,-0.2451) .. (-0.4621,-0.1914)
    .. controls (-0.4700,-0.1800) and (-0.4814,-0.1685) .. (-0.4867,-0.1556)
    .. controls (-0.4970,-0.1308) and (-0.4804,-0.1088) .. (-0.4966,-0.0923)
    .. controls (-0.5011,-0.0877) and (-0.5087,-0.0853) .. (-0.5178,-0.0844)
    --cycle
    (-0.4165,-0.0846)
    .. controls (-0.4357,-0.0807) and (-0.4622,-0.1075) .. (-0.4395,-0.1440)
    .. controls (-0.4316,-0.1566) and (-0.4254,-0.1571) .. (-0.4141,-0.1634)
    .. controls (-0.4094,-0.1522) and (-0.4042,-0.1415) .. (-0.4019,-0.1294)
    .. controls (-0.3960,-0.1004) and (-0.4049,-0.0870) .. (-0.4165,-0.0846)
    --cycle
    (-0.9358,-0.1125)
    -- (-0.8813,-0.2098)
    .. controls (-0.8768,-0.1903) and (-0.8656,-0.1673) .. (-0.8723,-0.1485)
    .. controls (-0.8801,-0.1269) and (-0.9022,-0.1274) .. (-0.9358,-0.1125)
    --cycle
    ( 0.1455,-0.1458)
    .. controls ( 0.1402,-0.1449) and ( 0.1336,-0.1452) .. ( 0.1255,-0.1471)
    .. controls ( 0.0901,-0.1850) and ( 0.1064,-0.2454) .. ( 0.1360,-0.2301)
    .. controls ( 0.1569,-0.2194) and ( 0.1827,-0.1522) .. ( 0.1455,-0.1458)
    --cycle
    (-0.1477,-0.1474)
    .. controls (-0.1646,-0.1458) and (-0.1813,-0.1543) .. (-0.1847,-0.1659)
    .. controls (-0.1889,-0.1806) and (-0.1612,-0.2953) .. (-0.1163,-0.2315)
    -- (-0.0420,-0.4418)
    .. controls (-0.0291,-0.4661) and (-0.0068,-0.4600) .. ( 0.0136,-0.4880)
    .. controls ( 0.0294,-0.5097) and ( 0.0259,-0.5331) .. ( 0.0419,-0.5487)
    .. controls ( 0.0694,-0.5755) and ( 0.1462,-0.5710) .. ( 0.1798,-0.6001)
    -- ( 0.2188,-0.6436)
    .. controls ( 0.2392,-0.6605) and ( 0.2566,-0.6577) .. ( 0.2804,-0.6838)
    .. controls ( 0.3122,-0.7186) and ( 0.3037,-0.7586) .. ( 0.3603,-0.7592)
    .. controls ( 0.3537,-0.7217) and ( 0.3358,-0.6781) .. ( 0.3603,-0.6427)
    .. controls ( 0.3743,-0.6222) and ( 0.3978,-0.6232) .. ( 0.4032,-0.6039)
    .. controls ( 0.4084,-0.5852) and ( 0.3901,-0.5654) .. ( 0.3712,-0.5741)
    .. controls ( 0.3573,-0.5804) and ( 0.3558,-0.5936) .. ( 0.3518,-0.6044)
    .. controls ( 0.3319,-0.6046) and ( 0.2996,-0.6092) .. ( 0.2842,-0.6044)
    .. controls ( 0.2568,-0.5917) and ( 0.2515,-0.5648) .. ( 0.2231,-0.5501)
    .. controls ( 0.1960,-0.5359) and ( 0.1632,-0.5421) .. ( 0.1413,-0.5292)
    -- ( 0.0626,-0.4601)
    .. controls ( 0.0525,-0.4430) and ( 0.0547,-0.4207) .. ( 0.0440,-0.4065)
```

```
    .. controls ( 0.0320,-0.3906) and ( 0.0076,-0.3898) .. (-0.0104,-0.3714)
    .. controls (-0.0515,-0.3289) and ( 0.0146,-0.2721) .. (-0.0737,-0.2358)
    .. controls (-0.0903,-0.2290) and (-0.0917,-0.2313) .. (-0.1098,-0.2315)
    -- (-0.1098,-0.1892)
    .. controls (-0.1137,-0.1607) and (-0.1308,-0.1491) .. (-0.1477,-0.1474)
    --cycle
    (-0.7679,-0.1481)
    .. controls (-0.8119,-0.1523) and (-0.8157,-0.2051) .. (-0.8303,-0.2401)
    -- (-0.8453,-0.2740)
    -- (-0.8299,-0.3015)
    .. controls (-0.7861,-0.2968) and (-0.8116,-0.2403) .. (-0.7732,-0.2278)
    .. controls (-0.7561,-0.2223) and (-0.7349,-0.2415) .. (-0.7204,-0.2497)
    .. controls (-0.6711,-0.2774) and (-0.6473,-0.2864) .. (-0.6524,-0.3506)
    -- (-0.6787,-0.3422)
    .. controls (-0.6786,-0.3475) and (-0.6826,-0.3544) .. (-0.6787,-0.3655)
    .. controls (-0.6635,-0.4244) and (-0.5943,-0.3658) .. (-0.5763,-0.3760)
    .. controls (-0.5586,-0.3861) and (-0.5497,-0.4251) .. (-0.5357,-0.4418)
    .. controls (-0.5118,-0.4701) and (-0.4694,-0.4662) .. (-0.4504,-0.5047)
    .. controls (-0.4231,-0.5599) and (-0.4535,-0.6772) .. (-0.4451,-0.7421)
    .. controls (-0.4389,-0.7901) and (-0.4023,-0.8005) .. (-0.3912,-0.8443)
    .. controls (-0.3883,-0.8558) and (-0.3874,-0.8667) .. (-0.3869,-0.8774)
    -- (-0.3386,-0.8778)
    .. controls (-0.3371,-0.8645) and (-0.3342,-0.8523) .. (-0.3394,-0.8358)
    .. controls (-0.3448,-0.8167) and (-0.3914,-0.7567) .. (-0.3962,-0.6996)
    .. controls (-0.4039,-0.6074) and (-0.3294,-0.5871) .. (-0.3545,-0.4954)
    -- (-0.3886,-0.5039)
    -- (-0.4196,-0.4442)
    -- (-0.4864,-0.4090)
    -- (-0.5345,-0.3241)
    -- (-0.6106,-0.2802)
    -- (-0.6106,-0.1975)
    .. controls (-0.6301,-0.2027) and (-0.6486,-0.2101) .. (-0.6694,-0.2022)
    .. controls (-0.7004,-0.1904) and (-0.7133,-0.1559) .. (-0.7464,-0.1495)
    .. controls (-0.7544,-0.1479) and (-0.7616,-0.1475) .. (-0.7679,-0.1481)
    --cycle
    ( 0.0029,-0.2060)
    .. controls (-0.0139,-0.2731) and ( 0.0196,-0.2608) .. ( 0.0476,-0.3014)
    .. controls ( 0.0682,-0.3314) and ( 0.0511,-0.3569) .. ( 0.0750,-0.3784)
    .. controls ( 0.0974,-0.3988) and ( 0.1304,-0.3876) .. ( 0.1549,-0.4019)
    .. controls ( 0.1795,-0.4164) and ( 0.1878,-0.4529) .. ( 0.1987,-0.4783)
    .. controls ( 0.2461,-0.4539) and ( 0.2519,-0.4021) .. ( 0.2180,-0.3618)
    .. controls ( 0.1964,-0.3362) and ( 0.1652,-0.3426) .. ( 0.1414,-0.3257)
    .. controls ( 0.1198,-0.3103) and ( 0.1183,-0.2881) .. ( 0.1007,-0.2689)
    .. controls ( 0.0838,-0.2504) and ( 0.0265,-0.2166) .. ( 0.0029,-0.2060)
    --cycle
    ( 0.2327,-0.2826)
    .. controls ( 0.1961,-0.2955) and ( 0.1961,-0.3123) .. ( 0.2327,-0.3251)
    --cycle
    (-0.7548,-0.3137)
    .. controls (-0.7774,-0.3164) and (-0.7890,-0.3323) .. (-0.7986,-0.3573)
    -- (-0.7759,-0.3979)
    .. controls (-0.7735,-0.3968) and (-0.7711,-0.3964) .. (-0.7688,-0.3946)
    -- (-0.7205,-0.3166)
```

```
    .. controls (-0.7341,-0.3135) and (-0.7454,-0.3126) .. (-0.7548,-0.3137)
    --cycle
    ( 0.4114,-0.3847)
    .. controls ( 0.4216,-0.4136) and ( 0.4238,-0.4142) .. ( 0.4540,-0.4102)
    -- ( 0.4540,-0.3932)
    --cycle
    ( 0.5395,-0.3997)
    .. controls ( 0.5263,-0.3990) and ( 0.5044,-0.4032) .. ( 0.4625,-0.4018)
    -- ( 0.4780,-0.4954)
    .. controls ( 0.4757,-0.5287) and ( 0.4518,-0.5542) .. ( 0.4648,-0.5776)
    .. controls ( 0.4852,-0.6142) and ( 0.5202,-0.5603) .. ( 0.5614,-0.5929)
    .. controls ( 0.5752,-0.6038) and ( 0.6063,-0.6359) .. ( 0.6275,-0.6638)
    -- ( 0.6570,-0.6132)
    .. controls ( 0.6460,-0.6042) and ( 0.6347,-0.5954) .. ( 0.6268,-0.5865)
    -- ( 0.5937,-0.5346)
    .. controls ( 0.5648,-0.5023) and ( 0.5031,-0.4880) .. ( 0.5646,-0.4273)
    .. controls ( 0.5574,-0.4062) and ( 0.5528,-0.4005) .. ( 0.5395,-0.3997)
    --cycle
    (-0.6609,-0.4273)
    .. controls (-0.7027,-0.4247) and (-0.7300,-0.4414) .. (-0.7397,-0.4624)
    -- (-0.7047,-0.5249)
    .. controls (-0.7013,-0.5263) and (-0.6989,-0.5282) .. (-0.6950,-0.5294)
    .. controls (-0.6935,-0.4878) and (-0.6933,-0.4806) .. (-0.6609,-0.4528)
    --cycle
    (-0.5689,-0.4528)
    .. controls (-0.6368,-0.4677) and (-0.6352,-0.5020) .. (-0.6354,-0.5634)
    -- (-0.5757,-0.6071)
    -- (-0.5162,-0.6826)
    .. controls (-0.5073,-0.6508) and (-0.5037,-0.6125) .. (-0.5241,-0.5838)
    .. controls (-0.5384,-0.5639) and (-0.5622,-0.5584) .. (-0.5689,-0.5361)
    .. controls (-0.5775,-0.5167) and (-0.5648,-0.4918) .. (-0.5689,-0.4528)
    --cycle
    (-0.6354,-0.5634)
    .. controls (-0.6583,-0.5576) and (-0.6713,-0.5579) .. (-0.6839,-0.5619)
    -- (-0.6487,-0.6248)
    .. controls (-0.6395,-0.6053) and (-0.6326,-0.5852) .. (-0.6354,-0.5634)
    --cycle
    (-0.0056,-0.5890)
    .. controls (-0.0554,-0.6155) and (-0.0426,-0.6370) .. (-0.0606,-0.6818)
    -- (-0.1199,-0.7847)
    .. controls (-0.1298,-0.8015) and (-0.1531,-0.8317) .. (-0.1499,-0.8510)
    .. controls (-0.1482,-0.8615) and (-0.1397,-0.8702) .. (-0.1295,-0.8795)
    -- (-0.0507,-0.8802)
    .. controls (-0.0629,-0.8583) and (-0.0745,-0.8380) .. (-0.0742,-0.8358)
    .. controls (-0.0792,-0.8239) and (-0.0776,-0.8135) .. (-0.0742,-0.8027)
    .. controls (-0.0460,-0.7520) and ( 0.0016,-0.7834) .. ( 0.0277,-0.7780)
    .. controls ( 0.0760,-0.7679) and ( 0.1284,-0.6914) .. ( 0.1207,-0.6405)
    .. controls ( 0.1150,-0.6017) and ( 0.0841,-0.6082) .. ( 0.0711,-0.6267)
    .. controls ( 0.0620,-0.6397) and ( 0.0556,-0.7141) .. ( 0.0539,-0.7336)
    .. controls (-0.0413,-0.7085) and ( 0.0139,-0.6637) .. (-0.0056,-0.5890)
    --cycle
    ( 0.4284,-0.6571)
    .. controls ( 0.4285,-0.7307) and ( 0.4284,-0.7652) .. ( 0.5135,-0.7336)
```

```
    .. controls ( 0.5170,-0.7469) and ( 0.5220,-0.7585) .. ( 0.5179,-0.7726)
    .. controls ( 0.5091,-0.8019) and ( 0.4473,-0.8546) .. ( 0.4851,-0.8847)
    -- ( 0.4987,-0.8848)
    -- ( 0.5768,-0.7509)
    .. controls ( 0.5767,-0.7509) and ( 0.5767,-0.7507) .. ( 0.5767,-0.7507)
    .. controls ( 0.5412,-0.6652) and ( 0.5083,-0.6726) .. ( 0.4284,-0.6571)
    --cycle
    (-0.2914,-0.6672)
    .. controls (-0.2998,-0.6666) and (-0.3106,-0.6686) .. (-0.3250,-0.6743)
    .. controls (-0.3545,-0.7128) and (-0.3081,-0.7358) .. (-0.2850,-0.7678)
    .. controls (-0.2710,-0.7873) and (-0.2601,-0.8137) .. (-0.2351,-0.8216)
    .. controls (-0.2083,-0.8301) and (-0.1916,-0.8105) .. (-0.1960,-0.7845)
    .. controls (-0.2008,-0.7566) and (-0.2232,-0.7418) .. (-0.2396,-0.7216)
    .. controls (-0.2612,-0.6950) and (-0.2660,-0.6690) .. (-0.2914,-0.6672)
    --cycle
    (-0.5641,-0.6998)
    .. controls (-0.5850,-0.6984) and (-0.5808,-0.7367) .. (-0.5766,-0.7507)
    .. controls (-0.5748,-0.7566) and (-0.5723,-0.7598) .. (-0.5702,-0.7648)
    -- (-0.5492,-0.8022)
    .. controls (-0.5310,-0.8247) and (-0.5120,-0.8367) .. (-0.5052,-0.8613)
    .. controls (-0.5044,-0.8642) and (-0.5062,-0.8717) .. (-0.5063,-0.8763)
    -- (-0.4585,-0.8767)
    .. controls (-0.4596,-0.7984) and (-0.5013,-0.7963) .. (-0.5234,-0.7583)
    .. controls (-0.5344,-0.7394) and (-0.5352,-0.7120) .. (-0.5535,-0.7030)
    .. controls (-0.5576,-0.7010) and (-0.5611,-0.7000) .. (-0.5641,-0.6998)
    --cycle
    ( 0.1990,-0.7341)
    .. controls ( 0.1094,-0.7768) and ( 0.2330,-0.8330) .. ( 0.2586,-0.8828)
    -- ( 0.3183,-0.8833)
    .. controls ( 0.3165,-0.8684) and ( 0.3066,-0.8565) .. ( 0.2991,-0.8428)
    .. controls ( 0.2762,-0.8010) and ( 0.2508,-0.7418) .. ( 0.1990,-0.7341)
    --cycle
    ( 0.3603,-0.7592)
    -- ( 0.3859,-0.8188)
    .. controls ( 0.4178,-0.7853) and ( 0.4108,-0.7527) .. ( 0.3603,-0.7592)
    --cycle
    ( 0.4369,-0.8443)
    .. controls ( 0.4147,-0.8480) and ( 0.3837,-0.8661) .. ( 0.3628,-0.8837)
    -- ( 0.4240,-0.8842)
    .. controls ( 0.4307,-0.8690) and ( 0.4358,-0.8541) .. ( 0.4369,-0.8443)
    --cycle
    (-0.3205,-0.8528)
    -- (-0.3266,-0.8779)
    -- (-0.2773,-0.8783)
    .. controls (-0.2800,-0.8719) and (-0.2850,-0.8655) .. (-0.2963,-0.8600)
    --cycle
    ( 0.1093,-0.8568)
    .. controls ( 0.0964,-0.8568) and ( 0.0834,-0.8587) .. ( 0.0710,-0.8600)
    .. controls ( 0.0605,-0.8611) and ( 0.0403,-0.8617) .. ( 0.0312,-0.8664)
    .. controls ( 0.0240,-0.8701) and ( 0.0203,-0.8751) .. ( 0.0184,-0.8808)
    -- ( 0.1002,-0.8815)
    -- ( 0.1050,-0.8698)
    -- ( 0.1085,-0.8815)
```

```
    -- ( 0.1641,-0.8820)
    .. controls ( 0.1606,-0.8757) and ( 0.1553,-0.8698) .. ( 0.1463,-0.8649)
    .. controls ( 0.1347,-0.8586) and ( 0.1221,-0.8568) .. ( 0.1093,-0.8568)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/light woods

The draw style for light woods. The pattern is filled with light green, and outline is not drawn.

```
\tikzset{
  hex/terrain/light woods/.style={
    draw=none,
    fill={rgb,100:red,69;green,98;blue,69}
  }
}
```

hex/terrain/light woods

Next, we have light woods.


```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/light woods/.pic={
    \path[hex/terrain/light woods,pic actions,draw=none]
    (-0.4795, 0.8736)
    -- (-0.5104, 0.8207)
    .. controls (-0.5041, 0.8191) and (-0.4967, 0.8182) .. (-0.4854, 0.8192)
    -- (-0.4770, 0.8108)
    -- (-0.4854, 0.7856)
    -- (-0.5190, 0.8023)
    .. controls (-0.5219, 0.7975) and (-0.5245, 0.7958) .. (-0.5272, 0.7916)
    -- (-0.5881, 0.6872)
    .. controls (-0.5849, 0.6876) and (-0.5819, 0.6876) .. (-0.5782, 0.6885)
    .. controls (-0.5524, 0.6946) and (-0.5387, 0.7153) .. (-0.5182, 0.7298)
    .. controls (-0.4841, 0.7540) and (-0.4420, 0.7539) .. (-0.4346, 0.7864)
    .. controls (-0.4295, 0.8088) and (-0.4470, 0.8265) .. (-0.4572, 0.8444)
    .. controls (-0.4631, 0.8549) and (-0.4670, 0.8646) .. (-0.4707, 0.8736)
    --cycle
    (-0.3185, 0.8722)
    .. controls (-0.3478, 0.8487) and (-0.3526, 0.8080) .. (-0.3290, 0.7808)
    .. controls (-0.3140, 0.7633) and (-0.2394, 0.7433) .. (-0.2165, 0.7459)
    .. controls (-0.1895, 0.7488) and (-0.1787, 0.7643) .. (-0.1561, 0.7725)
    .. controls (-0.1380, 0.7791) and (-0.1179, 0.7766) .. (-0.1025, 0.7906)
```

```
    .. controls (-0.0719, 0.8182) and (-0.0936, 0.8427) .. (-0.1240, 0.8528)
    -- (-0.1323, 0.8192)
    -- (-0.1912, 0.8359)
    .. controls (-0.1985, 0.8023) and (-0.1999, 0.7965) .. (-0.2332, 0.7856)
    .. controls (-0.2512, 0.8363) and (-0.2775, 0.8009) .. (-0.2909, 0.8240)
    .. controls (-0.2975, 0.8355) and (-0.2884, 0.8535) .. (-0.2756, 0.8719)
    --cycle
    (-0.1660, 0.8709)
    .. controls (-0.1609, 0.8538) and (-0.1460, 0.8596) .. (-0.1371, 0.8707)
    --cycle
    ( 0.0768, 0.8689)
    .. controls ( 0.0767, 0.8688) and ( 0.0765, 0.8686) .. ( 0.0764, 0.8685)
    .. controls ( 0.0704, 0.8503) and ( 0.0779, 0.7592) .. ( 0.1533, 0.7700)
    .. controls ( 0.1955, 0.7761) and ( 0.1956, 0.8018) .. ( 0.1871, 0.8359)
    -- ( 0.1366, 0.8108)
    -- ( 0.1510, 0.8683)
    --cycle
    ( 0.1840, 0.8680)
    .. controls ( 0.1910, 0.8650) and ( 0.1993, 0.8662) .. ( 0.2081, 0.8678)
    --cycle
    ( 0.2214, 0.8677)
    -- ( 0.2459, 0.7939)
    .. controls ( 0.1903, 0.7716) and ( 0.2267, 0.7399) .. ( 0.2534, 0.7490)
    .. controls ( 0.2925, 0.7624) and ( 0.2842, 0.8066) .. ( 0.2735, 0.8359)
    .. controls ( 0.2690, 0.8483) and ( 0.2655, 0.8586) .. ( 0.2619, 0.8674)
    --cycle
    ( 0.4057, 0.8661)
    .. controls ( 0.4149, 0.8349) and ( 0.4483, 0.8068) .. ( 0.4873, 0.8349)
    .. controls ( 0.4993, 0.8436) and ( 0.5001, 0.8496) .. ( 0.5065, 0.8612)
    .. controls ( 0.5170, 0.8447) and ( 0.5269, 0.8297) .. ( 0.5405, 0.8189)
    -- ( 0.5145, 0.8652)
    --cycle
    (-0.0288, 0.8391)
    .. controls (-0.0335, 0.8388) and (-0.0390, 0.8377) .. (-0.0453, 0.8356)
    .. controls (-0.0698, 0.8019) and (-0.0347, 0.7882) .. (-0.0173, 0.7966)
    .. controls ( 0.0001, 0.8052) and ( 0.0042, 0.8413) .. (-0.0288, 0.8391)
    --cycle
    ( 0.3888, 0.7856)
    -- ( 0.3719, 0.7687)
    -- ( 0.3719, 0.7604)
    -- ( 0.3888, 0.7435)
    -- ( 0.3972, 0.7435)
    -- ( 0.4140, 0.7604)
    --cycle
    (-0.0821, 0.7138)
    .. controls (-0.0999, 0.7158) and (-0.1171, 0.7050) .. (-0.1211, 0.6922)
    .. controls (-0.1297, 0.6650) and (-0.0695, 0.6250) .. (-0.0468, 0.6186)
    .. controls (-0.0352, 0.6169) and (-0.0107, 0.6175) .. ( 0.0022, 0.6186)
    .. controls (-0.0326, 0.5765) and (-0.0411, 0.5767) .. (-0.0909, 0.5922)
    .. controls (-0.0924, 0.5799) and (-0.0959, 0.5731) .. (-0.0909, 0.5597)
    .. controls (-0.0591, 0.4605) and ( 0.1221, 0.6255) .. ( 0.0020, 0.6581)
    .. controls (-0.0090, 0.6597) and (-0.0281, 0.6592) .. (-0.0399, 0.6581)
    .. controls (-0.0462, 0.6969) and (-0.0645, 0.7118) .. (-0.0821, 0.7138)
```

```
--cycle
( 0.3704, 0.7106)
.. controls ( 0.3510, 0.7072) and ( 0.3332, 0.6943) .. ( 0.3224, 0.6679)
.. controls ( 0.3172, 0.6530) and ( 0.3220, 0.6121) .. ( 0.3224, 0.5922)
-- ( 0.3056, 0.6154)
.. controls ( 0.2531, 0.6742) and ( 0.2322, 0.5554) .. ( 0.2966, 0.5454)
.. controls ( 0.3239, 0.5412) and ( 0.3417, 0.5630) .. ( 0.3972, 0.5670)
.. controls ( 0.4005, 0.5473) and ( 0.4019, 0.5314) .. ( 0.4237, 0.5231)
.. controls ( 0.4541, 0.5116) and ( 0.4961, 0.5392) .. ( 0.4841, 0.5736)
.. controls ( 0.4794, 0.5870) and ( 0.4556, 0.5991) .. ( 0.4331, 0.6106)
.. controls ( 0.4972, 0.6497) and ( 0.4277, 0.7210) .. ( 0.3704, 0.7106)
--cycle
(-0.4679, 0.7004)
.. controls (-0.5116, 0.6983) and (-0.4629, 0.6153) .. (-0.4266, 0.6632)
.. controls (-0.4200, 0.6718) and (-0.4201, 0.6786) .. (-0.4182, 0.6846)
-- (-0.4434, 0.6958)
.. controls (-0.4536, 0.6993) and (-0.4618, 0.7007) .. (-0.4679, 0.7004)
--cycle
( 0.5653, 0.7002)
.. controls ( 0.5661, 0.6911) and ( 0.5658, 0.6799) .. ( 0.5704, 0.6702)
.. controls ( 0.5856, 0.6381) and ( 0.6183, 0.6504) .. ( 0.6246, 0.6688)
-- ( 0.6102, 0.6944)
.. controls ( 0.6066, 0.6965) and ( 0.6036, 0.6986) .. ( 0.5984, 0.7002)
.. controls ( 0.5884, 0.7016) and ( 0.5757, 0.7012) .. ( 0.5653, 0.7002)
--cycle
( 0.1310, 0.6925)
.. controls ( 0.1003, 0.6568) and ( 0.1392, 0.6414) .. ( 0.1582, 0.6530)
.. controls ( 0.1772, 0.6646) and ( 0.1778, 0.7030) .. ( 0.1310, 0.6925)
--cycle
(-0.3425, 0.6846)
.. controls (-0.3485, 0.6703) and (-0.3540, 0.6584) .. (-0.3564, 0.6427)
.. controls (-0.3714, 0.5438) and (-0.2673, 0.5839) .. (-0.3103, 0.6583)
.. controls (-0.3198, 0.6747) and (-0.3272, 0.6765) .. (-0.3425, 0.6846)
--cycle
(-0.1828, 0.6763)
.. controls (-0.2468, 0.6411) and (-0.2396, 0.5532) .. (-0.1659, 0.5602)
.. controls (-0.1273, 0.5639) and (-0.0946, 0.6066) .. (-0.1492, 0.6258)
-- (-0.1828, 0.6006)
--cycle
( 0.3972, 0.6763)
-- ( 0.4287, 0.6131)
.. controls ( 0.4206, 0.6173) and ( 0.4113, 0.6217) .. ( 0.4056, 0.6258)
-- ( 0.3719, 0.6006)
.. controls ( 0.3635, 0.6415) and ( 0.3652, 0.6489) .. ( 0.3972, 0.6763)
--cycle
( 0.5737, 0.6319)
-- ( 0.5485, 0.6258)
.. controls ( 0.5516, 0.6201) and ( 0.5520, 0.6138) .. ( 0.5614, 0.6043)
.. controls ( 0.6074, 0.5569) and ( 0.6453, 0.6371) .. ( 0.5737, 0.6319)
--cycle
(-0.6211, 0.6305)
-- (-0.6755, 0.5370)
-- (-0.6787, 0.5166)
```

```
    .. controls (-0.6809, 0.5180) and (-0.6832, 0.5188) .. (-0.6854, 0.5203)
    -- (-0.7191, 0.4623)
    -- (-0.7291, 0.4073)
    .. controls (-0.7367, 0.4126) and (-0.7403, 0.4136) .. (-0.7456, 0.4169)
    -- (-0.7651, 0.3834)
    .. controls (-0.7455, 0.3798) and (-0.7239, 0.3727) .. (-0.7052, 0.3845)
    .. controls (-0.6739, 0.3993) and (-0.6763, 0.4662) .. (-0.6703, 0.4998)
    .. controls (-0.6178, 0.4665) and (-0.6044, 0.4826) .. (-0.5611, 0.5204)
    .. controls (-0.5440, 0.5353) and (-0.5267, 0.5491) .. (-0.5345, 0.5748)
    .. controls (-0.5466, 0.6149) and (-0.5841, 0.6243) .. (-0.6211, 0.6305)
    --cycle
    (-0.6450, 0.5670)
    -- (-0.5862, 0.5670)
    .. controls (-0.6029, 0.5328) and (-0.6086, 0.5274) .. (-0.6450, 0.5166)
    --cycle
    ( 0.5940, 0.5141)
    .. controls ( 0.5876, 0.5135) and ( 0.5814, 0.5119) .. ( 0.5737, 0.5105)
    .. controls ( 0.5529, 0.5005) and ( 0.5203, 0.4878) .. ( 0.5123, 0.4644)
    .. controls ( 0.5022, 0.4349) and ( 0.5312, 0.3332) .. ( 0.5982, 0.3551)
    .. controls ( 0.6173, 0.3612) and ( 0.6614, 0.3963) .. ( 0.6651, 0.4168)
    .. controls ( 0.6700, 0.4432) and ( 0.6406, 0.5019) .. ( 0.6149, 0.5105)
    .. controls ( 0.6066, 0.5139) and ( 0.6003, 0.5146) .. ( 0.5940, 0.5141)
    --cycle
    ( 0.0525, 0.5036)
    .. controls ( 0.0223, 0.5016) and ( 0.0014, 0.4715) .. (-0.0147, 0.4493)
    .. controls (-0.0480, 0.4823) and (-0.1271, 0.5502) .. (-0.1240, 0.4493)
    -- (-0.0819, 0.4661)
    .. controls (-0.0631, 0.4289) and ( 0.0054, 0.3259) .. ( 0.0443, 0.3176)
    .. controls ( 0.1031, 0.3051) and ( 0.1431, 0.3862) .. ( 0.0694, 0.3989)
    .. controls ( 0.0551, 0.3118) and ( 0.0044, 0.4056) .. ( 0.0316, 0.4326)
    .. controls ( 0.0741, 0.4748) and ( 0.1233, 0.3699) .. ( 0.1388, 0.4261)
    .. controls ( 0.1477, 0.4584) and ( 0.0813, 0.5057) .. ( 0.0525, 0.5036)
    --cycle
    ( 0.6073, 0.4745)
    -- ( 0.6242, 0.4241)
    -- ( 0.5569, 0.3989)
    -- ( 0.5569, 0.4493)
    --cycle
    (-0.3498, 0.4626)
    .. controls (-0.3744, 0.4586) and (-0.3998, 0.4069) .. (-0.3941, 0.3847)
    .. controls (-0.3893, 0.3661) and (-0.3650, 0.3651) .. (-0.3503, 0.3798)
    -- (-0.3257, 0.4157)
    .. controls (-0.3295, 0.3698) and (-0.2940, 0.3485) .. (-0.2697, 0.3592)
    .. controls (-0.2492, 0.3684) and (-0.2611, 0.3898) .. (-0.2697, 0.4024)
    .. controls (-0.2865, 0.4277) and (-0.3149, 0.4682) .. (-0.3498, 0.4626)
    --cycle
    ( 0.7488, 0.4472)
    .. controls ( 0.7446, 0.4429) and ( 0.7413, 0.4378) .. ( 0.7395, 0.4315)
    .. controls ( 0.7338, 0.4111) and ( 0.7612, 0.3277) .. ( 0.8087, 0.3352)
    .. controls ( 0.8094, 0.3354) and ( 0.8102, 0.3361) .. ( 0.8109, 0.3364)
    --cycle
    (-0.1492, 0.4409)
    .. controls (-0.1577, 0.3701) and (-0.1298, 0.3577) .. (-0.0651, 0.3568)
```

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    .. controls (-0.0461, 0.3027) and (-0.0025, 0.3462) .. (-0.0567, 0.3652)
    -- (-0.0567, 0.3568)
    -- (-0.0651, 0.3652)
    -- (-0.0567, 0.3652)
    -- (-0.0567, 0.3989)
    -- (-0.0988, 0.3905)
    .. controls (-0.1116, 0.4252) and (-0.1112, 0.4344) .. (-0.1492, 0.4409)
    --cycle
    ( 0.2869, 0.4351)
    .. controls ( 0.2475, 0.4293) and ( 0.2234, 0.3681) .. ( 0.2795, 0.3485)
    -- ( 0.3048, 0.3905)
    .. controls ( 0.3028, 0.3760) and ( 0.3013, 0.3442) .. ( 0.3278, 0.3583)
    .. controls ( 0.3557, 0.3731) and ( 0.3437, 0.4227) .. ( 0.3046, 0.4338)
    .. controls ( 0.2985, 0.4356) and ( 0.2925, 0.4359) .. ( 0.2869, 0.4351)
    --cycle
    (-0.5352, 0.4038)
    .. controls (-0.5519, 0.4042) and (-0.5689, 0.3932) .. (-0.5778, 0.3652)
    -- (-0.5358, 0.3652)
    -- (-0.5442, 0.3149)
    -- (-0.6030, 0.3401)
    .. controls (-0.6099, 0.3078) and (-0.5933, 0.2580) .. (-0.5523, 0.2636)
    .. controls (-0.5251, 0.2673) and (-0.4980, 0.3070) .. (-0.4910, 0.3316)
    .. controls (-0.4799, 0.3705) and (-0.5072, 0.4030) .. (-0.5352, 0.4038)
    --cycle
    ( 0.4056, 0.3989)
    .. controls ( 0.4011, 0.3650) and ( 0.4064, 0.3627) .. ( 0.4392, 0.3568)
    .. controls ( 0.4340, 0.3865) and ( 0.4336, 0.3876) .. ( 0.4056, 0.3989)
    --cycle
    (-0.2248, 0.3737)
    -- (-0.2164, 0.3401)
    -- (-0.1828, 0.3568)
    --cycle
    ( 0.4558, 0.3414)
    .. controls ( 0.4424, 0.3419) and ( 0.4339, 0.3363) .. ( 0.4224, 0.3316)
    -- ( 0.4340, 0.2885)
    .. controls ( 0.4635, 0.2154) and ( 0.5405, 0.3381) .. ( 0.4558, 0.3414)
    --cycle
    (-0.3179, 0.3382)
    .. controls (-0.3270, 0.3401) and (-0.3357, 0.3403) .. (-0.3425, 0.3381)
    .. controls (-0.3762, 0.3275) and (-0.3957, 0.2970) .. (-0.4013, 0.2644)
    -- (-0.3341, 0.2892)
    .. controls (-0.3207, 0.2121) and (-0.2456, 0.2402) .. (-0.2545, 0.2892)
    .. controls (-0.2586, 0.3110) and (-0.2906, 0.3324) .. (-0.3179, 0.3382)
    --cycle
    ( 0.3611, 0.3359)
    .. controls ( 0.3110, 0.3372) and ( 0.2179, 0.3015) .. ( 0.2626, 0.2392)
    -- ( 0.2207, 0.2056)
    -- ( 0.2123, 0.2308)
    -- ( 0.1955, 0.2308)
    .. controls ( 0.1691, 0.1342) and ( 0.2461, 0.1660) .. ( 0.2711, 0.1678)
    .. controls ( 0.3105, 0.1704) and ( 0.3525, 0.1635) .. ( 0.3836, 0.2013)
    .. controls ( 0.4000, 0.2213) and ( 0.3935, 0.2469) .. ( 0.3552, 0.2434)
    .. controls ( 0.3256, 0.2408) and ( 0.3193, 0.2282) .. ( 0.3048, 0.2056)
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    .. controls ( 0.2927, 0.2510) and ( 0.2970, 0.2476) .. ( 0.3131, 0.2897)
    -- ( 0.3552, 0.2728)
    -- ( 0.3636, 0.2980)
    -- ( 0.3719, 0.2644)
    .. controls ( 0.4287, 0.2825) and ( 0.4092, 0.3226) .. ( 0.3795, 0.3331)
    .. controls ( 0.3746, 0.3349) and ( 0.3683, 0.3357) .. ( 0.3611, 0.3359)
    --cycle
    (-0.7326, 0.3304)
    .. controls (-0.7558, 0.2996) and (-0.7303, 0.2839) .. (-0.7147, 0.2917)
    .. controls (-0.6982, 0.3000) and (-0.6941, 0.3349) .. (-0.7326, 0.3304)
    --cycle
    ( 0.5316, 0.3064)
    .. controls ( 0.5417, 0.2779) and ( 0.5439, 0.2772) .. ( 0.5737, 0.2813)
    .. controls ( 0.5591, 0.3056) and ( 0.5600, 0.3049) .. ( 0.5316, 0.3064)
    --cycle
    ( 0.7063, 0.2870)
    .. controls ( 0.6995, 0.2880) and ( 0.6923, 0.2874) .. ( 0.6840, 0.2844)
    .. controls ( 0.6531, 0.2731) and ( 0.6307, 0.2270) .. ( 0.6242, 0.1972)
    -- ( 0.6914, 0.2056)
    -- ( 0.6914, 0.2475)
    -- ( 0.7166, 0.2139)
    -- ( 0.7670, 0.2224)
    -- ( 0.7670, 0.1887)
    -- ( 0.8091, 0.1804)
    -- ( 0.7755, 0.1047)
    -- ( 0.8343, 0.1131)
    .. controls ( 0.8409, 0.1435) and ( 0.8409, 0.1473) .. ( 0.8679, 0.1636)
    .. controls ( 0.8652, 0.1490) and ( 0.8470, 0.0581) .. ( 0.8896, 0.0809)
    .. controls ( 0.9211, 0.0965) and ( 0.9103, 0.1720) .. ( 0.8896, 0.1909)
    .. controls ( 0.8668, 0.2094) and ( 0.8421, 0.2029) .. ( 0.8174, 0.1972)
    .. controls ( 0.8135, 0.2098) and ( 0.8137, 0.2162) .. ( 0.8041, 0.2272)
    .. controls ( 0.7922, 0.2408) and ( 0.7748, 0.2458) .. ( 0.7601, 0.2552)
    .. controls ( 0.7419, 0.2667) and ( 0.7266, 0.2841) .. ( 0.7063, 0.2870)
    --cycle
    ( 0.6242, 0.1972)
    .. controls ( 0.6061, 0.1985) and ( 0.5845, 0.2023) .. ( 0.5690, 0.1902)
    .. controls ( 0.5426, 0.1695) and ( 0.5550, 0.1248) .. ( 0.5909, 0.1110)
    .. controls ( 0.6168, 0.1011) and ( 0.6421, 0.1125) .. ( 0.6679, 0.1215)
    .. controls ( 0.6663, 0.1076) and ( 0.6658, 0.0850) .. ( 0.6679, 0.0720)
    .. controls ( 0.6961,-0.0135) and ( 0.8163, 0.0895) .. ( 0.7250, 0.1215)
    -- ( 0.6998, 0.0795)
    -- ( 0.7166, 0.1299)
    -- ( 0.6830, 0.1804)
    -- ( 0.6578, 0.1636)
    --cycle
    ( 0.0950, 0.2671)
    .. controls ( 0.0367, 0.2427) and ( 0.0851, 0.1985) .. ( 0.1112, 0.2040)
    .. controls ( 0.1427, 0.2110) and ( 0.1597, 0.2672) .. ( 0.0950, 0.2671)
    --cycle
    (-0.0988, 0.2609)
    .. controls (-0.1426, 0.2672) and (-0.2761, 0.1879) .. (-0.1828, 0.1551)
    -- (-0.1743, 0.1972)
    -- (-0.1240, 0.1804)
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    -- (-0.0904, 0.2308)
    -- (-0.1071, 0.1720)
    .. controls (-0.0221, 0.1543) and (-0.0435, 0.2528) .. (-0.0988, 0.2609)
    --cycle
    (-0.8142, 0.2071)
    .. controls (-0.8258, 0.2070) and (-0.8375, 0.2012) .. (-0.8466, 0.1869)
    .. controls (-0.8534, 0.1760) and (-0.8533, 0.1669) .. (-0.8551, 0.1551)
    -- (-0.7963, 0.1636)
    -- (-0.8132, 0.1215)
    .. controls (-0.8020, 0.1234) and (-0.7923, 0.1232) .. (-0.7821, 0.1301)
    .. controls (-0.7447, 0.1557) and (-0.7793, 0.2072) .. (-0.8142, 0.2071)
    --cycle
    (-0.2584, 0.2056)
    -- (-0.2584, 0.1636)
    .. controls (-0.2445, 0.1848) and (-0.2445, 0.1843) .. (-0.2584, 0.2056)
    --cycle
    (-0.7132, 0.1953)
    .. controls (-0.7373, 0.1910) and (-0.7568, 0.1647) .. (-0.7459, 0.1215)
    -- (-0.6955, 0.1551)
    .. controls (-0.7015, 0.1043) and (-0.7057, 0.0835) .. (-0.6450, 0.0963)
    -- (-0.6535, 0.0711)
    .. controls (-0.5898, 0.0580) and (-0.5907, 0.1071) .. (-0.6081, 0.1249)
    .. controls (-0.6203, 0.1374) and (-0.6375, 0.1370) .. (-0.6535, 0.1383)
    .. controls (-0.6607, 0.1823) and (-0.6892, 0.1997) .. (-0.7132, 0.1953)
    --cycle
    (-0.4097, 0.1720)
    -- (-0.3845, 0.1215)
    -- (-0.4097, 0.0963)
    -- (-0.4349, 0.1047)
    .. controls (-0.4598,-0.0134) and (-0.2772, 0.1076) .. (-0.3690, 0.1621)
    .. controls (-0.3821, 0.1699) and (-0.3951, 0.1703) .. (-0.4097, 0.1720)
    --cycle
    ( 0.4374, 0.1711)
    .. controls ( 0.4200, 0.1682) and ( 0.4016, 0.1543) .. ( 0.3888, 0.1299)
    -- ( 0.4477, 0.1299)
    .. controls ( 0.4703, 0.1056) and ( 0.4891, 0.1252) .. ( 0.4798, 0.1463)
    .. controls ( 0.4711, 0.1661) and ( 0.4548, 0.1741) .. ( 0.4374, 0.1711)
    --cycle
    (-0.4594, 0.1707)
    .. controls (-0.4648, 0.1719) and (-0.4705, 0.1718) .. (-0.4752, 0.1698)
    .. controls (-0.4878, 0.1646) and (-0.4954, 0.1508) .. (-0.4982, 0.1382)
    .. controls (-0.5096, 0.0875) and (-0.4448, 0.0609) .. (-0.4602, 0.1299)
    .. controls (-0.4304, 0.1504) and (-0.4433, 0.1669) .. (-0.4594, 0.1707)
    --cycle
    (-0.0230, 0.1592)
    .. controls (-0.0727, 0.1609) and (-0.0799, 0.1002) .. (-0.1492, 0.0795)
    -- (-0.1576, 0.0374)
    .. controls (-0.1940, 0.0779) and (-0.1965, 0.0894) .. (-0.2500, 0.0711)
    -- (-0.2584, 0.0795)
    -- (-0.2332, 0.1383)
    .. controls (-0.2779, 0.1347) and (-0.3158, 0.0997) .. (-0.2855, 0.0563)
    .. controls (-0.2695, 0.0332) and (-0.2481, 0.0337) .. (-0.2256, 0.0248)
    .. controls (-0.1803, 0.0069) and (-0.1541,-0.0311) .. (-0.1155, 0.0290)
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    .. controls (-0.0607, 0.0067) and (-0.0553,-0.0150) .. (-0.0307,-0.0232)
    .. controls ( 0.0157,-0.0389) and ( 0.0524, 0.0035) .. ( 0.0442, 0.0543)
    .. controls ( 0.0843, 0.0613) and ( 0.1010, 0.0937) .. ( 0.0727, 0.1263)
    .. controls ( 0.0598, 0.1414) and (-0.0030, 0.1586) .. (-0.0230, 0.1592)
    --cycle
    (-0.0230, 0.1215)
    -- ( 0.0442, 0.1131)
    .. controls ( 0.0289, 0.0705) and ( 0.0228, 0.0356) .. (-0.0230, 0.0207)
    .. controls (-0.0339, 0.0543) and (-0.0383, 0.0572) .. (-0.0735, 0.0543)
    -- (-0.0819, 0.0627)
    --cycle
    (-0.8973, 0.1131)
    .. controls (-0.9051, 0.0492) and (-0.8679, 0.0676) .. (-0.8321, 0.0457)
    .. controls (-0.7996, 0.0258) and (-0.7906,-0.0272) .. (-0.7039,-0.0046)
    .. controls (-0.6977,-0.0167) and (-0.6964,-0.0237) .. (-0.6846,-0.0331)
    .. controls (-0.6146,-0.0891) and (-0.5741, 0.0485) .. (-0.6619, 0.0396)
    .. controls (-0.6723, 0.0384) and (-0.6856, 0.0326) .. (-0.6955, 0.0290)
    .. controls (-0.7145, 0.0487) and (-0.7442, 0.0435) .. (-0.7712, 0.0459)
    -- (-0.7771, 0.0746)
    --cycle
    ( 0.7839, 0.0627)
    .. controls ( 0.7798, 0.0513) and ( 0.7748, 0.0421) .. ( 0.7752, 0.0292)
    .. controls ( 0.7776,-0.0409) and ( 0.8888, 0.0073) .. ( 0.8169, 0.0493)
    .. controls ( 0.8064, 0.0555) and ( 0.7952, 0.0587) .. ( 0.7839, 0.0627)
    --cycle
    ( 0.6399, 0.0543)
    .. controls ( 0.6341, 0.0555) and ( 0.6275, 0.0553) .. ( 0.6207, 0.0536)
    .. controls ( 0.5899, 0.0092) and ( 0.6489,-0.0145) .. ( 0.6606, 0.0149)
    .. controls ( 0.6690, 0.0359) and ( 0.6576, 0.0510) .. ( 0.6399, 0.0543)
    --cycle
    ( 0.2228, 0.0528)
    .. controls ( 0.1887, 0.0319) and ( 0.2131,-0.0076) .. ( 0.2361,-0.0078)
    .. controls ( 0.2619,-0.0080) and ( 0.2726, 0.0432) .. ( 0.2228, 0.0528)
    --cycle
    ( 0.4509, 0.0479)
    .. controls ( 0.4394, 0.0460) and ( 0.4290, 0.0332) .. ( 0.4224, 0.0038)
    .. controls ( 0.3826, 0.0304) and ( 0.3797, 0.0371) .. ( 0.3300, 0.0301)
    .. controls ( 0.3175, 0.0283) and ( 0.3021, 0.0266) .. ( 0.2915, 0.0192)
    .. controls ( 0.2691, 0.0036) and ( 0.2444,-0.0690) .. ( 0.3552,-0.0718)
    -- ( 0.3131,-0.0046)
    .. controls ( 0.3436,-0.0165) and ( 0.3418,-0.0171) .. ( 0.3719,-0.0046)
    .. controls ( 0.3961,-0.0513) and ( 0.4113,-0.0431) .. ( 0.4560,-0.0298)
    -- ( 0.4560, 0.0038)
    -- ( 0.4812,-0.0466)
    .. controls ( 0.4281,-0.0863) and ( 0.4953,-0.1091) .. ( 0.5137,-0.0706)
    .. controls ( 0.5296,-0.0376) and ( 0.4853, 0.0538) .. ( 0.4509, 0.0479)
    --cycle
    (-0.9381, 0.0440)
    .. controls (-0.9573, 0.0465) and (-0.9752, 0.0361) .. (-0.9800, 0.0016)
    -- (-0.9774,-0.0032)
    -- (-0.9308, 0.0123)
    .. controls (-0.9260, 0.0012) and (-0.9218,-0.0135) .. (-0.9103,-0.0200)
    .. controls (-0.8939,-0.0290) and (-0.8783,-0.0112) .. (-0.8895, 0.0115)
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    .. controls (-0.8962, 0.0252) and (-0.9176, 0.0414) .. (-0.9381, 0.0440)
    --cycle
    ( 0.9435, 0.0207)
    -- ( 0.9184, 0.0123)
    -- ( 0.9435,-0.0046)
    --cycle
    ( 0.8999,-0.0129)
    .. controls ( 0.9000,-0.0216) and ( 0.8974,-0.0282) .. ( 0.8999,-0.0376)
    .. controls ( 0.9043,-0.0955) and ( 0.9800,-0.0453) .. ( 0.9254,-0.0191)
    .. controls ( 0.9173,-0.0151) and ( 0.9098,-0.0148) .. ( 0.8999,-0.0129)
    --cycle
    (-0.5187,-0.0249)
    .. controls (-0.5448,-0.0284) and (-0.5586,-0.0592) .. (-0.5611,-0.0886)
    -- (-0.5022,-0.0718)
    .. controls (-0.5038,-0.1199) and (-0.4832,-0.1244) .. (-0.4434,-0.1054)
    -- (-0.4349,-0.1139)
    -- (-0.5106,-0.1811)
    -- (-0.5442,-0.1475)
    -- (-0.5274,-0.1139)
    .. controls (-0.5482,-0.1103) and (-0.5717,-0.1068) .. (-0.5806,-0.1326)
    .. controls (-0.5943,-0.1714) and (-0.5235,-0.2179) .. (-0.5014,-0.2194)
    .. controls (-0.4612,-0.2223) and (-0.4187,-0.1658) .. (-0.4108,-0.1306)
    .. controls (-0.4075,-0.1185) and (-0.4054,-0.1026) .. (-0.4108,-0.0911)
    .. controls (-0.4193,-0.0753) and (-0.4422,-0.0688) .. (-0.4571,-0.0576)
    -- (-0.4884,-0.0315)
    .. controls (-0.4999,-0.0256) and (-0.5100,-0.0237) .. (-0.5187,-0.0249)
    --cycle
    ( 0.2098,-0.0382)
    .. controls ( 0.1959,-0.0434) and ( 0.1851,-0.0663) .. ( 0.1925,-0.0882)
    .. controls ( 0.2035,-0.1206) and ( 0.2830,-0.1639) .. ( 0.2964,-0.0882)
    .. controls ( 0.2773,-0.0896) and ( 0.2586,-0.0934) .. ( 0.2447,-0.0768)
    .. controls ( 0.2363,-0.0666) and ( 0.2352,-0.0463) .. ( 0.2242,-0.0396)
    .. controls ( 0.2194,-0.0367) and ( 0.2145,-0.0365) .. ( 0.2098,-0.0382)
    --cycle
    (-0.2960,-0.0452)
    .. controls (-0.3231,-0.0465) and (-0.3530,-0.0602) .. (-0.3592,-0.0683)
    .. controls (-0.3758,-0.0903) and (-0.3560,-0.1221) .. (-0.3845,-0.1979)
    -- (-0.4013,-0.1727)
    -- (-0.4182,-0.1727)
    .. controls (-0.4336,-0.2291) and (-0.4124,-0.2782) .. (-0.3803,-0.2577)
    .. controls (-0.3601,-0.2446) and (-0.3538,-0.2099) .. (-0.3392,-0.1970)
    .. controls (-0.3137,-0.1743) and (-0.2596,-0.2064) .. (-0.2752,-0.1306)
    -- (-0.3257,-0.1558)
    -- (-0.3341,-0.1475)
    -- (-0.3341,-0.0970)
    -- (-0.2500,-0.0970)
    .. controls (-0.2447,-0.0551) and (-0.2689,-0.0439) .. (-0.2960,-0.0452)
    --cycle
    ( 0.6563,-0.0662)
    .. controls ( 0.6458,-0.0662) and ( 0.6374,-0.0668) .. ( 0.6332,-0.0685)
    .. controls ( 0.5970,-0.0835) and ( 0.6057,-0.1189) .. ( 0.6332,-0.1391)
    -- ( 0.6493,-0.0970)
    -- ( 0.6662,-0.0970)
```

```
    .. controls ( 0.6850,-0.1248) and ( 0.6940,-0.1204) .. ( 0.7250,-0.1139)
    -- ( 0.7081,-0.1475)
    .. controls ( 0.7837,-0.1829) and ( 0.7876,-0.1033) .. ( 0.7490,-0.0804)
    .. controls ( 0.7374,-0.0735) and ( 0.6877,-0.0664) .. ( 0.6563,-0.0662)
    --cycle
    ( 0.7081,-0.1475)
    .. controls ( 0.6742,-0.1429) and ( 0.6720,-0.1483) .. ( 0.6662,-0.1811)
    .. controls ( 0.6162,-0.1289) and ( 0.6115,-0.1833) .. ( 0.6244,-0.2044)
    .. controls ( 0.6426,-0.2346) and ( 0.6823,-0.2320) .. ( 0.7016,-0.2044)
    .. controls ( 0.7147,-0.1858) and ( 0.7107,-0.1681) .. ( 0.7081,-0.1475)
    --cycle
    ( 0.0544,-0.0769)
    .. controls ( 0.0466,-0.0773) and ( 0.0382,-0.0797) .. ( 0.0297,-0.0845)
    -- (-0.0147,-0.1139)
    .. controls (-0.0057,-0.1396) and (-0.0069,-0.1385) .. ( 0.0189,-0.1475)
    .. controls (-0.0074,-0.2147) and ( 0.0346,-0.2081) .. ( 0.0553,-0.1870)
    .. controls ( 0.0667,-0.1752) and ( 0.0961,-0.1299) .. ( 0.0958,-0.1139)
    .. controls ( 0.0955,-0.0925) and ( 0.0776,-0.0759) .. ( 0.0544,-0.0769)
    --cycle
    ( 0.3572,-0.0881)
    .. controls ( 0.3447,-0.0867) and ( 0.3392,-0.1053) .. ( 0.3450,-0.1208)
    .. controls ( 0.3587,-0.1579) and ( 0.4169,-0.1493) .. ( 0.4239,-0.1208)
    .. controls ( 0.4287,-0.1010) and ( 0.4113,-0.0745) .. ( 0.3888,-0.0970)
    -- ( 0.3719,-0.0970)
    .. controls ( 0.3663,-0.0912) and ( 0.3613,-0.0886) .. ( 0.3572,-0.0881)
    --cycle
    ( 0.7250,-0.1054)
    -- ( 0.7333,-0.1054)
    -- ( 0.7333,-0.1139)
    --cycle
    (-0.7357,-0.1221)
    .. controls (-0.7405,-0.1203) and (-0.7472,-0.1201) .. (-0.7562,-0.1227)
    .. controls (-0.7721,-0.1527) and (-0.7463,-0.1606) .. (-0.7339,-0.1532)
    .. controls (-0.7244,-0.1475) and (-0.7214,-0.1275) .. (-0.7357,-0.1221)
    --cycle
    (-0.8606,-0.1378)
    .. controls (-0.8718,-0.1386) and (-0.8832,-0.1446) .. (-0.8941,-0.1518)
    -- (-0.8728,-0.1897)
    -- (-0.8468,-0.1811)
    -- (-0.8613,-0.2102)
    -- (-0.8317,-0.2631)
    .. controls (-0.7953,-0.2270) and (-0.7967,-0.1536) .. (-0.8471,-0.1391)
    .. controls (-0.8514,-0.1378) and (-0.8560,-0.1374) .. (-0.8606,-0.1378)
    --cycle
    ( 0.9187,-0.1555)
    .. controls ( 0.9083,-0.1585) and ( 0.8971,-0.1627) .. ( 0.8847,-0.1675)
    .. controls ( 0.8669,-0.1743) and ( 0.8469,-0.1785) .. ( 0.8399,-0.1989)
    .. controls ( 0.8307,-0.2247) and ( 0.8481,-0.2329) .. ( 0.8679,-0.2399)
    -- ( 0.8847,-0.2063)
    .. controls ( 0.8863,-0.2068) and ( 0.8871,-0.2069) .. ( 0.8886,-0.2074)
    --cycle
    ( 0.8679,-0.2399)
    .. controls ( 0.8663,-0.2432) and ( 0.8651,-0.2468) .. ( 0.8637,-0.2502)
```

```
    -- ( 0.8693,-0.2405)
    .. controls ( 0.8687,-0.2402) and ( 0.8685,-0.2401) .. ( 0.8679,-0.2399)
    --cycle
    ( 0.4392,-0.1558)
    -- ( 0.4332,-0.1807)
    .. controls ( 0.4281,-0.2431) and ( 0.5089,-0.2120) .. ( 0.4618,-0.1688)
    .. controls ( 0.4519,-0.1597) and ( 0.4457,-0.1593) .. ( 0.4392,-0.1558)
    --cycle
    (-0.6846,-0.1952)
    .. controls (-0.6966,-0.1951) and (-0.7082,-0.2013) .. (-0.7157,-0.2171)
    .. controls (-0.7203,-0.2268) and (-0.7199,-0.2378) .. (-0.7207,-0.2483)
    -- (-0.6787,-0.2399)
    -- (-0.6703,-0.2735)
    .. controls (-0.6096,-0.2523) and (-0.6488,-0.1955) .. (-0.6846,-0.1952)
    --cycle
    (-0.1120,-0.2035)
    .. controls (-0.1188,-0.2048) and (-0.1255,-0.2071) .. (-0.1323,-0.2089)
    .. controls (-0.1785,-0.2217) and (-0.2021,-0.2285) .. (-0.1912,-0.2819)
    -- (-0.0988,-0.2483)
    -- (-0.0651,-0.2740)
    .. controls (-0.0333,-0.3228) and (-0.0165,-0.2917) .. (-0.0209,-0.2740)
    .. controls (-0.0243,-0.2616) and (-0.0384,-0.2481) .. (-0.0474,-0.2386)
    .. controls (-0.0590,-0.2264) and (-0.0744,-0.2085) .. (-0.0911,-0.2040)
    .. controls (-0.0982,-0.2021) and (-0.1052,-0.2023) .. (-0.1120,-0.2035)
    --cycle
    ( 0.1647,-0.2053)
    .. controls ( 0.1471,-0.2058) and ( 0.1297,-0.2092) .. ( 0.1164,-0.2148)
    .. controls ( 0.0833,-0.2632) and ( 0.1207,-0.3872) .. ( 0.1933,-0.3346)
    .. controls ( 0.2031,-0.3275) and ( 0.2109,-0.3165) .. ( 0.2178,-0.3068)
    .. controls ( 0.2722,-0.2297) and ( 0.2177,-0.2039) .. ( 0.1647,-0.2053)
    --cycle
    ( 0.3262,-0.2328)
    .. controls ( 0.3073,-0.2617) and ( 0.3314,-0.2707) .. ( 0.3420,-0.2638)
    .. controls ( 0.3522,-0.2572) and ( 0.3585,-0.2285) .. ( 0.3262,-0.2328)
    --cycle
    ( 0.1534,-0.2399)
    -- ( 0.2039,-0.2483)
    -- ( 0.1534,-0.2987)
    --cycle
    ( 0.5217,-0.2636)
    .. controls ( 0.5071,-0.2632) and ( 0.4918,-0.2708) .. ( 0.4798,-0.2909)
    .. controls ( 0.4713,-0.3051) and ( 0.4736,-0.3094) .. ( 0.4728,-0.3240)
    -- ( 0.4812,-0.3240)
    -- ( 0.4812,-0.3324)
    -- ( 0.5232,-0.2987)
    -- ( 0.5232,-0.3492)
    .. controls ( 0.6028,-0.3358) and ( 0.5655,-0.2645) .. ( 0.5217,-0.2636)
    --cycle
    ( 0.4812,-0.3324)
    -- ( 0.4728,-0.3240)
    .. controls ( 0.4525,-0.3209) and ( 0.4056,-0.3074) .. ( 0.3892,-0.3106)
    .. controls ( 0.3596,-0.3163) and ( 0.3503,-0.3437) .. ( 0.3892,-0.3660)
    -- ( 0.3972,-0.3407)
```

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    .. controls ( 0.4281,-0.3611) and ( 0.4279,-0.3612) .. ( 0.4644,-0.3576)
    -- ( 0.4560,-0.4080)
    .. controls ( 0.5104,-0.3986) and ( 0.5053,-0.3736) .. ( 0.4812,-0.3324)
    --cycle
    ( 0.7282,-0.2775)
    .. controls ( 0.7176,-0.2768) and ( 0.7066,-0.2782) .. ( 0.6965,-0.2822)
    .. controls ( 0.6458,-0.3532) and ( 0.7574,-0.3899) .. ( 0.7782,-0.3306)
    .. controls ( 0.7887,-0.3013) and ( 0.7602,-0.2797) .. ( 0.7282,-0.2775)
    --cycle
    (-0.2465,-0.2903)
    .. controls (-0.2987,-0.3042) and (-0.2344,-0.4071) .. (-0.2306,-0.4102)
    .. controls (-0.1938,-0.4396) and (-0.1663,-0.4010) .. (-0.1299,-0.4027)
    .. controls (-0.1140,-0.4034) and (-0.0666,-0.4182) .. (-0.0557,-0.3820)
    .. controls (-0.0504,-0.3644) and (-0.0676,-0.3334) .. (-0.0988,-0.3744)
    -- (-0.1181,-0.3407)
    -- (-0.1308,-0.3168)
    .. controls (-0.1675,-0.2582) and (-0.1759,-0.3435) .. (-0.1781,-0.3492)
    .. controls (-0.1841,-0.3653) and (-0.1898,-0.3700) .. (-0.1996,-0.3828)
    -- (-0.2164,-0.2903)
    .. controls (-0.2291,-0.2881) and (-0.2389,-0.2883) .. (-0.2465,-0.2903)
    --cycle
    (-0.5947,-0.3156)
    -- (-0.6030,-0.3407)
    -- (-0.5778,-0.3240)
    --cycle
    (-0.0014,-0.3194)
    .. controls (-0.0278,-0.3131) and (-0.0544,-0.3497) .. (-0.0058,-0.3694)
    .. controls ( 0.0049,-0.3738) and ( 0.0162,-0.3735) .. ( 0.0273,-0.3744)
    .. controls ( 0.0265,-0.3636) and ( 0.0269,-0.3522) .. ( 0.0223,-0.3420)
    .. controls ( 0.0163,-0.3283) and ( 0.0074,-0.3214) .. (-0.0014,-0.3194)
    --cycle
    (-0.6508,-0.3284)
    .. controls (-0.6656,-0.3290) and (-0.6816,-0.3373) .. (-0.6955,-0.3576)
    .. controls (-0.7159,-0.3441) and (-0.7363,-0.3292) .. (-0.7624,-0.3378)
    .. controls (-0.7705,-0.3405) and (-0.7771,-0.3450) .. (-0.7829,-0.3501)
    -- (-0.7599,-0.3912)
    -- (-0.7543,-0.3744)
    -- (-0.6619,-0.4164)
    -- (-0.6619,-0.3660)
    -- (-0.6367,-0.4164)
    .. controls (-0.5723,-0.3945) and (-0.6064,-0.3266) .. (-0.6508,-0.3284)
    --cycle
    (-0.5287,-0.3512)
    .. controls (-0.5489,-0.3498) and (-0.5690,-0.3591) .. (-0.5764,-0.3751)
    .. controls (-0.5966,-0.4192) and (-0.5398,-0.3912) .. (-0.5274,-0.3828)
    -- (-0.5190,-0.4500)
    -- (-0.5358,-0.4333)
    -- (-0.5358,-0.4248)
    -- (-0.5611,-0.4248)
    .. controls (-0.5664,-0.4641) and (-0.5605,-0.4735) .. (-0.5442,-0.5088)
    -- (-0.5274,-0.5088)
    .. controls (-0.4972,-0.4701) and (-0.4647,-0.4466) .. (-0.4806,-0.3915)
    .. controls (-0.4882,-0.3649) and (-0.5085,-0.3527) .. (-0.5287,-0.3512)
```

```
--cycle
( 0.5485,-0.3594)
.. controls ( 0.5504,-0.3686) and ( 0.5513,-0.3797) .. ( 0.5560,-0.3899)
.. controls ( 0.5831,-0.4490) and ( 0.6446,-0.3809) .. ( 0.5811,-0.3594)
.. controls ( 0.5706,-0.3579) and ( 0.5594,-0.3583) .. ( 0.5485,-0.3594)
--cycle
( 0.3311,-0.3646)
.. controls ( 0.3201,-0.3659) and ( 0.3103,-0.3791) .. ( 0.3084,-0.3917)
.. controls ( 0.3035,-0.4255) and ( 0.3481,-0.5315) .. ( 0.4140,-0.4669)
.. controls ( 0.4439,-0.4932) and ( 0.4962,-0.5278) .. ( 0.5388,-0.5107)
.. controls ( 0.5684,-0.4989) and ( 0.5806,-0.4516) .. ( 0.5232,-0.4333)
-- ( 0.5232,-0.4669)
.. controls ( 0.4932,-0.4550) and ( 0.4949,-0.4563) .. ( 0.4644,-0.4669)
-- ( 0.4560,-0.4248)
-- ( 0.4224,-0.4417)
-- ( 0.3888,-0.4080)
-- ( 0.3617,-0.4500)
-- ( 0.3617,-0.4080)
.. controls ( 0.3546,-0.3735) and ( 0.3422,-0.3632) .. ( 0.3311,-0.3646)
--cycle
( 0.0862,-0.3828)
.. controls ( 0.0086,-0.4104) and ( 0.1258,-0.4856) .. ( 0.1453,-0.4236)
.. controls ( 0.1495,-0.4116) and ( 0.1465,-0.4028) .. ( 0.1453,-0.3912)
-- ( 0.0946,-0.4080)
--cycle
(-0.3761,-0.4056)
.. controls (-0.4460,-0.4310) and (-0.4022,-0.4833) .. (-0.3686,-0.4756)
.. controls (-0.3385,-0.4686) and (-0.3150,-0.4102) .. (-0.3761,-0.4056)
--cycle
(-0.1407,-0.4164)
.. controls (-0.1510,-0.4360) and (-0.1606,-0.4518) .. (-0.1524,-0.4748)
.. controls (-0.1401,-0.5093) and (-0.0958,-0.5218) .. (-0.0687,-0.4961)
.. controls (-0.0363,-0.4652) and (-0.0685,-0.4086) .. (-0.0988,-0.4753)
--cycle
(-0.7345,-0.4223)
.. controls (-0.7375,-0.4223) and (-0.7393,-0.4233) .. (-0.7417,-0.4237)
-- (-0.7259,-0.4519)
-- (-0.7123,-0.4248)
.. controls (-0.7212,-0.4230) and (-0.7284,-0.4222) .. (-0.7345,-0.4223)
--cycle
(-0.6450,-0.4333)
-- (-0.6283,-0.4753)
-- (-0.6959,-0.5053)
-- (-0.6728,-0.5467)
.. controls (-0.6597,-0.5415) and (-0.6464,-0.5310) .. (-0.6353,-0.5238)
.. controls (-0.6229,-0.5161) and (-0.6029,-0.5082) .. (-0.5949,-0.4962)
.. controls (-0.5673,-0.4552) and (-0.6118,-0.4359) .. (-0.6450,-0.4333)
--cycle
( 0.7515,-0.4421)
.. controls ( 0.7404,-0.4518) and ( 0.7330,-0.4660) .. ( 0.7289,-0.4814)
-- ( 0.7518,-0.4421)
.. controls ( 0.7518,-0.4422) and ( 0.7516,-0.4421) .. ( 0.7515,-0.4421)
--cycle
```

```
    (-0.7203,-0.4618)
    -- (-0.7004,-0.4973)
    .. controls (-0.6944,-0.4774) and (-0.6993,-0.4695) .. (-0.7203,-0.4618)
    --cycle
    ( 0.1694,-0.4873)
    .. controls ( 0.1182,-0.4851) and ( 0.0606,-0.5165) .. ( 0.1114,-0.5509)
    .. controls ( 0.1043,-0.5681) and ( 0.0968,-0.5809) .. ( 0.1030,-0.6004)
    .. controls ( 0.1160,-0.6424) and ( 0.2092,-0.6560) .. ( 0.1955,-0.5761)
    -- ( 0.1450,-0.6013)
    -- ( 0.1199,-0.5425)
    -- ( 0.1282,-0.5341)
    .. controls ( 0.1602,-0.5459) and ( 0.1584,-0.5438) .. ( 0.1871,-0.5257)
    .. controls ( 0.1977,-0.5856) and ( 0.2311,-0.5564) .. ( 0.2301,-0.5337)
    .. controls ( 0.2287,-0.5019) and ( 0.2002,-0.4885) .. ( 0.1694,-0.4873)
    --cycle
    ( 0.3143,-0.5168)
    .. controls ( 0.2653,-0.5233) and ( 0.3123,-0.5809) .. ( 0.3334,-0.5398)
    .. controls ( 0.3375,-0.5319) and ( 0.3370,-0.5251) .. ( 0.3384,-0.5168)
    --cycle
    ( 0.5821,-0.5172)
    -- ( 0.5905,-0.5425)
    .. controls ( 0.5223,-0.5546) and ( 0.5461,-0.6299) .. ( 0.5965,-0.6187)
    .. controls ( 0.6116,-0.6153) and ( 0.6642,-0.5952) .. ( 0.6693,-0.5808)
    .. controls ( 0.6859,-0.5354) and ( 0.6147,-0.5138) .. ( 0.5821,-0.5172)
    --cycle
    (-0.2667,-0.5315)
    .. controls (-0.3091,-0.5364) and (-0.3818,-0.5868) .. (-0.3173,-0.6098)
    .. controls (-0.3409,-0.7049) and (-0.2257,-0.7182) .. (-0.2332,-0.6265)
    -- (-0.2752,-0.6434)
    -- (-0.3173,-0.6013)
    .. controls (-0.2964,-0.5962) and (-0.2716,-0.5851) .. (-0.2511,-0.5945)
    .. controls (-0.2356,-0.6015) and (-0.2239,-0.6203) .. (-0.2131,-0.6252)
    .. controls (-0.1929,-0.6345) and (-0.1822,-0.6134) .. (-0.1883,-0.5942)
    .. controls (-0.1944,-0.5749) and (-0.2315,-0.5384) .. (-0.2508,-0.5323)
    .. controls (-0.2552,-0.5310) and (-0.2606,-0.5308) .. (-0.2667,-0.5315)
    --cycle
    ( 0.5989,-0.5509)
    -- ( 0.6073,-0.5509)
    -- ( 0.6073,-0.5593)
    --cycle
    (-0.0485,-0.5624)
    .. controls (-0.0662,-0.5623) and (-0.0842,-0.5741) .. (-0.0904,-0.6098)
    -- (-0.0483,-0.6013)
    .. controls (-0.0229,-0.6296) and ( 0.0007,-0.6067) .. (-0.0083,-0.5860)
    .. controls (-0.0134,-0.5744) and (-0.0308,-0.5625) .. (-0.0485,-0.5624)
    --cycle
    (-0.4918,-0.5707)
    .. controls (-0.5107,-0.5708) and (-0.5309,-0.5802) .. (-0.5442,-0.6013)
    -- (-0.5778,-0.5846)
    -- (-0.5862,-0.6181)
    .. controls (-0.5249,-0.6353) and (-0.5439,-0.6523) .. (-0.4854,-0.6098)
    -- (-0.4937,-0.6770)
    -- (-0.5442,-0.6854)
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```
    -- (-0.5442,-0.7022)
    .. controls (-0.4313,-0.7520) and (-0.4409,-0.6069) .. (-0.4465,-0.5962)
    .. controls (-0.4550,-0.5800) and (-0.4728,-0.5707) .. (-0.4918,-0.5707)
    --cycle
    ( 0.3300,-0.5846)
    -- ( 0.3300,-0.6098)
    -- ( 0.3552,-0.6098)
    -- ( 0.3552,-0.5846)
    --cycle
    ( 0.3726,-0.6221)
    .. controls ( 0.2948,-0.6226) and ( 0.2995,-0.7351) .. ( 0.3726,-0.7632)
    .. controls ( 0.4265,-0.7841) and ( 0.4818,-0.7181) .. ( 0.4056,-0.6938)
    -- ( 0.3719,-0.7275)
    -- ( 0.3719,-0.7027)
    .. controls ( 0.3796,-0.6524) and ( 0.4200,-0.6879) .. ( 0.4450,-0.6792)
    .. controls ( 0.4638,-0.6728) and ( 0.4659,-0.6470) .. ( 0.4510,-0.6352)
    .. controls ( 0.4434,-0.6293) and ( 0.3843,-0.6220) .. ( 0.3726,-0.6221)
    --cycle
    ( 0.0022,-0.6349)
    -- ( 0.0189,-0.6686)
    -- ( 0.0189,-0.6349)
    --cycle
    (-0.1244,-0.6794)
    .. controls (-0.1314,-0.6810) and (-0.1382,-0.6846) .. (-0.1441,-0.6904)
    .. controls (-0.1605,-0.7066) and (-0.1526,-0.7279) .. (-0.1607,-0.7464)
    -- (-0.1786,-0.7721)
    .. controls (-0.1852,-0.7840) and (-0.1929,-0.8079) .. (-0.1728,-0.8122)
    .. controls (-0.1636,-0.8142) and (-0.1224,-0.7844) .. (-0.1071,-0.7778)
    -- (-0.1155,-0.7106)
    -- (-0.0735,-0.7275)
    .. controls (-0.0800,-0.6898) and (-0.1033,-0.6748) .. (-0.1244,-0.6794)
    --cycle
    ( 0.1863,-0.6829)
    .. controls ( 0.1792,-0.6828) and ( 0.1712,-0.6837) .. ( 0.1618,-0.6854)
    -- ( 0.1618,-0.7022)
    -- ( 0.2123,-0.7442)
    -- ( 0.1282,-0.7190)
    .. controls ( 0.1336,-0.7372) and ( 0.1344,-0.7442) .. ( 0.1476,-0.7594)
    .. controls ( 0.1538,-0.7664) and ( 0.1626,-0.7738) .. ( 0.1704,-0.7788)
    .. controls ( 0.2127,-0.8054) and ( 0.2462,-0.7806) .. ( 0.2481,-0.7530)
    .. controls ( 0.2492,-0.7403) and ( 0.2417,-0.7279) .. ( 0.2353,-0.7175)
    .. controls ( 0.2199,-0.6926) and ( 0.2075,-0.6832) .. ( 0.1863,-0.6829)
    --cycle
    ( 0.5905,-0.6889)
    .. controls ( 0.5769,-0.6869) and ( 0.5692,-0.6908) .. ( 0.5569,-0.6938)
    -- ( 0.5569,-0.7106)
    -- ( 0.5821,-0.7190)
    .. controls ( 0.5823,-0.7234) and ( 0.5836,-0.7260) .. ( 0.5844,-0.7296)
    -- ( 0.6046,-0.6948)
    .. controls ( 0.6001,-0.6927) and ( 0.5958,-0.6898) .. ( 0.5905,-0.6889)
    --cycle
    (-0.0391,-0.7245)
    .. controls (-0.0667,-0.7229) and (-0.0839,-0.7453) .. (-0.0753,-0.7947)
```

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    .. controls (-0.0651,-0.8529) and (-0.0367,-0.8483) .. (-0.0106,-0.8698)
    -- ( 0.0547,-0.8704)
    .. controls ( 0.0548,-0.8616) and ( 0.0567,-0.8516) .. ( 0.0610,-0.8367)
    -- ( 0.0189,-0.8367)
    .. controls ( 0.0024,-0.8190) and ( 0.0000,-0.8231) .. (-0.0230,-0.8283)
    .. controls (-0.0380,-0.7923) and (-0.0454,-0.7840) .. (-0.0399,-0.7442)
    -- (-0.0230,-0.7442)
    -- (-0.0147,-0.7778)
    -- ( 0.0694,-0.7778)
    -- ( 0.0525,-0.8199)
    -- ( 0.1424,-0.8295)
    .. controls ( 0.1612,-0.8227) and ( 0.1619,-0.8006) .. ( 0.1424,-0.7877)
    .. controls ( 0.1265,-0.7801) and ( 0.1112,-0.7837) .. ( 0.0946,-0.7877)
    .. controls ( 0.0866,-0.7388) and ( 0.0598,-0.7228) .. ( 0.0189,-0.7526)
    .. controls (-0.0021,-0.7351) and (-0.0224,-0.7255) .. (-0.0391,-0.7245)
    --cycle
    (-0.5605,-0.7471)
    -- (-0.5242,-0.8116)
    .. controls (-0.5223,-0.8116) and (-0.5211,-0.8114) .. (-0.5190,-0.8115)
    -- (-0.5201,-0.8191)
    -- (-0.4998,-0.8552)
    .. controls (-0.4770,-0.8370) and (-0.4696,-0.8098) .. (-0.4974,-0.7815)
    --cycle
    (-0.3761,-0.7611)
    -- (-0.3845,-0.7694)
    -- (-0.3845,-0.7863)
    -- (-0.3761,-0.7947)
    -- (-0.3593,-0.7947)
    -- (-0.3508,-0.7863)
    -- (-0.3508,-0.7694)
    -- (-0.3593,-0.7611)
    --cycle
    ( 0.3384,-0.8347)
    .. controls ( 0.3106,-0.8395) and ( 0.2888,-0.8533) .. ( 0.2775,-0.8723)
    -- ( 0.3442,-0.8729)
    -- ( 0.3467,-0.8702)
    -- ( 0.3561,-0.8730)
    -- ( 0.4348,-0.8736)
    .. controls ( 0.4345,-0.8731) and ( 0.4345,-0.8727) .. ( 0.4341,-0.8721)
    .. controls ( 0.4186,-0.8512) and ( 0.3640,-0.8304) .. ( 0.3384,-0.8347)
    --cycle
    (-0.0904,-0.8535)
    .. controls (-0.1018,-0.8579) and (-0.1087,-0.8586) .. (-0.1185,-0.8680)
    .. controls (-0.1188,-0.8683) and (-0.1189,-0.8687) .. (-0.1192,-0.8690)
    -- (-0.0904,-0.8692)
    --cycle
    (-0.3081,-0.8645)
    .. controls (-0.3140,-0.8641) and (-0.3192,-0.8651) .. (-0.3238,-0.8672)
    -- (-0.2954,-0.8675)
    .. controls (-0.2996,-0.8660) and (-0.3039,-0.8648) .. (-0.3081,-0.8645)
    --cycle
    ;
}
```

```
}
\fi
```

hex/terrain/woods

The style for woods. The pattern is filled with a darker green, and outlines are not drawn.

```
\tikzset{
  hex/terrain/woods/.style={
    draw=none,
    fill={rgb,100:red,27;green,67;blue,27}
  }
}
```

hex/terrain/woods

Regular woods.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/woods/.pic={
    \path[hex/terrain/woods,pic actions,draw=none]
    (-0.2656, 0.8694)
    .. controls (-0.3133, 0.8640) and (-0.3608, 0.8400) .. (-0.3541, 0.8219)
    .. controls (-0.3417, 0.7629) and (-0.2512, 0.7779) .. (-0.2082, 0.7875)
    -- (-0.2424, 0.6937)
    .. controls (-0.2916, 0.7000) and (-0.3535, 0.6915) .. (-0.3950, 0.6606)
    .. controls (-0.4299, 0.6330) and (-0.4373, 0.5909) .. (-0.3950, 0.5657)
    .. controls (-0.4092, 0.5022) and (-0.3694, 0.4908) .. (-0.3191, 0.4633)
    .. controls (-0.3291, 0.3852) and (-0.2535, 0.3866) .. (-0.2935, 0.4633)
    .. controls (-0.2488, 0.4801) and (-0.2488, 0.5071) .. (-0.2778, 0.5156)
    .. controls (-0.2888, 0.5201) and (-0.3300, 0.5153) .. (-0.3447, 0.5156)
    -- (-0.3191, 0.6255)
    -- (-0.2680, 0.6425)
    -- (-0.2253, 0.5657)
    .. controls (-0.2136, 0.5780) and (-0.2023, 0.5853) .. (-0.2092, 0.6046)
    .. controls (-0.2132, 0.6161) and (-0.2403, 0.6366) .. (-0.2260, 0.6502)
    .. controls (-0.2044, 0.6711) and (-0.1779, 0.6203) .. (-0.1564, 0.6147)
    .. controls (-0.1363, 0.6094) and (-0.1262, 0.6240) .. (-0.1328, 0.6430)
    .. controls (-0.1449, 0.6778) and (-0.1661, 0.6737) .. (-0.1741, 0.7278)
    .. controls (-0.1213, 0.6943) and (-0.1063, 0.7287) .. (-0.1485, 0.7534)
    -- (-0.1058, 0.7875)
    -- (-0.0718, 0.7789)
    -- (-0.0633, 0.8046)
    .. controls (-0.0937, 0.8085) and (-0.0917, 0.8079) .. (-0.1143, 0.7875)
    -- (-0.1311, 0.8194)
    .. controls (-0.0764, 0.8223) and (-0.0450, 0.8485) .. (-0.0671, 0.8554)
```

```
    .. controls (-0.1156, 0.8701) and (-0.1015, 0.8233) .. (-0.1806, 0.8398)
    .. controls (-0.1900, 0.8580) and (-0.2089, 0.8664) .. (-0.2307, 0.8694)
    --cycle
    ( 0.3814, 0.8694)
    .. controls ( 0.3767, 0.8683) and ( 0.3712, 0.8666) .. ( 0.3632, 0.8643)
    -- ( 0.3974, 0.8387)
    .. controls ( 0.3974, 0.8591) and ( 0.3972, 0.8674) .. ( 0.3911, 0.8694)
    --cycle
    (-0.2452, 0.8541)
    .. controls (-0.2324, 0.8571) and (-0.2266, 0.8501) .. (-0.2079, 0.8422)
    -- (-0.2167, 0.8284)
    .. controls (-0.2397, 0.8309) and (-0.2848, 0.8202) .. (-0.2983, 0.8284)
    .. controls (-0.3215, 0.8378) and (-0.2860, 0.8342) .. (-0.2614, 0.8473)
    .. controls (-0.2547, 0.8509) and (-0.2496, 0.8531) .. (-0.2452, 0.8541)
    --cycle
    (-0.4331, 0.8427)
    .. controls (-0.4534, 0.8538) and (-0.5066, 0.7937) .. (-0.5170, 0.7773)
    .. controls (-0.5802, 0.6871) and (-0.6279, 0.5503) .. (-0.6704, 0.5650)
    .. controls (-0.6703, 0.5117) and (-0.7322, 0.4917) .. (-0.7340, 0.4547)
    .. controls (-0.7365, 0.4053) and (-0.6948, 0.3832) .. (-0.6621, 0.3593)
    .. controls (-0.6271, 0.3335) and (-0.6254, 0.2860) .. (-0.5409, 0.3014)
    -- (-0.5409, 0.3184)
    -- (-0.5750, 0.3099)
    -- (-0.5836, 0.3524)
    -- (-0.4898, 0.3184)
    -- (-0.5068, 0.3696)
    .. controls (-0.4593, 0.3586) and (-0.4552, 0.3659) .. (-0.4214, 0.3269)
    .. controls (-0.3754, 0.3528) and (-0.3794, 0.4022) .. (-0.4295, 0.4177)
    .. controls (-0.4450, 0.4224) and (-0.4931, 0.4354) .. (-0.5068, 0.4333)
    .. controls (-0.5383, 0.4284) and (-0.6200, 0.3557) .. (-0.6774, 0.4548)
    -- (-0.6432, 0.4548)
    -- (-0.6603, 0.4975)
    .. controls (-0.6019, 0.4851) and (-0.6021, 0.5053) .. (-0.5921, 0.5572)
    .. controls (-0.4969, 0.5307) and (-0.5431, 0.5224) .. (-0.4812, 0.4890)
    .. controls (-0.4749, 0.5293) and (-0.4896, 0.5637) .. (-0.5068, 0.5998)
    .. controls (-0.4948, 0.6064) and (-0.4850, 0.6107) .. (-0.4746, 0.6204)
    .. controls (-0.4177, 0.6740) and (-0.4877, 0.7151) .. (-0.5154, 0.6423)
    .. controls (-0.5225, 0.6240) and (-0.5189, 0.6174) .. (-0.5154, 0.5998)
    -- (-0.5889, 0.6190)
    .. controls (-0.5889, 0.6190) and (-0.5470, 0.6607) .. (-0.5396, 0.6879)
    .. controls (-0.5254, 0.7392) and (-0.4740, 0.7624) .. (-0.4378, 0.7960)
    .. controls (-0.4256, 0.8071) and (-0.3322, 0.7872) .. (-0.4331, 0.8427)
    --cycle
    ( 0.1374, 0.8418)
    .. controls ( 0.1320, 0.8428) and ( 0.1261, 0.8424) .. ( 0.1202, 0.8403)
    .. controls ( 0.1031, 0.8066) and ( 0.1641, 0.7460) .. ( 0.1812, 0.7545)
    .. controls ( 0.1999, 0.7639) and ( 0.1758, 0.8354) .. ( 0.1374, 0.8418)
    --cycle
    (-0.0462, 0.8217)
    -- (-0.0462, 0.7789)
    -- (-0.0121, 0.7961)
    --cycle
    ( 0.3717, 0.8217)
```

```
    -- ( 0.3717, 0.8046)
    -- ( 0.4059, 0.7961)
    -- ( 0.4144, 0.8217)
    --cycle
    ( 0.4898, 0.8122)
    .. controls ( 0.4741, 0.8124) and ( 0.4748, 0.7893) .. ( 0.4981, 0.7754)
    .. controls ( 0.5017, 0.7550) and ( 0.5313, 0.6452) .. ( 0.5686, 0.6689)
    .. controls ( 0.5928, 0.6844) and ( 0.5339, 0.7103) .. ( 0.5653, 0.7412)
    .. controls ( 0.5710, 0.7471) and ( 0.5728, 0.7507) .. ( 0.5731, 0.7536)
    -- ( 0.5703, 0.7583)
    .. controls ( 0.5582, 0.7647) and ( 0.5121, 0.7531) .. ( 0.5343, 0.7796)
    .. controls ( 0.5145, 0.8036) and ( 0.4992, 0.8122) .. ( 0.4898, 0.8122)
    --cycle
    ( 0.3291, 0.7997)
    .. controls ( 0.3112, 0.7975) and ( 0.2934, 0.7843) .. ( 0.2780, 0.7757)
    .. controls ( 0.2235, 0.7455) and ( 0.1913, 0.7199) .. ( 0.2438, 0.6595)
    .. controls ( 0.2287, 0.6542) and ( 0.2176, 0.6521) .. ( 0.2063, 0.6389)
    .. controls ( 0.1704, 0.5968) and ( 0.2192, 0.5413) .. ( 0.2430, 0.5712)
    .. controls ( 0.2494, 0.5791) and ( 0.2509, 0.6061) .. ( 0.2523, 0.6170)
    .. controls ( 0.2545, 0.6376) and ( 0.2547, 0.6388) .. ( 0.2523, 0.6595)
    -- ( 0.2865, 0.6681)
    .. controls ( 0.3094, 0.6426) and ( 0.3194, 0.6608) .. ( 0.3291, 0.6852)
    -- ( 0.2865, 0.6937)
    .. controls ( 0.3061, 0.7101) and ( 0.3276, 0.7308) .. ( 0.3547, 0.7322)
    .. controls ( 0.3792, 0.7335) and ( 0.4787, 0.6707) .. ( 0.4596, 0.7446)
    .. controls ( 0.4487, 0.7866) and ( 0.4132, 0.7751) .. ( 0.3912, 0.7800)
    .. controls ( 0.3681, 0.7853) and ( 0.3549, 0.8026) .. ( 0.3291, 0.7997)
    --cycle
    ( 0.0971, 0.7996)
    .. controls ( 0.0971, 0.7996) and (-0.0371, 0.7713) .. (-0.0393, 0.7247)
    .. controls (-0.0408, 0.6927) and ( 0.0217, 0.7175) .. ( 0.0521, 0.7277)
    .. controls ( 0.0789, 0.7366) and ( 0.0971, 0.7996) .. ( 0.0971, 0.7996)
    --cycle
    (-0.1571, 0.7961)
    -- (-0.1485, 0.7961)
    -- (-0.1485, 0.7875)
    -- (-0.1400, 0.7875)
    -- (-0.1400, 0.7789)
    -- (-0.1485, 0.7875)
    --cycle
    (-0.3689, 0.7733)
    .. controls (-0.3791, 0.7835) and (-0.4247, 0.7612) .. (-0.4247, 0.7612)
    .. controls (-0.4247, 0.7612) and (-0.4258, 0.7138) .. (-0.4104, 0.7184)
    .. controls (-0.3965, 0.7227) and (-0.3586, 0.7631) .. (-0.3689, 0.7733)
    --cycle
    ( 0.3462, 0.7278)
    -- ( 0.3462, 0.6766)
    -- ( 0.3804, 0.7107)
    --cycle
    ( 0.1142, 0.7077)
    .. controls ( 0.1016, 0.7065) and ( 0.0878, 0.7029) .. ( 0.0733, 0.6974)
    .. controls ( 0.0595, 0.6920) and ( 0.0449, 0.6883) .. ( 0.0332, 0.6789)
    .. controls ( 0.0192, 0.6678) and ( 0.0113, 0.6500) .. ( 0.0014, 0.6354)
```

```
    .. controls (-0.0079, 0.6219) and (-0.0221, 0.6074) .. (-0.0243, 0.5905)
    .. controls (-0.0267, 0.5713) and ( 0.0128, 0.4923) .. ( 0.0326, 0.4877)
    .. controls ( 0.0455, 0.4824) and ( 0.0530, 0.4866) .. ( 0.0647, 0.4877)
    .. controls ( 0.0870, 0.4591) and ( 0.0975, 0.4638) .. ( 0.1331, 0.4633)
    .. controls ( 0.1499, 0.4110) and ( 0.1908, 0.4198) .. ( 0.1671, 0.4890)
    .. controls ( 0.1267, 0.5142) and ( 0.1094, 0.5105) .. ( 0.0647, 0.4975)
    .. controls ( 0.0889, 0.5509) and ( 0.0981, 0.5486) .. ( 0.0733, 0.6084)
    .. controls ( 0.1221, 0.6144) and ( 0.1333, 0.6047) .. ( 0.1415, 0.6510)
    -- ( 0.1927, 0.6425)
    .. controls ( 0.1814, 0.6932) and ( 0.1526, 0.7111) .. ( 0.1142, 0.7077)
    --cycle
    ( 0.1671, 0.4890)
    -- ( 0.2182, 0.4890)
    .. controls ( 0.2474, 0.4580) and ( 0.2982, 0.5061) .. ( 0.2981, 0.5238)
    .. controls ( 0.2981, 0.5425) and ( 0.2721, 0.5720) .. ( 0.2418, 0.5318)
    -- ( 0.2182, 0.4975)
    .. controls ( 0.1923, 0.5152) and ( 0.1850, 0.5158) .. ( 0.1671, 0.4890)
    --cycle
    (-0.1058, 0.6937)
    -- (-0.0973, 0.6595)
    -- (-0.0802, 0.6595)
    -- (-0.0718, 0.6937)
    --cycle
    ( 0.3889, 0.6852)
    .. controls ( 0.3954, 0.6469) and ( 0.4108, 0.6416) .. ( 0.4314, 0.6766)
    --cycle
    ( 0.4826, 0.6852)
    -- ( 0.4562, 0.6475)
    .. controls ( 0.4460, 0.6335) and ( 0.4249, 0.5852) .. ( 0.4639, 0.5976)
    .. controls ( 0.4953, 0.6076) and ( 0.5058, 0.6583) .. ( 0.4998, 0.6852)
    --cycle
    (-0.0879, 0.6326)
    .. controls (-0.1189, 0.6139) and (-0.0956, 0.5976) .. (-0.0822, 0.6003)
    .. controls (-0.0699, 0.6027) and (-0.0544, 0.6253) .. (-0.0879, 0.6326)
    --cycle
    ( 0.3034, 0.6255)
    -- ( 0.2694, 0.6170)
    -- ( 0.2694, 0.5998)
    -- ( 0.3034, 0.5913)
    --cycle
    ( 0.6085, 0.6015)
    .. controls ( 0.5969, 0.6043) and ( 0.5796, 0.6004) .. ( 0.5688, 0.5964)
    .. controls ( 0.5189, 0.5780) and ( 0.5216, 0.5317) .. ( 0.5338, 0.4890)
    .. controls ( 0.5892, 0.5200) and ( 0.5513, 0.5451) .. ( 0.6191, 0.5657)
    .. controls ( 0.6318, 0.5296) and ( 0.6176, 0.4979) .. ( 0.6703, 0.5572)
    .. controls ( 0.6580, 0.5662) and ( 0.6196, 0.5989) .. ( 0.6085, 0.6015)
    --cycle
    ( 0.6703, 0.5572)
    .. controls ( 0.6650, 0.4639) and ( 0.7377, 0.4434) .. ( 0.6703, 0.5572)
    --cycle
    ( 0.2950, 0.5828)
    -- ( 0.3034, 0.5487)
    -- ( 0.3206, 0.5487)
```

```
    -- ( 0.3291, 0.5572)
    -- ( 0.3291, 0.5743)
    --cycle
    (-0.2167, 0.5572)
    .. controls (-0.2524, 0.4984) and (-0.2378, 0.4949) .. (-0.1997, 0.4463)
    -- (-0.1656, 0.4548)
    -- (-0.1656, 0.4719)
    -- (-0.1997, 0.4804)
    -- (-0.1997, 0.4719)
    -- (-0.2082, 0.4804)
    -- (-0.1997, 0.4804)
    .. controls (-0.1944, 0.5170) and (-0.1913, 0.5288) .. (-0.2167, 0.5572)
    --cycle
    ( 0.4528, 0.5567)
    .. controls ( 0.4208, 0.5591) and ( 0.3875, 0.5291) .. ( 0.3974, 0.4804)
    -- ( 0.4998, 0.5146)
    .. controls ( 0.4909, 0.5422) and ( 0.4721, 0.5552) .. ( 0.4528, 0.5567)
    --cycle
    (-0.5836, 0.5401)
    .. controls (-0.5724, 0.5036) and (-0.5428, 0.4697) .. (-0.5238, 0.5231)
    --cycle
    (-0.0890, 0.5163)
    .. controls (-0.1486, 0.4959) and (-0.1212, 0.4523) .. (-0.0806, 0.4615)
    .. controls (-0.0429, 0.4702) and (-0.0388, 0.5108) .. (-0.0890, 0.5163)
    --cycle
    ( 0.3494, 0.5160)
    .. controls ( 0.3442, 0.5162) and ( 0.3376, 0.5157) .. ( 0.3291, 0.5146)
    -- ( 0.3632, 0.4804)
    .. controls ( 0.3666, 0.5059) and ( 0.3648, 0.5149) .. ( 0.3494, 0.5160)
    --cycle
    ( 0.6832, 0.4635)
    .. controls ( 0.6577, 0.4592) and ( 0.6354, 0.4224) .. ( 0.6277, 0.3866)
    -- ( 0.6618, 0.3781)
    .. controls ( 0.6758, 0.4215) and ( 0.6897, 0.4164) .. ( 0.7299, 0.4293)
    .. controls ( 0.7150, 0.4573) and ( 0.6984, 0.4662) .. ( 0.6832, 0.4635)
    --cycle
    ( 0.3846, 0.4569)
    .. controls ( 0.3643, 0.4547) and ( 0.3427, 0.4484) .. ( 0.3206, 0.4379)
    .. controls ( 0.2993, 0.4278) and ( 0.2743, 0.4198) .. ( 0.2665, 0.3948)
    .. controls ( 0.2602, 0.3747) and ( 0.2710, 0.3497) .. ( 0.2940, 0.3491)
    .. controls ( 0.3208, 0.3484) and ( 0.3628, 0.4037) .. ( 0.4059, 0.3999)
    .. controls ( 0.4648, 0.3948) and ( 0.4817, 0.3238) .. ( 0.5508, 0.3184)
    -- ( 0.5594, 0.2842)
    .. controls ( 0.6325, 0.3301) and ( 0.6184, 0.4000) .. ( 0.5253, 0.3610)
    .. controls ( 0.4966, 0.4310) and ( 0.4457, 0.4630) .. ( 0.3846, 0.4569)
    --cycle
    ( 0.0020, 0.4093)
    .. controls (-0.0096, 0.4099) and (-0.0218, 0.4039) .. (-0.0547, 0.3920)
    .. controls (-0.0742, 0.3851) and (-0.1009, 0.3815) .. (-0.1085, 0.3591)
    .. controls (-0.1143, 0.3413) and (-0.1036, 0.3179) .. (-0.0973, 0.3014)
    .. controls (-0.1114, 0.2946) and (-0.1334, 0.2825) .. (-0.1485, 0.2820)
    .. controls (-0.1767, 0.2809) and (-0.1949, 0.3055) .. (-0.2182, 0.3110)
    .. controls (-0.2417, 0.3165) and (-0.3307, 0.2833) .. (-0.3437, 0.2635)
```

```
    .. controls (-0.3530, 0.2471) and (-0.3474, 0.2253) .. (-0.3437, 0.2075)
    .. controls (-0.4324, 0.1756) and (-0.3706, 0.0831) .. (-0.2765, 0.0710)
    .. controls (-0.2795, 0.0550) and (-0.2801, 0.0364) .. (-0.2860, 0.0213)
    .. controls (-0.2997,-0.0142) and (-0.3382,-0.0416) .. (-0.2680,-0.0825)
    -- (-0.2424, 0.0027)
    -- (-0.1997,-0.0143)
    .. controls (-0.1918, 0.0295) and (-0.2082, 0.0371) .. (-0.1741, 0.0710)
    .. controls (-0.1600, 0.0270) and (-0.1316, 0.0212) .. (-0.1230, 0.0710)
    -- (-0.0547, 0.0710)
    -- (-0.0547, 0.0198)
    .. controls (-0.0089, 0.0346) and (-0.0127, 0.0528) .. (-0.0121, 0.0966)
    .. controls ( 0.0434, 0.0981) and ( 0.0809, 0.1179) .. ( 0.0988, 0.1733)
    -- ( 0.0561, 0.1477)
    -- ( 0.0647, 0.1477)
    -- ( 0.0647, 0.1392)
    -- ( 0.0561, 0.1477)
    -- (-0.0333, 0.1681)
    -- (-0.0973, 0.1990)
    .. controls (-0.1035, 0.1519) and (-0.0915, 0.1406) .. (-0.0462, 0.1307)
    -- (-0.0547, 0.1051)
    .. controls (-0.0809, 0.1134) and (-0.1575, 0.1376) .. (-0.1816, 0.1275)
    .. controls (-0.1979, 0.1207) and (-0.2008, 0.1105) .. (-0.2082, 0.0966)
    -- (-0.2765, 0.0796)
    .. controls (-0.2913, 0.1042) and (-0.2904, 0.1037) .. (-0.3191, 0.1051)
    -- (-0.3277, 0.1307)
    -- (-0.3020, 0.1392)
    -- (-0.3191, 0.1733)
    -- (-0.2680, 0.2416)
    .. controls (-0.2555, 0.2025) and (-0.2434, 0.1999) .. (-0.2082, 0.1819)
    .. controls (-0.2103, 0.2198) and (-0.2204, 0.2217) .. (-0.2509, 0.2416)
    -- (-0.1571, 0.2416)
    -- (-0.0973, 0.1990)
    .. controls (-0.0622, 0.2159) and (-0.0506, 0.2107) .. (-0.0376, 0.2501)
    -- (-0.0718, 0.2672)
    -- (-0.0121, 0.2842)
    -- (-0.0121, 0.3014)
    -- (-0.0462, 0.3184)
    -- ( 0.0221, 0.3439)
    .. controls ( 0.0070, 0.2950) and ( 0.0355, 0.2771) .. ( 0.0818, 0.2757)
    -- ( 0.0561, 0.3354)
    .. controls ( 0.1139, 0.3092) and ( 0.1160, 0.3517) .. ( 0.0949, 0.3683)
    -- ( 0.0561, 0.3859)
    .. controls ( 0.0248, 0.4010) and ( 0.0136, 0.4085) .. ( 0.0020, 0.4093)
    --cycle
    (-0.2680,-0.0825)
    .. controls (-0.2752,-0.1245) and (-0.2656,-0.1332) .. (-0.2253,-0.1423)
    .. controls (-0.2780,-0.1694) and (-0.3487,-0.1517) .. (-0.3277,-0.2360)
    -- (-0.3958,-0.2275)
    .. controls (-0.3850,-0.1662) and (-0.4133,-0.1372) .. (-0.4727,-0.1337)
    -- (-0.4727,-0.0910)
    .. controls (-0.5590,-0.0763) and (-0.5042,-0.0134) .. (-0.5750,-0.0228)
    .. controls (-0.5589,-0.0849) and (-0.5477,-0.0819) .. (-0.5750,-0.1423)
    .. controls (-0.6476,-0.1314) and (-0.6815,-0.1792) .. (-0.6262,-0.2360)
```

```
    .. controls (-0.6614,-0.2507) and (-0.6863,-0.2704) .. (-0.6674,-0.3120)
    .. controls (-0.6596,-0.3292) and (-0.6399,-0.3442) .. (-0.6461,-0.3629)
    .. controls (-0.6528,-0.3836) and (-0.7224,-0.4151) .. (-0.6960,-0.4711)
    .. controls (-0.6692,-0.5273) and (-0.5938,-0.5008) .. (-0.6603,-0.4579)
    -- (-0.6262,-0.4237)
    -- (-0.5921,-0.4579)
    .. controls (-0.5645,-0.3552) and (-0.5902,-0.3724) .. (-0.6177,-0.2872)
    -- (-0.5750,-0.2531)
    -- (-0.6177,-0.2446)
    -- (-0.6006,-0.2190)
    .. controls (-0.5707,-0.2398) and (-0.5626,-0.2347) .. (-0.5494,-0.2019)
    -- (-0.5836,-0.1848)
    -- (-0.5153,-0.1592)
    .. controls (-0.5297,-0.1903) and (-0.5326,-0.1983) .. (-0.4983,-0.2105)
    -- (-0.4983,-0.1763)
    .. controls (-0.4268,-0.1951) and (-0.4189,-0.2337) .. (-0.3789,-0.2872)
    .. controls (-0.4036,-0.3020) and (-0.4028,-0.3012) .. (-0.4044,-0.3299)
    -- (-0.3362,-0.3299)
    .. controls (-0.3465,-0.3786) and (-0.3284,-0.3796) .. (-0.2850,-0.3811)
    -- (-0.2850,-0.4151)
    .. controls (-0.2401,-0.4035) and (-0.1731,-0.3767) .. (-0.1571,-0.3299)
    .. controls (-0.1233,-0.3324) and (-0.1022,-0.3221) .. (-0.1230,-0.2872)
    -- (-0.1143,-0.2360)
    -- (-0.1741,-0.2531)
    -- (-0.1741,-0.2701)
    -- (-0.1485,-0.2787)
    -- (-0.1571,-0.3214)
    -- (-0.2765,-0.3640)
    .. controls (-0.2785,-0.3286) and (-0.2853,-0.3271) .. (-0.3191,-0.3214)
    -- (-0.3191,-0.3299)
    -- (-0.3277,-0.3214)
    -- (-0.3191,-0.3214)
    .. controls (-0.3191,-0.3214) and (-0.2922,-0.3221) .. (-0.2850,-0.3128)
    .. controls (-0.2781,-0.3038) and (-0.2850,-0.2787) .. (-0.2850,-0.2787)
    .. controls (-0.2850,-0.2462) and (-0.2522,-0.2669) .. (-0.2424,-0.2360)
    -- (-0.2935,-0.2360)
    -- (-0.2509,-0.2019)
    -- (-0.2424,-0.2360)
    .. controls (-0.1852,-0.2624) and (-0.2046,-0.2259) .. (-0.1740,-0.2170)
    .. controls (-0.1599,-0.2119) and (-0.1427,-0.2266) .. (-0.1281,-0.2170)
    .. controls (-0.1166,-0.2109) and (-0.1070,-0.1747) .. (-0.1656,-0.1848)
    -- (-0.2082,-0.0228)
    -- (-0.2253,-0.0228)
    .. controls (-0.2307,-0.0463) and (-0.2347,-0.0485) .. (-0.2167,-0.0654)
    -- (-0.2253,-0.0910)
    --cycle
    ( 0.7385, 0.3781)
    .. controls ( 0.7464, 0.3334) and ( 0.7712, 0.3235) .. ( 0.7897, 0.3696)
    --cycle
    ( 0.3825, 0.3684)
    .. controls ( 0.3722, 0.3709) and ( 0.3598, 0.3638) .. ( 0.3547, 0.3341)
    -- ( 0.3712, 0.3341)
    .. controls ( 0.4107, 0.3328) and ( 0.3998, 0.3641) .. ( 0.3825, 0.3684)
```

```
--cycle
( 0.3547, 0.3341)
-- ( 0.3034, 0.3280)
.. controls ( 0.2587, 0.3223) and ( 0.2449, 0.3331) .. ( 0.2267, 0.2842)
-- ( 0.1515, 0.2970)
.. controls ( 0.1395, 0.3001) and ( 0.1217, 0.3113) .. ( 0.1096, 0.3062)
.. controls ( 0.0947, 0.3000) and ( 0.0955, 0.2804) .. ( 0.0944, 0.2671)
.. controls ( 0.0897, 0.2118) and ( 0.0889, 0.2059) .. ( 0.1158, 0.1563)
-- ( 0.1331, 0.1563)
-- ( 0.1415, 0.1648)
-- ( 0.1415, 0.2501)
-- ( 0.2449, 0.2446)
.. controls ( 0.2870, 0.2248) and ( 0.2549, 0.1801) .. ( 0.3376, 0.1733)
-- ( 0.3376, 0.2245)
-- ( 0.3889, 0.2075)
.. controls ( 0.3692, 0.2680) and ( 0.3319, 0.2493) .. ( 0.3034, 0.2928)
.. controls ( 0.3440, 0.2858) and ( 0.3561, 0.2934) .. ( 0.3547, 0.3341)
--cycle
( 0.4285, 0.3341)
.. controls ( 0.4111, 0.3048) and ( 0.4418, 0.2997) .. ( 0.4508, 0.3082)
.. controls ( 0.4603, 0.3170) and ( 0.4582, 0.3376) .. ( 0.4285, 0.3341)
--cycle
( 0.7199, 0.3309)
.. controls ( 0.7120, 0.3311) and ( 0.7041, 0.3301) .. ( 0.6963, 0.3276)
.. controls ( 0.6516, 0.3141) and ( 0.5998, 0.2127) .. ( 0.6788, 0.2075)
-- ( 0.6874, 0.1819)
.. controls ( 0.6908, 0.1882) and ( 0.6948, 0.1871) .. ( 0.6958, 0.2009)
.. controls ( 0.6967, 0.2152) and ( 0.6850, 0.2341) .. ( 0.6875, 0.2482)
.. controls ( 0.6912, 0.2697) and ( 0.7185, 0.2790) .. ( 0.7404, 0.2558)
-- ( 0.7556, 0.2330)
.. controls ( 0.8209, 0.2699) and ( 0.7743, 0.3292) .. ( 0.7199, 0.3309)
--cycle
(-0.4641, 0.3269)
-- (-0.4556, 0.2928)
-- (-0.4386, 0.2928)
-- (-0.4300, 0.3269)
--cycle
(-0.3532, 0.3269)
.. controls (-0.3838, 0.3252) and (-0.3857, 0.3233) .. (-0.3874, 0.2928)
.. controls (-0.3613, 0.3019) and (-0.3623, 0.3007) .. (-0.3532, 0.3269)
--cycle
(-0.7723, 0.3114)
.. controls (-0.9303, 0.2491) and (-0.8236, 0.1766) .. (-0.9066, 0.1318)
.. controls (-0.9222, 0.1231) and (-0.9315, 0.1156) .. (-0.9385, 0.1084)
-- (-0.9505, 0.0875)
.. controls (-0.9537, 0.0757) and (-0.9542, 0.0621) .. (-0.9542, 0.0410)
-- (-0.9333, 0.0454)
.. controls (-0.9116, 0.1020) and (-0.8383, 0.0970) .. (-0.8943, 0.1349)
.. controls (-0.8577, 0.1472) and (-0.8473, 0.1249) .. (-0.8748, 0.1652)
-- (-0.8414, 0.1559)
.. controls (-0.8055, 0.1614) and (-0.8119, 0.2075) .. (-0.8279, 0.2170)
.. controls (-0.8020, 0.2197) and (-0.8300, 0.2698) .. (-0.8062, 0.2572)
.. controls (-0.7862, 0.2467) and (-0.7713, 0.2258) .. (-0.7547, 0.2261)
```

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    .. controls (-0.7211, 0.2267) and (-0.7384, 0.2895) .. (-0.7723, 0.3114)
    --cycle
    ( 0.5167, 0.2928)
    -- ( 0.5083, 0.2842)
    -- ( 0.5083, 0.2672)
    -- ( 0.5167, 0.2587)
    -- ( 0.5338, 0.2587)
    -- ( 0.5423, 0.2672)
    -- ( 0.5423, 0.2842)
    -- ( 0.5338, 0.2928)
    --cycle
    ( 0.8233, 0.2914)
    .. controls ( 0.8159, 0.2897) and ( 0.8101, 0.2823) .. ( 0.8101, 0.2664)
    .. controls ( 0.8101, 0.2592) and ( 0.7901, 0.2245) .. ( 0.7943, 0.2184)
    .. controls ( 0.8010, 0.2085) and ( 0.8177, 0.1916) .. ( 0.8341, 0.1843)
    -- ( 0.7897, 0.1051)
    .. controls ( 0.7638, 0.1109) and ( 0.6977, 0.1143) .. ( 0.6790, 0.0913)
    .. controls ( 0.6678, 0.0772) and ( 0.6727, 0.0528) .. ( 0.6644, 0.0283)
    .. controls ( 0.6511,-0.0104) and ( 0.6263,-0.0275) .. ( 0.5936,-0.0484)
    .. controls ( 0.5977,-0.0521) and ( 0.6009,-0.0593) .. ( 0.6125,-0.0633)
    .. controls ( 0.6432,-0.0738) and ( 0.6954,-0.0310) .. ( 0.7067,-0.0043)
    .. controls ( 0.7123, 0.0088) and ( 0.7121, 0.0229) .. ( 0.7130, 0.0368)
    .. controls ( 0.7585, 0.0333) and ( 0.7707, 0.0484) .. ( 0.7897, 0.0881)
    -- ( 0.8409, 0.0027)
    .. controls ( 0.7828,-0.0157) and ( 0.7583,-0.0941) .. ( 0.8409,-0.1337)
    .. controls ( 0.8561,-0.0647) and ( 0.8176,-0.0742) .. ( 0.8836,-0.0143)
    -- ( 0.9348,-0.0654)
    .. controls ( 0.9443,-0.0311) and ( 0.9398,-0.0319) .. ( 0.9430,-0.0008)
    .. controls ( 0.9475, 0.0433) and ( 0.9603, 0.0556) .. ( 0.8921, 0.0796)
    -- ( 0.8836, 0.0710)
    -- ( 0.8836, 0.0540)
    -- ( 0.9006, 0.0198)
    .. controls ( 0.8705, 0.0555) and ( 0.8589, 0.0671) .. ( 0.8494, 0.1137)
    -- ( 0.8921, 0.0881)
    .. controls ( 0.9100, 0.1275) and ( 0.9093, 0.1211) .. ( 0.9077, 0.1641)
    .. controls ( 0.8502, 0.2199) and ( 0.8502, 0.2055) .. ( 0.8245, 0.2294)
    .. controls ( 0.8511, 0.2387) and ( 0.8571, 0.2533) .. ( 0.8546, 0.2660)
    -- ( 0.8445, 0.2834)
    .. controls ( 0.8380, 0.2892) and ( 0.8301, 0.2928) .. ( 0.8233, 0.2914)
    --cycle
    (-0.6221, 0.2851)
    .. controls (-0.6403, 0.2814) and (-0.6578, 0.2533) .. (-0.6578, 0.2330)
    .. controls (-0.6578, 0.2083) and (-0.6228, 0.1685) .. (-0.6090, 0.1392)
    .. controls (-0.6712, 0.1174) and (-0.6013, 0.0486) .. (-0.5914, 0.0454)
    .. controls (-0.5625, 0.0361) and (-0.5594, 0.0690) .. (-0.5384, 0.0751)
    .. controls (-0.5161, 0.0820) and (-0.5142, 0.0619) .. (-0.4641, 0.0796)
    .. controls (-0.4838, 0.1372) and (-0.5135, 0.1504) .. (-0.5665, 0.1733)
    -- (-0.5323, 0.2075)
    -- (-0.5665, 0.2160)
    -- (-0.5665, 0.1819)
    -- (-0.5921, 0.2245)
    -- (-0.6006, 0.2330)
    -- (-0.6090, 0.2416)
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    -- (-0.6006, 0.2416)
    -- (-0.6006, 0.2330)
    -- (-0.5921, 0.2330)
    -- (-0.5921, 0.2245)
    .. controls (-0.5591, 0.2361) and (-0.5513, 0.2585) .. (-0.5921, 0.2587)
    .. controls (-0.5999, 0.2809) and (-0.6112, 0.2874) .. (-0.6221, 0.2851)
    --cycle
    (-0.4001, 0.2659)
    -- (-0.4398, 0.2231)
    -- (-0.4713, 0.1989)
    .. controls (-0.5030, 0.1708) and (-0.4873, 0.1496) .. (-0.4486, 0.1607)
    .. controls (-0.4215, 0.1683) and (-0.3832, 0.1951) .. (-0.3704, 0.2199)
    .. controls (-0.3565, 0.2464) and (-0.3702, 0.2690) .. (-0.4001, 0.2659)
    --cycle
    ( 0.5167, 0.2501)
    .. controls ( 0.4726, 0.2275) and ( 0.4751, 0.2109) .. ( 0.4771, 0.1648)
    .. controls ( 0.4776, 0.1495) and ( 0.4771, 0.1247) .. ( 0.4946, 0.1178)
    .. controls ( 0.5149, 0.1096) and ( 0.5288, 0.1359) .. ( 0.5681, 0.1435)
    .. controls ( 0.6164, 0.1530) and ( 0.6391, 0.1274) .. ( 0.6568, 0.1214)
    .. controls ( 0.6669, 0.1180) and ( 0.6795, 0.1163) .. ( 0.6862, 0.1272)
    .. controls ( 0.7003, 0.1512) and ( 0.6673, 0.1556) .. ( 0.6532, 0.1563)
    .. controls ( 0.6261, 0.2314) and ( 0.5966, 0.1859) .. ( 0.5605, 0.1960)
    .. controls ( 0.5390, 0.2022) and ( 0.5268, 0.2319) .. ( 0.5167, 0.2501)
    --cycle
    (-0.0462, 0.2075)
    -- (-0.0462, 0.1819)
    -- (-0.0206, 0.1819)
    -- (-0.0206, 0.2075)
    --cycle
    (-0.7371, 0.1990)
    -- (-0.7371, 0.1563)
    -- (-0.7115, 0.1905)
    -- (-0.7200, 0.1990)
    --cycle
    (-0.1656, 0.1905)
    -- (-0.1400, 0.1648)
    --cycle
    (-0.7797, 0.1819)
    -- (-0.7883, 0.1733)
    -- (-0.7883, 0.1563)
    -- (-0.7542, 0.1477)
    -- (-0.7627, 0.1819)
    --cycle
    ( 0.1671, 0.1819)
    -- ( 0.1841, 0.1477)
    --cycle
    ( 0.6447, 0.1477)
    -- ( 0.6532, 0.1477)
    -- ( 0.6532, 0.1392)
    --cycle
    (-0.7081, 0.1437)
    .. controls (-0.7387, 0.1429) and (-0.7462, 0.1254) .. (-0.7593, 0.0844)
    .. controls (-0.7628, 0.0670) and (-0.7720, 0.0499) .. (-0.7593, 0.0321)
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    .. controls (-0.7496, 0.0145) and (-0.7241, 0.0137) .. (-0.7173, 0.0321)
    .. controls (-0.7114, 0.0479) and (-0.7222, 0.0657) .. (-0.7285, 0.0796)
    .. controls (-0.6938, 0.0968) and (-0.6811, 0.1011) .. (-0.6688, 0.1392)
    .. controls (-0.6852, 0.1425) and (-0.6979, 0.1439) .. (-0.7081, 0.1437)
    --cycle
    ( 0.8921, 0.1392)
    -- ( 0.9006, 0.1392)
    -- ( 0.9006, 0.1307)
    --cycle
    ( 0.5765, 0.1222)
    -- ( 0.5850, 0.0881)
    -- ( 0.6021, 0.0881)
    -- ( 0.6106, 0.1222)
    --cycle
    ( 0.2872, 0.1175)
    .. controls ( 0.2767, 0.1166) and ( 0.2651, 0.1135) .. ( 0.2533, 0.1071)
    .. controls ( 0.2151, 0.0867) and ( 0.2220, 0.0479) .. ( 0.2267, 0.0113)
    .. controls ( 0.2625, 0.0237) and ( 0.2504, 0.0254) .. ( 0.2701, 0.0519)
    .. controls ( 0.2958, 0.0863) and ( 0.3249, 0.0559) .. ( 0.3338, 0.0822)
    .. controls ( 0.3402, 0.1009) and ( 0.3185, 0.1198) .. ( 0.2872, 0.1175)
    --cycle
    ( 0.4845, 0.1051)
    .. controls ( 0.4706, 0.1009) and ( 0.4616, 0.0995) .. ( 0.4512, 0.0905)
    .. controls ( 0.4040, 0.0493) and ( 0.4796,-0.0172) .. ( 0.4845, 0.0710)
    .. controls ( 0.4877, 0.0867) and ( 0.4856, 0.0907) .. ( 0.4845, 0.1051)
    --cycle
    ( 0.6362, 0.1051)
    -- ( 0.6277, 0.0966)
    -- ( 0.6277, 0.0796)
    -- ( 0.6618, 0.0710)
    -- ( 0.6532, 0.1051)
    --cycle
    ( 0.0988, 0.0966)
    -- ( 0.0647, 0.0881)
    -- ( 0.0647, 0.0710)
    -- ( 0.0902, 0.0625)
    .. controls ( 0.0813, 0.0194) and ( 0.0842, 0.0065) .. ( 0.1244,-0.0143)
    -- ( 0.1331, 0.0283)
    -- ( 0.1671, 0.0368)
    -- ( 0.1671, 0.0540)
    .. controls ( 0.1326, 0.0659) and ( 0.1186, 0.0637) .. ( 0.0988, 0.0966)
    --cycle
    (-0.8125, 0.0621)
    .. controls (-0.8490, 0.0401) and (-0.8237, 0.0162) .. (-0.8062, 0.0190)
    .. controls (-0.7883, 0.0219) and (-0.7704, 0.0544) .. (-0.8125, 0.0621)
    --cycle
    ( 0.5167, 0.0540)
    -- ( 0.5083, 0.0198)
    -- ( 0.5423, 0.0283)
    -- ( 0.5423, 0.0454)
    -- ( 0.5338, 0.0540)
    --cycle
    (-0.0973, 0.0454)
```

```
    -- (-0.1058, 0.0368)
    -- (-0.1058, 0.0198)
    -- (-0.0718, 0.0113)
    -- (-0.0802, 0.0454)
    --cycle
    (-0.0035, 0.0368)
    -- (-0.0210, 0.0109)
    .. controls (-0.0655,-0.0708) and ( 0.0385,-0.0566) .. ( 0.0166, 0.0109)
    .. controls ( 0.0120, 0.0245) and ( 0.0056, 0.0275) .. (-0.0035, 0.0368)
    --cycle
    (-0.4977, 0.0207)
    .. controls (-0.5147, 0.0204) and (-0.5312, 0.0080) .. (-0.5211,-0.0096)
    .. controls (-0.5118,-0.0261) and (-0.4926,-0.0166) .. (-0.4645,-0.0487)
    .. controls (-0.4440,-0.0720) and (-0.4524,-0.0706) .. (-0.4214,-0.0825)
    .. controls (-0.4050,-0.0235) and (-0.4308, 0.0217) .. (-0.4977, 0.0207)
    --cycle
    ( 0.3756, 0.0075)
    .. controls ( 0.3646, 0.0069) and ( 0.3522, 0.0045) .. ( 0.3376, 0.0002)
    .. controls ( 0.3227,-0.0042) and ( 0.3054,-0.0075) .. ( 0.2946,-0.0193)
    -- ( 0.2742,-0.0568)
    .. controls ( 0.2649,-0.0745) and ( 0.2554,-0.0861) .. ( 0.2571,-0.1073)
    .. controls ( 0.2601,-0.1471) and ( 0.2967,-0.2295) .. ( 0.3408,-0.1666)
    .. controls ( 0.3653,-0.1317) and ( 0.3284,-0.1299) .. ( 0.3717,-0.0654)
    .. controls ( 0.4033,-0.0789) and ( 0.4049,-0.0788) .. ( 0.4314,-0.0568)
    .. controls ( 0.4664,-0.1165) and ( 0.5153,-0.0409) .. ( 0.5152,-0.0308)
    .. controls ( 0.5148,-0.0111) and ( 0.4690, 0.0277) .. ( 0.4571,-0.0399)
    .. controls ( 0.4280,-0.0054) and ( 0.4082, 0.0095) .. ( 0.3756, 0.0075)
    --cycle
    (-0.9801, 0.0047)
    -- (-0.9427,-0.0792)
    -- (-0.8931,-0.0669)
    -- (-0.8538,-0.0818)
    .. controls (-0.8464,-0.0219) and (-0.9339,-0.0180) .. (-0.9801, 0.0047)
    --cycle
    ( 0.5423,-0.0484)
    -- ( 0.5594,-0.0997)
    .. controls ( 0.5416,-0.1040) and ( 0.4986,-0.1096) .. ( 0.4864,-0.1181)
    .. controls ( 0.4658,-0.1324) and ( 0.4601,-0.1677) .. ( 0.4793,-0.1854)
    .. controls ( 0.4883,-0.1938) and ( 0.5053,-0.1981) .. ( 0.5167,-0.2019)
    .. controls ( 0.4933,-0.2045) and ( 0.4609,-0.2005) .. ( 0.4427,-0.2156)
    .. controls ( 0.4166,-0.2372) and ( 0.4089,-0.2872) .. ( 0.4826,-0.2957)
    -- ( 0.4826,-0.2446)
    .. controls ( 0.5217,-0.2597) and ( 0.5287,-0.2486) .. ( 0.5167,-0.2105)
    .. controls ( 0.5424,-0.2023) and ( 0.5512,-0.1934) .. ( 0.5594,-0.1677)
    -- ( 0.6191,-0.1848)
    -- ( 0.6788,-0.3042)
    -- ( 0.6532,-0.3128)
    -- ( 0.6532,-0.3299)
    -- ( 0.7385,-0.3214)
    -- ( 0.7130,-0.2617)
    .. controls ( 0.7337,-0.2558) and ( 0.7608,-0.2439) .. ( 0.7812,-0.2454)
    .. controls ( 0.7973,-0.2453) and ( 0.8226,-0.2581) .. ( 0.8346,-0.2454)
    .. controls ( 0.8523,-0.2285) and ( 0.8216,-0.2043) .. ( 0.8067,-0.1989)
```

```
    .. controls ( 0.7691,-0.1854) and ( 0.7439,-0.2093) .. ( 0.6805,-0.1933)
    -- ( 0.6805,-0.1448)
    -- ( 0.6017,-0.0907)
    -- ( 0.5680,-0.0907)
    -- ( 0.5765,-0.0484)
    --cycle
    (-0.7372,-0.0610)
    .. controls (-0.7812,-0.0612) and (-0.8222,-0.0885) .. (-0.7969,-0.1508)
    -- (-0.8546,-0.1518)
    .. controls (-0.8578,-0.0809) and (-0.9199,-0.0961) .. (-0.9322,-0.1220)
    -- (-0.9145,-0.1528)
    .. controls (-0.9119,-0.1539) and (-0.9110,-0.1554) .. (-0.9080,-0.1566)
    .. controls (-0.8746,-0.1628) and (-0.8911,-0.2081) .. (-0.8709,-0.2184)
    .. controls (-0.8479,-0.2301) and (-0.8289,-0.2160) .. (-0.8075,-0.2238)
    .. controls (-0.7880,-0.2309) and (-0.7418,-0.2959) .. (-0.7285,-0.2190)
    -- (-0.7712,-0.2105)
    .. controls (-0.7608,-0.1935) and (-0.7474,-0.1633) .. (-0.7309,-0.1535)
    .. controls (-0.7132,-0.1433) and (-0.6647,-0.1458) .. (-0.6532,-0.1225)
    .. controls (-0.6410,-0.0974) and (-0.6763,-0.0776) .. (-0.6945,-0.0697)
    .. controls (-0.7075,-0.0641) and (-0.7225,-0.0610) .. (-0.7372,-0.0610)
    --cycle
    ( 0.0790,-0.0703)
    .. controls ( 0.0586,-0.0724) and ( 0.0391,-0.0799) .. ( 0.0314,-0.0938)
    .. controls ( 0.0258,-0.1059) and ( 0.0293,-0.1207) .. ( 0.0314,-0.1337)
    .. controls (-0.0051,-0.1451) and (-0.0235,-0.1672) .. ( 0.0136,-0.1933)
    -- ( 0.0050,-0.2190)
    -- ( 0.0647,-0.2360)
    -- ( 0.0561,-0.2019)
    -- ( 0.0391,-0.2105)
    -- ( 0.0307,-0.2019)
    -- ( 0.0818,-0.1251)
    -- ( 0.0988,-0.1251)
    .. controls ( 0.1190,-0.1566) and ( 0.1311,-0.1660) .. ( 0.1671,-0.1763)
    .. controls ( 0.1712,-0.1381) and ( 0.1680,-0.1029) .. ( 0.1325,-0.0792)
    .. controls ( 0.1208,-0.0715) and ( 0.0994,-0.0682) .. ( 0.0790,-0.0703)
    --cycle
    (-0.0347,-0.0729)
    .. controls (-0.0400,-0.0723) and (-0.0465,-0.0725) .. (-0.0547,-0.0739)
    .. controls (-0.1154,-0.1097) and (-0.0914,-0.1419) .. (-0.0629,-0.1331)
    .. controls (-0.0318,-0.1235) and ( 0.0014,-0.0769) .. (-0.0347,-0.0729)
    --cycle
    (-0.1485,-0.0997)
    -- (-0.1656,-0.1166)
    -- (-0.1656,-0.1251)
    .. controls (-0.1656,-0.1251) and (-0.1284,-0.1383) .. (-0.1230,-0.1251)
    .. controls (-0.1184,-0.1140) and (-0.1485,-0.0997) .. (-0.1485,-0.0997)
    --cycle
    ( 0.8579,-0.1251)
    -- ( 0.8579,-0.1508)
    -- ( 0.8921,-0.1508)
    -- ( 0.8921,-0.1251)
    --cycle
    ( 0.3462,-0.1848)
```

```
    .. controls ( 0.3553,-0.2111) and ( 0.3541,-0.2099) .. ( 0.3804,-0.2190)
    .. controls ( 0.3789,-0.1929) and ( 0.3722,-0.1863) .. ( 0.3462,-0.1848)
    --cycle
    ( 0.5680,-0.2105)
    -- ( 0.5680,-0.2360)
    -- ( 0.5936,-0.2360)
    -- ( 0.5936,-0.2105)
    --cycle
    ( 0.2429,-0.2175)
    .. controls ( 0.2301,-0.2183) and ( 0.2146,-0.2250) .. ( 0.2042,-0.2351)
    .. controls ( 0.1851,-0.2515) and ( 0.1867,-0.2802) .. ( 0.1841,-0.3042)
    -- ( 0.2267,-0.3128)
    .. controls ( 0.2366,-0.2535) and ( 0.2673,-0.2625) .. ( 0.2665,-0.2351)
    .. controls ( 0.2661,-0.2218) and ( 0.2558,-0.2167) .. ( 0.2429,-0.2175)
    --cycle
    (-0.8394,-0.2360)
    .. controls (-0.8657,-0.2452) and (-0.8037,-0.2814) .. (-0.8128,-0.3076)
    .. controls (-0.7841,-0.3060) and (-0.8155,-0.2595) .. (-0.8394,-0.2360)
    --cycle
    (-0.3106,-0.2446)
    .. controls (-0.3061,-0.2411) and (-0.2935,-0.2446) .. (-0.2935,-0.2446)
    .. controls (-0.2935,-0.2446) and (-0.3063,-0.2847) .. (-0.3191,-0.2787)
    .. controls (-0.3297,-0.2736) and (-0.3199,-0.2518) .. (-0.3106,-0.2446)
    --cycle
    ( 0.0809,-0.2495)
    .. controls ( 0.0629,-0.2468) and ( 0.0475,-0.2563) .. ( 0.0307,-0.2602)
    .. controls ( 0.0102,-0.2651) and (-0.0913,-0.2616) .. (-0.0376,-0.3640)
    .. controls (-0.1141,-0.3685) and (-0.1262,-0.4016) .. (-0.0926,-0.4664)
    .. controls (-0.0856,-0.4795) and (-0.0758,-0.5040) .. (-0.0668,-0.5138)
    .. controls (-0.0449,-0.5377) and ( 0.0001,-0.5440) .. ( 0.0307,-0.5431)
    -- ( 0.0221,-0.4579)
    -- (-0.0206,-0.4833)
    .. controls (-0.0180,-0.4388) and (-0.0055,-0.4140) .. (-0.0633,-0.4237)
    .. controls (-0.0215,-0.3935) and (-0.0083,-0.4022) .. ( 0.0050,-0.3640)
    -- ( 0.0476,-0.3555)
    -- ( 0.0476,-0.3384)
    .. controls ( 0.0149,-0.3341) and ( 0.0150,-0.3375) .. (-0.0035,-0.3640)
    .. controls (-0.0031,-0.3175) and ( 0.0507,-0.3021) .. ( 0.0895,-0.3132)
    .. controls ( 0.0967,-0.3153) and ( 0.1020,-0.3182) .. ( 0.1069,-0.3214)
    -- ( 0.0733,-0.3214)
    -- ( 0.0733,-0.3555)
    -- ( 0.1073,-0.3555)
    -- ( 0.1073,-0.3217)
    .. controls ( 0.1209,-0.3306) and ( 0.1314,-0.3431) .. ( 0.1671,-0.3555)
    .. controls ( 0.1861,-0.3011) and ( 0.1658,-0.3044) .. ( 0.1276,-0.2793)
    .. controls ( 0.1121,-0.2692) and ( 0.1003,-0.2524) .. ( 0.0809,-0.2495)
    --cycle
    ( 0.5253,-0.2617)
    .. controls ( 0.5159,-0.2894) and ( 0.5137,-0.2935) .. ( 0.5423,-0.3042)
    --cycle
    (-0.5836,-0.2872)
    -- (-0.5921,-0.3299)
    .. controls (-0.5632,-0.3196) and (-0.5624,-0.3175) .. (-0.5665,-0.2872)
```

```
--cycle
( 0.4825,-0.3113)
.. controls ( 0.4709,-0.3098) and ( 0.4621,-0.3187) .. ( 0.4571,-0.3470)
.. controls ( 0.4065,-0.2945) and ( 0.3565,-0.3080) .. ( 0.3141,-0.3613)
.. controls ( 0.3029,-0.3754) and ( 0.2880,-0.3874) .. ( 0.2903,-0.4075)
.. controls ( 0.2921,-0.4247) and ( 0.3027,-0.4361) .. ( 0.3120,-0.4493)
.. controls ( 0.2945,-0.4516) and ( 0.2350,-0.4574) .. ( 0.2234,-0.4665)
.. controls ( 0.2011,-0.4843) and ( 0.2099,-0.5378) .. ( 0.2182,-0.5602)
-- ( 0.2352,-0.5602)
.. controls ( 0.2421,-0.5417) and ( 0.2492,-0.5116) .. ( 0.2706,-0.5071)
.. controls ( 0.3048,-0.4961) and ( 0.3439,-0.5674) .. ( 0.3618,-0.5071)
-- ( 0.3618,-0.4833)
-- ( 0.3974,-0.4919)
-- ( 0.4059,-0.4579)
-- ( 0.3376,-0.4493)
-- ( 0.3717,-0.3896)
.. controls ( 0.4306,-0.3991) and ( 0.4623,-0.4570) .. ( 0.4656,-0.3640)
.. controls ( 0.4971,-0.3707) and ( 0.5062,-0.3751) .. ( 0.5253,-0.3470)
-- ( 0.5451,-0.3694)
.. controls ( 0.6171,-0.4271) and ( 0.5795,-0.2610) .. ( 0.5253,-0.3384)
.. controls ( 0.5089,-0.3248) and ( 0.4943,-0.3128) .. ( 0.4825,-0.3113)
--cycle
( 0.6371,-0.3426)
.. controls ( 0.6165,-0.3414) and ( 0.6075,-0.3499) .. ( 0.6021,-0.3811)
.. controls ( 0.6375,-0.3781) and ( 0.6440,-0.3786) .. ( 0.6618,-0.3470)
.. controls ( 0.6521,-0.3447) and ( 0.6439,-0.3431) .. ( 0.6371,-0.3426)
--cycle
( 0.1158,-0.3640)
-- ( 0.1073,-0.3981)
-- ( 0.1415,-0.3981)
-- ( 0.1331,-0.3640)
--cycle
(-0.4660,-0.3701)
.. controls (-0.4757,-0.3670) and (-0.4894,-0.3727) .. (-0.4983,-0.3981)
-- (-0.5580,-0.3811)
.. controls (-0.5508,-0.4276) and (-0.5277,-0.4685) .. (-0.4812,-0.4833)
-- (-0.4898,-0.4066)
.. controls (-0.4444,-0.4042) and (-0.4498,-0.3750) .. (-0.4660,-0.3701)
--cycle
( 0.1671,-0.3724)
-- ( 0.1585,-0.3811)
-- ( 0.1671,-0.4407)
-- ( 0.1927,-0.4322)
-- ( 0.1927,-0.3811)
-- ( 0.1841,-0.3724)
--cycle
(-0.4061,-0.3746)
.. controls (-0.4337,-0.3682) and (-0.4432,-0.4275) .. (-0.3933,-0.4421)
.. controls (-0.3807,-0.4474) and (-0.3733,-0.4433) .. (-0.3617,-0.4421)
.. controls (-0.3654,-0.4287) and (-0.3677,-0.4184) .. (-0.3740,-0.4070)
.. controls (-0.3858,-0.3861) and (-0.3969,-0.3767) .. (-0.4061,-0.3746)
--cycle
(-0.2091,-0.4066)
```

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    -- (-0.2091,-0.4298)
    -- (-0.1315,-0.5004)
    .. controls (-0.1221,-0.4446) and (-0.1606,-0.4228) .. (-0.2091,-0.4066)
    --cycle
    ( 0.6634,-0.4202)
    .. controls ( 0.6063,-0.4164) and ( 0.5403,-0.4628) .. ( 0.5936,-0.5175)
    .. controls ( 0.5533,-0.5676) and ( 0.6039,-0.5913) .. ( 0.6362,-0.5261)
    -- ( 0.6021,-0.5175)
    -- ( 0.6618,-0.5004)
    -- ( 0.6874,-0.5261)
    -- ( 0.6532,-0.4749)
    -- ( 0.6618,-0.4664)
    .. controls ( 0.6767,-0.4763) and ( 0.6924,-0.4939) .. ( 0.7031,-0.4938)
    .. controls ( 0.7482,-0.4516) and ( 0.7588,-0.4217) .. ( 0.6869,-0.4249)
    .. controls ( 0.6795,-0.4222) and ( 0.6716,-0.4207) .. ( 0.6634,-0.4202)
    --cycle
    (-0.2595,-0.4322)
    -- (-0.2680,-0.4407)
    -- (-0.2680,-0.4579)
    -- (-0.2595,-0.4664)
    -- (-0.2424,-0.4664)
    -- (-0.2338,-0.4579)
    -- (-0.2338,-0.4407)
    -- (-0.2424,-0.4322)
    --cycle
    (-0.3947,-0.4820)
    .. controls (-0.4064,-0.4819) and (-0.4202,-0.4884) .. (-0.4300,-0.4906)
    .. controls (-0.4705,-0.5000) and (-0.4926,-0.4888) .. (-0.4812,-0.5431)
    .. controls (-0.4962,-0.5405) and (-0.5172,-0.5356) .. (-0.5319,-0.5380)
    .. controls (-0.5497,-0.5409) and (-0.6218,-0.5786) .. (-0.6276,-0.5954)
    .. controls (-0.6443,-0.6458) and (-0.5896,-0.6294) .. (-0.5665,-0.6198)
    -- (-0.5750,-0.6455)
    -- (-0.5409,-0.6540)
    -- (-0.5409,-0.6198)
    -- (-0.4727,-0.5943)
    -- (-0.4812,-0.6370)
    -- (-0.4641,-0.6028)
    -- (-0.4214,-0.6796)
    -- (-0.4044,-0.6796)
    .. controls (-0.3922,-0.6110) and (-0.4199,-0.5974) .. (-0.4386,-0.5431)
    -- (-0.4053,-0.5384)
    .. controls (-0.3682,-0.5271) and (-0.3698,-0.4934) .. (-0.3840,-0.4848)
    .. controls (-0.3872,-0.4829) and (-0.3908,-0.4821) .. (-0.3947,-0.4820)
    --cycle
    (-0.2509,-0.4833)
    .. controls (-0.2897,-0.5056) and (-0.2886,-0.5289) .. (-0.2509,-0.5516)
    -- (-0.2509,-0.5688)
    .. controls (-0.3046,-0.5780) and (-0.3807,-0.5721) .. (-0.3362,-0.6796)
    .. controls (-0.3905,-0.7060) and (-0.4127,-0.7567) .. (-0.3447,-0.7820)
    -- (-0.3305,-0.8084)
    .. controls (-0.3952,-0.8150) and (-0.4330,-0.7851) .. (-0.3796,-0.8551)
    .. controls (-0.3707,-0.8560) and (-0.2665,-0.8846) .. (-0.3191,-0.8587)
    .. controls (-0.2670,-0.8376) and (-0.2955,-0.8083) .. (-0.3191,-0.7735)
```

```
    .. controls (-0.2852,-0.7626) and (-0.2805,-0.7579) .. (-0.2850,-0.7222)
    -- (-0.3277,-0.7393)
    -- (-0.3277,-0.6796)
    .. controls (-0.2965,-0.6680) and (-0.3000,-0.6597) .. (-0.3020,-0.6285)
    .. controls (-0.2349,-0.6402) and (-0.2059,-0.6119) .. (-0.1513,-0.6666)
    .. controls (-0.1144,-0.7033) and (-0.1214,-0.7764) .. (-0.0716,-0.7828)
    .. controls (-0.0398,-0.7870) and (-0.0581,-0.7438) .. (-0.0633,-0.7307)
    .. controls (-0.0105,-0.7419) and (-0.0101,-0.7107) .. (-0.0259,-0.6944)
    .. controls (-0.0416,-0.6781) and (-0.0638,-0.6847) .. (-0.0920,-0.6613)
    .. controls (-0.1363,-0.6245) and (-0.1312,-0.5893) .. (-0.2253,-0.5516)
    --cycle
    ( 0.0893,-0.4928)
    .. controls ( 0.0854,-0.4941) and ( 0.0816,-0.4977) .. ( 0.0781,-0.5045)
    .. controls ( 0.0717,-0.5167) and ( 0.0733,-0.5538) .. ( 0.0733,-0.5688)
    .. controls (-0.0068,-0.5661) and ( 0.0229,-0.6522) .. ( 0.0360,-0.6661)
    .. controls ( 0.0456,-0.6761) and ( 0.0531,-0.6759) .. ( 0.0647,-0.6796)
    -- ( 0.0647,-0.6198)
    -- ( 0.1244,-0.6113)
    -- ( 0.1073,-0.5773)
    -- ( 0.1331,-0.5688)
    .. controls ( 0.1502,-0.5983) and ( 0.1514,-0.6011) .. ( 0.1841,-0.6113)
    .. controls ( 0.1815,-0.5647) and ( 0.1767,-0.5414) .. ( 0.1244,-0.5431)
    -- ( 0.1174,-0.5185)
    .. controls ( 0.1127,-0.5047) and ( 0.1008,-0.4886) .. ( 0.0893,-0.4928)
    --cycle
    ( 0.0647,-0.6796)
    .. controls ( 0.0651,-0.7162) and ( 0.0755,-0.7152) .. ( 0.1073,-0.7052)
    .. controls ( 0.0927,-0.6800) and ( 0.0939,-0.6798) .. ( 0.0647,-0.6796)
    --cycle
    ( 0.4429,-0.5307)
    .. controls ( 0.4305,-0.5311) and ( 0.4171,-0.5380) .. ( 0.4059,-0.5558)
    .. controls ( 0.3999,-0.5655) and ( 0.3989,-0.5750) .. ( 0.3994,-0.5861)
    .. controls ( 0.3998,-0.5978) and ( 0.4033,-0.6088) .. ( 0.4059,-0.6198)
    .. controls ( 0.4351,-0.6096) and ( 0.4347,-0.6075) .. ( 0.4400,-0.5773)
    .. controls ( 0.5088,-0.5860) and ( 0.4802,-0.5296) .. ( 0.4429,-0.5307)
    --cycle
    ( 0.6296,-0.5636)
    .. controls ( 0.6201,-0.5648) and ( 0.6129,-0.5872) .. ( 0.5850,-0.6007)
    .. controls ( 0.5662,-0.6071) and ( 0.5466,-0.6101) .. ( 0.5358,-0.6303)
    .. controls ( 0.5238,-0.6524) and ( 0.5014,-0.6717) .. ( 0.5092,-0.6929)
    .. controls ( 0.4879,-0.7051) and ( 0.4594,-0.7105) .. ( 0.4574,-0.7383)
    .. controls ( 0.4557,-0.7622) and ( 0.5198,-0.8058) .. ( 0.5459,-0.7885)
    .. controls ( 0.5602,-0.7791) and ( 0.4924,-0.7612) .. ( 0.5176,-0.7262)
    -- ( 0.5713,-0.7309)
    .. controls ( 0.6461,-0.7123) and ( 0.5265,-0.6556) .. ( 0.6262,-0.6344)
    .. controls ( 0.6303,-0.6340) and ( 0.6389,-0.6314) .. ( 0.6474,-0.6278)
    -- ( 0.6629,-0.6006)
    .. controls ( 0.6611,-0.5976) and ( 0.6583,-0.5944) .. ( 0.6541,-0.5908)
    .. controls ( 0.6418,-0.5698) and ( 0.6353,-0.5628) .. ( 0.6296,-0.5636)
    --cycle
    ( 0.2723,-0.5991)
    .. controls ( 0.2592,-0.6003) and ( 0.2468,-0.6028) .. ( 0.2363,-0.6064)
    .. controls ( 0.1997,-0.6189) and ( 0.1915,-0.6622) .. ( 0.2438,-0.6796)
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```
    -- ( 0.2524,-0.6540)
    -- ( 0.2694,-0.6540)
    -- ( 0.2438,-0.6796)
    -- ( 0.2352,-0.7052)
    .. controls ( 0.1815,-0.6689) and ( 0.1445,-0.7418) .. ( 0.2182,-0.7649)
    .. controls ( 0.2103,-0.7956) and ( 0.2084,-0.7983) .. ( 0.2267,-0.8246)
    .. controls ( 0.1155,-0.7748) and ( 0.1095,-0.9097) .. ( 0.1942,-0.8505)
    -- ( 0.2141,-0.8675)
    .. controls ( 0.2535,-0.8323) and ( 0.2056,-0.8655) .. ( 0.2756,-0.8643)
    -- ( 0.2903,-0.8720)
    -- ( 0.3279,-0.8720)
    -- ( 0.3427,-0.8612)
    .. controls ( 0.3869,-0.8663) and ( 0.4661,-0.8748) .. ( 0.4741,-0.8502)
    .. controls ( 0.5431,-0.8855) and ( 0.5233,-0.7888) .. ( 0.5039,-0.8143)
    .. controls ( 0.4752,-0.7958) and ( 0.5046,-0.8131) .. ( 0.4741,-0.8331)
    .. controls ( 0.3949,-0.7997) and ( 0.4522,-0.8406) .. ( 0.3683,-0.8327)
    .. controls ( 0.3744,-0.7942) and ( 0.4288,-0.7829) .. ( 0.4051,-0.7307)
    .. controls ( 0.4260,-0.7007) and ( 0.4185,-0.6946) .. ( 0.4051,-0.6626)
    .. controls ( 0.3990,-0.6503) and ( 0.3940,-0.6359) .. ( 0.3839,-0.6265)
    .. controls ( 0.3585,-0.6027) and ( 0.3119,-0.5953) .. ( 0.2723,-0.5991)
    --cycle
    (-0.2424,-0.6455)
    -- (-0.2424,-0.6796)
    -- (-0.1997,-0.6711)
    -- (-0.1997,-0.6540)
    --cycle
    ( 0.2950,-0.6455)
    .. controls ( 0.3615,-0.6477) and ( 0.3567,-0.6705) .. ( 0.3974,-0.7222)
    .. controls ( 0.3592,-0.8249) and ( 0.3353,-0.7947) .. ( 0.2609,-0.7990)
    -- ( 0.2438,-0.7649)
    .. controls ( 0.2681,-0.7474) and ( 0.2638,-0.7424) .. ( 0.2609,-0.7137)
    -- ( 0.2950,-0.6881)
    .. controls ( 0.3035,-0.6916) and ( 0.3102,-0.6959) .. ( 0.3198,-0.6974)
    .. controls ( 0.3496,-0.7020) and ( 0.3487,-0.6665) .. ( 0.3120,-0.6881)
    --cycle
    (-0.6122,-0.6460)
    .. controls (-0.6202,-0.6484) and (-0.6222,-0.6534) .. (-0.6220,-0.6591)
    -- (-0.6084,-0.6829)
    .. controls (-0.6039,-0.6880) and (-0.6001,-0.6940) .. (-0.5958,-0.6974)
    .. controls (-0.5822,-0.7078) and (-0.5979,-0.7175) .. (-0.5836,-0.7137)
    -- (-0.5557,-0.7397)
    .. controls (-0.5863,-0.7181) and (-0.4852,-0.7770) .. (-0.5233,-0.7812)
    .. controls (-0.4643,-0.7650) and (-0.4542,-0.8172) .. (-0.4400,-0.7940)
    .. controls (-0.4310,-0.7794) and (-0.4454,-0.7672) .. (-0.4569,-0.7609)
    .. controls (-0.5042,-0.7356) and (-0.5468,-0.7364) .. (-0.5580,-0.6711)
    .. controls (-0.5740,-0.6662) and (-0.5960,-0.6410) .. (-0.6122,-0.6460)
    --cycle
    (-0.2799,-0.6723)
    .. controls (-0.2946,-0.6977) and (-0.2726,-0.7009) .. (-0.2645,-0.6954)
    .. controls (-0.2563,-0.6899) and (-0.2508,-0.6683) .. (-0.2799,-0.6723)
    --cycle
    (-0.1741,-0.6796)
    -- (-0.1826,-0.6881)
```

```
    -- (-0.1826,-0.7052)
    -- (-0.1571,-0.6796)
    --cycle
    ( 0.0647,-0.7393)
    -- ( 0.0733,-0.7735)
    -- ( 0.0902,-0.7735)
    -- ( 0.0988,-0.7649)
    -- ( 0.0988,-0.7478)
    --cycle
    ( 0.2267,-0.7564)
    -- ( 0.2352,-0.7564)
    -- ( 0.2352,-0.7649)
    --cycle
    (-0.2765,-0.7649)
    -- (-0.2850,-0.7990)
    -- (-0.2509,-0.7905)
    -- (-0.2595,-0.7649)
    --cycle
    (-0.1620,-0.7999)
    .. controls (-0.1665,-0.7994) and (-0.1723,-0.7994) .. (-0.1792,-0.8003)
    .. controls (-0.2378,-0.8436) and (-0.2549,-0.8217) .. (-0.2658,-0.8441)
    .. controls (-0.2799,-0.8733) and (-0.2098,-0.8685) .. (-0.1746,-0.8466)
    .. controls (-0.1557,-0.8347) and (-0.1302,-0.8033) .. (-0.1620,-0.7999)
    --cycle
    (-0.0021,-0.8033)
    .. controls (-0.0289,-0.7979) and (-0.0697,-0.8240) .. (-0.0817,-0.8284)
    .. controls (-0.1018,-0.8361) and (-0.1245,-0.8333) .. (-0.1384,-0.8539)
    .. controls (-0.1534,-0.8760) and (-0.1093,-0.8641) .. (-0.0866,-0.8639)
    .. controls (-0.0704,-0.8637) and (-0.0573,-0.8695) .. (-0.0331,-0.8549)
    .. controls ( 0.0004,-0.8348) and (-0.0157,-0.8559) .. ( 0.0221,-0.8587)
    .. controls ( 0.0252,-0.8212) and ( 0.0141,-0.8066) .. (-0.0021,-0.8033)
    --cycle
    ( 0.1096,-0.8160)
    .. controls ( 0.1044,-0.8138) and ( 0.0965,-0.8137) .. ( 0.0850,-0.8167)
    .. controls ( 0.0624,-0.8514) and ( 0.0794,-0.8648) .. ( 0.0988,-0.8546)
    .. controls ( 0.1148,-0.8462) and ( 0.1249,-0.8224) .. ( 0.1096,-0.8160)
    --cycle
    (-0.4386,-0.8161)
    -- (-0.4386,-0.8587)
    .. controls (-0.3929,-0.8508) and (-0.3929,-0.8240) .. (-0.4386,-0.8161)
    --cycle
    (-0.4898,-0.8246)
    -- (-0.5227,-0.8312)
    -- (-0.5082,-0.8563)
    .. controls (-0.5034,-0.8573) and (-0.4999,-0.8586) .. (-0.4898,-0.8587)
    -- (-0.4878,-0.8720)
    -- (-0.4837,-0.8720)
    -- (-0.4565,-0.8673)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/swamp

The pattern for swamps. The pattern is filled with a light blue.

```
\tikzset{
  hex/terrain/swamp/.style={
    draw=none,
    fill={rgb,100:red,26;green,55;blue,70}
  }
}
```

hex/terrain/swamp

Swamps. This is probably the shortest of the terrain patterns.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/swamp/.pic={
    \path[hex/terrain/swamp,pic actions,draw=none]
    (-0.5026, 0.8699)
    -- (-0.5041, 0.8672)
    .. controls (-0.3586, 0.8441) and (-0.1148, 0.8722) .. ( 0.0006, 0.8697)
    -- ( 0.2386, 0.8529)
    -- ( 0.2386, 0.8699)
    --cycle
    ( 0.4257, 0.8699)
    -- ( 0.4257, 0.8529)
    -- ( 0.5112, 0.8558)
    -- ( 0.5033, 0.8699)
    --cycle
    ( 0.3067, 0.8359)
    -- ( 0.2897, 0.7848)
    -- ( 0.2726, 0.8188)
    -- ( 0.2556, 0.8188)
    -- ( 0.2217, 0.7509)
    -- ( 0.5719, 0.7509)
    -- ( 0.5621, 0.7679)
    -- ( 0.5617, 0.7679)
    -- ( 0.3746, 0.7848)
    -- ( 0.3746, 0.8359)
    --cycle
    (-0.3225, 0.7848)
    -- (-0.3225, 0.7509)
    -- ( 0.0856, 0.7509)
    -- ( 0.0856, 0.7848)
    --cycle
    (-0.5555, 0.7782)
```

```
    -- (-0.5713, 0.7509)
    -- (-0.5097, 0.7509)
    --cycle
    ( 0.2789, 0.6696)
    .. controls ( 0.2234, 0.6713) and ( 0.1659, 0.6658) .. ( 0.1195, 0.6658)
    -- (-0.6117, 0.6658)
    -- (-0.6117, 0.6318)
    -- ( 0.4257, 0.6318)
    .. controls ( 0.3878, 0.6597) and ( 0.3344, 0.6681) .. ( 0.2789, 0.6696)
    --cycle
    ( 0.6297, 0.6318)
    -- ( 0.6297, 0.5468)
    -- ( 0.5617, 0.5807)
    .. controls ( 0.5449, 0.5387) and ( 0.5194, 0.5474) .. ( 0.4764, 0.5468)
    -- ( 0.2047, 0.5468)
    .. controls ( 0.2857, 0.5146) and ( 0.5508, 0.5135) .. ( 0.7089, 0.5136)
    -- ( 0.6740, 0.5740)
    -- ( 0.6638, 0.5637)
    --cycle
    (-0.6684, 0.5591)
    .. controls (-0.6731, 0.5588) and (-0.6784, 0.5577) .. (-0.6832, 0.5571)
    -- (-0.6990, 0.5298)
    -- (-0.5777, 0.5298)
    .. controls (-0.6139, 0.5561) and (-0.6407, 0.5608) .. (-0.6684, 0.5591)
    --cycle
    (-0.3396, 0.5468)
    .. controls (-0.2194, 0.4991) and (-0.1285, 0.5826) .. (-0.0845, 0.4447)
    -- (-0.1525, 0.4957)
    -- (-0.1525, 0.4277)
    .. controls (-0.0482, 0.4023) and ( 0.2732, 0.3989) .. ( 0.3746, 0.4277)
    .. controls ( 0.2597, 0.4733) and ( 0.2397, 0.4045) .. ( 0.1026, 0.4957)
    -- ( 0.0686, 0.4617)
    -- ( 0.0516, 0.4617)
    -- ( 0.0686, 0.5298)
    -- ( 0.0006, 0.4447)
    -- ( 0.0006, 0.5468)
    --cycle
    (-0.0675, 0.5127)
    -- (-0.0164, 0.5127)
    -- (-0.0505, 0.4447)
    --cycle
    (-0.7435, 0.4527)
    -- (-0.7580, 0.4277)
    -- (-0.6797, 0.4277)
    .. controls (-0.6982, 0.4394) and (-0.7200, 0.4471) .. (-0.7435, 0.4527)
    --cycle
    (-0.5266, 0.4447)
    .. controls (-0.4681, 0.4018) and (-0.4413, 0.4086) .. (-0.3736, 0.4277)
    --cycle
    ( 0.5787, 0.4277)
    -- ( 0.5447, 0.3257)
    -- ( 0.5108, 0.3257)
    -- ( 0.4597, 0.4107)
```

```
    -- ( 0.4597, 0.3257)
    -- ( 0.4257, 0.3937)
    -- ( 0.4087, 0.3257)
    -- ( 0.2897, 0.3257)
    .. controls ( 0.3725, 0.2928) and ( 0.6913, 0.3087) .. ( 0.7998, 0.3087)
    .. controls ( 0.7426, 0.3376) and ( 0.7264, 0.3382) .. ( 0.6638, 0.3257)
    -- ( 0.6638, 0.3767)
    -- ( 0.5787, 0.3257)
    --cycle
    (-0.7817, 0.3257)
    -- (-0.7137, 0.2407)
    -- (-0.7988, 0.2746)
    .. controls (-0.8162, 0.2534) and (-0.8404, 0.2432) .. (-0.8672, 0.2385)
    -- (-0.8857, 0.2066)
    -- (-0.6627, 0.2066)
    .. controls (-0.5059, 0.2059) and (-0.2690, 0.1655) .. (-0.1185, 0.2066)
    .. controls (-0.2358, 0.2532) and (-0.4834, 0.1773) .. (-0.5607, 0.2746)
    -- (-0.6287, 0.2237)
    -- (-0.6457, 0.2407)
    .. controls (-0.5823, 0.3108) and (-0.5667, 0.3074) .. (-0.4756, 0.3087)
    --cycle
    ( 0.8338, 0.2576)
    -- ( 0.7998, 0.2066)
    -- ( 0.8906, 0.1990)
    -- ( 0.8567, 0.2576)
    --cycle
    (-0.0164, 0.2237)
    .. controls ( 0.0715, 0.1799) and ( 0.3189, 0.1896) .. ( 0.4257, 0.1896)
    -- ( 0.4257, 0.2237)
    --cycle
    (-0.2716, 0.1216)
    -- (-0.2716, 0.0876)
    -- ( 0.1501, 0.0876)
    -- ( 0.1434, 0.1042)
    -- ( 0.0345, 0.1216)
    --cycle
    ( 0.1501, 0.0876)
    -- ( 0.1536, 0.0789)
    -- ( 0.1536, 0.0876)
    --cycle
    ( 0.1536, 0.0789)
    -- ( 0.1536, 0.0196)
    -- ( 0.0856, 0.0534)
    -- ( 0.0686,-0.0145)
    -- ( 0.7658,-0.0145)
    .. controls ( 0.6332, 0.0380) and ( 0.4479,-0.0524) .. ( 0.3406, 0.0534)
    -- ( 0.3236, 0.0534)
    -- ( 0.2897, 0.0196)
    -- ( 0.2897, 0.0876)
    -- ( 0.2556, 0.0196)
    -- ( 0.2386, 0.0876)
    -- ( 0.1705, 0.0365)
    --cycle
```

```
    ( 0.3917, 0.1216)
    -- ( 0.3917, 0.0876)
    -- ( 0.8678, 0.0876)
    .. controls ( 0.7768, 0.1266) and ( 0.5022, 0.1216) .. ( 0.3917, 0.1216)
    --cycle
    (-0.9351, 0.1208)
    -- (-0.9518, 0.0921)
    -- (-0.9518, 0.0876)
    -- (-0.6117, 0.1045)
    --cycle
    (-0.9144, 0.0213)
    .. controls (-0.9468, 0.0204) and (-0.9775, 0.0109) .. (-0.9996,-0.0116)
    -- (-0.9982,-0.0141)
    -- (-0.8158, 0.0026)
    .. controls (-0.8449, 0.0142) and (-0.8804, 0.0222) .. (-0.9144, 0.0213)
    --cycle
    (-0.6287, 0.0196)
    .. controls (-0.5470,-0.0404) and (-0.2796,-0.0145) .. (-0.1695,-0.0145)
    -- (-0.1695, 0.0196)
    --cycle
    (-0.9488,-0.0996)
    -- (-0.9292,-0.1335)
    -- (-0.4756,-0.1335)
    -- (-0.4756,-0.0996)
    --cycle
    (-0.2886,-0.0996)
    -- (-0.2886,-0.1335)
    -- ( 0.2726,-0.1335)
    .. controls ( 0.2164,-0.0920) and ( 0.1871,-0.0997) .. ( 0.1195,-0.0996)
    --cycle
    ( 0.5478,-0.1025)
    .. controls ( 0.5070,-0.1018) and ( 0.4651,-0.1086) .. ( 0.4257,-0.1165)
    -- ( 0.6638,-0.1335)
    .. controls ( 0.6286,-0.1113) and ( 0.5887,-0.1031) .. ( 0.5478,-0.1025)
    --cycle
    ( 0.8928,-0.1132)
    .. controls ( 0.8481,-0.1114) and ( 0.8007,-0.1165) .. ( 0.7658,-0.1165)
    -- ( 0.9264,-0.1394)
    -- ( 0.9384,-0.1186)
    .. controls ( 0.9238,-0.1157) and ( 0.9087,-0.1137) .. ( 0.8928,-0.1132)
    --cycle
    (-0.2982,-0.2002)
    .. controls (-0.3469,-0.2010) and (-0.3950,-0.2053) .. (-0.4416,-0.2185)
    -- (-0.0505,-0.2355)
    -- ( 0.7827,-0.2355)
    .. controls ( 0.6739,-0.1909) and ( 0.4335,-0.2017) .. ( 0.3067,-0.2016)
    -- (-0.1525,-0.2016)
    .. controls (-0.2005,-0.2016) and (-0.2496,-0.1992) .. (-0.2982,-0.2002)
    --cycle
    (-0.8328,-0.2016)
    .. controls (-0.7894,-0.2498) and (-0.7244,-0.2355) .. (-0.6627,-0.2355)
    -- (-0.6627,-0.3034)
    -- (-0.6967,-0.2696)
```

```
    -- (-0.7137,-0.2696)
    .. controls (-0.7385,-0.3064) and (-0.7772,-0.3191) .. (-0.8200,-0.3227)
    -- (-0.8113,-0.3377)
    .. controls (-0.6682,-0.3440) and (-0.4684,-0.3376) .. (-0.3906,-0.3376)
    -- (-0.4586,-0.2696)
    -- (-0.5266,-0.3034)
    -- (-0.5097,-0.2355)
    -- (-0.5607,-0.3206)
    -- (-0.5777,-0.2355)
    -- (-0.6457,-0.3034)
    -- (-0.6287,-0.2185)
    --cycle
    ( 0.8169,-0.2866)
    -- ( 0.7489,-0.3206)
    .. controls ( 0.7652,-0.3284) and ( 0.7871,-0.3345) .. ( 0.8114,-0.3386)
    -- ( 0.8324,-0.3020)
    --cycle
    ( 0.2076,-0.3170)
    .. controls ( 0.0913,-0.3168) and (-0.0288,-0.3206) .. (-0.0845,-0.3206)
    -- ( 0.2509,-0.3621)
    -- ( 0.2897,-0.4056)
    -- ( 0.2556,-0.3716)
    -- ( 0.2386,-0.3716)
    -- ( 0.2386,-0.4566)
    -- ( 0.4257,-0.4566)
    -- ( 0.3746,-0.3716)
    -- ( 0.3067,-0.4226)
    -- ( 0.3067,-0.3547)
    -- ( 0.4766,-0.3376)
    .. controls ( 0.4363,-0.3215) and ( 0.3237,-0.3172) .. ( 0.2076,-0.3170)
    --cycle
    (-0.7622,-0.4226)
    -- (-0.7427,-0.4566)
    -- (-0.5607,-0.4566)
    -- (-0.5607,-0.4226)
    --cycle
    (-0.3396,-0.4226)
    -- (-0.3396,-0.4566)
    -- (-0.0164,-0.4566)
    -- (-0.0164,-0.4226)
    --cycle
    ( 0.5787,-0.4226)
    .. controls ( 0.6179,-0.4661) and ( 0.6835,-0.4595) .. ( 0.7407,-0.4607)
    -- ( 0.7528,-0.4400)
    .. controls ( 0.6947,-0.4396) and ( 0.6370,-0.4368) .. ( 0.5787,-0.4226)
    --cycle
    (-0.2496,-0.5239)
    .. controls (-0.2827,-0.5212) and (-0.3176,-0.5246) .. (-0.3566,-0.5246)
    -- (-0.7034,-0.5246)
    -- (-0.6873,-0.5524)
    .. controls (-0.6429,-0.5639) and (-0.5972,-0.5587) .. (-0.5436,-0.5587)
    -- (-0.1525,-0.5587)
    .. controls (-0.1848,-0.5349) and (-0.2163,-0.5263) .. (-0.2496,-0.5239)
```

```
    --cycle
    (-0.0164,-0.5417)
    .. controls ( 0.0514,-0.5917) and ( 0.1065,-0.5717) .. ( 0.1876,-0.5736)
    .. controls ( 0.2932,-0.5761) and ( 0.5300,-0.5848) .. ( 0.6766,-0.5720)
    -- ( 0.6872,-0.5538)
    -- ( 0.4937,-0.5417)
    --cycle
    (-0.6255,-0.6593)
    -- (-0.6248,-0.6607)
    -- (-0.6117,-0.6607)
    --cycle
    (-0.5777,-0.6607)
    -- (-0.5777,-0.7287)
    -- (-0.5856,-0.7287)
    -- (-0.5659,-0.7627)
    -- (-0.3906,-0.7627)
    -- (-0.1695,-0.7627)
    -- (-0.4246,-0.7287)
    -- (-0.4076,-0.6607)
    -- (-0.4416,-0.7287)
    -- (-0.4756,-0.7287)
    -- (-0.4756,-0.6607)
    -- (-0.5097,-0.6607)
    -- (-0.5097,-0.7287)
    --cycle
    ( 0.0686,-0.7457)
    .. controls ( 0.1464,-0.8028) and ( 0.3428,-0.7798) .. ( 0.4427,-0.7798)
    -- ( 0.4427,-0.7457)
    --cycle
    (-0.3736,-0.8478)
    -- (-0.3736,-0.8722)
    -- (-0.2203,-0.8722)
    .. controls (-0.2708,-0.8419) and (-0.3097,-0.8478) .. (-0.3736,-0.8478)
    --cycle
    (-0.0172,-0.8544)
    .. controls (-0.0398,-0.8556) and (-0.0623,-0.8586) .. (-0.0845,-0.8648)
    .. controls (-0.0753,-0.8684) and (-0.0664,-0.8700) .. (-0.0573,-0.8722)
    -- ( 0.5033,-0.8722)
    -- ( 0.5088,-0.8626)
    .. controls ( 0.3892,-0.8602) and ( 0.2527,-0.8649) .. ( 0.1876,-0.8648)
    .. controls ( 0.1186,-0.8647) and ( 0.0502,-0.8509) .. (-0.0172,-0.8544)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/rough

The style for rough hexes. The pattern is filled with a light brown, and outlines are not drawn.

```
\tikzset{
  hex/terrain/rough/.style={
    draw=none,
```

```
    fill={rgb,100:red,79;green,68;blue,41}
  }
}
```

hex/terrain/rough

Roughs. Again, a bit long.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/rough/.pic={
    \path[hex/terrain/rough,pic actions,draw=none]
    (-0.2701, 0.8873)
    .. controls (-0.2982, 0.8927) and (-0.3250, 0.8675) .. (-0.3296, 0.8537)
    .. controls (-0.3363, 0.8337) and (-0.3058, 0.8263) .. (-0.2820, 0.8610)
    .. controls (-0.2717, 0.8450) and (-0.2591, 0.8228) .. (-0.2441, 0.8112)
    .. controls (-0.2057, 0.7817) and (-0.1394, 0.7709) .. (-0.1208, 0.8270)
    -- (-0.2226, 0.8355)
    .. controls (-0.2359, 0.8698) and (-0.2532, 0.8840) .. (-0.2701, 0.8873)
    --cycle
    (-0.1081, 0.8792)
    .. controls (-0.1371, 0.8680) and (-0.1265, 0.8900) .. (-0.1377, 0.8610)
    .. controls (-0.1121, 0.8691) and (-0.1163, 0.8536) .. (-0.1081, 0.8792)
    --cycle
    ( 0.1762, 0.8752)
    -- ( 0.1761, 0.8710)
    .. controls ( 0.1746, 0.8556) and ( 0.1707, 0.8704) .. ( 0.1822, 0.8575)
    .. controls ( 0.1958, 0.8423) and ( 0.2514, 0.8065) .. ( 0.2435, 0.8694)
    --cycle
    ( 0.3216, 0.8740)
    .. controls ( 0.3061, 0.8744) and ( 0.2932, 0.8668) .. ( 0.2896, 0.8414)
    .. controls ( 0.2869, 0.8222) and ( 0.3049, 0.8110) .. ( 0.3122, 0.7930)
    -- ( 0.3292, 0.7930)
    -- ( 0.3377, 0.8440)
    -- ( 0.3874, 0.8438)
    -- ( 0.3702, 0.8584)
    .. controls ( 0.3556, 0.8652) and ( 0.3372, 0.8736) .. ( 0.3216, 0.8740)
    --cycle
    ( 0.4696, 0.8697)
    .. controls ( 0.4362, 0.8687) and ( 0.4116, 0.8113) .. ( 0.4594, 0.7865)
    -- ( 0.4565, 0.8238)
    -- ( 0.5034, 0.8485)
    .. controls ( 0.4927, 0.8641) and ( 0.4807, 0.8700) .. ( 0.4696, 0.8697)
    --cycle
    (-0.0783, 0.8695)
    -- (-0.0698, 0.8185)
    -- (-0.0528, 0.8185)
```

```
    .. controls (-0.0488, 0.8507) and (-0.0499, 0.8533) .. (-0.0783, 0.8695)
    --cycle
    ( 0.0321, 0.8695)
    .. controls (-0.0074, 0.8534) and (-0.0195, 0.8453) .. (-0.0104, 0.8015)
    .. controls ( 0.0252, 0.8183) and ( 0.0356, 0.8295) .. ( 0.0321, 0.8695)
    --cycle
    (-0.4155, 0.8596)
    .. controls (-0.4417, 0.8307) and (-0.4165, 0.8213) .. (-0.4032, 0.8284)
    .. controls (-0.3903, 0.8353) and (-0.3789, 0.8639) .. (-0.4155, 0.8596)
    --cycle
    (-0.4857, 0.8525)
    .. controls (-0.4972, 0.8321) and (-0.5172, 0.8207) .. (-0.5389, 0.8116)
    -- (-0.5595, 0.7763)
    .. controls (-0.5377, 0.7748) and (-0.5144, 0.7944) .. (-0.4942, 0.8100)
    -- (-0.4857, 0.7845)
    .. controls (-0.4503, 0.8051) and (-0.4552, 0.8169) .. (-0.4688, 0.8525)
    --cycle
    ( 0.1002, 0.8511)
    .. controls ( 0.0869, 0.8528) and ( 0.0769, 0.8478) .. ( 0.0696, 0.8260)
    -- ( 0.1509, 0.8185)
    -- ( 0.1509, 0.8355)
    .. controls ( 0.1302, 0.8408) and ( 0.1135, 0.8493) .. ( 0.1002, 0.8511)
    --cycle
    ( 0.2485, 0.8268)
    .. controls ( 0.2378, 0.8296) and ( 0.2250, 0.8213) .. ( 0.2103, 0.7930)
    .. controls ( 0.2410, 0.7676) and ( 0.2451, 0.7555) .. ( 0.2867, 0.7591)
    .. controls ( 0.2791, 0.7861) and ( 0.2665, 0.8220) .. ( 0.2485, 0.8268)
    --cycle
    (-0.3754, 0.8100)
    -- (-0.3754, 0.7930)
    -- (-0.3330, 0.7930)
    -- (-0.3330, 0.8100)
    --cycle
    ( 0.5066, 0.8010)
    -- ( 0.5131, 0.7667)
    -- ( 0.5443, 0.7538)
    -- ( 0.5566, 0.7611)
    -- ( 0.5392, 0.7958)
    --cycle
    (-0.4008, 0.7930)
    -- (-0.4348, 0.7591)
    --cycle
    ( 0.1509, 0.7930)
    -- ( 0.1254, 0.7676)
    .. controls ( 0.1432, 0.7361) and ( 0.1497, 0.7365) .. ( 0.1849, 0.7336)
    .. controls ( 0.1820, 0.7688) and ( 0.1824, 0.7753) .. ( 0.1509, 0.7930)
    --cycle
    ( 0.0301, 0.7854)
    .. controls ( 0.0240, 0.7861) and ( 0.0162, 0.7858) .. ( 0.0066, 0.7845)
    -- ( 0.0490, 0.7421)
    .. controls ( 0.0527, 0.7709) and ( 0.0486, 0.7831) .. ( 0.0301, 0.7854)
    --cycle
    (-0.2757, 0.7847)
```

```
    .. controls (-0.2819, 0.7857) and (-0.2896, 0.7857) .. (-0.2990, 0.7845)
    -- (-0.2820, 0.7411)
    .. controls (-0.3010, 0.7423) and (-0.3576, 0.7485) .. (-0.3704, 0.7411)
    .. controls (-0.3832, 0.7314) and (-0.3819, 0.7137) .. (-0.3644, 0.7089)
    .. controls (-0.3522, 0.7029) and (-0.3199, 0.7069) .. (-0.3075, 0.7089)
    .. controls (-0.2647, 0.7227) and (-0.2326, 0.7776) .. (-0.2757, 0.7847)
    --cycle
    ( 0.3631, 0.7676)
    -- ( 0.3122, 0.7479)
    .. controls ( 0.3064, 0.6995) and ( 0.3021, 0.7030) .. ( 0.3546, 0.7166)
    .. controls ( 0.3550, 0.6777) and ( 0.3499, 0.6644) .. ( 0.3886, 0.6488)
    .. controls ( 0.3854, 0.7398) and ( 0.3467, 0.6989) .. ( 0.3631, 0.7676)
    --cycle
    ( 0.5753, 0.7676)
    .. controls ( 0.5837, 0.7354) and ( 0.5927, 0.7219) .. ( 0.6097, 0.7131)
    -- ( 0.5796, 0.7669)
    .. controls ( 0.5781, 0.7670) and ( 0.5768, 0.7674) .. ( 0.5753, 0.7676)
    --cycle
    (-0.5536, 0.7591)
    -- (-0.5706, 0.7082)
    -- (-0.5621, 0.6997)
    -- (-0.5027, 0.6997)
    .. controls (-0.5136, 0.7365) and (-0.5192, 0.7422) .. (-0.5536, 0.7591)
    --cycle
    (-0.1361, 0.7534)
    .. controls (-0.1512, 0.7509) and (-0.1612, 0.7304) .. (-0.1462, 0.6912)
    -- (-0.0953, 0.7082)
    .. controls (-0.1007, 0.7406) and (-0.1210, 0.7560) .. (-0.1361, 0.7534)
    --cycle
    (-0.4655, 0.7519)
    .. controls (-0.4811, 0.7476) and (-0.4887, 0.7146) .. (-0.4551, 0.6911)
    .. controls (-0.4447, 0.6838) and (-0.4376, 0.6846) .. (-0.4263, 0.6827)
    -- (-0.4362, 0.7201)
    .. controls (-0.4440, 0.7466) and (-0.4562, 0.7544) .. (-0.4655, 0.7519)
    --cycle
    (-0.2311, 0.7421)
    -- (-0.2480, 0.7082)
    -- (-0.1971, 0.6827)
    -- (-0.2141, 0.7421)
    --cycle
    ( 0.4819, 0.7421)
    -- ( 0.5244, 0.7082)
    -- ( 0.5329, 0.7166)
    -- ( 0.5329, 0.7336)
    --cycle
    ( 0.4140, 0.7336)
    .. controls ( 0.4091, 0.6951) and ( 0.4180, 0.6863) .. ( 0.4565, 0.6912)
    --cycle
    ( 0.1000, 0.7166)
    .. controls ( 0.0969, 0.7064) and ( 0.0893, 0.6845) .. ( 0.0896, 0.6747)
    .. controls ( 0.0911, 0.6142) and ( 0.1603, 0.6571) .. ( 0.1849, 0.6658)
    -- ( 0.2260, 0.6725)
    .. controls ( 0.2381, 0.6766) and ( 0.2515, 0.6891) .. ( 0.2429, 0.7019)
```

```
    .. controls ( 0.2330, 0.7185) and ( 0.1897, 0.7058) .. ( 0.1756, 0.7019)
    -- ( 0.1339, 0.6827)
    --cycle
    ( 0.0321, 0.7082)
    -- (-0.0019, 0.6318)
    .. controls ( 0.0528, 0.6362) and ( 0.0992, 0.6731) .. ( 0.0321, 0.7082)
    --cycle
    ( 0.5074, 0.6997)
    .. controls ( 0.5090, 0.6563) and ( 0.5107, 0.6351) .. ( 0.5584, 0.6572)
    --cycle
    (-0.6116, 0.6867)
    -- (-0.6413, 0.6359)
    .. controls (-0.6321, 0.6229) and (-0.6158, 0.6171) .. (-0.6009, 0.6289)
    .. controls (-0.5820, 0.6437) and (-0.5846, 0.6623) .. (-0.5876, 0.6827)
    --cycle
    (-0.3414, 0.6742)
    .. controls (-0.3515, 0.6371) and (-0.3559, 0.6083) .. (-0.3075, 0.6148)
    -- (-0.3245, 0.6742)
    --cycle
    (-0.5112, 0.6657)
    -- (-0.5112, 0.6318)
    -- (-0.4772, 0.6233)
    -- (-0.5027, 0.5893)
    -- (-0.5027, 0.5808)
    -- (-0.4857, 0.5638)
    .. controls (-0.4400, 0.6074) and (-0.4373, 0.6597) .. (-0.5112, 0.6657)
    --cycle
    (-0.2905, 0.6657)
    .. controls (-0.2682, 0.6064) and (-0.2058, 0.5997) .. (-0.2141, 0.6657)
    --cycle
    (-0.0953, 0.6488)
    -- (-0.1547, 0.6403)
    -- (-0.1377, 0.5553)
    -- (-0.1208, 0.5553)
    .. controls (-0.0926, 0.5982) and (-0.0954, 0.5977) .. (-0.0953, 0.6488)
    --cycle
    ( 0.0915, 0.6403)
    .. controls ( 0.0497, 0.6269) and ( 0.0505, 0.6133) .. ( 0.0490, 0.5723)
    .. controls ( 0.0796, 0.5913) and ( 0.0822, 0.6066) .. ( 0.0915, 0.6403)
    --cycle
    ( 0.4310, 0.6403)
    .. controls ( 0.4211, 0.6043) and ( 0.4125, 0.5931) .. ( 0.4480, 0.5723)
    -- ( 0.4819, 0.6148)
    -- ( 0.4819, 0.6318)
    --cycle
    ( 0.5838, 0.6403)
    .. controls ( 0.5923, 0.5846) and ( 0.5925, 0.5918) .. ( 0.6362, 0.5668)
    -- ( 0.6521, 0.5663)
    -- ( 0.6615, 0.5890)
    .. controls ( 0.6340, 0.6304) and ( 0.6328, 0.6347) .. ( 0.5838, 0.6403)
    --cycle
    ( 0.2018, 0.6233)
    -- ( 0.2018, 0.5808)
```

```
    -- ( 0.2358, 0.5808)
    .. controls ( 0.2306, 0.6108) and ( 0.2301, 0.6119) .. ( 0.2018, 0.6233)
    --cycle
    ( 0.3200, 0.6175)
    .. controls ( 0.3147, 0.6171) and ( 0.3095, 0.6162) .. ( 0.3037, 0.6159)
    -- ( 0.3144, 0.5906)
    .. controls ( 0.3494, 0.5385) and ( 0.3913, 0.6066) .. ( 0.3367, 0.6159)
    .. controls ( 0.3306, 0.6176) and ( 0.3252, 0.6178) .. ( 0.3200, 0.6175)
    --cycle
    ( 0.1254, 0.6148)
    -- ( 0.1169, 0.5553)
    -- ( 0.1339, 0.5553)
    -- ( 0.1594, 0.5808)
    --cycle
    (-0.0188, 0.6063)
    .. controls (-0.0629, 0.5361) and (-0.0925, 0.5785) .. (-0.1038, 0.5044)
    -- (-0.0528, 0.4875)
    .. controls (-0.0307, 0.5232) and (-0.0275, 0.5285) .. ( 0.0151, 0.5299)
    .. controls ( 0.0257, 0.5724) and ( 0.0206, 0.5860) .. (-0.0188, 0.6063)
    --cycle
    (-0.2820, 0.5893)
    .. controls (-0.2753, 0.5073) and (-0.2107, 0.5185) .. (-0.1801, 0.5808)
    --cycle
    ( 0.5244, 0.5893)
    .. controls ( 0.5408, 0.5621) and ( 0.5447, 0.5620) .. ( 0.5753, 0.5553)
    .. controls ( 0.5625, 0.5873) and ( 0.5579, 0.5867) .. ( 0.5244, 0.5893)
    --cycle
    (-0.4023, 0.5839)
    .. controls (-0.4095, 0.5826) and (-0.4161, 0.5794) .. (-0.4210, 0.5751)
    .. controls (-0.4340, 0.5638) and (-0.4334, 0.5376) .. (-0.4348, 0.5214)
    .. controls (-0.3835, 0.5433) and (-0.4044, 0.5361) .. (-0.3499, 0.5299)
    .. controls (-0.3537, 0.5756) and (-0.3808, 0.5879) .. (-0.4023, 0.5839)
    --cycle
    (-0.6717, 0.5836)
    -- (-0.7007, 0.5338)
    .. controls (-0.6810, 0.5286) and (-0.6639, 0.5441) .. (-0.6717, 0.5836)
    --cycle
    (-0.5683, 0.5760)
    .. controls (-0.5775, 0.5769) and (-0.5875, 0.5722) .. (-0.6045, 0.5638)
    -- (-0.5876, 0.5214)
    -- (-0.5367, 0.5553)
    .. controls (-0.5506, 0.5688) and (-0.5590, 0.5752) .. (-0.5683, 0.5760)
    --cycle
    ( 0.2527, 0.5638)
    -- ( 0.2782, 0.5129)
    -- ( 0.2867, 0.5129)
    -- ( 0.3037, 0.5299)
    .. controls ( 0.2852, 0.5566) and ( 0.2848, 0.5585) .. ( 0.2527, 0.5638)
    --cycle
    ( 0.6946, 0.5616)
    .. controls ( 0.6944, 0.5600) and ( 0.6921, 0.5548) .. ( 0.6787, 0.5413)
    -- ( 0.6878, 0.5061)
    .. controls ( 0.6794, 0.4976) and ( 0.6747, 0.5161) .. ( 0.6694, 0.5045)
```

```
    -- ( 0.6262, 0.5469)
    .. controls ( 0.6001, 0.4510) and ( 0.6708, 0.4762) .. ( 0.6776, 0.4804)
    .. controls ( 0.6913, 0.4889) and ( 0.7003, 0.4848) .. ( 0.7078, 0.4982)
    -- ( 0.7283, 0.4862)
    -- ( 0.7151, 0.5087)
    -- ( 0.6995, 0.5381)
    .. controls ( 0.6915, 0.5505) and ( 0.6933, 0.5583) .. ( 0.6948, 0.5614)
    --cycle
    ( 0.1764, 0.5469)
    .. controls ( 0.1765, 0.5023) and ( 0.1718, 0.4964) .. ( 0.2018, 0.4620)
    -- ( 0.2443, 0.4790)
    .. controls ( 0.2287, 0.5015) and ( 0.2286, 0.4995) .. ( 0.2018, 0.4960)
    -- ( 0.1934, 0.5044)
    -- ( 0.1934, 0.5469)
    --cycle
    ( 0.3971, 0.5384)
    -- ( 0.4056, 0.5044)
    -- ( 0.4649, 0.4875)
    -- ( 0.4904, 0.5384)
    -- ( 0.4395, 0.5214)
    --cycle
    ( 0.5668, 0.5384)
    .. controls ( 0.5368, 0.5332) and ( 0.5357, 0.5327) .. ( 0.5244, 0.5044)
    -- ( 0.5329, 0.4960)
    -- ( 0.5668, 0.5044)
    -- ( 0.5499, 0.4620)
    .. controls ( 0.5250, 0.4718) and ( 0.5240, 0.4756) .. ( 0.5074, 0.4535)
    -- ( 0.5584, 0.4280)
    .. controls ( 0.6164, 0.4608) and ( 0.5800, 0.4918) .. ( 0.5668, 0.5384)
    --cycle
    ( 0.0770, 0.5310)
    .. controls ( 0.0682, 0.5304) and ( 0.0588, 0.5222) .. ( 0.0538, 0.5053)
    .. controls ( 0.0343, 0.4401) and ( 0.0794, 0.3794) .. ( 0.1169, 0.4450)
    -- ( 0.0830, 0.4535)
    .. controls ( 0.0904, 0.4711) and ( 0.1010, 0.4920) .. ( 0.0968, 0.5117)
    .. controls ( 0.0941, 0.5249) and ( 0.0858, 0.5317) .. ( 0.0770, 0.5310)
    --cycle
    (-0.3075, 0.5299)
    -- (-0.3414, 0.4790)
    -- (-0.3330, 0.4705)
    .. controls (-0.2926, 0.4813) and (-0.2724, 0.4931) .. (-0.3075, 0.5299)
    --cycle
    (-0.6105, 0.5210)
    .. controls (-0.6292, 0.5286) and (-0.6359, 0.5102) .. (-0.6385, 0.4790)
    -- (-0.5876, 0.5044)
    .. controls (-0.5967, 0.5132) and (-0.6043, 0.5185) .. (-0.6105, 0.5210)
    --cycle
    (-0.6810, 0.5129)
    .. controls (-0.6924, 0.5121) and (-0.7036, 0.5121) .. (-0.7147, 0.5086)
    .. controls (-0.7151, 0.5085) and (-0.7153, 0.5083) .. (-0.7157, 0.5081)
    -- (-0.7430, 0.4612)
    .. controls (-0.7297, 0.4478) and (-0.7007, 0.4457) .. (-0.6860, 0.4801)
    .. controls (-0.6815, 0.4906) and (-0.6819, 0.5019) .. (-0.6810, 0.5129)
```

```
4773    --cycle
4774    (-0.1462, 0.5129)
4775    .. controls (-0.1949, 0.5129) and (-0.2098, 0.5207) .. (-0.2480, 0.4875)
4776    -- (-0.2480, 0.4790)
4777    -- (-0.2311, 0.4620)
4778    -- (-0.1801, 0.4790)
4779    -- (-0.1801, 0.4535)
4780    -- (-0.1462, 0.4535)
4781    --cycle
4782    ( 0.0066, 0.5044)
4783    -- (-0.0019, 0.4620)
4784    .. controls (-0.0908, 0.4424) and (-0.0252, 0.3738) .. ( 0.0185, 0.4370)
4785    .. controls ( 0.0238, 0.4448) and ( 0.0272, 0.4527) .. ( 0.0290, 0.4620)
4786    .. controls ( 0.0322, 0.4784) and ( 0.0277, 0.4893) .. ( 0.0236, 0.5044)
4787    --cycle
4788    (-0.5118, 0.4944)
4789    .. controls (-0.5315, 0.4962) and (-0.5506, 0.4944) .. (-0.5676, 0.4798)
4790    .. controls (-0.5973, 0.4546) and (-0.5662, 0.4306) .. (-0.5676, 0.4033)
4791    .. controls (-0.5682, 0.3806) and (-0.5896, 0.3679) .. (-0.5934, 0.3509)
4792    .. controls (-0.6001, 0.3209) and (-0.5656, 0.2986) .. (-0.5452, 0.2838)
4793    -- (-0.5621, 0.2498)
4794    -- (-0.5282, 0.2498)
4795    .. controls (-0.5165, 0.2920) and (-0.5111, 0.3040) .. (-0.5536, 0.3262)
4796    .. controls (-0.5263, 0.3959) and (-0.5223, 0.3799) .. (-0.5452, 0.4535)
4797    -- (-0.4857, 0.4705)
4798    -- (-0.4518, 0.4535)
4799    -- (-0.4518, 0.4875)
4800    .. controls (-0.4715, 0.4873) and (-0.4920, 0.4926) .. (-0.5118, 0.4944)
4801    --cycle
4802    ( 0.3588, 0.4802)
4803    .. controls ( 0.3533, 0.4806) and ( 0.3465, 0.4801) .. ( 0.3377, 0.4790)
4804    -- ( 0.3801, 0.4365)
4805    -- ( 0.3886, 0.4450)
4806    .. controls ( 0.3795, 0.4694) and ( 0.3752, 0.4789) .. ( 0.3588, 0.4802)
4807    --cycle
4808    (-0.3923, 0.4620)
4809    .. controls (-0.3995, 0.4156) and (-0.3752, 0.3562) .. (-0.3330, 0.3347)
4810    -- (-0.3245, 0.3431)
4811    -- (-0.3172, 0.4229)
4812    -- (-0.3754, 0.4620)
4813    --cycle
4814    ( 0.1254, 0.4620)
4815    .. controls ( 0.1311, 0.4303) and ( 0.1371, 0.3466) .. ( 0.1909, 0.3657)
4816    .. controls ( 0.2082, 0.3718) and ( 0.2132, 0.3929) .. ( 0.2274, 0.4041)
4817    .. controls ( 0.2376, 0.4123) and ( 0.2569, 0.4158) .. ( 0.2697, 0.4196)
4818    .. controls ( 0.2404, 0.4707) and ( 0.2211, 0.4375) .. ( 0.1594, 0.4196)
4819    --cycle
4820    ( 0.6347, 0.4620)
4821    .. controls ( 0.5865, 0.3970) and ( 0.5594, 0.4145) .. ( 0.5753, 0.3516)
4822    .. controls ( 0.6248, 0.3639) and ( 0.6190, 0.3659) .. ( 0.6687, 0.3516)
4823    .. controls ( 0.6624, 0.3942) and ( 0.6392, 0.4050) .. ( 0.6772, 0.4280)
4824    --cycle
4825    (-0.2735, 0.4535)
```

```
    .. controls (-0.2776, 0.4212) and (-0.2764, 0.4187) .. (-0.2480, 0.4026)
    -- (-0.2565, 0.4535)
    --cycle
    ( 0.4565, 0.4535)
    -- ( 0.4395, 0.4365)
    -- ( 0.4395, 0.4280)
    -- ( 0.4565, 0.4111)
    -- ( 0.4649, 0.4111)
    -- ( 0.4819, 0.4280)
    --cycle
    ( 0.7558, 0.4524)
    .. controls ( 0.7494, 0.4473) and ( 0.7430, 0.4394) .. ( 0.7366, 0.4280)
    .. controls ( 0.7552, 0.4225) and ( 0.7653, 0.4183) .. ( 0.7753, 0.4176)
    --cycle
    (-0.4518, 0.4450)
    -- (-0.4772, 0.4365)
    -- (-0.4518, 0.4196)
    --cycle
    (-0.6423, 0.4300)
    .. controls (-0.6532, 0.4307) and (-0.6637, 0.4304) .. (-0.6690, 0.4274)
    .. controls (-0.6866, 0.4158) and (-0.6850, 0.3910) .. (-0.6630, 0.3848)
    -- (-0.6130, 0.3848)
    -- (-0.6130, 0.4274)
    .. controls (-0.6201, 0.4279) and (-0.6314, 0.4294) .. (-0.6423, 0.4300)
    --cycle
    ( 0.7111, 0.4196)
    -- ( 0.7451, 0.3771)
    .. controls ( 0.7399, 0.4071) and ( 0.7394, 0.4082) .. ( 0.7111, 0.4196)
    --cycle
    (-0.7404, 0.4111)
    -- (-0.7574, 0.3347)
    -- (-0.7065, 0.3262)
    -- (-0.7234, 0.4111)
    --cycle
    (-0.1547, 0.4111)
    -- (-0.1462, 0.3601)
    -- (-0.1038, 0.3856)
    .. controls (-0.0885, 0.3562) and (-0.0864, 0.3520) .. (-0.0528, 0.3516)
    -- (-0.0783, 0.4026)
    --cycle
    ( 0.3886, 0.4111)
    .. controls ( 0.3213, 0.4055) and ( 0.3289, 0.3610) .. ( 0.3801, 0.3347)
    --cycle
    ( 0.3801, 0.3347)
    -- ( 0.3801, 0.3262)
    -- ( 0.3631, 0.3092)
    -- ( 0.3801, 0.2753)
    -- ( 0.3971, 0.2753)
    .. controls ( 0.4050, 0.3067) and ( 0.4083, 0.3157) .. ( 0.3801, 0.3347)
    --cycle
    ( 0.5074, 0.4026)
    -- ( 0.4565, 0.3516)
    .. controls ( 0.4935, 0.3518) and ( 0.5571, 0.3505) .. ( 0.5074, 0.4026)
```

```
    --cycle
    (-0.4348, 0.3941)
    -- (-0.4433, 0.3856)
    -- (-0.4348, 0.3516)
    -- (-0.4008, 0.3856)
    --cycle
    (-0.5112, 0.3856)
    -- (-0.5027, 0.3347)
    -- (-0.4518, 0.3856)
    --cycle
    ( 0.0405, 0.3856)
    .. controls ( 0.0481, 0.3444) and ( 0.0444, 0.3224) .. ( 0.0830, 0.3007)
    -- ( 0.1169, 0.3686)
    --cycle
    ( 0.2586, 0.3821)
    .. controls ( 0.2327, 0.3759) and ( 0.2165, 0.3319) .. ( 0.2699, 0.3440)
    -- ( 0.2952, 0.3516)
    .. controls ( 0.2928, 0.3578) and ( 0.2924, 0.3646) .. ( 0.2856, 0.3722)
    .. controls ( 0.2770, 0.3820) and ( 0.2672, 0.3842) .. ( 0.2586, 0.3821)
    --cycle
    (-0.2650, 0.3686)
    .. controls (-0.2695, 0.3349) and (-0.2648, 0.3302) .. (-0.2311, 0.3347)
    --cycle
    ( 0.8037, 0.3670)
    .. controls ( 0.7958, 0.3549) and ( 0.8002, 0.3405) .. ( 0.8215, 0.3262)
    -- ( 0.8225, 0.3334)
    --cycle
    (-0.0104, 0.3601)
    -- (-0.0273, 0.3007)
    -- (-0.0698, 0.3007)
    .. controls (-0.0385, 0.2465) and ( 0.0057, 0.2824) .. ( 0.0066, 0.3601)
    --cycle
    (-0.4348, 0.3431)
    -- (-0.4348, 0.3007)
    .. controls (-0.4123, 0.3163) and (-0.4143, 0.3163) .. (-0.4178, 0.3431)
    --cycle
    (-0.8185, 0.3317)
    -- (-0.8365, 0.3007)
    -- (-0.7998, 0.3007)
    -- (-0.7998, 0.3177)
    --cycle
    ( 0.4649, 0.3315)
    .. controls ( 0.4219, 0.3238) and ( 0.4094, 0.2904) .. ( 0.4395, 0.2583)
    -- ( 0.4565, 0.2922)
    -- ( 0.5414, 0.2922)
    -- ( 0.5414, 0.3092)
    .. controls ( 0.5190, 0.3194) and ( 0.4902, 0.3361) .. ( 0.4649, 0.3315)
    --cycle
    (-0.6388, 0.3309)
    .. controls (-0.6527, 0.3328) and (-0.6597, 0.3256) .. (-0.6674, 0.3156)
    -- (-0.6895, 0.2838)
    .. controls (-0.6839, 0.2742) and (-0.6820, 0.2649) .. (-0.6700, 0.2597)
    .. controls (-0.6290, 0.2418) and (-0.5917, 0.3244) .. (-0.6388, 0.3309)
```

```
--cycle
(-0.1462, 0.3262)
.. controls (-0.1623, 0.2693) and (-0.1610, 0.2418) .. (-0.0953, 0.2498)
-- (-0.1292, 0.3262)
--cycle
( 0.2103, 0.3262)
-- ( 0.1849, 0.2753)
.. controls ( 0.2243, 0.2757) and ( 0.2321, 0.2881) .. ( 0.2273, 0.3262)
--cycle
( 0.3292, 0.3262)
-- ( 0.2782, 0.2668)
-- ( 0.2782, 0.2498)
-- ( 0.3390, 0.2109)
.. controls ( 0.3506, 0.1937) and ( 0.3360, 0.1683) .. ( 0.3513, 0.1579)
.. controls ( 0.3686, 0.1461) and ( 0.4096, 0.1877) .. ( 0.3631, 0.2073)
-- ( 0.3801, 0.2243)
-- ( 0.3377, 0.2583)
-- ( 0.3546, 0.3007)
--cycle
( 0.6941, 0.3262)
-- ( 0.6941, 0.2838)
-- ( 0.7111, 0.2838)
-- ( 0.7111, 0.3262)
--cycle
( 0.7706, 0.3177)
-- ( 0.7366, 0.3092)
-- ( 0.7366, 0.2922)
-- ( 0.7451, 0.2838)
-- ( 0.7621, 0.2838)
--cycle
(-0.7913, 0.3092)
-- (-0.7828, 0.2583)
-- (-0.7658, 0.2583)
-- (-0.7574, 0.2668)
-- (-0.7743, 0.3092)
--cycle
( 0.6093, 0.3092)
-- ( 0.5838, 0.2413)
-- ( 0.6093, 0.2668)
-- ( 0.6347, 0.2583)
-- ( 0.6432, 0.3092)
--cycle
(-0.3494, 0.3079)
.. controls (-0.4142, 0.2885) and (-0.3452, 0.2195) .. (-0.3258, 0.2842)
-- (-0.3258, 0.3079)
--cycle
( 0.1084, 0.3007)
.. controls ( 0.1005, 0.2885) and ( 0.0956, 0.2764) .. ( 0.0807, 0.2708)
.. controls ( 0.0663, 0.2653) and ( 0.0431, 0.2752) .. ( 0.0335, 0.2617)
.. controls ( 0.0200, 0.2427) and ( 0.0540, 0.2322) .. ( 0.0660, 0.2298)
.. controls ( 0.1034, 0.2226) and ( 0.1204, 0.2407) .. ( 0.1509, 0.2583)
--cycle
(-0.2201, 0.2946)
```

```
    .. controls (-0.2487, 0.2922) and (-0.2701, 0.2767) .. (-0.2990, 0.2583)
    -- (-0.2565, 0.2073)
    -- (-0.1886, 0.2922)
    .. controls (-0.2003, 0.2947) and (-0.2106, 0.2954) .. (-0.2201, 0.2946)
    --cycle
    (-0.4772, 0.2583)
    .. controls (-0.5022, 0.2481) and (-0.5267, 0.2367) .. (-0.5427, 0.2138)
    .. controls (-0.5681, 0.1773) and (-0.5547, 0.1549) .. (-0.5112, 0.1575)
    .. controls (-0.4976, 0.1584) and (-0.4899, 0.1613) .. (-0.4772, 0.1649)
    -- (-0.4688, 0.1564)
    -- (-0.4688, 0.1225)
    -- (-0.4518, 0.1225)
    .. controls (-0.4302, 0.1774) and (-0.4489, 0.1866) .. (-0.5027, 0.1988)
    --cycle
    (-0.4433, 0.2583)
    -- (-0.4348, 0.2073)
    -- (-0.4263, 0.2073)
    -- (-0.4093, 0.2243)
    -- (-0.4263, 0.2583)
    --cycle
    (-0.8446, 0.2512)
    .. controls (-0.8626, 0.2459) and (-0.8672, 0.2066) .. (-0.8677, 0.1903)
    .. controls (-0.8362, 0.1909) and (-0.8333, 0.1924) .. (-0.8168, 0.1649)
    -- (-0.7913, 0.1734)
    .. controls (-0.7979, 0.1888) and (-0.8118, 0.2347) .. (-0.8218, 0.2431)
    .. controls (-0.8311, 0.2510) and (-0.8386, 0.2530) .. (-0.8446, 0.2512)
    --cycle
    (-0.6130, 0.2498)
    -- (-0.6385, 0.1988)
    .. controls (-0.5969, 0.2023) and (-0.5781, 0.2132) .. (-0.6130, 0.2498)
    --cycle
    ( 0.7209, 0.2469)
    .. controls ( 0.7057, 0.2498) and ( 0.6918, 0.2452) .. ( 0.6875, 0.2241)
    .. controls ( 0.6832, 0.1844) and ( 0.7333, 0.1800) .. ( 0.6875, 0.1309)
    .. controls ( 0.6935, 0.1147) and ( 0.6966, 0.1050) .. ( 0.7123, 0.0936)
    .. controls ( 0.7287, 0.0815) and ( 0.7996, 0.0650) .. ( 0.8166, 0.0782)
    .. controls ( 0.8441, 0.0997) and ( 0.8443, 0.1468) .. ( 0.7875, 0.1564)
    -- ( 0.8130, 0.1055)
    -- ( 0.7706, 0.0970)
    .. controls ( 0.7537, 0.1222) and ( 0.7493, 0.1200) .. ( 0.7196, 0.1225)
    -- ( 0.7621, 0.2241)
    .. controls ( 0.7526, 0.2335) and ( 0.7361, 0.2440) .. ( 0.7209, 0.2469)
    --cycle
    ( 0.5029, 0.2452)
    .. controls ( 0.4837, 0.2409) and ( 0.4663, 0.2223) .. ( 0.4749, 0.2012)
    .. controls ( 0.4861, 0.1737) and ( 0.5371, 0.1377) .. ( 0.5668, 0.1819)
    .. controls ( 0.5276, 0.2081) and ( 0.5495, 0.2337) .. ( 0.5218, 0.2442)
    .. controls ( 0.5159, 0.2464) and ( 0.5093, 0.2466) .. ( 0.5029, 0.2452)
    --cycle
    (-0.7065, 0.2328)
    .. controls (-0.7174, 0.2318) and (-0.7287, 0.2323) .. (-0.7391, 0.2277)
    .. controls (-0.7803, 0.2096) and (-0.7474, 0.1632) .. (-0.7171, 0.2086)
    --cycle
```

```
    (-0.0188, 0.2328)
    .. controls (-0.0280, 0.2283) and (-0.0341, 0.2273) .. (-0.0430, 0.2197)
    .. controls (-0.1097, 0.1629) and ( 0.0304, 0.1216) .. (-0.0010, 0.2037)
    --cycle
    ( 0.2612, 0.2328)
    -- ( 0.1849, 0.2073)
    .. controls ( 0.2210, 0.1548) and ( 0.2532, 0.1800) .. ( 0.2612, 0.2328)
    --cycle
    (-0.3330, 0.2243)
    -- (-0.3958, 0.1938)
    .. controls (-0.4203, 0.1689) and (-0.3928, 0.1505) .. (-0.4518, 0.0970)
    -- (-0.4518, 0.0800)
    .. controls (-0.4010, 0.0738) and (-0.3851, 0.1024) .. (-0.3754, 0.1479)
    .. controls (-0.3297, 0.1544) and (-0.3165, 0.1646) .. (-0.2990, 0.2073)
    --cycle
    (-0.1971, 0.2243)
    -- (-0.2056, 0.1479)
    -- (-0.1462, 0.1394)
    -- (-0.1462, 0.1564)
    -- (-0.1801, 0.2243)
    --cycle
    ( 0.8384, 0.2243)
    .. controls ( 0.8324, 0.1770) and ( 0.8519, 0.1318) .. ( 0.8979, 0.1140)
    -- ( 0.9064, 0.1225)
    .. controls ( 0.8952, 0.1805) and ( 0.8898, 0.1922) .. ( 0.8384, 0.2243)
    --cycle
    ( 0.0151, 0.2073)
    -- ( 0.0151, 0.1903)
    -- ( 0.0405, 0.1819)
    -- ( 0.0405, 0.1479)
    -- ( 0.0575, 0.1479)
    -- ( 0.0575, 0.1564)
    -- ( 0.0745, 0.1734)
    .. controls ( 0.0548, 0.2031) and ( 0.0517, 0.2101) .. ( 0.0151, 0.2073)
    --cycle
    ( 0.6262, 0.2073)
    -- ( 0.6347, 0.1734)
    -- ( 0.6517, 0.1734)
    -- ( 0.6602, 0.1819)
    -- ( 0.6602, 0.1988)
    --cycle
    ( 0.7621, 0.2073)
    -- ( 0.7621, 0.1649)
    .. controls ( 0.7903, 0.1763) and ( 0.7908, 0.1774) .. ( 0.7960, 0.2073)
    --cycle
    (-0.8988, 0.1938)
    -- (-0.9014, 0.1893)
    .. controls (-0.9006, 0.1906) and (-0.8994, 0.1914) .. (-0.8988, 0.1930)
    .. controls (-0.8987, 0.1933) and (-0.8989, 0.1936) .. (-0.8988, 0.1938)
    --cycle
    (-0.1292, 0.1903)
    -- (-0.1292, 0.1479)
    -- (-0.0953, 0.1819)
```

```
    --cycle
    ( 0.2952, 0.1903)
    .. controls ( 0.2890, 0.1611) and ( 0.2867, 0.1567) .. ( 0.3122, 0.1394)
    -- ( 0.3122, 0.1903)
    --cycle
    (-0.6895, 0.1819)
    -- (-0.6895, 0.1479)
    -- (-0.6640, 0.1564)
    -- (-0.6640, 0.1734)
    -- (-0.6725, 0.1819)
    --cycle
    ( 0.1480, 0.1735)
    .. controls ( 0.1310, 0.1697) and ( 0.1252, 0.1423) .. ( 0.1594, 0.1225)
    -- ( 0.1849, 0.1479)
    .. controls ( 0.1726, 0.1694) and ( 0.1583, 0.1757) .. ( 0.1480, 0.1735)
    --cycle
    (-0.6300, 0.1734)
    .. controls (-0.6429, 0.1238) and (-0.6284, 0.1142) .. (-0.5876, 0.0885)
    -- (-0.6215, 0.0461)
    -- (-0.6640, 0.0800)
    .. controls (-0.6670, 0.0697) and (-0.6746, 0.0478) .. (-0.6743, 0.0381)
    .. controls (-0.6736, 0.0066) and (-0.6456, 0.0044) .. (-0.6219, 0.0135)
    .. controls (-0.5925, 0.0247) and (-0.5281, 0.0777) .. (-0.5319, 0.1120)
    .. controls (-0.5350, 0.1399) and (-0.5677, 0.1315) .. (-0.5853, 0.1410)
    .. controls (-0.5998, 0.1487) and (-0.6048, 0.1603) .. (-0.6130, 0.1734)
    --cycle
    (-0.6640, 0.0800)
    .. controls (-0.6595, 0.1137) and (-0.6643, 0.1185) .. (-0.6980, 0.1140)
    --cycle
    (-0.2565, 0.1734)
    -- (-0.3584, 0.1309)
    -- (-0.3330, 0.0800)
    -- (-0.2990, 0.1140)
    .. controls (-0.2519, 0.1142) and (-0.2453, 0.1302) .. (-0.2565, 0.1734)
    --cycle
    ( 0.2271, 0.1407)
    .. controls ( 0.1925, 0.1328) and ( 0.1533, 0.0767) .. ( 0.2190, 0.0890)
    -- ( 0.2612, 0.0970)
    .. controls ( 0.2604, 0.1073) and ( 0.2611, 0.1186) .. ( 0.2562, 0.1281)
    .. controls ( 0.2497, 0.1405) and ( 0.2386, 0.1433) .. ( 0.2271, 0.1407)
    --cycle
    (-0.0698, 0.1394)
    .. controls (-0.0981, 0.1280) and (-0.0986, 0.1270) .. (-0.1038, 0.0970)
    -- (-0.0698, 0.0970)
    --cycle
    ( 0.3971, 0.1394)
    -- ( 0.3971, 0.1225)
    -- ( 0.4056, 0.1140)
    -- ( 0.4395, 0.1225)
    -- ( 0.4395, 0.1394)
    --cycle
    ( 0.6090, 0.1316)
    .. controls ( 0.5968, 0.1320) and ( 0.5847, 0.1313) .. ( 0.5753, 0.1309)
```

```
    .. controls ( 0.5937, 0.1034) and ( 0.6031, 0.1066) .. ( 0.6347, 0.1055)
    .. controls ( 0.5863, 0.0654) and ( 0.5849, 0.0269) .. ( 0.6432,-0.0049)
    -- ( 0.6262, 0.0461)
    -- ( 0.6488, 0.0715)
    .. controls ( 0.6828, 0.1212) and ( 0.6456, 0.1307) .. ( 0.6090, 0.1316)
    --cycle
    (-0.9354, 0.1309)
    -- (-0.9422, 0.1193)
    -- (-0.9356, 0.0800)
    -- (-0.8847, 0.0970)
    -- (-0.8847, 0.1309)
    --cycle
    (-0.8507, 0.1309)
    .. controls (-0.8417, 0.0965) and (-0.8401, 0.0890) .. (-0.8083, 0.0715)
    .. controls (-0.8126, 0.1087) and (-0.8139, 0.1187) .. (-0.8507, 0.1309)
    --cycle
    ( 0.1084, 0.1309)
    -- ( 0.0575, 0.1225)
    .. controls ( 0.0537, 0.0923) and ( 0.0510, 0.0922) .. ( 0.0236, 0.0800)
    .. controls ( 0.0578, 0.0292) and ( 0.1015, 0.0713) .. ( 0.1084, 0.1309)
    --cycle
    ( 0.4819, 0.1309)
    -- ( 0.5028, 0.0739)
    -- ( 0.4819,-0.0049)
    .. controls ( 0.4993,-0.0102) and ( 0.5299,-0.0233) .. ( 0.5472,-0.0163)
    .. controls ( 0.5677,-0.0081) and ( 0.5663, 0.0195) .. ( 0.5644, 0.0376)
    .. controls ( 0.5592, 0.0860) and ( 0.5308, 0.1235) .. ( 0.4819, 0.1309)
    --cycle
    ( 0.3461, 0.1140)
    .. controls ( 0.3108, 0.0951) and ( 0.3082, 0.0849) .. ( 0.3037, 0.0461)
    .. controls ( 0.3481, 0.0535) and ( 0.3552, 0.0713) .. ( 0.3461, 0.1140)
    --cycle
    (-0.4857, 0.0970)
    .. controls (-0.5241, 0.0326) and (-0.4983, 0.0214) .. (-0.4348, 0.0206)
    .. controls (-0.4420,-0.0343) and (-0.4036,-0.0413) .. (-0.3728,-0.0186)
    .. controls (-0.3557,-0.0061) and (-0.3442, 0.0265) .. (-0.3330, 0.0461)
    .. controls (-0.3807, 0.0916) and (-0.3834, 0.0423) .. (-0.3839, 0.0036)
    --cycle
    (-0.2480, 0.0970)
    -- (-0.2480, 0.0800)
    -- (-0.2056, 0.0800)
    -- (-0.2056, 0.0970)
    --cycle
    (-0.1292, 0.0970)
    -- (-0.1462, 0.0800)
    -- (-0.1462, 0.0715)
    -- (-0.1292, 0.0546)
    -- (-0.1208, 0.0546)
    -- (-0.1038, 0.0715)
    --cycle
    ( 0.3801, 0.0800)
    -- ( 0.3801, 0.0206)
    -- ( 0.3971, 0.0206)
```

```
    -- ( 0.4056, 0.0291)
    -- ( 0.4140, 0.0800)
    --cycle
    ( 0.4225, 0.0800)
    .. controls ( 0.4316, 0.0456) and ( 0.4332, 0.0381) .. ( 0.4649, 0.0206)
    .. controls ( 0.4618, 0.0591) and ( 0.4606, 0.0679) .. ( 0.4225, 0.0800)
    --cycle
    ( 0.8809, 0.0759)
    .. controls ( 0.8722, 0.0759) and ( 0.8634, 0.0659) .. ( 0.8554, 0.0461)
    -- ( 0.9064, 0.0461)
    .. controls ( 0.8984, 0.0659) and ( 0.8897, 0.0759) .. ( 0.8809, 0.0759)
    --cycle
    ( 0.1413, 0.0752)
    .. controls ( 0.1324, 0.0761) and ( 0.1215, 0.0749) .. ( 0.1084, 0.0715)
    .. controls ( 0.1253, 0.0362) and ( 0.1326, 0.0290) .. ( 0.1679, 0.0121)
    .. controls ( 0.1762, 0.0511) and ( 0.1679, 0.0726) .. ( 0.1413, 0.0752)
    --cycle
    (-0.7409, 0.0649)
    .. controls (-0.7448, 0.0648) and (-0.7485, 0.0639) .. (-0.7518, 0.0618)
    .. controls (-0.7690, 0.0508) and (-0.7544,-0.0147) .. (-0.7438,-0.0279)
    .. controls (-0.7341,-0.0398) and (-0.7273,-0.0409) .. (-0.7149,-0.0473)
    -- (-0.7065, 0.0546)
    .. controls (-0.7159, 0.0583) and (-0.7292, 0.0653) .. (-0.7409, 0.0649)
    --cycle
    ( 0.9762, 0.0591)
    -- ( 0.9564, 0.0203)
    .. controls ( 0.9517,-0.0013) and ( 0.9637,-0.0270) .. ( 0.9761,-0.0510)
    -- ( 0.9997,-0.0105)
    .. controls ( 1.0000,-0.0010) and ( 1.0000, 0.0075) .. ( 0.9998, 0.0171)
    --cycle
    (-0.1717, 0.0546)
    .. controls (-0.2038, 0.0492) and (-0.2042, 0.0472) .. (-0.2226, 0.0206)
    -- (-0.1717, 0.0206)
    --cycle
    ( 0.7281, 0.0546)
    -- ( 0.6687, 0.0461)
    -- ( 0.6687, 0.0291)
    .. controls ( 0.7027, 0.0233) and ( 0.7100, 0.0245) .. ( 0.7281, 0.0546)
    --cycle
    (-0.9726, 0.0477)
    .. controls (-0.9758, 0.0477) and (-0.9806, 0.0473) .. (-0.9843, 0.0471)
    -- (-1.0000, 0.0201)
    -- (-0.9912, 0.0044)
    -- (-0.9696, 0.0206)
    -- (-0.9448,-0.0784)
    -- (-0.9432,-0.0812)
    -- (-0.8422,-0.0728)
    -- (-0.8677,-0.0982)
    -- (-0.8677,-0.1322)
    .. controls (-0.8159,-0.1280) and (-0.7904,-0.1016) .. (-0.8308,-0.0569)
    .. controls (-0.8618,-0.0226) and (-0.8917,-0.0142) .. (-0.9356,-0.0049)
    .. controls (-0.9393, 0.0402) and (-0.9477, 0.0479) .. (-0.9726, 0.0477)
    --cycle
```

```
    (-0.0273, 0.0430)
    .. controls (-0.1037, 0.0283) and (-0.0659,-0.0617) .. (-0.0043, 0.0049)
    .. controls ( 0.0066, 0.0167) and ( 0.0086, 0.0240) .. ( 0.0151, 0.0376)
    .. controls ( 0.0001, 0.0416) and (-0.0110, 0.0461) .. (-0.0273, 0.0430)
    --cycle
    ( 0.2361, 0.0409)
    .. controls ( 0.2189, 0.0454) and ( 0.2022, 0.0366) .. ( 0.2018, 0.0036)
    .. controls ( 0.2379, 0.0017) and ( 0.2409,-0.0057) .. ( 0.2527,-0.0388)
    .. controls ( 0.2946,-0.0103) and ( 0.2647, 0.0336) .. ( 0.2361, 0.0409)
    --cycle
    (-0.2852, 0.0389)
    .. controls (-0.3005, 0.0379) and (-0.3023, 0.0289) .. (-0.2990, 0.0036)
    -- (-0.2650, 0.0376)
    .. controls (-0.2735, 0.0387) and (-0.2801, 0.0393) .. (-0.2852, 0.0389)
    --cycle
    ( 0.3037, 0.0291)
    .. controls ( 0.3231,-0.0055) and ( 0.3338,-0.0035) .. ( 0.3716,-0.0049)
    .. controls ( 0.3519, 0.0279) and ( 0.3402, 0.0269) .. ( 0.3037, 0.0291)
    --cycle
    (-0.8206, 0.0192)
    .. controls (-0.8430,-0.0126) and (-0.8179,-0.0291) .. (-0.8045,-0.0204)
    .. controls (-0.7923,-0.0127) and (-0.7854, 0.0239) .. (-0.8206, 0.0192)
    --cycle
    (-0.1371, 0.0134)
    .. controls (-0.1438, 0.0114) and (-0.1493, 0.0019) .. (-0.1547,-0.0134)
    -- (-0.1123,-0.0049)
    .. controls (-0.1224, 0.0099) and (-0.1303, 0.0154) .. (-0.1371, 0.0134)
    --cycle
    ( 0.7536, 0.0121)
    -- ( 0.7111, 0.0036)
    -- ( 0.7111,-0.0304)
    .. controls ( 0.7469,-0.0274) and ( 0.7588,-0.0268) .. ( 0.7536, 0.0121)
    --cycle
    ( 0.0750, 0.0106)
    .. controls ( 0.0661, 0.0093) and ( 0.0570, 0.0067) .. ( 0.0490, 0.0036)
    .. controls ( 0.0651,-0.0248) and ( 0.0680,-0.0250) .. ( 0.1000,-0.0304)
    .. controls ( 0.0590,-0.0732) and ( 0.0241,-0.0913) .. ( 0.0745,-0.1492)
    .. controls ( 0.1110,-0.1331) and ( 0.1272,-0.1362) .. ( 0.1424,-0.0982)
    -- ( 0.1339,-0.0897)
    -- ( 0.1000,-0.0982)
    .. controls ( 0.1057,-0.0835) and ( 0.1261,-0.0416) .. ( 0.1266,-0.0304)
    .. controls ( 0.1284, 0.0069) and ( 0.1019, 0.0144) .. ( 0.0750, 0.0106)
    --cycle
    (-0.2311, 0.0036)
    -- (-0.2311,-0.0049)
    -- (-0.2480,-0.0219)
    .. controls (-0.2373,-0.0386) and (-0.2259,-0.0581) .. (-0.2054,-0.0643)
    .. controls (-0.1781,-0.0725) and (-0.1665,-0.0457) .. (-0.1984,-0.0158)
    .. controls (-0.2100,-0.0050) and (-0.2177,-0.0027) .. (-0.2311, 0.0036)
    --cycle
    ( 0.8469, 0.0036)
    .. controls ( 0.8030,-0.0174) and ( 0.7970,-0.0343) .. ( 0.7706,-0.0728)
    .. controls ( 0.7934,-0.1060) and ( 0.7994,-0.1083) .. ( 0.8384,-0.0982)
```

```
    -- ( 0.8384,-0.0813)
    -- ( 0.8130,-0.0728)
    -- ( 0.8130,-0.0558)
    .. controls ( 0.8448,-0.0370) and ( 0.8501,-0.0340) .. ( 0.8469, 0.0036)
    --cycle
    (-0.4603,-0.0049)
    .. controls (-0.4831,-0.0157) and (-0.5088,-0.0301) .. (-0.5182,-0.0557)
    .. controls (-0.5278,-0.0816) and (-0.5057,-0.0969) .. (-0.4907,-0.0883)
    .. controls (-0.4763,-0.0802) and (-0.4829,-0.0617) .. (-0.4518,-0.0304)
    -- (-0.4518,-0.0134)
    --cycle
    ( 0.4264,-0.0112)
    .. controls ( 0.3999,-0.0108) and ( 0.3834,-0.0280) .. ( 0.4056,-0.0728)
    -- ( 0.4565,-0.0558)
    -- ( 0.4649,-0.1237)
    -- ( 0.4819,-0.1237)
    -- ( 0.5074,-0.0558)
    .. controls ( 0.4895,-0.0297) and ( 0.4529,-0.0116) .. ( 0.4264,-0.0112)
    --cycle
    (-0.5706,-0.0134)
    -- (-0.6045,-0.0388)
    .. controls (-0.6509,-0.0147) and (-0.6809,-0.0236) .. (-0.6725,-0.0813)
    -- (-0.6980,-0.0897)
    .. controls (-0.6821,-0.1195) and (-0.6788,-0.1210) .. (-0.6470,-0.1322)
    .. controls (-0.6222,-0.0713) and (-0.6544,-0.0848) .. (-0.6130,-0.0473)
    .. controls (-0.5953,-0.0788) and (-0.5888,-0.0784) .. (-0.5536,-0.0813)
    --cycle
    ( 0.1679,-0.0219)
    .. controls ( 0.1573,-0.0941) and ( 0.2349,-0.1063) .. ( 0.2526,-0.0847)
    .. controls ( 0.2609,-0.0744) and ( 0.2602,-0.0596) .. ( 0.2612,-0.0473)
    --cycle
    (-0.3112,-0.0274)
    .. controls (-0.3586,-0.0281) and (-0.4163,-0.0558) .. (-0.4212,-0.0609)
    .. controls (-0.4295,-0.0692) and (-0.4319,-0.0787) .. (-0.4327,-0.0899)
    -- (-0.4327,-0.1492)
    -- (-0.4327,-0.2086)
    .. controls (-0.3777,-0.1999) and (-0.3244,-0.1312) .. (-0.4008,-0.1067)
    -- (-0.3823,-0.0879)
    .. controls (-0.3347,-0.0526) and (-0.3277,-0.1099) .. (-0.2903,-0.1163)
    .. controls (-0.2612,-0.1213) and (-0.2444,-0.0914) .. (-0.2507,-0.0659)
    .. controls (-0.2581,-0.0362) and (-0.2828,-0.0269) .. (-0.3112,-0.0274)
    --cycle
    ( 0.9234,-0.0304)
    -- ( 0.9149,-0.0643)
    -- ( 0.9488,-0.0558)
    -- ( 0.9488,-0.0388)
    -- ( 0.9403,-0.0304)
    --cycle
    ( 0.6406,-0.0369)
    .. controls ( 0.6333,-0.0375) and ( 0.6251,-0.0419) .. ( 0.6177,-0.0522)
    .. controls ( 0.6105,-0.0620) and ( 0.6112,-0.0704) .. ( 0.6093,-0.0799)
    -- ( 0.6342,-0.0799)
    .. controls ( 0.6760,-0.0673) and ( 0.6625,-0.0350) .. ( 0.6406,-0.0369)
```

```
--cycle
(-0.0016,-0.0449)
.. controls (-0.0461,-0.0548) and (-0.0410,-0.0663) .. (-0.0297,-0.1043)
.. controls (-0.0250,-0.1199) and (-0.0232,-0.1440) .. (-0.0016,-0.1422)
.. controls ( 0.0349,-0.1392) and ( 0.0554,-0.0537) .. (-0.0016,-0.0449)
--cycle
(-0.1123,-0.0473)
-- (-0.1208,-0.1067)
.. controls (-0.0719,-0.1062) and (-0.0661,-0.0635) .. (-0.1123,-0.0473)
--cycle
( 0.3037,-0.0473)
.. controls ( 0.3198,-0.0756) and ( 0.3223,-0.0769) .. ( 0.3546,-0.0728)
.. controls ( 0.3383,-0.0447) and ( 0.3358,-0.0446) .. ( 0.3037,-0.0473)
--cycle
( 0.5329,-0.0473)
.. controls ( 0.5004,-0.0966) and ( 0.4981,-0.1266) .. ( 0.5668,-0.1322)
-- ( 0.5499,-0.0473)
--cycle
(-0.1632,-0.0728)
-- (-0.1462,-0.1067)
-- (-0.1462,-0.0728)
--cycle
( 0.7090,-0.0817)
.. controls ( 0.6987,-0.0843) and ( 0.6911,-0.0952) .. ( 0.6894,-0.1068)
.. controls ( 0.6863,-0.1276) and ( 0.7043,-0.1387) .. ( 0.7111,-0.1831)
.. controls ( 0.7499,-0.1786) and ( 0.7602,-0.1760) .. ( 0.7791,-0.1407)
-- ( 0.7196,-0.1322)
-- ( 0.7451,-0.1068)
.. controls ( 0.7324,-0.0850) and ( 0.7193,-0.0791) .. ( 0.7090,-0.0817)
--cycle
( 0.9485,-0.0984)
.. controls ( 0.9284,-0.1094) and ( 0.8781,-0.1542) .. ( 0.8706,-0.1754)
.. controls ( 0.8655,-0.1897) and ( 0.8704,-0.2051) .. ( 0.8817,-0.2131)
--cycle
(-0.9323,-0.1007)
-- (-0.9101,-0.1405)
.. controls (-0.9101,-0.1287) and (-0.9146,-0.1173) .. (-0.9187,-0.1067)
--cycle
(-0.0528,-0.1067)
.. controls (-0.0616,-0.1167) and (-0.0681,-0.1217) .. (-0.0735,-0.1348)
.. controls (-0.0802,-0.1513) and (-0.0835,-0.2032) .. (-0.0603,-0.2082)
.. controls (-0.0462,-0.2108) and (-0.0167,-0.1971) .. (-0.0603,-0.1577)
.. controls (-0.0459,-0.1339) and (-0.0396,-0.1326) .. (-0.0528,-0.1067)
--cycle
(-0.4876,-0.1114)
.. controls (-0.4992,-0.1127) and (-0.5150,-0.1170) .. (-0.5367,-0.1237)
-- (-0.5367,-0.1577)
-- (-0.4433,-0.1916)
.. controls (-0.4544,-0.1299) and (-0.4526,-0.1074) .. (-0.4876,-0.1114)
--cycle
(-0.7635,-0.1120)
.. controls (-0.7788,-0.1114) and (-0.7890,-0.1295) .. (-0.7913,-0.1577)
-- (-0.7574,-0.1577)
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    .. controls (-0.7442,-0.2093) and (-0.7301,-0.2080) .. (-0.6810,-0.2086)
    -- (-0.6810,-0.1746)
    -- (-0.7149,-0.1916)
    .. controls (-0.7175,-0.1714) and (-0.7177,-0.1520) .. (-0.7311,-0.1350)
    .. controls (-0.7433,-0.1194) and (-0.7544,-0.1124) .. (-0.7635,-0.1120)
    --cycle
    (-0.2082,-0.1145)
    .. controls (-0.2215,-0.1126) and (-0.2378,-0.1199) .. (-0.2495,-0.1410)
    .. controls (-0.2530,-0.1510) and (-0.2546,-0.1612) .. (-0.2495,-0.1721)
    .. controls (-0.2475,-0.1840) and (-0.2388,-0.1913) .. (-0.2311,-0.2001)
    .. controls (-0.2202,-0.1931) and (-0.2111,-0.1884) .. (-0.2020,-0.1785)
    .. controls (-0.1722,-0.1464) and (-0.1860,-0.1177) .. (-0.2082,-0.1145)
    --cycle
    ( 0.4225,-0.1152)
    -- ( 0.3631,-0.1492)
    -- ( 0.3801,-0.1831)
    .. controls ( 0.4160,-0.1656) and ( 0.4276,-0.1565) .. ( 0.4225,-0.1152)
    --cycle
    (-0.5925,-0.1174)
    .. controls (-0.6021,-0.1151) and (-0.6144,-0.1208) .. (-0.6203,-0.1336)
    .. controls (-0.6283,-0.1508) and (-0.6192,-0.1674) .. (-0.6130,-0.1831)
    -- (-0.5961,-0.1831)
    .. controls (-0.5903,-0.1723) and (-0.5831,-0.1615) .. (-0.5803,-0.1494)
    .. controls (-0.5758,-0.1301) and (-0.5828,-0.1197) .. (-0.5925,-0.1174)
    --cycle
    ( 0.2952,-0.1237)
    -- ( 0.3292,-0.1746)
    -- ( 0.3377,-0.1746)
    -- ( 0.3546,-0.1577)
    .. controls ( 0.3339,-0.1275) and ( 0.3315,-0.1266) .. ( 0.2952,-0.1237)
    --cycle
    ( 0.1832,-0.1240)
    .. controls ( 0.1608,-0.1263) and ( 0.1298,-0.1544) .. ( 0.1254,-0.2086)
    .. controls ( 0.1747,-0.2011) and ( 0.2191,-0.1503) .. ( 0.2015,-0.1301)
    .. controls ( 0.1972,-0.1252) and ( 0.1907,-0.1232) .. ( 0.1832,-0.1240)
    --cycle
    (-0.3330,-0.1407)
    .. controls (-0.3325,-0.1552) and (-0.3330,-0.1683) .. (-0.3280,-0.1824)
    .. controls (-0.3221,-0.1993) and (-0.2907,-0.2626) .. (-0.2674,-0.2496)
    .. controls (-0.2290,-0.2283) and (-0.2939,-0.1556) .. (-0.3330,-0.1407)
    --cycle
    (-0.8677,-0.1492)
    .. controls (-0.8906,-0.2074) and (-0.8704,-0.2079) .. (-0.8168,-0.2086)
    -- (-0.8168,-0.2341)
    -- (-0.7828,-0.2341)
    .. controls (-0.7876,-0.1754) and (-0.8159,-0.1679) .. (-0.8677,-0.1492)
    --cycle
    ( 0.6507,-0.1523)
    .. controls ( 0.6150,-0.1514) and ( 0.5790,-0.1648) .. ( 0.5634,-0.2019)
    .. controls ( 0.5467,-0.2418) and ( 0.5701,-0.2915) .. ( 0.6347,-0.2595)
    -- ( 0.5923,-0.2426)
    .. controls ( 0.6167,-0.1901) and ( 0.6349,-0.1909) .. ( 0.6857,-0.1746)
    -- ( 0.6857,-0.1577)
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    .. controls ( 0.6745,-0.1545) and ( 0.6627,-0.1526) .. ( 0.6507,-0.1523)
    --cycle
    ( 0.4992,-0.1530)
    .. controls ( 0.4893,-0.1544) and ( 0.4788,-0.1613) .. ( 0.4723,-0.1757)
    .. controls ( 0.4601,-0.2024) and ( 0.4716,-0.2265) .. ( 0.4819,-0.2510)
    -- ( 0.4310,-0.2510)
    .. controls ( 0.4659,-0.3129) and ( 0.5002,-0.2692) .. ( 0.5329,-0.2341)
    .. controls ( 0.5195,-0.1890) and ( 0.5320,-0.1766) .. ( 0.5232,-0.1628)
    .. controls ( 0.5186,-0.1555) and ( 0.5091,-0.1515) .. ( 0.4992,-0.1530)
    --cycle
    (-0.1462,-0.1577)
    -- (-0.1462,-0.2001)
    -- (-0.1292,-0.2001)
    -- (-0.1292,-0.1577)
    --cycle
    ( 0.0490,-0.1577)
    -- ( 0.0066,-0.1831)
    -- ( 0.0066,-0.2001)
    .. controls ( 0.0224,-0.2077) and ( 0.0639,-0.2307) .. ( 0.0802,-0.2267)
    .. controls ( 0.1236,-0.2159) and ( 0.0615,-0.1657) .. ( 0.0490,-0.1577)
    --cycle
    ( 0.2527,-0.1577)
    -- ( 0.2358,-0.1746)
    -- ( 0.2273,-0.1746)
    -- ( 0.2273,-0.1916)
    .. controls ( 0.2817,-0.2389) and ( 0.2612,-0.2548) .. ( 0.3207,-0.2595)
    -- ( 0.2952,-0.2341)
    .. controls ( 0.2952,-0.1946) and ( 0.2813,-0.1829) .. ( 0.2527,-0.1577)
    --cycle
    ( 0.4124,-0.1906)
    .. controls ( 0.3901,-0.1934) and ( 0.3801,-0.2077) .. ( 0.3631,-0.2341)
    .. controls ( 0.4031,-0.2391) and ( 0.4075,-0.2303) .. ( 0.4395,-0.2086)
    -- ( 0.4395,-0.1916)
    .. controls ( 0.4286,-0.1900) and ( 0.4198,-0.1897) .. ( 0.4124,-0.1906)
    --cycle
    (-0.5282,-0.1916)
    -- (-0.5536,-0.2001)
    -- (-0.5282,-0.2171)
    --cycle
    (-0.6045,-0.2001)
    .. controls (-0.6700,-0.2056) and (-0.6485,-0.2287) .. (-0.6330,-0.2741)
    .. controls (-0.6243,-0.2991) and (-0.6268,-0.3013) .. (-0.6130,-0.3274)
    .. controls (-0.5769,-0.3048) and (-0.5602,-0.2946) .. (-0.5536,-0.2510)
    -- (-0.6045,-0.2510)
    --cycle
    (-0.3584,-0.2086)
    .. controls (-0.3921,-0.2259) and (-0.3939,-0.2318) .. (-0.4008,-0.2680)
    .. controls (-0.4235,-0.2397) and (-0.4237,-0.2318) .. (-0.4603,-0.2256)
    -- (-0.4603,-0.2850)
    .. controls (-0.4267,-0.2892) and (-0.3194,-0.3199) .. (-0.3429,-0.2424)
    --cycle
    ( 0.7960,-0.2086)
    -- ( 0.8384,-0.2510)
```

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    .. controls ( 0.8428,-0.2169) and ( 0.8301,-0.2042) .. ( 0.7960,-0.2086)
    --cycle
    ( 0.1928,-0.2162)
    .. controls ( 0.1816,-0.2174) and ( 0.1689,-0.2258) .. ( 0.1598,-0.2322)
    .. controls ( 0.1191,-0.2606) and ( 0.1214,-0.2831) .. ( 0.1339,-0.3274)
    -- ( 0.1509,-0.3274)
    .. controls ( 0.1561,-0.3114) and ( 0.1614,-0.2848) .. ( 0.1729,-0.2730)
    .. controls ( 0.1867,-0.2591) and ( 0.2098,-0.2594) .. ( 0.2174,-0.2461)
    .. controls ( 0.2253,-0.2321) and ( 0.2130,-0.2142) .. ( 0.1928,-0.2162)
    --cycle
    (-0.1905,-0.2188)
    .. controls (-0.1970,-0.2195) and (-0.2037,-0.2233) .. (-0.2087,-0.2284)
    .. controls (-0.2248,-0.2451) and (-0.2297,-0.2881) .. (-0.2311,-0.3104)
    -- (-0.1801,-0.3104)
    .. controls (-0.1960,-0.2531) and (-0.1611,-0.2530) .. (-0.1738,-0.2284)
    .. controls (-0.1778,-0.2206) and (-0.1840,-0.2181) .. (-0.1905,-0.2188)
    --cycle
    (-0.5112,-0.2256)
    -- (-0.5112,-0.2595)
    -- (-0.4772,-0.2595)
    -- (-0.4772,-0.2256)
    --cycle
    ( 0.7451,-0.2256)
    -- ( 0.6687,-0.2341)
    -- ( 0.6602,-0.2426)
    .. controls ( 0.6862,-0.3159) and ( 0.7361,-0.2848) .. ( 0.7451,-0.2256)
    --cycle
    (-0.8578,-0.2336)
    -- (-0.8203,-0.3006)
    .. controls (-0.7747,-0.3108) and (-0.8112,-0.2349) .. (-0.8578,-0.2336)
    --cycle
    (-0.0280,-0.2369)
    .. controls (-0.0529,-0.2386) and (-0.0646,-0.2625) .. (-0.0273,-0.3019)
    -- ( 0.0236,-0.2595)
    .. controls ( 0.0068,-0.2430) and (-0.0130,-0.2359) .. (-0.0280,-0.2369)
    --cycle
    (-0.7234,-0.2510)
    .. controls (-0.7141,-0.2750) and (-0.7050,-0.2842) .. (-0.6810,-0.2935)
    -- (-0.6725,-0.2850)
    .. controls (-0.6853,-0.2530) and (-0.6899,-0.2536) .. (-0.7234,-0.2510)
    --cycle
    ( 0.0504,-0.2510)
    -- ( 0.0504,-0.2760)
    .. controls ( 0.0689,-0.3381) and ( 0.1243,-0.2780) .. ( 0.0804,-0.2561)
    .. controls ( 0.0707,-0.2513) and ( 0.0594,-0.2519) .. ( 0.0504,-0.2510)
    --cycle
    (-0.1292,-0.2595)
    -- (-0.1462,-0.2765)
    -- (-0.1038,-0.3274)
    -- (-0.0953,-0.3274)
    -- (-0.0783,-0.3104)
    --cycle
    ( 0.7877,-0.2632)
```

```
    .. controls ( 0.7523,-0.2682) and ( 0.7335,-0.3052) .. ( 0.7960,-0.3359)
    .. controls ( 0.8015,-0.3335) and ( 0.8068,-0.3333) .. ( 0.8122,-0.3324)
    -- ( 0.8442,-0.2774)
    .. controls ( 0.8248,-0.2696) and ( 0.8026,-0.2612) .. ( 0.7877,-0.2632)
    --cycle
    ( 0.5329,-0.2765)
    .. controls ( 0.5358,-0.3116) and ( 0.5353,-0.3182) .. ( 0.5668,-0.3359)
    .. controls ( 0.5639,-0.3008) and ( 0.5644,-0.2942) .. ( 0.5329,-0.2765)
    --cycle
    ( 0.3385,-0.2820)
    .. controls ( 0.3148,-0.2878) and ( 0.2673,-0.3492) .. ( 0.3385,-0.3614)
    -- ( 0.3122,-0.4038)
    .. controls ( 0.3574,-0.4463) and ( 0.3787,-0.4004) .. ( 0.3701,-0.3806)
    .. controls ( 0.3644,-0.3672) and ( 0.3492,-0.3602) .. ( 0.3377,-0.3529)
    -- ( 0.3886,-0.3019)
    .. controls ( 0.3746,-0.2928) and ( 0.3572,-0.2777) .. ( 0.3385,-0.2820)
    --cycle
    (-0.3075,-0.2850)
    -- (-0.3669,-0.3359)
    .. controls (-0.3237,-0.3346) and (-0.3194,-0.3327) .. (-0.2820,-0.3104)
    --cycle
    ( 0.6347,-0.2850)
    -- ( 0.6093,-0.3359)
    -- ( 0.6687,-0.3359)
    .. controls ( 0.6634,-0.3038) and ( 0.6614,-0.3034) .. ( 0.6347,-0.2850)
    --cycle
    ( 0.2482,-0.2927)
    .. controls ( 0.2430,-0.2922) and ( 0.2370,-0.2926) .. ( 0.2301,-0.2942)
    .. controls ( 0.1967,-0.3336) and ( 0.2478,-0.3609) .. ( 0.2647,-0.3515)
    .. controls ( 0.2796,-0.3431) and ( 0.2843,-0.2960) .. ( 0.2482,-0.2927)
    --cycle
    (-0.5371,-0.2933)
    .. controls (-0.5481,-0.2970) and (-0.5577,-0.3098) .. (-0.5621,-0.3359)
    -- (-0.5112,-0.3869)
    .. controls (-0.4600,-0.3526) and (-0.5043,-0.2822) .. (-0.5371,-0.2933)
    --cycle
    (-0.4433,-0.3019)
    .. controls (-0.4430,-0.3328) and (-0.4401,-0.3356) .. (-0.4093,-0.3359)
    -- (-0.4263,-0.3019)
    --cycle
    ( 0.0236,-0.3104)
    -- ( 0.0066,-0.3274)
    -- ( 0.0066,-0.3359)
    -- ( 0.0236,-0.3529)
    -- ( 0.0321,-0.3529)
    -- ( 0.0490,-0.3359)
    --cycle
    ( 0.4140,-0.3104)
    -- ( 0.4140,-0.3274)
    -- ( 0.4565,-0.3274)
    -- ( 0.4565,-0.3104)
    --cycle
    (-0.6555,-0.3189)
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    .. controls (-0.7282,-0.3463) and (-0.7047,-0.4238) .. (-0.6385,-0.3614)
    --cycle
    (-0.7635,-0.3203)
    .. controls (-0.7897,-0.3491) and (-0.7645,-0.3586) .. (-0.7512,-0.3515)
    .. controls (-0.7383,-0.3446) and (-0.7269,-0.3159) .. (-0.7635,-0.3203)
    --cycle
    (-0.1547,-0.3359)
    .. controls (-0.2375,-0.3951) and (-0.1886,-0.3975) .. (-0.2106,-0.4536)
    .. controls (-0.2221,-0.4826) and (-0.2548,-0.4886) .. (-0.2435,-0.5309)
    .. controls (-0.2373,-0.5540) and (-0.1692,-0.6520) .. (-0.1548,-0.5893)
    .. controls (-0.1503,-0.5696) and (-0.1713,-0.5323) .. (-0.1801,-0.5141)
    -- (-0.2141,-0.5141)
    -- (-0.1801,-0.4836)
    -- (-0.1632,-0.3784)
    -- (-0.1292,-0.3614)
    --cycle
    ( 0.5838,-0.3444)
    -- ( 0.6178,-0.3869)
    .. controls ( 0.6126,-0.3569) and ( 0.6121,-0.3558) .. ( 0.5838,-0.3444)
    --cycle
    (-0.5876,-0.3529)
    -- (-0.5876,-0.3869)
    -- (-0.5536,-0.3869)
    --cycle
    (-0.3075,-0.3529)
    .. controls (-0.3075,-0.4259) and (-0.3150,-0.4459) .. (-0.2480,-0.4378)
    .. controls (-0.2520,-0.3893) and (-0.2634,-0.3741) .. (-0.3075,-0.3529)
    --cycle
    ( 0.0745,-0.3529)
    .. controls ( 0.0603,-0.3977) and ( 0.0512,-0.3786) .. ( 0.0066,-0.3869)
    .. controls ( 0.0321,-0.4377) and ( 0.0562,-0.4373) .. ( 0.1084,-0.4378)
    -- ( 0.1254,-0.3614)
    --cycle
    ( 0.1868,-0.3534)
    .. controls ( 0.1605,-0.3550) and ( 0.1563,-0.3921) .. ( 0.1681,-0.4095)
    .. controls ( 0.1887,-0.4397) and ( 0.2596,-0.3970) .. ( 0.2782,-0.3784)
    .. controls ( 0.2016,-0.3640) and ( 0.2352,-0.3656) .. ( 0.1995,-0.3551)
    .. controls ( 0.1948,-0.3537) and ( 0.1906,-0.3532) .. ( 0.1868,-0.3534)
    --cycle
    (-0.0650,-0.3585)
    .. controls (-0.0712,-0.3584) and (-0.0783,-0.3594) .. (-0.0865,-0.3617)
    .. controls (-0.1407,-0.4045) and (-0.1029,-0.4414) .. (-0.0731,-0.4301)
    .. controls (-0.0250,-0.4118) and (-0.0217,-0.3591) .. (-0.0650,-0.3585)
    --cycle
    (-0.4008,-0.3614)
    -- (-0.3584,-0.4293)
    .. controls (-0.3814,-0.4389) and (-0.3792,-0.4389) .. (-0.3839,-0.4632)
    .. controls (-0.3078,-0.4504) and (-0.3334,-0.3529) .. (-0.4008,-0.3614)
    --cycle
    ( 0.7706,-0.3784)
    -- ( 0.6689,-0.4004)
    -- ( 0.6602,-0.4378)
    .. controls ( 0.6990,-0.4346) and ( 0.7019,-0.4328) .. ( 0.7281,-0.4038)
```

```
    .. controls ( 0.7344,-0.4232) and ( 0.7382,-0.4373) .. ( 0.7461,-0.4460)
    -- ( 0.7747,-0.3969)
    --cycle
    (-0.7404,-0.3869)
    -- (-0.7574,-0.4038)
    .. controls (-0.7352,-0.4249) and (-0.7368,-0.4246) .. (-0.7065,-0.4208)
    -- (-0.7065,-0.4038)
    --cycle
    ( 0.3971,-0.3953)
    -- ( 0.3801,-0.4378)
    -- ( 0.4140,-0.4378)
    -- ( 0.4140,-0.3953)
    --cycle
    (-0.6640,-0.4038)
    .. controls (-0.6429,-0.4478) and (-0.6261,-0.4537) .. (-0.5876,-0.4802)
    -- (-0.5367,-0.4378)
    .. controls (-0.5592,-0.4163) and (-0.5680,-0.4098) .. (-0.5876,-0.4378)
    .. controls (-0.6195,-0.4110) and (-0.6224,-0.4072) .. (-0.6640,-0.4038)
    --cycle
    (-0.4603,-0.4038)
    -- (-0.4603,-0.4378)
    -- (-0.4263,-0.4378)
    -- (-0.4263,-0.4038)
    --cycle
    ( 0.5584,-0.4038)
    .. controls ( 0.5189,-0.4043) and ( 0.5111,-0.4167) .. ( 0.5159,-0.4548)
    -- ( 0.5329,-0.4548)
    --cycle
    ( 0.6093,-0.4123)
    -- ( 0.6008,-0.4378)
    -- ( 0.6262,-0.4378)
    --cycle
    ( 0.2273,-0.4293)
    -- ( 0.2273,-0.4632)
    -- ( 0.2612,-0.4632)
    -- ( 0.2612,-0.4293)
    --cycle
    ( 0.1339,-0.4378)
    .. controls ( 0.1294,-0.4715) and ( 0.1342,-0.4762) .. ( 0.1679,-0.4717)
    --cycle
    (-0.1337,-0.4435)
    .. controls (-0.1394,-0.4438) and (-0.1452,-0.4454) .. (-0.1547,-0.4474)
    -- (-0.1547,-0.4632)
    -- (-0.1038,-0.4972)
    -- (-0.1547,-0.5057)
    .. controls (-0.1508,-0.5315) and (-0.1180,-0.5928) .. (-0.0833,-0.5723)
    .. controls (-0.0768,-0.5684) and (-0.0244,-0.4827) .. (-0.1123,-0.4474)
    .. controls (-0.1220,-0.4442) and (-0.1279,-0.4432) .. (-0.1337,-0.4435)
    --cycle
    (-0.0033,-0.4457)
    .. controls (-0.0284,-0.4445) and (-0.0459,-0.4662) .. (-0.0273,-0.5141)
    -- ( 0.0660,-0.5141)
    .. controls ( 0.0545,-0.4708) and ( 0.0219,-0.4468) .. (-0.0033,-0.4457)
```

```
    --cycle
    (-0.7383,-0.4470)
    -- (-0.7101,-0.4972)
    .. controls (-0.7099,-0.4756) and (-0.7233,-0.4577) .. (-0.7383,-0.4470)
    --cycle
    (-0.4942,-0.4548)
    -- (-0.4857,-0.5065)
    .. controls (-0.4998,-0.5043) and (-0.5212,-0.5004) .. (-0.5329,-0.5065)
    .. controls (-0.5629,-0.5229) and (-0.5515,-0.5662) .. (-0.5329,-0.5843)
    .. controls (-0.5068,-0.6075) and (-0.4879,-0.6033) .. (-0.4603,-0.5906)
    .. controls (-0.4787,-0.5639) and (-0.4791,-0.5620) .. (-0.5112,-0.5566)
    -- (-0.5112,-0.5396)
    .. controls (-0.4518,-0.5306) and (-0.4206,-0.4773) .. (-0.4942,-0.4548)
    --cycle
    ( 0.3377,-0.4548)
    .. controls ( 0.3023,-0.4717) and ( 0.2951,-0.4788) .. ( 0.2782,-0.5141)
    .. controls ( 0.3342,-0.5180) and ( 0.3822,-0.5526) .. ( 0.3886,-0.4717)
    -- ( 0.3631,-0.4972)
    --cycle
    ( 0.5663,-0.4671)
    .. controls ( 0.5583,-0.4668) and ( 0.5478,-0.4680) .. ( 0.5329,-0.4717)
    -- ( 0.5329,-0.4887)
    .. controls ( 0.5814,-0.5209) and ( 0.6607,-0.5778) .. ( 0.6687,-0.4802)
    -- ( 0.6201,-0.4852)
    .. controls ( 0.5908,-0.4828) and ( 0.5901,-0.4680) .. ( 0.5663,-0.4671)
    --cycle
    (-0.6640,-0.4802)
    .. controls (-0.6763,-0.5067) and (-0.6845,-0.5204) .. (-0.6886,-0.5355)
    -- (-0.6647,-0.5782)
    -- (-0.5876,-0.5396)
    .. controls (-0.6003,-0.5515) and (-0.6232,-0.5710) .. (-0.6310,-0.5860)
    .. controls (-0.6373,-0.5982) and (-0.6388,-0.6155) .. (-0.6360,-0.6294)
    -- (-0.6224,-0.6537)
    .. controls (-0.5951,-0.6768) and (-0.5385,-0.6561) .. (-0.5112,-0.6415)
    .. controls (-0.5400,-0.5996) and (-0.5579,-0.6048) .. (-0.6045,-0.6161)
    -- (-0.5621,-0.5651)
    -- (-0.5621,-0.5566)
    -- (-0.5791,-0.5481)
    -- (-0.5621,-0.5141)
    --cycle
    ( 0.1000,-0.4802)
    -- ( 0.0745,-0.5396)
    .. controls ( 0.1186,-0.5345) and ( 0.1548,-0.5114) .. ( 0.1000,-0.4802)
    --cycle
    ( 0.2188,-0.4802)
    -- ( 0.2358,-0.5141)
    -- ( 0.2358,-0.4802)
    --cycle
    ( 0.4310,-0.4802)
    -- ( 0.4140,-0.5311)
    -- ( 0.4140,-0.5396)
    -- ( 0.4310,-0.5566)
    .. controls ( 0.4679,-0.5313) and ( 0.4644,-0.5230) .. ( 0.4649,-0.4802)
```

```
--cycle
( 0.7111,-0.4802)
-- ( 0.7111,-0.5059)
-- ( 0.7261,-0.4802)
--cycle
(-0.3414,-0.4972)
.. controls (-0.3911,-0.5256) and (-0.3704,-0.5729) .. (-0.3075,-0.5566)
-- (-0.3075,-0.5396)
--cycle
(-0.4348,-0.5057)
-- (-0.4348,-0.5736)
.. controls (-0.4068,-0.5549) and (-0.4098,-0.5369) .. (-0.4008,-0.5057)
--cycle
( 0.1509,-0.5311)
-- ( 0.1254,-0.5736)
-- ( 0.1849,-0.5651)
--cycle
( 0.2273,-0.5311)
-- ( 0.2103,-0.5975)
.. controls ( 0.1971,-0.5957) and ( 0.1843,-0.5904) .. ( 0.1705,-0.5975)
.. controls ( 0.1304,-0.6124) and ( 0.1679,-0.7346) .. ( 0.2142,-0.6893)
.. controls ( 0.2226,-0.6812) and ( 0.2236,-0.6741) .. ( 0.2273,-0.6670)
-- ( 0.1849,-0.6330)
.. controls ( 0.2427,-0.6183) and ( 0.2598,-0.5884) .. ( 0.2443,-0.5311)
--cycle
( 0.5074,-0.5311)
.. controls ( 0.5252,-0.5626) and ( 0.5317,-0.5622) .. ( 0.5668,-0.5651)
.. controls ( 0.5491,-0.5336) and ( 0.5426,-0.5340) .. ( 0.5074,-0.5311)
--cycle
( 0.0269,-0.5388)
.. controls ( 0.0166,-0.5396) and ( 0.0072,-0.5496) .. ( 0.0090,-0.5738)
-- ( 0.0151,-0.5991)
.. controls ( 0.0222,-0.5954) and ( 0.0287,-0.5947) .. ( 0.0377,-0.5860)
.. controls ( 0.0637,-0.5611) and ( 0.0441,-0.5373) .. ( 0.0269,-0.5388)
--cycle
( 0.2782,-0.5481)
-- ( 0.2612,-0.5821)
-- ( 0.3122,-0.6245)
.. controls ( 0.3120,-0.5837) and ( 0.3197,-0.5648) .. ( 0.2782,-0.5481)
--cycle
(-0.2820,-0.5566)
.. controls (-0.2791,-0.5918) and (-0.2795,-0.5983) .. (-0.2480,-0.6161)
.. controls (-0.2450,-0.5789) and (-0.2492,-0.5737) .. (-0.2820,-0.5566)
--cycle
( 0.3631,-0.5651)
.. controls ( 0.3595,-0.5776) and ( 0.3566,-0.5855) .. ( 0.3557,-0.5990)
.. controls ( 0.3500,-0.6875) and ( 0.4541,-0.6501) .. ( 0.3934,-0.5846)
.. controls ( 0.3826,-0.5729) and ( 0.3761,-0.5717) .. ( 0.3631,-0.5651)
--cycle
( 0.4330,-0.5736)
-- ( 0.4330,-0.6379)
.. controls ( 0.4274,-0.6731) and ( 0.3959,-0.6885) .. ( 0.4395,-0.7179)
.. controls ( 0.4751,-0.6405) and ( 0.4954,-0.6629) .. ( 0.4480,-0.5736)
```

```
    --cycle
    ( 0.5329,-0.5821)
    .. controls ( 0.5362,-0.6232) and ( 0.5740,-0.6869) .. ( 0.6222,-0.6585)
    -- ( 0.6513,-0.6086)
    .. controls ( 0.6095,-0.6116) and ( 0.5939,-0.6354) .. ( 0.5668,-0.5821)
    --cycle
    ( 0.1000,-0.5906)
    -- ( 0.0830,-0.6245)
    -- ( 0.0575,-0.6161)
    .. controls ( 0.0477,-0.6898) and ( 0.1617,-0.6541) .. ( 0.1000,-0.5906)
    --cycle
    (-0.3245,-0.5991)
    .. controls (-0.3790,-0.5920) and (-0.3824,-0.6312) .. (-0.3839,-0.6754)
    -- (-0.3245,-0.6161)
    --cycle
    (-0.4348,-0.6076)
    -- (-0.4603,-0.6670)
    -- (-0.4942,-0.6585)
    -- (-0.5027,-0.6670)
    .. controls (-0.4589,-0.7510) and (-0.3531,-0.6544) .. (-0.4348,-0.6076)
    --cycle
    (-0.1377,-0.6076)
    .. controls (-0.1554,-0.6464) and (-0.1574,-0.6512) .. (-0.1292,-0.6839)
    -- (-0.1208,-0.6839)
    -- (-0.1038,-0.6670)
    -- (-0.1208,-0.6076)
    --cycle
    (-0.0698,-0.6161)
    -- (-0.0698,-0.6330)
    -- (-0.0019,-0.6330)
    -- (-0.0019,-0.6161)
    --cycle
    (-0.2735,-0.6330)
    .. controls (-0.3246,-0.6408) and (-0.3550,-0.6906) .. (-0.3754,-0.7356)
    -- (-0.3510,-0.7356)
    -- (-0.2786,-0.6658)
    --cycle
    (-0.1971,-0.6330)
    .. controls (-0.2393,-0.6535) and (-0.2774,-0.6931) .. (-0.2226,-0.7264)
    --cycle
    ( 0.2782,-0.6415)
    -- ( 0.2612,-0.6585)
    .. controls ( 0.2834,-0.6795) and ( 0.2819,-0.6792) .. ( 0.3122,-0.6754)
    -- ( 0.3122,-0.6585)
    --cycle
    ( 0.5244,-0.6630)
    .. controls ( 0.5103,-0.6630) and ( 0.4934,-0.6765) .. ( 0.4819,-0.6839)
    .. controls ( 0.4916,-0.7019) and ( 0.4915,-0.7036) .. ( 0.5078,-0.7175)
    -- ( 0.5293,-0.7332)
    .. controls ( 0.6028,-0.7786) and ( 0.5789,-0.6636) .. ( 0.5244,-0.6630)
    --cycle
    (-0.0698,-0.6839)
    -- (-0.0613,-0.7433)
```

```
    -- (-0.0528,-0.7518)
    .. controls (-0.0005,-0.7307) and (-0.0190,-0.6844) .. (-0.0698,-0.6839)
    --cycle
    ( 0.1339,-0.6839)
    .. controls ( 0.0648,-0.6945) and ( 0.0512,-0.7734) .. ( 0.1169,-0.7943)
    .. controls ( 0.1059,-0.7314) and ( 0.1116,-0.7410) .. ( 0.1339,-0.6839)
    --cycle
    ( 0.3546,-0.6839)
    .. controls ( 0.3575,-0.7191) and ( 0.3571,-0.7256) .. ( 0.3886,-0.7433)
    -- ( 0.3716,-0.6839)
    --cycle
    ( 0.3886,-0.7433)
    -- ( 0.3886,-0.7603)
    -- ( 0.3546,-0.7943)
    -- ( 0.3631,-0.7943)
    -- ( 0.3801,-0.8113)
    .. controls ( 0.4252,-0.7878) and ( 0.4333,-0.7840) .. ( 0.4140,-0.7349)
    --cycle
    (-0.5653,-0.6922)
    .. controls (-0.5767,-0.6913) and (-0.5873,-0.6939) .. (-0.5981,-0.6969)
    -- (-0.5741,-0.7399)
    .. controls (-0.5528,-0.7446) and (-0.5350,-0.7433) .. (-0.5027,-0.7433)
    .. controls (-0.5172,-0.7077) and (-0.5409,-0.6942) .. (-0.5653,-0.6922)
    --cycle
    (-0.1547,-0.7099)
    .. controls (-0.1719,-0.7103) and (-0.1811,-0.7133) .. (-0.1971,-0.7179)
    .. controls (-0.1923,-0.7317) and (-0.1881,-0.7454) .. (-0.1792,-0.7574)
    .. controls (-0.1162,-0.8422) and (-0.0444,-0.7079) .. (-0.1547,-0.7099)
    --cycle
    (-0.4348,-0.7179)
    .. controls (-0.4394,-0.7549) and (-0.4359,-0.7636) .. (-0.4008,-0.7773)
    --cycle
    ( 0.2358,-0.7179)
    -- ( 0.2358,-0.7349)
    -- ( 0.3037,-0.7349)
    -- ( 0.3037,-0.7179)
    --cycle
    ( 0.4649,-0.7179)
    -- ( 0.4734,-0.7858)
    .. controls ( 0.4612,-0.7900) and ( 0.4516,-0.7918) .. ( 0.4409,-0.8004)
    .. controls ( 0.3964,-0.8360) and ( 0.4585,-0.8927) .. ( 0.4819,-0.8198)
    -- ( 0.5159,-0.8283)
    .. controls ( 0.5142,-0.8359) and ( 0.5131,-0.8417) .. ( 0.5125,-0.8468)
    -- ( 0.5398,-0.8000)
    .. controls ( 0.5329,-0.7638) and ( 0.5138,-0.7350) .. ( 0.4649,-0.7179)
    --cycle
    ( 0.2103,-0.7264)
    -- ( 0.1509,-0.7349)
    -- ( 0.1509,-0.7688)
    .. controls ( 0.1894,-0.7657) and ( 0.1982,-0.7645) .. ( 0.2103,-0.7264)
    --cycle
    (-0.2905,-0.7349)
    .. controls (-0.3009,-0.7717) and (-0.3009,-0.7829) .. (-0.2905,-0.8198)
```

```
    -- (-0.2480,-0.8028)
    -- (-0.2311,-0.8367)
    .. controls (-0.1820,-0.7845) and (-0.2454,-0.7805) .. (-0.2735,-0.7349)
    --cycle
    (-0.0019,-0.7349)
    .. controls (-0.0202,-0.7845) and (-0.0471,-0.8007) .. (-0.0358,-0.8537)
    -- ( 0.0066,-0.8113)
    -- ( 0.0236,-0.8113)
    .. controls ( 0.0412,-0.8384) and ( 0.0421,-0.8410) .. ( 0.0745,-0.8367)
    .. controls ( 0.0599,-0.7914) and ( 0.0500,-0.7437) .. (-0.0019,-0.7349)
    --cycle
    (-0.5282,-0.7688)
    .. controls (-0.5349,-0.8205) and (-0.5012,-0.8219) .. (-0.4603,-0.8113)
    -- (-0.4603,-0.7943)
    --cycle
    ( 0.3122,-0.7688)
    -- ( 0.3037,-0.7773)
    .. controls ( 0.3122,-0.8236) and ( 0.3093,-0.8598) .. ( 0.3608,-0.8698)
    -- ( 0.3628,-0.8698)
    -- ( 0.3292,-0.7688)
    --cycle
    (-0.3584,-0.7858)
    -- (-0.3770,-0.8622)
    .. controls (-0.3770,-0.8627) and (-0.3768,-0.8631) .. (-0.3768,-0.8636)
    -- (-0.3401,-0.8639)
    -- (-0.3245,-0.7858)
    --cycle
    ( 0.2612,-0.7858)
    .. controls ( 0.2125,-0.7858) and ( 0.1976,-0.7780) .. ( 0.1594,-0.8113)
    .. controls ( 0.2029,-0.8570) and ( 0.2552,-0.8596) .. ( 0.2612,-0.7858)
    --cycle
    (-0.1292,-0.7943)
    -- (-0.1886,-0.8537)
    .. controls (-0.1453,-0.8604) and (-0.1341,-0.8487) .. (-0.1038,-0.8198)
    --cycle
    (-0.4348,-0.8367)
    -- (-0.4479,-0.8630)
    -- (-0.4228,-0.8632)
    .. controls (-0.4191,-0.8583) and (-0.4180,-0.8505) .. (-0.4178,-0.8367)
    --cycle
    (-0.0783,-0.8452)
    .. controls (-0.0928,-0.8536) and (-0.0996,-0.8588) .. (-0.1026,-0.8659)
    -- (-0.0748,-0.8661)
    -- (-0.0698,-0.8537)
    --cycle
    ( 0.1503,-0.8501)
    .. controls ( 0.1440,-0.8514) and ( 0.1387,-0.8545) .. ( 0.1353,-0.8602)
    .. controls ( 0.1334,-0.8621) and ( 0.1330,-0.8649) .. ( 0.1333,-0.8679)
    -- ( 0.2103,-0.8685)
    -- ( 0.2103,-0.8602)
    .. controls ( 0.1968,-0.8575) and ( 0.1690,-0.8460) .. ( 0.1503,-0.8501)
    --cycle
    (-0.2396,-0.8622)
```

```
    -- (-0.2421,-0.8647)
    -- (-0.2217,-0.8649)
    .. controls (-0.2221,-0.8638) and (-0.2222,-0.8633) .. (-0.2226,-0.8622)
    --cycle
    ( 0.2867,-0.8622)
    .. controls ( 0.2782,-0.8636) and ( 0.2734,-0.8665) .. ( 0.2676,-0.8690)
    -- ( 0.2859,-0.8691)
    --cycle
    ( 0.3942,-0.8639)
    .. controls ( 0.3909,-0.8650) and ( 0.3884,-0.8678) .. ( 0.3855,-0.8700)
    -- ( 0.4192,-0.8703)
    .. controls ( 0.4168,-0.8684) and ( 0.4154,-0.8656) .. ( 0.4124,-0.8643)
    .. controls ( 0.4062,-0.8618) and ( 0.4000,-0.8619) .. ( 0.3942,-0.8639)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/mountains

The style for mountains. The pattern is filled with a darker brown, and outlines are not drawn. Note that the mountain pattern is the same as the beach pattern, just with a different colour.

```
\tikzset{
  hex/terrain/mountains/.style={
    draw=none,
    fill={rgb,100:red,49;green,35;blue,1}
  }
}
```

hex/terrain/mountains

And the mountains pattern. This is the same as the beach pattern, only filled with a darker brown colour.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/mountains/.pic={
    \path[hex/terrain/mountains,pic actions,draw=none]
    (-0.4931, 0.8848)
    -- (-0.4998, 0.8734)
    .. controls (-0.4908, 0.8731) and (-0.4813, 0.8762) .. (-0.4762, 0.8847)
    --cycle
    (-0.4032, 0.8841)
    .. controls (-0.4004, 0.8804) and (-0.3988, 0.8794) .. (-0.3956, 0.8745)
    .. controls (-0.3760, 0.8443) and (-0.3811, 0.8330) .. (-0.3456, 0.8112)
```

```
    .. controls (-0.3250, 0.7986) and (-0.2712, 0.7770) .. (-0.2531, 0.8032)
    .. controls (-0.2294, 0.8375) and (-0.2984, 0.8503) .. (-0.3193, 0.8690)
    .. controls (-0.3243, 0.8735) and (-0.3281, 0.8785) .. (-0.3321, 0.8835)
    --cycle
    (-0.2462, 0.8828)
    .. controls (-0.2425, 0.8681) and (-0.2383, 0.8546) .. (-0.2293, 0.8461)
    .. controls (-0.2102, 0.8280) and (-0.1892, 0.8390) .. (-0.1859, 0.8669)
    .. controls (-0.1854, 0.8711) and (-0.1871, 0.8772) .. (-0.1875, 0.8822)
    --cycle
    (-0.0997, 0.8815)
    .. controls (-0.0971, 0.8706) and (-0.0941, 0.8597) .. (-0.0907, 0.8493)
    -- (-0.0570, 0.8578)
    .. controls (-0.0570, 0.8629) and (-0.0560, 0.8730) .. (-0.0553, 0.8812)
    --cycle
    ( 0.0213, 0.8805)
    .. controls ( 0.0222, 0.8725) and ( 0.0235, 0.8650) .. ( 0.0262, 0.8587)
    .. controls ( 0.0391, 0.8281) and ( 0.0706, 0.8199) .. ( 0.0917, 0.7894)
    .. controls ( 0.1112, 0.7609) and ( 0.1058, 0.7286) .. ( 0.1050, 0.6961)
    -- ( 0.1731, 0.7216)
    -- ( 0.1203, 0.8649)
    -- ( 0.1097, 0.8797)
    --cycle
    ( 0.2978, 0.8781)
    .. controls ( 0.2985, 0.8773) and ( 0.3002, 0.8756) .. ( 0.3008, 0.8749)
    .. controls ( 0.2854, 0.8687) and ( 0.2549, 0.8572) .. ( 0.2421, 0.8487)
    .. controls ( 0.2026, 0.8224) and ( 0.1905, 0.7567) .. ( 0.2046, 0.7132)
    .. controls ( 0.2146, 0.6819) and ( 0.2330, 0.6680) .. ( 0.2394, 0.6280)
    .. controls ( 0.2413, 0.6160) and ( 0.2468, 0.5527) .. ( 0.2446, 0.5437)
    .. controls ( 0.2396, 0.5232) and ( 0.2211, 0.5122) .. ( 0.2231, 0.4913)
    .. controls ( 0.2261, 0.4603) and ( 0.2686, 0.4388) .. ( 0.2891, 0.4194)
    .. controls ( 0.3020, 0.4071) and ( 0.3136, 0.3895) .. ( 0.3281, 0.3799)
    .. controls ( 0.3688, 0.3533) and ( 0.3905, 0.3863) .. ( 0.4199, 0.3902)
    .. controls ( 0.4350, 0.3921) and ( 0.4560, 0.3849) .. ( 0.4710, 0.3812)
    -- ( 0.4795, 0.4067)
    -- ( 0.4965, 0.4067)
    .. controls ( 0.5008, 0.3961) and ( 0.5009, 0.3893) .. ( 0.5112, 0.3811)
    .. controls ( 0.5112, 0.3811) and ( 0.6172, 0.3385) .. ( 0.6481, 0.3037)
    .. controls ( 0.6729, 0.2758) and ( 0.6641, 0.2532) .. ( 0.6667, 0.2206)
    -- ( 0.7004, 0.2206)
    .. controls ( 0.7839, 0.2118) and ( 0.7047, 0.0740) .. ( 0.7057, 0.0568)
    .. controls ( 0.7067, 0.0396) and ( 0.7865,-0.0424) .. ( 0.8032,-0.0520)
    .. controls ( 0.8251,-0.0644) and ( 0.8703,-0.0686) .. ( 0.8572,-0.0293)
    .. controls ( 0.8518,-0.0131) and ( 0.7996, 0.0474) .. ( 0.7843, 0.0564)
    .. controls ( 0.7724, 0.0633) and ( 0.7645, 0.0636) .. ( 0.7518, 0.0664)
    .. controls ( 0.7688, 0.1093) and ( 0.7993, 0.1905) .. ( 0.7930, 0.2362)
    .. controls ( 0.7869, 0.2804) and ( 0.7252, 0.2982) .. ( 0.6946, 0.3268)
    .. controls ( 0.6664, 0.3531) and ( 0.6746, 0.3662) .. ( 0.6323, 0.3966)
    .. controls ( 0.5760, 0.4371) and ( 0.5386, 0.4324) .. ( 0.5250, 0.4601)
    .. controls ( 0.5090, 0.4927) and ( 0.5578, 0.6035) .. ( 0.5969, 0.5911)
    .. controls ( 0.6199, 0.5839) and ( 0.6224, 0.5471) .. ( 0.6341, 0.5291)
    .. controls ( 0.6488, 0.5064) and ( 0.7020, 0.4614) .. ( 0.7263, 0.4493)
    -- ( 0.7373, 0.4768)
    -- ( 0.6866, 0.5671)
```

```
    -- ( 0.6756, 0.5720)
    -- ( 0.6766, 0.5850)
    -- ( 0.6331, 0.6627)
    .. controls ( 0.6280, 0.6613) and ( 0.6239, 0.6599) .. ( 0.6157, 0.6589)
    -- ( 0.5646, 0.6589)
    .. controls ( 0.5375, 0.6557) and ( 0.5277, 0.6432) .. ( 0.4965, 0.6489)
    .. controls ( 0.4716, 0.6520) and ( 0.4306, 0.6774) .. ( 0.4104, 0.6489)
    .. controls ( 0.3809, 0.6093) and ( 0.4627, 0.6240) .. ( 0.4837, 0.5772)
    .. controls ( 0.4958, 0.5502) and ( 0.4652, 0.4811) .. ( 0.4429, 0.4648)
    -- ( 0.3523, 0.4350)
    .. controls ( 0.3178, 0.4372) and ( 0.3207, 0.4766) .. ( 0.3153, 0.5004)
    .. controls ( 0.3090, 0.5282) and ( 0.2968, 0.5398) .. ( 0.2922, 0.5684)
    .. controls ( 0.2896, 0.6035) and ( 0.3061, 0.6276) .. ( 0.2922, 0.6621)
    .. controls ( 0.2756, 0.6961) and ( 0.2422, 0.7190) .. ( 0.2525, 0.7640)
    .. controls ( 0.2650, 0.8188) and ( 0.3165, 0.7932) .. ( 0.3324, 0.8417)
    .. controls ( 0.3359, 0.8522) and ( 0.3385, 0.8648) .. ( 0.3399, 0.8778)
    --cycle
    ( 0.4261, 0.8770)
    -- ( 0.4333, 0.8493)
    -- ( 0.4845, 0.7440)
    .. controls ( 0.4963, 0.7304) and ( 0.5450, 0.6930) .. ( 0.5630, 0.6989)
    .. controls ( 0.5735, 0.7024) and ( 0.5838, 0.7169) .. ( 0.5932, 0.7337)
    -- ( 0.5612, 0.7909)
    .. controls ( 0.5537, 0.7875) and ( 0.5468, 0.7852) .. ( 0.5403, 0.7864)
    .. controls ( 0.5078, 0.7926) and ( 0.5191, 0.8406) .. ( 0.5145, 0.8567)
    .. controls ( 0.5121, 0.8651) and ( 0.5076, 0.8710) .. ( 0.5025, 0.8764)
    --cycle
    ( 0.3773, 0.8153)
    .. controls ( 0.3625, 0.7892) and ( 0.2993, 0.7161) .. ( 0.3316, 0.6877)
    .. controls ( 0.3432, 0.6774) and ( 0.3866, 0.6728) .. ( 0.4029, 0.6706)
    -- ( 0.3973, 0.7472)
    -- ( 0.4029, 0.8153)
    --cycle
    (-0.4224, 0.8088)
    .. controls (-0.4416, 0.8077) and (-0.4585, 0.7826) .. (-0.4275, 0.7562)
    -- (-0.3971, 0.7387)
    .. controls (-0.4780, 0.6942) and (-0.4752, 0.6640) .. (-0.4591, 0.5855)
    .. controls (-0.4391, 0.4887) and (-0.4527, 0.5347) .. (-0.4103, 0.4493)
    .. controls (-0.3870, 0.4026) and (-0.4070, 0.3747) .. (-0.3460, 0.3642)
    -- (-0.3352, 0.4823)
    .. controls (-0.3409, 0.5024) and (-0.3617, 0.5113) .. (-0.3739, 0.5281)
    -- (-0.4164, 0.6287)
    .. controls (-0.4188, 0.6375) and (-0.4186, 0.6444) .. (-0.4164, 0.6528)
    .. controls (-0.4067, 0.6807) and (-0.3521, 0.7255) .. (-0.3274, 0.6931)
    .. controls (-0.3070, 0.6694) and (-0.3336, 0.6432) .. (-0.3274, 0.6221)
    .. controls (-0.3249, 0.6055) and (-0.3059, 0.6028) .. (-0.2950, 0.6162)
    .. controls (-0.2867, 0.6265) and (-0.2838, 0.6558) .. (-0.2829, 0.6692)
    .. controls (-0.2775, 0.7444) and (-0.3333, 0.7652) .. (-0.3955, 0.7472)
    .. controls (-0.3950, 0.7586) and (-0.3916, 0.7684) .. (-0.3955, 0.7803)
    .. controls (-0.3986, 0.8016) and (-0.4109, 0.8096) .. (-0.4224, 0.8088)
    --cycle
    (-0.1391, 0.8077)
    .. controls (-0.1634, 0.8024) and (-0.1582, 0.7647) .. (-0.1487, 0.7492)
```

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    .. controls (-0.1306, 0.7190) and (-0.1004, 0.7270) .. (-0.0652, 0.7073)
    -- (-0.0226, 0.6801)
    -- ( 0.0282, 0.6560)
    .. controls ( 0.0622, 0.6331) and ( 0.0955, 0.5639) .. ( 0.1219, 0.5259)
    .. controls ( 0.2125, 0.5714) and ( 0.1427, 0.6114) .. ( 0.1219, 0.6453)
    -- ( 0.1054, 0.6768)
    .. controls ( 0.0862, 0.7028) and ( 0.0448, 0.7080) .. ( 0.0115, 0.7299)
    .. controls (-0.0377, 0.7622) and (-0.0173, 0.7726) .. (-0.0822, 0.7918)
    .. controls (-0.0961, 0.7958) and (-0.1270, 0.8103) .. (-0.1391, 0.8077)
    --cycle
    (-0.5460, 0.7940)
    -- (-0.5911, 0.7166)
    .. controls (-0.5649, 0.7015) and (-0.5397, 0.7188) .. (-0.5308, 0.7556)
    .. controls (-0.5251, 0.7788) and (-0.5335, 0.7873) .. (-0.5460, 0.7940)
    --cycle
    (-0.2382, 0.7423)
    .. controls (-0.2453, 0.7424) and (-0.2512, 0.7383) .. (-0.2550, 0.7274)
    .. controls (-0.2635, 0.7026) and (-0.2353, 0.6726) .. (-0.2229, 0.6536)
    .. controls (-0.2031, 0.6234) and (-0.2020, 0.6105) .. (-0.1928, 0.5770)
    .. controls (-0.1763, 0.5803) and (-0.1499, 0.5890) .. (-0.1342, 0.5831)
    .. controls (-0.1112, 0.5745) and (-0.1047, 0.5481) .. (-0.0866, 0.5338)
    -- (-0.0397, 0.5102)
    -- ( 0.0664, 0.4219)
    .. controls ( 0.0874, 0.3954) and ( 0.0785, 0.3655) .. ( 0.1070, 0.3502)
    .. controls ( 0.1367, 0.3343) and ( 0.1690, 0.3592) .. ( 0.1732, 0.3899)
    .. controls ( 0.1755, 0.4075) and ( 0.1545, 0.4554) .. ( 0.1475, 0.4748)
    .. controls ( 0.0838, 0.4666) and ( 0.0509, 0.4836) .. ( 0.0454, 0.5515)
    .. controls (-0.0576, 0.5778) and (-0.0955, 0.6323) .. (-0.1754, 0.6949)
    .. controls (-0.1861, 0.7034) and (-0.2171, 0.7418) .. (-0.2382, 0.7423)
    --cycle
    (-0.5068, 0.6706)
    .. controls (-0.5119, 0.6724) and (-0.5194, 0.6726) .. (-0.5299, 0.6701)
    .. controls (-0.5512, 0.6413) and (-0.5242, 0.6333) .. (-0.5102, 0.6400)
    .. controls (-0.4981, 0.6457) and (-0.4916, 0.6653) .. (-0.5068, 0.6706)
    --cycle
    (-0.6356, 0.6402)
    -- (-0.6681, 0.5845)
    -- (-0.6588, 0.5684)
    .. controls (-0.6473, 0.5521) and (-0.6323, 0.5371) .. (-0.6265, 0.5174)
    .. controls (-0.6174, 0.4865) and (-0.6614, 0.4161) .. (-0.6950, 0.4206)
    .. controls (-0.7111, 0.4226) and (-0.7174, 0.4376) .. (-0.7460, 0.4507)
    -- (-0.7632, 0.4212)
    .. controls (-0.7629, 0.4042) and (-0.7611, 0.3875) .. (-0.7546, 0.3789)
    .. controls (-0.7424, 0.3626) and (-0.7129, 0.3612) .. (-0.6966, 0.3297)
    .. controls (-0.6823, 0.3022) and (-0.6963, 0.2741) .. (-0.6808, 0.2598)
    .. controls (-0.6602, 0.2410) and (-0.6495, 0.2720) .. (-0.6484, 0.2878)
    .. controls (-0.6461, 0.3229) and (-0.6488, 0.4046) .. (-0.6080, 0.4204)
    .. controls (-0.5750, 0.4330) and (-0.4980, 0.3514) .. (-0.4929, 0.3217)
    .. controls (-0.4895, 0.3019) and (-0.5044, 0.2671) .. (-0.4860, 0.2550)
    .. controls (-0.4691, 0.2439) and (-0.4582, 0.2679) .. (-0.4535, 0.2796)
    .. controls (-0.4450, 0.3015) and (-0.4273, 0.3562) .. (-0.4401, 0.3771)
    .. controls (-0.4495, 0.3922) and (-0.5019, 0.4172) .. (-0.5296, 0.4507)
    .. controls (-0.5656, 0.4941) and (-0.5734, 0.5631) .. (-0.5973, 0.6021)
```

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    .. controls (-0.6099, 0.6226) and (-0.6226, 0.6316) .. (-0.6356, 0.6402)
    --cycle
    ( 0.2242, 0.6110)
    -- ( 0.1816, 0.6025)
    -- ( 0.1816, 0.5855)
    .. controls ( 0.2117, 0.5815) and ( 0.2140, 0.5821) .. ( 0.2242, 0.6110)
    --cycle
    ( 0.3924, 0.6049)
    .. controls ( 0.3895, 0.6048) and ( 0.3860, 0.6036) .. ( 0.3820, 0.6011)
    .. controls ( 0.3535, 0.5835) and ( 0.3670, 0.5238) .. ( 0.3773, 0.5004)
    -- ( 0.3944, 0.5004)
    -- ( 0.4061, 0.5429)
    .. controls ( 0.4082, 0.5540) and ( 0.4130, 0.6056) .. ( 0.3924, 0.6049)
    --cycle
    (-0.2864, 0.5940)
    .. controls (-0.2904, 0.5793) and (-0.2950, 0.5676) .. (-0.2919, 0.5518)
    .. controls (-0.2769, 0.4768) and (-0.1616, 0.5041) .. (-0.2162, 0.5623)
    .. controls (-0.2236, 0.5702) and (-0.2346, 0.5747) .. (-0.2443, 0.5790)
    --cycle
    (-0.7010, 0.5280)
    -- (-0.7269, 0.4835)
    .. controls (-0.7207, 0.4876) and (-0.7144, 0.4952) .. (-0.7081, 0.5094)
    --cycle
    (-0.0992, 0.4748)
    -- (-0.2099, 0.4556)
    -- (-0.2888, 0.3790)
    -- (-0.3460, 0.3557)
    -- (-0.3389, 0.3218)
    .. controls (-0.3310, 0.2959) and (-0.3026, 0.2636) .. (-0.2781, 0.2927)
    .. controls (-0.2745, 0.2971) and (-0.2504, 0.3947) .. (-0.1948, 0.3764)
    .. controls (-0.1607, 0.3651) and (-0.1697, 0.2984) .. (-0.1588, 0.2536)
    -- (-0.1503, 0.2536)
    -- (-0.1503, 0.2450)
    -- (-0.1163, 0.2366)
    .. controls (-0.0968, 0.3059) and (-0.1262, 0.3371) .. (-0.1239, 0.3982)
    .. controls (-0.1229, 0.4261) and (-0.1067, 0.4484) .. (-0.0992, 0.4748)
    --cycle
    (-0.1503, 0.2450)
    -- (-0.1588, 0.2536)
    .. controls (-0.2292, 0.2544) and (-0.2730, 0.2893) .. (-0.2677, 0.2195)
    -- (-0.2609, 0.1855)
    .. controls (-0.2393, 0.1890) and (-0.2005, 0.2039) .. (-0.1909, 0.1753)
    .. controls (-0.1709, 0.1163) and (-0.2582, 0.0953) .. (-0.2387, 0.0533)
    .. controls (-0.2275, 0.0292) and (-0.1430, 0.0537) .. (-0.1361, 0.0692)
    .. controls (-0.1250, 0.0859) and (-0.1359, 0.1083) .. (-0.1361, 0.1259)
    .. controls (-0.1437, 0.1788) and (-0.1186, 0.1766) .. (-0.1503, 0.2450)
    --cycle
    ( 0.7348, 0.4408)
    .. controls ( 0.7113, 0.3774) and ( 0.7569, 0.3513) .. ( 0.7901, 0.3824)
    -- ( 0.7585, 0.4390)
    --cycle
    ( 0.2071, 0.4153)
    .. controls ( 0.1984, 0.3706) and ( 0.2118, 0.3204) .. ( 0.2582, 0.3046)
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    .. controls ( 0.2685, 0.3631) and ( 0.2706, 0.3931) .. ( 0.2071, 0.4153)
    --cycle
    (-0.0567, 0.3982)
    .. controls (-0.0558, 0.3230) and (-0.0460, 0.3456) .. (-0.0210, 0.2876)
    -- ( 0.0067, 0.1940)
    .. controls ( 0.0180, 0.1513) and ( 0.0026, 0.1332) .. ( 0.0454, 0.1089)
    -- ( 0.0767, 0.1940)
    -- ( 0.0546, 0.2621)
    -- ( 0.0406, 0.3185)
    -- (-0.0258, 0.3896)
    --cycle
    (-0.7969, 0.3634)
    -- (-0.8570, 0.2602)
    .. controls (-0.8515, 0.2550) and (-0.8469, 0.2514) .. (-0.8414, 0.2450)
    .. controls (-0.8020, 0.1990) and (-0.8201, 0.1971) .. (-0.7629, 0.1540)
    .. controls (-0.7462, 0.1414) and (-0.7054, 0.1023) .. (-0.6834, 0.1181)
    .. controls (-0.6662, 0.1304) and (-0.6813, 0.1625) .. (-0.6882, 0.1768)
    .. controls (-0.7213, 0.2456) and (-0.7865, 0.2417) .. (-0.8004, 0.2965)
    .. controls (-0.8052, 0.3154) and (-0.7990, 0.3413) .. (-0.7969, 0.3634)
    --cycle
    ( 0.8244, 0.3214)
    .. controls ( 0.8136, 0.3128) and ( 0.8080, 0.2984) .. ( 0.8114, 0.2706)
    .. controls ( 0.8314, 0.2739) and ( 0.8424, 0.2735) .. ( 0.8526, 0.2710)
    --cycle
    ( 0.5015, 0.3207)
    .. controls ( 0.4943, 0.3196) and ( 0.4861, 0.3171) .. ( 0.4766, 0.3130)
    .. controls ( 0.4611, 0.2827) and ( 0.4839, 0.2747) .. ( 0.5028, 0.2521)
    -- ( 0.5376, 0.1972)
    .. controls ( 0.5529, 0.1772) and ( 0.5728, 0.1698) .. ( 0.5845, 0.1426)
    .. controls ( 0.5979, 0.1115) and ( 0.5837, 0.0732) .. ( 0.5987, 0.0532)
    .. controls ( 0.6095, 0.0384) and ( 0.6236, 0.0428) .. ( 0.6350, 0.0532)
    .. controls ( 0.6681, 0.0842) and ( 0.6456, 0.1087) .. ( 0.6482, 0.1429)
    .. controls ( 0.6481, 0.1614) and ( 0.6596, 0.1802) .. ( 0.6482, 0.1967)
    .. controls ( 0.6390, 0.2131) and ( 0.5992, 0.2239) .. ( 0.5768, 0.2483)
    .. controls ( 0.5547, 0.2722) and ( 0.5524, 0.3288) .. ( 0.5015, 0.3207)
    --cycle
    (-0.5678, 0.3115)
    .. controls (-0.5832, 0.3118) and (-0.6140, 0.2810) .. (-0.6269, 0.2706)
    .. controls (-0.6185, 0.2412) and (-0.5926, 0.1953) .. (-0.5973, 0.1685)
    .. controls (-0.6029, 0.1373) and (-0.6320, 0.1239) .. (-0.6369, 0.0996)
    .. controls (-0.6406, 0.0816) and (-0.6303, 0.0652) .. (-0.6237, 0.0493)
    .. controls (-0.6147, 0.0275) and (-0.6000,-0.0443) .. (-0.5641,-0.0258)
    .. controls (-0.5134,-0.0018) and (-0.5902, 0.0606) .. (-0.5641, 0.1074)
    .. controls (-0.5332, 0.1697) and (-0.4913, 0.1444) .. (-0.4481, 0.1593)
    .. controls (-0.3913, 0.1792) and (-0.3439, 0.2446) .. (-0.3545, 0.3046)
    -- (-0.4568, 0.2201)
    -- (-0.5588, 0.2201)
    .. controls (-0.5549, 0.2390) and (-0.5305, 0.3109) .. (-0.5678, 0.3115)
    --cycle
    ( 0.2243, 0.2813)
    -- ( 0.1631, 0.2450)
    -- ( 0.0965, 0.2281)
    -- ( 0.1689, 0.1131)
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    -- ( 0.2065, 0.0861)
    .. controls ( 0.2453, 0.0564) and ( 0.2384, 0.0410) .. ( 0.2923, 0.0323)
    -- ( 0.2988,-0.0188)
    .. controls ( 0.2994,-0.0695) and ( 0.2657,-0.0796) .. ( 0.2249,-0.0579)
    .. controls ( 0.1337,-0.0093) and ( 0.1545, 0.0219) .. ( 0.1102, 0.0744)
    .. controls ( 0.0914, 0.0967) and ( 0.0807, 0.1010) .. ( 0.0539, 0.1089)
    .. controls ( 0.0562, 0.0613) and ( 0.0756,-0.0434) .. ( 0.0403,-0.0825)
    .. controls ( 0.0293,-0.0948) and (-0.0336,-0.1168) .. (-0.0567,-0.1294)
    .. controls (-0.0615,-0.1087) and (-0.0777,-0.0729) .. (-0.0703,-0.0546)
    .. controls (-0.0586,-0.0251) and ( 0.0562, 0.0040) .. (-0.0152, 0.0389)
    -- (-0.0397, 0.0480)
    -- (-0.0737, 0.0578)
    .. controls (-0.0806, 0.0391) and (-0.0849, 0.0192) .. (-0.1018, 0.0068)
    .. controls (-0.1154,-0.0032) and (-0.1352,-0.0018) .. (-0.1438,-0.0212)
    .. controls (-0.1562,-0.0491) and (-0.1117,-0.1243) .. (-0.0874,-0.1373)
    .. controls (-0.0745,-0.1434) and (-0.0687,-0.1394) .. (-0.0567,-0.1373)
    .. controls (-0.0358,-0.2033) and (-0.0062,-0.1612) .. ( 0.0370,-0.1500)
    -- ( 0.1050,-0.1379)
    .. controls ( 0.0882,-0.0871) and ( 0.0808,-0.0999) .. ( 0.0965,-0.0443)
    .. controls ( 0.1454,-0.0619) and ( 0.1336,-0.0743) .. ( 0.1664,-0.0940)
    .. controls ( 0.1897,-0.1081) and ( 0.2226,-0.1052) .. ( 0.2361,-0.1388)
    .. controls ( 0.2495,-0.1724) and ( 0.2245,-0.1963) .. ( 0.2412,-0.2584)
    .. controls ( 0.2526,-0.2569) and ( 0.2622,-0.2548) .. ( 0.2735,-0.2584)
    .. controls ( 0.2987,-0.2708) and ( 0.3225,-0.3241) .. ( 0.3212,-0.3506)
    .. controls ( 0.3203,-0.3711) and ( 0.3053,-0.3950) .. ( 0.3008,-0.4443)
    -- ( 0.2497,-0.4187)
    .. controls ( 0.2599,-0.4479) and ( 0.2621,-0.4475) .. ( 0.2905,-0.4528)
    .. controls ( 0.2877,-0.4715) and ( 0.2799,-0.4998) .. ( 0.2905,-0.5182)
    .. controls ( 0.2991,-0.5392) and ( 0.3228,-0.5357) .. ( 0.3346,-0.5182)
    .. controls ( 0.3506,-0.4943) and ( 0.3355,-0.4515) .. ( 0.3532,-0.4203)
    .. controls ( 0.3716,-0.3881) and ( 0.4096,-0.3844) .. ( 0.4084,-0.3499)
    .. controls ( 0.4074,-0.3241) and ( 0.3866,-0.3087) .. ( 0.3728,-0.2897)
    -- ( 0.3426,-0.2337)
    -- ( 0.2989,-0.1879)
    .. controls ( 0.2810,-0.1587) and ( 0.2976,-0.1327) .. ( 0.3187,-0.1323)
    .. controls ( 0.3342,-0.1319) and ( 0.3489,-0.1451) .. ( 0.3603,-0.1541)
    .. controls ( 0.3817,-0.1712) and ( 0.4026,-0.1894) .. ( 0.4144,-0.2146)
    .. controls ( 0.4299,-0.2477) and ( 0.4289,-0.2977) .. ( 0.4712,-0.3110)
    .. controls ( 0.4957,-0.3188) and ( 0.5167,-0.3024) .. ( 0.5044,-0.2753)
    .. controls ( 0.4967,-0.2585) and ( 0.4769,-0.2471) .. ( 0.4676,-0.2227)
    .. controls ( 0.4582,-0.1981) and ( 0.4681,-0.1743) .. ( 0.4488,-0.1492)
    .. controls ( 0.4286,-0.1227) and ( 0.3809,-0.1095) .. ( 0.3621,-0.0696)
    .. controls ( 0.3402,-0.0230) and ( 0.3896, 0.0270) .. ( 0.3092, 0.0408)
    -- ( 0.3532, 0.1933)
    -- ( 0.3944, 0.2536)
    -- ( 0.3433, 0.2765)
    --cycle
    ( 0.2497, 0.2450)
    -- ( 0.2782, 0.2025)
    .. controls ( 0.2843, 0.1911) and ( 0.2884, 0.1815) .. ( 0.2900, 0.1685)
    .. controls ( 0.3021, 0.0654) and ( 0.1495, 0.1479) .. ( 0.2135, 0.2245)
    .. controls ( 0.2246, 0.2378) and ( 0.2346, 0.2396) .. ( 0.2497, 0.2450)
    --cycle
```

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    ( 0.8836, 0.2157)
    .. controls ( 0.8688, 0.2061) and ( 0.8571, 0.1889) .. ( 0.8687, 0.1736)
    .. controls ( 0.8785, 0.1608) and ( 0.8967, 0.1613) .. ( 0.9161, 0.1578)
    --cycle
    (-0.3035, 0.1940)
    .. controls (-0.3340, 0.1390) and (-0.3508, 0.1491) .. (-0.3624, 0.1300)
    .. controls (-0.3738, 0.1112) and (-0.3588, 0.0896) .. (-0.3288, 0.0972)
    .. controls (-0.2842, 0.1084) and (-0.2392, 0.1714) .. (-0.3035, 0.1940)
    --cycle
    ( 0.4710, 0.1940)
    .. controls ( 0.4330, 0.1525) and ( 0.3961, 0.1447) .. ( 0.4114, 0.0833)
    .. controls ( 0.4294, 0.0897) and ( 0.4596, 0.1056) .. ( 0.4776, 0.0984)
    .. controls ( 0.5010, 0.0888) and ( 0.5182, 0.0420) .. ( 0.4925, 0.0231)
    .. controls ( 0.4698, 0.0064) and ( 0.4500, 0.0299) .. ( 0.3944, 0.0153)
    .. controls ( 0.4243,-0.0189) and ( 0.4618,-0.0333) .. ( 0.4765,-0.0621)
    .. controls ( 0.4928,-0.0939) and ( 0.4729,-0.1183) .. ( 0.4881,-0.1406)
    .. controls ( 0.4977,-0.1549) and ( 0.5241,-0.1630) .. ( 0.5425,-0.1894)
    .. controls ( 0.5557,-0.2085) and ( 0.5562,-0.2282) .. ( 0.5657,-0.2485)
    -- ( 0.6122,-0.3251)
    .. controls ( 0.6335,-0.3720) and ( 0.6160,-0.3973) .. ( 0.6323,-0.4443)
    .. controls ( 0.6532,-0.5042) and ( 0.6754,-0.5231) .. ( 0.6973,-0.5440)
    -- ( 0.7289,-0.4899)
    .. controls ( 0.7138,-0.4739) and ( 0.6992,-0.4579) .. ( 0.6886,-0.4358)
    -- ( 0.6489,-0.2690)
    .. controls ( 0.6485,-0.2445) and ( 0.6654,-0.2180) .. ( 0.6598,-0.2002)
    .. controls ( 0.6522,-0.1752) and ( 0.6202,-0.1899) .. ( 0.5938,-0.1612)
    .. controls ( 0.5619,-0.1263) and ( 0.5907,-0.0980) .. ( 0.5797,-0.0720)
    .. controls ( 0.5714,-0.0525) and ( 0.5434,-0.0441) .. ( 0.5374,-0.0184)
    .. controls ( 0.5319, 0.0056) and ( 0.5522, 0.0300) .. ( 0.5533, 0.0578)
    .. controls ( 0.5548, 0.0943) and ( 0.4981, 0.1701) .. ( 0.4710, 0.1940)
    --cycle
    (-0.9001, 0.1862)
    -- (-0.9386, 0.1201)
    .. controls (-0.9374, 0.1181) and (-0.9371, 0.1158) .. (-0.9356, 0.1139)
    .. controls (-0.9242, 0.0996) and (-0.9046, 0.0893) .. (-0.8911, 0.0660)
    .. controls (-0.8684, 0.0268) and (-0.8960, 0.0297) .. (-0.8592,-0.0296)
    .. controls (-0.8262,-0.0830) and (-0.8655,-0.1092) .. (-0.7971,-0.1209)
    -- (-0.7875, 0.0068)
    -- (-0.8579, 0.1174)
    --cycle
    (-0.4453, 0.0979)
    .. controls (-0.4922, 0.0916) and (-0.4988, 0.0347) .. (-0.4759, 0.0116)
    .. controls (-0.4491,-0.0149) and (-0.4165, 0.0208) .. (-0.3900, 0.0116)
    .. controls (-0.3555,-0.0011) and (-0.3800,-0.0410) .. (-0.3751,-0.0698)
    -- (-0.3537,-0.1294)
    .. controls (-0.3428,-0.1879) and (-0.4042,-0.1777) .. (-0.3801,-0.2656)
    .. controls (-0.3617,-0.2531) and (-0.3352,-0.2292) .. (-0.3122,-0.2330)
    .. controls (-0.2845,-0.2375) and (-0.2669,-0.2694) .. (-0.2543,-0.2911)
    .. controls (-0.2183,-0.3533) and (-0.2004,-0.3613) .. (-0.2184,-0.4358)
    .. controls (-0.3300,-0.4097) and (-0.2723,-0.5065) .. (-0.2483,-0.5549)
    -- (-0.2129,-0.6314)
    .. controls (-0.2017,-0.6508) and (-0.1900,-0.6661) .. (-0.1670,-0.6712)
    .. controls (-0.1211,-0.6813) and (-0.1100,-0.6527) .. (-0.1163,-0.6145)
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    .. controls (-0.1327,-0.6119) and (-0.1427,-0.6118) .. (-0.1568,-0.6009)
    .. controls (-0.1780,-0.5845) and (-0.2123,-0.5041) .. (-0.2042,-0.4783)
    .. controls (-0.1947,-0.4484) and (-0.1575,-0.4121) .. (-0.1333,-0.3932)
    -- (-0.1527,-0.3251)
    -- (-0.1588,-0.2656)
    .. controls (-0.2187,-0.2715) and (-0.2083,-0.2536) .. (-0.2457,-0.2163)
    .. controls (-0.2684,-0.1935) and (-0.2911,-0.1886) .. (-0.2996,-0.1546)
    -- (-0.2996,-0.1209)
    -- (-0.3232,-0.0698)
    .. controls (-0.3283,-0.0435) and (-0.3124,-0.0260) .. (-0.3175,-0.0041)
    .. controls (-0.3251, 0.0283) and (-0.3891, 0.0917) .. (-0.4227, 0.0973)
    .. controls (-0.4311, 0.0987) and (-0.4386, 0.0989) .. (-0.4453, 0.0979)
    --cycle
    (-0.1163,-0.6145)
    -- (-0.0812,-0.6009)
    -- (-0.0509,-0.4868)
    -- (-0.0567,-0.4528)
    .. controls (-0.1227,-0.4845) and (-0.1350,-0.5483) .. (-0.1163,-0.6145)
    --cycle
    ( 0.9165, 0.0573)
    .. controls ( 0.8982, 0.0512) and ( 0.8800, 0.0260) .. ( 0.8880,-0.0013)
    .. controls ( 0.8973,-0.0334) and ( 0.9330,-0.0408) .. ( 0.9466,-0.0703)
    .. controls ( 0.9528,-0.0838) and ( 0.9514,-0.0964) .. ( 0.9506,-0.1091)
    -- ( 1.0000,-0.0243)
    .. controls ( 0.9816,-0.0179) and ( 0.9678,-0.0119) .. ( 0.9563, 0.0077)
    .. controls ( 0.9465, 0.0244) and ( 0.9476, 0.0488) .. ( 0.9340, 0.0564)
    .. controls ( 0.9288, 0.0593) and ( 0.9227, 0.0593) .. ( 0.9165, 0.0573)
    --cycle
    (-0.7064, 0.0069)
    .. controls (-0.7128, 0.0077) and (-0.7187, 0.0075) .. (-0.7237, 0.0061)
    .. controls (-0.7255, 0.0030) and (-0.7310, 0.0025) .. (-0.7316,-0.0115)
    .. controls (-0.7321,-0.0230) and (-0.7071,-0.1058) .. (-0.6984,-0.1096)
    .. controls (-0.6872,-0.1176) and (-0.6721,-0.1116) .. (-0.6609,-0.1096)
    .. controls (-0.6502,-0.1046) and (-0.6316,-0.0986) .. (-0.6242,-0.0900)
    .. controls (-0.5901,-0.0507) and (-0.6615, 0.0017) .. (-0.7064, 0.0069)
    --cycle
    (-1.0000, 0.0068)
    -- (-1.0000, 0.0020)
    -- (-0.9548,-0.0788)
    .. controls (-0.9170,-0.0310) and (-0.9342,-0.0158) .. (-1.0000, 0.0068)
    --cycle
    (-0.2643, 0.0054)
    .. controls (-0.2853,-0.0295) and (-0.2523,-0.0713) .. (-0.2182,-0.0843)
    .. controls (-0.2024,-0.0902) and (-0.1781,-0.0944) .. (-0.1687,-0.0757)
    .. controls (-0.1530,-0.0441) and (-0.2378, 0.0095) .. (-0.2643, 0.0054)
    --cycle
    ( 0.6299,-0.0102)
    .. controls ( 0.6155,-0.0145) and ( 0.6071,-0.0342) .. ( 0.6128,-0.0510)
    .. controls ( 0.6198,-0.0721) and ( 0.6440,-0.0790) .. ( 0.6606,-0.0986)
    .. controls ( 0.6738,-0.1143) and ( 0.6761,-0.1328) .. ( 0.6948,-0.1437)
    .. controls ( 0.7092,-0.1520) and ( 0.7311,-0.1484) .. ( 0.7401,-0.1664)
    .. controls ( 0.7461,-0.1784) and ( 0.7351,-0.2363) .. ( 0.7348,-0.2570)
    .. controls ( 0.7336,-0.3524) and ( 0.7289,-0.3324) .. ( 0.7620,-0.4187)
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    .. controls ( 0.7631,-0.4216) and ( 0.7642,-0.4246) .. ( 0.7652,-0.4275)
    -- ( 0.8003,-0.3672)
    .. controls ( 0.7976,-0.3636) and ( 0.7942,-0.3606) .. ( 0.7918,-0.3568)
    .. controls ( 0.7778,-0.3349) and ( 0.7645,-0.2537) .. ( 0.7970,-0.2417)
    .. controls ( 0.8206,-0.2330) and ( 0.8347,-0.2671) .. ( 0.8432,-0.2822)
    -- ( 0.8469,-0.2872)
    -- ( 0.8787,-0.2326)
    -- ( 0.8594,-0.1993)
    .. controls ( 0.8496,-0.1847) and ( 0.7996,-0.1314) .. ( 0.7847,-0.1281)
    .. controls ( 0.7712,-0.1229) and ( 0.7642,-0.1268) .. ( 0.7518,-0.1281)
    .. controls ( 0.7451,-0.1148) and ( 0.7397,-0.1014) .. ( 0.7293,-0.0886)
    -- ( 0.6461,-0.0117)
    .. controls ( 0.6402,-0.0090) and ( 0.6347,-0.0087) .. ( 0.6299,-0.0102)
    --cycle
    (-0.5178,-0.0844)
    .. controls (-0.5451,-0.0820) and (-0.5852,-0.0947) .. (-0.5902,-0.1144)
    .. controls (-0.6007,-0.1557) and (-0.5621,-0.1731) .. (-0.5414,-0.1997)
    .. controls (-0.5274,-0.2177) and (-0.5229,-0.2355) .. (-0.5044,-0.2525)
    .. controls (-0.4888,-0.2669) and (-0.4706,-0.2705) .. (-0.4543,-0.2923)
    .. controls (-0.4420,-0.3087) and (-0.4220,-0.3707) .. (-0.4141,-0.3932)
    .. controls (-0.3620,-0.3875) and (-0.3060,-0.4031) .. (-0.3060,-0.3592)
    .. controls (-0.3060,-0.3272) and (-0.3358,-0.3272) .. (-0.3716,-0.3008)
    .. controls (-0.4367,-0.2529) and (-0.4253,-0.2451) .. (-0.4621,-0.1914)
    .. controls (-0.4700,-0.1800) and (-0.4814,-0.1685) .. (-0.4867,-0.1556)
    .. controls (-0.4970,-0.1308) and (-0.4804,-0.1088) .. (-0.4966,-0.0923)
    .. controls (-0.5011,-0.0877) and (-0.5087,-0.0853) .. (-0.5178,-0.0844)
    --cycle
    (-0.4165,-0.0846)
    .. controls (-0.4357,-0.0807) and (-0.4622,-0.1075) .. (-0.4395,-0.1440)
    .. controls (-0.4316,-0.1566) and (-0.4254,-0.1571) .. (-0.4141,-0.1634)
    .. controls (-0.4094,-0.1522) and (-0.4042,-0.1415) .. (-0.4019,-0.1294)
    .. controls (-0.3960,-0.1004) and (-0.4049,-0.0870) .. (-0.4165,-0.0846)
    --cycle
    (-0.9358,-0.1125)
    -- (-0.8813,-0.2098)
    .. controls (-0.8768,-0.1903) and (-0.8656,-0.1673) .. (-0.8723,-0.1485)
    .. controls (-0.8801,-0.1269) and (-0.9022,-0.1274) .. (-0.9358,-0.1125)
    --cycle
    ( 0.1455,-0.1458)
    .. controls ( 0.1402,-0.1449) and ( 0.1336,-0.1452) .. ( 0.1255,-0.1471)
    .. controls ( 0.0901,-0.1850) and ( 0.1064,-0.2454) .. ( 0.1360,-0.2301)
    .. controls ( 0.1569,-0.2194) and ( 0.1827,-0.1522) .. ( 0.1455,-0.1458)
    --cycle
    (-0.1477,-0.1474)
    .. controls (-0.1646,-0.1458) and (-0.1813,-0.1543) .. (-0.1847,-0.1659)
    .. controls (-0.1889,-0.1806) and (-0.1612,-0.2953) .. (-0.1163,-0.2315)
    -- (-0.0420,-0.4418)
    .. controls (-0.0291,-0.4661) and (-0.0068,-0.4600) .. ( 0.0136,-0.4880)
    .. controls ( 0.0294,-0.5097) and ( 0.0259,-0.5331) .. ( 0.0419,-0.5487)
    .. controls ( 0.0694,-0.5755) and ( 0.1462,-0.5710) .. ( 0.1798,-0.6001)
    -- ( 0.2188,-0.6436)
    .. controls ( 0.2392,-0.6605) and ( 0.2566,-0.6577) .. ( 0.2804,-0.6838)
    .. controls ( 0.3122,-0.7186) and ( 0.3037,-0.7586) .. ( 0.3603,-0.7592)
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    .. controls ( 0.3537,-0.7217) and ( 0.3358,-0.6781) .. ( 0.3603,-0.6427)
    .. controls ( 0.3743,-0.6222) and ( 0.3978,-0.6232) .. ( 0.4032,-0.6039)
    .. controls ( 0.4084,-0.5852) and ( 0.3901,-0.5654) .. ( 0.3712,-0.5741)
    .. controls ( 0.3573,-0.5804) and ( 0.3558,-0.5936) .. ( 0.3518,-0.6044)
    .. controls ( 0.3319,-0.6046) and ( 0.2996,-0.6092) .. ( 0.2842,-0.6044)
    .. controls ( 0.2568,-0.5917) and ( 0.2515,-0.5648) .. ( 0.2231,-0.5501)
    .. controls ( 0.1960,-0.5359) and ( 0.1632,-0.5421) .. ( 0.1413,-0.5292)
    -- ( 0.0626,-0.4601)
    .. controls ( 0.0525,-0.4430) and ( 0.0547,-0.4207) .. ( 0.0440,-0.4065)
    .. controls ( 0.0320,-0.3906) and ( 0.0076,-0.3898) .. (-0.0104,-0.3714)
    .. controls (-0.0515,-0.3289) and ( 0.0146,-0.2721) .. (-0.0737,-0.2358)
    .. controls (-0.0903,-0.2290) and (-0.0917,-0.2313) .. (-0.1098,-0.2315)
    -- (-0.1098,-0.1892)
    .. controls (-0.1137,-0.1607) and (-0.1308,-0.1491) .. (-0.1477,-0.1474)
    --cycle
    (-0.7679,-0.1481)
    .. controls (-0.8119,-0.1523) and (-0.8157,-0.2051) .. (-0.8303,-0.2401)
    -- (-0.8453,-0.2740)
    -- (-0.8299,-0.3015)
    .. controls (-0.7861,-0.2968) and (-0.8116,-0.2403) .. (-0.7732,-0.2278)
    .. controls (-0.7561,-0.2223) and (-0.7349,-0.2415) .. (-0.7204,-0.2497)
    .. controls (-0.6711,-0.2774) and (-0.6473,-0.2864) .. (-0.6524,-0.3506)
    -- (-0.6787,-0.3422)
    .. controls (-0.6786,-0.3475) and (-0.6826,-0.3544) .. (-0.6787,-0.3655)
    .. controls (-0.6635,-0.4244) and (-0.5943,-0.3658) .. (-0.5763,-0.3760)
    .. controls (-0.5586,-0.3861) and (-0.5497,-0.4251) .. (-0.5357,-0.4418)
    .. controls (-0.5118,-0.4701) and (-0.4694,-0.4662) .. (-0.4504,-0.5047)
    .. controls (-0.4231,-0.5599) and (-0.4535,-0.6772) .. (-0.4451,-0.7421)
    .. controls (-0.4389,-0.7901) and (-0.4023,-0.8005) .. (-0.3912,-0.8443)
    .. controls (-0.3883,-0.8558) and (-0.3874,-0.8667) .. (-0.3869,-0.8774)
    -- (-0.3386,-0.8778)
    .. controls (-0.3371,-0.8645) and (-0.3342,-0.8523) .. (-0.3394,-0.8358)
    .. controls (-0.3448,-0.8167) and (-0.3914,-0.7567) .. (-0.3962,-0.6996)
    .. controls (-0.4039,-0.6074) and (-0.3294,-0.5871) .. (-0.3545,-0.4954)
    -- (-0.3886,-0.5039)
    -- (-0.4196,-0.4442)
    -- (-0.4864,-0.4090)
    -- (-0.5345,-0.3241)
    -- (-0.6106,-0.2802)
    -- (-0.6106,-0.1975)
    .. controls (-0.6301,-0.2027) and (-0.6486,-0.2101) .. (-0.6694,-0.2022)
    .. controls (-0.7004,-0.1904) and (-0.7133,-0.1559) .. (-0.7464,-0.1495)
    .. controls (-0.7544,-0.1479) and (-0.7616,-0.1475) .. (-0.7679,-0.1481)
    --cycle
    ( 0.0029,-0.2060)
    .. controls (-0.0139,-0.2731) and ( 0.0196,-0.2608) .. ( 0.0476,-0.3014)
    .. controls ( 0.0682,-0.3314) and ( 0.0511,-0.3569) .. ( 0.0750,-0.3784)
    .. controls ( 0.0974,-0.3988) and ( 0.1304,-0.3876) .. ( 0.1549,-0.4019)
    .. controls ( 0.1795,-0.4164) and ( 0.1878,-0.4529) .. ( 0.1987,-0.4783)
    .. controls ( 0.2461,-0.4539) and ( 0.2519,-0.4021) .. ( 0.2180,-0.3618)
    .. controls ( 0.1964,-0.3362) and ( 0.1652,-0.3426) .. ( 0.1414,-0.3257)
    .. controls ( 0.1198,-0.3103) and ( 0.1183,-0.2881) .. ( 0.1007,-0.2689)
    .. controls ( 0.0838,-0.2504) and ( 0.0265,-0.2166) .. ( 0.0029,-0.2060)
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    --cycle
    ( 0.2327,-0.2826)
    .. controls ( 0.1961,-0.2955) and ( 0.1961,-0.3123) .. ( 0.2327,-0.3251)
    --cycle
    (-0.7548,-0.3137)
    .. controls (-0.7774,-0.3164) and (-0.7890,-0.3323) .. (-0.7986,-0.3573)
    -- (-0.7759,-0.3979)
    .. controls (-0.7735,-0.3968) and (-0.7711,-0.3964) .. (-0.7688,-0.3946)
    -- (-0.7205,-0.3166)
    .. controls (-0.7341,-0.3135) and (-0.7454,-0.3126) .. (-0.7548,-0.3137)
    --cycle
    ( 0.4114,-0.3847)
    .. controls ( 0.4216,-0.4136) and ( 0.4238,-0.4142) .. ( 0.4540,-0.4102)
    -- ( 0.4540,-0.3932)
    --cycle
    ( 0.5395,-0.3997)
    .. controls ( 0.5263,-0.3990) and ( 0.5044,-0.4032) .. ( 0.4625,-0.4018)
    -- ( 0.4780,-0.4954)
    .. controls ( 0.4757,-0.5287) and ( 0.4518,-0.5542) .. ( 0.4648,-0.5776)
    .. controls ( 0.4852,-0.6142) and ( 0.5202,-0.5603) .. ( 0.5614,-0.5929)
    .. controls ( 0.5752,-0.6038) and ( 0.6063,-0.6359) .. ( 0.6275,-0.6638)
    -- ( 0.6570,-0.6132)
    .. controls ( 0.6460,-0.6042) and ( 0.6347,-0.5954) .. ( 0.6268,-0.5865)
    -- ( 0.5937,-0.5346)
    .. controls ( 0.5648,-0.5023) and ( 0.5031,-0.4880) .. ( 0.5646,-0.4273)
    .. controls ( 0.5574,-0.4062) and ( 0.5528,-0.4005) .. ( 0.5395,-0.3997)
    --cycle
    (-0.6609,-0.4273)
    .. controls (-0.7027,-0.4247) and (-0.7300,-0.4414) .. (-0.7397,-0.4624)
    -- (-0.7047,-0.5249)
    .. controls (-0.7013,-0.5263) and (-0.6989,-0.5282) .. (-0.6950,-0.5294)
    .. controls (-0.6935,-0.4878) and (-0.6933,-0.4806) .. (-0.6609,-0.4528)
    --cycle
    (-0.5689,-0.4528)
    .. controls (-0.6368,-0.4677) and (-0.6352,-0.5020) .. (-0.6354,-0.5634)
    -- (-0.5757,-0.6071)
    -- (-0.5162,-0.6826)
    .. controls (-0.5073,-0.6508) and (-0.5037,-0.6125) .. (-0.5241,-0.5838)
    .. controls (-0.5384,-0.5639) and (-0.5622,-0.5584) .. (-0.5689,-0.5361)
    .. controls (-0.5775,-0.5167) and (-0.5648,-0.4918) .. (-0.5689,-0.4528)
    --cycle
    (-0.6354,-0.5634)
    .. controls (-0.6583,-0.5576) and (-0.6713,-0.5579) .. (-0.6839,-0.5619)
    -- (-0.6487,-0.6248)
    .. controls (-0.6395,-0.6053) and (-0.6326,-0.5852) .. (-0.6354,-0.5634)
    --cycle
    (-0.0056,-0.5890)
    .. controls (-0.0554,-0.6155) and (-0.0426,-0.6370) .. (-0.0606,-0.6818)
    -- (-0.1199,-0.7847)
    .. controls (-0.1298,-0.8015) and (-0.1531,-0.8317) .. (-0.1499,-0.8510)
    .. controls (-0.1482,-0.8615) and (-0.1397,-0.8702) .. (-0.1295,-0.8795)
    -- (-0.0507,-0.8802)
    .. controls (-0.0629,-0.8583) and (-0.0745,-0.8380) .. (-0.0742,-0.8358)
```

```
    .. controls (-0.0792,-0.8239) and (-0.0776,-0.8135) .. (-0.0742,-0.8027)
    .. controls (-0.0460,-0.7520) and ( 0.0016,-0.7834) .. ( 0.0277,-0.7780)
    .. controls ( 0.0760,-0.7679) and ( 0.1284,-0.6914) .. ( 0.1207,-0.6405)
    .. controls ( 0.1150,-0.6017) and ( 0.0841,-0.6082) .. ( 0.0711,-0.6267)
    .. controls ( 0.0620,-0.6397) and ( 0.0556,-0.7141) .. ( 0.0539,-0.7336)
    .. controls (-0.0413,-0.7085) and ( 0.0139,-0.6637) .. (-0.0056,-0.5890)
    --cycle
    ( 0.4284,-0.6571)
    .. controls ( 0.4285,-0.7307) and ( 0.4284,-0.7652) .. ( 0.5135,-0.7336)
    .. controls ( 0.5170,-0.7469) and ( 0.5220,-0.7585) .. ( 0.5179,-0.7726)
    .. controls ( 0.5091,-0.8019) and ( 0.4473,-0.8546) .. ( 0.4851,-0.8847)
    -- ( 0.4987,-0.8848)
    -- ( 0.5768,-0.7509)
    .. controls ( 0.5767,-0.7509) and ( 0.5767,-0.7507) .. ( 0.5767,-0.7507)
    .. controls ( 0.5412,-0.6652) and ( 0.5083,-0.6726) .. ( 0.4284,-0.6571)
    --cycle
    (-0.2914,-0.6672)
    .. controls (-0.2998,-0.6666) and (-0.3106,-0.6686) .. (-0.3250,-0.6743)
    .. controls (-0.3545,-0.7128) and (-0.3081,-0.7358) .. (-0.2850,-0.7678)
    .. controls (-0.2710,-0.7873) and (-0.2601,-0.8137) .. (-0.2351,-0.8216)
    .. controls (-0.2083,-0.8301) and (-0.1916,-0.8105) .. (-0.1960,-0.7845)
    .. controls (-0.2008,-0.7566) and (-0.2232,-0.7418) .. (-0.2396,-0.7216)
    .. controls (-0.2612,-0.6950) and (-0.2660,-0.6690) .. (-0.2914,-0.6672)
    --cycle
    (-0.5641,-0.6998)
    .. controls (-0.5850,-0.6984) and (-0.5808,-0.7367) .. (-0.5766,-0.7507)
    .. controls (-0.5748,-0.7566) and (-0.5723,-0.7598) .. (-0.5702,-0.7648)
    -- (-0.5492,-0.8022)
    .. controls (-0.5310,-0.8247) and (-0.5120,-0.8367) .. (-0.5052,-0.8613)
    .. controls (-0.5044,-0.8642) and (-0.5062,-0.8717) .. (-0.5063,-0.8763)
    -- (-0.4585,-0.8767)
    .. controls (-0.4596,-0.7984) and (-0.5013,-0.7963) .. (-0.5234,-0.7583)
    .. controls (-0.5344,-0.7394) and (-0.5352,-0.7120) .. (-0.5535,-0.7030)
    .. controls (-0.5576,-0.7010) and (-0.5611,-0.7000) .. (-0.5641,-0.6998)
    --cycle
    ( 0.1990,-0.7341)
    .. controls ( 0.1094,-0.7768) and ( 0.2330,-0.8330) .. ( 0.2586,-0.8828)
    -- ( 0.3183,-0.8833)
    .. controls ( 0.3165,-0.8684) and ( 0.3066,-0.8565) .. ( 0.2991,-0.8428)
    .. controls ( 0.2762,-0.8010) and ( 0.2508,-0.7418) .. ( 0.1990,-0.7341)
    --cycle
    ( 0.3603,-0.7592)
    -- ( 0.3859,-0.8188)
    .. controls ( 0.4178,-0.7853) and ( 0.4108,-0.7527) .. ( 0.3603,-0.7592)
    --cycle
    ( 0.4369,-0.8443)
    .. controls ( 0.4147,-0.8480) and ( 0.3837,-0.8661) .. ( 0.3628,-0.8837)
    -- ( 0.4240,-0.8842)
    .. controls ( 0.4307,-0.8690) and ( 0.4358,-0.8541) .. ( 0.4369,-0.8443)
    --cycle
    (-0.3205,-0.8528)
    -- (-0.3266,-0.8779)
    -- (-0.2773,-0.8783)
```

```
    .. controls (-0.2800,-0.8719) and (-0.2850,-0.8655) .. (-0.2963,-0.8600)
    --cycle
    ( 0.1093,-0.8568)
    .. controls ( 0.0964,-0.8568) and ( 0.0834,-0.8587) .. ( 0.0710,-0.8600)
    .. controls ( 0.0605,-0.8611) and ( 0.0403,-0.8617) .. ( 0.0312,-0.8664)
    .. controls ( 0.0240,-0.8701) and ( 0.0203,-0.8751) .. ( 0.0184,-0.8808)
    -- ( 0.1002,-0.8815)
    -- ( 0.1050,-0.8698)
    -- ( 0.1085,-0.8815)
    -- ( 0.1641,-0.8820)
    .. controls ( 0.1606,-0.8757) and ( 0.1553,-0.8698) .. ( 0.1463,-0.8649)
    .. controls ( 0.1347,-0.8586) and ( 0.1221,-0.8568) .. ( 0.1093,-0.8568)
    --cycle
    ;
  }
}
\fi
```

```
hex/terrain/town/road
hex/terrain/town/small road
hex/terrain/town/house
```

For villages, towns, and cities, we need three styles: one for houses, and separate styles for regular and small roads. Note that we draw using the stroke colour for roads and houses.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/town/road/.style={
    fill=none,
    draw=gray!50!black,
    scale line widths,
    line width=.3mm
  },
  hex/terrain/town/small road/.style={
    fill=none,
    draw=gray!75!black,
    scale line widths,
    line width=.15mm
  },
  hex/terrain/town/post road/.style={
    fill=none
  },
  hex/terrain/town/house/.style={
    draw=none,
    fill=gray!75!black,
  }
}
```

hex/terrain/village

Now for village, town, and city patterns.

```
\tikzset{
  hex/terrain/village/.pic={
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.0073, 0.8700)
    -- ( 0.3952, 0.3373)
    -- ( 0.3884, 0.2029)
    -- ( 0.3555, 0.1378)
    -- ( 0.3751, 0.0880)
    -- ( 0.2513,-0.1997)
    -- ( 0.1396,-0.4505)
    -- ( 0.0641,-0.6512)
    -- ( 0.0070,-0.8700)
    -- ( 0.0070,-0.8700)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.7575, 0.4367)
    -- ( 0.3945, 0.3375)
    -- ( 0.3945, 0.3375)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.1900,-0.0806)
    -- (-0.1155, 0.1588)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.1308, 0.1580)
    -- (-0.7603, 0.4394)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.6615,-0.2309)
    -- (-0.6777,-0.3255)
    -- (-0.7607,-0.4327)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.6676,-0.2405)
    -- (-0.4599,-0.1067)
    -- (-0.1877,-0.0679)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.2082,-0.3003)
    -- ( 0.4578,-0.4855)
    -- ( 0.5914,-0.3675)
    -- ( 0.7607,-0.4420)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.3827, 0.1864)
    -- (-0.1290, 0.1576)
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.2259, 0.4898)
    -- ( 0.2453, 0.4680)
    -- ( 0.2052, 0.4324)
    -- ( 0.1858, 0.4542)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2259, 0.4898)
    -- ( 0.2453, 0.4680)
    -- ( 0.2052, 0.4324)
    -- ( 0.1858, 0.4542)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1978, 0.1663)
    -- (-0.1534, 0.1549)
    -- (-0.1685, 0.0960)
    -- (-0.2130, 0.1074)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1978, 0.1663)
    -- (-0.1534, 0.1549)
    -- (-0.1685, 0.0960)
    -- (-0.2130, 0.1074)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5127,-0.3559)
    -- ( 0.5341,-0.3759)
    -- ( 0.4975,-0.4151)
    -- ( 0.4761,-0.3951)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5127,-0.3559)
    -- ( 0.5341,-0.3759)
    -- ( 0.4975,-0.4151)
    -- ( 0.4761,-0.3951)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2761, 0.3992)
    -- ( 0.2947, 0.3765)
    -- ( 0.2533, 0.3425)
    -- ( 0.2347, 0.3651)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2761, 0.3992)
    -- ( 0.2947, 0.3765)
    -- ( 0.2533, 0.3425)
    -- ( 0.2347, 0.3651)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3227, 0.3548)
    -- ( 0.3421, 0.3329)
    -- ( 0.3020, 0.2974)
    -- ( 0.2826, 0.3192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3227, 0.3548)
    -- ( 0.3421, 0.3329)
    -- ( 0.3020, 0.2974)
    -- ( 0.2826, 0.3192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2901, 0.6234)
    -- ( 0.3088, 0.6008)
    -- ( 0.2674, 0.5667)
    -- ( 0.2487, 0.5893)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2901, 0.6234)
    -- ( 0.3088, 0.6008)
    -- ( 0.2674, 0.5667)
    -- ( 0.2487, 0.5893)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3456, 0.2854)
    -- (-0.3335, 0.3120)
    -- (-0.2847, 0.2898)
    -- (-0.2968, 0.2632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3456, 0.2854)
    -- (-0.3335, 0.3120)
    -- (-0.2847, 0.2898)
    -- (-0.2968, 0.2632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6678,-0.1369)
    -- (-0.6492,-0.1143)
    -- (-0.6078,-0.1484)
    -- (-0.6264,-0.1710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6678,-0.1369)
```

```
    -- (-0.6492,-0.1143)
    -- (-0.6078,-0.1484)
    -- (-0.6264,-0.1710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4610, 0.0967)
    -- ( 0.4896, 0.0909)
    -- ( 0.4790, 0.0384)
    -- ( 0.4503, 0.0442)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4610, 0.0967)
    -- ( 0.4896, 0.0909)
    -- ( 0.4790, 0.0384)
    -- ( 0.4503, 0.0442)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2924,-0.1375)
    -- ( 0.3110,-0.0955)
    -- ( 0.3667,-0.1202)
    -- ( 0.3481,-0.1621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2924,-0.1375)
    -- ( 0.3110,-0.0955)
    -- ( 0.3667,-0.1202)
    -- ( 0.3481,-0.1621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5094, 0.3292)
    -- ( 0.5505, 0.3494)
    -- ( 0.5773, 0.2947)
    -- ( 0.5362, 0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5094, 0.3292)
    -- ( 0.5505, 0.3494)
    -- ( 0.5773, 0.2947)
    -- ( 0.5362, 0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1323, 0.2640)
    -- (-0.0890, 0.2489)
    -- (-0.1092, 0.1914)
    -- (-0.1524, 0.2065)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1323, 0.2640)
    -- (-0.0890, 0.2489)
    -- (-0.1092, 0.1914)
    -- (-0.1524, 0.2065)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4115,-0.5373)
    -- ( 0.4390,-0.5006)
    -- ( 0.4877,-0.5372)
    -- ( 0.4601,-0.5739)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4115,-0.5373)
    -- ( 0.4390,-0.5006)
    -- ( 0.4877,-0.5372)
    -- ( 0.4601,-0.5739)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3095, 0.1272)
    -- ( 0.3519, 0.1095)
    -- ( 0.3284, 0.0533)
    -- ( 0.2861, 0.0710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3095, 0.1272)
    -- ( 0.3519, 0.1095)
    -- ( 0.3284, 0.0533)
    -- ( 0.2861, 0.0710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2904, 0.2714)
    -- ( 0.3361, 0.2681)
    -- ( 0.3318, 0.2074)
    -- ( 0.2861, 0.2106)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2904, 0.2714)
    -- ( 0.3361, 0.2681)
    -- ( 0.3318, 0.2074)
    -- ( 0.2861, 0.2106)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665, 0.4396)
    -- ( 0.4868, 0.3985)
```

```
    -- ( 0.4321, 0.3716)
    -- ( 0.4119, 0.4127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665, 0.4396)
    -- ( 0.4868, 0.3985)
    -- ( 0.4321, 0.3716)
    -- ( 0.4119, 0.4127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4187, 0.2523)
    -- ( 0.4643, 0.2574)
    -- ( 0.4711, 0.1969)
    -- ( 0.4256, 0.1917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4187, 0.2523)
    -- ( 0.4643, 0.2574)
    -- ( 0.4711, 0.1969)
    -- ( 0.4256, 0.1917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3746, 0.1600)
    -- ( 0.4021, 0.1699)
    -- ( 0.4204, 0.1195)
    -- ( 0.3929, 0.1095)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3746, 0.1600)
    -- ( 0.4021, 0.1699)
    -- ( 0.4204, 0.1195)
    -- ( 0.3929, 0.1095)
    --cycle
    ;
  }
}
\fi
```

`hex/terrain/town`

A town.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/town/.pic={
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.1432,-0.4518)
    -- (-0.0320,-0.2906)
    -- ( 0.0745,-0.0351)
    -- ( 0.1130,-0.0387)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0729,-0.0352)
    -- (-0.1716, 0.0254)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.2493, 0.5648)
    -- (-0.2192, 0.4501)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0677,-0.6538)
    -- ( 0.1754,-0.7052)
    -- ( 0.4358,-0.4688)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0439,-0.3617)
    -- (-0.0921,-0.5012)
    -- (-0.2865,-0.3243)
    -- (-0.4420,-0.4608)
    -- (-0.5795,-0.4446)
    -- (-0.6421,-0.3520)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0622,-0.6515)
    -- (-0.0316,-0.6176)
    -- (-0.0221,-0.5364)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0048,-0.2069)
    -- (-0.1945,-0.1818)
    -- (-0.2278,-0.2247)
    -- (-0.5051,-0.1356)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.3383, 0.0449)
    -- (-0.2189, 0.4510)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.0073, 0.8700)
    -- ( 0.3952, 0.3373)
    -- ( 0.3884, 0.2029)
    -- ( 0.3555, 0.1378)
    -- ( 0.3751, 0.0880)
    -- ( 0.2513,-0.1997)
    -- ( 0.1396,-0.4505)
```

```
7057    -- ( 0.0641,-0.6512)
7058    -- ( 0.0070,-0.8700)
7059    -- ( 0.0070,-0.8700)
7060    ;
7061    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
7062    ( 0.7575, 0.4367)
7063    -- ( 0.3945, 0.3375)
7064    -- ( 0.3945, 0.3375)
7065    ;
7066    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
7067    (-0.1900,-0.0806)
7068    -- (-0.0751, 0.3938)
7069    -- (-0.0765, 0.3925)
7070    ;
7071    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
7072    (-0.1308, 0.1580)
7073    -- (-0.7603, 0.4394)
7074    ;
7075    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
7076    (-0.7139,-0.1526)
7077    -- (-0.6147,-0.3362)
7078    -- (-0.7607,-0.4327)
7079    ;
7080    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
7081    (-0.6676,-0.2405)
7082    -- (-0.4599,-0.1067)
7083    -- (-0.1877,-0.0679)
7084    ;
7085    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
7086    ( 0.2082,-0.3003)
7087    -- ( 0.4578,-0.4855)
7088    -- ( 0.5914,-0.3675)
7089    -- ( 0.7607,-0.4420)
7090    ;
7091    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
7092    ( 0.3827, 0.1864)
7093    -- (-0.1290, 0.1576)
7094    ;
7095    \path[hex/terrain/town/house,pic actions]
7096    (-0.4493,-0.3075)
7097    -- (-0.4043,-0.2868)
7098    -- (-0.3710,-0.3593)
7099    -- (-0.4160,-0.3799)
7100    --cycle
7101    ;
7102    \path[hex/terrain/town/house,pic actions]
7103    (-0.4493,-0.3075)
7104    -- (-0.4043,-0.2868)
7105    -- (-0.3710,-0.3593)
7106    -- (-0.4160,-0.3799)
7107    --cycle
7108    ;
7109    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.5264,-0.1066)
    -- (-0.5514,-0.0681)
    -- (-0.5002,-0.0349)
    -- (-0.4753,-0.0733)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5264,-0.1066)
    -- (-0.5514,-0.0681)
    -- (-0.5002,-0.0349)
    -- (-0.4753,-0.0733)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1978, 0.1663)
    -- (-0.1534, 0.1549)
    -- (-0.1685, 0.0960)
    -- (-0.2130, 0.1074)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1978, 0.1663)
    -- (-0.1534, 0.1549)
    -- (-0.1685, 0.0960)
    -- (-0.2130, 0.1074)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2259, 0.4898)
    -- ( 0.2453, 0.4680)
    -- ( 0.2052, 0.4324)
    -- ( 0.1858, 0.4542)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2259, 0.4898)
    -- ( 0.2453, 0.4680)
    -- ( 0.2052, 0.4324)
    -- ( 0.1858, 0.4542)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0986, 0.2553)
    -- (-0.0882, 0.2827)
    -- (-0.0380, 0.2637)
    -- (-0.0484, 0.2363)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0986, 0.2553)
    -- (-0.0882, 0.2827)
    -- (-0.0380, 0.2637)
    -- (-0.0484, 0.2363)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0834, 0.2379)
    -- ( 0.0888, 0.2667)
    -- ( 0.1415, 0.2566)
    -- ( 0.1361, 0.2279)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0834, 0.2379)
    -- ( 0.0888, 0.2667)
    -- ( 0.1415, 0.2566)
    -- ( 0.1361, 0.2279)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0207,-0.0604)
    -- (-0.0103,-0.0331)
    -- ( 0.0398,-0.0521)
    -- ( 0.0294,-0.0794)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0207,-0.0604)
    -- (-0.0103,-0.0331)
    -- ( 0.0398,-0.0521)
    -- ( 0.0294,-0.0794)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3580,-0.4608)
    -- ( 0.3837,-0.4748)
    -- ( 0.3581,-0.5219)
    -- ( 0.3324,-0.5080)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3580,-0.4608)
    -- ( 0.3837,-0.4748)
    -- ( 0.3581,-0.5219)
    -- ( 0.3324,-0.5080)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5127,-0.3559)
    -- ( 0.5341,-0.3759)
    -- ( 0.4975,-0.4151)
    -- ( 0.4761,-0.3951)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5127,-0.3559)
```

```
    -- ( 0.5341,-0.3759)
    -- ( 0.4975,-0.4151)
    -- ( 0.4761,-0.3951)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2118,-0.3884)
    -- ( 0.2245,-0.3620)
    -- ( 0.2728,-0.3854)
    -- ( 0.2600,-0.4118)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2118,-0.3884)
    -- ( 0.2245,-0.3620)
    -- ( 0.2728,-0.3854)
    -- ( 0.2600,-0.4118)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1651,-0.4740)
    -- ( 0.1775,-0.4475)
    -- ( 0.2260,-0.4702)
    -- ( 0.2137,-0.4968)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1651,-0.4740)
    -- ( 0.1775,-0.4475)
    -- ( 0.2260,-0.4702)
    -- ( 0.2137,-0.4968)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2834,-0.4196)
    -- ( 0.2957,-0.3932)
    -- ( 0.3443,-0.4159)
    -- ( 0.3319,-0.4423)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2834,-0.4196)
    -- ( 0.2957,-0.3932)
    -- ( 0.3443,-0.4159)
    -- ( 0.3319,-0.4423)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1447,-0.5170)
    -- ( 0.1555,-0.4899)
    -- ( 0.2053,-0.5096)
    -- ( 0.1945,-0.5368)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1447,-0.5170)
    -- ( 0.1555,-0.4899)
    -- ( 0.2053,-0.5096)
    -- ( 0.1945,-0.5368)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0154,-0.5671)
    -- ( 0.0244,-0.5392)
    -- ( 0.0754,-0.5558)
    -- ( 0.0664,-0.5836)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0154,-0.5671)
    -- ( 0.0244,-0.5392)
    -- ( 0.0754,-0.5558)
    -- ( 0.0664,-0.5836)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2958,-0.3614)
    -- (-0.2707,-0.3764)
    -- (-0.2983,-0.4224)
    -- (-0.3234,-0.4073)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2958,-0.3614)
    -- (-0.2707,-0.3764)
    -- (-0.2983,-0.4224)
    -- (-0.3234,-0.4073)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3024,-0.2385)
    -- (-0.2753,-0.2491)
    -- (-0.2948,-0.2990)
    -- (-0.3220,-0.2883)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3024,-0.2385)
    -- (-0.2753,-0.2491)
    -- (-0.2948,-0.2990)
    -- (-0.3220,-0.2883)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5719,-0.2295)
    -- (-0.5577,-0.2550)
```

```
    -- (-0.6045,-0.2811)
    -- (-0.6187,-0.2556)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5719,-0.2295)
    -- (-0.5577,-0.2550)
    -- (-0.6045,-0.2811)
    -- (-0.6187,-0.2556)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5909,-0.3922)
    -- (-0.5677,-0.3744)
    -- (-0.5351,-0.4170)
    -- (-0.5584,-0.4348)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5909,-0.3922)
    -- (-0.5677,-0.3744)
    -- (-0.5351,-0.4170)
    -- (-0.5584,-0.4348)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4367,-0.3858)
    -- (-0.4233,-0.4119)
    -- (-0.4709,-0.4364)
    -- (-0.4843,-0.4105)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4367,-0.3858)
    -- (-0.4233,-0.4119)
    -- (-0.4709,-0.4364)
    -- (-0.4843,-0.4105)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6605,-0.4272)
    -- (-0.6489,-0.4540)
    -- (-0.6982,-0.4752)
    -- (-0.7097,-0.4483)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6605,-0.4272)
    -- (-0.6489,-0.4540)
    -- (-0.6982,-0.4752)
    -- (-0.7097,-0.4483)
    --cycle
    ;
```

```
7375    \path[hex/terrain/town/house,pic actions]
7376    ( 0.2694,-0.2379)
7377    -- ( 0.2777,-0.2098)
7378    -- ( 0.3291,-0.2250)
7379    -- ( 0.3209,-0.2530)
7380    --cycle
7381    ;
7382    \path[hex/terrain/town/house,pic actions]
7383    ( 0.2694,-0.2379)
7384    -- ( 0.2777,-0.2098)
7385    -- ( 0.3291,-0.2250)
7386    -- ( 0.3209,-0.2530)
7387    --cycle
7388    ;
7389    \path[hex/terrain/town/house,pic actions]
7390    ( 0.1131,-0.3134)
7391    -- ( 0.1237,-0.2861)
7392    -- ( 0.1737,-0.3055)
7393    -- ( 0.1630,-0.3328)
7394    --cycle
7395    ;
7396    \path[hex/terrain/town/house,pic actions]
7397    ( 0.1131,-0.3134)
7398    -- ( 0.1237,-0.2861)
7399    -- ( 0.1737,-0.3055)
7400    -- ( 0.1630,-0.3328)
7401    --cycle
7402    ;
7403    \path[hex/terrain/town/house,pic actions]
7404    ( 0.1931,-0.0936)
7405    -- ( 0.2058,-0.0673)
7406    -- ( 0.2541,-0.0904)
7407    -- ( 0.2415,-0.1168)
7408    --cycle
7409    ;
7410    \path[hex/terrain/town/house,pic actions]
7411    ( 0.1931,-0.0936)
7412    -- ( 0.2058,-0.0673)
7413    -- ( 0.2541,-0.0904)
7414    -- ( 0.2415,-0.1168)
7415    --cycle
7416    ;
7417    \path[hex/terrain/town/house,pic actions]
7418    ( 0.1779, 0.1198)
7419    -- ( 0.1984, 0.0990)
7420    -- ( 0.1603, 0.0613)
7421    -- ( 0.1398, 0.0821)
7422    --cycle
7423    ;
7424    \path[hex/terrain/town/house,pic actions]
7425    ( 0.1779, 0.1198)
7426    -- ( 0.1984, 0.0990)
7427    -- ( 0.1603, 0.0613)
```

```
    -- ( 0.1398, 0.0821)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2761, 0.3992)
    -- ( 0.2947, 0.3765)
    -- ( 0.2533, 0.3425)
    -- ( 0.2347, 0.3651)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2761, 0.3992)
    -- ( 0.2947, 0.3765)
    -- ( 0.2533, 0.3425)
    -- ( 0.2347, 0.3651)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3227, 0.3548)
    -- ( 0.3421, 0.3329)
    -- ( 0.3020, 0.2974)
    -- ( 0.2826, 0.3192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3227, 0.3548)
    -- ( 0.3421, 0.3329)
    -- ( 0.3020, 0.2974)
    -- ( 0.2826, 0.3192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2473, 0.2770)
    -- (-0.2380, 0.3048)
    -- (-0.1871, 0.2879)
    -- (-0.1964, 0.2601)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2473, 0.2770)
    -- (-0.2380, 0.3048)
    -- (-0.1871, 0.2879)
    -- (-0.1964, 0.2601)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1395, 0.3602)
    -- (-0.1127, 0.3488)
    -- (-0.1335, 0.2995)
    -- (-0.1604, 0.3109)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.1395, 0.3602)
    -- (-0.1127, 0.3488)
    -- (-0.1335, 0.2995)
    -- (-0.1604, 0.3109)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2901, 0.6234)
    -- ( 0.3088, 0.6008)
    -- ( 0.2674, 0.5667)
    -- ( 0.2487, 0.5893)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2901, 0.6234)
    -- ( 0.3088, 0.6008)
    -- ( 0.2674, 0.5667)
    -- ( 0.2487, 0.5893)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3456, 0.2854)
    -- (-0.3335, 0.3120)
    -- (-0.2847, 0.2898)
    -- (-0.2968, 0.2632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3456, 0.2854)
    -- (-0.3335, 0.3120)
    -- (-0.2847, 0.2898)
    -- (-0.2968, 0.2632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3040, 0.3746)
    -- (-0.2919, 0.4012)
    -- (-0.2431, 0.3791)
    -- (-0.2552, 0.3524)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3040, 0.3746)
    -- (-0.2919, 0.4012)
    -- (-0.2431, 0.3791)
    -- (-0.2552, 0.3524)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7420,-0.2456)
    -- (-0.7302,-0.2189)
    -- (-0.6812,-0.2407)
    -- (-0.6930,-0.2674)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7420,-0.2456)
    -- (-0.7302,-0.2189)
    -- (-0.6812,-0.2407)
    -- (-0.6930,-0.2674)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6678,-0.1369)
    -- (-0.6492,-0.1143)
    -- (-0.6078,-0.1484)
    -- (-0.6264,-0.1710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6678,-0.1369)
    -- (-0.6492,-0.1143)
    -- (-0.6078,-0.1484)
    -- (-0.6264,-0.1710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2252,-0.0023)
    -- (-0.1960,-0.0023)
    -- (-0.1960,-0.0559)
    -- (-0.2252,-0.0559)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2252,-0.0023)
    -- (-0.1960,-0.0023)
    -- (-0.1960,-0.0559)
    -- (-0.2252,-0.0559)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0041,-0.2944)
    -- ( 0.0064,-0.2671)
    -- ( 0.0564,-0.2862)
    -- ( 0.0460,-0.3135)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0041,-0.2944)
    -- ( 0.0064,-0.2671)
    -- ( 0.0564,-0.2862)
    -- ( 0.0460,-0.3135)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1877,-0.2296)
```

```
    -- (-0.1764,-0.2026)
    -- (-0.1270,-0.2233)
    -- (-0.1383,-0.2503)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1877,-0.2296)
    -- (-0.1764,-0.2026)
    -- (-0.1270,-0.2233)
    -- (-0.1383,-0.2503)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1170,-0.3014)
    -- (-0.1067,-0.2740)
    -- (-0.0566,-0.2928)
    -- (-0.0668,-0.3202)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1170,-0.3014)
    -- (-0.1067,-0.2740)
    -- (-0.0566,-0.2928)
    -- (-0.0668,-0.3202)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0719,-0.3499)
    -- (-0.0428,-0.3468)
    -- (-0.0371,-0.4001)
    -- (-0.0661,-0.4032)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0719,-0.3499)
    -- (-0.0428,-0.3468)
    -- (-0.0371,-0.4001)
    -- (-0.0661,-0.4032)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4610, 0.0967)
    -- ( 0.4896, 0.0909)
    -- ( 0.4790, 0.0384)
    -- ( 0.4503, 0.0442)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4610, 0.0967)
    -- ( 0.4896, 0.0909)
    -- ( 0.4790, 0.0384)
    -- ( 0.4503, 0.0442)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1944,-0.4810)
    -- (-0.1500,-0.4925)
    -- (-0.1653,-0.5515)
    -- (-0.2097,-0.5399)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1944,-0.4810)
    -- (-0.1500,-0.4925)
    -- (-0.1653,-0.5515)
    -- (-0.2097,-0.5399)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2924,-0.1375)
    -- ( 0.3110,-0.0955)
    -- ( 0.3667,-0.1202)
    -- ( 0.3481,-0.1621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2924,-0.1375)
    -- ( 0.3110,-0.0955)
    -- ( 0.3667,-0.1202)
    -- ( 0.3481,-0.1621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3062, 0.5810)
    -- (-0.2635, 0.5641)
    -- (-0.2859, 0.5075)
    -- (-0.3285, 0.5243)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3062, 0.5810)
    -- (-0.2635, 0.5641)
    -- (-0.2859, 0.5075)
    -- (-0.3285, 0.5243)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0310,-0.4661)
    -- ( 0.0449,-0.4224)
    -- ( 0.1029,-0.4409)
    -- ( 0.0889,-0.4846)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0310,-0.4661)
    -- ( 0.0449,-0.4224)
```

```
    -- ( 0.1029,-0.4409)
    -- ( 0.0889,-0.4846)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1523,-0.2013)
    -- ( 0.1718,-0.1598)
    -- ( 0.2270,-0.1857)
    -- ( 0.2075,-0.2272)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1523,-0.2013)
    -- ( 0.1718,-0.1598)
    -- ( 0.2270,-0.1857)
    -- ( 0.2075,-0.2272)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0857,-0.3676)
    -- ( 0.1052,-0.3261)
    -- ( 0.1603,-0.3520)
    -- ( 0.1409,-0.3935)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0857,-0.3676)
    -- ( 0.1052,-0.3261)
    -- ( 0.1603,-0.3520)
    -- ( 0.1409,-0.3935)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0204,-0.2046)
    -- ( 0.0398,-0.1631)
    -- ( 0.0950,-0.1890)
    -- ( 0.0755,-0.2305)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0204,-0.2046)
    -- ( 0.0398,-0.1631)
    -- ( 0.0950,-0.1890)
    -- ( 0.0755,-0.2305)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5094, 0.3292)
    -- ( 0.5505, 0.3494)
    -- ( 0.5773, 0.2947)
    -- ( 0.5362, 0.2746)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.5094, 0.3292)
    -- ( 0.5505, 0.3494)
    -- ( 0.5773, 0.2947)
    -- ( 0.5362, 0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0647, 0.4710)
    -- (-0.0215, 0.4559)
    -- (-0.0416, 0.3984)
    -- (-0.0848, 0.4135)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0647, 0.4710)
    -- (-0.0215, 0.4559)
    -- (-0.0416, 0.3984)
    -- (-0.0848, 0.4135)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1476,-0.3704)
    -- (-0.1403,-0.3251)
    -- (-0.0802,-0.3347)
    -- (-0.0873,-0.3799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1476,-0.3704)
    -- (-0.1403,-0.3251)
    -- (-0.0802,-0.3347)
    -- (-0.0873,-0.3799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0755, 0.3210)
    -- (-0.0531, 0.3610)
    -- ( 0.0001, 0.3312)
    -- (-0.0224, 0.2912)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0755, 0.3210)
    -- (-0.0531, 0.3610)
    -- ( 0.0001, 0.3312)
    -- (-0.0224, 0.2912)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1354, 0.0442)
    -- (-0.1129, 0.0842)
    -- (-0.0599, 0.0544)
```

```
    -- (-0.0823, 0.0144)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1354, 0.0442)
    -- (-0.1129, 0.0842)
    -- (-0.0599, 0.0544)
    -- (-0.0823, 0.0144)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1672,-0.0608)
    -- (-0.1524,-0.0175)
    -- (-0.0948,-0.0371)
    -- (-0.1096,-0.0805)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1672,-0.0608)
    -- (-0.1524,-0.0175)
    -- (-0.0948,-0.0371)
    -- (-0.1096,-0.0805)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0920,-0.6296)
    -- ( 0.1069,-0.5863)
    -- ( 0.1645,-0.6060)
    -- ( 0.1497,-0.6493)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0920,-0.6296)
    -- ( 0.1069,-0.5863)
    -- ( 0.1645,-0.6060)
    -- ( 0.1497,-0.6493)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4115,-0.5373)
    -- ( 0.4390,-0.5006)
    -- ( 0.4877,-0.5372)
    -- ( 0.4601,-0.5739)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4115,-0.5373)
    -- ( 0.4390,-0.5006)
    -- ( 0.4877,-0.5372)
    -- ( 0.4601,-0.5739)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.3095, 0.1272)
    -- ( 0.3519, 0.1095)
    -- ( 0.3284, 0.0533)
    -- ( 0.2861, 0.0710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3095, 0.1272)
    -- ( 0.3519, 0.1095)
    -- ( 0.3284, 0.0533)
    -- ( 0.2861, 0.0710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3558, 0.0291)
    -- (-0.3124, 0.0144)
    -- (-0.3318,-0.0433)
    -- (-0.3753,-0.0287)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3558, 0.0291)
    -- (-0.3124, 0.0144)
    -- (-0.3318,-0.0433)
    -- (-0.3753,-0.0287)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2904, 0.2714)
    -- ( 0.3361, 0.2681)
    -- ( 0.3318, 0.2074)
    -- ( 0.2861, 0.2106)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2904, 0.2714)
    -- ( 0.3361, 0.2681)
    -- ( 0.3318, 0.2074)
    -- ( 0.2861, 0.2106)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0124, 0.1558)
    -- ( 0.0333, 0.1525)
    -- ( 0.0290, 0.0918)
    -- (-0.0167, 0.0950)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0124, 0.1558)
    -- ( 0.0333, 0.1525)
    -- ( 0.0290, 0.0918)
    -- (-0.0167, 0.0950)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665, 0.4396)
    -- ( 0.4868, 0.3985)
    -- ( 0.4321, 0.3716)
    -- ( 0.4119, 0.4127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665, 0.4396)
    -- ( 0.4868, 0.3985)
    -- ( 0.4321, 0.3716)
    -- ( 0.4119, 0.4127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2433,-0.1480)
    -- (-0.2141,-0.1472)
    -- (-0.2127,-0.2008)
    -- (-0.2419,-0.2015)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2433,-0.1480)
    -- (-0.2141,-0.1472)
    -- (-0.2127,-0.2008)
    -- (-0.2419,-0.2015)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4187, 0.2523)
    -- ( 0.4643, 0.2574)
    -- ( 0.4711, 0.1969)
    -- ( 0.4256, 0.1917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4187, 0.2523)
    -- ( 0.4643, 0.2574)
    -- ( 0.4711, 0.1969)
    -- ( 0.4256, 0.1917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2599,-0.2379)
    -- (-0.2164,-0.2525)
    -- (-0.2358,-0.3102)
    -- (-0.2793,-0.2955)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2599,-0.2379)
```

```
    -- (-0.2164,-0.2525)
    -- (-0.2358,-0.3102)
    -- (-0.2793,-0.2955)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0167, 0.0438)
    -- ( 0.0385, 0.0365)
    -- ( 0.0301, 0.0113)
    -- ( 0.0082, 0.0187)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0167, 0.0438)
    -- ( 0.0385, 0.0365)
    -- ( 0.0301, 0.0113)
    -- ( 0.0082, 0.0187)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2901,-0.1193)
    -- (-0.2450,-0.1273)
    -- (-0.2556,-0.1872)
    -- (-0.3008,-0.1792)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2901,-0.1193)
    -- (-0.2450,-0.1273)
    -- (-0.2556,-0.1872)
    -- (-0.3008,-0.1792)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1275,-0.0001)
    -- ( 0.1734,-0.0022)
    -- ( 0.1707,-0.0630)
    -- ( 0.1248,-0.0610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1275,-0.0001)
    -- ( 0.1734,-0.0022)
    -- ( 0.1707,-0.0630)
    -- ( 0.1248,-0.0610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0645,-0.5272)
    -- (-0.0415,-0.5245)
    -- (-0.0383,-0.5509)
    -- (-0.0612,-0.5536)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0645,-0.5272)
    -- (-0.0415,-0.5245)
    -- (-0.0383,-0.5509)
    -- (-0.0612,-0.5536)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3209, 0.2176)
    -- (-0.2989, 0.2105)
    -- (-0.3069, 0.1853)
    -- (-0.3289, 0.1923)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3209, 0.2176)
    -- (-0.2989, 0.2105)
    -- (-0.3069, 0.1853)
    -- (-0.3289, 0.1923)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3746, 0.1600)
    -- ( 0.4021, 0.1699)
    -- ( 0.4204, 0.1195)
    -- ( 0.3929, 0.1095)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3746, 0.1600)
    -- ( 0.4021, 0.1699)
    -- ( 0.4204, 0.1195)
    -- ( 0.3929, 0.1095)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/city

And finally a city

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/city/.pic={
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
```

```
    ( 0.6475, 0.4068)
    -- ( 0.7314,-0.0575)
    -- ( 0.7314,-0.0575)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.3200,-0.0497)
    -- ( 0.7360,-0.0572)
    -- ( 0.9222,-0.0903)
    -- ( 0.7082,-0.4210)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.3828, 0.1855)
    -- ( 0.0279, 0.1945)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0433, 0.3473)
    -- ( 0.0217, 0.1444)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.1413, 0.1884)
    -- ( 0.3369,-0.0066)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.1278, 0.7257)
    -- (-0.2203, 0.4496)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.1602, 0.6526)
    -- ( 0.0382, 0.6110)
    -- (-0.1527, 0.6534)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.1688, 0.6051)
    -- (-0.4768, 0.7222)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.3602,-0.4159)
    .. controls ( 0.4139,-0.2355) and ( 0.4139,-0.2352) .. ( 0.4139,-0.2352)
    -- ( 0.4838,-0.2184)
    -- ( 0.5251,-0.0570)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.5443,-0.6880)
    -- ( 0.5887,-0.5618)
    -- ( 0.4781,-0.4650)
    -- ( 0.4781,-0.4650)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0671,-0.6564)
    -- ( 0.2799,-0.7025)
    -- ( 0.4360,-0.4711)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
```

```
    ( 0.2023,-0.8374)
    -- ( 0.2231,-0.6909)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0433,-0.3639)
    -- (-0.0931,-0.5036)
    -- (-0.3798,-0.4049)
    -- (-0.4436,-0.4630)
    -- (-0.5468,-0.5027)
    -- (-0.6442,-0.3540)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.3296,-0.7486)
    -- (-0.3153,-0.6107)
    -- (-0.4388,-0.4598)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.3247,-0.6883)
    -- (-0.0201,-0.7169)
    -- ( 0.0501,-0.7042)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0616,-0.6541)
    -- (-0.0427,-0.6505)
    -- (-0.0229,-0.5387)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0040,-0.2086)
    -- (-0.1956,-0.1835)
    -- (-0.2290,-0.2265)
    -- (-0.5068,-0.1372)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.3396, 0.0437)
    -- (-0.2201, 0.4506)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.0066, 0.8705)
    -- ( 0.3952, 0.3367)
    -- ( 0.3885, 0.2021)
    -- ( 0.3555, 0.1368)
    -- ( 0.3751, 0.0869)
    -- ( 0.2511,-0.2014)
    -- ( 0.1393,-0.4528)
    -- ( 0.0636,-0.6538)
    -- ( 0.0063,-0.8731)
    -- ( 0.0063,-0.8731)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.1775, 0.6355)
    -- ( 0.4288, 0.7459)
    -- ( 0.5543, 0.5148)
    -- ( 0.5543, 0.5148)
```

```
8160    ;
8161    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
8162    ( 0.7584, 0.4363)
8163    -- ( 0.3946, 0.3369)
8164    -- ( 0.3946, 0.3369)
8165    ;
8166    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
8167    ( 0.1428,-0.4540)
8168    -- (-0.0329,-0.2925)
8169    -- ( 0.0739,-0.0364)
8170    -- ( 0.1645,-0.0483)
8171    ;
8172    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
8173    ( 0.0723,-0.0367)
8174    -- (-0.5150, 0.0791)
8175    ;
8176    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
8177    (-0.1911,-0.0821)
8178    -- (-0.0760, 0.3934)
8179    -- (-0.0774, 0.3920)
8180    ;
8181    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
8182    ( 0.0439, 0.3452)
8183    -- (-0.3449, 0.4978)
8184    -- (-0.4614, 0.2954)
8185    -- (-0.4614, 0.2954)
8186    ;
8187    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
8188    (-0.4152, 0.2683)
8189    -- (-0.7626, 0.4390)
8190    -- (-0.7626, 0.4390)
8191    ;
8192    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
8193    (-0.5846, 0.3486)
8194    -- (-0.8106,-0.1286)
8195    -- (-0.7727,-0.2079)
8196    -- (-0.7053,-0.1745)
8197    ;
8198    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
8199    (-0.7161,-0.1542)
8200    -- (-0.6166,-0.3381)
8201    -- (-0.7630,-0.4349)
8202    ;
8203    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
8204    (-0.6697,-0.2422)
8205    -- (-0.4615,-0.1081)
8206    -- (-0.4615,-0.1081)
8207    ;
8208    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
8209    ( 0.2080,-0.3022)
8210    -- ( 0.4581,-0.4878)
8211    -- ( 0.5919,-0.3695)
8212    -- ( 0.7615,-0.4441)
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1146, 0.0405)
    -- ( 0.1598, 0.0323)
    -- ( 0.1489,-0.0277)
    -- ( 0.1036,-0.0196)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1146, 0.0405)
    -- ( 0.1598, 0.0323)
    -- ( 0.1489,-0.0277)
    -- ( 0.1036,-0.0196)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0844, 0.4998)
    -- (-0.0599, 0.4835)
    -- (-0.0898, 0.4389)
    -- (-0.1141, 0.4551)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0844, 0.4998)
    -- (-0.0599, 0.4835)
    -- (-0.0898, 0.4389)
    -- (-0.1141, 0.4551)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6143,-0.0454)
    -- (-0.6005,-0.0196)
    -- (-0.5531,-0.0447)
    -- (-0.5668,-0.0707)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6143,-0.0454)
    -- (-0.6005,-0.0196)
    -- (-0.5531,-0.0447)
    -- (-0.5668,-0.0707)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3809,-0.0792)
    -- (-0.3371,-0.0929)
    -- (-0.3553,-0.1511)
    -- (-0.3991,-0.1375)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3809,-0.0792)
    -- (-0.3371,-0.0929)
```

```
    -- (-0.3553,-0.1511)
    -- (-0.3991,-0.1375)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5133, 0.1838)
    -- (-0.4733, 0.1613)
    -- (-0.5032, 0.1081)
    -- (-0.5433, 0.1307)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5133, 0.1838)
    -- (-0.4733, 0.1613)
    -- (-0.5032, 0.1081)
    -- (-0.5433, 0.1307)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3878, 0.1398)
    -- (-0.3421, 0.1442)
    -- (-0.3362, 0.0834)
    -- (-0.3819, 0.0790)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3878, 0.1398)
    -- (-0.3421, 0.1442)
    -- (-0.3362, 0.0834)
    -- (-0.3819, 0.0790)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5622, 0.0806)
    -- (-0.5234, 0.0560)
    -- (-0.5559, 0.0044)
    -- (-0.5948, 0.0290)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5622, 0.0806)
    -- (-0.5234, 0.0560)
    -- (-0.5559, 0.0044)
    -- (-0.5948, 0.0290)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6218, 0.1903)
    -- (-0.6097, 0.2346)
    -- (-0.5508, 0.2185)
    -- (-0.5629, 0.1742)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.6218, 0.1903)
    -- (-0.6097, 0.2346)
    -- (-0.5508, 0.2185)
    -- (-0.5629, 0.1742)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2884, 0.7423)
    -- (-0.2596, 0.7372)
    -- (-0.2691, 0.6843)
    -- (-0.2980, 0.6895)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2884, 0.7423)
    -- (-0.2596, 0.7372)
    -- (-0.2691, 0.6843)
    -- (-0.2980, 0.6895)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1219, 0.8731)
    -- ( 0.1475, 0.8350)
    -- ( 0.0970, 0.8008)
    -- ( 0.0712, 0.8389)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1219, 0.8731)
    -- ( 0.1475, 0.8350)
    -- ( 0.0970, 0.8008)
    -- ( 0.0712, 0.8389)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3659, 0.5557)
    -- ( 0.3913, 0.5175)
    -- ( 0.3405, 0.4837)
    -- ( 0.3150, 0.5219)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3659, 0.5557)
    -- ( 0.3913, 0.5175)
    -- ( 0.3405, 0.4837)
    -- ( 0.3150, 0.5219)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0626, 0.4298)
    -- ( 0.0896, 0.4184)
    -- ( 0.0686, 0.3690)
```

```
    -- ( 0.0416, 0.3804)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0626, 0.4298)
    -- ( 0.0896, 0.4184)
    -- ( 0.0686, 0.3690)
    -- ( 0.0416, 0.3804)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4510,-0.3094)
    -- (-0.4058,-0.2887)
    -- (-0.3725,-0.3614)
    -- (-0.4176,-0.3821)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4510,-0.3094)
    -- (-0.4058,-0.2887)
    -- (-0.3725,-0.3614)
    -- (-0.4176,-0.3821)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5282,-0.1080)
    -- (-0.5533,-0.0695)
    -- (-0.5021,-0.0363)
    -- (-0.4770,-0.0749)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5282,-0.1080)
    -- (-0.5533,-0.0695)
    -- (-0.5021,-0.0363)
    -- (-0.4770,-0.0749)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0108,-0.2602)
    -- ( 0.0173,-0.2316)
    -- ( 0.0696,-0.2435)
    -- ( 0.0632,-0.2721)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0108,-0.2602)
    -- ( 0.0173,-0.2316)
    -- ( 0.0696,-0.2435)
    -- ( 0.0632,-0.2721)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.1989, 0.1654)
    -- (-0.1544, 0.1540)
    -- (-0.1696, 0.0948)
    -- (-0.2141, 0.1063)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1989, 0.1654)
    -- (-0.1544, 0.1540)
    -- (-0.1696, 0.0948)
    -- (-0.2141, 0.1063)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0216,-0.0407)
    -- ( 0.0230,-0.0521)
    -- ( 0.0078,-0.1112)
    -- (-0.0368,-0.0997)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0216,-0.0407)
    -- ( 0.0230,-0.0521)
    -- ( 0.0078,-0.1112)
    -- (-0.0368,-0.0997)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1936, 0.5180)
    -- ( 0.2045, 0.4909)
    -- ( 0.1547, 0.4709)
    -- ( 0.1437, 0.4981)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1936, 0.5180)
    -- ( 0.2045, 0.4909)
    -- ( 0.1547, 0.4709)
    -- ( 0.1437, 0.4981)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1903, 0.4858)
    -- (-0.1678, 0.5258)
    -- (-0.1146, 0.4960)
    -- (-0.1371, 0.4559)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1903, 0.4858)
    -- (-0.1678, 0.5258)
    -- (-0.1146, 0.4960)
    -- (-0.1371, 0.4559)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1470, 0.3493)
    -- ( 0.1689, 0.3567)
    -- ( 0.1775, 0.3315)
    -- ( 0.1555, 0.3241)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1470, 0.3493)
    -- ( 0.1689, 0.3567)
    -- ( 0.1775, 0.3315)
    -- ( 0.1555, 0.3241)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1892, 0.2562)
    -- ( 0.2118, 0.2510)
    -- ( 0.2058, 0.2251)
    -- ( 0.1833, 0.2303)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1892, 0.2562)
    -- ( 0.2118, 0.2510)
    -- ( 0.2058, 0.2251)
    -- ( 0.1833, 0.2303)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8016, 0.0292)
    -- ( 0.8235, 0.0367)
    -- ( 0.8321, 0.0116)
    -- ( 0.8103, 0.0040)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8016, 0.0292)
    -- ( 0.8235, 0.0367)
    -- ( 0.8321, 0.0116)
    -- ( 0.8103, 0.0040)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7392, 0.1737)
    -- ( 0.7609, 0.1816)
    -- ( 0.7702, 0.1568)
    -- ( 0.7485, 0.1487)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7392, 0.1737)
```

```
    -- ( 0.7609, 0.1816)
    -- ( 0.7702, 0.1568)
    -- ( 0.7485, 0.1487)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3736, 0.7805)
    -- ( 0.3937, 0.7921)
    -- ( 0.4071, 0.7691)
    -- ( 0.3870, 0.7575)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3736, 0.7805)
    -- ( 0.3937, 0.7921)
    -- ( 0.4071, 0.7691)
    -- ( 0.3870, 0.7575)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4808,-0.6251)
    -- (-0.4706,-0.6459)
    -- (-0.4946,-0.6576)
    -- (-0.5047,-0.6368)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4808,-0.6251)
    -- (-0.4706,-0.6459)
    -- (-0.4946,-0.6576)
    -- (-0.5047,-0.6368)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4514,-0.6075)
    -- (-0.4393,-0.6272)
    -- (-0.4620,-0.6412)
    -- (-0.4740,-0.6215)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4514,-0.6075)
    -- (-0.4393,-0.6272)
    -- (-0.4620,-0.6412)
    -- (-0.4740,-0.6215)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2390,-0.7174)
    -- (-0.2175,-0.7260)
    -- (-0.2273,-0.7508)
    -- (-0.2489,-0.7421)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2390,-0.7174)
    -- (-0.2175,-0.7260)
    -- (-0.2273,-0.7508)
    -- (-0.2489,-0.7421)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2386,-0.5506)
    -- (-0.2108,-0.5598)
    -- (-0.2277,-0.6108)
    -- (-0.2555,-0.6015)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2386,-0.5506)
    -- (-0.2108,-0.5598)
    -- (-0.2277,-0.6108)
    -- (-0.2555,-0.6015)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3574, 0.2226)
    -- (-0.3530, 0.2515)
    -- (-0.2999, 0.2435)
    -- (-0.3043, 0.2145)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3574, 0.2226)
    -- (-0.3530, 0.2515)
    -- (-0.2999, 0.2435)
    -- (-0.3043, 0.2145)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3315, 0.3242)
    -- (-0.3271, 0.3532)
    -- (-0.2740, 0.3451)
    -- (-0.2783, 0.3162)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3315, 0.3242)
    -- (-0.3271, 0.3532)
    -- (-0.2740, 0.3451)
    -- (-0.2783, 0.3162)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2256, 0.4895)
    -- ( 0.2451, 0.4676)
```

```
    -- ( 0.2049, 0.4320)
    -- ( 0.1854, 0.4539)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2256, 0.4895)
    -- ( 0.2451, 0.4676)
    -- ( 0.2049, 0.4320)
    -- ( 0.1854, 0.4539)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1717, 0.5777)
    -- ( 0.1903, 0.5551)
    -- ( 0.1488, 0.5210)
    -- ( 0.1302, 0.5436)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1717, 0.5777)
    -- ( 0.1903, 0.5551)
    -- ( 0.1488, 0.5210)
    -- ( 0.1302, 0.5436)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0995, 0.2545)
    -- (-0.0891, 0.2819)
    -- (-0.0389, 0.2629)
    -- (-0.0492, 0.2355)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0995, 0.2545)
    -- (-0.0891, 0.2819)
    -- (-0.0389, 0.2629)
    -- (-0.0492, 0.2355)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0828, 0.2371)
    -- ( 0.0883, 0.2659)
    -- ( 0.1411, 0.2559)
    -- ( 0.1357, 0.2271)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0828, 0.2371)
    -- ( 0.0883, 0.2659)
    -- ( 0.1411, 0.2559)
    -- ( 0.1357, 0.2271)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.1049, 0.1819)
    -- (-0.0945, 0.2094)
    -- (-0.0443, 0.1904)
    -- (-0.0546, 0.1629)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1049, 0.1819)
    -- (-0.0945, 0.2094)
    -- (-0.0443, 0.1904)
    -- (-0.0546, 0.1629)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0889,-0.0631)
    -- (-0.0785,-0.0357)
    -- (-0.0283,-0.0549)
    -- (-0.0388,-0.0823)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0889,-0.0631)
    -- (-0.0785,-0.0357)
    -- (-0.0283,-0.0549)
    -- (-0.0388,-0.0823)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2282,-0.7907)
    -- (-0.1823,-0.7907)
    -- (-0.1823,-0.8518)
    -- (-0.2282,-0.8518)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2282,-0.7907)
    -- (-0.1823,-0.7907)
    -- (-0.1823,-0.8518)
    -- (-0.2282,-0.8518)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2275,-0.7989)
    -- ( 0.2734,-0.7989)
    -- ( 0.2734,-0.8599)
    -- ( 0.2275,-0.8599)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2275,-0.7989)
    -- ( 0.2734,-0.7989)
    -- ( 0.2734,-0.8599)
```

```
    -- ( 0.2275,-0.8599)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2516,-0.7126)
    -- ( 0.2808,-0.7126)
    -- ( 0.2808,-0.7663)
    -- ( 0.2516,-0.7663)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2516,-0.7126)
    -- ( 0.2808,-0.7126)
    -- ( 0.2808,-0.7663)
    -- ( 0.2516,-0.7663)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1669,-0.7129)
    -- ( 0.1954,-0.7199)
    -- ( 0.1826,-0.7721)
    -- ( 0.1542,-0.7650)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1669,-0.7129)
    -- ( 0.1954,-0.7199)
    -- ( 0.1826,-0.7721)
    -- ( 0.1542,-0.7650)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1222,-0.7854)
    -- ( 0.1514,-0.7854)
    -- ( 0.1514,-0.8390)
    -- ( 0.1222,-0.8390)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1222,-0.7854)
    -- ( 0.1514,-0.7854)
    -- ( 0.1514,-0.8390)
    -- ( 0.1222,-0.8390)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3031,-0.7156)
    -- ( 0.3325,-0.7156)
    -- ( 0.3325,-0.7693)
    -- ( 0.3031,-0.7693)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.3031,-0.7156)
    -- ( 0.3325,-0.7156)
    -- ( 0.3325,-0.7693)
    -- ( 0.3031,-0.7693)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3574,-0.7174)
    -- ( 0.3867,-0.7174)
    -- ( 0.3867,-0.7712)
    -- ( 0.3574,-0.7712)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3574,-0.7174)
    -- ( 0.3867,-0.7174)
    -- ( 0.3867,-0.7712)
    -- ( 0.3574,-0.7712)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3742,-0.8016)
    -- ( 0.4036,-0.8016)
    -- ( 0.4036,-0.8554)
    -- ( 0.3742,-0.8554)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3742,-0.8016)
    -- ( 0.4036,-0.8016)
    -- ( 0.4036,-0.8554)
    -- ( 0.3742,-0.8554)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4107,-0.8072)
    -- ( 0.4400,-0.8072)
    -- ( 0.4400,-0.8610)
    -- ( 0.4107,-0.8610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4107,-0.8072)
    -- ( 0.4400,-0.8072)
    -- ( 0.4400,-0.8610)
    -- ( 0.4107,-0.8610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4612,-0.7886)
    -- ( 0.4905,-0.7886)
    -- ( 0.4905,-0.8423)
    -- ( 0.4612,-0.8423)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4612,-0.7886)
    -- ( 0.4905,-0.7886)
    -- ( 0.4905,-0.8423)
    -- ( 0.4612,-0.8423)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5733,-0.6570)
    -- ( 0.6007,-0.6675)
    -- ( 0.5814,-0.7176)
    -- ( 0.5540,-0.7071)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5733,-0.6570)
    -- ( 0.6007,-0.6675)
    -- ( 0.5814,-0.7176)
    -- ( 0.5540,-0.7071)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6698,-0.4454)
    -- ( 0.6958,-0.4589)
    -- ( 0.6710,-0.5065)
    -- ( 0.6450,-0.4930)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6698,-0.4454)
    -- ( 0.6958,-0.4589)
    -- ( 0.6710,-0.5065)
    -- ( 0.6450,-0.4930)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5789,-0.4658)
    -- ( 0.6009,-0.4851)
    -- ( 0.5654,-0.5254)
    -- ( 0.5434,-0.5061)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5789,-0.4658)
    -- ( 0.6009,-0.4851)
    -- ( 0.5654,-0.5254)
    -- ( 0.5434,-0.5061)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6025,-0.4876)
```

```
    -- ( 0.6259,-0.5054)
    -- ( 0.5934,-0.5481)
    -- ( 0.5701,-0.5304)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6025,-0.4876)
    -- ( 0.6259,-0.5054)
    -- ( 0.5934,-0.5481)
    -- ( 0.5701,-0.5304)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6466,-0.5044)
    -- ( 0.6729,-0.5172)
    -- ( 0.6493,-0.5654)
    -- ( 0.6230,-0.5526)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6466,-0.5044)
    -- ( 0.6729,-0.5172)
    -- ( 0.6493,-0.5654)
    -- ( 0.6230,-0.5526)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4854,-0.5939)
    -- ( 0.5002,-0.5686)
    -- ( 0.5466,-0.5955)
    -- ( 0.5320,-0.6208)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4854,-0.5939)
    -- ( 0.5002,-0.5686)
    -- ( 0.5466,-0.5955)
    -- ( 0.5320,-0.6208)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4577,-0.6299)
    -- ( 0.4750,-0.6063)
    -- ( 0.5183,-0.6380)
    -- ( 0.5010,-0.6617)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4577,-0.6299)
    -- ( 0.4750,-0.6063)
    -- ( 0.5183,-0.6380)
    -- ( 0.5010,-0.6617)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4354,-0.6506)
    -- ( 0.4568,-0.6305)
    -- ( 0.4935,-0.6697)
    -- ( 0.4721,-0.6898)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4354,-0.6506)
    -- ( 0.4568,-0.6305)
    -- ( 0.4935,-0.6697)
    -- ( 0.4721,-0.6898)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3580,-0.4631)
    -- ( 0.3837,-0.4771)
    -- ( 0.3581,-0.5243)
    -- ( 0.3323,-0.5103)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3580,-0.4631)
    -- ( 0.3837,-0.4771)
    -- ( 0.3581,-0.5243)
    -- ( 0.3323,-0.5103)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5131,-0.3580)
    -- ( 0.5345,-0.3780)
    -- ( 0.4978,-0.4172)
    -- ( 0.4763,-0.3972)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5131,-0.3580)
    -- ( 0.5345,-0.3780)
    -- ( 0.4978,-0.4172)
    -- ( 0.4763,-0.3972)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2116,-0.3904)
    -- ( 0.2243,-0.3641)
    -- ( 0.2726,-0.3875)
    -- ( 0.2598,-0.4139)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2116,-0.3904)
    -- ( 0.2243,-0.3641)
```

```
    -- ( 0.2726,-0.3875)
    -- ( 0.2598,-0.4139)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1786,-0.4343)
    -- ( 0.1889,-0.4069)
    -- ( 0.2391,-0.4259)
    -- ( 0.2289,-0.4532)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1786,-0.4343)
    -- ( 0.1889,-0.4069)
    -- ( 0.2391,-0.4259)
    -- ( 0.2289,-0.4532)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1647,-0.4763)
    -- ( 0.1772,-0.4497)
    -- ( 0.2258,-0.4725)
    -- ( 0.2134,-0.4990)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1647,-0.4763)
    -- ( 0.1772,-0.4497)
    -- ( 0.2258,-0.4725)
    -- ( 0.2134,-0.4990)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2335,-0.5197)
    -- ( 0.2460,-0.4932)
    -- ( 0.2946,-0.5160)
    -- ( 0.2821,-0.5425)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2335,-0.5197)
    -- ( 0.2460,-0.4932)
    -- ( 0.2946,-0.5160)
    -- ( 0.2821,-0.5425)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2832,-0.4218)
    -- ( 0.2956,-0.3952)
    -- ( 0.3443,-0.4180)
    -- ( 0.3318,-0.4445)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.2832,-0.4218)
    -- ( 0.2956,-0.3952)
    -- ( 0.3443,-0.4180)
    -- ( 0.3318,-0.4445)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2064,-0.6136)
    -- ( 0.2189,-0.5871)
    -- ( 0.2675,-0.6099)
    -- ( 0.2551,-0.6364)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2064,-0.6136)
    -- ( 0.2189,-0.5871)
    -- ( 0.2675,-0.6099)
    -- ( 0.2551,-0.6364)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1443,-0.5195)
    -- ( 0.1550,-0.4922)
    -- ( 0.2050,-0.5120)
    -- ( 0.1942,-0.5392)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1443,-0.5195)
    -- ( 0.1550,-0.4922)
    -- ( 0.2050,-0.5120)
    -- ( 0.1942,-0.5392)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3128,-0.5333)
    -- ( 0.3394,-0.5455)
    -- ( 0.3173,-0.5943)
    -- ( 0.2906,-0.5823)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3128,-0.5333)
    -- ( 0.3394,-0.5455)
    -- ( 0.3173,-0.5943)
    -- ( 0.2906,-0.5823)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1781,-0.6526)
    -- ( 0.1883,-0.6250)
    -- ( 0.2386,-0.6435)
```

```
    -- ( 0.2286,-0.6710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1781,-0.6526)
    -- ( 0.1883,-0.6250)
    -- ( 0.2386,-0.6435)
    -- ( 0.2286,-0.6710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0147,-0.5695)
    -- ( 0.0238,-0.5417)
    -- ( 0.0749,-0.5582)
    -- ( 0.0658,-0.5861)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0147,-0.5695)
    -- ( 0.0238,-0.5417)
    -- ( 0.0749,-0.5582)
    -- ( 0.0658,-0.5861)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0205,-0.5124)
    -- ( 0.0287,-0.4843)
    -- ( 0.0803,-0.4994)
    -- ( 0.0720,-0.5275)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0205,-0.5124)
    -- ( 0.0287,-0.4843)
    -- ( 0.0803,-0.4994)
    -- ( 0.0720,-0.5275)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0719,-0.6560)
    -- (-0.0678,-0.6849)
    -- (-0.1209,-0.6925)
    -- (-0.1250,-0.6635)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0719,-0.6560)
    -- (-0.0678,-0.6849)
    -- (-0.1209,-0.6925)
    -- (-0.1250,-0.6635)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.1330,-0.6411)
    -- (-0.1375,-0.6700)
    -- (-0.1906,-0.6618)
    -- (-0.1861,-0.6329)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1330,-0.6411)
    -- (-0.1375,-0.6700)
    -- (-0.1906,-0.6618)
    -- (-0.1861,-0.6329)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0334,-0.7381)
    -- (-0.0042,-0.7381)
    -- (-0.0042,-0.7917)
    -- (-0.0334,-0.7917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0334,-0.7381)
    -- (-0.0042,-0.7381)
    -- (-0.0042,-0.7917)
    -- (-0.0334,-0.7917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0998,-0.7315)
    -- (-0.0706,-0.7315)
    -- (-0.0706,-0.7852)
    -- (-0.0998,-0.7852)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0998,-0.7315)
    -- (-0.0706,-0.7315)
    -- (-0.0706,-0.7852)
    -- (-0.0998,-0.7852)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2018,-0.7234)
    -- (-0.1730,-0.7180)
    -- (-0.1631,-0.7708)
    -- (-0.1919,-0.7762)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2018,-0.7234)
    -- (-0.1730,-0.7180)
    -- (-0.1631,-0.7708)
    -- (-0.1919,-0.7762)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2956,-0.7184)
    -- (-0.2667,-0.7229)
    -- (-0.2750,-0.7760)
    -- (-0.3039,-0.7714)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2956,-0.7184)
    -- (-0.2667,-0.7229)
    -- (-0.2750,-0.7760)
    -- (-0.3039,-0.7714)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1661,-0.8014)
    -- (-0.1372,-0.8060)
    -- (-0.1454,-0.8590)
    -- (-0.1744,-0.8545)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1661,-0.8014)
    -- (-0.1372,-0.8060)
    -- (-0.1454,-0.8590)
    -- (-0.1744,-0.8545)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1269,-0.8074)
    -- (-0.0977,-0.8054)
    -- (-0.0940,-0.8590)
    -- (-0.1232,-0.8610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1269,-0.8074)
    -- (-0.0977,-0.8054)
    -- (-0.0940,-0.8590)
    -- (-0.1232,-0.8610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2787,-0.7975)
    -- (-0.2495,-0.7956)
    -- (-0.2459,-0.8492)
    -- (-0.2751,-0.8511)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2787,-0.7975)
```

```
    -- (-0.2495,-0.7956)
    -- (-0.2459,-0.8492)
    -- (-0.2751,-0.8511)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3966,-0.5592)
    -- (-0.3802,-0.5834)
    -- (-0.4246,-0.6135)
    -- (-0.4411,-0.5892)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3966,-0.5592)
    -- (-0.3802,-0.5834)
    -- (-0.4246,-0.6135)
    -- (-0.4411,-0.5892)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4189,-0.5000)
    -- (-0.4033,-0.5248)
    -- (-0.4488,-0.5534)
    -- (-0.4644,-0.5286)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4189,-0.5000)
    -- (-0.4033,-0.5248)
    -- (-0.4488,-0.5534)
    -- (-0.4644,-0.5286)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3561,-0.4332)
    -- (-0.3310,-0.4483)
    -- (-0.3586,-0.4944)
    -- (-0.3837,-0.4793)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3561,-0.4332)
    -- (-0.3310,-0.4483)
    -- (-0.3586,-0.4944)
    -- (-0.3837,-0.4793)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3120,-0.4787)
    -- (-0.2896,-0.4976)
    -- (-0.3241,-0.5386)
    -- (-0.3466,-0.5198)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3120,-0.4787)
    -- (-0.2896,-0.4976)
    -- (-0.3241,-0.5386)
    -- (-0.3466,-0.5198)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2660,-0.5113)
    -- (-0.2456,-0.5323)
    -- (-0.2840,-0.5697)
    -- (-0.3045,-0.5487)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2660,-0.5113)
    -- (-0.2456,-0.5323)
    -- (-0.2840,-0.5697)
    -- (-0.3045,-0.5487)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3939,-0.2212)
    -- (-0.3666,-0.2319)
    -- (-0.3863,-0.2819)
    -- (-0.4135,-0.2712)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3939,-0.2212)
    -- (-0.3666,-0.2319)
    -- (-0.3863,-0.2819)
    -- (-0.4135,-0.2712)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3038,-0.2403)
    -- (-0.2765,-0.2509)
    -- (-0.2961,-0.3010)
    -- (-0.3234,-0.2902)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3038,-0.2403)
    -- (-0.2765,-0.2509)
    -- (-0.2961,-0.3010)
    -- (-0.3234,-0.2902)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3532,-0.2251)
    -- (-0.3255,-0.2346)
```

```
    -- (-0.3428,-0.2854)
    -- (-0.3705,-0.2760)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3532,-0.2251)
    -- (-0.3255,-0.2346)
    -- (-0.3428,-0.2854)
    -- (-0.3705,-0.2760)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3482,-0.3198)
    -- (-0.3204,-0.3293)
    -- (-0.3377,-0.3801)
    -- (-0.3655,-0.3706)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3482,-0.3198)
    -- (-0.3204,-0.3293)
    -- (-0.3377,-0.3801)
    -- (-0.3655,-0.3706)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5006,-0.1767)
    -- (-0.4737,-0.1885)
    -- (-0.4953,-0.2376)
    -- (-0.5221,-0.2258)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5006,-0.1767)
    -- (-0.4737,-0.1885)
    -- (-0.4953,-0.2376)
    -- (-0.5221,-0.2258)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5739,-0.2312)
    -- (-0.5595,-0.2568)
    -- (-0.6065,-0.2830)
    -- (-0.6207,-0.2575)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5739,-0.2312)
    -- (-0.5595,-0.2568)
    -- (-0.6065,-0.2830)
    -- (-0.6207,-0.2575)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.5929,-0.3943)
    -- (-0.5696,-0.3765)
    -- (-0.5369,-0.4192)
    -- (-0.5602,-0.4370)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5929,-0.3943)
    -- (-0.5696,-0.3765)
    -- (-0.5369,-0.4192)
    -- (-0.5602,-0.4370)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5005,-0.3312)
    -- (-0.4775,-0.3129)
    -- (-0.4441,-0.3550)
    -- (-0.4670,-0.3733)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5005,-0.3312)
    -- (-0.4775,-0.3129)
    -- (-0.4441,-0.3550)
    -- (-0.4670,-0.3733)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5523,-0.3618)
    -- (-0.5293,-0.3436)
    -- (-0.4960,-0.3857)
    -- (-0.5189,-0.4038)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5523,-0.3618)
    -- (-0.5293,-0.3436)
    -- (-0.4960,-0.3857)
    -- (-0.5189,-0.4038)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4383,-0.3880)
    -- (-0.4249,-0.4140)
    -- (-0.4726,-0.4386)
    -- (-0.4861,-0.4126)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4383,-0.3880)
    -- (-0.4249,-0.4140)
    -- (-0.4726,-0.4386)
```

```
    -- (-0.4861,-0.4126)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6626,-0.4293)
    -- (-0.6510,-0.4562)
    -- (-0.7003,-0.4775)
    -- (-0.7119,-0.4506)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6626,-0.4293)
    -- (-0.6510,-0.4562)
    -- (-0.7003,-0.4775)
    -- (-0.7119,-0.4506)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6449,-0.4759)
    -- (-0.6280,-0.4998)
    -- (-0.6717,-0.5309)
    -- (-0.6887,-0.5069)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6449,-0.4759)
    -- (-0.6280,-0.4998)
    -- (-0.6717,-0.5309)
    -- (-0.6887,-0.5069)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5766,-0.5683)
    -- (-0.5643,-0.5948)
    -- (-0.6130,-0.6174)
    -- (-0.6254,-0.5909)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5766,-0.5683)
    -- (-0.5643,-0.5948)
    -- (-0.6130,-0.6174)
    -- (-0.6254,-0.5909)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4733,-0.5728)
    -- (-0.4590,-0.5983)
    -- (-0.5061,-0.6244)
    -- (-0.5202,-0.5988)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.4733,-0.5728)
    -- (-0.4590,-0.5983)
    -- (-0.5061,-0.6244)
    -- (-0.5202,-0.5988)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4272,-0.6520)
    -- (-0.4128,-0.6774)
    -- (-0.4595,-0.7039)
    -- (-0.4740,-0.6785)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4272,-0.6520)
    -- (-0.4128,-0.6774)
    -- (-0.4595,-0.7039)
    -- (-0.4740,-0.6785)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5374,-0.6782)
    -- (-0.5236,-0.7040)
    -- (-0.5710,-0.7292)
    -- (-0.5848,-0.7034)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5374,-0.6782)
    -- (-0.5236,-0.7040)
    -- (-0.5710,-0.7292)
    -- (-0.5848,-0.7034)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5214,-0.7131)
    -- (-0.5038,-0.7365)
    -- (-0.5468,-0.7687)
    -- (-0.5644,-0.7453)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5214,-0.7131)
    -- (-0.5038,-0.7365)
    -- (-0.5468,-0.7687)
    -- (-0.5644,-0.7453)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2847,-0.1917)
    -- ( 0.2954,-0.1644)
    -- ( 0.3454,-0.1841)
    -- ( 0.3347,-0.2114)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2847,-0.1917)
    -- ( 0.2954,-0.1644)
    -- ( 0.3454,-0.1841)
    -- ( 0.3347,-0.2114)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2692,-0.2397)
    -- ( 0.2775,-0.2116)
    -- ( 0.3291,-0.2268)
    -- ( 0.3208,-0.2548)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2692,-0.2397)
    -- ( 0.2775,-0.2116)
    -- ( 0.3291,-0.2268)
    -- ( 0.3208,-0.2548)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2587,-0.2944)
    -- ( 0.2585,-0.2651)
    -- ( 0.3123,-0.2648)
    -- ( 0.3125,-0.2941)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2587,-0.2944)
    -- ( 0.2585,-0.2651)
    -- ( 0.3123,-0.2648)
    -- ( 0.3125,-0.2941)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1269,-0.2581)
    -- ( 0.1359,-0.2303)
    -- ( 0.1871,-0.2468)
    -- ( 0.1780,-0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1269,-0.2581)
    -- ( 0.1359,-0.2303)
    -- ( 0.1871,-0.2468)
    -- ( 0.1780,-0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1127,-0.3153)
```

```
    -- ( 0.1232,-0.2880)
    -- ( 0.1733,-0.3074)
    -- ( 0.1626,-0.3348)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1127,-0.3153)
    -- ( 0.1232,-0.2880)
    -- ( 0.1733,-0.3074)
    -- ( 0.1626,-0.3348)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1928,-0.0951)
    -- ( 0.2055,-0.0687)
    -- ( 0.2539,-0.0920)
    -- ( 0.2412,-0.1184)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1928,-0.0951)
    -- ( 0.2055,-0.0687)
    -- ( 0.2539,-0.0920)
    -- ( 0.2412,-0.1184)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2202,-0.0375)
    -- ( 0.2335,-0.0113)
    -- ( 0.2814,-0.0356)
    -- ( 0.2682,-0.0617)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2202,-0.0375)
    -- ( 0.2335,-0.0113)
    -- ( 0.2814,-0.0356)
    -- ( 0.2682,-0.0617)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2582, 0.0509)
    -- ( 0.2736, 0.0259)
    -- ( 0.2278,-0.0022)
    -- ( 0.2125, 0.0227)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2582, 0.0509)
    -- ( 0.2736, 0.0259)
    -- ( 0.2278,-0.0022)
    -- ( 0.2125, 0.0227)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2111, 0.0849)
    -- ( 0.2307, 0.0632)
    -- ( 0.1908, 0.0273)
    -- ( 0.1712, 0.0490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2111, 0.0849)
    -- ( 0.2307, 0.0632)
    -- ( 0.1908, 0.0273)
    -- ( 0.1712, 0.0490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1776, 0.1187)
    -- ( 0.1982, 0.0978)
    -- ( 0.1599, 0.0601)
    -- ( 0.1394, 0.0810)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1776, 0.1187)
    -- ( 0.1982, 0.0978)
    -- ( 0.1599, 0.0601)
    -- ( 0.1394, 0.0810)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2760, 0.3987)
    -- ( 0.2946, 0.3760)
    -- ( 0.2531, 0.3420)
    -- ( 0.2345, 0.3646)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2760, 0.3987)
    -- ( 0.2946, 0.3760)
    -- ( 0.2531, 0.3420)
    -- ( 0.2345, 0.3646)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3226, 0.3543)
    -- ( 0.3420, 0.3323)
    -- ( 0.3018, 0.2967)
    -- ( 0.2824, 0.3185)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3226, 0.3543)
    -- ( 0.3420, 0.3323)
```

```
    -- ( 0.3018, 0.2967)
    -- ( 0.2824, 0.3185)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2277, 0.3599)
    -- (-0.2171, 0.3872)
    -- (-0.1671, 0.3676)
    -- (-0.1777, 0.3404)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2277, 0.3599)
    -- (-0.2171, 0.3872)
    -- (-0.1671, 0.3676)
    -- (-0.1777, 0.3404)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1722, 0.5368)
    -- (-0.1616, 0.5642)
    -- (-0.1116, 0.5446)
    -- (-0.1223, 0.5174)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1722, 0.5368)
    -- (-0.1616, 0.5642)
    -- (-0.1116, 0.5446)
    -- (-0.1223, 0.5174)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2400, 0.3081)
    -- (-0.2307, 0.3359)
    -- (-0.1797, 0.3189)
    -- (-0.1890, 0.2912)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2400, 0.3081)
    -- (-0.2307, 0.3359)
    -- (-0.1797, 0.3189)
    -- (-0.1890, 0.2912)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2735, 0.1997)
    -- (-0.2631, 0.2270)
    -- (-0.2129, 0.2080)
    -- (-0.2233, 0.1807)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.2735, 0.1997)
    -- (-0.2631, 0.2270)
    -- (-0.2129, 0.2080)
    -- (-0.2233, 0.1807)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3047, 0.1045)
    -- (-0.2975, 0.1329)
    -- (-0.2455, 0.1200)
    -- (-0.2525, 0.0915)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3047, 0.1045)
    -- (-0.2975, 0.1329)
    -- (-0.2455, 0.1200)
    -- (-0.2525, 0.0915)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1406, 0.3596)
    -- (-0.1136, 0.3482)
    -- (-0.1345, 0.2988)
    -- (-0.1615, 0.3102)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1406, 0.3596)
    -- (-0.1136, 0.3482)
    -- (-0.1345, 0.2988)
    -- (-0.1615, 0.3102)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0597, 0.5878)
    -- (-0.0327, 0.5763)
    -- (-0.0536, 0.5269)
    -- (-0.0806, 0.5383)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0597, 0.5878)
    -- (-0.0327, 0.5763)
    -- (-0.0536, 0.5269)
    -- (-0.0806, 0.5383)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0206, 0.5864)
    -- ( 0.0064, 0.5749)
    -- (-0.0146, 0.5255)
```

```
    -- (-0.0416, 0.5369)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0206, 0.5864)
    -- ( 0.0064, 0.5749)
    -- (-0.0146, 0.5255)
    -- (-0.0416, 0.5369)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1653, 0.2738)
    -- (-0.1360, 0.2738)
    -- (-0.1360, 0.2200)
    -- (-0.1653, 0.2200)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1653, 0.2738)
    -- (-0.1360, 0.2738)
    -- (-0.1360, 0.2200)
    -- (-0.1653, 0.2200)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1782, 0.2207)
    -- (-0.1501, 0.2122)
    -- (-0.1657, 0.1608)
    -- (-0.1937, 0.1693)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1782, 0.2207)
    -- (-0.1501, 0.2122)
    -- (-0.1657, 0.1608)
    -- (-0.1937, 0.1693)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2343, 0.0622)
    -- (-0.2239, 0.0896)
    -- (-0.1737, 0.0706)
    -- (-0.1840, 0.0432)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2343, 0.0622)
    -- (-0.2239, 0.0896)
    -- (-0.1737, 0.0706)
    -- (-0.1840, 0.0432)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.1289, 0.0933)
    -- (-0.1186, 0.1207)
    -- (-0.0683, 0.1017)
    -- (-0.0787, 0.0743)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1289, 0.0933)
    -- (-0.1186, 0.1207)
    -- (-0.0683, 0.1017)
    -- (-0.0787, 0.0743)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2223, 0.7399)
    -- ( 0.2483, 0.7532)
    -- ( 0.2727, 0.7054)
    -- ( 0.2467, 0.6920)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2223, 0.7399)
    -- ( 0.2483, 0.7532)
    -- ( 0.2727, 0.7054)
    -- ( 0.2467, 0.6920)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5440, 0.7476)
    -- ( 0.5576, 0.7217)
    -- ( 0.5102, 0.6965)
    -- ( 0.4965, 0.7224)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5440, 0.7476)
    -- ( 0.5576, 0.7217)
    -- ( 0.5102, 0.6965)
    -- ( 0.4965, 0.7224)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5919, 0.6377)
    -- ( 0.6068, 0.6125)
    -- ( 0.5604, 0.5853)
    -- ( 0.5456, 0.6106)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5919, 0.6377)
    -- ( 0.6068, 0.6125)
    -- ( 0.5604, 0.5853)
    -- ( 0.5456, 0.6106)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6224, 0.5979)
    -- ( 0.6382, 0.5732)
    -- ( 0.5930, 0.5443)
    -- ( 0.5772, 0.5690)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6224, 0.5979)
    -- ( 0.6382, 0.5732)
    -- ( 0.5930, 0.5443)
    -- ( 0.5772, 0.5690)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4104, 0.6743)
    -- ( 0.4255, 0.6491)
    -- ( 0.3795, 0.6215)
    -- ( 0.3644, 0.6466)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4104, 0.6743)
    -- ( 0.4255, 0.6491)
    -- ( 0.3795, 0.6215)
    -- ( 0.3644, 0.6466)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4437, 0.6203)
    -- ( 0.4592, 0.5954)
    -- ( 0.4136, 0.5671)
    -- ( 0.3981, 0.5918)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4437, 0.6203)
    -- ( 0.4592, 0.5954)
    -- ( 0.4136, 0.5671)
    -- ( 0.3981, 0.5918)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5275, 0.4892)
    -- ( 0.5449, 0.4656)
    -- ( 0.5018, 0.4337)
    -- ( 0.4844, 0.4571)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5275, 0.4892)
```

```
    -- ( 0.5449, 0.4656)
    -- ( 0.5018, 0.4337)
    -- ( 0.4844, 0.4571)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2900, 0.6234)
    -- ( 0.3087, 0.6008)
    -- ( 0.2671, 0.5666)
    -- ( 0.2485, 0.5892)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2900, 0.6234)
    -- ( 0.3087, 0.6008)
    -- ( 0.2671, 0.5666)
    -- ( 0.2485, 0.5892)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3295, 0.5855)
    -- ( 0.3477, 0.5626)
    -- ( 0.3058, 0.5291)
    -- ( 0.2875, 0.5519)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3295, 0.5855)
    -- ( 0.3477, 0.5626)
    -- ( 0.3058, 0.5291)
    -- ( 0.2875, 0.5519)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3915, 0.5035)
    -- ( 0.4098, 0.4807)
    -- ( 0.3680, 0.4471)
    -- ( 0.3497, 0.4699)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3915, 0.5035)
    -- ( 0.4098, 0.4807)
    -- ( 0.3680, 0.4471)
    -- ( 0.3497, 0.4699)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4274, 0.4691)
    -- ( 0.4472, 0.4474)
    -- ( 0.4075, 0.4112)
    -- ( 0.3878, 0.4327)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4274, 0.4691)
    -- ( 0.4472, 0.4474)
    -- ( 0.4075, 0.4112)
    -- ( 0.3878, 0.4327)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0465, 0.7243)
    -- ( 0.0751, 0.7305)
    -- ( 0.0864, 0.6779)
    -- ( 0.0578, 0.6717)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0465, 0.7243)
    -- ( 0.0751, 0.7305)
    -- ( 0.0864, 0.6779)
    -- ( 0.0578, 0.6717)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0312, 0.7116)
    -- (-0.0338, 0.7407)
    -- ( 0.0197, 0.7456)
    -- ( 0.0223, 0.7164)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0312, 0.7116)
    -- (-0.0338, 0.7407)
    -- ( 0.0197, 0.7456)
    -- ( 0.0223, 0.7164)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1044, 0.7143)
    -- (-0.1084, 0.7434)
    -- (-0.0552, 0.7507)
    -- (-0.0512, 0.7216)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1044, 0.7143)
    -- (-0.1084, 0.7434)
    -- (-0.0552, 0.7507)
    -- (-0.0512, 0.7216)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1250, 0.6753)
    -- (-0.1169, 0.7034)
```

```
    -- (-0.0653, 0.6887)
    -- (-0.0733, 0.6605)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1250, 0.6753)
    -- (-0.1169, 0.7034)
    -- (-0.0653, 0.6887)
    -- (-0.0733, 0.6605)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2293, 0.7263)
    -- (-0.2016, 0.7170)
    -- (-0.2185, 0.6660)
    -- (-0.2463, 0.6753)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2293, 0.7263)
    -- (-0.2016, 0.7170)
    -- (-0.2185, 0.6660)
    -- (-0.2463, 0.6753)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4164, 0.8019)
    -- (-0.3886, 0.7926)
    -- (-0.4056, 0.7417)
    -- (-0.4335, 0.7510)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4164, 0.8019)
    -- (-0.3886, 0.7926)
    -- (-0.4056, 0.7417)
    -- (-0.4335, 0.7510)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3769, 0.7827)
    -- (-0.3486, 0.7746)
    -- (-0.3636, 0.7230)
    -- (-0.3918, 0.7311)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3769, 0.7827)
    -- (-0.3486, 0.7746)
    -- (-0.3636, 0.7230)
    -- (-0.3918, 0.7311)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.2690, 0.8085)
    -- (-0.2696, 0.8379)
    -- (-0.2159, 0.8389)
    -- (-0.2153, 0.8097)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2690, 0.8085)
    -- (-0.2696, 0.8379)
    -- (-0.2159, 0.8389)
    -- (-0.2153, 0.8097)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0864, 0.8532)
    -- (-0.0767, 0.8256)
    -- (-0.1273, 0.8076)
    -- (-0.1371, 0.8352)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0864, 0.8532)
    -- (-0.0767, 0.8256)
    -- (-0.1273, 0.8076)
    -- (-0.1371, 0.8352)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3699, 0.6041)
    -- (-0.3425, 0.5939)
    -- (-0.3609, 0.5436)
    -- (-0.3885, 0.5537)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3699, 0.6041)
    -- (-0.3425, 0.5939)
    -- (-0.3609, 0.5436)
    -- (-0.3885, 0.5537)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4770, 0.6412)
    -- (-0.4500, 0.6299)
    -- (-0.4707, 0.5804)
    -- (-0.4978, 0.5918)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4770, 0.6412)
    -- (-0.4500, 0.6299)
    -- (-0.4707, 0.5804)
```

```
    -- (-0.4978, 0.5918)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4348, 0.4860)
    -- (-0.4060, 0.4806)
    -- (-0.4159, 0.4278)
    -- (-0.4447, 0.4332)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4348, 0.4860)
    -- (-0.4060, 0.4806)
    -- (-0.4159, 0.4278)
    -- (-0.4447, 0.4332)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4771, 0.4952)
    -- (-0.4520, 0.4800)
    -- (-0.4799, 0.4341)
    -- (-0.5050, 0.4493)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4771, 0.4952)
    -- (-0.4520, 0.4800)
    -- (-0.4799, 0.4341)
    -- (-0.5050, 0.4493)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5175, 0.4232)
    -- (-0.4917, 0.4092)
    -- (-0.5176, 0.3620)
    -- (-0.5433, 0.3761)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5175, 0.4232)
    -- (-0.4917, 0.4092)
    -- (-0.5176, 0.3620)
    -- (-0.5433, 0.3761)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5739, 0.5614)
    -- (-0.5487, 0.5464)
    -- (-0.5762, 0.5003)
    -- (-0.6013, 0.5152)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.5739, 0.5614)
    -- (-0.5487, 0.5464)
    -- (-0.5762, 0.5003)
    -- (-0.6013, 0.5152)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6244, 0.4780)
    -- (-0.5977, 0.4661)
    -- (-0.6195, 0.4170)
    -- (-0.6463, 0.4289)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6244, 0.4780)
    -- (-0.5977, 0.4661)
    -- (-0.6195, 0.4170)
    -- (-0.6463, 0.4289)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6236, 0.1401)
    -- (-0.6192, 0.1691)
    -- (-0.5661, 0.1611)
    -- (-0.5705, 0.1321)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6236, 0.1401)
    -- (-0.6192, 0.1691)
    -- (-0.5661, 0.1611)
    -- (-0.5705, 0.1321)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3872, 0.3590)
    -- (-0.3829, 0.3880)
    -- (-0.3297, 0.3800)
    -- (-0.3341, 0.3510)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3872, 0.3590)
    -- (-0.3829, 0.3880)
    -- (-0.3297, 0.3800)
    -- (-0.3341, 0.3510)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6525, 0.1021)
    -- (-0.6404, 0.1288)
    -- (-0.5915, 0.1066)
    -- (-0.6036, 0.0799)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6525, 0.1021)
    -- (-0.6404, 0.1288)
    -- (-0.5915, 0.1066)
    -- (-0.6036, 0.0799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4323, 0.3237)
    -- (-0.4202, 0.3503)
    -- (-0.3713, 0.3280)
    -- (-0.3834, 0.3014)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4323, 0.3237)
    -- (-0.4202, 0.3503)
    -- (-0.3713, 0.3280)
    -- (-0.3834, 0.3014)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3470, 0.2846)
    -- (-0.3349, 0.3113)
    -- (-0.2859, 0.2891)
    -- (-0.2981, 0.2624)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3470, 0.2846)
    -- (-0.3349, 0.3113)
    -- (-0.2859, 0.2891)
    -- (-0.2981, 0.2624)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3053, 0.3741)
    -- (-0.2932, 0.4008)
    -- (-0.2443, 0.3786)
    -- (-0.2564, 0.3519)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3053, 0.3741)
    -- (-0.2932, 0.4008)
    -- (-0.2443, 0.3786)
    -- (-0.2564, 0.3519)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6751, 0.0465)
```

```
    -- (-0.6666, 0.0746)
    -- (-0.6152, 0.0590)
    -- (-0.6237, 0.0310)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6751, 0.0465)
    -- (-0.6666, 0.0746)
    -- (-0.6152, 0.0590)
    -- (-0.6237, 0.0310)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7316,-0.0595)
    -- (-0.7215,-0.0320)
    -- (-0.6711,-0.0505)
    -- (-0.6812,-0.0780)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7316,-0.0595)
    -- (-0.7215,-0.0320)
    -- (-0.6711,-0.0505)
    -- (-0.6812,-0.0780)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7748,-0.1355)
    -- (-0.7629,-0.1088)
    -- (-0.7138,-0.1305)
    -- (-0.7257,-0.1573)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7748,-0.1355)
    -- (-0.7629,-0.1088)
    -- (-0.7138,-0.1305)
    -- (-0.7257,-0.1573)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6698,-0.1385)
    -- (-0.6512,-0.1159)
    -- (-0.6098,-0.1501)
    -- (-0.6284,-0.1727)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6698,-0.1385)
    -- (-0.6512,-0.1159)
    -- (-0.6098,-0.1501)
    -- (-0.6284,-0.1727)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3325,-0.1175)
    -- (-0.3067,-0.1313)
    -- (-0.3320,-0.1787)
    -- (-0.3579,-0.1649)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3325,-0.1175)
    -- (-0.3067,-0.1313)
    -- (-0.3320,-0.1787)
    -- (-0.3579,-0.1649)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4097,-0.0630)
    -- (-0.3827,-0.0741)
    -- (-0.4031,-0.1238)
    -- (-0.4302,-0.1127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4097,-0.0630)
    -- (-0.3827,-0.0741)
    -- (-0.4031,-0.1238)
    -- (-0.4302,-0.1127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3028, 0.0016)
    -- (-0.2734, 0.0016)
    -- (-0.2734,-0.0522)
    -- (-0.3028,-0.0522)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3028, 0.0016)
    -- (-0.2734, 0.0016)
    -- (-0.2734,-0.0522)
    -- (-0.3028,-0.0522)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2492,-0.0037)
    -- (-0.2198,-0.0037)
    -- (-0.2198,-0.0574)
    -- (-0.2492,-0.0574)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2492,-0.0037)
    -- (-0.2198,-0.0037)
```

```
    -- (-0.2198,-0.0574)
    -- (-0.2492,-0.0574)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4151, 0.0294)
    -- (-0.3858, 0.0294)
    -- (-0.3858,-0.0243)
    -- (-0.4151,-0.0243)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4151, 0.0294)
    -- (-0.3858, 0.0294)
    -- (-0.3858,-0.0243)
    -- (-0.4151,-0.0243)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4687, 0.0340)
    -- (-0.4394, 0.0340)
    -- (-0.4394,-0.0197)
    -- (-0.4687,-0.0197)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4687, 0.0340)
    -- (-0.4394, 0.0340)
    -- (-0.4394,-0.0197)
    -- (-0.4687,-0.0197)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5170, 0.0545)
    -- (-0.4876, 0.0545)
    -- (-0.4876, 0.0008)
    -- (-0.5170, 0.0008)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5170, 0.0545)
    -- (-0.4876, 0.0545)
    -- (-0.4876, 0.0008)
    -- (-0.5170, 0.0008)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4695, 0.1540)
    -- (-0.4413, 0.1461)
    -- (-0.4557, 0.0943)
    -- (-0.4839, 0.1022)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.4695, 0.1540)
    -- (-0.4413, 0.1461)
    -- (-0.4557, 0.0943)
    -- (-0.4839, 0.1022)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4511, 0.2320)
    -- (-0.4227, 0.2241)
    -- (-0.4372, 0.1724)
    -- (-0.4654, 0.1803)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4511, 0.2320)
    -- (-0.4227, 0.2241)
    -- (-0.4372, 0.1724)
    -- (-0.4654, 0.1803)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4191, 0.1396)
    -- (-0.3904, 0.1335)
    -- (-0.4017, 0.0809)
    -- (-0.4304, 0.0871)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4191, 0.1396)
    -- (-0.3904, 0.1335)
    -- (-0.4017, 0.0809)
    -- (-0.4304, 0.0871)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0048,-0.2963)
    -- ( 0.0056,-0.2689)
    -- ( 0.0558,-0.2881)
    -- ( 0.0453,-0.3155)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0048,-0.2963)
    -- ( 0.0056,-0.2689)
    -- ( 0.0558,-0.2881)
    -- ( 0.0453,-0.3155)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0804,-0.1001)
    -- ( 0.0908,-0.0728)
    -- ( 0.1410,-0.0919)
```

```
    -- ( 0.1305,-0.1192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0804,-0.1001)
    -- ( 0.0908,-0.0728)
    -- ( 0.1410,-0.0919)
    -- ( 0.1305,-0.1192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1027,-0.2588)
    -- (-0.0979,-0.2299)
    -- (-0.0449,-0.2387)
    -- (-0.0498,-0.2676)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1027,-0.2588)
    -- (-0.0979,-0.2299)
    -- (-0.0449,-0.2387)
    -- (-0.0498,-0.2676)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1889,-0.2314)
    -- (-0.1776,-0.2043)
    -- (-0.1281,-0.2251)
    -- (-0.1394,-0.2521)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1889,-0.2314)
    -- (-0.1776,-0.2043)
    -- (-0.1281,-0.2251)
    -- (-0.1394,-0.2521)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1180,-0.3033)
    -- (-0.1077,-0.2759)
    -- (-0.0575,-0.2947)
    -- (-0.0677,-0.3221)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1180,-0.3033)
    -- (-0.1077,-0.2759)
    -- (-0.0575,-0.2947)
    -- (-0.0677,-0.3221)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.2120,-0.2801)
    -- (-0.2010,-0.2529)
    -- (-0.1512,-0.2729)
    -- (-0.1622,-0.3002)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2120,-0.2801)
    -- (-0.2010,-0.2529)
    -- (-0.1512,-0.2729)
    -- (-0.1622,-0.3002)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2265,-0.3343)
    -- (-0.2161,-0.3069)
    -- (-0.1659,-0.3259)
    -- (-0.1762,-0.3533)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2265,-0.3343)
    -- (-0.2161,-0.3069)
    -- (-0.1659,-0.3259)
    -- (-0.1762,-0.3533)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0728,-0.3520)
    -- (-0.0436,-0.3488)
    -- (-0.0379,-0.4022)
    -- (-0.0670,-0.4054)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0728,-0.3520)
    -- (-0.0436,-0.3488)
    -- (-0.0379,-0.4022)
    -- (-0.0670,-0.4054)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3598,-0.6299)
    -- ( 0.3752,-0.6051)
    -- ( 0.4209,-0.6334)
    -- ( 0.4054,-0.6583)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3598,-0.6299)
    -- ( 0.3752,-0.6051)
    -- ( 0.4209,-0.6334)
    -- ( 0.4054,-0.6583)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3284,-0.6582)
    -- ( 0.3482,-0.6365)
    -- ( 0.3879,-0.6727)
    -- ( 0.3681,-0.6944)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3284,-0.6582)
    -- ( 0.3482,-0.6365)
    -- ( 0.3879,-0.6727)
    -- ( 0.3681,-0.6944)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8159,-0.3188)
    -- (-0.7892,-0.3067)
    -- (-0.7670,-0.3556)
    -- (-0.7937,-0.3677)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8159,-0.3188)
    -- (-0.7892,-0.3067)
    -- (-0.7670,-0.3556)
    -- (-0.7937,-0.3677)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8755, 0.1805)
    -- (-0.8623, 0.2066)
    -- (-0.8144, 0.1824)
    -- (-0.8276, 0.1562)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8755, 0.1805)
    -- (-0.8623, 0.2066)
    -- (-0.8144, 0.1824)
    -- (-0.8276, 0.1562)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9400, 0.0507)
    -- (-0.9275, 0.0771)
    -- (-0.8789, 0.0541)
    -- (-0.8916, 0.0276)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9400, 0.0507)
```

```
    -- (-0.9275, 0.0771)
    -- (-0.8789, 0.0541)
    -- (-0.8916, 0.0276)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9500,-0.0171)
    -- (-0.9467, 0.0120)
    -- (-0.8934, 0.0060)
    -- (-0.8966,-0.0232)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9500,-0.0171)
    -- (-0.9467, 0.0120)
    -- (-0.8934, 0.0060)
    -- (-0.8966,-0.0232)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0374, 0.6594)
    -- (-0.0376, 0.6887)
    -- ( 0.0161, 0.6890)
    -- ( 0.0162, 0.6598)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0374, 0.6594)
    -- (-0.0376, 0.6887)
    -- ( 0.0161, 0.6890)
    -- ( 0.0162, 0.6598)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1600, 0.8267)
    -- ( 0.1793, 0.8046)
    -- ( 0.1388, 0.7692)
    -- ( 0.1195, 0.7913)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1600, 0.8267)
    -- ( 0.1793, 0.8046)
    -- ( 0.1388, 0.7692)
    -- ( 0.1195, 0.7913)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4284, 0.3107)
    -- ( 0.4572, 0.3163)
    -- ( 0.4672, 0.2634)
    -- ( 0.4384, 0.2580)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4284, 0.3107)
    -- ( 0.4572, 0.3163)
    -- ( 0.4672, 0.2634)
    -- ( 0.4384, 0.2580)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4721, 0.3149)
    -- ( 0.5003, 0.3230)
    -- ( 0.5151, 0.2714)
    -- ( 0.4870, 0.2633)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4721, 0.3149)
    -- ( 0.5003, 0.3230)
    -- ( 0.5151, 0.2714)
    -- ( 0.4870, 0.2633)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5761, 0.3388)
    -- ( 0.6049, 0.3443)
    -- ( 0.6150, 0.2916)
    -- ( 0.5862, 0.2860)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5761, 0.3388)
    -- ( 0.6049, 0.3443)
    -- ( 0.6150, 0.2916)
    -- ( 0.5862, 0.2860)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6283, 0.3369)
    -- ( 0.6567, 0.3296)
    -- ( 0.6432, 0.2775)
    -- ( 0.6148, 0.2849)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6283, 0.3369)
    -- ( 0.6567, 0.3296)
    -- ( 0.6432, 0.2775)
    -- ( 0.6148, 0.2849)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5378, 0.2581)
    -- ( 0.5670, 0.2616)
```

```
    -- ( 0.5734, 0.2083)
    -- ( 0.5443, 0.2047)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5378, 0.2581)
    -- ( 0.5670, 0.2616)
    -- ( 0.5734, 0.2083)
    -- ( 0.5443, 0.2047)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4853, 0.2500)
    -- ( 0.5140, 0.2555)
    -- ( 0.5241, 0.2028)
    -- ( 0.4953, 0.1973)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4853, 0.2500)
    -- ( 0.5140, 0.2555)
    -- ( 0.5241, 0.2028)
    -- ( 0.4953, 0.1973)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4028, 0.0895)
    -- ( 0.4321, 0.0895)
    -- ( 0.4321, 0.0358)
    -- ( 0.4028, 0.0358)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4028, 0.0895)
    -- ( 0.4321, 0.0895)
    -- ( 0.4321, 0.0358)
    -- ( 0.4028, 0.0358)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4612, 0.0957)
    -- ( 0.4899, 0.0898)
    -- ( 0.4793, 0.0371)
    -- ( 0.4506, 0.0430)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4612, 0.0957)
    -- ( 0.4899, 0.0898)
    -- ( 0.4793, 0.0371)
    -- ( 0.4506, 0.0430)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.5422,-0.0041)
    -- ( 0.5437,-0.0333)
    -- ( 0.4900,-0.0361)
    -- ( 0.4885,-0.0068)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5422,-0.0041)
    -- ( 0.5437,-0.0333)
    -- ( 0.4900,-0.0361)
    -- ( 0.4885,-0.0068)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6654,-0.0050)
    -- ( 0.6664,-0.0343)
    -- ( 0.6128,-0.0361)
    -- ( 0.6117,-0.0068)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6654,-0.0050)
    -- ( 0.6664,-0.0343)
    -- ( 0.6128,-0.0361)
    -- ( 0.6117,-0.0068)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7573, 0.2817)
    -- ( 0.7646, 0.2533)
    -- ( 0.7124, 0.2402)
    -- ( 0.7053, 0.2686)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7573, 0.2817)
    -- ( 0.7646, 0.2533)
    -- ( 0.7124, 0.2402)
    -- ( 0.7053, 0.2686)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7393, 0.3502)
    -- ( 0.7456, 0.3216)
    -- ( 0.6931, 0.3101)
    -- ( 0.6868, 0.3387)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7393, 0.3502)
    -- ( 0.7456, 0.3216)
    -- ( 0.6931, 0.3101)
```

```
    -- ( 0.6868, 0.3387)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8114, 0.0963)
    -- ( 0.8188, 0.0679)
    -- ( 0.7668, 0.0543)
    -- ( 0.7594, 0.0826)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8114, 0.0963)
    -- ( 0.8188, 0.0679)
    -- ( 0.7668, 0.0543)
    -- ( 0.7594, 0.0826)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8247,-0.0115)
    -- ( 0.8312,-0.0401)
    -- ( 0.7788,-0.0521)
    -- ( 0.7723,-0.0235)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8247,-0.0115)
    -- ( 0.8312,-0.0401)
    -- ( 0.7788,-0.0521)
    -- ( 0.7723,-0.0235)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9279, 0.0392)
    -- ( 0.9358, 0.0110)
    -- ( 0.8842,-0.0036)
    -- ( 0.8762, 0.0245)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9279, 0.0392)
    -- ( 0.9358, 0.0110)
    -- ( 0.8842,-0.0036)
    -- ( 0.8762, 0.0245)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9473,-0.0199)
    -- ( 0.9500,-0.0490)
    -- ( 0.8965,-0.0540)
    -- ( 0.8939,-0.0248)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.9473,-0.0199)
    -- ( 0.9500,-0.0490)
    -- ( 0.8965,-0.0540)
    -- ( 0.8939,-0.0248)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8832, 0.1513)
    -- ( 0.8949, 0.1245)
    -- ( 0.8456, 0.1031)
    -- ( 0.8339, 0.1300)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8832, 0.1513)
    -- ( 0.8949, 0.1245)
    -- ( 0.8456, 0.1031)
    -- ( 0.8339, 0.1300)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8604, 0.2135)
    -- ( 0.8734, 0.1872)
    -- ( 0.8254, 0.1634)
    -- ( 0.8123, 0.1896)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8604, 0.2135)
    -- ( 0.8734, 0.1872)
    -- ( 0.8254, 0.1634)
    -- ( 0.8123, 0.1896)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7675, 0.2368)
    -- ( 0.7736, 0.2082)
    -- ( 0.7210, 0.1970)
    -- ( 0.7150, 0.2257)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7675, 0.2368)
    -- ( 0.7736, 0.2082)
    -- ( 0.7210, 0.1970)
    -- ( 0.7150, 0.2257)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7696,-0.1796)
    -- ( 0.7978,-0.1875)
    -- ( 0.7835,-0.2392)
    -- ( 0.7552,-0.2314)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7696,-0.1796)
    -- ( 0.7978,-0.1875)
    -- ( 0.7835,-0.2392)
    -- ( 0.7552,-0.2314)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7546,-0.0830)
    -- ( 0.7838,-0.0830)
    -- ( 0.7838,-0.1367)
    -- ( 0.7546,-0.1367)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7546,-0.0830)
    -- ( 0.7838,-0.0830)
    -- ( 0.7838,-0.1367)
    -- ( 0.7546,-0.1367)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7114,-0.1735)
    -- ( 0.7402,-0.1784)
    -- ( 0.7313,-0.2313)
    -- ( 0.7024,-0.2265)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7114,-0.1735)
    -- ( 0.7402,-0.1784)
    -- ( 0.7313,-0.2313)
    -- ( 0.7024,-0.2265)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6398,-0.0896)
    -- ( 0.6691,-0.0896)
    -- ( 0.6691,-0.1433)
    -- ( 0.6398,-0.1433)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6398,-0.0896)
    -- ( 0.6691,-0.0896)
    -- ( 0.6691,-0.1433)
    -- ( 0.6398,-0.1433)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5390,-0.1093)
```

```
    -- ( 0.5377,-0.0801)
    -- ( 0.5913,-0.0776)
    -- ( 0.5927,-0.1069)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5390,-0.1093)
    -- ( 0.5377,-0.0801)
    -- ( 0.5913,-0.0776)
    -- ( 0.5927,-0.1069)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5171,-0.2250)
    -- ( 0.5252,-0.1968)
    -- ( 0.5767,-0.2117)
    -- ( 0.5687,-0.2399)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5171,-0.2250)
    -- ( 0.5252,-0.1968)
    -- ( 0.5767,-0.2117)
    -- ( 0.5687,-0.2399)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5024,-0.2807)
    -- ( 0.5066,-0.2517)
    -- ( 0.5597,-0.2597)
    -- ( 0.5555,-0.2887)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5024,-0.2807)
    -- ( 0.5066,-0.2517)
    -- ( 0.5597,-0.2597)
    -- ( 0.5555,-0.2887)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6783,-0.2717)
    -- ( 0.7056,-0.2824)
    -- ( 0.6858,-0.3324)
    -- ( 0.6585,-0.3216)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6783,-0.2717)
    -- ( 0.7056,-0.2824)
    -- ( 0.6858,-0.3324)
    -- ( 0.6585,-0.3216)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4010,-0.3903)
    -- ( 0.4019,-0.3609)
    -- ( 0.4556,-0.3627)
    -- ( 0.4547,-0.3921)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4010,-0.3903)
    -- ( 0.4019,-0.3609)
    -- ( 0.4556,-0.3627)
    -- ( 0.4547,-0.3921)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6576,-0.1610)
    -- ( 0.6852,-0.1708)
    -- ( 0.6672,-0.2214)
    -- ( 0.6396,-0.2116)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6576,-0.1610)
    -- ( 0.6852,-0.1708)
    -- ( 0.6672,-0.2214)
    -- ( 0.6396,-0.2116)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4024,-0.7175)
    -- ( 0.4484,-0.7175)
    -- ( 0.4484,-0.7785)
    -- ( 0.4024,-0.7785)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4024,-0.7175)
    -- ( 0.4484,-0.7175)
    -- ( 0.4484,-0.7785)
    -- ( 0.4024,-0.7785)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3999,-0.7917)
    -- (-0.3540,-0.7917)
    -- (-0.3540,-0.8527)
    -- (-0.3999,-0.8527)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3999,-0.7917)
    -- (-0.3540,-0.7917)
```

```
    -- (-0.3540,-0.8527)
    -- (-0.3999,-0.8527)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7770,-0.2886)
    -- (-0.7319,-0.2679)
    -- (-0.6985,-0.3406)
    -- (-0.7437,-0.3613)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7770,-0.2886)
    -- (-0.7319,-0.2679)
    -- (-0.6985,-0.3406)
    -- (-0.7437,-0.3613)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1783,-0.5367)
    -- (-0.1339,-0.5483)
    -- (-0.1492,-0.6074)
    -- (-0.1937,-0.5958)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1783,-0.5367)
    -- (-0.1339,-0.5483)
    -- (-0.1492,-0.6074)
    -- (-0.1937,-0.5958)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3106,-0.7770)
    -- ( 0.3564,-0.7770)
    -- ( 0.3564,-0.8380)
    -- ( 0.3106,-0.8380)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3106,-0.7770)
    -- ( 0.3564,-0.7770)
    -- ( 0.3564,-0.8380)
    -- ( 0.3106,-0.8380)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0626,-0.7954)
    -- (-0.0196,-0.8113)
    -- (-0.0406,-0.8686)
    -- (-0.0837,-0.8527)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.0626,-0.7954)
    -- (-0.0196,-0.8113)
    -- (-0.0406,-0.8686)
    -- (-0.0837,-0.8527)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0570,-0.7843)
    -- ( 0.1025,-0.7910)
    -- ( 0.0936,-0.8514)
    -- ( 0.0481,-0.8446)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0570,-0.7843)
    -- ( 0.1025,-0.7910)
    -- ( 0.0936,-0.8514)
    -- ( 0.0481,-0.8446)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0906,-0.6908)
    -- ( 0.1345,-0.7046)
    -- ( 0.1161,-0.7629)
    -- ( 0.0723,-0.7490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0906,-0.6908)
    -- ( 0.1345,-0.7046)
    -- ( 0.1161,-0.7629)
    -- ( 0.0723,-0.7490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4731,-0.7998)
    -- (-0.4283,-0.7899)
    -- (-0.4151,-0.8496)
    -- (-0.4600,-0.8595)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4731,-0.7998)
    -- (-0.4283,-0.7899)
    -- (-0.4151,-0.8496)
    -- (-0.4600,-0.8595)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4125,-0.0879)
    -- ( 0.4578,-0.0951)
    -- ( 0.4483,-0.1553)
```

```
    -- ( 0.4029,-0.1481)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4125,-0.0879)
    -- ( 0.4578,-0.0951)
    -- ( 0.4483,-0.1553)
    -- ( 0.4029,-0.1481)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2078, 0.8568)
    -- ( 0.2536, 0.8583)
    -- ( 0.2555, 0.7973)
    -- ( 0.2097, 0.7958)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2078, 0.8568)
    -- ( 0.2536, 0.8583)
    -- ( 0.2555, 0.7973)
    -- ( 0.2097, 0.7958)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5829,-0.2493)
    -- ( 0.6289,-0.2493)
    -- ( 0.6289,-0.3104)
    -- ( 0.5829,-0.3104)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5829,-0.2493)
    -- ( 0.6289,-0.2493)
    -- ( 0.6289,-0.3104)
    -- ( 0.5829,-0.3104)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2923,-0.1390)
    -- ( 0.3109,-0.0970)
    -- ( 0.3667,-0.1218)
    -- ( 0.3481,-0.1638)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2923,-0.1390)
    -- ( 0.3109,-0.0970)
    -- ( 0.3667,-0.1218)
    -- ( 0.3481,-0.1638)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.6866,-0.0789)
    -- ( 0.7324,-0.0789)
    -- ( 0.7324,-0.1400)
    -- ( 0.6866,-0.1400)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6866,-0.0789)
    -- ( 0.7324,-0.0789)
    -- ( 0.7324,-0.1400)
    -- ( 0.6866,-0.1400)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8206,-0.0922)
    -- ( 0.8649,-0.1044)
    -- ( 0.8487,-0.1632)
    -- ( 0.8045,-0.1511)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8206,-0.0922)
    -- ( 0.8649,-0.1044)
    -- ( 0.8487,-0.1632)
    -- ( 0.8045,-0.1511)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3075, 0.5809)
    -- (-0.2648, 0.5640)
    -- (-0.2872, 0.5072)
    -- (-0.3299, 0.5241)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3075, 0.5809)
    -- (-0.2648, 0.5640)
    -- (-0.2872, 0.5072)
    -- (-0.3299, 0.5241)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7746, 0.3900)
    -- (-0.7312, 0.3750)
    -- (-0.7511, 0.3173)
    -- (-0.7945, 0.3322)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7746, 0.3900)
    -- (-0.7312, 0.3750)
    -- (-0.7511, 0.3173)
    -- (-0.7945, 0.3322)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8224, 0.3024)
    -- (-0.7807, 0.2831)
    -- (-0.8064, 0.2277)
    -- (-0.8481, 0.2470)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8224, 0.3024)
    -- (-0.7807, 0.2831)
    -- (-0.8064, 0.2277)
    -- (-0.8481, 0.2470)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7172, 0.2999)
    -- (-0.6959, 0.3406)
    -- (-0.6418, 0.3122)
    -- (-0.6632, 0.2715)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7172, 0.2999)
    -- (-0.6959, 0.3406)
    -- (-0.6418, 0.3122)
    -- (-0.6632, 0.2715)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7505, 0.2368)
    -- (-0.7273, 0.2764)
    -- (-0.6746, 0.2456)
    -- (-0.6979, 0.2060)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7505, 0.2368)
    -- (-0.7273, 0.2764)
    -- (-0.6746, 0.2456)
    -- (-0.6979, 0.2060)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7726, 0.1668)
    -- (-0.7521, 0.2080)
    -- (-0.6975, 0.1808)
    -- (-0.7180, 0.1396)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7726, 0.1668)
```

```
    -- (-0.7521, 0.2080)
    -- (-0.6975, 0.1808)
    -- (-0.7180, 0.1396)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8067, 0.1033)
    -- (-0.7877, 0.1452)
    -- (-0.7322, 0.1199)
    -- (-0.7512, 0.0781)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8067, 0.1033)
    -- (-0.7877, 0.1452)
    -- (-0.7322, 0.1199)
    -- (-0.7512, 0.0781)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8292, 0.0434)
    -- (-0.8106, 0.0854)
    -- (-0.7548, 0.0608)
    -- (-0.7733, 0.0188)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8292, 0.0434)
    -- (-0.8106, 0.0854)
    -- (-0.7548, 0.0608)
    -- (-0.7733, 0.0188)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8479,-0.0238)
    -- (-0.8336, 0.0199)
    -- (-0.7757, 0.0009)
    -- (-0.7899,-0.0427)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8479,-0.0238)
    -- (-0.8336, 0.0199)
    -- (-0.7757, 0.0009)
    -- (-0.7899,-0.0427)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9015,-0.0795)
    -- (-0.8746,-0.0423)
    -- (-0.8252,-0.0782)
    -- (-0.8521,-0.1153)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9015,-0.0795)
    -- (-0.8746,-0.0423)
    -- (-0.8252,-0.0782)
    -- (-0.8521,-0.1153)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5616,-0.6142)
    -- (-0.5431,-0.6563)
    -- (-0.5990,-0.6808)
    -- (-0.6175,-0.6387)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5616,-0.6142)
    -- (-0.5431,-0.6563)
    -- (-0.5990,-0.6808)
    -- (-0.6175,-0.6387)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0094,-0.6230)
    -- ( 0.0047,-0.5793)
    -- ( 0.0627,-0.5978)
    -- ( 0.0487,-0.6416)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0094,-0.6230)
    -- ( 0.0047,-0.5793)
    -- ( 0.0627,-0.5978)
    -- ( 0.0487,-0.6416)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0303,-0.4683)
    -- ( 0.0443,-0.4246)
    -- ( 0.1024,-0.4432)
    -- ( 0.0884,-0.4869)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0303,-0.4683)
    -- ( 0.0443,-0.4246)
    -- ( 0.1024,-0.4432)
    -- ( 0.0884,-0.4869)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2507,-0.3956)
    -- (-0.2367,-0.3518)
```

```
    -- (-0.1786,-0.3704)
    -- (-0.1926,-0.4142)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2507,-0.3956)
    -- (-0.2367,-0.3518)
    -- (-0.1786,-0.3704)
    -- (-0.1926,-0.4142)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3208,-0.3936)
    -- (-0.3069,-0.3498)
    -- (-0.2487,-0.3684)
    -- (-0.2627,-0.4122)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3208,-0.3936)
    -- (-0.3069,-0.3498)
    -- (-0.2487,-0.3684)
    -- (-0.2627,-0.4122)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1634,-0.1430)
    -- ( 0.1790,-0.0997)
    -- ( 0.2365,-0.1205)
    -- ( 0.2209,-0.1637)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1634,-0.1430)
    -- ( 0.1790,-0.0997)
    -- ( 0.2365,-0.1205)
    -- ( 0.2209,-0.1637)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1520,-0.2030)
    -- ( 0.1715,-0.1614)
    -- ( 0.2268,-0.1873)
    -- ( 0.2072,-0.2289)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1520,-0.2030)
    -- ( 0.1715,-0.1614)
    -- ( 0.2268,-0.1873)
    -- ( 0.2072,-0.2289)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.0852,-0.3696)
    -- ( 0.1047,-0.3280)
    -- ( 0.1600,-0.3540)
    -- ( 0.1404,-0.3956)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0852,-0.3696)
    -- ( 0.1047,-0.3280)
    -- ( 0.1600,-0.3540)
    -- ( 0.1404,-0.3956)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0197,-0.2063)
    -- ( 0.0392,-0.1647)
    -- ( 0.0944,-0.1907)
    -- ( 0.0750,-0.2323)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0197,-0.2063)
    -- ( 0.0392,-0.1647)
    -- ( 0.0944,-0.1907)
    -- ( 0.0750,-0.2323)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3100, 0.7769)
    -- ( 0.3513, 0.7971)
    -- ( 0.3781, 0.7423)
    -- ( 0.3369, 0.7221)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3100, 0.7769)
    -- ( 0.3513, 0.7971)
    -- ( 0.3781, 0.7423)
    -- ( 0.3369, 0.7221)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5097, 0.3286)
    -- ( 0.5510, 0.3488)
    -- ( 0.5778, 0.2940)
    -- ( 0.5366, 0.2738)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5097, 0.3286)
    -- ( 0.5510, 0.3488)
    -- ( 0.5778, 0.2940)
```

```
    -- ( 0.5366, 0.2738)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4014, 0.8173)
    -- ( 0.4429, 0.8369)
    -- ( 0.4689, 0.7817)
    -- ( 0.4274, 0.7621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4014, 0.8173)
    -- ( 0.4429, 0.8369)
    -- ( 0.4689, 0.7817)
    -- ( 0.4274, 0.7621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2627, 0.7599)
    -- ( 0.3055, 0.7765)
    -- ( 0.3276, 0.7196)
    -- ( 0.2848, 0.7030)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2627, 0.7599)
    -- ( 0.3055, 0.7765)
    -- ( 0.3276, 0.7196)
    -- ( 0.2848, 0.7030)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1763, 0.7193)
    -- ( 0.2174, 0.7400)
    -- ( 0.2448, 0.6855)
    -- ( 0.2038, 0.6648)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1763, 0.7193)
    -- ( 0.2174, 0.7400)
    -- ( 0.2448, 0.6855)
    -- ( 0.2038, 0.6648)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0655, 0.4707)
    -- (-0.0222, 0.4555)
    -- (-0.0424, 0.3979)
    -- (-0.0858, 0.4131)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.0655, 0.4707)
    -- (-0.0222, 0.4555)
    -- (-0.0424, 0.3979)
    -- (-0.0858, 0.4131)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0019, 0.5606)
    -- ( 0.0452, 0.5454)
    -- ( 0.0251, 0.4878)
    -- (-0.0183, 0.5030)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0019, 0.5606)
    -- ( 0.0452, 0.5454)
    -- ( 0.0251, 0.4878)
    -- (-0.0183, 0.5030)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0634, 0.0555)
    -- ( 0.1067, 0.0403)
    -- ( 0.0865,-0.0174)
    -- ( 0.0432,-0.0022)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0634, 0.0555)
    -- ( 0.1067, 0.0403)
    -- ( 0.0865,-0.0174)
    -- ( 0.0432,-0.0022)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0445, 0.0687)
    -- (-0.0010, 0.0535)
    -- (-0.0213,-0.0041)
    -- (-0.0646, 0.0110)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0445, 0.0687)
    -- (-0.0010, 0.0535)
    -- (-0.0213,-0.0041)
    -- (-0.0646, 0.0110)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0541, 0.5519)
    -- ( 0.0966, 0.5344)
    -- ( 0.0732, 0.4779)
    -- ( 0.0308, 0.4956)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0541, 0.5519)
    -- ( 0.0966, 0.5344)
    -- ( 0.0732, 0.4779)
    -- ( 0.0308, 0.4956)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0096, 0.8274)
    -- ( 0.0163, 0.7820)
    -- (-0.0441, 0.7731)
    -- (-0.0508, 0.8185)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0096, 0.8274)
    -- ( 0.0163, 0.7820)
    -- (-0.0441, 0.7731)
    -- (-0.0508, 0.8185)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0878, 0.6237)
    -- (-0.0810, 0.5783)
    -- (-0.1415, 0.5693)
    -- (-0.1482, 0.6147)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0878, 0.6237)
    -- (-0.0810, 0.5783)
    -- (-0.1415, 0.5693)
    -- (-0.1482, 0.6147)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0678, 0.8193)
    -- (-0.0575, 0.7745)
    -- (-0.1168, 0.7608)
    -- (-0.1273, 0.8055)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0678, 0.8193)
    -- (-0.0575, 0.7745)
    -- (-0.1168, 0.7608)
    -- (-0.1273, 0.8055)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1958, 0.8007)
```

```
    -- (-0.1517, 0.7877)
    -- (-0.1688, 0.7292)
    -- (-0.2129, 0.7420)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1958, 0.8007)
    -- (-0.1517, 0.7877)
    -- (-0.1688, 0.7292)
    -- (-0.2129, 0.7420)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6001, 0.0672)
    -- ( 0.6452, 0.0758)
    -- ( 0.6566, 0.0159)
    -- ( 0.6115, 0.0072)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6001, 0.0672)
    -- ( 0.6452, 0.0758)
    -- ( 0.6566, 0.0159)
    -- ( 0.6115, 0.0072)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8357, 0.2798)
    -- ( 0.8514, 0.2365)
    -- ( 0.7940, 0.2158)
    -- ( 0.7783, 0.2591)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8357, 0.2798)
    -- ( 0.8514, 0.2365)
    -- ( 0.7940, 0.2158)
    -- ( 0.7783, 0.2591)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4450, 0.0292)
    -- ( 0.4606,-0.0141)
    -- ( 0.4032,-0.0348)
    -- ( 0.3876, 0.0085)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4450, 0.0292)
    -- ( 0.4606,-0.0141)
    -- ( 0.4032,-0.0348)
    -- ( 0.3876, 0.0085)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9043, 0.1125)
    -- ( 0.9184, 0.0687)
    -- ( 0.8603, 0.0500)
    -- ( 0.8462, 0.0937)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9043, 0.1125)
    -- ( 0.9184, 0.0687)
    -- ( 0.8603, 0.0500)
    -- ( 0.8462, 0.0937)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7148,-0.2814)
    -- ( 0.7591,-0.2935)
    -- ( 0.7430,-0.3524)
    -- ( 0.6987,-0.3402)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7148,-0.2814)
    -- ( 0.7591,-0.2935)
    -- ( 0.7430,-0.3524)
    -- ( 0.6987,-0.3402)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5891,-0.1425)
    -- ( 0.5806,-0.1876)
    -- ( 0.5207,-0.1764)
    -- ( 0.5291,-0.1313)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5891,-0.1425)
    -- ( 0.5806,-0.1876)
    -- ( 0.5207,-0.1764)
    -- ( 0.5291,-0.1313)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5865, 0.0684)
    -- ( 0.5782, 0.0233)
    -- ( 0.5181, 0.0345)
    -- ( 0.5266, 0.0796)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5865, 0.0684)
    -- ( 0.5782, 0.0233)
```

```
    -- ( 0.5181, 0.0345)
    -- ( 0.5266, 0.0796)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4044,-0.3422)
    -- ( 0.4189,-0.2987)
    -- ( 0.4768,-0.3180)
    -- ( 0.4623,-0.3616)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4044,-0.3422)
    -- ( 0.4189,-0.2987)
    -- ( 0.4768,-0.3180)
    -- ( 0.4623,-0.3616)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665,-0.7188)
    -- ( 0.5125,-0.7188)
    -- ( 0.5125,-0.7799)
    -- ( 0.4665,-0.7799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665,-0.7188)
    -- ( 0.5125,-0.7188)
    -- ( 0.5125,-0.7799)
    -- ( 0.4665,-0.7799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1285,-0.5747)
    -- (-0.0826,-0.5747)
    -- (-0.0826,-0.6356)
    -- (-0.1285,-0.6356)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1285,-0.5747)
    -- (-0.0826,-0.5747)
    -- (-0.0826,-0.6356)
    -- (-0.1285,-0.6356)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2861,-0.6694)
    -- (-0.2789,-0.6240)
    -- (-0.2186,-0.6336)
    -- (-0.2258,-0.6789)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.2861,-0.6694)
    -- (-0.2789,-0.6240)
    -- (-0.2186,-0.6336)
    -- (-0.2258,-0.6789)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1486,-0.3725)
    -- (-0.1414,-0.3271)
    -- (-0.0811,-0.3367)
    -- (-0.0883,-0.3820)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1486,-0.3725)
    -- (-0.1414,-0.3271)
    -- (-0.0811,-0.3367)
    -- (-0.0883,-0.3820)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3576,-0.5916)
    -- (-0.3319,-0.6297)
    -- (-0.3826,-0.6638)
    -- (-0.4082,-0.6256)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3576,-0.5916)
    -- (-0.3319,-0.6297)
    -- (-0.3826,-0.6638)
    -- (-0.4082,-0.6256)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5468,-0.2716)
    -- (-0.5213,-0.3098)
    -- (-0.5719,-0.3438)
    -- (-0.5976,-0.3056)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5468,-0.2716)
    -- (-0.5213,-0.3098)
    -- (-0.5719,-0.3438)
    -- (-0.5976,-0.3056)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4969,-0.5222)
    -- (-0.4767,-0.5634)
    -- (-0.5315,-0.5902)
```

```
    -- (-0.5518,-0.5490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4969,-0.5222)
    -- (-0.4767,-0.5634)
    -- (-0.5315,-0.5902)
    -- (-0.5518,-0.5490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3963,-0.6922)
    -- (-0.3778,-0.7343)
    -- (-0.4338,-0.7588)
    -- (-0.4522,-0.7168)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3963,-0.6922)
    -- (-0.3778,-0.7343)
    -- (-0.4338,-0.7588)
    -- (-0.4522,-0.7168)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6145,-0.5157)
    -- (-0.5944,-0.5570)
    -- (-0.6493,-0.5836)
    -- (-0.6694,-0.5423)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6145,-0.5157)
    -- (-0.5944,-0.5570)
    -- (-0.6493,-0.5836)
    -- (-0.6694,-0.5423)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8791,-0.2053)
    -- (-0.8402,-0.1810)
    -- (-0.8079,-0.2327)
    -- (-0.8468,-0.2571)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8791,-0.2053)
    -- (-0.8402,-0.1810)
    -- (-0.8079,-0.2327)
    -- (-0.8468,-0.2571)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.9144, 0.1039)
    -- (-0.8919, 0.1439)
    -- (-0.8388, 0.1140)
    -- (-0.8613, 0.0740)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9144, 0.1039)
    -- (-0.8919, 0.1439)
    -- (-0.8388, 0.1140)
    -- (-0.8613, 0.0740)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4095, 0.2277)
    -- (-0.3639, 0.2229)
    -- (-0.3703, 0.1622)
    -- (-0.4159, 0.1670)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4095, 0.2277)
    -- (-0.3639, 0.2229)
    -- (-0.3703, 0.1622)
    -- (-0.4159, 0.1670)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3590, 0.4200)
    -- (-0.3365, 0.4600)
    -- (-0.2833, 0.4302)
    -- (-0.3058, 0.3901)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3590, 0.4200)
    -- (-0.3365, 0.4600)
    -- (-0.2833, 0.4302)
    -- (-0.3058, 0.3901)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0764, 0.3204)
    -- (-0.0539, 0.3604)
    -- (-0.0007, 0.3306)
    -- (-0.0232, 0.2905)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0764, 0.3204)
    -- (-0.0539, 0.3604)
    -- (-0.0007, 0.3306)
    -- (-0.0232, 0.2905)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1364, 0.0430)
    -- (-0.1139, 0.0831)
    -- (-0.0607, 0.0532)
    -- (-0.0832, 0.0131)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1364, 0.0430)
    -- (-0.1139, 0.0831)
    -- (-0.0607, 0.0532)
    -- (-0.0832, 0.0131)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1269, 0.1239)
    -- (-0.1149, 0.1681)
    -- (-0.0560, 0.1521)
    -- (-0.0681, 0.1078)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1269, 0.1239)
    -- (-0.1149, 0.1681)
    -- (-0.0560, 0.1521)
    -- (-0.0681, 0.1078)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6443,-0.1022)
    -- (-0.6321,-0.0579)
    -- (-0.5733,-0.0740)
    -- (-0.5854,-0.1183)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6443,-0.1022)
    -- (-0.6321,-0.0579)
    -- (-0.5733,-0.0740)
    -- (-0.5854,-0.1183)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6032, 0.2357)
    -- (-0.5912, 0.2800)
    -- (-0.5323, 0.2639)
    -- (-0.5443, 0.2196)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6032, 0.2357)
```

```
    -- (-0.5912, 0.2800)
    -- (-0.5323, 0.2639)
    -- (-0.5443, 0.2196)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7230, 0.0020)
    -- (-0.7026, 0.0432)
    -- (-0.6479, 0.0162)
    -- (-0.6682,-0.0250)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7230, 0.0020)
    -- (-0.7026, 0.0432)
    -- (-0.6479, 0.0162)
    -- (-0.6682,-0.0250)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5055, 0.2596)
    -- (-0.4629, 0.2423)
    -- (-0.4859, 0.1858)
    -- (-0.5285, 0.2031)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5055, 0.2596)
    -- (-0.4629, 0.2423)
    -- (-0.4859, 0.1858)
    -- (-0.5285, 0.2031)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1337, 0.3296)
    -- ( 0.1283, 0.2840)
    -- ( 0.0677, 0.2911)
    -- ( 0.0731, 0.3367)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1337, 0.3296)
    -- ( 0.1283, 0.2840)
    -- ( 0.0677, 0.2911)
    -- ( 0.0731, 0.3367)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1476, 0.4414)
    -- ( 0.1506, 0.3955)
    -- ( 0.0897, 0.3916)
    -- ( 0.0867, 0.4375)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1476, 0.4414)
    -- ( 0.1506, 0.3955)
    -- ( 0.0897, 0.3916)
    -- ( 0.0867, 0.4375)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0539,-0.1542)
    -- ( 0.0687,-0.1107)
    -- ( 0.1264,-0.1304)
    -- ( 0.1116,-0.1738)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0539,-0.1542)
    -- ( 0.0687,-0.1107)
    -- ( 0.1264,-0.1304)
    -- ( 0.1116,-0.1738)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0962,-0.1436)
    -- (-0.0814,-0.1001)
    -- (-0.0237,-0.1198)
    -- (-0.0385,-0.1633)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0962,-0.1436)
    -- (-0.0814,-0.1001)
    -- (-0.0237,-0.1198)
    -- (-0.0385,-0.1633)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1683,-0.0622)
    -- (-0.1535,-0.0188)
    -- (-0.0958,-0.0385)
    -- (-0.1106,-0.0820)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1683,-0.0622)
    -- (-0.1535,-0.0188)
    -- (-0.0958,-0.0385)
    -- (-0.1106,-0.0820)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1842,-0.1310)
    -- (-0.1694,-0.0876)
```

```
    -- (-0.1116,-0.1073)
    -- (-0.1264,-0.1508)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1842,-0.1310)
    -- (-0.1694,-0.0876)
    -- (-0.1116,-0.1073)
    -- (-0.1264,-0.1508)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1167,-0.5813)
    -- ( 0.1315,-0.5379)
    -- ( 0.1892,-0.5576)
    -- ( 0.1744,-0.6011)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1167,-0.5813)
    -- ( 0.1315,-0.5379)
    -- ( 0.1892,-0.5576)
    -- ( 0.1744,-0.6011)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0916,-0.6322)
    -- ( 0.1064,-0.5888)
    -- ( 0.1642,-0.6085)
    -- ( 0.1493,-0.6520)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0916,-0.6322)
    -- ( 0.1064,-0.5888)
    -- ( 0.1642,-0.6085)
    -- ( 0.1493,-0.6520)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3791,-0.5978)
    -- ( 0.3941,-0.5544)
    -- ( 0.4518,-0.5741)
    -- ( 0.4369,-0.6176)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3791,-0.5978)
    -- ( 0.3941,-0.5544)
    -- ( 0.4518,-0.5741)
    -- ( 0.4369,-0.6176)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.4116,-0.5397)
    -- ( 0.4392,-0.5029)
    -- ( 0.4880,-0.5396)
    -- ( 0.4604,-0.5764)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4116,-0.5397)
    -- ( 0.4392,-0.5029)
    -- ( 0.4880,-0.5396)
    -- ( 0.4604,-0.5764)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2218,-0.5853)
    -- ( 0.2366,-0.5418)
    -- ( 0.2944,-0.5615)
    -- ( 0.2796,-0.6051)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2218,-0.5853)
    -- ( 0.2366,-0.5418)
    -- ( 0.2944,-0.5615)
    -- ( 0.2796,-0.6051)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3094, 0.1262)
    -- ( 0.3519, 0.1085)
    -- ( 0.3284, 0.0522)
    -- ( 0.2860, 0.0698)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3094, 0.1262)
    -- ( 0.3519, 0.1085)
    -- ( 0.3284, 0.0522)
    -- ( 0.2860, 0.0698)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2797, 0.1784)
    -- ( 0.3041, 0.1395)
    -- ( 0.2524, 0.1070)
    -- ( 0.2280, 0.1459)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2797, 0.1784)
    -- ( 0.3041, 0.1395)
    -- ( 0.2524, 0.1070)
```

```
    -- ( 0.2280, 0.1459)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7950, 0.1548)
    -- ( 0.8065, 0.1103)
    -- ( 0.7475, 0.0949)
    -- ( 0.7359, 0.1394)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7950, 0.1548)
    -- ( 0.8065, 0.1103)
    -- ( 0.7475, 0.0949)
    -- ( 0.7359, 0.1394)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5739, 0.6926)
    -- ( 0.5961, 0.6525)
    -- ( 0.5427, 0.6229)
    -- ( 0.5205, 0.6632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5739, 0.6926)
    -- ( 0.5961, 0.6525)
    -- ( 0.5427, 0.6229)
    -- ( 0.5205, 0.6632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6499, 0.5535)
    -- ( 0.6714, 0.5129)
    -- ( 0.6174, 0.4844)
    -- ( 0.5959, 0.5250)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6499, 0.5535)
    -- ( 0.6714, 0.5129)
    -- ( 0.6174, 0.4844)
    -- ( 0.5959, 0.5250)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4994, 0.7998)
    -- (-0.4558, 0.8143)
    -- (-0.4364, 0.7565)
    -- (-0.4800, 0.7419)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.4994, 0.7998)
    -- (-0.4558, 0.8143)
    -- (-0.4364, 0.7565)
    -- (-0.4800, 0.7419)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3350, 0.7630)
    -- (-0.2917, 0.7475)
    -- (-0.3125, 0.6901)
    -- (-0.3558, 0.7057)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3350, 0.7630)
    -- (-0.2917, 0.7475)
    -- (-0.3125, 0.6901)
    -- (-0.3558, 0.7057)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4472, 0.6282)
    -- (-0.4040, 0.6124)
    -- (-0.4252, 0.5551)
    -- (-0.4683, 0.5710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4472, 0.6282)
    -- (-0.4040, 0.6124)
    -- (-0.4252, 0.5551)
    -- (-0.4683, 0.5710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5200, 0.6603)
    -- (-0.4792, 0.6394)
    -- (-0.5070, 0.5851)
    -- (-0.5480, 0.6061)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5200, 0.6603)
    -- (-0.4792, 0.6394)
    -- (-0.5070, 0.5851)
    -- (-0.5480, 0.6061)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5301, 0.5359)
    -- (-0.4915, 0.5109)
    -- (-0.5247, 0.4597)
    -- (-0.5633, 0.4846)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5301, 0.5359)
    -- (-0.4915, 0.5109)
    -- (-0.5247, 0.4597)
    -- (-0.5633, 0.4846)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6860, 0.5063)
    -- (-0.6426, 0.4914)
    -- (-0.6624, 0.4337)
    -- (-0.7058, 0.4486)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6860, 0.5063)
    -- (-0.6426, 0.4914)
    -- (-0.6624, 0.4337)
    -- (-0.7058, 0.4486)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5849, 0.4574)
    -- (-0.5414, 0.4425)
    -- (-0.5613, 0.3847)
    -- (-0.6047, 0.3997)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5849, 0.4574)
    -- (-0.5414, 0.4425)
    -- (-0.5613, 0.3847)
    -- (-0.6047, 0.3997)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4531,-0.1794)
    -- (-0.4094,-0.1941)
    -- (-0.4289,-0.2518)
    -- (-0.4725,-0.2372)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4531,-0.1794)
    -- (-0.4094,-0.1941)
    -- (-0.4289,-0.2518)
    -- (-0.4725,-0.2372)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3573, 0.0277)
```

```
    -- (-0.3138, 0.0131)
    -- (-0.3333,-0.0447)
    -- (-0.3768,-0.0300)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3573, 0.0277)
    -- (-0.3138, 0.0131)
    -- (-0.3333,-0.0447)
    -- (-0.3768,-0.0300)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3354,-0.4695)
    -- ( 0.3141,-0.5101)
    -- ( 0.2601,-0.4816)
    -- ( 0.2815,-0.4410)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3354,-0.4695)
    -- ( 0.3141,-0.5101)
    -- ( 0.2601,-0.4816)
    -- ( 0.2815,-0.4410)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6206,-0.4111)
    -- ( 0.6599,-0.4350)
    -- ( 0.6281,-0.4872)
    -- ( 0.5889,-0.4632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6206,-0.4111)
    -- ( 0.6599,-0.4350)
    -- ( 0.6281,-0.4872)
    -- ( 0.5889,-0.4632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6061,-0.5834)
    -- ( 0.6495,-0.5984)
    -- ( 0.6296,-0.6561)
    -- ( 0.5861,-0.6411)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6061,-0.5834)
    -- ( 0.6495,-0.5984)
    -- ( 0.6296,-0.6561)
    -- ( 0.5861,-0.6411)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2902, 0.2707)
    -- ( 0.3361, 0.2673)
    -- ( 0.3317, 0.2065)
    -- ( 0.2859, 0.2098)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2902, 0.2707)
    -- ( 0.3361, 0.2673)
    -- ( 0.3317, 0.2065)
    -- ( 0.2859, 0.2098)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2215, 0.2766)
    -- ( 0.2673, 0.2733)
    -- ( 0.2630, 0.2124)
    -- ( 0.2172, 0.2157)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2215, 0.2766)
    -- ( 0.2673, 0.2733)
    -- ( 0.2630, 0.2124)
    -- ( 0.2172, 0.2157)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0159, 0.4498)
    -- ( 0.0299, 0.4466)
    -- ( 0.0256, 0.3857)
    -- (-0.0202, 0.3889)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0159, 0.4498)
    -- ( 0.0299, 0.4466)
    -- ( 0.0256, 0.3857)
    -- (-0.0202, 0.3889)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0377, 0.1701)
    -- ( 0.0835, 0.1668)
    -- ( 0.0791, 0.1060)
    -- ( 0.0333, 0.1092)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0377, 0.1701)
    -- ( 0.0835, 0.1668)
```

```
    -- ( 0.0791, 0.1060)
    -- ( 0.0333, 0.1092)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0944, 0.1648)
    -- ( 0.1403, 0.1657)
    -- ( 0.1415, 0.1047)
    -- ( 0.0955, 0.1038)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0944, 0.1648)
    -- ( 0.1403, 0.1657)
    -- ( 0.1415, 0.1047)
    -- ( 0.0955, 0.1038)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2434, 0.4429)
    -- ( 0.2698, 0.4054)
    -- ( 0.2199, 0.3702)
    -- ( 0.1935, 0.4077)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2434, 0.4429)
    -- ( 0.2698, 0.4054)
    -- ( 0.2199, 0.3702)
    -- ( 0.1935, 0.4077)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4777, 0.5914)
    -- ( 0.4980, 0.5501)
    -- ( 0.4432, 0.5232)
    -- ( 0.4229, 0.5644)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4777, 0.5914)
    -- ( 0.4980, 0.5501)
    -- ( 0.4432, 0.5232)
    -- ( 0.4229, 0.5644)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4936, 0.5331)
    -- ( 0.5191, 0.4949)
    -- ( 0.4683, 0.4611)
    -- ( 0.4428, 0.4993)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.4936, 0.5331)
    -- ( 0.5191, 0.4949)
    -- ( 0.4683, 0.4611)
    -- ( 0.4428, 0.4993)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4667, 0.4393)
    -- ( 0.4871, 0.3980)
    -- ( 0.4323, 0.3711)
    -- ( 0.4120, 0.4123)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4667, 0.4393)
    -- ( 0.4871, 0.3980)
    -- ( 0.4323, 0.3711)
    -- ( 0.4120, 0.4123)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2446,-0.1495)
    -- (-0.2153,-0.1488)
    -- (-0.2138,-0.2024)
    -- (-0.2431,-0.2032)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2446,-0.1495)
    -- (-0.2153,-0.1488)
    -- (-0.2138,-0.2024)
    -- (-0.2431,-0.2032)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1018, 0.2179)
    -- (-0.0915, 0.2454)
    -- (-0.0412, 0.2264)
    -- (-0.0516, 0.1989)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1018, 0.2179)
    -- (-0.0915, 0.2454)
    -- (-0.0412, 0.2264)
    -- (-0.0516, 0.1989)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4189, 0.2515)
    -- ( 0.4645, 0.2567)
    -- ( 0.4714, 0.1960)
```

```
    -- ( 0.4257, 0.1909)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4189, 0.2515)
    -- ( 0.4645, 0.2567)
    -- ( 0.4714, 0.1960)
    -- ( 0.4257, 0.1909)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5784, 0.2650)
    -- ( 0.6240, 0.2702)
    -- ( 0.6308, 0.2095)
    -- ( 0.5852, 0.2043)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5784, 0.2650)
    -- ( 0.6240, 0.2702)
    -- ( 0.6308, 0.2095)
    -- ( 0.5852, 0.2043)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5509, 0.4874)
    -- ( 0.5966, 0.4925)
    -- ( 0.6034, 0.4319)
    -- ( 0.5577, 0.4267)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5509, 0.4874)
    -- ( 0.5966, 0.4925)
    -- ( 0.6034, 0.4319)
    -- ( 0.5577, 0.4267)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1390, 0.6195)
    -- ( 0.1654, 0.5820)
    -- ( 0.1155, 0.5468)
    -- ( 0.0890, 0.5843)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1390, 0.6195)
    -- ( 0.1654, 0.5820)
    -- ( 0.1155, 0.5468)
    -- ( 0.0890, 0.5843)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.1780,-0.4082)
    -- (-0.1533,-0.3695)
    -- (-0.1018,-0.4023)
    -- (-0.1265,-0.4410)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1780,-0.4082)
    -- (-0.1533,-0.3695)
    -- (-0.1018,-0.4023)
    -- (-0.1265,-0.4410)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2611,-0.2396)
    -- (-0.2175,-0.2543)
    -- (-0.2370,-0.3121)
    -- (-0.2805,-0.2974)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2611,-0.2396)
    -- (-0.2175,-0.2543)
    -- (-0.2370,-0.3121)
    -- (-0.2805,-0.2974)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1640,-0.8299)
    -- ( 0.1872,-0.8299)
    -- ( 0.1872,-0.8565)
    -- ( 0.1640,-0.8565)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1640,-0.8299)
    -- ( 0.1872,-0.8299)
    -- ( 0.1872,-0.8565)
    -- ( 0.1640,-0.8565)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1330,-0.7413)
    -- (-0.1099,-0.7413)
    -- (-0.1099,-0.7679)
    -- (-0.1330,-0.7679)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1330,-0.7413)
    -- (-0.1099,-0.7413)
    -- (-0.1099,-0.7679)
    -- (-0.1330,-0.7679)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3280,-0.8061)
    -- (-0.3049,-0.8061)
    -- (-0.3049,-0.8327)
    -- (-0.3280,-0.8327)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3280,-0.8061)
    -- (-0.3049,-0.8061)
    -- (-0.3049,-0.8327)
    -- (-0.3280,-0.8327)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7302,-0.0754)
    -- (-0.7099,-0.0866)
    -- (-0.7228,-0.1099)
    -- (-0.7430,-0.0988)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7302,-0.0754)
    -- (-0.7099,-0.0866)
    -- (-0.7228,-0.1099)
    -- (-0.7430,-0.0988)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0147, 0.1985)
    -- ( 0.0078, 0.1934)
    -- ( 0.0020, 0.1675)
    -- (-0.0206, 0.1726)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0147, 0.1985)
    -- ( 0.0078, 0.1934)
    -- ( 0.0020, 0.1675)
    -- (-0.0206, 0.1726)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7613, 0.0272)
    -- ( 0.7841, 0.0313)
    -- ( 0.7889, 0.0050)
    -- ( 0.7661, 0.0009)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7613, 0.0272)
```

```
    -- ( 0.7841, 0.0313)
    -- ( 0.7889, 0.0050)
    -- ( 0.7661, 0.0009)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0160, 0.0427)
    -- ( 0.0379, 0.0352)
    -- ( 0.0294, 0.0100)
    -- ( 0.0075, 0.0174)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0160, 0.0427)
    -- ( 0.0379, 0.0352)
    -- ( 0.0294, 0.0100)
    -- ( 0.0075, 0.0174)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3515,-0.2403)
    -- ( 0.3743,-0.2442)
    -- ( 0.3697,-0.2705)
    -- ( 0.3469,-0.2665)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3515,-0.2403)
    -- ( 0.3743,-0.2442)
    -- ( 0.3697,-0.2705)
    -- ( 0.3469,-0.2665)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0718, 0.3637)
    -- ( 0.0933, 0.3723)
    -- ( 0.1032, 0.3476)
    -- ( 0.0817, 0.3390)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0718, 0.3637)
    -- ( 0.0933, 0.3723)
    -- ( 0.1032, 0.3476)
    -- ( 0.0817, 0.3390)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2555, 0.2647)
    -- (-0.2413, 0.2902)
    -- (-0.1944, 0.2641)
    -- (-0.2086, 0.2385)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2555, 0.2647)
    -- (-0.2413, 0.2902)
    -- (-0.1944, 0.2641)
    -- (-0.2086, 0.2385)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2832, 0.1509)
    -- (-0.2826, 0.1802)
    -- (-0.2289, 0.1792)
    -- (-0.2295, 0.1498)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2832, 0.1509)
    -- (-0.2826, 0.1802)
    -- (-0.2289, 0.1792)
    -- (-0.2295, 0.1498)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5694, 0.6977)
    -- (-0.5248, 0.6870)
    -- (-0.5390, 0.6277)
    -- (-0.5837, 0.6384)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5694, 0.6977)
    -- (-0.5248, 0.6870)
    -- (-0.5390, 0.6277)
    -- (-0.5837, 0.6384)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6046, 0.6071)
    -- (-0.5747, 0.5723)
    -- (-0.6210, 0.5326)
    -- (-0.6509, 0.5674)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6046, 0.6071)
    -- (-0.5747, 0.5723)
    -- (-0.6210, 0.5326)
    -- (-0.6509, 0.5674)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2915,-0.1208)
    -- (-0.2462,-0.1288)
```

```
    -- (-0.2569,-0.1889)
    -- (-0.3021,-0.1809)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2915,-0.1208)
    -- (-0.2462,-0.1288)
    -- (-0.2569,-0.1889)
    -- (-0.3021,-0.1809)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1636, 0.0236)
    -- ( 0.2095, 0.0215)
    -- ( 0.2067,-0.0394)
    -- ( 0.1608,-0.0374)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1636, 0.0236)
    -- ( 0.2095, 0.0215)
    -- ( 0.2067,-0.0394)
    -- ( 0.1608,-0.0374)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0653,-0.5296)
    -- (-0.0423,-0.5269)
    -- (-0.0391,-0.5533)
    -- (-0.0621,-0.5560)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0653,-0.5296)
    -- (-0.0423,-0.5269)
    -- (-0.0391,-0.5533)
    -- (-0.0621,-0.5560)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3393, 0.1912)
    -- (-0.3173, 0.1843)
    -- (-0.3254, 0.1589)
    -- (-0.3474, 0.1659)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3393, 0.1912)
    -- (-0.3173, 0.1843)
    -- (-0.3254, 0.1589)
    -- (-0.3474, 0.1659)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.2247, 0.5875)
    -- (-0.2027, 0.5801)
    -- (-0.2113, 0.5549)
    -- (-0.2332, 0.5623)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2247, 0.5875)
    -- (-0.2027, 0.5801)
    -- (-0.2113, 0.5549)
    -- (-0.2332, 0.5623)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3747, 0.1590)
    -- ( 0.4022, 0.1690)
    -- ( 0.4206, 0.1185)
    -- ( 0.3930, 0.1085)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3747, 0.1590)
    -- ( 0.4022, 0.1690)
    -- ( 0.4206, 0.1185)
    -- ( 0.3930, 0.1085)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/mountain

This is an example of a terrain picture.

```
\tikzset{
  hex/terrain/mountain/.pic={%
    \path[draw=black,fill=white] (0,0) -- (.3,.9)--(.45,0) -- cycle;
    \path[draw=black,fill=lightgray,pic actions]
    (-.6 ,- .9) --
    (-.3 ,  .3) --
    (  0,    0) --
    ( .45,   0)  --
    ( .6 , -.9) -- cycle;
  }
}
```

hex/terrain/tree

```
\tikzset{
  hex/terrain/tree/.pic={
```

```
    \path[draw,very thick,pic actions]
    (-.15,.0)
    arc (269:135:.1)
    arc (215: 90:.1)
    arc (180: 45:.1)
    arc (135:  0:.1)
    arc ( 90:-45:.1)
    arc ( 45:-90:.1)
    (-.15,.025)
    arc (60:-60:.25)
    arc (150:30:.075)
    arc (150:30:.075)
    arc (150:30:.075)
    arc (-120:-240:.25);

  }
}
```

5.4.6 Ridges

A hex can be decorated with up to 6 ridges — one for each edge of the hexagon. The first thing is to set up the graphics style to use for the ridges. We use the `wave` decoration.

If rounded corners are set for ridges, (e.g., via `every hex ridges`), then it should be `0pt` or `4pt` (roughly 2mm) or larger. Otherwise, one will get a "dimension too large" error.

```
\tikzset{%
  hex/ridges pre/.style={
    line cap=round,
    draw=pgfstrokecolor,
    solid,
    /hex/ridges/.cd,%
    radius=0.85,%
    n=4,
    R=.25,
  },
  hex/ridges/.style={
    get scale,
    decoration={
      path has corners=true,
      waves,
      radius=\wg@scale\hex@r@R,
      segment length=\wg@scale\hex@r@s,
    },
    decorate}}
```

To properly set up the ridges, we need to concatenate ridge paths in order. To facilitate that, we define 6 `\if`s — one for each edge.

```
\newif\ifhex@r@ne
\newif\ifhex@r@n
\newif\ifhex@r@nw
\newif\ifhex@r@sw
\newif\ifhex@r@s
```

```
\newif\ifhex@r@se
```

Next is the keys for each edge. These will set the above `\if`s to `true`. We put these into the family `/hex/r` so that we can parse them separately.

```
\tikzset{%
  /hex/ridges/.search also={/tikz},
  /hex/ridges/.cd,
  north east/.is if=hex@r@ne,
  north/.is if=hex@r@n,
  north west/.is if=hex@r@nw,
  south west/.is if=hex@r@sw,
  south/.is if=hex@r@s,
  south east/.is if=hex@r@se,
  radius/.store in=\hex@r@r,
  curve radius/.store in=\hex@r@w,
  NE/.is if=hex@r@ne,
  N/.is if=hex@r@n,
  NW/.is if=hex@r@nw,
  SW/.is if=hex@r@sw,
  S/.is if=hex@r@s,
  SE/.is if=hex@r@se,
  r/.store in=\hex@r@r,
  n/.store in=\hex@r@n,
  R/.store in=\hex@r@w,
}
```

\hex@do@ridges

This is the macro that actually generates the ridge. We use the same PGF filtered key parsing trick as above. Note that the routine below is handcrafted since it is relatively simple.

```
\newdimen\hex@r@s
\newdimen\hex@r@R
\def\hex@do@ridges{%
  \edef\hex@r@tmp{[
    hex/ridges pre,
    /tikz/every hex ridges/.try,
    \hex@ridges]}
  \expandafter\scope\hex@r@tmp%
    \hex@dbg{3}{Ridges: `\meaning\hex@ridges', `\meaning\hex@r@tmp'
      ^^Jnorth east=\ifhex@r@ne yes\else no\fi
      ^^Jnorth     =\ifhex@r@n  yes\else no\fi
      ^^Jnorth west=\ifhex@r@nw yes\else no\fi
      ^^Jsouth west=\ifhex@r@sw yes\else no\fi
      ^^Jsouth     =\ifhex@r@s  yes\else no\fi
      ^^Jsouth east=\ifhex@r@se yes\else no\fi
      ^^Jradius    =\hex@r@r
      ^^Jn         =\hex@r@n
    }
    \pgfmathparse{\hex@r@r/\hex@r@n}\xdef\hex@r@t{\pgfmathresult}
    \hex@r@s=\hex@r@t cm
    \hex@r@R=\hex@r@w cm
```

```
13270     \def\hex@r@p{}
13271     % Hand written algorithm
13272     \ifhex@r@ne
13273       \ifhex@r@se
13274         \xdef\hex@r@p{(0:\hex@r@r)--(60:\hex@r@r)}
13275       \else
13276         \xdef\hex@r@p{($(0:\hex@r@r)+(-60:\hex@r@t/2)$)--(60:\hex@r@r)}
13277       \fi
13278       \hex@dbg{4}{Ridge along north east edge: `\hex@r@p'}
13279     \fi
13280     \ifhex@r@n
13281       \ifhex@r@ne\else
13282         \xdef\hex@r@p{\hex@r@p ($( 60:\hex@r@r)+(0:\hex@r@t/2)$)}
13283       \fi
13284       \xdef\hex@r@p{\hex@r@p --(120:\hex@r@r)}
13285       \hex@dbg{4}{Ridge along north edge: `\hex@r@p'}
13286     \fi
13287     \ifhex@r@nw
13288       \ifhex@r@n\else
13289         \xdef\hex@r@p{\hex@r@p ($(120:\hex@r@r)+(60:\hex@r@t/2)$)}
13290       \fi
13291       \xdef\hex@r@p{\hex@r@p --(180:\hex@r@r)}
13292       \hex@dbg{4}{Ridge along north west: `\hex@r@p'}
13293     \fi
13294     \ifhex@r@sw
13295       \ifhex@r@nw\else
13296         \xdef\hex@r@p{\hex@r@p ($(180:\hex@r@r)+(120:\hex@r@t/2)$)}
13297       \fi
13298       \ifhex@r@s
13299         \xdef\hex@r@p{\hex@r@p --(240:\hex@r@r)}
13300       \else
13301         \xdef\hex@r@p{\hex@r@p --(240:\hex@r@r)}
13302       \fi
13303       \hex@dbg{4}{Ridge along south west: `\hex@r@p'}
13304     \fi
13305     \ifhex@r@s
13306       \ifhex@r@sw\else
13307         \xdef\hex@r@p{\hex@r@p ($(240:\hex@r@r)+(-\hex@r@t/2,0)$)}
13308       \fi
13309       \ifhex@r@se
13310         \xdef\hex@r@p{\hex@r@p --(300:\hex@r@r)}
13311       \else
13312         \xdef\hex@r@p{\hex@r@p --(300.5:\hex@r@r)}
13313       \fi
13314       \hex@dbg{4}{Ridge along south: `\hex@r@p'}
13315     \fi
13316     \ifhex@r@se
13317       \ifhex@r@s\else
13318         \xdef\hex@r@p{\hex@r@p ($(300:\hex@r@r)+(-120:\hex@r@t/2)$)}
13319       \fi
13320       \ifhex@r@ne
13321       %\xdef\hex@r@p{\hex@r@p --cycle}
13322       \xdef\hex@r@p{\hex@r@p -- (0:\hex@r@r)}
```

```
      \else
        \xdef\hex@r@p{\hex@r@p --(.5:\hex@r@r)}
      \fi
      \hex@dbg{4}{Ridge along south east: ‘\hex@r@p’}
    \fi
    \hex@dbg{3}{ Ridges path: \hex@r@p}
    % \draw[red] \hex@r@p;
    \draw[hex/ridges] \hex@r@p;
  \endscope% End of ridges scope
}
```

5.4.7 Towns

Similar to above, we define a namespace and family for towns. First thing is the graphics style for towns.

```
\tikzset{%
  hex/town/.style={
    scale line widths,
    solid,
    thin,
    fill=pgfstrokecolor,
    color=pgfstrokecolor},
  hex/town name/.style={
    transform shape,
    shape=rectangle,
    above right=.1,
    color=pgfstrokecolor,
    font=\sffamily\fontsize{11}{13}\selectfont}
}
```

Next is the namespace for dealing with towns.

```
\tikzset{%
  /hex/town/.search also={/tikz},%
  /hex/town/.cd,
  pic/.store in=\hex@c@pic,
  type/.store in=\hex@c@pic,
  place/.store in=\hex@c@pos,
  location/.store in=\hex@c@pos,
  name/.store in=\hex@c@name,
  village/.style={pic=hex/town/village},
  town/.style={pic=hex/town/town},
  city/.style={pic=hex/town/city}
}
```

And some pictures for making the towns.

```
\tikzset{%
  hex/town/village/.pic={\path[fill,solid,pic actions] circle(.1);},
  hex/town/town/.pic={\path[fill,solid,pic actions] circle(.2);},
  hex/town/city/.pic={%
    \path[fill,solid,pic actions] circle(.25);
    \path[draw,solid,pic actions] circle(.35);}
}
```

\hex@do@town

The macro to make the towns. This uses same tricks as above.

```
\def\hex@c@nameparse{%
  \@ifnextchar[{\hex@c@namep@rse}{\hex@c@namep@rse[]}%]
}
\def\hex@c@namep@rse[#1]#2\endhex@c@nameparse{%
  \def\hex@c@node{node[shape=rectangle,hex/town name,#1]{#2}}}

\def\hex@do@town{%
  \edef\hex@c@tmp{[
    /hex/town/.cd,%
    town,%
    /tikz/hex/town,%
    /tikz/every hex town/.try,
    \hex@town]}
  \expandafter\scope\hex@c@tmp%
    \ifx\hex@c@pic\empty\else%
      \@ifundefined{hex@c@pos}{\let\hex@c@pos\empty}{}
      \@ifundefined{hex@c@name}{\let\hex@c@name\empty}{}
      \expandafter\hex@c@nameparse\hex@c@name\endhex@c@nameparse%
      \ifx\hex@c@pos\empty\def\hex@c@pos{(0,0)}\fi
      \hex@dbg{2}{Town:
        ^^J text=\hex@c@name
        ^^J pic=\hex@c@pic
        ^^J place=\hex@c@pos
        ^^J node=\hex@c@node
      }
      \filldraw \hex@c@pos pic{\hex@c@pic} \hex@c@node;
    \fi%
  \endscope%
}
```

5.4.8 Labels

Like terrains, we will set up some macros for dealing with labels.

To process coordinates and turn them into labels, we set up two counters.

```
\newcounter{hex@l@c}
\newcounter{hex@l@r}
```

In case we want to invert the row axis, we set-up a key to set the maximum row number.

```
\def\hex@max@row{-1}
\tikzset{
  max hex row/.store in=\hex@max@row,
}
```

Again, we will make a separate namespace/family for the handling labels. We also define a counter which we will use to typeset alphabetic column numbers.

First a graphics style.

```
\tikzset{%
  hex/label/.style={%
    draw=none,%
    shape=rectangle,%
    anchor=north,%
    color=gray,%
    font=\sffamily\bfseries\scriptsize,%
    inner sep=0},
}
```

Next, the choices of how to make a label. These are put in the `/hex/label` family to make it easy to parse out only these keys. This uses some macros defined below. Note, this uses the macros `\hex@col` and `\hex@row` defined by the hex coordinate system. *Important:* If you do not want to set a label but they are otherwise automatically added, then set `label=none` rather than `label=` (empty), which will not work.

```
\tikzset{%
  /hex/label/.search also={/tikz},
  /hex/label/.cd,
  none/.code={\global\let\hex@l@text\@empty},
  auto/.is choice,
  auto/none/.code={\global\let\hex@l@text\@empty},
  auto/numbers/.code={%
    \hex@l@abs%
    \xdef\hex@l@text{%
      \hex@l@n@pad{\the\c@hex@l@c}%
      \hex@l@n@pad{\the\c@hex@l@r}}},
  auto/alpha column/.code={%
    \xdef\hex@l@text{%
      \ifnum0>\hex@col\AlphAlph{-\hex@col}\else\AlphAlph{\hex@col}\fi%
      \hex@row}},
  auto/alpha 2 column/.code={%
    \hex@l@abs%
    \advance\c@hex@l@c27\relax%
    \xdef\hex@l@text{%
      \AlphAlph{\value{hex@l@c}}%
      \hex@l@n@pad{\hex@row}}},
  auto/inv y x plus 1/.code={%
    \hex@dbg{3}{Inverse row, add one to column with arg `#1'}
    \let\hex@l@text\@empty%
    \ifnum\hex@max@row>0%
      \pgfmathtruncatemacro{\hex@l@row}{\hex@max@row-\hex@row}
      \pgfmathtruncatemacro{\hex@l@col}{1+\hex@col}
      \xdef\hex@l@text{%
        \hex@l@n@pad{\hex@l@col}%
        \hex@l@n@pad{\hex@l@row}}
    \else\message{Max row number not set}\fi},
  auto/x and y plus 1/.code={%
    \hex@dbg{3}{Inverse row, add one to column with arg `#1'}
    \pgfmathtruncatemacro{\hex@l@row}{1+\hex@row}
    \pgfmathtruncatemacro{\hex@l@col}{1+\hex@col}
    \xdef\hex@l@text{%
      \hex@l@n@pad{\hex@l@col}%
```

```
      \hex@l@n@pad{\hex@l@row}}},
  auto/.default=numbers,
  %text/.store in=\hex@l@text,
  text/.code={\gdef\hex@l@text{#1}},
  place/.store in=\hex@l@pos,
  location/.forward to=/hex/label/place,
  rotate/.store in=\hex@l@rot
}
```

\hex@l@abs

This takes the absolute value of row and column numbers.

```
\def\hex@l@abs{
  \setcounter{hex@l@c}{\hex@col}
  \setcounter{hex@l@r}{\hex@row}
  \expandafter\ifnum\value{hex@l@c}<0\multiply\c@hex@l@c by-1\fi%
  \expandafter\ifnum\value{hex@l@r}<0\multiply\c@hex@l@r by-1\fi%
  % \hex@dbg{0}{\hex@col->\the\c@hex@l@c\space\hex@row->\the\c@hex@l@r}
}
```

\hex@l@n@pad

This will pad a number with a 0 if the number is smaller than 10.

```
\long\def\hex@l@n@pad#1{%
  \ifnum#1<10 0\fi%
  #1}
```

\hex@do@label

This macro puts in the label. First, we reset label keys, then we read in the keys from the argument. If this results in the macro `\hex@l@text` to be non-empty, then we set the label via a Ti*k*Z `node`.

```
\def\hex@do@label{%
  \hex@dbg{3}{Hex label: `\meaning\hex@label'}%
  \edef\hex@l@tmp{[%
    /hex/label/.cd,%
    rotate=0,%
    place={(90:.8)},%
    /tikz/hex/label/.try,%
    /tikz/every hex label/.try,%
    \hex@label]}%
  \expandafter\scope\hex@l@tmp%
    \hex@dbg{1}{Label:
      ^^J  Text: `\meaning\hex@l@text'
      ^^J  Location: `\meaning\hex@l@pos'
      ^^J  Rotation: `\meaning\hex@l@rot'
    }%
    \@ifundefined{hex@l@text}{\let\hex@l@text\empty}{}%
    \ifx\hex@l@text\empty\else%
```

```
    \node[rotate=\hex@l@rot] at \hex@l@pos {\hex@l@text};%
    \fi%
  \endscope%
}
```

5.4.9 Extra graphics

To make the interface a bit more flexible we allow for adding arbitrary stuff to the hexes. Some examples of `pic`tures to add in the `extra` stuff.

`hex/fortress`

Draw a fortress. An example of a extra graphics entity.

```
\tikzset{%
  hex/fortress/.pic={
    \path[draw,solid,pic actions]
    (0:  .9) --
    (0:  .7) --
    (60: .7) -- ( 60:.9) -- ( 60:.7) --
    (120:.7) -- (120:.9) -- (120:.7) --
    (180:.7) -- (180:.9) -- (180:.7) --
    (240:.7) -- (240:.9) -- (240:.7) --
    (300:.7) -- (300:.9) -- (300:.7) --
    (0:  .7) -- cycle;}}
```

`hex/fortress 2`

Draw a fortress. An example of a extra graphics entity.

```
\tikzset{
  hex/fortress 2/.pic={%
    \draw[pic actions,transform shape] (0:0.64)
    foreach \a in {15,45,...,345}{
      --(\a:0.64)
      --(\a:0.80)
      --(\a+15:0.80)
      --(\a+15:0.64)}
    --cycle;
  },
}
```

5.4.10 Some macros

```
\DeclareRobustCommand\fortmark[1][scale=.25]{\tikz[#1,transform shape]{%
    \pic{hex/fortress 2}}}
\providecommand\terrainmark[2][scale=.2]{%
  \tikz[#1]{\hex[label=,terrain=#2]}}
\providecommand\clearhex[1][scale=.2]{\tikz[#1]{\hex[label=]}}
\providecommand\woodshex[1][scale=.2]{\terrainmark[#1]{woods}}
```

```
\providecommand\mountainhex[1][scale=.2]{\terrainmark[#1]{mountains}}
\providecommand\cityhex[1][scale=.2]{\terrainmark[#1]{city}}
\providecommand\beachhex[1][scale=.2]{\terrainmark[#1]{beach}}
\providecommand\seahex[1][scale=.2]{\tikz[#1]{\hex[label=,fill=sea]}}
\providecommand\riverhex[1][scale=.2]{%
  \tikz[#1]{%
    \hex[label=](c=0,r=0)%
    \river[](hex cs:e=SW)--(hex cs:e=NE);}}
\providecommand\roadhex[1][scale=.2]{%
  \tikz[#1]{%
    \hex[label=](c=0,r=0)%
    \road(hex cs:e=SW)--(hex cs:e=NE);}}
```

5.4.11 Edges, borders, roads, rivers, and so on

Styles of drawing edges, borders, rivers, roads, and railroads.

```
% A decoration to extract outline of a path
\pgfdeclaredecoration{outline}{init}
{%
  \state{init}[next state=tick,width=0pt]{
    \xdef\outlinerev{}}
  \state{tick}[%
  width=+\pgfdecorationsegmentlength]%
  {
    \pgfpathlineto{\pgfpointadd{\pgfpointorigin}{
        \pgfpointpolar{\pgfdecorationsegmentangle}{
          +\pgfdecorationsegmentamplitude}}}
    \pgf@xa=\pgf@x
    \pgf@ya=\pgf@y
    \message{^^J\the\pgf@x,\the\pgf@y}
    \pgfpointadd{\pgfpointorigin}{
      \pgfpointpolar{-\pgfdecorationsegmentangle}{
        \pgfdecorationsegmentamplitude}}
    \pgfpointtransformed{\pgfpoint{\pgf@x}{\pgf@y}}%
    \message{^^J\the\pgf@x,\the\pgf@y}
    \xdef\outlinerev{\the\pgf@x/\the\pgf@y,\outlinerev}
    \pgf@x=\pgf@xa
    \pgf@y=\pgf@ya
  }%
  \state{final}
  {
    \pgfpathlineto{\pgfpointdecoratedpathlast}
    \foreach \x/\y in \outlinerev{
      \ifx\x\empty\else
         \ifx\y\empty\else
           \pgf@xa=\x
           \pgf@ya=\y
           \pgf@nlt@lineto{\pgf@xa}{\pgf@ya}
        \fi
      \fi
    }
  }%
}%
```

A decoration to make a fortification line

```
\pgfdeclaredecoration{fortification}{initial}
{
  \state{initial}[width=4\pgflinewidth]
  {
    \pgfpathlineto{\pgfpoint{2\pgflinewidth}{0}}
    \pgfpathlineto{\pgfpoint{2\pgflinewidth}{2\pgflinewidth}}
    \pgfpathlineto{\pgfpoint{4\pgflinewidth}{2\pgflinewidth}}
    \pgfpathlineto{\pgfpoint{4\pgflinewidth}{0}}
  }
  \state{final}
  {
    \pgfpathlineto{\pgfpointdecoratedpathlast}
  }
}
```

Roads, railroads, rivers, borders.

```
\tikzset{
  hex/road/.style={
    rounded corners=3\pgflinewidth,% .25cm,
    color=black,
    transform shape,
    scale line widths,
    thick,
    every hex road/.try,
  },
  hex/railroad/.style={
    %scale line widths,
    rounded corners=.25cm,
    color=gray!50!black,
    transform shape,
    every hex railroad/.try,
    postaction={draw,decorate},
    decoration={ticks,
      segment length=9\pgflinewidth,
      amplitude=3\pgflinewidth,%.1cm
    }
  },
  hex/river/.style={
    color=blue,
    scale line widths,
    scale rounded corners,
    line width=3pt,
    transform shape,
    every hex river/.try,
    decorate,
    decoration={random steps,
      segment length=3\pgflinewidth,
       amplitude=1.5\pgflinewidth,
       pre=lineto,
       post=lineto,
       pre length=.5\pgflinewidth,
```

```
      post length=.5\pgflinewidth},
    rounded corners=.75\pgflinewidth},
  hex/border/.style={
    color=gray,
    dashed,
    transform shape,
    scale line widths,
    very thick,
    rounded corners=3\pgflinewidth,
    every hex border/.try
  },
  %
  % Fortification line
  %
  hex/fortified line/.style={
    draw=brown!50!black,
    scale line widths,
    line width=2pt,
    every hex fortification line/.try,
    decoration={fortification,raise=-2\pgflinewidth},
    decorate},
  % every river/.style={},
  % every road/.style={},
  % every railroad/.style={},
  % every border/.style={},
}
```

```
\road
\railroad
\river
\border
```

```
\def\road{%
  %\hex@dbg{3}{Road}
  \@ifnextchar[{\road@}{\road@[]}%]
}
\def\road@[#1]{\draw[hex/road,every hex road/.try,#1]}
\def\railroad{%
  %\hex@dbg{3}{Rail road}
  \@ifnextchar[{\railroad@}{\railroad@[]}%]
}
\def\railroad@[#1]{\draw[hex/railroad,every hex railroad/.try,#1]}
\def\river{%
  %\hex@dbg{3}{River}
  \@ifnextchar[{\river@}{\river@[]}%]
}
\def\river@[#1]{\draw[hex/river,#1]}
\def\border{%
  \hex@dbg{3}{Border}
  \@ifnextchar[{\border@}{\border@[]}%]
}
\def\border@[#1]{\draw[hex/border,every hex border/.try,#1]}
```

```
\def\fortifiedline{%
  \@ifnextchar[{\fortifiedline@}{\fortifiedline@[]}%]
}%
\def\fortifiedline@[#1]{%
  \draw[hex/fortified line,every hex fortified line/.try,#1]}
```

5.4.12 Other paths

`\shiftScalePath`

Shifts and scales a path and defines a macro to contain the path

`\shiftScalePath{⟨macro⟩}{⟨relative-coordinates⟩}`

where ⟨*relative-coordinates*⟩ is a comma separated list of relative coordinates (to the lower-left and upper-right corners)

`⟨x⟩/⟨y⟩`

Note, this requires that `\boardXmin`,`\boardYmin` and `\boardXmax`,`\boardYmax` is defined. This can be done using the `\boardframe` macro.

```
\def\shiftScalePath#1#2{%
  \let\tmp@path\@undefined%
  \foreach \x/\y in {#2}{%
    \pgfmathparse{\x*\boardW+\boardXmin}\xdef\tmp@x{\pgfmathresult}%
    \pgfmathparse{\y*\boardH+\boardYmin}\xdef\tmp@y{\pgfmathresult}%
    \@ifundefined{tmp@path}{\def\tmp@path{}}{\xdef\tmp@path{\tmp@path--}}%
    \xdef\tmp@path{\tmp@path(\tmp@x,\tmp@y)}}%
  \expandafter\xdef\csname #1\endcsname{\tmp@path}}
```

5.4.13 Move, attacks, retreats from hex to hex

`\hex@getscale`

Get current scaling factor.

```
\def\hex@getscale#1{%
  \begingroup
  \pgfgettransformentries{%
    \scaleA}{%
    \scaleB}{%
    \scaleC}{%
    \scaleD}{%
    \whatevs}{%
    \whatevs}%
  \pgfmathsetmacro{#1}{sqrt(abs(\scaleA*\scaleD-\scaleB*\scaleC))}%
  \expandafter
  \endgroup
  \expandafter\def\expandafter#1\expandafter{#1}%
}
```

Key to get the scale

```
\tikzset{%
  hex/get scale/.code={
    \hex@getscale{\hex@scale}},
}
```

Style for moves. Use like

`\path[move] ⟨coordinates⟩;`

```
\tikzset{%
  % Argument is colour
  hex/move/.style={
    hex/get scale,
    decorate,
    decoration={
      markings,
      mark=between positions 0 and 1 step 0.75*\hex@scale*\hex@dy with {
        \node [single arrow,
               single arrow head extend=.1*\hex@scale*\hex@dy,
               fill=#1,
               inner sep=0.05*\hex@scale*\hex@dy,
               minimum width=0.02*\hex@scale*\hex@dy,
               minimum height=\hex@scale*\hex@dy/2,
               transform shape]{};
      }
    },
  },
```

A short move style

`\path[short move] ⟨coordinates⟩;`

```
  % Argument is colour
  hex/short move/.style={
    hex/get scale,
    decorate,
    decoration={
      markings,
      mark=between positions 0 and 1 step 0.5*\hex@scale*\hex@dy with {
        \node [single arrow,
               single arrow head extend=.1*\hex@scale*\hex@dy,
               fill=#1,
               inner sep=0.05*\hex@scale*\hex@dy,
               minimum width=0.02*\hex@scale*\hex@dy,
               minimum height=\hex@scale*\hex@dy/3,
               transform shape]{};
      }
    },
  },
```

A short move style

`\path[long move] ⟨coordinates⟩;`

```
  % Argument is colour
```

```
hex/long move/.style={
  hex/get scale,
  transform shape,
  decorate,
  decoration={
    markings,
    mark=between positions 0 and -.7*\hex@scale*\hex@dy
    step 2*\hex@scale*\hex@dy with {
      \node [single arrow,
             single arrow head extend=3pt,
             fill=#1,
             anchor=west,
             inner sep=\hex@scale*.25mm,
             outer sep=.3*\hex@scale*\hex@dy,
             minimum width=0.02*\hex@scale*\hex@dy,
             minimum height=1.4*\hex@scale*\hex@dy,
             transform shape]{};
    }
  },
},
```

A short move style

`\path[move with start]` ⟨*coordinates*⟩;

```
% Argument is colour
hex/move with start/.style={
  hex/get scale,
  decorate,
  decoration={
    markings,
    mark=at position 0 with {
      \node [inner sep=0,
      circle,
      minimum size=\hex@scale*5mm,
      fill=#1,
      transform shape] {};},
    mark=between positions 0 and 1 step 0.75*\hex@scale*\hex@dy with {
      \node [single arrow,
             single arrow head extend=.1*\hex@scale*\hex@dy,
             fill=#1,
             inner sep=0.05*\hex@scale*\hex@dy,
             minimum width=0.02*\hex@scale*\hex@dy,
             minimum height=\hex@scale*\hex@dy/2,
             transform shape]{};
    }
  },
},
% Default fill colour is black
hex/move/.default=black,
hex/move with start/.default=black,
hex/short move/.default=black,
hex/long move/.default=black,
% Arguments are draw and fill color
```

A move cost style

```
\path[move] ...(coordinate)node[hex/move cost] ...;
```

```
13774  hex/move cost/.style 2 args={
13775    minimum size=1mm,
13776    inner sep=0.1mm,
13777    circle,
13778    fill=#2,
13779    transform shape,
13780    text=#1,
13781    font=\sffamily\bfseries\fontsize{14.4}{17}\selectfont},
13782  hex/move cost/.default={black}{none},
13783  % Argument is fill colour
```

A short line style for retreates, advances, and so on

```
\path[short line] (start)--(end);
```

```
13784  hex/short line/.style={%
13785    hex/get scale,
13786    inherit options/.code={\csname tikz@options\endcsname},
13787    inherit options,
13788    decorate,
13789    decoration={
13790      markings,
13791      mark=between positions \hex@scale*\hex@dy
13792      and 1 step 2*\hex@scale*\hex@dy with {
13793        \node [single arrow,draw=black,fill=#1,
13794        single arrow head extend=\hex@scale*3pt,
13795        inner sep=1mm,
13796        minimum width=0.75*\hex@scale*\hex@dy,
13797        minimum height=\hex@scale*\hex@dy,
13798        transform shape]{};
13799      }
13800    },
13801  },
```

An attack indication style

```
\path[attack] (start)--(end);
```

```
13802  % Argument is fill color
13803  hex/attack/.style={
13804    hex/get scale,
13805    inherit options/.code={\csname tikz@options\endcsname},
13806    inherit options,
13807    decorate,
13808    decoration={
13809      markings,
13810      mark=between positions \hex@scale*\hex@dy
13811      and 1 step 2*\hex@scale*\hex@dy with {
13812        \node [regular polygon,
13813        fill=#1,
13814        draw=#1,
```

```
        regular polygon sides=3,
        inner sep=0,
        minimum size=0.75*\hex@scale*\hex@dy,
        rotate=-90,
        transform shape]{};
      }
    },
  },
```

Short hands

```
\path[attack] (start)--(end);
```

```
  % Default colour is red for attachs
  hex/attack/.default=red!70!black,
  %%
  hex/retreat/.style={hex/short line=#1},
  hex/retreat/.default=white,
  %%
  hex/advance/.style={hex/short line=#1},
  hex/advance/.default={green!70!black},
}
```

5.4.14 Board clipping and frame

```
\boardframe
```

Define the bounding box around the board

```
\boardframe[⟨margin⟩](⟨lower=left⟩)(⟨upper-right⟩)
```

where ⟨*lower-left*⟩ and ⟨*upper-right*⟩ specifies the lower left and upper right hexes (inclusive) of the board.

```
\def\boardframe{%
  \@ifnextchar[{\bo@rdframe}{\bo@rdframe[0]}%]
}
```

Below is our new implementation of `\boardframe`. This is split into parts.

First, a macro that will define the path around rectangular placed hexes. This takes 4 mandatory arguments: lower left column and row, and upper right column and row, in that order. It also accepts an optional argument. If this is not empty, then it is assumed to be a style to apply, and hexes will be drawn using that style. The style will be passed the hex coordinates and can react accordingly.

```
\def\bo@rdfr@me{
  \@ifnextchar[{\bo@rdfr@me@}{\bo@rdfr@me@[]}%]
}
\def\bo@rdfr@me@u(#1)#2#3#4#5{
  \hex@coords@conv{#1}%
  % \hex@dbg{0}{#1 -> `\hex@x',`\hex@y'}
  \pgfmathparse{min(#2,\hex@x)}\xdef#2{\pgfmathresult}%
  \pgfmathparse{min(#3,\hex@y)}\xdef#3{\pgfmathresult}%
  \pgfmathparse{max(#4,\hex@x)}\xdef#4{\pgfmathresult}%
  \pgfmathparse{max(#5,\hex@y)}\xdef#5{\pgfmathresult}%
```

```
  \hex@dbg{2}{#1 -> ll=‘#2’,‘#3’, ur=‘#4’,‘#5’}%
}
\def\bo@rdfr@me@[#1]#2#3#4#5{%
  % Define rtmp and a ctmp to by directions
  \pgfmathparse{int(\hex@coords@row@fac)}\edef\rtmp{\pgfmathresult}%
  \pgfmathparse{int(\hex@coords@col@fac)}\edef\ctmp{\pgfmathresult}%
  % Define vertices for path
  \def\ctfv{SW}%
  \def\ctsv{SE}%
  \def\cbfv{NE}%
  \def\cbsv{NW}%
  \def\rrfv{E}%
  \def\rrsv{NE}%
  \def\rlfv{W}%
  \def\rlsv{SW}%
  % Swap around some definitions based on the row direction
  \ifnum\rtmp<0%
    \let\max@short\hex@bot@short@col%
    \let\min@short\hex@top@short@col%
    \let\swp\ctfv\let\ctfv\cbsv\let\cbsv\swp%
    \let\swp\ctsv\let\ctsv\cbfv\let\cbfv\swp%
    \def\rrsv{SE}%
    \def\rlsv{NW}%
  \else%
    \let\max@short\hex@top@short@col%
    \let\min@short\hex@bot@short@col%
  \fi%
  % Swap around some definitions based on the column direction
  \ifnum\ctmp<0%
    \let\swp\ctfv\let\ctfv\ctsv\let\ctsv\swp%
    \let\swp\cbfv\let\cbfv\cbsv\let\cbsv\swp%
    \let\swp\rrfv\let\rrfv\rlsv\let\rlsv\swp%
    \let\swp\rrsv\let\rrsv\rlfv\let\rlfv\swp%
  \fi%
  % Define tmp = 0 if no shorts, 1 if top short, 2 if both
  \pgfmathparse{ifthenelse(\hex@got@top@short,
    ifthenelse(\hex@got@bot@short,2,1),0)}\edef\tmp{\pgfmathresult}%
  % If top-short, set factors
  \ifnum\tmp=1%
    \def\mnf{-1}%
    \def\mxf{-1}%
    \def\mnn{}%
    \def\mxn{}%
  % If both short, set factors
  \else\ifnum\tmp=2%
    \def\mnf{\rtmp}%
    \def\mxf{(-\rtmp)}%
    % If inverse rows, set factors
    \ifnum\rtmp<0%
      \def\mnn{}%
      \def\mxn{not}%
    \else%
      \def\mnn{not}%
```

```
      \def\mxn{}%
    \fi%
  % If none is short
  \else%
    \def\mnf{1}%
    \def\mxf{1}%
    \def\mnn{not}%
    \def\mxn{not}%
  \fi\fi%
  % Define row@mn to give least row of column
  \def\row@mn##1{%
    \pgfmathparse{int(#3+\mnf*
      \hex@coords@row@fac*\min@short(##1)*
      \mnn(\min@short(\hex@coords@col@off)))}%
    \edef\lr{\pgfmathresult}}%
  % Define row@mx to give largest row of column
  \def\row@mx##1{%
    \pgfmathparse{int(#5+\mxf*
      \hex@coords@row@fac*\max@short(##1)*
      \mxn(\max@short(\hex@coords@col@off)))}%
    \edef\ur{\pgfmathresult}}%
  %
  %
  % Below defines a path around the perimeter of the hexes.
  %
  \def\@llx{10000}%
  \def\@lly{10000}%
  \def\@urx{-10000}%
  \def\@ury{-10000}%
  % Start with an empty path
  \def\p{}
  % Loop across least row (can be top if \rtmp<0)
  \foreach \c in {#2,...,#4}{%
    \row@mn{\c}%
    \row@mx{\c}%
    % \message{^^JColumn: `\c' -> `\lr',`\ur' (#3,#5)}
  }
  \foreach \c in {#2,...,#4}{%
    \row@mn{\c}%
    \xdef\p{\p
      (hex cs:c=\c,r=\lr,v=\ctfv)--
      (hex cs:c=\c,r=\lr,v=\ctsv)--}%
    \bo@rdfr@me@u(c=\c,r=\lr,v=\ctfv)\@llx\@lly\@urx\@ury%
    \bo@rdfr@me@u(c=\c,r=\lr,v=\ctsv)\@llx\@lly\@urx\@ury%
  }%
  % Go up (down if \rtmp<0) right side
  \row@mn{#4}%
  \row@mx{#4}%
  \foreach \r in {\lr,...,\ur}{%
    \xdef\p{\p
      (hex cs:c=#4,r=\r,v=\rrfv)--
      (hex cs:c=#4,r=\r,v=\rrsv)--}%
    \bo@rdfr@me@u(c=#4,r=\r,v=\rrfv)\@llx\@lly\@urx\@ury%
```

```
    \bo@rdfr@me@u(c=#4,r=\r,v=\rrsv)\@llx\@lly\@urx\@ury%
  }%
  % Go across largest row (can be bottom if \rtmp<0)
  \foreach \c in {#4,...,#2}{%
    \row@mx{\c}%
    % \message{^^JColumn: `\c', max:`\ur'}
    \xdef\p{\p
      (hex cs:c=\c,r=\ur,v=\cbfv)--
      (hex cs:c=\c,r=\ur,v=\cbsv)--}%
    \bo@rdfr@me@u(c=\c,r=\ur,v=\cbfv)\@llx\@lly\@urx\@ury%
    \bo@rdfr@me@u(c=\c,r=\ur,v=\cbsv)\@llx\@lly\@urx\@ury%
  }
  % Go up (down if \rtmp<0) left side.
  \row@mn{#2}%
  \row@mx{#2}%
  \foreach \r in {\ur,...,\lr}{%
    \xdef\p{\p
       (hex cs:c=#2,r=\r,v=\rlfv)--
       (hex cs:c=#2,r=\r,v=\rlsv)--}%
    \bo@rdfr@me@u(c=#2,r=\r,v=\rlfv)\@llx\@lly\@urx\@ury%
    \bo@rdfr@me@u(c=#2,r=\r,v=\rlsv)\@llx\@lly\@urx\@ury%
  }%
  % End path with cycle
  \edef\p{\p cycle}%
  % Define global path
  \global\let\hex@board@path\p%
  \hex@dbg{3}{Hex board path: `\meaning\hex@board@path'}%
  % If an optional argument was given, then use that to actually make
  % hexes.
  \ifx|#1|\else%
    \foreach[count=\nc] \c in {#2,...,#4}{%
      \row@mn{\c}%
      \row@mx{\c}%
      \foreach \r in {\lr,...,\ur}{%
        \hex[#1={\c,\r}](c=\c,r=\r)%
      }%
    }%
  \fi%
}%
```

This is a no operations style used as default for the macro `\boardhexes` below.

```
\tikzset{%
  /hex/board/no op/.style args={#1,#2}{}}%
```

This macro will make the actual hexes using the specified, optional, style. It builds on `\bo@rdfr@me` above.

```
\def\boardhexes{%
  \@ifnextchar[{\bo@rdhexes}{\bo@rdhexes[board/no op]}%]
}%
\def\bo@rdhexes[#1](#2)(#3){%
  \hex@coords@conv{#2}%
  \edef\llc{\hex@col}%
  \edef\llr{\hex@row}%
```

```
  \hex@coords@conv{#3}%
  \edef\urc{\hex@col}%
  \edef\urr{\hex@row}%
  \bo@rdfr@me[#1]{\llc}{\llr}{\urc}{\urr}}%
```

Creates a board frame using `\bo@rdfr@me`.

```
\tikzset{board frame bb/.code={
    \pgfkeys{
      %/tikz/local bounding box=tmp board frame,
      /tikz/transform shape,
      /tikz/execute at end scope={%
        % \hex@dbg{1}{Getting board frame BB}
        %\wg@get@bb{tmp board frame}
        \global\let\llx\@llx
        \global\let\lly\@lly
        \global\let\urx\@urx
        \global\let\ury\@ury
        % \hex@dbg{0}{Board bounding box (\llx,\lly)x(\urx,\ury)}
      }}}}

\def\bo@rdframe[#1](#2)(#3){%
  \hex@coords@conv{#2}%
  \edef\llc{\hex@col}%
  \edef\llr{\hex@row}%
  %
  \hex@coords@conv{#3}
  \edef\urc{\hex@col}%
  \edef\urr{\hex@row}%
  %
  \def\margin{#1}%
  %
  % This will store the bounding box in tmp node ‘board frame’
  \bo@rdfr@me{\llc}{\llr}{\urc}{\urr}%
  \begin{scope}[board frame bb]%
    \expandafter\path\hex@board@path;%
  \end{scope}%
  \hex@dbg{1}{Board frame LL: -> ‘\llx’,‘\lly’}%
  \pgfmathparse{\llx+ifthenelse(\llx<0,-1,1)*\margin}\edef\llx{\pgfmathresult}%
  \pgfmathparse{\lly+ifthenelse(\lly<0,-1,1)*\margin}\edef\lly{\pgfmathresult}%
  %
  \hex@dbg{1}{Board frame UR: -> ‘\urx’,‘\ury’}%
  \pgfmathparse{\urx+ifthenelse(\urx<0,-1,1)*\margin}\edef\urx{\pgfmathresult}%
  \pgfmathparse{\ury+ifthenelse(\ury<0,-1,1)*\margin}\edef\ury{\pgfmathresult}%
  %
  \pgfmathparse{\urx-\llx}\edef\w{\pgfmathresult}%
  \pgfmathparse{\ury-\lly}\edef\h{\pgfmathresult}%
  %% Print to the log
  \hex@dbg{0}{Board Frame: (\llx,\lly)x(\urx,\ury) (\w x\h) (\llc,\llr)x(\urc,\urr)}%
  %% Possibly draw
  \draw[hex/board frame/.try](\llx,\lly) rectangle(\urx,\ury);%
  %% Store macros
  \xdef\boardXmin{\llx}%
  \xdef\boardYmin{\lly}%
```

```
  \xdef\boardXmax{\urx}%
  \xdef\boardYmax{\ury}%
  \@ifnextchar;{\@gobble}{}%
}
```

\boardclip

Clip the board to not show incomplete hexes

\boardclip{⟨*nx*⟩}{⟨*ny*⟩}{⟨*preaction*⟩}

```
\def\boardpath(#1)(#2){%
  \hex@coords@reset%
  \tikzset{/hex/coords/.cd, #1}%
  \edef\llc{\hex@col}%
  \edef\llr{\hex@row}%
  %%
  \hex@coords@reset%
  \tikzset{/hex/coords/.cd, #2}%
  \edef\urc{\hex@col}%
  \edef\urr{\hex@row}%
  % This will store the bounding box in tmp node 'board frame'
  \bo@rdfr@me{\llc}{\llr}{\urc}{\urr}%
  %% Use the path to extract the bounding box
  %\begin{scope}[local bounding box=board frame]
  %  \expandafter\path\hex@board@path;
  %\end{scope}
  \global\let\hexboardpath\hex@board@path%
  \@ifnextchar;{\@gobble}{}%
}

\def\boardclip(#1)(#2)#3{%
  \boardpath(#1)(#2)%
  \draw \ifx|#3|\else[preaction={#3}]\fi%
  [clip] \hexboardpath;%
}
```

\debuggrid

Show a debug grid. This requires `\boardframe`.

```
\def\debuggrid{%
  \foreach \i in {0,0.1,0.2,0.3,0.4,0.5,0.6,0.7,0.8,0.9,1} {%
    \pgfmathparse{\i*\boardW+\boardXmin}%
    \edef\debug@x{\pgfmathresult}%
    \draw [very thin,gray](\debug@x,\boardYmin) --
    (\debug@x,\boardYmax) node [below,rotate=90] at
    (\debug@x,\boardYmin) {$\i$}; }%
  \foreach \i in {0,0.1,0.2,0.3,0.4,0.5,0.6,0.7,0.8,0.9,1} {%
    \pgfmathparse{\i*\boardH+\boardYmin}%
```

```
14089     \edef\debug@x{\pgfmathresult}%
14090     \draw [very thin,gray] (\boardXmin,\debug@x) --
14091     (\boardXmax,\debug@x) node [left,rotate=90] at
14092     (\boardXmin,\debug@x) {$\i$}; } }
```

Some dummy styles. These will be defined by the export class to facilitate getting information from the board.

```
14093 \tikzset{%
14094   zoned/.style={},
14095   zone scope/.style={},
14096   zone path/.style={}
14097 }
```

5.4.15 Board splitting

`\splitboard`

Calculates how to split a board into sheets of paper.

`\splitboard[⟨options⟩]`

where options are

- `paper`=⟨*format*⟩: Specifies the paper format. One of `a4`, `a3`, `letter`, `tabloid`. Default is `a4`.
- `landscape`: Sets the paper format to be in landscape mode (default is portrait).
- `margin`=⟨*size in centimetres*⟩: Size of margins on each sheet in centimetres *without* unit. That is put `0.6` for 6mm, *not* `6mm`. Default is `0.6`. This should be *slightly* larger (by roughly 5%) than the *least* margin required by the printer used. *Must* be given *before* `paper` to have any effect.
- `ncol`=⟨*number of columns*⟩: Sets the number of columns of sheets.
- `nrow`=⟨*number of rows*⟩: Set the number of rows of sheets.
- `overlap`=⟨*size in centimetres*⟩: Sets the size of the overlap between sheets in centimetres *without* unit. That is put `2` for 2cm, *not* `2cm`. Default is `2`.
- `image`=⟨*file name*⟩: File name of the board image (a PDF). Default is `board`
- `output`=⟨*file name*⟩: File name (without `.tex` ending) to write calculated split to.
- `standalone`: Boolean flag. If true, then output file will be a standalone document (i.e., has a `\documentclass`).
- `scale`=⟨*scale*⟩: Set scale of board.

The macro will produce a file named `\jobname_out.tex` which can be included in another document to generate the split board PDF.

To use, make, for example, the file `calcsplit.tex` with the content

```
\documentclass[11pt]{standalone}
\usepackage{wargame}
\usepackage{mystyle}
```

```
\begin{document}
\splitboard{paper=letter,margin=.7,ncol=2,nrow=2,overlap=1}
\end{document}
```

to calculate the split of `board.pdf` over 2×2 letter paper sheets, with a non-printable margin of 7mm, and an overlap between the segments of 1cm.

The final split document can then be

```
\documentclass[11pt]{article}
\usepackage[letterpaper,margin=7mm]{geometry}
\begin{document}
\input{calcsplit_out}
\end{document}
```

If you need to scale down the board, define the style `board scale`. E.g.,

```
\tikzset{board scale/.style={scale=.9}}
```

Styles used for drawing things.

```
\tikzset{%
  % Margin must be <1cm
  split/paper outline/.style={
    shape=rectangle,
    draw=red!50!black,
    line width=.5mm},
  split/effective outline/.style={
    shape=rectangle,
    draw=green!50!black,
    dashed,
    line width=.5mm},
  split/board outline/.style={%
    draw=magenta,
    line width=.5mm,
    dotted},
}
```

A scratch dimension used

```
\newdimen\split@tmp
```

Get upper right and lower left corners of node. Argument is node name.

```
\def\split@getem#1{%
  \draw (#1.north east);%
  \pgfgetlastxy{\split@ulx}{\split@uly}%
  \xdef\split@ulx{\split@ulx}%
  \xdef\split@ulx{\split@ulx}%
  \draw (#1.south west);%
```

```
  \pgfgetlastxy{\split@lrx}{\split@lry}%
  \xdef\split@lrx{\split@lrx}%
  \xdef\split@lry{\split@lry}%
}
```

Get board dimensions. Argument is node name.

```
\def\split@getboard#1{%
  \split@getem{#1}%
  \xdef\split@bulx{\split@ulx}%
  \xdef\split@buly{\split@uly}%
  \xdef\split@blrx{\split@lrx}%
  \xdef\split@blry{\split@lry}%
  \split@w{\@percentchar\space Board:
    (\split@bulx,\split@buly)(\split@blrx,\split@blry)}}
```

Adjust placement of markers and cut lines.

1. Dimension to adjust
2. Overlap dimension (with units)

```
\def\split@adj#1#2{%
  \split@tmp=#2%
  \divide\split@tmp by 2%
  \advance\split@tmp by #1%
  \edef\t{\the\split@tmp}}
```

Get initial offset in a direction.

1. Number of segments in direction
2. Overlap in centimetres (without unit)
3. Effective size, in centimetres (without unit), of sheets in direction
4. Full size, in centimetres (without unit), of board in direction.

```
\def\split@get@init#1#2#3#4{%
  \pgfmathparse{((#1 * #3 - (#1 - 1) * #2) - #4)/2}%
  \xdef\split@off{\pgfmathresult}%
  \hex@dbg{2}{((#1 * #3 - (#1 - 1) * #2) - #4)/2 -> `\split@off'}}
```

Get initial offset of first segment.

1. Number of rows
2. Number of columns
3. Overlap in centimetres (without unit)
4. Effective height, in centimetres (without unit), of sheets
5. Effective width, in centimetres (without unit), of sheets
6. Full height, in centimetres (without unit), of board

7. Full width, in centimetres (without unit), of board

```
\def\split@getinit#1#2#3#4#5#6#7{%
  \split@get@init{#1}{#3}{#4}{#6}\xdef\dy{\split@off cm}
  \split@get@init{#2}{#3}{#5}{#7}\xdef\dx{\split@off cm}}
```

Get coordinates of a segment

1. Column number
2. Row number
3. Overlap, in centimetres (without unit)

```
\def\split@getcoords#1#2#3{%
  \hex@dbg{2}{Getting coords ‘c#1r#2’}%
  \split@getem{c#1r#2}%
  \edef\sulx{\split@ulx}%
  \edef\suly{\split@uly}%
  \edef\slrx{\split@lrx}%
  \edef\slry{\split@lry}%
  \edef\mlx{\split@blrx}%
  \edef\mrx{\split@bulx}%
  \edef\mty{\split@buly}%
  \edef\mby{\split@blry}%
  \pgfmathparse{int(#1-1)}\edef\pc{\pgfmathresult}%
  \pgfmathparse{int(#2-1)}\edef\pr{\pgfmathresult}%
  \pgfmathparse{int(#1+1)}\edef\nc{\pgfmathresult}%
  \pgfmathparse{int(#2+1)}\edef\nr{\pgfmathresult}%
  \pgfutil@ifundefined{pgf@sh@ns@c\pc r#2}{}{% Left
    \hex@dbg{3}{\space Getting left ‘c\pc r#2’}%
    \split@getem{c\pc r#2}\split@adj{\split@ulx}{-#3}\edef\mlx{\t}}%
  \pgfutil@ifundefined{pgf@sh@ns@c\nc r#2}{}{% Right
    \hex@dbg{3}{\space Getting right ‘c\nc r#2’}%
    \split@getem{c\nc r#2}\split@adj{\split@lrx}{#3}\edef\mrx{\t}}%
  \pgfutil@ifundefined{pgf@sh@ns@c#1r\pr}{}{% Above
    \hex@dbg{3}{\space Getting above ‘c#1 r\pr’}%
    \split@getem{c#1r\pr}\split@adj{\split@lry}{#3} \edef\mty{\t}}%
  \pgfutil@ifundefined{pgf@sh@ns@c#1r\nr}{}{% Below
    \hex@dbg{3}{\space Getting below ‘c#1 r\nr’}%
    \split@getem{c#1r\nr}\split@adj{\split@uly}{-#3}\edef\mby{\t}}%
  \draw[fill=red]  (\mlx,\mty) circle(.2);%
  \draw[fill=green](\mrx,\mty) circle(.4);%
  \draw[fill=blue] (\mlx,\mby) circle(.6);%
  \draw[fill=cyan] (\mrx,\mby) circle(.8);%
  \split@w{%
    \@percentchar^^J%
    \string\segment(\sulx,\suly)(\slrx,\slry){\mlx}{\mrx}{\mby}{\mty}
    \@percentchar\space c#1r#2}
}
```

Stream to write to

```
\newwrite\split@calcout
```

Short-hand for write outs.

```
\def\split@w{\immediate\write\split@calcout}
```

Open stream and set-up

```
\def\split@header#1{%
  \immediate\openout\split@calcout=#1.tex
  \ifsplit@standalone
  \pgfmathparse{\split@margin*.95}\edef\tmp{\pgfmathresult}
  \split@w{\@percentchar\@percentchar\space These are made with
    ‘calcsplit’ with ‘-jobname \jobname’}
  \split@w{
    ^^J\string\documentclass[twoside]{article}
    ^^J\string\usepackage{geometry}
    ^^J\string\geometry{papersize={\the\paperwidth,\the\paperheight},margin=\tmp cm}
    ^^J\string\usepackage{wargame}
    ^^J\string\setlength{\string\parindent}{0pt}
    ^^J\string\setlength{\string\parskip}{0pt}
    ^^J\string\begin{document}
    ^^J\string\ignorespaces\@percentchar}
  \fi
  \split@w{\string\def\string\boardfile{\split@img}\@percentchar}
  \split@w{\string\def\string\boardscale{\split@scale}\@percentchar}
}
```

Write final stuff and close stream

```
\def\split@footer{%
  \ifsplit@standalone
  \split@w{^^J\string\end{document}}
  \fi
  \split@w{^^J\@percentchar\@percentchar End of ‘\jobname’^^J}
  \immediate\closeout\split@calcout
}
```

Initial calculations. This draws the board and then extracts the dimensions of the board. It also defines some styles for drawing the board segments.

```
\def\split@init#1{%
  \node[scale=\split@scale,
  inner sep=0pt,
  outer sep=0pt,
  anchor=north west,
  transform shape](b){\includegraphics{#1}};
  \split@getboard{b}
  %x
  \split@tmp=\split@blrx cm\advance\split@tmp by -\split@bulx%
  \wg@pt@to@cm{\split@tmp}\edef\split@bw{\pgfmathresult}%
  \pgfmathparse{abs(\split@bw)}\edef\split@bw{\pgfmathresult}%
  %
  \split@tmp=\split@buly cm\advance\split@tmp by -\split@blry%
  \wg@pt@to@cm{\split@tmp}\edef\split@bh{\pgfmathresult}%
  \pgfmathparse{abs(\split@bh)}\edef\split@bh{\pgfmathresult}%
  %
```

```
  \wg@pt@to@cm{\paperwidth}\edef\split@pw{\pgfmathresult}%
  \wg@pt@to@cm{\paperheight}\edef\split@ph{\pgfmathresult}%
  %
  \wg@pt@to@cm{\textwidth}\edef\split@ew{\pgfmathresult}%
  \wg@pt@to@cm{\textheight}\edef\split@eh{\pgfmathresult}%
  %
  \hex@dbg{1}{Board:
    (\split@bulx,\split@buly)(\split@blrx,\split@blry) \split@bw x\split@bh
    ^^JPaper: \split@pw x\split@ph
    ^^JEffective: \split@ew x\split@eh
  }
  \tikzset{
    split/paper size/.style={
      shape=rectangle,
      minimum width=\paperwidth,
      minimum height=\paperheight,
      split/paper outline,
    },
    split/effective size/.style={
      shape=rectangle,
      minimum width=\textwidth,
      minimum height=\textheight,
      split/effective outline},
    split/board size/.style={
      shape=rectangle,
      minimum width=\split@bw cm,
      minimum height=\split@bh cm,
      split/board outline}}
  \node[board/.try,split/board size,anchor=north west] {};
}
```

Calculate effective sheet sizes from sheet dimensions and the defined margin.

```
\def\split@text@dim#1{%
  \textwidth=\paperwidth%
  \textheight=\paperheight%
  \advance\textwidth by -#1cm%
  \advance\textwidth by -#1cm%
  \advance\textheight by -#1cm%
  \advance\textheight by -#1cm%
  \global\textwidth=\textwidth%
  \global\textheight=\textheight%
}
```

Options for the `\splitboard` macro.

```
\newif\ifsplit@standalone\split@standalonetrue
\tikzset{%
  split/.search also={/tikz},%
  split/.cd,%
  margin/.store in=\split@margin,
  paper/.is choice,%
  paper/a4/.code={%
    \hex@dbg{3}{A4 paper for split}%
```

```
    \global\paperwidth=21cm%
    \global\paperheight=29.7cm%
    \split@text@dim{\split@margin}},
  paper/a3/.code={%
    \hex@dbg{3}{A3 paper for split}%
    \global\paperheight=42cm%
    \global\paperwidth=29.7cm%
    \split@text@dim{\split@margin}},
  paper/letter/.code={%
    \hex@dbg{3}{Letter paper for split}
    \paperheight=27.9cm,%
    \paperwidth=21.6cm,%
    \split@text@dim{\split@margin}},%
  paper/tabloid/.code={%
    \hex@dbg{3}{Tabloid paper for split}%
    \paperheight=43.2cm,%
    \paperwidth=27.9cm,%
    \split@text@dim{\split@margin}},
  landscape/.code={%
    \hex@dbg{3}{Landscape option for split}
    \split@tmp=\paperheight
    \global\paperheight=\paperwidth
    \global\paperwidth=\split@tmp
    \split@tmp=\textheight
    \global\textheight=\textwidth
    \global\textwidth=\split@tmp},
  standalone/.is if=split@standalone,
  scale/.store in=\split@scale,
  output/.store in=\split@out,
  ncol/.store in=\split@ncol,
  nrow/.store in=\split@nrow,
  overlap/.store in=\split@ov, % Centimeter, no unit
  image/.store in=\split@img,
  paper/.default=a4,  paper/.initial=a4,
  margin/.default=.6, margin/.initial=.6,
  ncol/.default=0,    ncol/.initial=0,
  nrow/.default=0,    nrow/.initial=0,
  overlap/.default=2, overlap/.initial=2,
  image/.default=board, image/.initial=board,
  output/.default=\jobname_out,
  standalone/.default=true,
  scale/.default=1,
}
```

The actual macro. The argument is key-value pairs of options.

```
\def\splitboard#1{%
  \pgfkeys{/tikz/split/.cd,%
    standalone,%
    output,%
    margin,%
    paper,%
    image,%
    overlap,%
```

```
    scale,%
    ncol,%
    nrow,%
    #1}
  \hex@dbg{1}{%
       Paper:     `\the\paperwidth'x`\the\paperheight'
    ^^JEffective: `\the\textwidth'x`\the\textheight'
    ^^JNcols:     `\split@ncol'
    ^^JNrows:     `\split@nrow'
    ^^JOverlap:   `\split@ov' cm}
  \split@header{\split@out}
  \begin{tikzpicture}
    \split@init{\split@img}
    \split@getinit{%
      \split@nrow}{%
      \split@ncol}{%
      \split@ov}{\split@eh}{\split@ew}{\split@bh}{\split@bw}
    \node[split/effective size,
    above left=\dy and \dx of b.north west,
    anchor=north west] (c1r1) {};
    \node[split/paper size] at (c1r1) {};
    %
    \foreach \r [remember=\r as \pr (initially 0)] in {1,...,\split@nrow}{%
      \ifnum\r>1
        \hex@dbg{3}{Placing first column of row `\r'}
        \node[split/effective size,
        below=-\split@ov cm of c1r\pr.south west,anchor=north west] (c1r\r){};
        \node[split/paper size] at (c1r\r) {};
      \fi
      \foreach \c [remember=\c as \pc (initially 1)] in {2,...,\split@ncol}{%
        \ifnum\c>\split@ncol\else%
          \ifnum\c>\pc
          \hex@dbg{3}{Placing column `\c' (`\pc') of row `\r'}
            \node[split/effective size,
            right=-\split@ov cm of c\pc r\r.north east,anchor=north west]
            (c\c r\r) {};
            \node[split/paper size] at (c\c r\r) {};
          \fi
        \fi
      }
    }
    \foreach \r [remember=\r as \pr (initially 0)] in {1,...,\split@nrow}{%
      \foreach \c [remember=\c as \pc (initially 0)] in {1,...,\split@ncol}{%
        \split@getcoords{\c}{\r}{\split@ov cm}}}
  \end{tikzpicture}
  \split@footer
}
```

Macro used by the written file.

1. first coordinate (e.g., `(hex ak:c=C,r=17)`)
2. second coordinate (e.g., `(hex ak:c=M,r=33)`)

3. Crop mark left
4. Crop mark right
5. Crop mark bottom
6. Crop mark top

```
\def\segment(#1)(#2)#3#4#5#6{%
  \begin{tikzpicture}%
    \begin{scope}
      \clip (#1) rectangle (#2);
      \node[scale=\boardscale,
      inner sep=0pt,
      outer sep=0pt,
      anchor=north west,
      transform shape]{\includegraphics{\boardfile}};
    \end{scope}
    \pgfinterruptboundingbox
    \draw(#3,#6)--++( 0.0, 0.3);
    \draw(#3,#6)--++(-0.3, 0.0);
    \draw(#3,#5)--++( 0.0,-0.3);
    \draw(#3,#5)--++(-0.3, 0.0);
    \draw(#4,#6)--++( 0.0, 0.3);
    \draw(#4,#6)--++( 0.3, 0.0);
    \draw(#4,#5)--++( 0.0,-0.3);
    \draw(#4,#5)--++( 0.3, 0.0);
    \endpgfinterruptboundingbox
  \end{tikzpicture}%
  \cleardoublepage}%
```

5.5 The `wargame.chit` Ti*k*Z library

We define the library for making chits. We load the hex Ti*k*Z `wargame.natoapp6c` library and the amsmath and amstext packages as we need those.

```
\RequirePackage{amsmath}
\RequirePackage{amstext}
\usetikzlibrary{wargame.util,wargame.natoapp6c,math}
```

5.5.1 Debugging

```
\chitdbglvl
\chit@dbg
```

Some macros for debugging. Similar to what we have in `wargame.hex` (see Section 5.4.

```
\newcount\chitdbglvl\chitdbglvl=\wargamedbglvl
\def\chit@dbg#1#2{%
  \ifnum#1>\chitdbglvl\relax\else\message{^^J#2}\fi}
```

5.5.2 The `chit` key namespace

Some stuff to consider wrt. line widths. Setting the line width in the `chit` scope overrides frame settings. The frame stroke can be larger but not smaller. Setting the stroke width in the symbol scope sets it for the symbol only. Thus, to get a thin border, we need to

- Set a small line width in the top chit scope.
- Possible set a larger line width in the frame sub-scope.
- Set a larger line width in the symbol sub-scope.

I do not know why this is.

```
/chit/full
/chit/symbol
/chit/left
/chit/right
/chit/upper left
/chit/upper right
/chit/lower left
/chit/lower right
/chit/factors
/chit/extra
/chit/setup
/chit/bevel
/chit/id
```

The parts of a chit

```
\newif\ifchit@clip\chit@cliptrue
\tikzset{%
  /chit/.search also={/tikz},
  /chit/.cd,
  full/.store in=\chit@full,               full/.initial=,%
  symbol/.store in=\chit@symbol,           symbol/.initial=,%
  left/.store in=\chit@left,               left/.initial=,%
  unique/.style={/chit/left={#1}},%
  right/.store in=\chit@right,             right/.initial=,%
  parent/.style={/chit/right={#1}},%
  upper left/.store in=\chit@upper@left,   upper left/.initial=,%
  upper right/.store in=\chit@upper@right, upper right/.initial=,%
  lower left/.store in=\chit@lower@left,   lower left/.initial=,%
  lower right/.store in=\chit@lower@right, lower right/.initial=,%
  factors/.store in=\chit@factors,         factors/.initial=,%
  setup/.store in=\chit@setup,             setup/.initial=,%
  id/.store in=\chit@id,                   id/.initial=,%
  frame/.store in=\chit@frame,             frame/.initial=,%
  extra/.store in=\chit@extra,             extra/.initial=,%
  bev/.store in=\chit@bevel,               bev/.initial=,
  bevel fraction/.store in=\chit@bevel@frac,bevel fraction/.initial=10,
  bevel/.is choice,
```

```
  bevel/none/.style       = {/chit/bev=},
  bevel/north west/.style = {/chit/bev=1},
  bevel/north east/.style = {/chit/bev=2},
  bevel/south west/.style = {/chit/bev=3},
  bevel/south east/.style = {/chit/bev=4},
  bevel/NW/.style         = {/chit/bev=1},
  bevel/NE/.style         = {/chit/bev=2},
  bevel/SW/.style         = {/chit/bev=3},
  bevel/SE/.style         = {/chit/bev=4},
  bevel/.default          = north west,
  clip/.is if=chit@clip,%
  nato shape/.store in=\chit@n@to@shape,
}
```

```
/tikz/chit/full
/tikz/chit/symbol
/tikz/chit/left
/tikz/chit/right
/tikz/chit/upper left
/tikz/chit/upper right
/tikz/chit/lower left
/tikz/chit/lower right
/tikz/chit/factors
/tikz/chit/setup
/tikz/chit/id
```

Styles of each element in a chit. Users may override these at their own peril. That is, it is OK to override them, but the user should be careful.

```
\def\chit@sym@sc@le{.4}
\tikzset{
  chit/symbol/.style={scale=\chit@sym@sc@le,transform shape},
  chit/parts/.style={shape=rectangle,transform shape},
  chit/factors/.style={chit/parts,anchor=south},
  chit/left/.style={chit/parts,anchor=base,rotate=90},%Anchor was south
  chit/right/.style={chit/parts,anchor=north,rotate=90},
  chit/upper left/.style={chit/parts,anchor=north west},
  chit/upper right/.style={chit/parts,anchor=north east},
  chit/lower left/.style={chit/parts,anchor=south west},
  chit/lower right/.style={chit/parts,anchor=south east},
  chit/setup/.style={chit/parts},
  chit/full/.style={chit/parts},
  chit/frame/.try={draw=pgfstrokecolor},
  chit/bevel highlight/.style={fill=white,opacity=.25},
  chit/bevel shadow/.style={fill=black,opacity=.25},
}
\def\chit@bevel@frac{10}
\newif\ifchit@draw@frame\chit@draw@frametrue
\tikzset{
  chit/frame style/.search also={/tikz},
  chit/frame style/.cd,
  none/.code={\chit@draw@framefalse},
```

```
  draw/.code={%
    \chit@dbg{2}{Frame draw option ‘#1’}
    \edef\tikz@temp{#1}%
    \ifx\tikz@temp\tikz@nonetext%
      \chit@draw@framefalse%
    \else%
      \chit@draw@frametrue%
      \tikzset{/tikz/draw=#1}
    \fi
  }
}
```

5.5.3 The `chit` styles

`/tikz/chit`

This key sets up a node to make a chit. The key takes a single argument which in turn must contain key–value pairs in the `/chit` (or `/tikz`) namespace(s). We set the `shape` parameter of the node, and calls the passed keys in the `/chit` namespace to set-up elements of the chit.

```
\tikzset{%
  chit/.code={%
    \chit@dbg{2}{chit arguments are ‘#1’}%
    \pgfkeys{/tikz/transform shape,/tikz/shape=chit}%
    \pgfkeys{/chit/.cd,nato shape=natoapp6c,#1}}}
```

We define a counter to set-up unique names for chit nodes.

```
\newcounter{chit@id}\setcounter{chit@id}{0}
```

5.5.4 The `\chit` shape

`\chit@n@to`
`\@chit@n@to`
`\@@chit@n@to`
`\@chit@n@to@`

These macros puts the NATO App6(c) symbol into a chit. The first macro takes the identifier and position of the symbol, and then scans for options. If no options are given, then we go directly to the rendering (`\@chit@n@to@`). Otherwise, we may also need to scan for an offset given as (⟨*delta-x,delta-y*⟩).

```
\def\chit@n@to#1#2{%
  %% Without a following start square bracket ’[’ by-pass to final
  \chit@dbg{1}{Chit NATO App6(c) first step ‘#1’ ‘#2’}
  \@ifnextchar[{%
    %\message{^^JStart square bracket}%
    \@chit@n@to{#1}{#2}}{%
    %\message{^^JNo start square bracket}%
    \@chit@n@to@{#1}{#2}}%]]
}
```

The following macro is called if we had no options.

```
\def\chit@n@to@shape{natoapp6c}
\def\@chit@n@to@#1#2#3\@end@chit@n@to{%
  \chit@dbg{1}{Chit NATO App6(c) w/o offset:
    ^^J  Options:  '#3'
    ^^J  ID:       '#1'
    ^^J  Position: '#2'
    ^^J  Style:    '\chit@n@to@shape'
  }
  \chit@dbg{2}{NATO shape: '\chit@n@to@shape'}
  \node[chit/symbol,\chit@n@to@shape={#3,id=#1}] (#1) at (#2) {};
  \chit@dbg{4}{Chit NATO App6(c) ended}%
}
```

This is called if we had an option-like argument. Check if we have an offset

```
\def\@chit@n@to#1#2[#3]{%
  \chit@dbg{1}{Chit NATO App6(c) second step '#1' '#2' '#3'}
  \@ifnextchar({\@@chit@n@to{#1}{#2}{#3}}{\@@chit@n@to{#1}{#2}{#3}(0,0)}%)
}
```

This called if we had option-like argument.

```
\def\@@chit@n@to#1#2#3(#4)\@end@chit@n@to{%
  \chit@dbg{1}{Chit NATO App6(c) w/offset:
    ^^J  Options:  #3
    ^^J  ID:       #1
    ^^J  Position: #2
    ^^J  Offset:   #4}
  \chit@dbg{10}{==== NATO shape: '\chit@n@to@shape' ====}
  \node[chit/symbol,\chit@n@to@shape={#3,id=#1}] (#1) at ($(#2)+(#4)$) {};}
```

`\chit@tr@ns@nchor`
`\chit@nchor`

Get anchor of sub-symbol element in chit. We need to do this, because the symbol is translated and scaled.

```
\def\chit@tr@ns@nchor{%
  \chit@dbg{10}{Translating anchor '\the\pgf@x','\the\pgf@y'}
  \wg@tmpa=\pgf@x%
  \wg@tmpb=\pgf@y%
  \symbol%
  \chit@dbg{10}{Symbol origin '\the\pgf@x','\the\pgf@y'}
  \wg@tmpc=\pgf@x%
  \wg@tmpd=\pgf@y%
  \pgf@x=\chit@sym@sc@le\wg@tmpa%
  \pgf@y=\chit@sym@sc@le\wg@tmpb%
  \chit@dbg{10}{Scaled anchor '\the\pgf@x','\the\pgf@y'}
  \advance\pgf@x\wg@tmpc%
  \advance\pgf@y\wg@tmpd%
  \chit@dbg{10}{Offset anchor '\the\pgf@x','\the\pgf@y'}
}
```

```
\def\chit@nchor#1#2{%
  \chit@dbg{10}{Get chit sub anchor of `#1' `#2'}%
  \wg@sub@nchor{#1}{#2}%
  \chit@tr@ns@nchor%
  \chit@dbg{10}{Got chit sub anchor of `\the\pgf@x `\the\pgf@y}%
}
\def\chit@sym@nchor#1{%
  \chit@dbg{10}{Get chit symbol `#1'}%
  \edef\tmpid{\id symbol}%
  \chit@nchor{\tmpid}{#1}}
\def\chit@report{}
\tikzset{
  zone turn/.style={},
  zone mult/.style={}
}
\def\chit@bkg@p@th{%
  \northeast%
  \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  \wg@tmpb=-\wg@tmpb \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  \pgfclosepath%
}
```

Now follows the actual chit shape. This is rather long, so we will break it up a bit

```
\def\chit@bevel@path#1{
  \scope[#1]
  \wg@tmpc=\wg@tmpa%
  \wg@tmpd=\wg@tmpb%
  %% Absolute values
  \ifdim\wg@tmpa<0pt\multiply\wg@tmpc by -1\fi%
  \ifdim\wg@tmpb<0pt\multiply\wg@tmpd by -1\fi%
  % Why the hell do I need this?
  \chit@dbg{10}{`\the\wg@tmpa' `\the\wg@tmpb'}%
  %% Smallest dimension
  \ifdim\wg@tmpc>\wg@tmpd \wg@tmpc=\wg@tmpd\fi%
  \ifdim\wg@tmpc<\wg@tmpd \wg@tmpd=\wg@tmpc\fi%
  %% Restore sign
  \ifdim\wg@tmpa<0pt\multiply\wg@tmpc by -1\fi%
  \ifdim\wg@tmpb<0pt\multiply\wg@tmpd by -1\fi%
  %% Take the fraction
  \multiply\wg@tmpc by \chit@bevel@frac%
  \multiply\wg@tmpd by \chit@bevel@frac%
  \divide\wg@tmpc100%
  \divide\wg@tmpd100%
  \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  % Move down along edge
  \wg@tmpb=-\wg@tmpb%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  % Move left along edge
  \wg@tmpa=-\wg@tmpa%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
```

```
  % Move in and up
  \advance\wg@tmpa\wg@tmpc%
  \advance\wg@tmpb\wg@tmpd%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  % Move right, but in
  \advance\wg@tmpa-\wg@tmpc\wg@tmpa=-\wg@tmpa%
  \advance\wg@tmpa-\wg@tmpc%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  % Move up but down
  \advance\wg@tmpb-\wg@tmpd\wg@tmpb=-\wg@tmpb%
  \advance\wg@tmpb-\wg@tmpd%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
  \pgfclosepath%
  \pgfusepath{fill}%
  \endscope%
}
```

The first thing is we declare some saved anchors. These are computed (and defined as internal macros) when the shape is instantised. The anchors give the centre and north east corner of the node, the place to put the NATO App6(c) symbol and factors. We also set a dimension for the margins (corner and factors elements).

```
\pgfdeclareshape{chit}{
  \savedanchor\center{\pgf@x=0cm\pgf@y=0cm}
  \savedanchor\northeast{\pgf@x=0.6cm\pgf@y=\pgf@x}
  \savedanchor\symbol{\pgf@x=0cm\pgf@y=0.1cm}
  \savedanchor\factors{\pgf@x=0cm\pgf@y=-0.5cm}
  \saveddimen\margin{\pgf@x=0.04cm}
```

Next, we define some saved macros. These are called (and declares internal macros) when the shape is instantised. We define macros for the identifier,

```
  \savedmacro\id{%
    \chit@dbg{4}{Chit ID: \meaning\chit@id}%
    \@ifundefined{chit@id}{\let\chit@id\pgfutil@empty}{}%
    \ifx\chit@id\pgfutil@empty%
      \wg@r@ndom@id%
      \edef\id{chit\wg@uuid}%
    \else%
      \edef\id{\chit@id}%
    \fi%
    \chit@dbg{4}{Chit ID stored: \meaning\chit@id}
  }
  \savedmacro\chitframeopt{%
    \let\chitframeopt\pgfutil@empty%
    \@ifundefined{chit@frame}{}{%
      \edef\chitframeopt{\chit@frame}}
    \chit@dbg{3}{Chit Frame options: \meaning\chitframeopt}%
  }
  \savedmacro\thisname{\def\thisname{chit}}
```

We define the regular anchors of the shape. That is, the centre, corners, and edges.

```
  \anchor{center}{\center}
  \anchor{north east}{\northeast}
```

```
\anchor{north west}{\northeast\pgf@x=-\pgf@x}
\anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
\anchor{south east}{\northeast\pgf@y=-\pgf@y}
\anchor{north}     {\northeast\pgf@x=0cm}
\anchor{south}     {\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
\anchor{east}      {\northeast\pgf@y=0cm}
\anchor{west}      {\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
```

Next, we want to be able to reference the symbol anchors too. So we define these anchors from the embedded node anchors. Note, these anchors will not exist if the chit is made with `full=`⟨*args*⟩.

```
\anchor{symbol north east}{\chit@sym@nchor{north east}}
\anchor{symbol north west}{\chit@sym@nchor{north west}}
\anchor{symbol south east}{\chit@sym@nchor{south east}}
\anchor{symbol south west}{\chit@sym@nchor{south west}}
\anchor{symbol north}     {\chit@sym@nchor{north}}
\anchor{symbol west}      {\chit@sym@nchor{west}}
\anchor{symbol south}     {\chit@sym@nchor{south}}
\anchor{symbol east}      {\chit@sym@nchor{east}}
\anchor{symbol upper}     {\chit@sym@nchor{upper}}
\anchor{symbol lower}     {\chit@sym@nchor{lower}}
\anchor{symbol left}      {\chit@sym@nchor{left}}
\anchor{symbol right}     {\chit@sym@nchor{right}}
\anchor{symbol echelon}   {\chit@sym@nchor{echelon}}
\anchor{symbol below}     {\chit@sym@nchor{below}}
```

Some anchors to sub-elements. Some of them only exists if we have NATO App6(c) symbol in the chit.

```
\anchor{symbol}    {\symbol}
\anchor{factors}   {\factors}
\anchor{left} {\chit@sym@nchor{west}\advance\pgf@x-\margin}
\anchor{right}{\chit@sym@nchor{east}\advance\pgf@x+\margin}
\anchor{upper right} {%
  \northeast \advance\pgf@x-\margin \advance\pgf@y-\margin%
}
\anchor{upper left}{
  \northeast \advance\pgf@x-\margin \advance\pgf@y-\margin \pgf@x=-\pgf@x%
}
\anchor{lower right} {%
  \northeast \advance\pgf@x-\margin \advance\pgf@y-\margin \pgf@y=-\pgf@y%
}
\anchor{lower left}{
  \northeast \advance\pgf@x-\margin \advance\pgf@y-\margin%
  \pgf@x=-\pgf@x \pgf@y=-\pgf@y%
}
```

Now for the actual path. For the background path, we simply specify the frame. This is so that this will get drawn (and possibly filled) using the appropriate options.

```
\backgroundpath{%
  %% This is the outline of the chit only.  The rest of the chit is
  %% made on the foreground "path".
  \chit@dbg{1}{Chit drawing background path}
  \chit@bkg@p@th%
```

```
    % \northeast%
    % \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
    % \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    % \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    % \wg@tmpb=-\wg@tmpb \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    % \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    % \pgfclosepath
  }
```

Finally, we make the foreground rendered path. This is where we do the most stuff. We do it in the *behind* foreground path so that we can ensure things are drawn the way we want it.

The first thing is to set-up the clipping to the chit frame.

```
  \behindforegroundpath{%
    \chit@dbg{1}{Chit drawing foreground path}
    % \chit@dbg{4}{%
    %   Chit foreground: \meaning\id
    %   ^^J  ID (set):    \meaning\chit@id
    %   ^^J  Symbol:      \meaning\chit@symbol
    %   ^^J  Full:        \meaning\chit@full
    %   ^^J  Factors:     \meaning\chit@factors
    %   ^^J  Left:        \meaning\chit@left
    %   ^^J  Right:       \meaning\chit@right
    %   ^^J  Upper left:  \meaning\chit@upper@left
    %   ^^J  Lower left:  \meaning\chit@lower@left
    %   ^^J  Upper right: \meaning\chit@upper@right
    %   ^^J  Lower right: \meaning\chit@lower@right
    %   ^^J  Extra:       \meaning\chit@extra
    %   ^^J  Bevel:       \meaning\chit@bevel
    %   ^^J  Frame:       \meaning\chit@frame}
    \chit@dbg{1}{Chit report}
    \chit@report{}
    \chit@dbg{1}{Chit start scope}
    \pgfscope
    %
    \ifchit@clip%
      \chit@dbg{1}{Chit clip path}
      \chit@bkg@p@th%
      % \northeast%
      % \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
      % \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      % \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      % \wg@tmpb=-\wg@tmpb \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      % \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      % \pgfclosepath%
      \pgfusepath{clip}%
    \fi%
```

If we do not have the `symbol` key set, then we set the `full` key as a picture.

```
    \@ifundefined{chit@symbol}{%
      %% Draw full stuff
      \@ifundefined{chit@full}{}{%
        \chit@dbg{1}{Chit draw full image: `\meaning\chit@full'}
```

```
14705         \center\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
14706         \wg@pic@all{\chit@full}{}{\the\wg@tmpa,\the\wg@tmpb}{chit/full}}%
14707     }{% With NATO symbol
```

Otherwise, we put in a node with shape `natoapp6c` and pass the `symbol` key–value pairs as options.

```
14708       \chit@dbg{1}{Chit draw symbol image}
14709       \edef\symid{\id symbol}%
14710       \symbol%
14711       \edef\args{{\symid}{\the\pgf@x,\the\pgf@y}\chit@symbol}%
14712       \chit@dbg{6}{Arguments to chit NATO symbol: \meaning\args}%
14713       \chit@dbg{1}{Chit draw nato image `\symid'}
14714       \expandafter\chit@n@to\args\@end@chit@n@to%
14715       \chit@dbg{6}{After making NATO symbol in chit}%
```

Having made the NATO App6(c) symbol, which we gave the node name ⟨*id*⟩`symbol` where ⟨*id*⟩ is the ID of this chit, we can make the rest of the chit elements. These are the left and right elements, which are set west and east of the symbol, respectively; the factors; and the four corner elements.

If the respective elements have not been specified, we do not make them.

First the left and right elements. Note that these uses the anchors of the embedded `natoapp6c` node for placement.

```
14716       % Put in left of symbol
14717       \@ifundefined{chit@left}{}{%
14718         \chit@dbg{2}{Chit draw left: `\meaning\chit@left'}
14719         \wg@nchor{\thisname}{left}
14720         \begin{scope}[]
14721           \wg@pic@all{\chit@left}{}{\pgf@x,\pgf@y}{chit/left}%
14722         \end{scope}}%
14723       % Put in right of symbol
14724       \@ifundefined{chit@right}{}{%
14725         \chit@dbg{2}{Chit draw right: `\meaning\chit@right'}
14726         \wg@nchor{\thisname}{right}
14727         \begin{scope}[]
14728           \wg@pic@all{\chit@right}{}{\pgf@x,\pgf@y}{chit/right}%
14729         \end{scope}}%
```

Next, we want to put in the corner elements. But before we do that, we use our saved anchors and dimensions to calculate the coordinates. Note that the corner elements are anchored to the corners (plus margin) of the chit frame.

```
14730       % Get coordinates
14731       \northeast%
14732       \wg@tmpa=\pgf@x%
14733       \wg@tmpb=\pgf@y%
14734       \advance\wg@tmpa-\margin%
14735       \advance\wg@tmpb-\margin%
```

With the coordinates extracted, we set the four corner elements. Note, for the anchoring to work, we should specify pictures that have anchors (e.g., nodes). If not, we must take care to give offsets or the like.

```
14736       % Put in upper left corner
14737       \@ifundefined{chit@upper@left}{}{%
14738         \chit@dbg{1}{Chit draw upper left: `\meaning\chit@upper@left'}%
14739         \wg@nchor{\thisname}{upper left}
```

```
      \begin{scope}[]
        \wg@pic@all{\chit@upper@left}{}{\pgf@x,\pgf@y}{chit/upper left}%
      \end{scope}}
    % Put in upper right corner
    \@ifundefined{chit@upper@right}{}{%
      \chit@dbg{1}{Chit draw upper right: `\meaning\chit@upper@right'}
      \wg@nchor{\thisname}{upper right}%
      \begin{scope}[]
        \wg@pic@all{\chit@upper@right}{}{\pgf@x,\pgf@y}{chit/upper right}%
      \end{scope}}
    % Put in lower left corner
    \@ifundefined{chit@lower@left}{}{%
      \chit@dbg{1}{Chit draw lower left: `\meaning\chit@lower@left'}
      \wg@nchor{\thisname}{lower left}%
      \begin{scope}[]
        \wg@pic@all{\chit@lower@left}{}{\pgf@x,\pgf@y}{chit/lower left}%
      \end{scope}}
    % Put in lower right corner
    \@ifundefined{chit@lower@right}{}{%
      \chit@dbg{1}{Chit draw lower right: `\meaning\chit@lower@right'}
      \wg@nchor{\thisname}{lower right}%
      \begin{scope}[]
        \wg@pic@all{\chit@lower@right}{}{\pgf@x,\pgf@y}{chit/lower right}%
      \end{scope}}
```

Finally, we put in the unit factors. They are put at the bottom of the chit frame (plus margin) and are typically anchored to the south anchor of the element. Note, we can put in several factors if need be.

```
    % Put in factors
    \@ifundefined{chit@factors}{}{%
      \chit@dbg{1}{Chit draw factors: `\meaning\chit@factors'}
      \advance\wg@tmpb-\margin%
      \begin{scope}[]
        \wg@pic@all{\chit@factors}{}{0,-\the\wg@tmpb}{chit/factors}%
      \end{scope}}%
    % Put in extra
    \@ifundefined{chit@extra}{}{%
      \chit@dbg{1}{Chit draw extra: `\meaning\chit@extra'}
      \begin{scope}[]
        \wg@pic@all{\chit@extra}{}{0,0}{chit/factors}%
      \end{scope}}%
  }% End of full or symbol
  \endpgfscope%
  % Make bevel?
  \@ifundefined{chit@bevel}{\let\chit@bevel\empty}{}
  \ifx\chit@bevel\empty\else%
    \chit@dbg{1}{Chit draw bevel}
    %% South east bevel
    \northeast%
    \wg@tmpa=-\pgf@x\wg@tmpb=-\pgf@y%
    \ifcase\chit@bevel\relax%
    \or% 1
    \or\wg@tmpa=-\wg@tmpa% 2
    \or\wg@tmpb=-\wg@tmpb% 3
```

```
      \or\wg@tmpa=-\wg@tmpa\wg@tmpb=-\wg@tmpb%4
      \fi
      \chit@bevel@path{chit/bevel highlight}
      %% North west bevel
      \northeast%
      \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
      \ifcase\chit@bevel\relax%
      \or% 1
      \or\wg@tmpa=-\wg@tmpa% 2
      \or\wg@tmpb=-\wg@tmpb% 3
      \or\wg@tmpa=-\wg@tmpa\wg@tmpb=-\wg@tmpb%4
      \fi
      \chit@bevel@path{chit/bevel shadow}
    \fi
    % Draw frame?
    \chit@dbg{1}{Chit draw frame: `\meaning\chitframeopt'}
    \edef\tmp@opt{[chit/frame style/.cd,chit/frame/.try,\chitframeopt]}
    \chit@dbg{1}{Chit draw frame: `\meaning\tmp@opt}
    \expandafter\scope\tmp@opt
      \northeast%
      \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      \wg@tmpb=-\wg@tmpb \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      \pgfclosepath%
      \chit@dbg{3}{Line width for frame: `\the\pgflinewidth'}
      \ifchit@draw@frame\pgfusepath{stroke}\fi%
      \chit@draw@frametrue%
      %\iftikz@mode@fill\pgfusepath{fill}\fi%
    \endscope%
    \chit@dbg{1}{Chit end of shape}
  }
}
```

5.5.5 The \chit wrapper macro

```
\chit
\chit@
\chit@@
```

The macro to make the chits. This is a wrapper around a `node` with shape `chit`. The syntax of this macro is

```
\chit[⟨chit options⟩](⟨position⟩)(⟨identifier⟩);
```

Note that the trailing semi-colon is optional. Here ⟨*chit options*⟩ are any key-value pairs in the `/chit` (and `/tikz`) namespace.

The first macro parses for options.

```
\def\chit{%
  \chit@dbg{5}{Chit}
  \@ifnextchar[{\chit@}{\chit@[]}%]
```

```
}
```

Parse for coordinates.

```
\def\chit@[#1]{%
  \chit@dbg{5}{Chit second: `#1'}
  \@ifnextchar({\chit@@{#1}}{\chit@@{#1}(0,0)}%)
}
```

Parse for name.

```
\def\chit@@#1(#2){%
  \@ifnextchar({\chit@@@{#1}{#2}}{\chit@@@{#1}{#2}()}%)
}
```

The work horse. This simply makes a `\node` with the shape `chit`. Note, we allow for a trailing semi-colon (`;`) to have a similar feel to other Ti*k*Z macros.

The macro will execute the style `/tikz/every chit` if defined. Note that this will be executed *before* the usual `every chip node` style.

```
\def\chit@@@#1#2(#3){%
  \chit@dbg{5}{Chit final:
    ^^J  Options:    #1
    ^^J  Position:   #2
    ^^J  Name:       `#3'}
  \let\name\pgfutil@empty%
  \chit@dbg{1}{=== Before chit node}%
  \node[chit={/tikz/every chit/.try,id=#3,#1}] (tmp) at (#2) {};
  \chit@dbg{2}{=== After chit node}%
  \ifx|#3|\relax%
  \else%
    \chit@dbg{3}{=== Renaming chit to user defined name `#3'}%
    \pgfnoderename{#3}{tmp}%
  \fi%
  \@ifnextchar;{\@gobble}{}%
}
```

5.5.6 The Kriegspiel option for chits

This will select a Kriegspiel-like chit layout. That is, if we pass `kriegspiel` as a keyword to the `chit` style, then we will make a Kriegspiel-like chit (oblong, other symbols).

```
\tikzset{
  /chit/kriegspiel/.code={
    \pgfkeys{%
      /tikz/shape=kriegspiel,%
      /chit/nato shape=kriegspiel symbol}
  }
}
```

Shape of a Kriegspiel like chit. This mainly inherits from the `chit` shape but overrides a number of anchors.

```
\pgfdeclareshape{kriegspiel}{
```

```
  \inheritsavedanchors[from=chit]
  \savedanchor\northeast{\pgf@x=0.8cm\pgf@y=0.4cm}
  \savedanchor\symbol{\pgf@x=0cm\pgf@y=0.15cm}
  \savedanchor\factors{\pgf@x=.2cm\pgf@y=-.4cm}
  \savedmacro\thisname{\def\thisname{kriegspiel}}
  \saveddimen\margin{\pgf@x=0.03cm}
  \inheritanchor[from=chit]{center}
  \inheritanchor[from=chit]{north east}
  \inheritanchor[from=chit]{north west}
  \inheritanchor[from=chit]{south west}
  \inheritanchor[from=chit]{south east}
  \inheritanchor[from=chit]{north}
  \inheritanchor[from=chit]{south}
  \inheritanchor[from=chit]{east}
  \inheritanchor[from=chit]{west}
  \inheritanchor[from=chit]{symbol north east}
  \inheritanchor[from=chit]{symbol north west}
  \inheritanchor[from=chit]{symbol south east}
  \inheritanchor[from=chit]{symbol south west}
  \inheritanchor[from=chit]{symbol north}
  \inheritanchor[from=chit]{symbol west}
  \inheritanchor[from=chit]{symbol south}
  \inheritanchor[from=chit]{symbol east}
  \inheritanchor[from=chit]{symbol upper}
  \inheritanchor[from=chit]{symbol lower}
  \inheritanchor[from=chit]{symbol left}
  \inheritanchor[from=chit]{symbol right}
  \inheritanchor[from=chit]{symbol echelon}
  \inheritanchor[from=chit]{symbol below}
  \inheritanchor[from=chit]{symbol}
  \inheritanchor[from=chit]{factors}
  \inheritanchor[from=chit]{left}
  \inheritanchor[from=chit]{right}
  \inheritanchor[from=chit]{upper right}
  \inheritanchor[from=chit]{upper left}
  \inheritanchor[from=chit]{lower right}
  \inheritanchor[from=chit]{lower left}
  % \anchor{upper right} {%
  %   \northeast%
  %   \advance\pgf@x-\margin%
  %   \advance\pgf@y-\margin%
  %   \pgf@y=-\pgf@y%
  %   \advance\pgf@y5pt%
  % }
  % \anchor{upper left}{
  %   \northeast%
  %   \advance\pgf@x-\margin%
  %   \advance\pgf@y-\margin%
  %   \pgf@x=-\pgf@x%
  %   \pgf@y=-\pgf@y%
  %   \advance\pgf@y5pt%
  % }
  %%
```

```
  \inheritbackgroundpath[from=chit]
  \inheritbehindforegroundpath[from=chit]
}
```

5.5.7 Predefined chit element pictures

```
\DeclareRobustCommand\chit@sep[2][/]{%
  \foreach[count=\is] \s in {#2}{%
    \ifnum\is>1\relax#1\fi%
    \s}}
```

```
/tikz/pics/chit/1 factor
/tikz/pics/chit/2 factors
/tikz/pics/chit/2 factors artillery
/tikz/pics/chit/3 factors
/tikz/pics/chit/4 factors
/tikz/pics/chit/identifier
/tikz/pics/chit/small identifier
/tikz/pics/chit/identifier macro
```

These pictures can be used as the value of chit keys.

```
\def\chit@oset#1#2{%
  %$\stackrel{{}_{\text{\scriptsize #1}}}{\text{#2}}$%
  %$\stackrel{\lower2ex\hbox{\text{\scriptsize #1}}}{\text{#2}}$%
  %${}\overset{\text{\scriptsize #1}}{\text{#2}}{}$%
  \tikz[]{%
    \node[inner sep=0pt](chit@dd){#2};%
    \node[above=-.1ex of chit@dd,inner sep=0pt]{{\scriptsize #1}};%
  }%
}
\tikzset{%
  chit/1 factor/.pic={
    \chit@dbg{4}{ Chit 1 factor: #1}%
    \node[chit/factor,chit/1 factor,pic actions]{#1};},
  pics/chit/2 factors/.style args={#1,#2}{%
    code={%
      \chit@dbg{4}{ Chit 2 factors: #1 and #2}%
      \node[chit/factor,chit/2 factors,pic actions]{#1--#2};}},
  pics/chit/2 factors artillery/.style args={#1,#2,#3}{%
    code={
      \chit@dbg{4}{ Chit 2 factors w/artillery: `#1' `#2' `#3'}%
      \node[chit/factor,chit/2 factors]{%
        {#1}\chit@oset{#3}{--}{#2}};}},
  pics/chit/3 factors/.style args={#1,#2,#3}{%
    code={
      \chit@dbg{4}{ Chit 3 factors: `#1' `#2' `#3'}%
      \node[chit/factor,chit/3 factors]{#1-#2-#3};}},
  pics/chit/4 factors/.style args={#1,#2,#3,#4}{%
    code={
      \chit@dbg{4}{ Chit 3 factors: `#1' `#2' `#3' `#4'}%
      \node[chit/factor,chit/4 factors]{#1-#2-#3-#4};}},
```

```
  chit/identifier/.pic={
    \chit@dbg{4}{  Chit identifier: `#1'}%
    \node[chit/identifier,pic actions]{#1};
  },
  chit/identifiers/.pic={
    \chit@dbg{4}{  Chit identifiers: `#1'}%
    \node[chit/identifier,pic actions]{\chit@sep{#1}};
  },
  chit/small identifier/.pic={
    \chit@dbg{4}{  Chit small identifier: `#1'}%
    \node[chit/small identifier,pic actions]{#1};
  },
  chit/small identifiers/.pic={
    \chit@dbg{4}{  Chit small identifiers: `#1'}%
    \node[chit/small identifier,pic actions]{\chit@sep{#1}};
  },
  chit/identifier macro/.pic={%
    \chit@dbg{4}{ Chit identifier macro: \meaning#1}
    \edef\chit@i@tmp{#1}
    \node[chit/identifier,pic actions]{\chit@i@tmp};},
}
```

```
/tikz/chit/factor
/tikz/chit/1 factor
/tikz/chit/2 factors
/tikz/chit/3 factors
/tikz/chit/4 factors
/tikz/chit/identifier
/tikz/chit/small identifier
```

Styles used by the above pictures. Users can change these as they see fit.

```
\tikzset{%
  chit/factor/.style={
    shape=rectangle,
    font=\sffamily\bfseries\fontsize{12}{14}\selectfont,
    anchor=base,
    inner sep=0,
    %text=pgfstrokecolor,
    draw=none,
    fill=none,
    transform shape,
  },
  chit/1 factor/.style={},
  chit/2 factors/.style={},
  chit/3 factors/.style={},
  chit/4 factors/.style={text/.append style=\fontsize{10}{12}\selectfont},
  chit/identifier/.style={
    shape=rectangle,
    font=\sffamily\bfseries\fontsize{8}{9}\selectfont,
    inner sep=0,
    % text=pgfstrokecolor,
    draw=none,
```

```
    fill=none,
    transform shape,
  },
  chit/small identifier/.style={
    shape=rectangle,
    font=\sffamily\bfseries\fontsize{6}{7}\selectfont,
    inner sep=0,
    % text=pgfstrokecolor,
    draw=none,
    fill=none,
    transform shape,
  },
}
```

5.5.8 Modifications to chits

These defines overlays one can add on top of chits, for example to shade a chit, put a semi-transparent red cover to indicate elimination, and similar.

```
\tikzset{
  pics/chit/shade/.style={
    code={%
      \path[fill=white,opacity=#1,pic actions] (-.6,-.6) rectangle(.6,.6);}},
  pics/chit/eliminate/.style={
    code={%
      \path[fill=red,opacity=#1,pic actions] (-.6,-.6) rectangle(.6,.6);}},
  pics/chit/shade/.default=0.5,
  pics/chit/eliminate/.default=0.25,
  dummy chit/.style={draw=none,fill=none,chit={}},
}
\def\shadechit{%
  \@ifnextchar[{\sh@dechit}{\sh@dechit[.5]}%]
}
\def\eliminatechit{%
  \@ifnextchar[{\elimin@techit}{\elimin@techit[.25]}%]
}
\def\sh@dechit[#1](#2){%
  % \message{^^JShading chit with opacity `#1'}%
  \pic[transform shape] at (#2) {chit/shade=#1};%
  \@ifnextchar;{\@gobble}{}}
\def\elimin@techit[#1](#2){%
  \pic[transform shape] at (#2) {chit/eliminate=#1};%
  \@ifnextchar;{\@gobble}{}}
```

5.5.9 Stacking of chits

Stacking of chits. The key `chit/stack direction` sets the default direction to make the stack in.

```
% offset, location, direction, list
\tikzset{%
  chit/stack direction/.store in=\chit@stack@dir,
  chit/stack direction/.initial={(.3,.3)},
}
```

Now the code

```
\def\chit@stack@dir{(.3,.3)}
\def\stackchits(#1){%
  \@ifnextchar({\st@ckchits{#1}}{\st@ckchits{#1}(.3,.3)}%)
}
\def\st@ckchits#1(#2)#3{%
  \chit@dbg{2}{Stacking chits ‘#1’, ‘#2’, ‘#3’}%
  \edef\xy{#1}%
  \chit@dbg{4}{Stack start at \xy}%
  \foreach[count=\i from 0] \c/\o in {#3} {%
    \ifx\c\empty\else%
      \edef\ccc{\c}%
      \chit@dbg{2}{Adding \meaning\ccc\space to stack at (\xy)’ ‘\o’}%
      \expandafter\ccc(\xy)%
      %%
      \ifx\c\o\else%
        %\chit@dbg{0}{Option: \o}
        \edef\ccc{\o}%
        \expandafter\ccc(\xy)%
      \fi
      \expandafter\ccc(\xy)%
      \tikzmath{%
        coordinate \cc;%
        \cc = (\xy) + (#2);}
      \xdef\xy{\cc}%
    \fi%
  }%
  \@ifnextchar;{\@gobble}{}%
}
```

5.5.10 Making order of battle charts

Macros for making OOBs

Style for turns

```
\tikzset{
  chit/oob turn/.pic={\node[pic actions]{#1};}}
```

current c, current r, n-columns, cell size, y

```
\def\chit@oob@cellupdate(#1,#2)#3#4#5{%
  \edef\f{\ifwg@oob@inv-1\else1\fi}%
  \chit@dbg{1}{ \space Cell update ‘c=|#1|’ vs ‘#4’*(‘#3’-1)}
  \pgfmathparse{int(ifthenelse(abs(#1)>=#4*(#3-1),#5-1,#5))}%
  \xdef#5{\pgfmathresult}
  \pgfmathparse{ifthenelse(abs(#1)>=#4*(#3-1),#2-#4,#2)}%
  \xdef#2{\pgfmathresult}%
  \pgfmathparse{ifthenelse(abs(#1)>=#4*(#3-1),0,#1+\f*#4)}%
  \xdef#1{\pgfmathresult}%
  \chit@dbg{1}{ \space\space-> ‘\string#5’=#5 ‘\string#2’=#2 ‘\string#1’=#1}
}
```

current c, current r, cell size, extra vertical spacing

```
\def\chit@oob@rowupdate(#1,#2)#3#4{%
  \chit@dbg{2}{ Row update  c=‘#1’,r=‘#2’,s=‘#3’,e=‘#4’}
  %\pgfmathparse{ifthenelse(#1>0,#2-#3,#2)}%
  \pgfmathparse{#2-#3-#4}%
  \xdef#2{\pgfmathresult}%
  \xdef#1{0}%\pgfmathresult}%
  %\xdef#1{0}
  \chit@dbg{2}{ \space\space-> update ‘\string#2’=#2}
}
```

current c, current r, cell size, extra spacing

```
\def\chit@oob@turnupdate(#1,#2)#3#4{%
  \chit@dbg{2}{ Turn update c=‘#1’,r=‘#2’,s=‘#3’,e=‘#4’}
  % \pgfmathparse{#2-ifthenelse(#1>0,#3,0)-#4}%
  \pgfmathparse{#2-#4-ifthenelse(abs(#1)>0.0001,#3,0)}
  \xdef#2{\pgfmathresult}%
  \xdef#1{0}%
  \chit@dbg{2}{ \space\space-> update ‘\string#1’=#1,‘\string#2’=#2}
}
```

chit list, n-colls, cell size, extra vertical spacing

This expects a list of lists of chits, one list per turn; the maximum number of columns; the size of cells, extra spacing between turns.

Note, the list of lists leaf elements should be styles for the chits.

This depends on the Tikz pic `chit/oob turn` which takes the number as argument.

```
\newif\ifwg@oob@inv\wg@oob@invfalse
\def\chit@oob@spacer{hspace}
\def\chit@oob@vspacer{vspace}
\def\wg@star@oob{\wg@oob@invtrue\wg@oob}
\def\wg@nostar@oob{\wg@oob@invfalse\wg@oob}
\def\oob{%
  \@ifstar{\wg@star@oob%
  }{\wg@nostar@oob%
  }%
}%
```

The inner macro of `\oob`. The arguments are

1. The list of lists of chits styles
2. The maximum number of columns
3. The width of each cell
4. Additional row spacing between turns

```
\def\wg@oob#1#2#3#4{%
  \def\r{0}%
  \pgfmathparse{#3*(#2-1)}%
  \edef\a{\pgfmathresult}%
```

```
\chit@dbg{2}{OOB: `#1'}%
\foreach[count=\ti from 0] \t/\y in #1{%
  \xdef\o{\r}%
  \def\c{0}%
  \ifx\t\y\def\y{0}\fi%
  \chit@dbg{2}{Turn \ti\space(\r,\t,y=\y):'}%
  \ifwg@oob@inv%
    \pic[transform shape] at ( .5*#3,\r) {chit/oob turn=\ti};% was dx=0.5
  \else%
    \pic[transform shape] at (-.5*#3,\r) {chit/oob turn=\ti};% was dx=-0.5
  \fi%
  \ifx\t\empty\else%
    \foreach \u/\m in \t{%
      %% \chit@dbg{2}{ `\u'=`\m'}
      \ifx\u\empty\else%
        \ifx\m\@empty\def\m{1}\fi%
        \ifx\u\m\def\m{1}\fi%
        \foreach \n in {1,...,\m}{%
          \chit@dbg{2}{OOB Chit is `\u' `\chit@oob@spacer'}%
          \ifx\u\chit@oob@spacer%
            \chit@dbg{3}{Chit `\u' is spacer `\chit@oob@spacer'}
            \pgfmathparse{\c+#4}%
            \xdef\c{\pgfmathresult}%
          \else%
            \ifx\u\chit@oob@vspacer%
              \chit@dbg{3}{Chit `\u' is vspacer `\chit@oob@vspacer'}%
              \pgfmathparse{ifthenelse(abs(\c)<0.0001,0,#3)}%
              \xdef\ll{\pgfmathresult}%
              \chit@dbg{2}{\string\ll=`\ll'}%
              \chit@oob@rowupdate(\c,\r){\ll}{#4}%
            \else
              \ifnum\chitdbglvl>2%
                \node[minimum width=#3cm,minimum height=#3cm,
                      draw,transform shape] at (\c,\r) {};%
              \fi
              \ifx\u\chit@blank\else%
                \chit[\u=\ti,zone oob point={\u}{\c}{\r}](\c,\r);%
              \fi%
              \chit@oob@cellupdate(\c,\r){#2}{#3}{\y}%
            \fi%
          \fi%
        }%
      \fi%
    }%
  \fi%
  \chit@dbg{1}{ End of chits in turn
    \ti\space(c=`\c',r=`\r',o='\o',y='\y')}%
  % IF no units where given, then we force \c to be non-zero so that
  % \chit@oob@turnupdate increments the row
  \ifx\t\@empty%
    \def\c{#3}%
    \chit@dbg{2}{ Turn is empty, set c=`\c'}%
  \fi
```

```
    %\ifnum\y<0% No explicit number of rows given
    %  \def\c{#3}
    %  \chit@dbg{2}{ No explicit number of rows given, set c=‘\c’}
    %\fi
    % In case the user gave and explicit number of rows, add the rows
    % that are missing.  \y is initially set to the number of
    % requested rows, and then decremented every time we go down one
    % row.  So if the number of rows we did so far is N, and the
    % requested number of rows is M, then the loop below adds M-N
    % rows.
    \ifnum\y>0%
      \chit@dbg{2}{ Looping rows from 2 to \y, break when row > \y}%
      \foreach \rr  in {2,...,\y}{%
        %\ifnum\rr>\y% A little funny, but \y can be negative!
        %  \chit@dbg{2}{ \space Breaking loop \rr\space > \y}%
        %  \breakforeach%
        %\else%
          \chit@oob@rowupdate(\c,\r){#3}{0}% Extra spacing?
        %\fi
      }%
    \fi%
    % This will zero \c.  However, if on entry |\c|>0, then we also
    % increment the row
    \chit@oob@turnupdate(\c,\r){#3}{#4}%
    \chit@dbg{2}{End of turn \ti\space(c=‘\c’,r=‘\r’,o=’\o’,y=’\y’)}%
  }
  \chit@dbg{3}{End of OOB (c=‘\c’,r=‘\r’,y=‘\y’)}%
  \@ifnextchar;{\@gobble}{}}%
```

Horizontal flow OOB

```
\def\wg@star@hoob{\wg@oob@invtrue\wg@hoob}
\def\wg@nostar@hoob{\wg@oob@invfalse\wg@hoob}
\def\hoob{%
  \@ifstar{\wg@star@hoob%
  }{\wg@nostar@hoob%
  }%
}
```

The inner macro of `\hoob`. The arguments are

1. The list of lists of chits styles
2. The maximum number of columns
3. The width of each cell
4. Additional row spacing between turns

```
\def\wg@hoob#1#2#3#4{%
  \def\r{0}%
  \def\c{0}%
  \pgfmathparse{#3*(#2-1)}%
  \edef\a{\pgfmathresult}%
  \chit@dbg{2}{OOB: ‘#1’}%
```

```
\foreach[count=\ti from 0] \t/\y in #1{%
  \xdef\o{\r}%
  % \def\c{0}
  \ifx\t\y\def\y{0}\fi%
  \chit@dbg{2}{Turn \ti\space(\r,\t,y=\y):'}
  \ifx\t\empty\else%
    % Count how many are left for this turn
    \chit@dbg{2}{At start of turn \t\space\string\c=\c}%
    \def\l{\c}%
    \let\ig\empty%
    \foreach \u/\m in \t{%
      \ifx\ig\empty%
        \ifx\u\empty\else%
          \ifx\u\m\def\m{1}\fi%
          \ifx\u\chit@oob@spacer%
            \pgfmathparse{\l+\m*#4}\xdef\l{\pgfmathresult}%
            \chit@dbg{2}{Got \m\space hspace (#4) -> \l}%
          \else%
            \ifx\u\chit@oob@vspace%
              \xdef\ig{1}%
              \chit@dbg{2}{Got vspace -> \l (\ig)}%
            \else%
              \pgfmathparse{\l+\m*#3}%
              \xdef\l{\pgfmathresult}%
              \chit@dbg{2}{Got \m\space units -> \l}%
            \fi%
          \fi%
        \fi%
      \fi}%
    % Check if there's enough room
    \chit@dbg{2}{To fill the rest of turn needs `\l' compared to
      `\a' (#3*(#2-1))}%
    \pgfmathparse{ifthenelse(abs(\l)>=#3*(#2-1),0,1}%
    \xdef\l{\pgfmathresult}%
    \chit@dbg{2}{Break or not `\l'}%
    \ifnum\l=0\chit@oob@turnupdate(\c,\r){#3}{#4}\fi%
  \fi%
  \ifwg@oob@inv%
    \pic[transform shape] at (\c+.5*#3,\r) {chit/oob turn=\ti};% was dx=0.5
  \else
    \pic[transform shape] at (\c+-.5*#3,\r) {chit/oob turn=\ti};% was dx=-0.5
  \fi%
  %\chit@oob@cellupdate(\c,\r){#2}{#3}{\y}
  \ifx\t\empty\else%
    \def\lv{0}%
    \foreach \u/\m in \t{%
      %% \chit@dbg{2}{ `\u'=`\m'}
      \ifx\u\empty\else%
        \ifx\m\@empty\def\m{1}\fi%
        \ifx\u\m\def\m{1}\fi%
        \foreach \n in {1,...,\m}{%
          \chit@dbg{2}{OOB Chit is `\u' `\chit@oob@spacer'}%
          \ifx\u\chit@oob@spacer%
```

```
            \chit@dbg{3}{Chit `\u' is spacer `\chit@oob@spacer'}%
            \pgfmathparse{\c+#4}%
            \xdef\c{\pgfmathresult}%
          \else%
            \ifx\u\chit@oob@vspacer%
              \chit@dbg{3}{Chit `\u' is vspacer `\chit@oob@vspacer'}%
              \pgfmathparse{ifthenelse(abs(\c)<0.0001,0,#3)}%
              \xdef\ll{\pgfmathresult}%
              \chit@dbg{2}{\string\ll=`\ll'}%
              \chit@oob@rowupdate(\c,\r){\ll}{#4}%
              \xdef\lv{1}%
            \else
              \ifnum\chitdbglvl>2%
                \node[minimum width=#3cm,minimum height=#3cm,
                      draw,transform shape] at (\c,\r) {};%
              \fi%
              \ifx\u\chit@blank\else%
                \chit[\u=\ti,zone oob point={\u}{\c}{\r}](\c,\r);%
              \fi%
              \chit@oob@cellupdate(\c,\r){#2}{#3}{\y}
            \fi%
          \fi%
        }%
      \fi%
    }%
  \fi%
  \chit@dbg{2}{ End of chits in turn
    \ti\space(c=`\c',r=`\r',o='\o',y='\y')}%
  % --- Not relevant, I think
  % IF no units where given, then we force \c to be non-zero so that
  % \chit@oob@turnupdate increments the row
  % \ifx\t\@empty
  %   \def\c{#3}
  %   \chit@dbg{2}{ Turn is empty, set c=`\c'}
  % \fi
  % ---
  %\ifnum\y<0% No explicit number of rows given
  %  \def\c{#3}
  %  \chit@dbg{2}{ No explicit number of rows given, set c=`\c'}
  %\fi
  % In case the user gave and explicit number of rows, add the rows
  % that are missing.  \y is initially set to the number of
  % requested rows, and then decremented every time we go down one
  % row.  So if the number of rows we did so far is N, and the
  % requested number of rows is M, then the loop below adds M-N
  % rows.
  \ifnum\y>0%
    \chit@dbg{2}{ Looping rows from 2 to \y, break when row > \y}%
    \foreach \rr  in {2,...,\y}{%
      %\ifnum\rr>\y% A little funny, but \y can be negative!
      %  \chit@dbg{2}{ \space Breaking loop \rr\space > \y}%
      %  \breakforeach%
      %\else%
```

```
          \chit@oob@rowupdate(\c,\r){#3}{0}% Extra spacing?
        %\fi
      }
    \fi%
    % --- Not relevant I think
    % This will zero \c.  However, if on entry |\c|>0, then we also
    % increment the row
    % \chit@oob@turnupdate(\c,\r){#3}{#4}
    % ---
    % Horizontal spacer

    %\pgfmathparse{ifthenelse(abs(\c)>=\a,1,0)}\xdef\l{\pgfmathresult}
    \pgfmathparse{\c+1.5*#4}%
    \xdef\c{\pgfmathresult}%
    \ifnum\lv=1%
      \pgfmathparse{\r-#4}
      \chit@oob@rowupdate(\c,\r){0}{#4}
    \else
      \chit@oob@cellupdate(\c,\r){#2}{#3}{\y}
      \ifnum\y<0
        \chit@oob@turnupdate(\c,\r){#3}{#4}
      \else
      \fi
    \fi
    % \xdef\y{0}
    \chit@dbg{2}{End of turn \ti\space(c=‘\c’,r=‘\r’,o=’\o’,y=’\y’)}%
  }%
  \chit@dbg{3}{End of OOB (c=‘\c’,r=‘\r’,y=‘\y’)}%
  \@ifnextchar;{\@gobble}{}}%
```

5.5.11 Table of chits

```
\tikzset{
  chit/cell background/.style={draw=black},
  %% Define to not dp anyting to disable wings
  chit/cell wings/.style={
    dashed,
    dash pattern=on 0pt off 3pt on 3pt off 0pt,
    draw=black},
  %chit/cell background flipped/.style={fill=black},
  blank chit/.style={/chit/frame={draw=none,fill=none}},
  chit/grid lines/.style={dashed},
}
```

These macros are used when we set tables of chits. This allows us to define blank spaces in the table by giving the element `blank chit`.

```
\def\chit@blank{blank chit}
\def\chit@cellbg(#1,#2)#3{%
  \draw[chit/cell background](#1-#3/2,#2-#3/2) rectangle++(#3,#3);
}
\def\chit@celldblbg(#1,#2)#3{%
  \draw[chit/cell background,chit/cell background flipped/.try]%
  (#1-#3/2,#2-#3/2) rectangle++(#3,#3);
```

```
}
```

`\ifchits@reset`

This 'if' controls whether to reset the coordinates to the origin when `\chits` is called. If true, then reset for a new table.

```
\newif\ifchits@reset\chits@resettrue
```

1. column
2. row
3. width
4. number of columns

`\chits`
`\@chits`
`\chit@sng@cellupdate`

```
\def\chit@sng@cellupdate(#1,#2)#3#4{%
  \chit@dbg{2}{Current '#1' vs '#4'*('#3'+1)}
  \pgfmathparse{ifthenelse(#1>=#4*(#3-1),#2-#4,#2)}%
  \xdef#2{\pgfmathresult}%
  \pgfmathparse{ifthenelse(#1>=#4*(#3-1),0,#1+#4)}%
  \xdef#1{\pgfmathresult}%
}

\def\chit@cell@frame#1#2{%
  \coordinate(cell@frame@north east) at ($(#1.north east)+( #2/2, #2/2)$);
  \coordinate(cell@frame@north west) at ($(#1.north west)+(-#2/2, #2/2)$);
  \coordinate(cell@frame@south east) at ($(#1.south east)+( #2/2,-#2/2)$);
  \coordinate(cell@frame@south west) at ($(#1.south west)+(-#2/2,-#2/2)$);
  \draw[chit/cell background,fill=none,scale line widths,line width=#2cm]
  (cell@frame@south west) rectangle (cell@frame@north east);
  \draw[scale line widths,line width=#2cm,chit/cell wings=10pt,fill=none,scale line widths,line width=#2cm]
  (cell@frame@north east)--++(     0,10*#2)
  (cell@frame@north east)--++( 10*#2,0)
  (cell@frame@north west)--++(     0,10*#2)
  (cell@frame@north west)--++(-10*#2,0)
  (cell@frame@south east)--++(     0,-10*#2)
  (cell@frame@south east)--++( 10*#2,0)
  (cell@frame@south west)--++(     0,-10*#2)
  (cell@frame@south west)--++(-10*#2,0)
  ;
}
```

The stared version (`\chits*`) of this macro continues the previously set chit table.

```
\def\chits{%
  \@ifstar{\chits@resetfalse\@chits}{\chits@resettrue\@chits}}
```

1. Chits. List (or list of list) of chit styles.
2. Number of columns
3. Size of cells

```
\newcount\wg@col
\newcount\wg@row
\def\@chits#1#2#3{
  \ifchits@reset
    %\def\r{0}%
    %\def\c{0}%
    \coordinate(wg@next) at (0,0);
    \wg@col=1
    \wg@row=1
  \fi
  \chit@dbg{1}{Chits to make: #1}%
  \foreach[count=\ti from 0] \t/\x in #1{%
    \chit@dbg{2}{Turn `\t' with option `\x'}
    \ifx\t\empty\else%
      \foreach \u/\m in \t{%
        \ifx\u\empty\else%
          \chit@dbg{2}{Next chit `\u' with possible multiplicity `\m'}%
          \ifx\m\@empty\def\m{1}\fi%
          \ifx\u\m\def\m{1}\fi%
          \chit@dbg{2}{Next chit `\u' multiplicity `\m'}%
          \foreach \n in {1,...,\m}{%
            \ifx\u\chit@blank%
              \chit@dbg{3}{Ignoring blank chit:\u}%
            \else%
              \ifx\u\chit@oob@vspacer%
                \chit@dbg{3}{Ignoring vertical spacer:\u}%
              \else
                \ifx\u\chit@oob@spacer%
                  \chit@dbg{3}{Ignoring horizontal spacer:\u}%
                \else
                  % \chit@cellbg(\c,\r){#3}%
                  %\chit[\u=\ti](\c,\r)%
                  \chit[\u=\ti](wg@next)(wg@chit)%
                  \chit@cell@frame{wg@chit}{#3}
                  \global\advance\wg@col1
                  \ifnum\wg@col>#2%
                    \path
                    let
                    \p1=(wg@chit.north),
                    \p2=(wg@chit.south),
                    \p3=(wg@chit),
                    \n1={\y3-\y1+\y2-#3cm} in
                    coordinate(wg@next) at (0,\n1);
                    \global\wg@col=1
                    \global\advance\wg@row1
                    \chit@dbg{10}{Row row, next column `\the\wg@col'}
                  \else
                    \path
```

```
                    let
                    \p1=(wg@chit.east),
                    \p2=(wg@chit.west),
                    \p3=(wg@chit),
                    \n1={\x3+\x1-\x2+#3cm} in
                    coordinate(wg@next) at (\n1,\y3);
                    \chit@dbg{10}{Next column ‘\the\wg@col’}
                  \fi
                  %\chit@sng@cellupdate(\c,\r){#2}{#3}%
                \fi%
              \fi%
            \fi%
          }%
        \fi%
      }%
    \fi%
  }%
  \chit@dbg{10}{Table is ‘\the\wg@col’x‘\the\wg@row’}
  \@ifnextchar;{\@gobble}{}}
```

\chitgrid

1. columns
2. rows
3. cell-size

```
\def\chitgrid#1#2#3{%
  \pgfmathparse{#3/2}\edef\rmin{\pgfmathresult}%
  \pgfmathparse{#2*#3-#3/2}\edef\rmax{\pgfmathresult}%
  %\draw[red](-#3/2,\rmin)rectangle(#3*#1-#3/2,-\rmax);
  \foreach \cc in {0,...,#1}{
    \draw[chit/grid lines] (\cc*#3-#3/2,3*#3/4)--(\cc*#3-#3/2,-\rmax-#3/4);}
  %\chit@dbg{0}{Drawing horizontal lines from ‘\rmin, ‘-\rmin’, ..., ‘-\rmax’}
  \foreach \rr in {\rmin,-\rmin,...,-\rmax}{
    %\chit@dbg{0}{Horizontal line at ‘\rr’}
    \draw[chit/grid lines] (-3*#3/4,\rr)--(#1*#3-#3/4,\rr);}
}
```

\doublechits
\@doublechits
\chit@dbl@cellupdate
\chit@dbl@flip

1. coordinates
2. coordinates
3. cell-size

```
\def\chit@dbl@flip(#1,#2)#3{%
  \pgfmathparse{-#1}%
  \xdef\mc{\pgfmathresult}%
}
```

1. coordinates
2. coordinates
3. Number of columns
4. cell-size

```
\def\chit@dbl@cellupdate(#1,#2)#3#4{%
  \pgfmathparse{ifthenelse(#1<-#4/2,#2,#4+#2)}%
  \xdef#2{\pgfmathresult}%
  \pgfmathparse{ifthenelse(#1<-#4/2,#4+#1,-(#3-.5)*#4)}%
  \xdef#1{\pgfmathresult}%
}
```

1. List of list of keys
2. Number of columns
3. size of each cell

The stared version (`\doublechits*`) of this macro continues the previously set chit table.

```
\def\doublechits{%
  \@ifstar{\chits@resetfalse\@doublechits}{\chits@resettrue\@doublechits}}
```

1. List (or list of list) of counters
2. Max number columns (for front)
3. Extra spacing

```
\newdimen\chit@w
\newdimen\chit@h
\def\@doublechits#1#2#3{%
  \chit@dbg{1}{Setting double-sided chits: #1}
  \ifchits@reset%
    %\pgfmathparse{-(#2-.5)*#3}
    %\xdef\c{\pgfmathresult}
    %\def\r{0}
    \coordinate(wg@next) at (0,0);%
    \coordinate(wg@fnxt) at (0,0);%
    \wg@col=1%
    \wg@row=1%
    \chit@w=0pt%
    \chit@h=0pt%
  \fi%
  %
  \foreach[count=\ti from 0] \t/\x in #1{
```

```
\ifx\t\empty\else%
  \foreach \u/\m in \t{
    \ifx\u\empty\else
      \ifx\m\@empty\def\m{1}\else%
        \ifx\u\m\def\m{1}\fi\fi
      \chit@dbg{2}{‘\u’=‘\m’ (\c,\r)}
      \foreach \n in {1,...,\m}{%
        \ifx\u\chit@blank
          \chit@dbg{3}{Ignoring blank chit:\u}
        \else
          \ifx\u\chit@oob@vspacer%
            \chit@dbg{3}{Ignoring vertical spacer:\u}%
          \else
            \ifx\u\chit@oob@spacer%
              \chit@dbg{3}{Ignoring horizontal spacer:\u}%
            \else
              \chit@dbg{10}{Drawing ‘\u’ at wg@next}
              \chit[\u=\ti](wg@next)(wg@chit)%
              \chit@cell@frame{wg@chit}{#3}
              \ifdim\chit@w=0pt
                \pgfextractx\chit@w{\pgfpointanchor{wg@chit}{east}}%
                \pgfextractx\wg@tmpa{\pgfpointanchor{wg@chit}{west}}%
                \advance\chit@w-\wg@tmpa%
                \global\advance\chit@w#3cm%
                \pgfextracty\chit@h{\pgfpointanchor{wg@chit}{north}}%
                \pgfextracty\wg@tmpa{\pgfpointanchor{wg@chit}{south}}%
                \advance\chit@h-\wg@tmpa%
                \global\advance\chit@h#3cm%
              \fi
              \ifnum\wg@col=1
                \pgfextractx\wg@tmpa{\pgfpointanchor{wg@chit}{center}}%
                \advance\wg@tmpa+\chit@w%
                \coordinate(wg@fnxt) at ($(wg@chit)+(\the\chit@w,0pt)$);
                %\coordinate(wg@fnxt
                %\chit@dbg{10}{Calculating wg@fnxt since ‘\the\wg@col’==1}
                %\path
                %let
                %\p1=(wg@chit.east),
                %\p2=(wg@chit.west),
                %\p3=(wg@chit),
                %\n1={\x3+\x1-\x2+#3cm} in
                %coordinate(wg@fnxt) at (\n1,\y3);
              \fi
              %\chit@dbg{10}{Drawing ‘\u\space flipped’ at wg@fnxt}
              \chit[\u\space flipped=\ti,
              zone turn=\t,
              zone mult=\n](wg@fnxt)(wg@flip)%
              \chit@cell@frame{wg@flip}{#3}
              \chit@dbg{10}{Next column: ‘\the\wg@col’}
              \ifnum\wg@col=1
                \ifnum\wg@row=1
                  \coordinate(wg@table@top) at (wg@chit.north east);
                \fi
```

```
                  \coordinate(wg@table@bot) at (wg@chit.south east);
                \fi
                \global\advance\wg@col1
                \ifnum\wg@col>#2%
                  % \path
                  %    let
                  %    \p1=(wg@chit.north),
                  %    \p2=(wg@chit.south),
                  %    \p3=(wg@chit),
                  %    \n1={\y3-\y1+\y2-#3cm} in %1.21991
                  %    coordinate(wg@next) at (0,\n1);
                  \coordinate(wg@next) at (0,-\wg@row\chit@h);
                  \global\wg@col=1
                  \global\advance\wg@row1
                  \chit@dbg{10}{Row row, next column `\the\wg@col'}
                \else
                  % \path
                  % let
                  % \p1=(wg@chit.east),
                  % \p2=(wg@chit.west),
                  % \p3=(wg@chit),
                  % \p4=(wg@flip.east),
                  % \p5=(wg@flip.west),
                  % \p6=(wg@flip),
                  % \n1={\x3-\x1+\x2-#3cm},
                  % \n2={\x6+\x4-\x5+#3cm} in
                  % coordinate(wg@next) at (\n1,\y3)
                  % coordinate(wg@fnxt) at (\n2,\y6);
                  \coordinate(wg@next) at ($(wg@chit)+(-\the\chit@w,0)$);
                  \coordinate(wg@fnxt) at ($(wg@flip)+(+\the\chit@w,0)$);
                  \chit@dbg{10}{Next column `\the\wg@col'}
                \fi
              \fi%
            \fi%
          \fi%
        }%
      \fi%
    }%
  \fi%
}%
\draw[dashed,scale line widths](wg@table@top)--++(0,.4);
\draw[dashed,scale line widths](wg@table@bot)--++(0,-.4);
\draw[dashed,scale line widths,{Stealth[]}-]
($(wg@table@top)+(0,.2)$) -- ++(.5,0)
node[transform shape,anchor=west]{Back};
\draw[dashed,scale line widths,{Stealth[]}-]
($(wg@table@top)+(0,.2)$) -- ++(-.5,0)
node[transform shape,anchor=east]{Front};
\draw[dashed,scale line widths,{Stealth[]}-]
($(wg@table@bot)+(0,-.2)$) -- ++(.5,0)
node[transform shape,anchor=west]{Back};
\draw[dashed,scale line widths,{Stealth[]}-]
($(wg@table@bot)+(0,-.2)$) -- ++(-.5,0)
```

```
  node[transform shape,anchor=east]{Front};
  % \draw[dashed,<-] (#3/5,-2*#3/3)--(#3/2,-2*#3/3) node[transform shape,anchor=west]{Back};%
  % \draw[dashed,<-] (-#3/5,-2*#3/3)--(-#3/2,-2*#3/3) node[transform shape,anchor=east]{Front};%
  % \foreach \cc in {0,...,#2}{
  %   \draw[dashed] (\cc*#3,-3*#3/4)--(\cc*#3,\r-#3/4);
  %   \draw[dashed] (-\cc*#3,-3*#3/4)--(-\cc*#3,\r-#3/4);}
  % \pgfmathparse{#3/2}\edef\rmin{\pgfmathresult}%
  % \chit@dbg{0}{Drawing horizontal lines from `-\rmin, `\rmin', ..., `\r'}
  % \foreach \rr in {-\rmin,\rmin,...,\r}{
  %   \chit@dbg{0}{Horizontal line at `\rr'}
  %   \draw[dashed] (-#2*#3-#3/4,\rr)--(#2*#3+#3/4,\rr);}
  \@ifnextchar;{\@gobble}{}}
```

`\doublechitgrid`

1. columns
2. rows
3. cell-size

```
\def\doublechitgrid#1#2#3{%
  \message{^^JWARNING - the grid table might be messed up!}
  %\iffalse
  \pgfmathparse{#3/2}\edef\rmin{\pgfmathresult}%
  \pgfmathparse{#2*#3-#3/2}\edef\rmax{\pgfmathresult}%
  \foreach \cc in {0,...,#1}{
    \draw[chit/grid lines] (\cc*#3+\rmin,3*#3/4)--(\cc*#3+\rmin,-\rmax-#3/4);
    \draw[chit/grid lines] (-\cc*#3+\rmin,3*#3/4)--(-\cc*#3+\rmin,-\rmax-#3/4);}
  %\chit@dbg{0}{Drawing horizontal lines from `-\rmin, `\rmin', ..., `\rmax'}
  \foreach \rr in {\rmin,-\rmin,...,-\rmax}{
    \chit@dbg{0}{Horizontal line at `\rr'}
    \draw[chit/grid lines] (-#1*#3-#3/4+\rmin,\rr)--(#1*#3+#3/4+\rmin,\rr);}
  %\fi
}
```

5.5.12 Battle markers

Takes 1 arguments - the identifier.

Define `every battle marker` to change the style.

```
\tikzset{%
  battle marker/.pic={
    \node[shape=circle,
    font=\sffamily\bfseries,
    inner sep=0pt,
    minimum size=5mm,
    draw=black,
    fill=yellow!85!black,
    every battle marker/.try] at (-.3,.3) {%
      \ifnum#1>0\relax #1\fi%
```

```
    };
  },
  battle marker/.style={
    chit={full={battle marker=#1},frame={draw=none}}},
}
```

Takes two arguments - the odds and the fill colour. The latter is useful to differentiate the severity of an attack. Define `every odds marker` to change the style.

```
\tikzset{%
  pics/odds marker/.style args={#1,#2}{
    code={
      \node[shape=circle,
      font=\sffamily\bfseries\large,
      inner sep=0pt,
      minimum size=8mm,
      draw=black,
      fill=#2,
      every odds marker/.try] at (.16,-.16) {#1};
    }
  },
  odds marker/.style args={#1,#2}{
    chit={full={odds marker={#1,#2}},frame={draw=none}}},
}
```

Takes two arguments - the result and the fill colour. The latter is useful to differentiate the severity of an attack. Define `every result marker` to change the style.

```
\tikzset{
  pics/result marker/.style args={#1,#2}{
    code={
      \chit@dbg{3}{Results marker #1 (#2)}
      \node[shape=circle,
      font=\sffamily\bfseries\large,
      inner sep=0pt,
      minimum size=8mm,
      draw=black,
      fill=#2,
      every result marker/.try] at (0,0) {#1};}},
  result marker/.style args={#1,#2}{
    chit={full={result marker={#1,#2}},frame={draw=none}}}
}
```

5.5.13 Dice

First, a regular 6-sided dice with configurable number of dots. Use like

```
\pic[⟨pic options⟩]{dice=⟨eyes⟩}
```

For example:

1. 
2. 
3. 
4. 
5. 
6. 

```
\tikzset{
  dice bg/.style={
    % /utils/exec={
    %   \pgfgettransformentries{%
    %     \wg@jaca}{%
    %     \wg@jacb}{%
    %     \wg@jacc}{%
    %     \wg@jacd}{%
    %     \wg@tmp}{%
    %     \wg@tmp}%
    %   \pgfmathsetmacro{\wg@tmp}{%
    %     sqrt(abs(\wg@jaca*\wg@jacd-\wg@jacb*\wg@jacc))}
    %   \xdef\wg@tmp{\wg@tmp}},%
    fill=black,
    draw=none,
    minimum width=1cm,
    minimum height=1cm,
    scale rounded corners,
    rounded corners=.1cm,
    inner sep=0pt,
    transform shape},
  dice fg/.style={
    fill=white,
    shape=circle,
    inner sep=0pt,
    minimum size=.2cm,
    transform shape},
  pics/dice/.style={
    code={
      \node[dice bg] (dice bg) {};
      \ifodd#1\node[dice fg] at (dice bg) {};\fi
      \ifnum#1>1%
      \node[dice fg] at ($(dice bg)+(-45:.4)$){};%
```

```
      \node[dice fg] at ($(dice bg)+(135:.4)$){};%
      \fi%
      \ifnum#1>3%
      \node[dice fg] at ($(dice bg)+(  45:.4)$){};%
      \node[dice fg] at ($(dice bg)+(-135:.4)$){};%
      \fi%
      \ifnum#1=6%
      \node[dice fg] at ($(dice bg)+(-.282,0)$){};
      \node[dice fg] at ($(dice bg)+( .282,0)$){};
      \fi
    }
  },
  pics/dice/.default=3
}
\newcommand\dicemark[2][scale=.5]{%
  \tikz[baseline={($(dice bg.south east)!.25!(dice bg.north east)$)},#1]{
    \pic[transform shape]{dice=3};}}
```

Now some shapes of different dice. This was originally done by David Carlisle. Usage is for example

```
\node[shape=⟨dice⟩,⟨node options⟩] {⟨value⟩};
```

where ⟨*dice*⟩ is one of `d4`, `d6`, `d8`, `d10`, `d12`, or `d20`.

Tetrahedron

```
\pgfdeclareshape{d4}{
  \anchor{center}{\pgfpointorigin}    % within the node, (0,0) is the center
  \anchor{text}{
    % this is used to center the text in the node
    \pgfpoint{-.5\wd\pgfnodeparttextbox}{-.5\ht\pgfnodeparttextbox}}
  \backgroundpath{ % draw border
    \pgfpathmoveto{\pgfpoint{0cm}{.4cm}}
    \pgfpathlineto{\pgfpoint{.433cm}{-.35cm}}
    \pgfpathlineto{\pgfpoint{-.433cm}{-.35cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.4cm}}
    % \pgfusepath{draw}  %draw border
    % \pgfusepath{draw}  %draw rectangle
  }}
```

Cubic

```
\newif\ifwg@dsixdot\wg@dsixdotfalse
\tikzset{
  d6 dots/.is if=wg@dsixdot,
  d6 dots/.initial=false,
  d6 dots/.default=true
}
\pgfdeclareshape{d6}{
```

```
15734   \anchor{center}{\pgfpointorigin}    % within the node, (0,0) is the center
15735   \anchor{text}{
15736     % this is used to center the text in the node
15737     \pgfpoint{-.5\wd\pgfnodeparttextbox}{-.5\ht\pgfnodeparttextbox}}
15738   \backgroundpath{ % draw border
15739     \pgfpathrectanglecorners{\pgfpoint{.4cm}{.4cm}}{\pgfpoint{-.4cm}{-.4cm}}
15740     % \pgfusepath{draw}  %draw rectangle
15741   }
15742   \behindforegroundpath{ % draw border
15743     \ifwg@dsixdot%
15744       \edef\numdots{\tikz@node@content}%
15745       % Draw over text
15746       \pgfpathrectanglecorners{\pgfpoint{.4cm}{.4cm}}{\pgfpoint{-.4cm}{-.4cm}}%
15747       \pgfusepath{fill}  %draw rectangle
15748       \ifx\tikz@textcolor\pgfutilempty%
15749         \pgfutil@colorlet{.}{pgfstrokecolor}%
15750       \else
15751         % \pgfsetfillcolor{\tikz@textcolor}%
15752         \pgfutil@colorlet{.}{\tikz@textcolor}%
15753       \fi
15754       \pgfsetfillcolor{.}%
15755       \ifodd\numdots
15756         %\message{^^JCenter dot}
15757         \pgfpathcircle{\pgfpoint{0cm}{0cm}}{.09cm}
15758       \fi
15759       \ifnum\numdots=2%
15760         %\message{^^JSpecial 2}
15761         \pgfpathcircle{\pgfpointpolar{-45}{.32cm}}{.09cm}
15762         \pgfpathcircle{\pgfpointpolar{135}{.32cm}}{.09cm}
15763       \fi%
15764       \ifnum\numdots>2%
15765         %\message{^^JAt least 2}
15766         \pgfpathcircle{\pgfpointpolar{-45}{.35cm}}{.09cm}
15767         \pgfpathcircle{\pgfpointpolar{135}{.35cm}}{.09cm}
15768       \fi%
15769       \ifnum\numdots>3%
15770         %\message{^^JAt least 4}
15771         \pgfpathcircle{\pgfpointpolar{  45}{.35cm}}{.09cm}
15772         \pgfpathcircle{\pgfpointpolar{-135}{.35cm}}{.09cm}
15773       \fi%
15774       \ifnum\numdots=6%
15775         %\message{^^JLucky 6}
15776         \pgfpathcircle{\pgfpoint{-.247cm}{0cm}}{.09cm}
15777         \pgfpathcircle{\pgfpoint{ .247cm}{0cm}}{.09cm}
15778       \fi
15779       \pgfusepath{fill}  %draw rectangle
15780     \fi%
15781   }
15782 }
```

Octahedron 

```
\pgfdeclareshape{d8}{
  \anchor{center}{\pgfpointorigin}    % within the node, (0,0) is the center
  \anchor{text}{
    % this is used to center the text in the node
    \pgfpoint{-.5\wd\pgfnodeparttextbox}{-.5\ht\pgfnodeparttextbox}}
  \backgroundpath{ % draw border
    \pgfpathmoveto{\pgfpoint{0cm}{.5cm}}
    \pgfpathlineto{\pgfpoint{.433cm}{.25cm}}
    \pgfpathlineto{\pgfpoint{.433cm}{-.25cm}}
    \pgfpathlineto{\pgfpoint{0cm}{-.5cm}}
    \pgfpathlineto{\pgfpoint{-.433cm}{-.25cm}}
    \pgfpathlineto{\pgfpoint{-.433cm}{.25cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.5cm}}
    \pgfpathlineto{\pgfpoint{.433cm}{-.25cm}}
    \pgfpathlineto{\pgfpoint{-.433cm}{-.25cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.5cm}}
    % \pgfusepath{draw}  %draw interiaor
  }}
```

Decahedron 

```
\pgfdeclareshape{d10}{
  \anchor{center}{\pgfpointorigin}    % within the node, (0,0) is the center
  \anchor{text}{
    % this is used to center the text in the node
    \pgfpoint{-.5\wd\pgfnodeparttextbox}{-.5\ht\pgfnodeparttextbox}}
  \backgroundpath{ % draw border
    \pgfpathmoveto{\pgfpoint{0cm}{.5cm}}
    \pgfpathlineto{\pgfpoint{.294cm}{-.154cm}}
    \pgfpathlineto{\pgfpoint{0cm}{-.3cm}}
    \pgfpathlineto{\pgfpoint{-.294cm}{-.154cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.5cm}}
    \pgfpathlineto{\pgfpoint{.475cm}{.1cm}}
    \pgfpathlineto{\pgfpoint{.475cm}{-.1cm}}
    \pgfpathlineto{\pgfpoint{0cm}{-.5cm}}
    \pgfpathlineto{\pgfpoint{-.475cm}{-.1cm}}
    \pgfpathlineto{\pgfpoint{-.475cm}{.1cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.5cm}}
    \pgfpathmoveto{\pgfpoint{.294cm}{-.154cm}}
    \pgfpathlineto{\pgfpoint{.475cm}{-.1cm}}
    \pgfpathmoveto{\pgfpoint{-.475cm}{-.1cm}}
    \pgfpathlineto{\pgfpoint{-.294cm}{-.154cm}}
    \pgfpathmoveto{\pgfpoint{0cm}{-.5cm}}
    \pgfpathlineto{\pgfpoint{0cm}{-.3cm}}
    % \pgfusepath{draw}  %draw interiaor
  }}
```

Dodecahedron 

```
\pgfdeclareshape{d12}{
  \anchor{center}{\pgfpointorigin}    % within the node, (0,0) is the center
  \anchor{text}{   % this is used to center the text in the node
    \pgfpoint{-.5\wd\pgfnodeparttextbox}{-.5\ht\pgfnodeparttextbox}}
  \backgroundpath{ % draw border
    \pgfpathmoveto{\pgfpoint{0cm}{.5cm}}
    \pgfpathlineto{\pgfpoint{0.294cm}{.405cm}}
    \pgfpathlineto{\pgfpoint{.475cm}{.173cm}}
    \pgfpathlineto{\pgfpoint{.475cm}{-.173cm}}
    \pgfpathlineto{\pgfpoint{.294cm}{-.405cm}}
    \pgfpathlineto{\pgfpoint{0cm}{-.5cm}}
    \pgfpathlineto{\pgfpoint{-.294cm}{-.405cm}}
    \pgfpathlineto{\pgfpoint{-.475cm}{-.173cm}}
    \pgfpathlineto{\pgfpoint{-.475cm}{.173cm}}
    \pgfpathlineto{\pgfpoint{-.294cm}{.405cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.5cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.349cm}}
    \pgfpathlineto{\pgfpoint{.332cm}{.108cm}}
    \pgfpathlineto{\pgfpoint{.205cm}{-.282cm}}
    \pgfpathlineto{\pgfpoint{-.205cm}{-.282cm}}
    \pgfpathlineto{\pgfpoint{-.332cm}{.108cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.349cm}}
    \pgfpathmoveto{\pgfpoint{.475cm}{.173cm}}
    \pgfpathlineto{\pgfpoint{.332cm}{.108cm}}
    \pgfpathmoveto{\pgfpoint{.294cm}{-.405cm}}
    \pgfpathlineto{\pgfpoint{.205cm}{-.282cm}}
    \pgfpathmoveto{\pgfpoint{-.294cm}{-.405cm}}
    \pgfpathlineto{\pgfpoint{-.205cm}{-.282cm}}
    \pgfpathmoveto{\pgfpoint{-.475cm}{.173cm}}
    \pgfpathlineto{\pgfpoint{-.332cm}{.108cm}}
    % \pgfusepath{draw}  %draw interiaor
  }}
```

Icosohedron 

```
\pgfdeclareshape{d20}{
  \anchor{center}{\pgfpointorigin} % within the node, (0,0) is the center
  \anchor{text}{    % this is used to center the text in the node
    \pgfpoint{-.5\wd\pgfnodeparttextbox}{-.5\ht\pgfnodeparttextbox}}
  \backgroundpath{ % draw border
    \pgfpathmoveto{\pgfpoint{0cm}{.5cm}}
    \pgfpathlineto{\pgfpoint{.454cm}{.262cm}}
    \pgfpathlineto{\pgfpoint{.454cm}{-.262cm}}
    \pgfpathlineto{\pgfpoint{0cm}{-.5cm}}
    \pgfpathlineto{\pgfpoint{-.454cm}{-.262cm}}
    \pgfpathlineto{\pgfpoint{-.454cm}{.262cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.5cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.292cm}}
```

```
    \pgfpathlineto{\pgfpoint{.253cm}{-.146cm}}
    \pgfpathlineto{\pgfpoint{-.253cm}{-.146cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.292cm}}
    \pgfpathlineto{\pgfpoint{.454cm}{.262cm}}
    \pgfpathlineto{\pgfpoint{.253cm}{-.146cm}}
    \pgfpathlineto{\pgfpoint{0cm}{-.5cm}}
    \pgfpathlineto{\pgfpoint{-.253cm}{-.146cm}}
    \pgfpathlineto{\pgfpoint{-.454cm}{.262cm}}
    \pgfpathlineto{\pgfpoint{0cm}{.292cm}}
    \pgfpathmoveto{\pgfpoint{.454cm}{-.262cm}}
    \pgfpathlineto{\pgfpoint{.253cm}{-.146cm}}
    \pgfpathmoveto{\pgfpoint{-.454cm}{-.262cm}}
    \pgfpathlineto{\pgfpoint{-.253cm}{-.146cm}}
    % \pgfusepath{draw}  %draw interiaor
  }}
```

5.5.14 Some utilities

This style allows us to add a fading drop-shadow to chits.

```
\usetikzlibrary{shadows.blur}
\newif\ifwg@chit@drop\wg@chit@dropfalse
\tikzset{
  chit has drop/.is if=wg@chit@drop,
  chit has drop/.default=true,
  chit has drop/.initial=false,
  /tikz/render blur shadow/.add code={%
    \chit@dbg{2}{Number of blur steps: \pgfbs@steps}%
    \ifnum\pgfbs@steps=0\else
    \chit@dbg{2}{Making shadow blur}%
    }{\fi}}
\tikzset{%
  chit drop/.code={%
    %% \message{^^J Args `#1'}%
    \pgfkeysalso{%
      chit has drop=true,
      /tikz/blur shadow={shadow blur steps=5,
        shadow opacity=30,
        shadow xshift=.05cm,
        shadow yshift=-.05cm,
        shadow blur radius=.05cm,
        #1}}%
    \ifnum\pgfbs@steps=0%
      \gdef\wg@drop@margin{0pt}%
    \else%
      \ifwg@chit@drop%
        \pgfmathparse{
          \pgfbs@radius+
          veclen(
          \pgfkeysvalueof{/tikz/shadow xshift},
          \pgfkeysvalueof{/tikz/shadow yshift})}
        \xdef\wg@drop@margin{\pgfmathresult pt}%
      \else%
```

```
        \gdef\wg@drop@margin{0pt}%
      \fi
      %% \message{^^J Drop margin is `\wg@drop@margin'
      %%   `\pgfbs@radius'
      %%   `\pgfkeysvalueof{/tikz/shadow xshift}',
      %%   `\pgfkeysvalueof{/tikz/shadow yshift}'}%
    \fi%
  },%
  chit drop/.default=,%
  no chit drop/.code={%
    \pgfkeysalso{
      /tikz/blur shadow={shadow blur steps=0}}
    \gdef\wg@drop@margin{0pt}%
  }
}%
```

Game turn marker

```
\tikzset{
  chit/text base/.style={
    shape=rectangle,
    inner sep=0pt,
    align=center,
    text width=1.1cm},
  chit/number/.style={
    chit/text base,
    font=\sffamily\bfseries\fontsize{12}{14}\selectfont},
  chit/game turn/.style={
    chit/text base,
    font=\sffamily\bfseries},
  chit/text/.style={
    chit/text base,
    font=\sffamily\bfseries},
  chit/small text/.style={
    chit/text base,
    font=\sffamily\bfseries\fontsize{9}{10}\selectfont},
  chit/number/.pic={\node[chit/number]{#1};},
  chit/game turn/.pic={\node[chit/game turn]{Game\\Turn};},
  chit/text/.pic={\node[chit/text]{#1};},
  chit/small text/.pic={\node[chit/small text]{#1};},
  game turn chit/.style={
    /chit/full={chit/game turn},
    color=black,
    fill=white},
  game turn chit flipped/.style={game turn chit},
  dummy chit/.style={fill=white},
}
```

Marks of chits

```
\providecommand\chitmark[2][]{\tikz[scale=.25,#1]{\chit[#2]}}
```

Stacking mark

```
\tikzset{
  wg stacking/.style={fill=white,
    /chit/symbol={[faction=friendly,command=land]}},
}
\DeclareRobustCommand\stackmark[1][]{%
  \tikz[baseline=(current bounding box.center),scale=.3,#1]{
    \stackchits(0,0)(.3,-.3){%
      \noexpand\chit[wg stacking],
      \noexpand\chit[wg stacking],
      \noexpand\chit[wg stacking]}}}
```

ZOC mark

```
\DeclareRobustCommand\zocmark[1][]{%
  \tikz[baseline=($(current bounding box.center)!.5!(current bounding box.south)$),scale=.1,#1]{%
    \begin{scope}[hex/first row and column are=0,
      hex/row direction is=normal,
      hex/column direction is=normal,
      hex/short columns=none]
      \hex[label=,fill=gray](c=1,r=1)%
      \hex[label=,fill=white](c=1,r=2)%
      \hex[label=,fill=white](c=1,r=0)%
      \hex[label=,fill=white](c=0,r=0)%
      \hex[label=,fill=white](c=0,r=1)%
      \hex[label=,fill=white](c=2,r=1)%
      \hex[label=,fill=white](c=2,r=0)
    \end{scope}}}
```

Dummy implementations of zones hooks when exporting. Here, these do nothing, but in the wgexport class these are re-implemented.

```
\tikzset{
  zone point/.code n args={3}{},
  zone oob point/.code n args={3}{}}
```

5.6 The wargame.natoapp6c TikZ library

In this section we define the code for the Tikz library. The library defines a number of pic keys we can use to draw various parts of a marker. The markers conform to NATO App 6(c) specification. The implementation here is heavily inspired by the package milsymb [4] available at CTAN.

5.6.1 Debugging

```
\natoappdbglvl
\n@to@pp@dbg
```

Set the debug level, and make debug message.

```
\usetikzlibrary{wargame.util}
\usetikzlibrary{calc}
\usetikzlibrary{arrows.meta}
\usetikzlibrary{shapes.symbols}
```

```
\usetikzlibrary{positioning,intersections}
\newcount\natoappdbglvl\natoappdbglvl=\wargamedbglvl
\def\n@to@pp@dbg#1#2{%
  \ifnum#1>\natoappdbglvl\relax\else\message{^^J#2}\fi}
```

5.6.2 Colours

```
\c@friendly
\c@hostile
\c@neutral
\c@unknown
```

Define standard colours for marker affiliations.

Name	
friendly	
hostile	
neutral	
unknown	

```
\definecolor{friendly}{RGB}{128, 224, 255}
\definecolor{hostile}{RGB}{255, 128, 128}
\definecolor{neutral}{RGB}{170, 255, 170}
\definecolor{unknown}{RGB}{255, 255, 128}
\tikzset{%
  faction/.code={%
    \@ifundefined{natoapp@fac}{%
    }{\tikzset{fill=\natoapp@fac}}}}
```

5.6.3 Some dimensions

We define a number of dimensions which we will use in the following. They provide a rough parameterisation of the node shapes, but shouldn't really be changed. We have them here so that the code uses as few hard coded numbers as possible.

The dimensions are

- Installation 'hat' x coordinate
- Installation 'hat' height
- Activity width of boxes
- Height of space bar
- Radius of the symbol

```
\newdimen\n@to@pp@inst@x\n@to@pp@inst@x=0.2cm
\newdimen\n@to@pp@inst@h\n@to@pp@inst@h=0.15cm
\newdimen\n@to@pp@act@w\n@to@pp@act@w=0.15cm
\newdimen\n@to@pp@space@h\n@to@pp@space@h=0.1cm
\newdimen\n@to@pp@r\n@to@pp@r=0.5cm
```

5.6.4 Some utilities

`\n@to@pp@isclip`

This detects if we're in a node that is being used for clipping

```
%\def\n@to@pp@cliptoken{clip}
%\def\n@to@pp@isclip{FF\fi%
%  % \message{^^Jclip is \meaning\pgf@up@clip}%
%  \ifx\pgf@up@clip\n@to@pp@cliptoken}
\newif\ifn@to@pp@isclip\n@to@pp@isclipfalse
```

`\n@to@pp@saved@fill@color`
`\n@to@pp@saved@stroke@color`

Macros to hold saved colours.

```
\let\n@to@pp@saved@stroke@color\relax
\let\n@to@pp@saved@fill@color\relax
```

`\n@to@pp@stroke@to@fill`
`\n@to@pp@restore@fill`

Macro to get stroke and fill colours and set the fill colour to the stroke colour, and to restore to the old setting. This is used by the frame shapes below to make sure that filled elements of the frame uses the same colour as the for strokes.

```
\newcommand\n@to@pp@stroke@to@fill{%
  %
  \expandafter\let\expandafter\n@to@pp@saved@stroke@color%
  \csname\string\color@pgfstrokecolor\endcsname%
  %
  \expandafter\let\expandafter\n@to@pp@saved@fill@color%
  \csname\string\color@pgffillcolor\endcsname%
  %
  \expandafter\pgf@setfillcolor\n@to@pp@saved@stroke@color%
  %
  % \message{^^J=== Set fill to stroke color
  %   ^^J  Old fill:   \meaning\n@to@pp@saved@fill@color
  %   ^^J  Old stroke: \meaning\n@to@pp@saved@stroke@color}
}

\newcommand\n@to@pp@restore@fill{%
  % \message{^^J=== Restore fill color
  %   ^^J  Old fill:   \meaning\n@to@pp@saved@fill@color
  %   ^^J  Old stroke: \meaning\n@to@pp@saved@stroke@color}
  %
  \ifx\n@to@pp@saved@fill@color\relax\else%
    \expandafter\pgf@setfillcolor\n@to@pp@saved@fill@color%
  \fi%
  \global\let\n@to@pp@saved@fill@color\relax
  \global\let\n@to@pp@saved@stroke@color\relax
}
```

We also make an environment, just to simplify the use

```
\newenvironment{n@to@pp@stroketofill}{%
  \pgfscope%
  \n@to@pp@stroke@to@fill%
}{%
  \n@to@pp@restore@fill%
  \endpgfscope%
}
```

5.6.5 Faction names as macros

```
\def\n@to@pp@friendly{friendly}
\def\n@to@pp@hostile{hostile}
\def\n@to@pp@neutral{neutral}
\def\n@to@pp@unknown{unknown}
```

5.6.6 Node shapes

Here we define bases for all commands and affiliations. These are defined as node shapes. This means we will render the NATO App6(c) symbols as nodes with embedded nodes of the relevant shape.

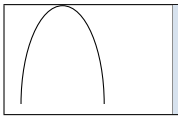
First, the generic bounding box symbol for all markers.

Place-holder symbol. This shape will form the basis of many of the other frame shapes. We define the relevant sizes and anchors.

```
\pgfdeclareshape{natoapp6c base}{%
  \saveddimen\radius{\pgf@x=\n@to@pp@r}
  \saveddimen\liney{\pgf@x=.2cm}
  \saveddimen\linex{\pgf@x=0.41cm}
  \savedanchor\center{\pgf@x=0cm\pgf@y=0cm}
  \savedanchor\upper{\pgf@x=0cm\pgf@y=0.35cm}
  \anchor{north east}{\pgf@x=\radius\pgf@y=\radius}
  \anchor{south west}{\pgf@x=-\radius\pgf@y=-\radius}
  \anchor{north west}{\pgf@x=-\radius\pgf@y=\radius}
  \anchor{south east}{\pgf@x=\radius\pgf@y=-\radius}
  \anchor{south}{\pgf@x=0cm\pgf@y=-\radius}
  \anchor{north}{\pgf@x=0cm\pgf@y=\radius}
  \anchor{west}{\pgf@x=-\radius\pgf@y=0cm}
  \anchor{east}{\pgf@x=\radius\pgf@y=0cm}
  \anchor{center}{\center}
  \anchor{upper}{\upper}
  \anchor{lower}{\upper\pgf@y=-\pgf@y}
  \anchor{left}{\upper\pgf@x=-\pgf@y\pgf@y=0cm}
  \anchor{right}{\upper\pgf@x=\pgf@y\pgf@y=0cm}
  \savedmacro\init{
    \def\octagon{%
      \pgfpathmoveto{\pgfqpointpolar{0}  {\radius}}%
      \pgfpathlineto{\pgfqpointpolar{45} {\radius}}%
```

```
      \pgfpathlineto{\pgfqpointpolar{90} {\radius}}%
      \pgfpathlineto{\pgfqpointpolar{135}{\radius}}%
      \pgfpathlineto{\pgfqpointpolar{180}{\radius}}%
      \pgfpathlineto{\pgfqpointpolar{225}{\radius}}%
      \pgfpathlineto{\pgfqpointpolar{270}{\radius}}%
      \pgfpathlineto{\pgfqpointpolar{315}{\radius}}%
      \pgfpathclose}
    \def\topline{%
      \pgfpathmoveto{\pgfqpoint{\linex}{\liney}}%
      \pgfpathlineto{\pgfqpoint{-\linex}{\liney}}}
    \def\bottomline{%
      \pgfpathmoveto{\pgfqpoint{\linex}{-\liney}}%
      \pgfpathlineto{\pgfqpoint{-\linex}{-\liney}}}
  }
  \backgroundpath{%
    \init%
    \octagon}
  \behindforegroundpath{%
    \init%
    \octagon%
    \pgfusepath{stroke}%
    \topline%
    \pgfusepath{stroke}%
    \bottomline%
    \pgfusepath{stroke}%
  }
}
```

5.6.7 'Friendly' node shapes



natoapp6c friendly air

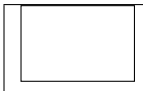
Macro for friendly air shape

```
\def\n@to@friendly@@ir{%
  \southeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
  \cntrl \wg@tmpb=\pgf@y%
  \pgfpatharc{180}{0}{\wg@tmpa and \wg@tmpb}}
```

The friendly air command.

```
\pgfdeclareshape{natoapp6c friendly air}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\southeast{%
    \pgf@x=1.1\n@to@pp@r%
    \pgf@y=-\n@to@pp@r}
  \savedanchor\cntrl{\pgf@x=0cm\pgf@y=2.6\n@to@pp@r}
  \savedanchor\north{\pgf@x=0cm\pgf@y=1.6\n@to@pp@r}
  \anchor{south east}{\southeast}
```

```
  \anchor{south west}{\southeast\pgf@x=-\pgf@x}
  \anchor{north east}{\southeast\wg@tmpa=\pgf@x\north\pgf@x=\wg@tmpa}
  \anchor{north west}{\southeast\wg@tmpa=\pgf@x\north\pgf@x=-\wg@tmpa}
  \anchor{north}{\north}
  \anchor{east}{%
    \north\wg@tmpb\pgf@y%
    \southeast\wg@tmpc=\pgf@y\wg@tmpa=\pgf@x%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{west}{%
    \north\wg@tmpb\pgf@y%
    \southeast\wg@tmpc=\pgf@y\wg@tmpa=\pgf@x%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=-\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{south}{\southeast\pgf@x=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@friendly@@ir%
  }
  \behindforegroundpath{%
    \n@to@friendly@@ir%
    \pgfusepath{stroke}%
  }
}
```



natoapp6c friendly land

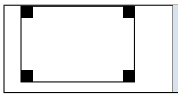
Macro for friendly land command

```
\def\n@to@friendly@l@nd{%
  \northeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{ \wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{ \wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpb}}%
  \pgfclosepath}
```

The friendly land command. The most used command frame.

```
\pgfdeclareshape{natoapp6c friendly land}{%
  \inheritsavedanchors[from=natoapp6c base]
```

```
16161   \savedanchor\northeast{%
16162     \pgf@x=1.5\n@to@pp@r%
16163     \pgf@y=\n@to@pp@r}
16164   \anchor{north east}{\northeast}
16165   \anchor{north west}{\northeast\pgf@x=-\pgf@x}
16166   \anchor{south east}{\northeast\pgf@y=-\pgf@y}
16167   \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
16168   \anchor{north}{\northeast\pgf@x=0cm}
16169   \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
16170   \anchor{east}{\northeast\pgf@y=0cm}
16171   \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
16172   \inheritanchor[from=natoapp6c base]{upper}
16173   \inheritanchor[from=natoapp6c base]{lower}
16174   \inheritanchor[from=natoapp6c base]{left}
16175   \inheritanchor[from=natoapp6c base]{right}
16176   \inheritanchor[from=natoapp6c base]{center}
16177   \backgroundpath{%
16178     \n@to@friendly@l@nd%
16179   }
16180   \behindforegroundpath{%
16181     \n@to@friendly@l@nd%
16182     \pgfusepath{stroke}%
16183   }
16184 }
```

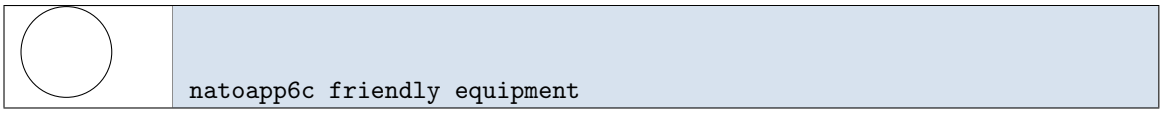


natoapp6c friendly activity

The friendly activity command. Similar to land command, but with boxes in the corners.

```
16185 \pgfdeclareshape{natoapp6c friendly activity}{%
16186   \inheritsavedanchors[from=natoapp6c friendly land]
16187   \inheritanchor[from=natoapp6c friendly land]{center}
16188   \inheritanchor[from=natoapp6c friendly land]{inner north east}
16189   \inheritanchor[from=natoapp6c friendly land]{inner north west}
16190   \inheritanchor[from=natoapp6c friendly land]{inner south west}
16191   \inheritanchor[from=natoapp6c friendly land]{inner south east}
16192   \inheritanchor[from=natoapp6c friendly land]{north east}
16193   \inheritanchor[from=natoapp6c friendly land]{north west}
16194   \inheritanchor[from=natoapp6c friendly land]{south east}
16195   \inheritanchor[from=natoapp6c friendly land]{south west}
16196   \inheritanchor[from=natoapp6c friendly land]{north}
16197   \inheritanchor[from=natoapp6c friendly land]{west}
16198   \inheritanchor[from=natoapp6c friendly land]{east}
16199   \inheritanchor[from=natoapp6c friendly land]{south}
16200   \inheritanchor[from=natoapp6c friendly land]{upper}
16201   \inheritanchor[from=natoapp6c friendly land]{lower}
16202   \inheritanchor[from=natoapp6c friendly land]{left}
16203   \inheritanchor[from=natoapp6c friendly land]{right}
16204   \inheritanchor[from=natoapp6c friendly land]{center}
16205   \inheritbackgroundpath[from=natoapp6c friendly land]
16206   \behindforegroundpath{
```

```
    \begin{n@to@pp@stroketofill}
      \n@to@friendly@l@nd%
      \pgfusepath{stroke}
      %
      \northeast \wg@tmpa=\pgf@x\wg@tmpb\pgf@y%
      \wg@tmpc=\wg@tmpa\advance\wg@tmpc-\n@to@pp@act@w
      \wg@tmpd=\wg@tmpb\advance\wg@tmpd-\n@to@pp@act@w
      %
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpd}}%
      \pgfclosepath
      %
      \pgfusepath{fill}%
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{-\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpa}{-\wg@tmpb}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpc}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{\wg@tmpd}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpb}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```

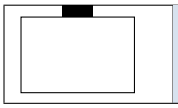


natoapp6c friendly equipment

The friendly equipment command. A circle.

```
\pgfdeclareshape{natoapp6c friendly equipment}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{%
    \pgf@x=1.2\n@to@pp@r%
    \pgf@y=1.2\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
```

```
16252   \anchor{south east}{\northeast\pgf@y=-\pgf@y}
16253   \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
16254   \anchor{north}{\northeast\pgf@x=0cm}
16255   \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
16256   \anchor{east}{\northeast\pgf@y=0cm}
16257   \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
16258   \inheritanchor[from=natoapp6c base]{upper}
16259   \inheritanchor[from=natoapp6c base]{lower}
16260   \inheritanchor[from=natoapp6c base]{left}
16261   \inheritanchor[from=natoapp6c base]{right}
16262   \inheritanchor[from=natoapp6c base]{center}
16263   \backgroundpath{%
16264     \northeast\wg@tmpa\pgf@x%
16265     \pgfpathcircle{\pgfqpoint{0cm}{0cm}}{\wg@tmpa}
16266   }
16267   \behindforegroundpath{%
16268     \northeast\wg@tmpa\pgf@x%
16269     \pgfpathcircle{\pgfqpoint{0cm}{0cm}}{\wg@tmpa}
16270     \pgfusepath{stroke}%
16271   }
16272 }
```

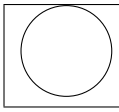


natoapp6c friendly installation

The friendly installation command. Similar to the land command, but with a 'hat' on top.

```
16273 \pgfdeclareshape{natoapp6c friendly installation}{%
16274   \inheritsavedanchors[from=natoapp6c friendly land]
16275   \inheritanchor[from=natoapp6c friendly land]{center}
16276   \inheritanchor[from=natoapp6c friendly land]{inner north east}
16277   \inheritanchor[from=natoapp6c friendly land]{inner north west}
16278   \inheritanchor[from=natoapp6c friendly land]{inner south west}
16279   \inheritanchor[from=natoapp6c friendly land]{inner south east}
16280   \inheritanchor[from=natoapp6c friendly land]{north east}
16281   \inheritanchor[from=natoapp6c friendly land]{north west}
16282   \inheritanchor[from=natoapp6c friendly land]{south east}
16283   \inheritanchor[from=natoapp6c friendly land]{south west}
16284   \inheritanchor[from=natoapp6c friendly land]{north}
16285   \inheritanchor[from=natoapp6c friendly land]{west}
16286   \inheritanchor[from=natoapp6c friendly land]{east}
16287   \inheritanchor[from=natoapp6c friendly land]{south}
16288   \inheritanchor[from=natoapp6c friendly land]{upper}
16289   \inheritanchor[from=natoapp6c friendly land]{lower}
16290   \inheritanchor[from=natoapp6c friendly land]{left}
16291   \inheritanchor[from=natoapp6c friendly land]{right}
16292   \inheritanchor[from=natoapp6c friendly land]{center}
16293   \inheritbackgroundpath[from=natoapp6c friendly land]
16294   \behindforegroundpath{
16295     \begin{n@to@pp@stroketofill}
16296       \n@to@friendly@l@nd%
16297       \pgfusepath{stroke}
```

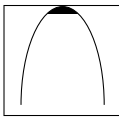
```
      %
      \northeast \wg@tmpa=\pgf@y%
      \wg@tmpb=\wg@tmpa\advance\wg@tmpb\n@to@pp@inst@h%
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpa}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c friendly sea surface

The friendly sea surface command. Same as equipment command.

```
\pgfdeclareshape{natoapp6c friendly sea surface}{%
  \inheritsavedanchors[from=natoapp6c friendly equipment]
  \inheritanchor[from=natoapp6c friendly equipment]{inner north east}
  \inheritanchor[from=natoapp6c friendly equipment]{inner north west}
  \inheritanchor[from=natoapp6c friendly equipment]{inner south west}
  \inheritanchor[from=natoapp6c friendly equipment]{inner south east}
  \inheritanchor[from=natoapp6c friendly equipment]{north east}
  \inheritanchor[from=natoapp6c friendly equipment]{north west}
  \inheritanchor[from=natoapp6c friendly equipment]{south east}
  \inheritanchor[from=natoapp6c friendly equipment]{south west}
  \inheritanchor[from=natoapp6c friendly equipment]{north}
  \inheritanchor[from=natoapp6c friendly equipment]{west}
  \inheritanchor[from=natoapp6c friendly equipment]{east}
  \inheritanchor[from=natoapp6c friendly equipment]{south}
  \inheritanchor[from=natoapp6c friendly equipment]{upper}
  \inheritanchor[from=natoapp6c friendly equipment]{lower}
  \inheritanchor[from=natoapp6c friendly equipment]{left}
  \inheritanchor[from=natoapp6c friendly equipment]{right}
  \inheritanchor[from=natoapp6c friendly equipment]{center}
  \inheritbackgroundpath[from=natoapp6c friendly equipment]
  \inheritbehindforegroundpath[from=natoapp6c friendly equipment]
}
```

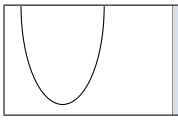


natoapp6c friendly space

The friendly space command. Similar to air command, but with a bar on top.

```
\pgfdeclareshape{natoapp6c friendly space}{%
  \inheritsavedanchors[from=natoapp6c friendly air]
```

```
  \inheritanchor[from=natoapp6c friendly air]{north east}
  \inheritanchor[from=natoapp6c friendly air]{north west}
  \inheritanchor[from=natoapp6c friendly air]{south east}
  \inheritanchor[from=natoapp6c friendly air]{south west}
  \inheritanchor[from=natoapp6c friendly air]{north}
  \inheritanchor[from=natoapp6c friendly air]{west}
  \inheritanchor[from=natoapp6c friendly air]{east}
  \inheritanchor[from=natoapp6c friendly air]{south}
  \inheritanchor[from=natoapp6c friendly air]{upper}
  \inheritanchor[from=natoapp6c friendly air]{lower}
  \inheritanchor[from=natoapp6c friendly air]{left}
  \inheritanchor[from=natoapp6c friendly air]{right}
  \inheritanchor[from=natoapp6c friendly air]{center}
  \inheritbackgroundpath[from=natoapp6c friendly air]
  \behindforegroundpath{%
    \begin{n@to@pp@stroketofill}
      \n@to@friendly@@ir%
      \pgfusepath{stroke,clip}%
      %
      \cntrl\wg@tmpa=\pgf@y%
      \north\wg@tmpb=\pgf@y
      \advance\wg@tmpb-\n@to@pp@space@h
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@r}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@r}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@r}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@r}{\wg@tmpb}}%
      \pgfclosepath%
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c friendly sub surface

Macro for friendly sub surface command

```
\def\n@to@friendly@sub{%
  \northeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
  \cntrl \wg@tmpb=\pgf@y%
  \pgfpatharc{180}{0}{\wg@tmpa and \wg@tmpb}}
```

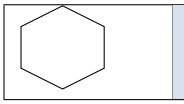
The friendly sub surface command.

```
\pgfdeclareshape{natoapp6c friendly sub surface}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{%
    \pgf@x=1.1\n@to@pp@r%
    \pgf@y=\n@to@pp@r}
```

```
  \savedanchor\cntrl{\pgf@x=0cm\pgf@y=-2.6\n@to@pp@r}
  \savedanchor\south{\pgf@x=0cm\pgf@y=-1.6\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\wg@tmpa=\pgf@x\south\pgf@x=\wg@tmpa}
  \anchor{south west}{\northeast\wg@tmpa=\pgf@x\south\pgf@x=-\wg@tmpa}
  \anchor{south}{\south}
  \anchor{east}{
    \northeast\wg@tmpb=\pgf@y\wg@tmpa=\pgf@x%
    \south\wg@tmpc\pgf@y%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{west}{
    \northeast\wg@tmpb=\pgf@y\wg@tmpa=\pgf@x%
    \south\wg@tmpc\pgf@y%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=-\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{north}{\northeast\pgf@x=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@friendly@sub%
  }
  \behindforegroundpath{%
    \n@to@friendly@sub%
    \pgfusepath{stroke}%
  }
}

\pgfdeclareshape{natoapp6c friendly none}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{%
    \pgf@x=1.5\n@to@pp@r%
    \pgf@y=\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\pgf@y=-\pgf@y}
  \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{north}{\northeast\pgf@x=0cm}
  \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
  \anchor{east}{\northeast\pgf@y=0cm}
  \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
```

```
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{}
  \behindforegroundpath{}
}
```



natoapp6c friendly dismounted

Macro for friendly dismounted command

```
\def\n@to@friendly@l@nd{%
  \northeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{ \wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{ \wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpb}}%
  \pgfclosepath}
```

The friendly dismounted command. The most used command frame.

```
\def\n@to@pp@friendl@dismounted{%
  \northeast\wg@tmpa=\pgf@x\wg@tmpb\pgf@y%
  \pgfpathmoveto{\pgfpoint{-\wg@tmpa}{-.5\wg@tmpb}}%
  \pgfpathlineto{\pgfpoint{-\wg@tmpa}{ .5\wg@tmpb}}%
  \pgfpathlineto{\pgfpoint{0cm}      {   \wg@tmpb}}%
  \pgfpathlineto{\pgfpoint{ \wg@tmpa}{ .5\wg@tmpb}}%
  \pgfpathlineto{\pgfpoint{ \wg@tmpa}{-.5\wg@tmpb}}%
  \pgfpathlineto{\pgfpoint{0cm}      {  -\wg@tmpb}}%
  \pgfclosepath%
}%
\pgfdeclareshape{natoapp6c friendly dismounted}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{%
    \pgf@x=1.1\n@to@pp@r%
    \pgf@y=1.1\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\pgf@y=-\pgf@y}
  \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{north}{\northeast\pgf@x=0cm}
  \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
  \anchor{east}{\northeast\pgf@y=0cm}
  \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@pp@friendl@dismounted%
  }
```

```
  \behindforegroundpath{%
    \n@to@pp@friendl@dismounted%
    \pgfusepath{stroke}%
  }
}
```

5.6.8 'Hostile' node shapes

The hostile air command

Macro for hostile air shape

```
\def\n@to@hostile@@ir{%
  \southeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \cntrl \wg@tmpc=\pgf@y%
  \north \wg@tmpd=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpc}}%
  \pgfpathlineto{\pgfqpoint{ 0cm}{\wg@tmpd}}%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpc}}%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
}
```

The hostile air command.

```
\pgfdeclareshape{natoapp6c hostile air}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\southeast{%
    \pgf@x=\n@to@pp@r%
    \pgf@y=-\n@to@pp@r}
  \savedanchor\cntrl{%
    \pgf@x=\n@to@pp@r%
    \pgf@y=0.414\n@to@pp@r% (sqrt(2)-1)
  }
  \savedanchor\north{\pgf@x=0cm\pgf@y=1.414\n@to@pp@r}
  \anchor{south east}{\southeast}
  \anchor{south west}{\southeast\pgf@x=-\pgf@x}
  \anchor{north east}{\southeast\wg@tmpa=\pgf@x\north\pgf@x=\wg@tmpa}
  \anchor{north west}{\southeast\wg@tmpa=\pgf@x\north\pgf@x=-\wg@tmpa}
  \anchor{north}{\north}
  \anchor{east}{%
    \north\wg@tmpb\pgf@y%
    \southeast\wg@tmpc=\pgf@y\wg@tmpa=\pgf@x%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{west}{%
```

```
    \north\wg@tmpb\pgf@y%
    \southeast\wg@tmpc=\pgf@y\wg@tmpa=\pgf@x%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=-\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{south}{\southeast\pgf@x=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@hostile@@ir%
  }
  \behindforegroundpath{%
    \n@to@hostile@@ir%
    \pgfusepath{stroke}%
  }
}
```

natoapp6c hostile land

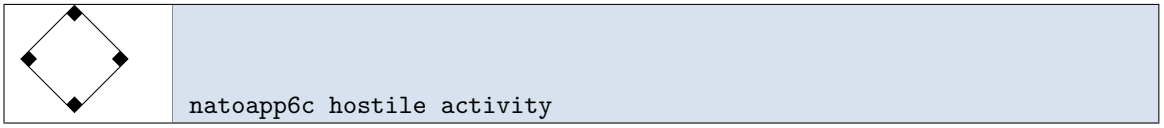
Macro for hostile land command

```
\def\n@to@hostile@l@nd{%
  \northeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{ 0cm}}%
  \pgfpathlineto{\pgfqpoint{ 0cm}{ \wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{ 0cm}}%
  \pgfpathlineto{\pgfqpoint{ 0cm}{-\wg@tmpb}}%
  \pgfclosepath}
```

The hostile land command.

```
\pgfdeclareshape{natoapp6c hostile land}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{%
    \pgf@x=1.414\n@to@pp@r%
    \pgf@y=1.414\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\pgf@y=-\pgf@y}
  \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{north}{\northeast\pgf@x=0cm}
  \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
  \anchor{east}{\northeast\pgf@y=0cm}
  \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
```

```
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@hostile@l@nd%
  }
  \behindforegroundpath{%
    \n@to@hostile@l@nd%
    \pgfusepath{stroke}%
  }
}
```



natoapp6c hostile activity

The hostile activity command. Similar to land command, but with boxes in the corners.

```
\pgfdeclareshape{natoapp6c hostile activity}{%
  \inheritsavedanchors[from=natoapp6c hostile land]
  \inheritanchor[from=natoapp6c hostile land]{center}
  \inheritanchor[from=natoapp6c hostile land]{inner north east}
  \inheritanchor[from=natoapp6c hostile land]{inner north west}
  \inheritanchor[from=natoapp6c hostile land]{inner south west}
  \inheritanchor[from=natoapp6c hostile land]{inner south east}
  \inheritanchor[from=natoapp6c hostile land]{north east}
  \inheritanchor[from=natoapp6c hostile land]{north west}
  \inheritanchor[from=natoapp6c hostile land]{south east}
  \inheritanchor[from=natoapp6c hostile land]{south west}
  \inheritanchor[from=natoapp6c hostile land]{north}
  \inheritanchor[from=natoapp6c hostile land]{west}
  \inheritanchor[from=natoapp6c hostile land]{east}
  \inheritanchor[from=natoapp6c hostile land]{south}
  \inheritanchor[from=natoapp6c hostile land]{upper}
  \inheritanchor[from=natoapp6c hostile land]{lower}
  \inheritanchor[from=natoapp6c hostile land]{left}
  \inheritanchor[from=natoapp6c hostile land]{right}
  \inheritanchor[from=natoapp6c hostile land]{center}
  \inheritbackgroundpath[from=natoapp6c hostile land]
  \behindforegroundpath{
    \begin{n@to@pp@stroketofill}
      \n@to@hostile@l@nd%
      \pgfusepath{stroke}
      %
      \northeast \wg@tmpb=\pgf@y%
      \wg@tmpa=0.707\n@to@pp@act@w
      \wg@tmpc=\wg@tmpb\advance\wg@tmpc-1.414\n@to@pp@act@w
      \wg@tmpd=\wg@tmpb\advance\wg@tmpd-\wg@tmpa
      %
      \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{      0cm}{\wg@tmpb}}%
```

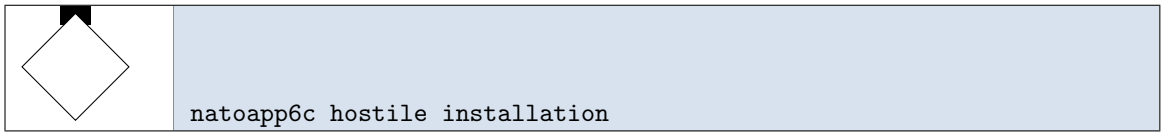
```
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{      0cm}{\wg@tmpc}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpc}{0cm}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpd}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpb}{0cm}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpd}{-\wg@tmpa}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{      0cm}{-\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{      0cm}{-\wg@tmpb}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{\wg@tmpb}{0cm}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpd}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{0cm}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpd}{-\wg@tmpa}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```

natoapp6c hostile equipment

The hostile equipment command. Same as land command.

```
\pgfdeclareshape{natoapp6c hostile equipment}{%
  \inheritsavedanchors[from=natoapp6c hostile land]
  \inheritanchor[from=natoapp6c hostile land]{inner north east}
  \inheritanchor[from=natoapp6c hostile land]{inner north west}
  \inheritanchor[from=natoapp6c hostile land]{inner south west}
  \inheritanchor[from=natoapp6c hostile land]{inner south east}
  \inheritanchor[from=natoapp6c hostile land]{north east}
  \inheritanchor[from=natoapp6c hostile land]{north west}
  \inheritanchor[from=natoapp6c hostile land]{south east}
  \inheritanchor[from=natoapp6c hostile land]{south west}
  \inheritanchor[from=natoapp6c hostile land]{north}
  \inheritanchor[from=natoapp6c hostile land]{west}
  \inheritanchor[from=natoapp6c hostile land]{east}
  \inheritanchor[from=natoapp6c hostile land]{south}
  \inheritanchor[from=natoapp6c hostile land]{upper}
  \inheritanchor[from=natoapp6c hostile land]{lower}
  \inheritanchor[from=natoapp6c hostile land]{left}
```

```
  \inheritanchor[from=natoapp6c hostile land]{right}
  \inheritanchor[from=natoapp6c hostile land]{center}
  \inheritbackgroundpath[from=natoapp6c hostile land]
  \inheritbehindforegroundpath[from=natoapp6c hostile land]
}
```

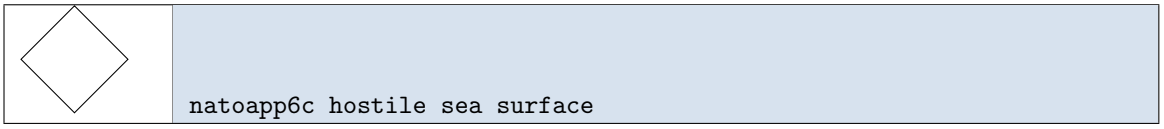


natoapp6c hostile installation

The hostile installation command. Similar to land command, but with a ‘hat’ on top.

```
\pgfdeclareshape{natoapp6c hostile installation}{%
  \inheritsavedanchors[from=natoapp6c hostile land]
  \inheritanchor[from=natoapp6c hostile land]{center}
  \inheritanchor[from=natoapp6c hostile land]{inner north east}
  \inheritanchor[from=natoapp6c hostile land]{inner north west}
  \inheritanchor[from=natoapp6c hostile land]{inner south west}
  \inheritanchor[from=natoapp6c hostile land]{inner south east}
  \inheritanchor[from=natoapp6c hostile land]{north east}
  \inheritanchor[from=natoapp6c hostile land]{north west}
  \inheritanchor[from=natoapp6c hostile land]{south east}
  \inheritanchor[from=natoapp6c hostile land]{south west}
  \inheritanchor[from=natoapp6c hostile land]{north}
  \inheritanchor[from=natoapp6c hostile land]{west}
  \inheritanchor[from=natoapp6c hostile land]{east}
  \inheritanchor[from=natoapp6c hostile land]{south}
  \inheritanchor[from=natoapp6c hostile land]{upper}
  \inheritanchor[from=natoapp6c hostile land]{lower}
  \inheritanchor[from=natoapp6c hostile land]{left}
  \inheritanchor[from=natoapp6c hostile land]{right}
  \inheritanchor[from=natoapp6c hostile land]{center}
  \inheritbackgroundpath[from=natoapp6c hostile land]
  \behindforegroundpath{
    \begin{n@to@pp@stroketofill}
      \n@to@hostile@l@nd%
      \pgfusepath{stroke}
      %
      \northeast \wg@tmpa=\pgf@x\wg@tmpb\pgf@y%
      \wg@tmpc=\wg@tmpb
      \advance\wg@tmpc\n@to@pp@inst@h%
      \advance\wg@tmpc-0.05cm%
      %
      \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{0cm}}
      \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{\wg@tmpc}}
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpc}}
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{0cm}}
      \pgfpathlineto{\pgfqpoint{ 0cm}{\wg@tmpb}}
      \pgfclosepath%
      \pgfusepath{clip}
      %
      \wg@tmpd=\wg@tmpb%
```

```
      \advance\wg@tmpd-\n@to@pp@inst@h%
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpd}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c hostile sea surface

The hostile sea surface command. Same as land command

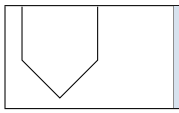
```
\pgfdeclareshape{natoapp6c hostile sea surface}{%
  \inheritsavedanchors[from=natoapp6c hostile equipment]
  \inheritanchor[from=natoapp6c hostile equipment]{inner north east}
  \inheritanchor[from=natoapp6c hostile equipment]{inner north west}
  \inheritanchor[from=natoapp6c hostile equipment]{inner south west}
  \inheritanchor[from=natoapp6c hostile equipment]{inner south east}
  \inheritanchor[from=natoapp6c hostile equipment]{north east}
  \inheritanchor[from=natoapp6c hostile equipment]{north west}
  \inheritanchor[from=natoapp6c hostile equipment]{south east}
  \inheritanchor[from=natoapp6c hostile equipment]{south west}
  \inheritanchor[from=natoapp6c hostile equipment]{north}
  \inheritanchor[from=natoapp6c hostile equipment]{west}
  \inheritanchor[from=natoapp6c hostile equipment]{east}
  \inheritanchor[from=natoapp6c hostile equipment]{south}
  \inheritanchor[from=natoapp6c hostile equipment]{upper}
  \inheritanchor[from=natoapp6c hostile equipment]{lower}
  \inheritanchor[from=natoapp6c hostile equipment]{left}
  \inheritanchor[from=natoapp6c hostile equipment]{right}
  \inheritanchor[from=natoapp6c hostile equipment]{center}
  \inheritbackgroundpath[from=natoapp6c hostile equipment]
  \inheritbehindforegroundpath[from=natoapp6c hostile equipment]
}
```

natoapp6c hostile space

The hostile space command. Similar to air command, but with bar on top.

```
\pgfdeclareshape{natoapp6c hostile space}{%
  \inheritsavedanchors[from=natoapp6c hostile air]
  \inheritanchor[from=natoapp6c hostile air]{north east}
  \inheritanchor[from=natoapp6c hostile air]{north west}
```

```
  \inheritanchor[from=natoapp6c hostile air]{south east}
  \inheritanchor[from=natoapp6c hostile air]{south west}
  \inheritanchor[from=natoapp6c hostile air]{north}
  \inheritanchor[from=natoapp6c hostile air]{west}
  \inheritanchor[from=natoapp6c hostile air]{east}
  \inheritanchor[from=natoapp6c hostile air]{south}
  \inheritanchor[from=natoapp6c hostile air]{upper}
  \inheritanchor[from=natoapp6c hostile air]{lower}
  \inheritanchor[from=natoapp6c hostile air]{left}
  \inheritanchor[from=natoapp6c hostile air]{right}
  \inheritanchor[from=natoapp6c hostile air]{center}
  \inheritbackgroundpath[from=natoapp6c hostile air]
  \behindforegroundpath{%
    \begin{n@to@pp@stroketofill}
      \n@to@hostile@@ir%
      \pgfusepath{stroke,clip}%
      %
      \north\wg@tmpa=\pgf@y\wg@tmpb=\pgf@y
      \advance\wg@tmpb-\n@to@pp@space@h
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@r}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@r}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@r}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@r}{\wg@tmpb}}%
      \pgfclosepath%
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c hostile sub surface

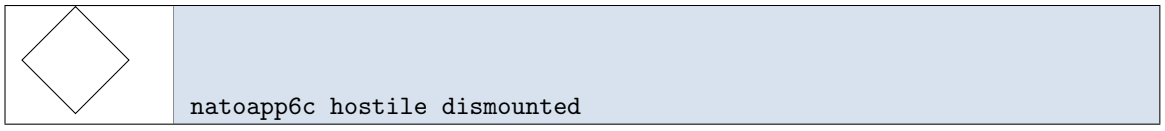
Macro for hostile sub surface command

```
\def\n@to@hostile@sub{%
  \northeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \cntrl \wg@tmpc=\pgf@y%
  \south \wg@tmpd=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpc}}%
  \pgfpathlineto{\pgfqpoint{ 0cm}{\wg@tmpd}}%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpc}}%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
}
```

The hostile sub surface command

```
\pgfdeclareshape{natoapp6c hostile sub surface}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{%
    \pgf@x=\n@to@pp@r%
```

```
    \pgf@y=\n@to@pp@r}
  \savedanchor\cntrl{\pgf@x=\n@to@pp@r\pgf@y=-0.414\n@to@pp@r}
  \savedanchor\south{\pgf@x=0cm\pgf@y=-1.414\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\wg@tmpa=\pgf@x\south\pgf@x=\wg@tmpa}
  \anchor{south west}{\northeast\wg@tmpa=\pgf@x\south\pgf@x=-\wg@tmpa}
  \anchor{south}{\south}
  \anchor{east}{
    \northeast\wg@tmpb=\pgf@y\wg@tmpa=\pgf@x%
    \south\wg@tmpc\pgf@y%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{west}{
    \northeast\wg@tmpb=\pgf@y\wg@tmpa=\pgf@x%
    \south\wg@tmpc\pgf@y%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=-\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{north}{\northeast\pgf@x=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@hostile@sub%
  }
  \behindforegroundpath{%
    \n@to@hostile@sub%
    \pgfusepath{stroke}%
  }
}
```



natoapp6c hostile dismounted

The hostile dismounted command. Same as land command.

```
\pgfdeclareshape{natoapp6c hostile dismounted}{%
  \inheritsavedanchors[from=natoapp6c hostile land]
  \inheritanchor[from=natoapp6c hostile land]{inner north east}
  \inheritanchor[from=natoapp6c hostile land]{inner north west}
  \inheritanchor[from=natoapp6c hostile land]{inner south west}
  \inheritanchor[from=natoapp6c hostile land]{inner south east}
  \inheritanchor[from=natoapp6c hostile land]{north east}
```

```
  \inheritanchor[from=natoapp6c hostile land]{north west}
  \inheritanchor[from=natoapp6c hostile land]{south east}
  \inheritanchor[from=natoapp6c hostile land]{south west}
  \inheritanchor[from=natoapp6c hostile land]{north}
  \inheritanchor[from=natoapp6c hostile land]{west}
  \inheritanchor[from=natoapp6c hostile land]{east}
  \inheritanchor[from=natoapp6c hostile land]{south}
  \inheritanchor[from=natoapp6c hostile land]{upper}
  \inheritanchor[from=natoapp6c hostile land]{lower}
  \inheritanchor[from=natoapp6c hostile land]{left}
  \inheritanchor[from=natoapp6c hostile land]{right}
  \inheritanchor[from=natoapp6c hostile land]{center}
  \inheritbackgroundpath[from=natoapp6c hostile land]
  \inheritbehindforegroundpath[from=natoapp6c hostile land]
}
```

5.6.9 'Neutral' node shapes

Macro for neutral shapes

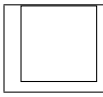
```
\def\n@to@pp@neutr@l@init{%
  \northeast\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \def\n@to@pp@neutr@l@left  {\pgflineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}}%
  \def\n@to@pp@neutr@l@right {\pgflineto{\pgfqpoint{ \wg@tmpa}{ \wg@tmpb}}}%
  \def\n@to@pp@neutr@l@top   {\pgflineto{\pgfqpoint{-\wg@tmpa}{ \wg@tmpb}}}%
  \def\n@to@pp@neutr@l@bottom{\pgflineto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpb}}}%
  \def\n@to@pp@neutr@l@nw    {\pgfmoveto{\pgfqpoint{-\wg@tmpa}{ \wg@tmpb}}}%
  \def\n@to@pp@neutr@l@ne    {\pgfmoveto{\pgfqpoint{ \wg@tmpa}{ \wg@tmpb}}}%
  \def\n@to@pp@neutr@l@se    {\pgfmoveto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpb}}}%
  \def\n@to@pp@neutr@l@sw    {\pgfmoveto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}}%
}
```

```
natoapp6c neutral air
```

The neutral air command

```
\pgfdeclareshape{natoapp6c neutral air}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{\pgf@x=\n@to@pp@r\pgf@y=\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\pgf@y=-\pgf@y}
  \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{north}{\northeast\pgf@x=0cm}
  \anchor{east}{\northeast\pgf@y=0cm}
  \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
  \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
```

```
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@se
    \n@to@pp@neutr@l@right%
    \n@to@pp@neutr@l@top%
    \n@to@pp@neutr@l@left%
  }
  \behindforegroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@se
    \n@to@pp@neutr@l@right%
    \n@to@pp@neutr@l@top%
    \n@to@pp@neutr@l@left%
    \pgfusepath{stroke}%
  }
}
```

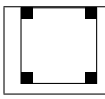


natoapp6c neutral land

The neutral land command

```
\pgfdeclareshape{natoapp6c neutral land}{%
  \inheritsavedanchors[from=natoapp6c neutral air]
  \inheritanchor[from=natoapp6c neutral air]{north east}
  \inheritanchor[from=natoapp6c neutral air]{north west}
  \inheritanchor[from=natoapp6c neutral air]{south east}
  \inheritanchor[from=natoapp6c neutral air]{south west}
  \inheritanchor[from=natoapp6c neutral air]{north}
  \inheritanchor[from=natoapp6c neutral air]{west}
  \inheritanchor[from=natoapp6c neutral air]{east}
  \inheritanchor[from=natoapp6c neutral air]{south}
  \inheritanchor[from=natoapp6c neutral air]{upper}
  \inheritanchor[from=natoapp6c neutral air]{lower}
  \inheritanchor[from=natoapp6c neutral air]{left}
  \inheritanchor[from=natoapp6c neutral air]{right}
  \inheritanchor[from=natoapp6c neutral air]{center}
  \backgroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@ne
    \n@to@pp@neutr@l@top%
    \n@to@pp@neutr@l@left%
    \n@to@pp@neutr@l@bottom%
    \pgfclosepath
  }
  \behindforegroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@ne
    \n@to@pp@neutr@l@top%
    \n@to@pp@neutr@l@left%
```

```
    \n@to@pp@neutr@l@bottom%
    \pgfclosepath
    \pgfusepath{stroke}%
  }
}
```

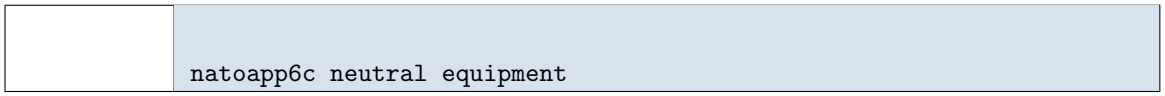


natoapp6c neutral activity

The neutral activity command. Similar to land command but with boxes added in the corners.

```
\pgfdeclareshape{natoapp6c neutral activity}{%
  \inheritsavedanchors[from=natoapp6c neutral land]
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritanchor[from=natoapp6c neutral land]{inner north east}
  \inheritanchor[from=natoapp6c neutral land]{inner north west}
  \inheritanchor[from=natoapp6c neutral land]{inner south west}
  \inheritanchor[from=natoapp6c neutral land]{inner south east}
  \inheritanchor[from=natoapp6c neutral land]{north east}
  \inheritanchor[from=natoapp6c neutral land]{north west}
  \inheritanchor[from=natoapp6c neutral land]{south east}
  \inheritanchor[from=natoapp6c neutral land]{south west}
  \inheritanchor[from=natoapp6c neutral land]{north}
  \inheritanchor[from=natoapp6c neutral land]{west}
  \inheritanchor[from=natoapp6c neutral land]{east}
  \inheritanchor[from=natoapp6c neutral land]{south}
  \inheritanchor[from=natoapp6c neutral land]{upper}
  \inheritanchor[from=natoapp6c neutral land]{lower}
  \inheritanchor[from=natoapp6c neutral land]{left}
  \inheritanchor[from=natoapp6c neutral land]{right}
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritbackgroundpath[from=natoapp6c neutral land]
  \behindforegroundpath{
    \begin{n@to@pp@stroketofill}
      \n@to@pp@neutr@l@init%
      \n@to@pp@neutr@l@ne
      \n@to@pp@neutr@l@top%
      \n@to@pp@neutr@l@left%
      \n@to@pp@neutr@l@bottom%
      \pgfclosepath
      \pgfusepath{stroke}
      %
      \northeast \wg@tmpa=\pgf@x\wg@tmpb\pgf@y%
      \wg@tmpc=\wg@tmpa\advance\wg@tmpc-\n@to@pp@act@w
      \wg@tmpd=\wg@tmpb\advance\wg@tmpd-\n@to@pp@act@w
      %
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpd}}%
      \pgfclosepath
      \pgfusepath{fill}%
```

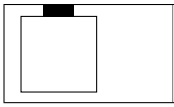
```
      %
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{-\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpa}{-\wg@tmpb}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpc}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{\wg@tmpd}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpb}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



The neutral equipment command. Same as land command

```
\pgfdeclareshape{natoapp6c neutral equipment}{%
  \inheritsavedanchors[from=natoapp6c neutral land]
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritanchor[from=natoapp6c neutral land]{inner north east}
  \inheritanchor[from=natoapp6c neutral land]{inner north west}
  \inheritanchor[from=natoapp6c neutral land]{inner south west}
  \inheritanchor[from=natoapp6c neutral land]{inner south east}
  \inheritanchor[from=natoapp6c neutral land]{north east}
  \inheritanchor[from=natoapp6c neutral land]{north west}
  \inheritanchor[from=natoapp6c neutral land]{south east}
  \inheritanchor[from=natoapp6c neutral land]{south west}
  \inheritanchor[from=natoapp6c neutral land]{north}
  \inheritanchor[from=natoapp6c neutral land]{west}
  \inheritanchor[from=natoapp6c neutral land]{east}
  \inheritanchor[from=natoapp6c neutral land]{south}
  \inheritanchor[from=natoapp6c neutral land]{upper}
  \inheritanchor[from=natoapp6c neutral land]{lower}
  \inheritanchor[from=natoapp6c neutral land]{left}
  \inheritanchor[from=natoapp6c neutral land]{right}
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritbackgroundpath[from=natoapp6c neutral land]
  \inheritbehindbackgroundpath[from=natoapp6c neutral land]
```

```
}
```



natoapp6c neutral installation

The neutral installation command. Similar to land command but with a ‘hat’ on top.

```
\pgfdeclareshape{natoapp6c neutral installation}{%
  \inheritsavedanchors[from=natoapp6c neutral land]
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritanchor[from=natoapp6c neutral land]{inner north east}
  \inheritanchor[from=natoapp6c neutral land]{inner north west}
  \inheritanchor[from=natoapp6c neutral land]{inner south west}
  \inheritanchor[from=natoapp6c neutral land]{inner south east}
  \inheritanchor[from=natoapp6c neutral land]{north east}
  \inheritanchor[from=natoapp6c neutral land]{north west}
  \inheritanchor[from=natoapp6c neutral land]{south east}
  \inheritanchor[from=natoapp6c neutral land]{south west}
  \inheritanchor[from=natoapp6c neutral land]{north}
  \inheritanchor[from=natoapp6c neutral land]{west}
  \inheritanchor[from=natoapp6c neutral land]{east}
  \inheritanchor[from=natoapp6c neutral land]{south}
  \inheritanchor[from=natoapp6c neutral land]{upper}
  \inheritanchor[from=natoapp6c neutral land]{lower}
  \inheritanchor[from=natoapp6c neutral land]{left}
  \inheritanchor[from=natoapp6c neutral land]{right}
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritbackgroundpath[from=natoapp6c neutral land]
  \behindforegroundpath{
    \begin{n@to@pp@stroketofill}
      \n@to@pp@neutr@l@init%
      \n@to@pp@neutr@l@ne
      \n@to@pp@neutr@l@top%
      \n@to@pp@neutr@l@left%
      \n@to@pp@neutr@l@bottom%
      \pgfclosepath
      \pgfusepath{stroke}
      %
      \northeast \wg@tmpa=\pgf@y%
      \wg@tmpb=\wg@tmpa\advance\wg@tmpb\n@to@pp@inst@h%
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpa}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```

natoapp6c neutral sea surface

The neutral sea surface command. Same as land command.

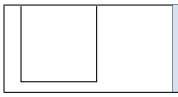
```
\pgfdeclareshape{natoapp6c neutral sea surface}{%
  \inheritsavedanchors[from=natoapp6c neutral equipment]
  \inheritanchor[from=natoapp6c neutral equipment]{inner north east}
  \inheritanchor[from=natoapp6c neutral equipment]{inner north west}
  \inheritanchor[from=natoapp6c neutral equipment]{inner south west}
  \inheritanchor[from=natoapp6c neutral equipment]{inner south east}
  \inheritanchor[from=natoapp6c neutral equipment]{north east}
  \inheritanchor[from=natoapp6c neutral equipment]{north west}
  \inheritanchor[from=natoapp6c neutral equipment]{south east}
  \inheritanchor[from=natoapp6c neutral equipment]{south west}
  \inheritanchor[from=natoapp6c neutral equipment]{north}
  \inheritanchor[from=natoapp6c neutral equipment]{west}
  \inheritanchor[from=natoapp6c neutral equipment]{east}
  \inheritanchor[from=natoapp6c neutral equipment]{south}
  \inheritanchor[from=natoapp6c neutral equipment]{upper}
  \inheritanchor[from=natoapp6c neutral equipment]{lower}
  \inheritanchor[from=natoapp6c neutral equipment]{left}
  \inheritanchor[from=natoapp6c neutral equipment]{right}
  \inheritanchor[from=natoapp6c neutral equipment]{center}
  \inheritbackgroundpath[from=natoapp6c neutral equipment]
  \inheritbehindforegroundpath[from=natoapp6c neutral equipment]
}
```

natoapp6c neutral space

The neutral space command. Similar to air command but with a bar.

```
\pgfdeclareshape{natoapp6c neutral space}{%
  \inheritsavedanchors[from=natoapp6c neutral air]
  \inheritanchor[from=natoapp6c neutral air]{north east}
  \inheritanchor[from=natoapp6c neutral air]{north west}
  \inheritanchor[from=natoapp6c neutral air]{south east}
  \inheritanchor[from=natoapp6c neutral air]{south west}
  \inheritanchor[from=natoapp6c neutral air]{north}
  \inheritanchor[from=natoapp6c neutral air]{west}
  \inheritanchor[from=natoapp6c neutral air]{east}
  \inheritanchor[from=natoapp6c neutral air]{south}
  \inheritanchor[from=natoapp6c neutral air]{upper}
  \inheritanchor[from=natoapp6c neutral air]{lower}
  \inheritanchor[from=natoapp6c neutral air]{left}
  \inheritanchor[from=natoapp6c neutral air]{right}
  \inheritanchor[from=natoapp6c neutral air]{center}
  \inheritbackgroundpath[from=natoapp6c neutral air]
  \behindforegroundpath{%
    \begin{n@to@pp@stroketofill}
      \n@to@pp@neutr@l@init%
```

```
      \n@to@pp@neutr@l@se
      \n@to@pp@neutr@l@right%
      \n@to@pp@neutr@l@top%
      \n@to@pp@neutr@l@left%
      \pgfusepath{stroke}%
      %
      \n@to@pp@neutr@l@ne
      \n@to@pp@neutr@l@top%
      \northeast\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
      \advance\wg@tmpb-\n@to@pp@space@h
      %
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{\wg@tmpb}}%
      \pgfclosepath%
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c neutral sub surface

The neutral sub surface command

```
\pgfdeclareshape{natoapp6c neutral sub surface}{%
  \inheritsavedanchors[from=natoapp6c neutral air]
  \inheritanchor[from=natoapp6c neutral air]{north east}
  \inheritanchor[from=natoapp6c neutral air]{north west}
  \inheritanchor[from=natoapp6c neutral air]{south east}
  \inheritanchor[from=natoapp6c neutral air]{south west}
  \inheritanchor[from=natoapp6c neutral air]{north}
  \inheritanchor[from=natoapp6c neutral air]{west}
  \inheritanchor[from=natoapp6c neutral air]{east}
  \inheritanchor[from=natoapp6c neutral air]{south}
  \inheritanchor[from=natoapp6c neutral air]{upper}
  \inheritanchor[from=natoapp6c neutral air]{lower}
  \inheritanchor[from=natoapp6c neutral air]{left}
  \inheritanchor[from=natoapp6c neutral air]{right}
  \inheritanchor[from=natoapp6c neutral air]{center}
  \backgroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@nw
    \n@to@pp@neutr@l@left%
    \n@to@pp@neutr@l@bottom%
    \n@to@pp@neutr@l@right%
  }
  \behindforegroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@nw
    \n@to@pp@neutr@l@left%
    \n@to@pp@neutr@l@bottom%
```

```
    \n@to@pp@neutr@l@right%
    \pgfusepath{stroke}%
  }
}
```

	natoapp6c neutral dismounted

The neutral dismounted command. Same as land command

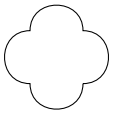
```
\pgfdeclareshape{natoapp6c neutral dismounted}{%
  \inheritsavedanchors[from=natoapp6c neutral land]
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritanchor[from=natoapp6c neutral land]{inner north east}
  \inheritanchor[from=natoapp6c neutral land]{inner north west}
  \inheritanchor[from=natoapp6c neutral land]{inner south west}
  \inheritanchor[from=natoapp6c neutral land]{inner south east}
  \inheritanchor[from=natoapp6c neutral land]{north east}
  \inheritanchor[from=natoapp6c neutral land]{north west}
  \inheritanchor[from=natoapp6c neutral land]{south east}
  \inheritanchor[from=natoapp6c neutral land]{south west}
  \inheritanchor[from=natoapp6c neutral land]{north}
  \inheritanchor[from=natoapp6c neutral land]{west}
  \inheritanchor[from=natoapp6c neutral land]{east}
  \inheritanchor[from=natoapp6c neutral land]{south}
  \inheritanchor[from=natoapp6c neutral land]{upper}
  \inheritanchor[from=natoapp6c neutral land]{lower}
  \inheritanchor[from=natoapp6c neutral land]{left}
  \inheritanchor[from=natoapp6c neutral land]{right}
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritbackgroundpath[from=natoapp6c neutral land]
  \inheritbehindbackgroundpath[from=natoapp6c neutral land]
}
```

5.6.10 'Unknown' node shapes

Macro to define unknown path elements

```
\def\n@to@pp@unknown@init{%
  \def\n@to@pp@unknown@top{%
    \innernortheast \wg@tmpa=\pgf@x%
    \cntrlnortheast \wg@tmpb=\pgf@x%
    \pgfpathcurveto{%
      \pgfqpoint{ \wg@tmpa}{\wg@tmpb}}{%
      \pgfqpoint{-\wg@tmpa}{\wg@tmpb}}{%
      \pgfqpoint{-\wg@tmpa}{\wg@tmpa}}}
  \def\n@to@pp@unknown@left{%
    \innernortheast \wg@tmpa=\pgf@x%
    \cntrlnortheast \wg@tmpb=\pgf@x%
    \pgfpathcurveto{%
      \pgfqpoint{-\wg@tmpb}{ \wg@tmpa}}{%
```

```
      \pgfqpoint{-\wg@tmpb}{-\wg@tmpa}}{%
      \pgfqpoint{-\wg@tmpa}{-\wg@tmpa}}}
  \def\n@to@pp@unknown@bottom{%
    \innernortheast \wg@tmpa=\pgf@x%
    \cntrlnortheast \wg@tmpb=\pgf@x%
    \pgfpathcurveto{%
      \pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}{%
      \pgfqpoint{ \wg@tmpa}{-\wg@tmpb}}{%
      \pgfqpoint{ \wg@tmpa}{-\wg@tmpa}}}
  \def\n@to@pp@unknown@right{%
    \innernortheast \wg@tmpa=\pgf@x%
    \cntrlnortheast \wg@tmpb=\pgf@x%
    \pgfpathcurveto{%
      \pgfqpoint{ \wg@tmpb}{-\wg@tmpa}}{%
      \pgfqpoint{ \wg@tmpb}{ \wg@tmpa}}{%
      \pgfqpoint{ \wg@tmpa}{ \wg@tmpa}}}
}
```

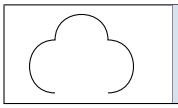


natoapp6c unknown land

The unknown land command

```
\pgfdeclareshape{natoapp6c unknown land}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\innernortheast{\pgf@x=.7\n@to@pp@r\pgf@y=.7\n@to@pp@r}
  \savedanchor\cntrlnortheast{\pgf@x=1.6\n@to@pp@r\pgf@y=1.6\n@to@pp@r}
  \savedanchor\northeast{\pgf@x=1.4\n@to@pp@r\pgf@y=1.4\n@to@pp@r}
  \anchor{inner north east}{\innernortheast}
  \anchor{inner north west}{\innernortheast\pgf@x=-\pgf@x}
  \anchor{inner south west}{\innernortheast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{inner south east}{\innernortheast\pgf@y=-\pgf@y}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{south east}{\northeast\pgf@y=-\pgf@y}
  \anchor{north}{\northeast\pgf@x=0cm}
  \anchor{east}{\northeast\pgf@y=0cm}
  \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
  \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
  \inheritanchor[from=natoapp6c base]{center}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \backgroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
    \n@to@pp@unknown@right %
```

```
    \n@to@pp@unknown@top   %
    \n@to@pp@unknown@left  %
    \n@to@pp@unknown@bottom%
  }
  \behindforegroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
    \n@to@pp@unknown@right %
    \n@to@pp@unknown@top   %
    \n@to@pp@unknown@left  %
    \n@to@pp@unknown@bottom%
    \pgfusepath{stroke}}
}
```

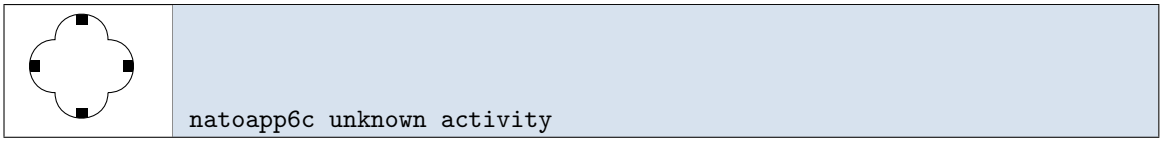


natoapp6c unknown air

The unknown air command. To consider: Should clipping path extend below the actual symbol to include that part of the base symbol?

```
\pgfdeclareshape{natoapp6c unknown air}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
  \inheritanchor[from=natoapp6c unknown land]{north east}
  \inheritanchor[from=natoapp6c unknown land]{north west}
  \inheritanchor[from=natoapp6c unknown land]{north}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \anchor{south}{\innernortheast\pgf@x=0cm\pgf@y=-\pgf@y}
  \anchor{south east}{
    \northeast\wg@tmpa=\pgf@x
    \innernortheast\pgf@y=-\pgf@y
    \pgf@x=\wg@tmpa}
  \anchor{south west}{
    \northeast\wg@tmpa=\pgf@x
    \innernortheast\pgf@y=-\pgf@y
    \pgf@x=-\wg@tmpa}
  \backgroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
    \n@to@pp@unknown@right %
```

```
    \n@to@pp@unknown@top   %
    \n@to@pp@unknown@left  %
    \ifn@to@pp@isclip
    \pgfpathlineto{\pgfqpoint{0cm}{-\radius}}
    \pgfpathclose
    \fi
  }
  \behindforegroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
    \n@to@pp@unknown@right %
    \n@to@pp@unknown@top   %
    \n@to@pp@unknown@left  %
    \pgfusepath{stroke}%
  }
}
```

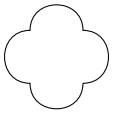


natoapp6c unknown activity

The unknown activity command. Similar to land command, but with boxes in the the 'corners'.

```
\pgfdeclareshape{natoapp6c unknown activity}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
  \inheritanchor[from=natoapp6c unknown land]{north east}
  \inheritanchor[from=natoapp6c unknown land]{north west}
  \inheritanchor[from=natoapp6c unknown land]{south east}
  \inheritanchor[from=natoapp6c unknown land]{south west}
  \inheritanchor[from=natoapp6c unknown land]{north}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{south}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \inheritbackgroundpath[from=natoapp6c unknown land]
  \behindforegroundpath{
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \begin{n@to@pp@stroketofill}
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
      \n@to@pp@unknown@right %
      \n@to@pp@unknown@top   %
```

```
      \n@to@pp@unknown@left  %
      \n@to@pp@unknown@bottom%
      \pgfusepath{stroke,clip}
      %
      \northeast\wg@tmpa\pgf@x
      \advance\wg@tmpa0.005cm
      \wg@tmpb=\wg@tmpa
      \advance\wg@tmpb-\n@to@pp@act@w
      \wg@tmpc=\n@to@pp@act@w
      \divide\wg@tmpc2
      %
      \pgfpathmoveto{\pgfqpoint{ \wg@tmpc}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{ \wg@tmpc}{\wg@tmpb}}%
      \pgfclosepath%
      \pgfusepath{fill}
      %
      \pgfpathmoveto{\pgfqpoint{ \wg@tmpc}{-\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{ \wg@tmpc}{-\wg@tmpa}}%
      \pgfclosepath%
      \pgfusepath{fill}
      %
      \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{ \wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{ \wg@tmpb}{ \wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{ \wg@tmpb}{-\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpc}}%
      \pgfclosepath%
      \pgfusepath{fill}
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpb}{ \wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{ \wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpb}{-\wg@tmpc}}%
      \pgfclosepath%
      \pgfusepath{fill}
    \end{n@to@pp@stroketofill}
  }
}
```

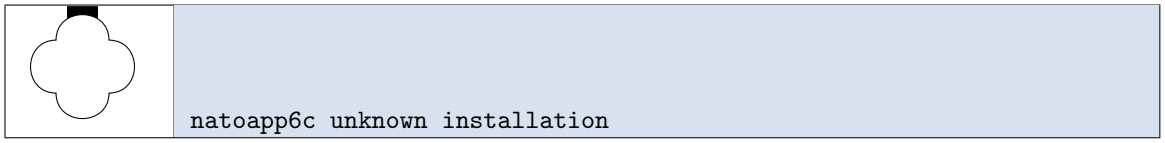


natoapp6c unknown equipment

The unknown equipment command. Same as land command.

```
\pgfdeclareshape{natoapp6c unknown equipment}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
```

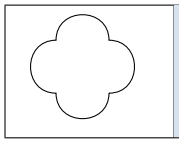
```
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
  \inheritanchor[from=natoapp6c unknown land]{north east}
  \inheritanchor[from=natoapp6c unknown land]{north west}
  \inheritanchor[from=natoapp6c unknown land]{south east}
  \inheritanchor[from=natoapp6c unknown land]{south west}
  \inheritanchor[from=natoapp6c unknown land]{north}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{south}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \inheritbackgroundpath[from=natoapp6c unknown land]
  \inheritbehindforegroundpath[from=natoapp6c unknown land]
}
```



The unknown installation command. Similar to land command, but with a ‘hat’ on top. Note, NATO App6(d) makes the ‘hat’ lower part disconnected from the main symbol. I find that ugly, so we do it like NATO App6(c).

```
\pgfdeclareshape{natoapp6c unknown installation}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{center}
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
  \inheritanchor[from=natoapp6c unknown land]{north east}
  \inheritanchor[from=natoapp6c unknown land]{north west}
  \inheritanchor[from=natoapp6c unknown land]{south east}
  \inheritanchor[from=natoapp6c unknown land]{south west}
  \inheritanchor[from=natoapp6c unknown land]{north}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{south}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \inheritbackgroundpath[from=natoapp6c unknown land]
  \behindforegroundpath{
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
```

```
17382
17383     \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
17384     \n@to@pp@unknown@right %
17385     \n@to@pp@unknown@top   %
17386     \n@to@pp@unknown@left  %
17387     \n@to@pp@unknown@bottom%
17388     \pgfusepath{stroke}
17389     %
17390     \begin{n@to@pp@stroketofill}
17391       \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpa}}%
17392       \n@to@pp@unknown@top   %
17393       %
17394       \northeast\wg@tmpb=\pgf@y\wg@tmpc=\pgf@y%
17395       \advance\wg@tmpb\n@to@pp@inst@h%
17396       \advance\wg@tmpb-0.05cm%
17397       \advance\wg@tmpc-\n@to@pp@inst@h%
17398       \advance\wg@tmpc-\n@to@pp@inst@h%
17399       %
17400       \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
17401       \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{\wg@tmpb}}%
17402       \pgfclosepath%
17403       \pgfusepath{clip}%
17404       %
17405       \pgfpathmoveto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpb}}%
17406       \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpb}}%
17407       \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpc}}%
17408       \pgfpathlineto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpc}}%
17409       \pgfclosepath%
17410       \pgfusepath{fill}%
17411     \end{n@to@pp@stroketofill}
17412   }
17413 }
```



natoapp6c unknown sea surface

The unknown sea surface command. Same as land command

```
17414 \pgfdeclareshape{natoapp6c unknown sea surface}{%
17415   \inheritsavedanchors[from=natoapp6c unknown land]
17416   \inheritanchor[from=natoapp6c unknown land]{inner north east}
17417   \inheritanchor[from=natoapp6c unknown land]{inner north west}
17418   \inheritanchor[from=natoapp6c unknown land]{inner south west}
17419   \inheritanchor[from=natoapp6c unknown land]{inner south east}
17420   \inheritanchor[from=natoapp6c unknown land]{north east}
17421   \inheritanchor[from=natoapp6c unknown land]{north west}
17422   \inheritanchor[from=natoapp6c unknown land]{south east}
17423   \inheritanchor[from=natoapp6c unknown land]{south west}
17424   \inheritanchor[from=natoapp6c unknown land]{north}
17425   \inheritanchor[from=natoapp6c unknown land]{west}
```

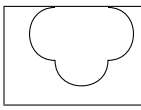
```
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{south}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \inheritbackgroundpath[from=natoapp6c unknown land]
  \inheritbehindforegroundpath[from=natoapp6c unknown land]
}
```

natoapp6c unknown space

The unknown space command. Similar to air command, but with a top bar.

```
\pgfdeclareshape{natoapp6c unknown space}{%
  \inheritsavedanchors[from=natoapp6c unknown air]
  \inheritanchor[from=natoapp6c unknown air]{inner north east}
  \inheritanchor[from=natoapp6c unknown air]{inner north west}
  \inheritanchor[from=natoapp6c unknown air]{inner south west}
  \inheritanchor[from=natoapp6c unknown air]{inner south east}
  \inheritanchor[from=natoapp6c unknown air]{north east}
  \inheritanchor[from=natoapp6c unknown air]{north west}
  \inheritanchor[from=natoapp6c unknown air]{south east}
  \inheritanchor[from=natoapp6c unknown air]{south west}
  \inheritanchor[from=natoapp6c unknown air]{north}
  \inheritanchor[from=natoapp6c unknown air]{west}
  \inheritanchor[from=natoapp6c unknown air]{east}
  \inheritanchor[from=natoapp6c unknown air]{south}
  \inheritanchor[from=natoapp6c unknown air]{upper}
  \inheritanchor[from=natoapp6c unknown air]{lower}
  \inheritanchor[from=natoapp6c unknown air]{left}
  \inheritanchor[from=natoapp6c unknown air]{right}
  \inheritanchor[from=natoapp6c unknown air]{center}
  \inheritbackgroundpath[from=natoapp6c unknown air]
  \behindforegroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \begin{n@to@pp@stroketofill}
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
      \n@to@pp@unknown@right %
      \n@to@pp@unknown@top   %
      \n@to@pp@unknown@left  %
      \pgfusepath{stroke,clip}%
      %
      \northeast\wg@tmpa=\pgf@y\wg@tmpb=\pgf@y
      \advance\wg@tmpb-\n@to@pp@space@h
      %
      \pgfpathmoveto{\pgfqpoint{ \radius}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\radius}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\radius}{\wg@tmpb}}%
```

```
      \pgfpathlineto{\pgfqpoint{ \radius}{\wg@tmpb}}%
      \pgfclosepath%
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```

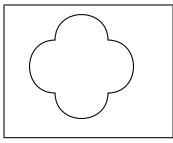


natoapp6c unknown sub surface

The unknown sub surface command.

```
\pgfdeclareshape{natoapp6c unknown sub surface}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
  \inheritanchor[from=natoapp6c unknown land]{south east}
  \inheritanchor[from=natoapp6c unknown land]{south west}
  \inheritanchor[from=natoapp6c unknown land]{south}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \anchor{north}{\innernortheast\pgf@x=0cm}
  \anchor{north east}{
    \northeast\wg@tmpa=\pgf@x
    \innernortheast\pgf@y=\pgf@y
    \pgf@x=\wg@tmpa}
  \anchor{north west}{
    \northeast\wg@tmpa=\pgf@x
    \innernortheast\pgf@y=\pgf@y
    \pgf@x=-\wg@tmpa}
  \backgroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpa}}%
    \n@to@pp@unknown@left %
    \n@to@pp@unknown@bottom   %
    \n@to@pp@unknown@right  %
    \ifn@to@pp@isclip
    \pgfpathlineto{\pgfqpoint{0cm}{\radius}}
    \pgfpathclose
    \fi
  }
  \behindforegroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
```

```
    \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpa}}%
    \n@to@pp@unknown@left %
    \n@to@pp@unknown@bottom   %
    \n@to@pp@unknown@right  %
    \pgfusepath{stroke}}
}
```



natoapp6c unknown dismounted

The unknown dismounted command. Same as land command.

```
\pgfdeclareshape{natoapp6c unknown dismounted}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
  \inheritanchor[from=natoapp6c unknown land]{north east}
  \inheritanchor[from=natoapp6c unknown land]{north west}
  \inheritanchor[from=natoapp6c unknown land]{south east}
  \inheritanchor[from=natoapp6c unknown land]{south west}
  \inheritanchor[from=natoapp6c unknown land]{north}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{south}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \inheritbackgroundpath[from=natoapp6c unknown land]
  \inheritbehindforegroundpath[from=natoapp6c unknown land]
}
```

5.6.11 Echelons

Dimensions

```
\def\n@to@pp@e@y{.12}
\def\n@to@pp@e@yy{.24}
```

Paths as macros

```
\def\n@to@pp@e@d#1{($(#1*\n@to@pp@e@y,0)$) circle(0.09)}
\def\n@to@pp@e@b#1{%
  ($(#1*\n@to@pp@e@y,-\n@to@pp@e@y)$) -- ($(#1*\n@to@pp@e@y,\n@to@pp@e@y)$)}
\def\n@to@pp@e@x#1{%
  ($(-\n@to@pp@e@y,-\n@to@pp@e@y)+(#1*\n@to@pp@e@y,0)$)--
  ++(\n@to@pp@e@yy,\n@to@pp@e@yy)
```

```
  ($(-\n@to@pp@e@y, \n@to@pp@e@y)+(#1*\n@to@pp@e@y,0)$)--
  ++(\n@to@pp@e@yy,-\n@to@pp@e@yy)}
```

Pictures

```
\tikzset{
  pics/natoapp6c/s/echelon/.is choice,
  pics/natoapp6c/s/echelon/squad/.style={code={
      \path[draw,fill=pgfstrokecolor,pic actions]
      \foreach \o in {0}{\n@to@pp@e@d{\o}};}},
  pics/natoapp6c/s/echelon/section/.style={code={
      \path[draw,fill=pgfstrokecolor,pic actions]
      \foreach \o in {-1,1}{\n@to@pp@e@d{\o}};}},
  pics/natoapp6c/s/echelon/platoon/.style={code={
      \path[draw,fill=pgfstrokecolor,pic actions]
      \foreach \o in {-2,0,2}{\n@to@pp@e@d{\o}};}},
  pics/natoapp6c/s/echelon/company/.style={code={
      \path[draw,pic actions]
      \foreach \o in {0}{\n@to@pp@e@b{\o}};}},
  pics/natoapp6c/s/echelon/battalion/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-1,1}{\n@to@pp@e@b{\o}};}},
  pics/natoapp6c/s/echelon/regiment/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-2,0,2}{\n@to@pp@e@b{\o}};}},
  pics/natoapp6c/s/echelon/brigade/.style={code={
      \path[draw,pic actions]
      \foreach \o in {0}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/division/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-1,1}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/corps/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-2,0,2}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/army/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-3,-1,1,3}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/army group/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-4,-2,0,2,4}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/theatre/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-5,-3,-1,1,3,5}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/command/.style={code={
      \path[draw,pic actions]
      (-.3,-.1) -- (-.3,.1) (-.4,  0) -- (-.2, 0)
      ( .3,-.1) -- ( .3,.1) ( .4,  0) -- ( .2, 0);}},
  pics/natoapp6c/s/echelon/dummy/.style={code={%
      \path[draw,pic actions] (M.north west) rectangle
      ($(M.north east)+(0,.1)$);}},
}
```

5.6.12 Text on symbols

```
/tikz/natoapp6c/normal text
/tikz/natoapp6c/squashed text
/tikz/natoapp6c/small text
/tikz/natoapp6c/small squashed text
```

NATO App6 does not specify any particular font for text symbols (main, modifiers, or amplifiers) but here we choose to use TEX Gyro Heros (a Gothic font, i.e., Helvetica-like).

```
\newcommand\n@to@ppfont[2][b]{%
  \fontencoding{T1}\fontfamily{qhv}\fontseries{#1}\fontsize{#2}{0}\selectfont}
\tikzset{%
  natoapp6c/text/.style={%
    shape=rectangle,%
    draw=none,%
    fill=none,%
    transform shape,%
    anchor=center},
  natoapp6c/normal text/.style={font=\n@to@ppfont{12}},
  natoapp6c/squashed text/.style={font=\n@to@ppfont[bc]{12}},
  natoapp6c/small text/.style={font=\n@to@ppfont{10}},
  natoapp6c/squashed small text/.style={font=\n@to@ppfont[bc]{10}},
}
```

```
\n@to@pp@text@normal
\n@to@pp@text@squashed
\n@to@pp@text@small
\n@to@pp@text@smallsquashed
```

These macros are short-hands for making a node at $(0, 0)$ in the local scope.

```
\newcommand\n@to@pp@text@normal[2][]  {%
  \node[natoapp6c/text,natoapp6c/normal text,#1]{#2}}
\newcommand\n@to@pp@text@squashed[2][]{%
  \node[natoapp6c/text,natoapp6c/squashed text,#1]{#2}}
\newcommand\n@to@pp@text@small[2][]   {%
  \node[natoapp6c/text,natoapp6c/small text,#1]{#2}}
\newcommand\n@to@pp@text@smallsquashed[2][]{%
  \node[natoapp6c/text,natoapp6c/squashed small text,#1]{#2}}
```

5.6.13 Text `natoapp6c` namespace

```
/natoapp6c
```

Here, we set up the key path `/natoapp6c`

```
\def\natoapp@report{}
\tikzset{
  /natoapp6c/.search also={/tikz},
  /natoapp6c/.cd,
```

```
}
```

Choices of faction, command, and echelon

`natoapp6c/id`
`natoapp6c/fac`
`natoapp6c/cmd`
`natoapp6c/ech`

The keys `id`, specfac, `cmd`, and `ech` are internal keys used to store the choice of faction, command, and echelon, respectively, in.

```
\tikzset{
  /natoapp6c/.cd,
  id/.store in=\natoapp@id,
  fac/.store in=\natoapp@fac,
  cmd/.store in=\natoapp@cmd,
  ech/.store in=\natoapp@ech,
  path/.store in=\n@to@ppp@th
}
```

`natoapp6c/faction`

Choice of ⟨*faction*⟩. This is limited to predefined values. The choice is stored in the key `natoapp6c/fac`.

```
\tikzset{
  /natoapp6c/.cd,
  faction/.is choice,
  faction/none/.code={\let\natoapp@fac\@undefined},
  faction/friendly/.style={fac=friendly},
  faction/friend/.style={fac=friendly},
  faction/hostile/.style={fac=hostile},
  faction/enemy/.style={fac=hostile},
  faction/neutral/.style={fac=neutral},
  faction/unknown/.style={fac=unknown},
  faction/?/.style={fac=unknown},
  faction/.initial=friendly,
}
```

`natoapp6c/command`

Choice of ⟨*command*⟩. This is limited to predefined values. The choice is stored in the key `natoapp6c/cmd`.

```
\tikzset{
  /natoapp6c/.cd,
  command/.is choice,
  command/base/.style={cmd=base},
  command/activity/.style={cmd=activity},
  command/air/.style={cmd=air},
  command/missile/.style={cmd=air},
  command/equipment/.style={cmd=equipment},
```

```
  command/installation/.style={cmd=installation},
  command/land/.style={cmd=land},
  command/sea surface/.style={cmd=sea surface},
  command/space/.style={cmd=space},
  command/sub surface/.style={cmd=sub surface},
  command/sea mine/.style={cmd=sub surface},
  command/dismounted/.style={cmd=dismounted},
  command/none/.style={cmd=none},
}
```

`natoapp6c/echolon`

Unit size. The choice is limited to one of the below. The choice is stored in the key `natoapp6c/ech`.

```
\tikzset{
  /natoapp6c/.cd,
  echelon/.is choice,
  echelon/none/.style={ech=},
  echelon/team/.style={ech=},
  echelon/squad/.style={ech=squad},
  echelon/section/.style={ech=section},
  echelon/platoon/.style={ech=platoon},
  echelon/company/.style={ech=company},
  echelon/battalion/.style={ech=battalion},
  echelon/regiment/.style={ech=regiment},
  echelon/brigade/.style={ech=brigade},
  echelon/division/.style={ech=division},
  echelon/corps/.style={ech=corps},
  echelon/army/.style={ech=army},
  echelon/army group/.style={ech=army group},
  echelon/theatre/.style={ech=theatre},
  echelon/command/.style={ech=command},
  echelon/dummy/.style={ech=dummy},
}
```

```
natoapp6c/main
natoapp6c/left
natoapp6c/right
natoapp6c/top
natoapp6c/bottom
natoapp6c/below
natoapp6c/frame
```

```
\natoapp@main
\natoapp@left
\natoapp@right
\natoapp@upper
\natoapp@lower
\natoapp@below
```

The various parts of the symbols. The keys `upper` and `lower` are aliases for `top` and `bottom`, respectively. The choices are stored in macros

```
\newif\ifnatoapp@decoy\natoapp@decoyfalse
\tikzset{
  /natoapp6c/.cd,
  main/.store in=\natoapp@main,   main/.initial=,%
  left/.store in=\natoapp@left,   left/.initial=,%
  right/.store in=\natoapp@right, right/.initial=,%
  upper/.store in=\natoapp@upper, upper/.initial=,%
  lower/.store in=\natoapp@lower, lower/.initial=,%
  top/.store in=\natoapp@upper,%
  bottom/.store in=\natoapp@lower,%
  below/.store in=\natoapp@below, below/.initial=,%
  frame/.store in=\natoapp@frame, frame/.initial=,%
  decoy/.is if=natoapp@decoy,%
}
```

`/tikz/natoapp6c/main`
`/tikz/natoapp6c/modifiers`
`/tikz/natoapp6c/lower`
`/tikz/natoapp6c/upper`
`/tikz/natoapp6c/left`
`/tikz/natoapp6c/right`
`/tikz/natoapp6c/echelon`
`/tikz/natoapp6c/below`

Styles used by the various parts of the symbol.

```
\tikzset{
  natoapp6c/parts/.style={
    scale line widths,
    draw,
    shape=rectangle,
    transform shape},
  natoapp6c/main/.style={natoapp6c/parts},
  natoapp6c/modifiers/.style={natoapp6c/parts,scale=.6},
  natoapp6c/lower/.style={natoapp6c/parts},
  natoapp6c/upper/.style={natoapp6c/parts},
  natoapp6c/left/.style={natoapp6c/parts},
  natoapp6c/right/.style={natoapp6c/parts},
  natoapp6c/echelon/.style={natoapp6c/parts},
  natoapp6c/below/.style={natoapp6c/parts}
}
```

5.6.14 The `natoapp6c` styles

`/tikz/natoapp6c`

This key sets up a node to make a NATO App6(c) symbol. The key takes a single argument which in turn must contain key–value pairs in the `/natoapp6c` (or `/tikz`) namespace(s). We set the `shape` parameter of the node, and

calls the passed keys in the /natoapp6c namespace to set-up elements of the chit.

```
\tikzset{%
  natoapp6c/.code={%
    \pgfkeys{/tikz/transform shape,/tikz/shape=natoapp6c}
    \pgfkeys{/natoapp6c/.cd,path=natoapp6c/s/,#1}}}
```

We define a counter to set-up unique names for symbol nodes.

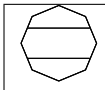
```
\newcounter{natoappid}\setcounter{natoappid}{0}
```

5.6.15 The \natoapp6c shape

```
\ifn@to@pp@below
\ifn@to@pp@mod
```

We define an \if to allow us to detect if something is rendered below the frame

```
\newif\ifn@to@pp@below\n@to@pp@belowfalse%
\newif\ifn@to@pp@mod\n@to@pp@modfalse%
```



natoapp6c

Next, we define the mother shape of NATO App6(c) nodes. This is a composite node with sub-nodes for the various parts (including the frame) of the symbol.

It is quite complex so we will go through the implementation in bits.

First, we make some saved anchors (the centre) and macros (identifier, frame type, and frame options).

```
% \def\wg@n@to@p@th{}
\pgfdeclareshape{natoapp6c}{%
  \savedanchor\center{\pgf@x=0cm\pgf@y=0cm}
  \savedmacro\id{%
    \n@to@pp@dbg{3}{NATO App6(c) id (set): \meaning\natoapp@id}
    \@ifundefined{natoapp@id}{\let\natoapp@id\pgfutil@empty}{}%
    \ifx\natoapp@id\pgfutil@empty\relax%
      \wg@r@ndom@id%
      \edef\id{natoapp6c\wg@uuid}%
    \else%
      \edef\id{\natoapp@id}%
    \fi%
    \n@to@pp@dbg{3}{NATO App6(c) id: \meaning\id}}
  \savedmacro\frameshape{%
    \let\frameshape\pgfutil@empty%
    \@ifundefined{natoapp@cmd}{\def\frameshape{base}}{%
      \edef\frameshape{\natoapp@cmd}
      \@ifundefined{natoapp@fac}{\def\frameshape{base}}{%
        \edef\frameshape{\natoapp@fac\space\frameshape}}}
    \n@to@pp@dbg{3}{NATO App6(c) frame shape: \meaning\frameshape}}
  \savedmacro\frameopt{%
```

```
    \let\frameopt\pgfutil@empty%
    \@ifundefined{natoapp@frame}{}{%
      \edef\frameopt{\natoapp@frame}}
    \n@to@pp@dbg{3}{NATO App6(c) Frame options: \meaning\frameopt}%
  }
  \savedmacro\thisname{\def\thisname{natoapp6c}}
```

Then we define a number of regular anchors

```
  \anchor{center}    {\center}
```

The remaining anchors depend on the shape being used. We reference the anchors of the embedded node of the frame.

```
  \anchor{north east}{\wg@sub@nchor{M\id}{north east}}
  \anchor{north west}{\wg@sub@nchor{M\id}{north west}}
  \anchor{south east}{\wg@sub@nchor{M\id}{south east}}
  \anchor{south west}{\wg@sub@nchor{M\id}{south west}}
  \anchor{north}     {\wg@sub@nchor{M\id}{north}}
  \anchor{west}      {\wg@sub@nchor{M\id}{west}}
  \anchor{south}     {\wg@sub@nchor{M\id}{south}}
  \anchor{east}      {\wg@sub@nchor{M\id}{east}}
  \anchor{upper}     {\wg@sub@nchor{M\id}{upper}}
  \anchor{lower}     {\wg@sub@nchor{M\id}{lower}}
  \anchor{left}      {\wg@sub@nchor{M\id}{left}}
  \anchor{right}     {\wg@sub@nchor{M\id}{right}}
```

The next two anchors are a little funny.

```
  \anchor{echelon}   {%
    \wg@sub@nchor{M}{north}%
    \wg@tmpa\pgflinewidth% by 1.5%
    %\wg@getscale%
    %\pgfmathparse{ifthenelse(\wg@scale>0.00001,\wg@tmpa/\wg@scale,\wg@tmpa)}
    %\edef\wg@a{\pgfmathresult}\pgfmathsetlength{\wg@tmpa}{\wg@a pt}
    %\n@to@pp@dbg{0}{Scale is `\wg@scale' -> `\the\wg@tmpa'}%
    %\divide\wg@tmpa by \wg@scale%
    \advance\wg@tmpa by\n@to@pp@e@y cm%
    \advance\pgf@y\wg@tmpa%
  }
  \anchor{below}     {%
    \n@to@pp@dbg{3}{NATO App6(c) get below anchor}%
    \wg@sub@nchor{M}{south}%
    \wg@tmpa=\n@to@pp@e@yy cm%
    \advance\wg@tmpa-\pgflinewidth% by 1.5%
    \advance\pgf@y-\wg@tmpa%
  }
```

All right, so time to make the actual frame. Note that we do this in a 'behind' path so we can actually draw stuff. First, we flag that we're not in a modifier, nor in the 'below' part.

```
  \behindbackgroundpath{%
    \wg@ignore@sub@nchortrue%
    \n@to@pp@dbg{3}{NATO App6(c) Before print}
    \n@to@pp@dbg{3}{NATO App6(c) background path: \meaning\id
      ^^J  ID:      \meaning\natoapp@id
```

```
      ^^J  Faction: \meaning\natoapp@fac
      ^^J  Command: \meaning\natoapp@cmd
      ^^J  Echelon: \meaning\natoapp@ech
      ^^J  Main:    \meaning\natoapp@main
      ^^J  Left:    \meaning\natoapp@left
      ^^J  Right:   \meaning\natoapp@right
      ^^J  Upper:   \meaning\natoapp@upper
      ^^J  Lower:   \meaning\natoapp@lower
      ^^J  Below:   \meaning\natoapp@below
      ^^J  Shape:   \meaning\frameshape
      ^^J  Options: \meaning\frameopt}
    \natoapp@report
    \n@to@pp@modfalse
    \n@to@pp@belowfalse
```

If the symbol is empty, then do nothing.

```
    \ifx\frameshape\pgfutil@empty%
    \n@to@pp@dbg{2}{NATO App6(c) has no frame!}
    \else
```

We start a scope because we want to do some clipping here. Then, we use the frame to clip the remaining part. Note that we do this via a node which we give the identifier `M`. Various elements of the symbol can then refer to this shape to define paths, etc.

```
    \begin{scope}
      \pgfinterruptboundingbox
      %% Clip to shape in scope
      %% \message{^^JClipping to NATO App6(c) shape}
      \n@to@pp@iscliptrue%
      \n@to@pp@dbg{1}{NATO App6(c) frame node M (clip)}
      \pgfnode{natoapp6c \frameshape}{center}{}{M}{\pgfusepath{clip}}
      \n@to@pp@isclipfalse%
```

Next, we should see if we need to fill the frame. We do that by expanding the passed `frame` key-values in a scope, and *then* get the fill colour.

```
      %% Start new scope including frame key options
      \edef\tmp@opt{[\frameopt]}
      \expandafter\scope\tmp@opt
      % Get fill color {possibly from frame key}
      \expandafter\let\expandafter\tmp@fill%
      \csname\string\color@pgffillcolor\endcsname%
```

If the fill colour is not `\relax`, then we fill the frame. Note that this is done in the background, so when we draw in the foreground we will render on top of the fill.

```
      % Check if we need to fill shape (fill colour us not \relax)
      \ifx\tmp@fill\relax\else%
      \n@to@pp@dbg{2}{NATO App6(c) frame fill}
      \pgfnode{natoapp6c \frameshape}{center}{}{}{\pgfusepath{fill}}%
      \fi%
      % End the fill scope
      \endscope%
```

Now we need to render some of the elements of the symbol. We start with the main elements. We can specify many main elements (to make composite symbols).

```
17824       % Render mains
17825       \@ifundefined{natoapp@main}{}{
17826         \n@to@pp@dbg{1}{NATO App6(c) mains: \meaning\natoapp@main}
17827         \begin{scope}[natoapp6c/main]
17828           \n@to@pp@dbg{1}{NATO symbol path `\n@to@ppp@th'}
17829           \wg@pic@all{\natoapp@main}{\n@to@ppp@th}{M.center}{natoapp6c/main}%
17830         \end{scope}}%
17831       % Modifiifiers flagged
```

The next thing is to render the various modifiers. We start by flagging this globally.

```
17832       \n@to@pp@modtrue
17833       \n@to@pp@dbg{2}{NATO App6(c) modifiers}
```

Below we render the lower, upper, left, and right elements. This is all done in the same way. Note that the elements positions are dictated by anchors of the frame shape (via shape identifier `M`).

```
17834       % Render lowers
17835       \@ifundefined{natoapp@lower}{}{%
17836         \begin{scope}%
17837           \wg@pic@all{\natoapp@lower}{natoapp6c/s/}{M.lower}{%
17838             natoapp6c/modifiers,natoapp6c/lower}%
17839         \end{scope}}%
17840       % Render uppers
17841       \@ifundefined{natoapp@upper}{}{%
17842         \begin{scope}[]
17843           \wg@pic@all{\natoapp@upper}{natoapp6c/s/}{M.upper}{%
17844             natoapp6c/modifiers,natoapp6c/upper}%
17845         \end{scope}}%
17846       % Render lefts
17847       \@ifundefined{natoapp@left}{}{%
17848         \begin{scope}[]
17849           \wg@pic@all{\natoapp@left}{natoapp6c/s/}{M.left}{%
17850             natoapp6c/modifiers,natoapp6c/left}%
17851         \end{scope}}%
17852       % Render rights
17853       \@ifundefined{natoapp@right}{}{%
17854         \begin{scope}[]
17855           \wg@pic@all{\natoapp@right}{natoapp6c/s/}{M.right}{%
17856             natoapp6c/modifiers,natoapp6c/right}%
17857         \end{scope}}%
17858       % Modifiifiers end
17859       \n@to@pp@modfalse%
17860       \endpgfinterruptboundingbox
17861     \end{scope}%
17862     \fi%
17863     \wg@ignore@sub@nchorfalse%
17864   }
```

That concludes rendering most of the symbol. We have not put in the echelon, below element, or drawn the frame yet. That we will do on the foreground path.

In the foreground ‘behind’ path we render the echelon, below element, and draw the frame.

```
\behindforegroundpath{%
  \wg@ignore@sub@nchortrue%
  \n@to@pp@dbg{2}{NATO App6(c) foreground path: ‘\meaning\id’
    ^^J  Echelon: \meaning\natoapp@ech
    ^^J  Symbol:  \meaning\frameshape
    ^^J  Below:   \meaning\natoapp@below
    ^^J  Frame:   \meaning\frameopt}
  %
  %
```

We check if we have a frame. If not, stop.

```
  \ifx\frameshape\pgfutil@empty%
    \n@to@pp@dbg{2}{NATO App6(c) has no frame shape!}%
  \else%
```

We want to draw the rest of the symbol as a part of the frame, so we expand the `frame` options in a scope.

```
    \edef\tmp@opt{[\frameopt]}
    \expandafter\scope\tmp@opt
```

First thing in this scope is to draw the actual frame. Again, this is done via a node with the right shape. Note that we label this node as `M`$\langle id \rangle$ so we way refer to it later on.

```
    \edef\mid{M\id{}}
    \n@to@pp@dbg{1}{NATO App6(c) inner node ‘M\id’ ===}
    \pgfnode{natoapp6c \frameshape}{center}{}{M\id}{\pgfusepath{stroke}}
    \wg@ignore@sub@nchorfalse%
```

If the user gave an echelon, then put that in. Note that echelons are limited to predefined values.

```
  % Put in the echelon
    \n@to@pp@dbg{2}{Echelon}
    \@ifundefined{natoapp@ech}{}{%
      \ifx\natoapp@ech\pgfutil@empty\else%
        \def\args{echelon=\natoapp@ech}
        \n@to@pp@dbg{3}{Make the echelon}%
        \wg@nchor{\thisname}{echelon}%
        \expandafter\wg@pic\args\@endwg@pic%
        {natoapp6c/s/}{\pgf@x,\pgf@y}{natoapp6c/echelon}
      \fi%
    }
```

If the user want something under the frame, put that in.

```
    % Put in stuff below main
    \n@to@pp@dbg{2}{Below}
    \@ifundefined{natoapp@below}{}{%
      \n@to@pp@belowtrue
      \begin{scope}
        \n@to@pp@dbg{3}{Make below}%
        \wg@nchor{\thisname}{below}%
        \wg@pic@all{\natoapp@below}{natoapp6c/s/}{\pgf@x,\pgf@y}{%
```

```
            natoapp6c/below}%
        \end{scope}%
        \n@to@pp@belowfalse}
```

If the `decoy` flag was set, we draw that.

```
      \n@to@pp@dbg{2}{Decoy}
      \ifnatoapp@decoy%
        \scope[dash pattern=on 3\pgflinewidth off 2\pgflinewidth]%
        \n@to@pp@dbg{1}{Drawing decoy modifier}%
        \wg@sub@nchor{M\id}{north east}
        \wg@tmpa=\pgf@x%
        \wg@tmpb=\pgf@y%
        \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
        \wg@tmpc=\n@to@pp@e@yy cm%
        \advance\wg@tmpc\n@to@pp@e@yy cm%
        \advance\wg@tmpc\wg@tmpb%
        \pgfpathlineto{\pgfqpoint{0cm}{\wg@tmpc}}%
        \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
        \pgfusepath{stroke}%
        \endscope%
      \fi%
      \endscope%
    \fi%
    \wg@ignore@sub@nchorfalse%
  }
}
```

That finished the shape for NATO App6(c) symbols. We could stop here, but for convenience we define a wrapper macro.

5.6.16 The `\natoapp` wrapper macro

`\natoapp`

This is a wrapper macro for inserting a node with a NATO App6(c) symbol in it. The syntax of the macro is

`\natoapp[`⟨*natoapp6c options*⟩`](`⟨*position*⟩`)(`⟨*identifier*⟩`);`

Note that the trailing semi-colon (`;`) is optional.

This macro forwards to `\n@toapp`.

```
\newcommand\natoapp[1][]{%
  \n@to@pp@dbg{2}{NATO App6(c) macro -> `#1'}
  \tikzset{/natoapp6c/.cd,faction=friendly,command=land}%
  \@ifnextchar({\n@toapp{#1}}{\n@toapp{#1}(0,0)}%)
}
```

`\n@toapp`

This macro takes care to parse the location argument — if any. It forwards to `\n@to@pp`.

```
\def\n@toapp#1(#2){%
  \n@to@pp@dbg{2}{NATO App6(c) second macro -> ‘#1’, ‘#2’}
  \@ifnextchar({\n@to@pp{#1}{#2}}{\n@to@pp{#1}{#2}()}%)
}
```

`\n@to@pp`

This is the main work-horse of the wrapper. It makes a node with the shape `natoapp6c` passing the relevant parameters. The syntax of the macro is

```
\def\n@to@pp#1#2(#3){%
  \node[draw,transform shape,natoapp6c={#1}] (#3) at (#2) {};%
  \@ifnextchar;{\@gobble}{}}
```

5.6.17 Kriegspiel-like symbols

Style that selects Kriegspiel-like symbols by setting the symbols picture path.

```
\tikzset{
  kriegspiel symbol/.code={
    \pgfkeys{%
      /tikz/transform shape,%
      /tikz/shape=kriegspiel symbol}
    \n@to@pp@dbg{10}{Args for symbol ‘#1’}
    \pgfkeys{/natoapp6c/.cd,%
      path=kriegspiel/s/,%
      #1}
  }
}
```

Shape of Kriegspiel-like symbols (always the same). This mainly inherits from the NATO shape. This hard-codes the frame shape to be `kriegspiel` (shape `natoapp6c kriegspiel`).

```
\pgfdeclareshape{kriegspiel symbol}{
  \inheritsavedanchors[from=natoapp6c]
  \savedmacro\frameshape{%
    \def\frameshape{kriegspiel}}
  \inheritanchor[from=natoapp6c]{center}
  \inheritanchor[from=natoapp6c]{north east}
  \inheritanchor[from=natoapp6c]{north west}
  \inheritanchor[from=natoapp6c]{south east}
  \inheritanchor[from=natoapp6c]{south west}
  \inheritanchor[from=natoapp6c]{north}
  \inheritanchor[from=natoapp6c]{west}
  \inheritanchor[from=natoapp6c]{south}
  \inheritanchor[from=natoapp6c]{east}
  \inheritanchor[from=natoapp6c]{upper}
  \inheritanchor[from=natoapp6c]{lower}
  \inheritanchor[from=natoapp6c]{left}
  \inheritanchor[from=natoapp6c]{right}
  \anchor{echelon}   {%
    \wg@sub@nchor{M\id}{north west}%
```

```
    \wg@tmpa=\n@to@pp@e@y cm%
    \divide\wg@tmpa by 2%
    \advance\pgf@y\wg@tmpa%
  }%
  \inheritbackgroundpath[from=natoapp6c]
  \inheritbehindforegroundpath[from=natoapp6c]
  \inheritbehindbackgroundpath[from=natoapp6c]
  \savedmacro\thisname{\def\thisname{kriegspiel symbol}}
}
```

The shape of a Kriegspiel-like frame. Always the same. This never draws the background path.

```
\pgfdeclareshape{natoapp6c kriegspiel}{
  \inheritsavedanchors[from=rectangle]
  \inheritbackgroundpath[from=rectangle]
  \savedanchor\northeast{\pgf@x=1.4cm\pgf@y=.3125cm}
  \savedanchor\southwest{\pgf@x=-1.4cm\pgf@y=-.3125cm}
  \inheritanchor[from=rectangle]{center}
  \inheritanchor[from=rectangle]{north east}
  \inheritanchor[from=rectangle]{north west}
  \inheritanchor[from=rectangle]{south east}
  \inheritanchor[from=rectangle]{south west}
  \inheritanchor[from=rectangle]{north}
  \inheritanchor[from=rectangle]{west}
  \inheritanchor[from=rectangle]{south}
  \inheritanchor[from=rectangle]{east}
  \backgroundpath{}
}
```

Now some symbols. We do not define a whole lot, since we do not need that for Kriegspiel-like counters.

```
\tikzset{
  ks debug frame/.style={
    draw=none,
    %draw=magenta,
    %dashed,
  },
  kriegspiel/s/infantry/.pic={
    \coordinate(a) at (M.south west);
    \coordinate(b) at ($(M.north east)+(0,-.2)$);
    \@ifundefinedcolor{pgffillcolor}{}{
      \path[fill=pgffillcolor](a)rectangle(b);}
    \path[pic actions,fill=none](a)rectangle(b);
    \path[pic actions,fill=none](a)--(b);
    \path[pic actions,fill=none] let
    \p1=(a),\p2=(b) in (\x2,\y1)--(\x1,\y2);
    \path[fill=pgfstrokecolor] let
    \p2=(b) in (-.05,\y2)rectangle++(.1,.2);
    \draw[ks debug frame](M.south west)rectangle(M.north east);
  },
  kriegspiel/s/reconnaissance/.pic={
    \coordinate(a) at (M.south west);
    \coordinate(b) at ($(M.north east)+(0,-.2)$);
    \@ifundefinedcolor{pgffillcolor}{}{
```

```
      \path[fill=pgffillcolor](a)rectangle(b);}
    \path[pic actions,fill=none](a)rectangle(b);
    \path[fill=pgfstrokecolor] (a)--(b)--(a|-b)--cycle;
    \path[fill=pgfstrokecolor] let
    \p2=(b) in
    (-.05,\y2)--++(0,.2)--++(-10:.4)--++(-170:.3)--(.05,\y2)--cycle;
    \draw[ks debug frame](M.south west)rectangle(M.north east);
  },
  kriegspiel/s/artillery/.pic={
    \coordinate(a) at (M.south west);
    \coordinate(b) at ($(M.north east)+(0,-.5)$);
    \@ifundefinedcolor{pgffillcolor}{}{
      \path[fill=pgffillcolor](a)rectangle(b);}
    \path[pic actions,fill=none](a)rectangle(b);
    \foreach \s in {-.8,0,.8}{
      \path[fill=pgfstrokecolor] let
      \p2=(b),%
      \n1={\y2+\pgflinewidth} in
      (\s-.04,\y2)rectangle++( .08,.5)
      ($(\s-.18,\n1)+(0,.05)$)rectangle++( .08,.2)
      ($(\s+.18,\n1)+(0,.05)$)rectangle++(-.08,.2);
    }
    \draw[ks debug frame](M.south west)rectangle(M.north east);
  },
  kriegspiel/s/reconnaissance artillery/.pic={
    \coordinate(a) at (M.south west);
    \coordinate(b) at ($(M.north east)+(0,-.5)$);
    \@ifundefinedcolor{pgffillcolor}{}{
      \path[fill=pgffillcolor](a)rectangle(b);}
    \path[pic actions,fill=none](a)rectangle(b);
    \path[fill=pgfstrokecolor] (a)--(b)--(a|-b)--cycle;
    \foreach \s in {-.8,0,.8}{
      \path[fill=pgfstrokecolor] let
      \p2=(b),%
      \n1={\y2+\pgflinewidth} in
      (\s-.04,\y2)rectangle++( .08,.5)
      ($(\s-.18,\n1)+(0,.05)$)rectangle++( .08,.2)
      ($(\s+.18,\n1)+(0,.05)$)rectangle++(-.08,.2);
    }
    \draw[ks debug frame](M.south west)rectangle(M.north east);
  }
}
```

5.6.18 Macros for markings

`\natoappmark`

A macro for making NATO App6(c) markings.

```
\providecommand\natoappmark[2][]{%
  \tikz[transform shape,
  scale=.25,
```

```
  baseline=(natoapp6c mark.south east),
  natoapp6c mark/.try,
  #1]{%1
    \node[draw,transform
    shape,natoapp6c={faction=friendly,command=land,
      main=#2}] (natoapp6c mark){}}}
% \natoapp[faction=friendly,command=land,main=#2](0,0)(natoapp6c mark)}}
```

`\echelonmark`

```
\providecommand\echelonmark[2][]{\tikz[transform shape,scale=.5,#1]{%
    \pic[scale line widths,line width=1pt] {natoapp6c/s/echelon=#2};}}
```

Some specific NATO App6(c) markers.

```
\DeclareRobustCommand\armouredmark[1][]{\natoappmark[#1]{armoured}}
\DeclareRobustCommand\infantrymark[1][]{\natoappmark[#1]{infantry}}
\DeclareRobustCommand\artillerymark[1][]{%
  \natoappmark[#1]{{[fill=pgfstrokecolor]artillery}}}
\DeclareRobustCommand\combinedmark[1][]{\natoappmark[#1]{combined arms}}
\DeclareRobustCommand\pgmark[1][]      {\natoappmark[#1]{{armoured,infantry}}}
\DeclareRobustCommand\reconnaissancemark[1][]{\natoappmark[#1]{reconnaissance}}
\DeclareRobustCommand\corpsmark[1][]{\natoappmark[#1]{,echelon=corps}}
\DeclareRobustCommand\divisionmark[1][]{\natoappmark[#1]{,echelon=division}}
\DeclareRobustCommand\brigademark[1][] {\natoappmark[#1]{,echelon=brigade}}
\DeclareRobustCommand\regimentmark[1][]{\natoappmark[#1]{,echelon=regiment}}
\DeclareRobustCommand\sofmark[1][]     {\natoappmark[#1]{{infantry,text=SOF}}}
\DeclareRobustCommand\mountaineermark[1][]{%
  \natoappmark[#1]{infantry,lower=mountain}}
\DeclareRobustCommand\airbornemark[1][]{%
  \natoappmark[#1]{infantry,lower=airborne}}
\DeclareRobustCommand\amphibiousmark[1][]{\natoappmark[#1]{,lower=amphibious}}
\DeclareRobustCommand\airassaultmark[1][]{%
  \natoappmark[#1]{infantry,upper=air assault}}
```

5.6.19 Utility macros used in the symbols

Here, we define the main symbols used when making markers. Since some of these symbols share code, we will create some regular TEX macros to hold the path definitions. This is by far the simplest way of storing just the path specifications.

`\testpath`

```
\def\testpath#1{\csname n@toapp@#1\endcsname}
```

Corps support for `friendly`, `hostile`, `neutral`, and `unknown` factions.

\n@toapp@corps@sup@friendly
\n@toapp@corps@sup@hostile
\n@toapp@corps@sup@neutral
\n@toapp@corps@sup@unknown

```
\def\n@toapp@corps@sup@friendly{(.75,.5)--(.5,0)--(.75,-.5)}
% (M.north east)--(M.east-.25,0)--(M.south east)}
\def\n@toapp@corps@sup@hostile{(.95,.5)--(.45,0)--(.95,-.5)}
\def\n@toapp@corps@sup@neutral{(.5,.5)--(.35,0)--(.5,-.5)}
\def\n@toapp@corps@sup@unknown{(.75,.5)--(.5,0)--(.75,-.5)}
```

Corps support, base

\n@toapp@corps@support

```
\def\n@toapp@corps@support#1{
  \ifx\n@to@pp@friendly#1\n@toapp@corps@sup@friendly%
  \else\ifx\n@to@pp@hostile#1\n@toapp@corps@sup@hostile%
  \else\ifx\n@to@pp@neutral#1\n@toapp@corps@sup@neutral%
  \else\ifx\n@to@pp@unknown#1\n@toapp@corps@sup@unknown%
  \fi\fi\fi\fi}
```

natoapp6c/s/TBD

Special placeholder for symbols To Be Done.

```
\tikzset{
  natoapp6c/s/TBD/.pic={\n@to@pp@text@normal{\color{magenta}TBD};}
}
```

5.6.20 Symbols used when defining weaponry

natoapp6c/s/weapon

```
\tikzset{
  pics/natoapp6c/s/weapon/.is choice,
  pics/natoapp6c/s/weapon/base/.style={
    code={\path [pic actions] (0,-0.2)--(0,.2);}},
  pics/natoapp6c/s/weapon/top/.style={
    code={\path [pic actions] (0,.2)--(0,.35);}},
  pics/natoapp6c/s/weapon/bottom/.style={
    code={\path [pic actions] (0,.-.35)--(0,-.2);}},
  pics/natoapp6c/s/weapon/rifle/.style={
    code={\path [pic actions] (0.2, 0.1)--(0, 0.35)--(-0.2,0.1);}},
  pics/natoapp6c/s/weapon/machine gun/.style={
    code={\path [pic actions] (0.2, -0.35)--(-0.2, -0.35);}},
  pics/natoapp6c/s/weapon/grenade launcher/.style={
    code={\path [pic actions] (0,0) circle (0.1);}},
  pics/natoapp6c/s/weapon/missile launcher/.style={
```

```
    code={%
      \path [pic actions] (0.2, 0.15)
      to[out=90,in=90,looseness=1.75] (-0.2, 0.15);}},
  pics/natoapp6c/s/weapon/non lethal/.style={
    code={\path [pic actions] (-.2,.35) -- (.2,.35);}},
  pics/natoapp6c/s/weapon/multi fire/.style={
    code={\path[pic actions] (.2,-.2)--(.2, .2) (-.2,-.2)--(-.2,0.2);}},
  pics/natoapp6c/s/weapon/air defence/.style={
    code={%
      \path[pic actions] (0.2, -0.4)
      to[out=90,in=90,looseness=1.7] (-0.2, -0.4) -- cycle;}},
  pics/natoapp6c/s/weapon/anti tank/.style={
    code={\path[pic actions]  (0.2, -0.4)--(0,-0.2)--(-0.2,-0.4);}},
  pics/natoapp6c/s/weapon/full/.style={
    code={%
      \pic[draw]{natoapp6c/s/weapon=base};
      \pic[draw]{natoapp6c/s/weapon=top};
      \pic[draw]{natoapp6c/s/weapon=bottom};}},
  pics/natoapp6c/s/weapon/.default=full
}
```

natoapp6c/s/type

(Weight) class of weapons: light, medium, heavy

```
\tikzset{
  pics/natoapp6c/s/type/.is choice,
  pics/natoapp6c/s/type/light/.style={
    code={\path [fill=pgfstrokecolor,pic actions] (-0.2, -0.12) rectangle (.2,-.08);}},
  pics/natoapp6c/s/type/medium/.style={
    code={
      \path [fill=pgfstrokecolor,pic actions]
      (-0.2, -0.12) rectangle (.2,-.08)
      (-0.2, -0.22) rectangle (.2,-.18);}},
  pics/natoapp6c/s/type/heavy/.style={
    code={
      \path [fill=pgfstrokecolor,pic actions]
      (-0.2, -0.12) rectangle (.2,-.08)
      (-0.2, -0.22) rectangle (.2,-.18)
      (-0.2, -0.32) rectangle (.2,-.28);}},
  pics/natoapp6c/s/type/vlight/.style={
    code={\path [fill=pgfstrokecolor,pic actions]
      (-.025,-0.2) rectangle (.025,.2);}},
  pics/natoapp6c/s/type/vmedium/.style={
    code={\path [fill=pgfstrokecolor,pic actions]
      (-.075,-0.2) rectangle (-.025,.2)
      ( .025, -0.2) rectangle (.075,.2);}},
  pics/natoapp6c/s/type/vheavy/.style={
    code={\path [fill=pgfstrokecolor,pic actions]
      (-.125,-0.2) rectangle (-.075,.2)
      (-.025,-0.2) rectangle ( .025,.2)
      ( .075,-0.2) rectangle ( .125,.2);}},
```

```
  pics/natoapp6c/s/type/.default=light,
}
```

5.6.21 The symbols

Next, we define all the symbols. Note that we define them all as if they are in the `main` section of the symbol, since `top`, `bottom`, and `below` symbols are automatically scaled.

natoapp6c/s/above corps support

```
\tikzset{%
  natoapp6c/s/above corps support/.pic={%
    \edef\n@toapp@path{\n@toapp@corps@support{\natoapp@fac}}
    \expandafter\path[draw] \n@toapp@path;
    \expandafter\path[draw,xscale=-1] \n@toapp@path;},
}
```

natoapp6c/s/air assault with organic lift

```
\tikzset{%
  natoapp6c/s/air assault with organic lift/.pic={%
    \ifx\n@to@pp@hostile\natoapp@fac%
    \def\n@toapp@path{(-.75,-.2)--(-.15,-.2)--(0,-.5)--(.15,-.2)--(.75,-.2)}
    \else
    \def\n@toapp@path{(-.75,-.2)--(-.1,-.2)--(0,-.325)--(.1,-.2)--(.75,-.2)}
    \fi
    \path[draw] \n@toapp@path;},
}
```

natoapp6c/s/air decoy

```
\tikzset{%
  natoapp6c/s/air decoy/.pic={%
    \pic[pic actions]{natoapp6c/s/decoy};
    \path[fill=pgfstrokecolor,pic actions] (0.4, -0.2) rectangle (-0.4, -0.15);},
}
```

natoapp6c/s/air assault

```
\tikzset{%
  natoapp6c/s/air assault/.pic={%
    \path[draw] ([shift={(150:.4)}]0,-.1)--(0,-.1)--([shift={(30:.4)}]0,-.1);},
}
```

natoapp6c/s/air defence

```
\tikzset{%
  natoapp6c/s/air defence/.pic={%
    \ifx\natoapp@fac\n@to@pp@friendly%
    \def\n@toapp@opt{[out=90,in=90,looseness=.675]}%
    \else\ifx\natoapp@fac\n@to@pp@neutral%
    \def\n@toapp@opt{[out=90,in=90,looseness=1]}%
    \else%
    \def\n@toapp@opt{[out=45,in=135,looseness=1.5]}%
    \fi\fi%
    \edef\n@toapp@path{(M.south west) to\n@toapp@opt (M.south east)}
    \path[draw] \n@toapp@path;},
}
```

natoapp6c/s/air strip

```
\tikzset{%
  natoapp6c/s/air strip/.pic={%
    \path[fill=pgfstrokecolor] (-.4,-.1) rectangle(.4,0);
    \path[rotate=45,fill=pgfstrokecolor] (-.4,0) rectangle (.4,.1);
  }
}
```

natoapp6c/s/air traffic

```
\tikzset{%
  natoapp6c/s/air traffic/.pic={
    \path[fill=pgfstrokecolor]
    (0.33,0.21)--
    (0.33, -0.21)--
    (-0.33, 0.21)--
    (-0.33,-0.21)--
    cycle;},
}
```

natoapp6c/s/airship

```
\tikzset{%
  natoapp6c/s/airship/.pic={%
    % \path (0.45, 0.175) rectangle (-0.45, -0.175);
    \path[pic actions] (0, 0) ellipse (0.45 and 0.15);
    \begin{scope}
      \clip (0, 0) ellipse (0.45 and 0.15) [reverseclip];
      \path[pic actions]
      (0.2,0)--(0.3,0.175)--(0.4,0.175)--(0.375,0)
      --(0.4,-0.175)--(0.3, -0.175)--cycle;
```

```
    \end{scope}},
}
```

natoapp6c/s/airborne

```
\tikzset{%
  natoapp6c/s/airborne/.pic={%
    \ifx\n@to@pp@neutral\natoapp@fac%
      \draw (0,-0.05) arc(0:180:0.15);
      \draw (0,-0.05) arc(180:0:0.15);
    \else%
      \draw (0,-0.05) arc(0:180:0.2);
      \draw (0,-0.05) arc(180:0:0.2);
    \fi},
}
```

natoapp6c/s/ammunition

```
\tikzset{%
  natoapp6c/s/ammunition/.pic={\path[draw]
    (0.175,-0.175)--(-0.175,-0.175)
    (0.125,-0.175)--(0.125, 0) to[out=90,in=90,looseness=2.75]
    (-0.125, 0)--(-0.125, -0.175);},
}
```

natoapp6c/s/amphibious

```
\tikzset{%
  natoapp6c/s/amphibious/.pic={
    \def\n@to@pp@tmp{0}
    \ifn@to@pp@below\def\n@to@pp@tmp{-.1}\fi
    \ifn@to@pp@mod
    \path[draw,shift={(0,\n@to@pp@tmp)}](1.21,0)
    to[out=-90,in=-90, looseness=2.25]  (1.05, 0)
    to[out= 90,in= 90, looseness=2.25]  (0.89, 0)
    to[out=-90,in=-90, looseness=2.25]  (0.73, 0)
    to[out= 90,in= 90, looseness=2.25]  (0.57, 0)
    to[out=-90,in=-90, looseness=2.25]  (0.41, 0)
    to[out= 90,in= 90, looseness=2.25]  (0.25, 0)
    to[out=-90,in=-90, looseness=2.25]  (0.08, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.08, 0)
    to[out=-90,in=-90, looseness=2.25] (-0.25, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.41, 0)
    to[out=-90,in=-90, looseness=2.25] (-0.57, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.73, 0)
    to[out=-90,in=-90, looseness=2.25] (-0.89, 0)
    to[out= 90,in= 90, looseness=2.25] (-1.05, 0)
    to[out=-90,in=-90, looseness=2.25] (-1.21, 0)
```

```
    \else
    \path[draw,shift={(0,\n@to@pp@tmp)}](0.73, 0)
    to[out= 90,in= 90, looseness=2.25]  (0.57, 0)
    to[out=-90,in=-90, looseness=2.25]  (0.41, 0)
    to[out= 90,in= 90, looseness=2.25]  (0.25, 0)
    to[out=-90,in=-90, looseness=2.25]  (0.08, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.08, 0)
    to[out=-90,in=-90, looseness=2.25] (-0.25, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.41, 0)
    to[out=-90,in=-90, looseness=2.25] (-0.57, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.73, 0)
    \fi
    ;
  },
}
```

natoapp6c/s/amphibious warfare ship

```
\tikzset{%
  natoapp6c/s/amphibious warfare ship/.pic={
    \pic{natoapp6c/s/warfare vessel};
    \path[draw,fill=pgfstrokecolor]
    (0.15, 0.05) --
    (0.15, 0.2) --
    (-0.15, 0.2) --
    (-0.15, 0.05) -- cycle
    (0, -0.2) rectangle (0.25, -0.175);},
}
```

natoapp6c/s/analysis

```
\tikzset{%
  natoapp6c/s/analysis/.pic={
    \path[pic actions]
      (-0.3,-0.2)--(0.3,-0.2)--(0, -0.4)--cycle (0,-0.2)--(0,0.4);},
}
```

natoapp6c/s/arrest

```
\tikzset{%
  natoapp6c/s/arrest/.pic={
    \path[pic actions] circle(0.2);
    \pic[scale=.8]{natoapp6c/s/individual};},
}
```

natoapp6c/s/artillery

```
\tikzset{%
  natoapp6c/s/artillery/.pic={
    \path[pic actions] circle(0.2);},
}
```

natoapp6c/s/anti tank anti armour

```
\tikzset{%
  natoapp6c/s/anti tank anti armour/.pic={%
    \ifx\natoapp@fac\n@to@pp@unknown%
    \path[draw,pic actions] (225:.5)--(M.north)--(315:.5);
    \else%
    \path[draw,pic actions] (M.south west)--(M.north)--(M.south east);%
    \fi},
}
```

natoapp6c/s/antenna

```
\tikzset{%
  natoapp6c/s/antenna/.pic={\path[draw]
    (0, -0.3) -- (0, 0.3) (-0.125, 0.3) -- (0, 0.2) -- (0.125, 0.3);},
}
```

natoapp6c/s/armoured

```
\tikzset{%
  natoapp6c/s/armoured/.pic={\path[draw]
    (-0.275,0.2) arc(90:270:0.2)--(0.275, -0.2) arc(270:450:0.2)--cycle;},
}
```

natoapp6c/s/armoured fighting vehicle

```
\tikzset{%
  natoapp6c/s/armoured fighting vehicle/.pic={
    \path[fill=pgfstrokecolor] (-.4,-.2) rectangle (-.3,.2) (.3,-.2) rectangle (.4,.2);
    \path[pic actions] (-.3,0) -- (0,.2) -- (.3,0) -- (0,-.2) -- cycle;},
}
```

natoapp6c/s/armoured personnel carrier

```
\tikzset{%
```

```
  natoapp6c/s/armoured personnel carrier/.pic={
    \pic[sub pic actions,draw]{natoapp6c/s/vehicle};
    \path[pic actions] (.35,.15)--(0,.3)--(-.35,.15);},
}
```

natoapp6c/s/arctic

```
\tikzset{%
  natoapp6c/s/arctic/.pic={
    \draw (-0.325,0.135) arc(180:270:0.075 and 0.15) --
       +(0.5, 0) arc(-90:0:0.075 and 0.15);},
}
```

natoapp6c/s/automobile

```
\tikzset{%
  natoapp6c/s/automobile/.pic={
    \begin{scope}
      \clip (0.2,-0.15) circle(0.05) (-0.2,-0.15) circle(0.05) [reverseclip];
      \path[pic actions]
      (0.3,   -0.15)  --
      (-0.3,  -0.15)  --
      (-0.3,   0.025) --
      (-0.1,   0.025) --
      (-0.1,   0.2)   --
      ( 0.1,   0.2)   --
      ( 0.1,   0.025) --
      ( 0.3,   0.025) -- cycle
      ( 0.075, 0.025) rectangle (-0.075, 0.175);
    \end{scope}
    \path[pic actions]
    ( 0.2, -0.15) circle (0.05)
    (-0.2, -0.15) circle (0.05);
  },
}
```

natoapp6c/s/balloon

```
\tikzset{%
 natoapp6c/s/balloon/.pic={%
    \path[pic actions] (0, 0.025) circle (0.175);
    \begin{scope}
      \clip (0, 0.025) circle (0.175) [reverseclip];
      \path[pic actions] (-0.05,0) rectangle (0.05,-0.2)--(0.05,0);
    \end{scope}},
}
```

natoapp6c/s/bar

```
\tikzset{
  natoapp6c/s/bar/.pic={
    \path[fill=pgfstrokecolor] (-.3,-.1) rectangle (.3,.1);},
}
```

natoapp6c/s/base

```
\tikzset{
  natoapp6c/s/base/.pic={
    \path[pic actions] circle(.2);
    \path[pic actions]
    (-.2,0)   -- (.2,0)
    (  0,-.2) -- (0 ,.2)
    (225:.2) -- (45:.2)
    (135:.2) -- (-45:.2);
  }
}
```

natoapp6c/s/bicycle equipped

```
\tikzset{%
  natoapp6c/s/bicycle equipped/.pic={\draw(0,0) circle(.1);},
}
```

natoapp6c/s/boat

```
\tikzset{%
  natoapp6c/s/boat/.pic={
    \path[pic actions]
    (-0.2,  -0.2)  --
    ( 0.2,  -0.2)  --
    ( 0.35,  0.05) --
    (-0.15,  0.05) --
    (-0.075, 0.2)  --
    (-0.175, 0.2)  --
    (-0.25,  0.05) --
    (-0.35,  0.05) --
    cycle;},
}
```

natoapp6c/s/booby trap

```
\tikzset{%
```

```
  natoapp6c/s/booby trap/.pic={
    \path[draw] (0, -0.2) ellipse(0.2 and 0.065);
    \begin{scope}
      \clip (0, -0.2) ellipse(0.2 and 0.065) [reverseclip];
      \path[draw] (-0.2, -0.2) -- (0, 0.2) -- (0.2, -0.2);
    \end{scope}},
}
```

natoapp6c/s/bottomed

```
\tikzset{%
  natoapp6c/s/bottomed/.pic={
    \path[draw,fill=pgfstrokecolor] (-0.33,.1) rectangle(0.33,.2);},
}
```

natoapp6c/s/bridge

```
\tikzset{%
  pics/natoapp6c/s/bridge/.is choice,
  pics/natoapp6c/s/bridge/none/.style={
    code={\path[pic actions]
      (0.35,-0.15)--(0.25,-0.05)--(-0.25,-0.05)--(-0.35,-0.15)
      (0.35, 0.15)--(0.25, 0.05)--(-0.25, 0.05)--(-0.35, 0.15);}},
  pics/natoapp6c/s/bridge/fixed/.style={
    code={\pic{natoapp6c/s/bridge};\pic{natoapp6c/s/type=vlight};}},
  pics/natoapp6c/s/bridge/folding/.style={
    code={\pic{natoapp6c/s/bridge=none};
      \path[draw] (.1,-.2) -- (-.1,-.2) -- (-.1,.2) -- (.1,.2);}},
  pics/natoapp6c/s/bridge/hollow/.style={
    code={\pic{natoapp6c/s/bridge=none};
      \path[draw] (.1,-.2) -- (-.1,-.2) -- (-.1,.2) -- (.1,.2) -- cycle;}},
  pics/natoapp6c/s/bridge/.default=none,
}
```

natoapp6c/s/capsule

```
\tikzset{%
  natoapp6c/s/capsule/.pic={
    \path[pic actions]
    ($(0.25, -0.2)!0.1!(0, 0.5)$) --
    ($(0.25, -0.2)!0.5!(0, 0.5)$) to[in=75, out=105, looseness=0.75]
    ($(0, 0.5)!0.5!(-0.25, -0.2)$) --
    ($(0, 0.5)!0.9!(-0.25, -0.2)$) to[in=285, out=255, looseness=0.55]
    cycle;},
}
```

natoapp6c/s/carrier

```
\tikzset{%
  natoapp6c/s/carrier/.pic={
    \pic{natoapp6c/s/warfare vessel};
    \path[draw,fill=pgfstrokecolor]
    (-0.15, 0.05) --
    (-0.15, 0.2)  --
    (-0.3,  0.2)  --
    (-0.3, 0.05)  -- cycle;},
}
```

natoapp6c/s/chemical biological radiological nuclear

```
\tikzset{%
  natoapp6c/s/chemical biological radiological nuclear/.pic={
    \path[draw,fill=pgfstrokecolor] (-0.29,0.1) circle(0.096) (0.29,0.1) circle(0.096);
    \path[pic actions]  (0.15,-0.2) arc(0:90:0.45 and 0.375)
    (-0.15,-0.2) arc(180:90:0.45 and 0.375);},
}
```

natoapp6c/s/civilian military cooperation

```
\tikzset{%
  natoapp6c/s/civilian military cooperation/.pic={%
    \path[draw] (.375,.2)--(-.375,.2)--(-.375,-.025)
    to[in=270, out=270, looseness=0.75] (.375,-.025)--cycle;},
}
```

natoapp6c/s/civilian police

```
\tikzset{%
  natoapp6c/s/civilian police/.pic={%
    \path[draw] (0.225, 0.2)
    to[in=270, out=270, looseness=3] (-0.225, 0.2)
    to [in=270, out=270, looseness=1.5] (0,0.2)
    to [in=270, out=270, looseness=1.5] (0.225, 0.2) -- cycle;},
}
```

natoapp6c/s/civilian telecommunications

```
\tikzset{%
  natoapp6c/s/civilian telecommunications/.pic={
    \path[draw] (0.075, -0.2){[line join=bevel] -- (0, 0.1) -- (-0.075, -0.2)}
       (0.065, -0.05) -- (-0.065, -0.05)
```

```
      (-0.325, 0.2) -- (-0.15, 0.125) -- (-0.15, 0.175) -- (0, 0.1) -- (0.15, 0.175) -- (0.15, 0.125) -- (0.3
  },
}
```

natoapp6c/s/coast guard vessel

```
\tikzset{%
  natoapp6c/s/coast guard vessel/.pic={%
    \pic[draw] {natoapp6c/s/ship};
    \path[pic actions] (0.15, 0.05) -- (0, -0.2) (0.2, 0.05)--(0.05, -0.2);},
}
```

natoapp6c/s/combat support

```
\tikzset{%
  natoapp6c/s/combat support/.pic={%
    \path[fill=pgfstrokecolor]
    (.15,.2)--(-.15,.2)--(-.15,-.05)--(0,-.2)--(.15,-.05) -- cycle;},
}
```

natoapp6c/s/combatant

```
\tikzset{%
  natoapp6c/s/combatant/.pic={%
    \begin{scope}[xshift=-4.5, yshift=-5]
      \path[pic actions]
      (0.3213,0.0534) .. controls (0.3186,0.0295)  and (0.3072,0.0136) ..
      (0.2925,0.0063) .. controls (0.2777,-0.0010) and (0.2605,0.0001) ..
      (0.2461,0.0068) .. controls (0.2317,0.0136)  and (0.2198,0.0265) ..
      (0.2163,0.0433) .. controls (0.2147,0.0513)  and (0.2150,0.0601) ..
      (0.2179,0.0694) .. controls (0.1304,0.1129)  and (0.0223,0.1961) ..
      (0.0013,0.3209) .. controls (0.0601,0.1809)  and (0.1770,0.0912) ..
      (0.3213,0.0534) -- cycle
      (0.2304,0.0633) .. controls (0.2287,0.0570)  and (0.2287,0.0513) ..
      (0.2298,0.0461) .. controls (0.2323,0.0340)  and (0.2409,0.0245) ..
      (0.2520,0.0193) .. controls (0.2630,0.0141)  and (0.2760,0.0135) ..
      (0.2864,0.0186) .. controls (0.2932,0.0220)  and (0.2992,0.0277) ..
      (0.3033,0.0370) .. controls (0.2845,0.0413)  and (0.2597,0.0498) ..
      (0.2304,0.0633) -- cycle
      (0.1785,0.1137) .. controls (0.2446,0.1612)  and (0.3061,0.2300) ..
      (0.3214,0.3209) .. controls (0.2864,0.2377)  and (0.2310,0.1723) ..
      (0.1614,0.1249)
      (0.1443,0.1138) .. controls (0.1011,0.0871)  and (0.0530,0.0670) ..
      (0.0014,0.0535) .. controls (0.0041,0.0295)  and (0.0154,0.0136) ..
      (0.0302,0.0063) .. controls (0.0449,-0.0010) and (0.0621,0.0001) ..
      (0.0765,0.0069) .. controls (0.0909,0.0137)  and (0.1028,0.0265) ..
      (0.1063,0.0433) .. controls (0.1079,0.0513)  and (0.1076,0.0602) ..
      (0.1047,0.0694) .. controls (0.1230,0.0785)  and (0.1422,0.0893) ..
```

```
      (0.1613,0.1019)
      (0.0928,0.0461) .. controls (0.0903,0.0340)  and (0.0816,0.0245) ..
      (0.0706,0.0193) .. controls (0.0596,0.0141)  and (0.0466,0.0135) ..
      (0.0362,0.0186) .. controls (0.0294,0.0220)  and (0.0234,0.0277) ..
      (0.0193,0.0370) .. controls (0.0381,0.0413)  and (0.0629,0.0498) ..
      (0.0921,0.0633) --
      (0.0921,0.0633) .. controls (0.0938,0.0570)  and (0.0938,0.0512) ..
      (0.0928,0.0461) -- cycle;
    \end{scope}
  },
}
```

natoapp6c/s/combined arms

```
\tikzset{%
  natoapp6c/s/combined arms/.pic={%
    \path[draw] pic {natoapp6c/s/armoured};
    \path[draw] (0.275, 0.2) -- (-0.275, -0.2) (0.275, -0.2) -- (-0.275, 0.2);},
}
```

natoapp6c/s/computer system

```
\tikzset{%
  natoapp6c/s/computer system/.pic={
    \path[draw,fill=pgfstrokecolor,pic actions]
    (-.3,  .28) rectangle ( .3,  .3)
    (-.3, -.18) rectangle ( .3, -.2)
    (-.3, -.18) rectangle (-.3,  .28)
    ( .3, -.18) rectangle ( .3,  .28)
    (-.3, -.3)  rectangle ( .3, -.28)
    (-.05,-.28) rectangle ( .05,-.18);},
}
```

natoapp6c/s/control

```
\tikzset{%
  natoapp6c/s/control/.pic={
    \path[pic actions]
    [{Stealth[inset=0pt,scale=0.5]}-{Stealth[inset=0pt,scale=0.5]}]
    (0, .2) -- (0, -.2);
    \path[pic actions]
    [{Stealth[inset=0pt,scale=0.5]}-{Stealth[inset=0pt,scale=0.5]}]
    (-.2, 0) -- (.2, 0);},
}
```

natoapp6c/s/convoy

```
\tikzset{%
  natoapp6c/s/convoy/.pic={
    \path[draw,fill=pgfstrokecolor]
    (0.35, 0.175) --
    (-0.35, 0.175) --
    (-0.35, -0.175) --
    (-0.2, -0.175) --
    (-0.2, 0.025) --
    (0.2, 0.025) --
    (0.2, -0.175) --
    (0.35, -0.175) -- cycle;},
}
```

natoapp6c/s/corps support

```
\tikzset{%
  natoapp6c/s/corps support/.pic={%
    \edef\n@toapp@path{\n@toapp@corps@support{\natoapp@fac}}
    \expandafter\path[draw] \n@toapp@path;},
}
```

natoapp6c/s/crime

```
\tikzset{%
  natoapp6c/s/crime/.pic={\path[draw,dashed] (-.45,.25)--(.45,-.25);},
}
```

natoapp6c/s/decoy

```
\tikzset{%
  natoapp6c/s/decoy/.pic={%
    \path[fill=pgfstrokecolor,draw,yshift=1.5]
    (0.2, 0) -- (0.4, 0.15) -- (0.4, -0.15) -- cycle
    (-0.1, 0) -- (0.1, 0.15) -- (0.1, -0.15) -- cycle
    (-0.4, 0) -- (-0.2, 0.15) -- (-0.2, -0.15) -- cycle;},
}
```

natoapp6c/s/direct communications

```
\tikzset{%
  natoapp6c/s/direct communications/.pic={
    \path[draw] (-.35,0) circle(.1) (.35,0) circle(.1);
    \pic[fill=pgfstrokecolor]{natoapp6c/s/intermodal};
```

```
  },
}
```

natoapp6c/s/direction finding

```
\tikzset{%
  natoapp6c/s/direction finding/.pic={%
    \path[draw] (-.3,.2)--(0,.4)--(.3,.2) (0,.4)--(0,-.4);},
}
```

natoapp6c/s/diving

```
\tikzset{%
  pics/natoapp6c/s/diving/.is choice,
  pics/natoapp6c/s/diving/none/.style={
    code={
      \path[pic actions] (0,0) circle(.1) (0,0) circle(.25);
      \begin{scope}
        \clip (0,0) circle(.25) [reverseclip];
        \path[pic actions] (-.3,-.1) rectangle(.3,.1)
        (0,0) -- (-45:.4) -- (-135:.4) -- cycle;
      \end{scope}}},
  pics/natoapp6c/s/diving/military/.style={
    code={
      \begin{scope}[even odd rule]
        \clip (0,0) circle(0.1)[reverseclip];
        \pic[fill=pgfstrokecolor]{natoapp6c/s/diving=none};
      \end{scope}
      \path[fill=pgfstrokecolor] (0,0) circle(0.08);
    }},
  pics/natoapp6c/s/diving/.default=none,
}
```

natoapp6c/s/drilling

```
\tikzset{%
  natoapp6c/s/drilling/.pic={\path[fill=pgfstrokecolor]
    (-0.1,-0.2) -- (0.1,-0.2) -- (0.2, 0.2) -- (-0.2, 0.2) -- cycle;},
}
```

natoapp6c/s/earthmover

```
\tikzset{%
  natoapp6c/s/earthmover/.pic={
    \pic{natoapp6c/s/tank};
    \path[pic actions] (.3,
```

```
    .3)--(.175,.35)--(-.175,.35)--(-.3,.3)
    (0,.2)--(0,.35);
  },
}
```

natoapp6c/s/electric power

```
\tikzset{%
  natoapp6c/s/electric power/.pic={
    \path[pic actions]
    (-0.05, 0)    .. controls(-0.06, 0.14) ..
    ( 0,    0.09) .. controls( 0.03, 0.06) ..
    ( 0,    0.06) .. controls(-0.03, 0.06) ..
    ( 0,    0.09) .. controls( 0.06, 0.14) ..
    (0.05, 0)
    ($(-55:0.125) + (0, 0.075)$) arc(-55:235:0.125) arc(415:360:0.05) --
    +(0, -0.08) arc(180:360:0.05035) --
    +(0,  0.08) arc(180:125:0.05) -- cycle;
  },
}
```

natoapp6c/s/electronic ranging

```
\tikzset{%
  natoapp6c/s/electronic ranging/.pic={%
    \path[draw] (135:.225) arc (135:315:.225)--cycle (0,0)--(225:-.225);},
}
```

natoapp6c/s/electronic warfare wide

```
\tikzset{%
  natoapp6c/s/electronic warfare wide/.pic={%
    % OBS
    \node[natoapp6c/text,natoapp6c/normal text] at(-.25,0){E};
    \node[natoapp6c/text,natoapp6c/normal text] at(.25,0){W};
  },
}
```

natoapp6c/s/engineer

```
\tikzset{%
  natoapp6c/s/engineer/.pic={\path[draw]
    (.4,-.2)--(.4,.2)--(-.4,.2)--(-.4,-.2) (0,.2)--(0,-.2);},
}
```

natoapp6c/s/enhanced location reporting system

```
\tikzset{%
  natoapp6c/s/enhanced location reporting system/.pic={\path[draw]
    (0, -0.3) -- (0, 0.3) (-0.2, -.3) -- (0, 0.-.1) -- (0.2, -.3);},
}
```

natoapp6c/s/environmental protection

```
\tikzset{%
  natoapp6c/s/environmental protection/.pic={%
    \path[draw] (0, 0.2)
    -- (0.1, 0.05)
    -- (0.05, 0.05)
    -- (0.15, -0.05)
    -- (0.1, -0.05)
    -- (0.2, -0.15)
    -- (0.15, -0.15)
    -- (0.05, -0.15)
    -- (0.05, -0.2)
    -- (-0.05, -0.2)
    -- (-0.05, -0.15)
    -- (-0.2, -0.15)
    -- (-0.1, -0.05)
    -- (-0.15, -0.05)
    -- (-0.05, 0.05)
    -- (-0.1, 0.05)
    -- cycle;},
}
```

natoapp6c/s/explosion

```
\tikzset{%
  natoapp6c/s/explosion/.pic={%
    \node [shape=rectangle,
    starburst,
    draw,
    minimum width=0.9cm,
    minimum height=0.9cm,
    starburst point height=0.25cm,
    starburst points=12] {};},
}
```

natoapp6c/s/finance

```
\tikzset{%
  natoapp6c/s/finance/.pic={%
```

```
    \path[draw] (-.3,-.25) rectangle(.3,0)
    (-.3,0) -- ++(60:.28) -- ([shift=(120:.28)].3,0) -- (.3,0);},
}
```

natoapp6c/s/fishing vessel

```
\tikzset{%
  natoapp6c/s/fishing vessel/.pic={
    \path[pic actions]
      (-0.15, -0.2)  --
      ( 0.15, -0.2)  --
      ( 0.25, 0.025) --
      (-0.05, 0.025) --
      (-0.05, 0.125) --
      (-0.2,  0.125) --
      (-0.2,  0.025) --
      (-0.25, 0.025) -- cycle
      (0.025, 0.025) -- (0.025, 0.2)
      (0.025, 0.025) -- +(45:0.2);},
}
```

natoapp6c/s/fire protection

```
\tikzset{%
  natoapp6c/s/fire protection/.pic={%
    \path[fill=pgfstrokecolor] (0,0) circle(.2)
      (0,0) -- (60:.3) -- (120:.3) -- cycle
      (0,0) -- (-30:.3) -- (30:.3) -- cycle
      (0,0) -- (150:.3) -- (210:.3) -- cycle
      (0,0) -- (240:.3) -- (300:.3) -- cycle;
  },
}
```

natoapp6c/s/fixed and rotary wing

```
\tikzset{%
  natoapp6c/s/fixed and rotary wing/.pic={%
      \path[xscale=.45,yscale=.75,pic actions] pic {natoapp6c/s/fixed wing};
      \path[yscale=.45,xscale=.7,rotate=90, pic actions] pic {
        natoapp6c/s/rotary wing};
    },
}
```

natoapp6c/s/fixed wing

```
\tikzset{%
```

```
  natoapp6c/s/fixed wing/.pic={
    \path[pic actions]
      (-0.36,0.125) arc (77:275:0.075 and 0.125) -- (0,0) -- cycle
      ( 0.36,0.125) arc (-275:-77:-0.075 and 0.125) -- (0,0)
      --cycle;},
}
```

natoapp6c/s/flame thrower

```
\tikzset{%
  natoapp6c/s/flame thrower/.pic={
    \path[pic actions]
    (-0.1, -0.4) -- (-0.1, 0.3) to[out=90,in=90,looseness=2]
    (0.1, 0.3) -- (0.1, 0.275);},
}
```

natoapp6c/s/floating

```
\tikzset{%
  natoapp6c/s/floating/.pic={
    \path[draw]
    (-0.5, 0.100) --
    (-0.417, 0.242) --
    (-0.333, 0.100) --
    (-0.250, 0.242) --
    (-0.167, 0.100) --
    (-0.083, 0.242) --
    (0.0, 0.100) --
    (0.083, 0.242) --
    (0.167, 0.100) --
    (0.250, 0.242) --
    (0.333, 0.100) --
    (0.417, 0.242) --
    (0.5, 0.100);},
  pics/natoapp6c/s/surfaced/.style=natoapp6c/s/floating,
}
```

natoapp6c/s/food

```
\tikzset{%
  natoapp6c/s/food/.pic={
    \path[pic actions]
    (0.075, 0.2) to[out=210, in=150, looseness=1]
    (0.075, -0.2) to[out=180, in=180, looseness=1.5]
    (0.075, 0.2) -- cycle;},
}
```

natoapp6c/s/fuel

```
\tikzset{%
  natoapp6c/s/fuel/.pic={
    \path[draw] (0,0) -- (135:.3) -- (45:.3) -- cycle (0,0) -- (0,-.3);},
}
```

natoapp6c/s/grenade launcher

```
\tikzset{%
  pics/natoapp6c/s/grenade launcher/.is choice,%
  pics/natoapp6c/s/grenade launcher/none/.style={%
    code={%
      \pic[draw]{natoapp6c/s/rifle};
      \pic[draw]{natoapp6c/s/weapon=grenade launcher};}},%
  pics/natoapp6c/s/grenade launcher/non lethal/.style={
    code={%
      \pic[draw]{natoapp6c/s/non lethal weapon};
      \pic[draw]{natoapp6c/s/weapon=grenade launcher};}},
  pics/natoapp6c/s/grenade launcher/.default=none,
}
```

natoapp6c/s/graffiti

```
\tikzset{%
  natoapp6c/s/graffiti/.pic={
    \path[pic actions]
    (0.05, 0.2)
    arc (90:270:0.05)
    arc (450:270:0.05)
    arc (90:270:0.05)
    arc (450:270:0.05)
    (-0.05, 0.2)
    arc (90:270:0.05)
    arc (450:270:0.05)
    arc (90:270:0.05)
    arc (450:270:0.05);},
}
```

natoapp6c/s/group

```
\tikzset{%
  natoapp6c/s/group/.pic={
    \path(-.23,.05) pic [draw,scale=.8] {natoapp6c/s/individual};
    \path(0,-.05)   pic [draw,scale=.8] {natoapp6c/s/individual};
    \path(.23,.05)  pic [draw,scale=.8] {natoapp6c/s/individual};},
}
```

natoapp6c/s/gun

```
\tikzset{%
  pics/natoapp6c/s/gun/.is choice,
  pics/natoapp6c/s/gun/base/.style={
    code={
      \pic[draw]{natoapp6c/s/weapon=base};
      \pic[draw]{natoapp6c/s/weapon=top};
      \pic[draw]{natoapp6c/s/weapon=multi fire};}},
  pics/natoapp6c/s/gun/air defence/.style={
    code={
      \pic[draw]{natoapp6c/s/gun/base};
      \pic[draw]{natoapp6c/s/weapon=air defence};}},
  pics/natoapp6c/s/gun/anti tank/.style={
    code={
      \pic[draw]{natoapp6c/s/gun/base};
      \pic[draw]{natoapp6c/s/weapon/anti tank};}},
  pics/natoapp6c/s/gun/direct/.style={
    code={
      \pic[draw]{natoapp6c/s/gun/base};
      \pic[draw]{natoapp6c/s/weapon=bottom};}},
  pics/natoapp6c/s/gun/recoilless/.style={
    code={
      \pic[draw]{natoapp6c/s/rifle};
      \pic[yshift=-4,draw]{natoapp6c/s/weapon=multi fire};}},
  pics/natoapp6c/s/gun/.default=direct,
}
```

natoapp6c/s/headquarters

```
\tikzset{%
  natoapp6c/s/headquarters/.pic={
    \path[pic actions] (M.north west) -- ++(0,-.3) --
      ([shift=(-90:.3)]M.north east) -- (M.north east) -- cycle;},
}
```

natoapp6c/s/house

```
\tikzset{%
  natoapp6c/s/house/.pic={
    \path[pic actions]
    (-.125,-.175) rectangle (.125,.075)
    (-.167,.075) -- (0,.225) -- (.167,.075) -- cycle;},
}
```

natoapp6c/s/howitzer

```
\tikzset{%
  natoapp6c/s/howitzer/.pic={
    \pic[draw]{natoapp6c/s/weapon=base};
    \pic[draw]{natoapp6c/s/weapon=top};
    \pic[draw]{natoapp6c/s/weapon=multi fire};
    \pic[yshift=-8,draw]{natoapp6c/s/weapon=grenade launcher};
  },
}
```

natoapp6c/s/in position

```
\tikzset{%
  natoapp6c/s/in position/.pic={
    \path[draw,fill=pgfstrokecolor]
    (-.3,-.01) rectangle (-.2,.01) (.2,-.01) rectangle (.3,.01);},
}
```

natoapp6c/s/individual

```
\tikzset{%
  natoapp6c/s/individual/.pic={
    \path[pic actions]
      (0,.08) -- (0,-.3) (-.15,0) -- (.15,0) (0,.18) circle(.1);},
}
```

natoapp6c/s/infantry

```
\tikzset{%
  natoapp6c/s/infantry/.pic={
    \path[draw] (-.75,.5) -- (.75,-.5) (-.75,-.5) -- (.75,.5);},
}
```

natoapp6c/s/intermodal

```
\tikzset{%
  natoapp6c/s/intermodal/.pic={
    \path[pic actions]
    ( 0.15,  0.025) --
    (-0.15,  0.025) --
    (-0.15,  0.075) --
    (-0.25,  0)     --
    (-0.15, -0.075) --
    (-0.15, -0.025) --
```

```
    ( 0.15, -0.025) --
    ( 0.15, -0.075) --
    ( 0.25,  0)     --
    ( 0.15,  0.075) -- cycle;},
}
```

natoapp6c/s/jagged wave

```
\tikzset{%
  natoapp6c/s/jagged wave/.pic={
    \draw (0.3,  -0.05) --
          (0.2,   0.05) --
          (0.1,  -0.05) --
          (0,     0.05) --
          (-0.1, -0.05) --
          (-0.2,  0.05) --
          (-0.3, -0.05);},
}
```

natoapp6c/s/jam

```
\tikzset{%
  natoapp6c/s/jam/.pic={%
    \path[draw]
    (0.75, 0)
    to[out=90, in=90, looseness=2.25] ( 0.65, 0)
    to[out=-90,in=-90,looseness=2.25] ( 0.55, 0)
    to[out=90, in=90, looseness=2.25] ( 0.45, 0)
    to[out=-90,in=-90,looseness=2.25] ( 0.35, 0)
    to[out=90, in=90, looseness=2.25] ( 0.25, 0)
    to[out=-90,in=-90,looseness=2.25] ( 0.15, 0)
    to[out=90, in=90, looseness=2.25] ( 0.05, 0)
    to[out=-90,in=-90,looseness=2.25] (-0.05, 0)
    to[out=90, in=90, looseness=2.25] (-0.15, 0)
    to[out=-90,in=-90,looseness=2.25] (-0.25, 0)
    to[out=90, in=90, looseness=2.25] (-0.35, 0)
    to[out=-90,in=-90,looseness=2.25] (-0.45, 0)
    to[out=90, in=90, looseness=2.25] (-0.55, 0)
    to[out=-90,in=-90,looseness=2.25] (-0.65, 0)
    to[out=90, in=90, looseness=2.25] (-0.75, 0)
    ;},
}
```

natoapp6c/s/jamming

```
\tikzset{%
  natoapp6c/s/jamming/.pic={%
    \path(0,.4) pic {natoapp6c/s/jam} (0,.26) pic {natoapp6c/s/jam};},
```

```
}
```

natoapp6c/s/jetski

```
\tikzset{%
  natoapp6c/s/jetski/.pic={
    \path[pic actions]
    ( 0.3, -0.2)  --
    (-0.3, -0.2)  --
    (-0.35,-0.1)  --
    (-0.1,  0.2)  --
    ( 0,    0.2)  --
    ( 0,    0.1)  --
    (-0.05, 0.1)  --
    (-0.1, -0.05) --
    ( 0.3, -0.05) --
    ( 0.3, -0.2)  -- cycle;
},
}
```

natoapp6c/s/killing

```
\tikzset{%
  natoapp6c/s/killing/.pic={\path[draw] (-.45,.25)--(.45,-.25);},
}
```

natoapp6c/s/labour

```
\tikzset{%
  natoapp6c/s/labour/.pic={%
    \path[draw] (-.15,.2) -- (.15,.2) (0,.2) -- (0,0)
    (-.15,0) -- ++(300:.3) -- ++(60:.3) -- cycle;},
}
```

natoapp6c/s/land mine

```
\tikzset{%
  pics/natoapp6c/s/land mine/.is choice,
  pics/natoapp6c/s/land mine/personnel/.style={
    code={\pic[fill=pgfstrokecolor]{natoapp6c/s/land mine=none};
      \path[pic actions] (135:0.35) -- (0, 0) -- (45:0.35);}},
  pics/natoapp6c/s/land mine/tank/.style={
    code={\pic[fill=pgfstrokecolor]{natoapp6c/s/land mine=none};}},
  pics/natoapp6c/s/land mine/none/.style={
    code={\path[pic actions] (0,0) circle(0.25);}},
  pics/natoapp6c/s/land mine/.default=none,
```

```
}
```

natoapp6c/s/land missile

```
\tikzset{%
  natoapp6c/s/land missile/.pic={\pic{natoapp6c/s/missile launcher};},
}
```

natoapp6c/s/laser

```
\tikzset{%
  natoapp6c/s/laser/.pic={
    \path[draw,line join=round,line cap=round,pic actions]
    ( 0.1, -0.25)   --
    (-0.1, -0.225)  --
    ( 0.1, -0.2)    --
    (-0.1, -0.175)  --
    ( 0.1, -0.15)   --
    ( 0,   -0.1375) --
    ( 0,   -0.0125) --
    (-0.1,  0)      --
    ( 0.1,  0.025)  --
    (-0.1,  0.05)   --
    ( 0.1,  0.075)  --
    ( 0,    0.0875) --
    ( 0,    0.25)
    ( 0.1,  0.2)  --
    ( 0,    0.25) --
    (-0.1, 0.2);},
}
```

natoapp6c/s/launcher

```
\tikzset{%
  natoapp6c/s/launcher/.pic={
    \path[draw] (-.3,-.2) -- (.3,.2) -- (.3,-.2);},
}
```

natoapp6c/s/laundry

```
\tikzset{%
  natoapp6c/s/laundry/.pic={%
    \path[draw] (0,-.3) -- (0,.1)
    (0,.1) -- ++(150:.25)
    (0,.1) -- ++(180:.2)
    (0,.1) -- ++(210:.25);},
```

```
}
```

natoapp6c/s/machine gun

```
\tikzset{%
  natoapp6c/s/machine gun/.pic={%
    \pic[draw]{natoapp6c/s/rifle};
    \pic[draw]{natoapp6c/s/weapon=machine gun};},
}
```

natoapp6c/s/main gun

```
\tikzset{%
  natoapp6c/s/main gun/.pic={
    \path[pic actions] (M.north west) -- ++(.25,0) --
      ([shift=(0:.25)]M.south west) -- (M.south west) -- cycle;},
}
```

natoapp6c/s/maintenance

```
\tikzset{%
  natoapp6c/s/maintenance/.pic={
    \path[fill=pgfstrokecolor]
    (-.38,.25)
    to[out=0,in=90,looseness=1.5] (-.2,.05) -- (.2,.05)
    to [out=90,in=180,looseness=1.5] (.38,.25) --  ++(0,-.08)
    to [out=180,in=90,looseness=1.5] (.28,0)
    to [out=-90,in=180,looseness=1.5] (.38,-.17) -- ++(0,-.08)
    to [out=180,in=-90,looseness=1.5] (.2,-.05) -- (-.2,-.05)
    to [out=-90,in=0,looseness=1.5] (-.38,-.25) -- ++(0,.08)
    to [out=0,in=-90,looseness=1.5] (-.28,0)
    to [out=90,in=0,looseness=1.5] (-.38,.17) -- cycle;
  },
}
```

natoapp6c/s/medic

```
\tikzset{%
  natoapp6c/s/medic/.pic={
    \path[pic actions]
      (-0.075,-0.2)
      --(0.075,-.2)
      --(.075,-.075)
      --(.2,-.075)
      --(.2,.075)
      --(.075,.075)
```

```
      --(.075,.2)
      --(-0.075,.2)
      --(-0.075,.075)
      --(-.2,.075)
      --(-.2,-.075)
      --(-.075,-.075)
      --cycle;},
}
```

natoapp6c/s/medical

```
\tikzset{%
  natoapp6c/s/medical/.pic={\path[draw] (-1,0) -- (1,0) (0,-1) -- (0,1);},
}
```

natoapp6c/s/medical treatment

```
\tikzset{%
  natoapp6c/s/medical treatment/.pic={
    \path[draw] (0,0) pic {natoapp6c/s/medical}
    ([xscale=.5,shift={(0,-.2)}]M.west) -- ([xscale=.5,shift={(0,.2)}]M.west)
    ([xscale=.5,shift={(0,-.2)}]M.east) -- ([xscale=.5,shift={(0,.2)}]M.east);},
}
```

natoapp6c/s/mine

```
\tikzset{%
  natoapp6c/s/mine/.pic={
    \path[fill=pgfstrokecolor,draw] (0,0) ellipse(.2 and .15)
    (0,0) -- ++(60:.3)
    (0,0) -- ++(90:.3)
    (0,0) -- ++(120:.3)
    (0,0) -- ++(240:.3)
    (0,0) -- ++(270:.3)
    (0,0) -- ++(300:.3)
    ;},
}
```

natoapp6c/s/mine clearing equipment

```
\tikzset{%
  natoapp6c/s/mine clearing equipment/.pic={
    \path[pic actions]
    (0, 0.2) -- (0, 0) -- (0.35, -0.2) -- (-0.35, -0.2) -- (0, 0);},
}
```

natoapp6c/s/mine warfare vessel

```
\tikzset{%
  natoapp6c/s/mine warfare vessel/.pic={%
    \pic[scale=.8,fill=pgfstrokecolor,yshift=2.5]{natoapp6c/s/sea mine=top half};
    \pic          {natoapp6c/s/warfare vessel};
  },
}
```

natoapp6c/s/missile

```
\tikzset{%
  natoapp6c/s/missile/.pic={%
    \path[pic actions,draw]
      (0, 0.3)
      -- (-0.05, 0.2)
      -- (-0.05, -0.2)
      -- (-0.125,-0.3)
      -- (-0.125,-0.4)
      -- (0, -0.265)
      -- (0.125,-0.4)
      -- (0.125,-0.3)
      -- (0.05,-0.2)
      -- (0.05,0.2)
      -- cycle;},
}
```

natoapp6c/s/missile launcher

```
\tikzset{%
  pics/natoapp6c/s/missile launcher/.is choice,
  pics/natoapp6c/s/missile launcher/base/.style={
    code={
      \pic[draw]{natoapp6c/s/weapon=base};
      \pic[draw]{natoapp6c/s/weapon=top};
      \pic[draw]{natoapp6c/s/weapon=multi fire};
      \pic[draw]{natoapp6c/s/weapon=missile launcher};}},
  pics/natoapp6c/s/missile launcher/none/.style={
    code={
      \pic[draw]{natoapp6c/s/missile launcher=base};
      \path[pic actions] (-.2,-.2)--(-.2,-.35) (.2,-.2)--(.2,-.35);}},
  pics/natoapp6c/s/missile launcher/air defence/.style={
    code={
      \pic[draw]{natoapp6c/s/missile launcher=none};
      \pic[draw]{natoapp6c/s/weapon=air defence};}},
  pics/natoapp6c/s/missile launcher/anti tank/.style={
    code={
      \pic[draw]{natoapp6c/s/missile launcher=base};
```

```
      \pic[draw]{natoapp6c/s/weapon=anti tank};}},
  pics/natoapp6c/s/missile launcher/surface to surface/.style={
    code={%
      \pic[draw]{natoapp6c/s/missile launcher=none};
      \pic[draw]{natoapp6c/s/weapon=bottom};
      \pic[draw]{natoapp6c/s/weapon=machine gun};
    }},
  pics/natoapp6c/s/missile launcher/.default=none,
}
```

natoapp6c/s/mobile advisor and support

```
\tikzset{%
  natoapp6c/s/mobile advisor and support/.pic={
    \path[draw] (-.35,0) circle(.1) (.35,0) circle(.1);
    \path[draw,fill=pgfstrokecolor,pic actions]
    ( 0.15,  0.025) --
    (-0.25,  0.025) --
    (-0.25, -0.025) --
    ( 0.15, -0.025) --
    ( 0.15, -0.075) --
    ( 0.25,  0)     --
    ( 0.15,  0.075) -- cycle;},
}
```

natoapp6c/s/moored

```
\tikzset{%
  natoapp6c/s/moored/.pic={
    \path[draw] (0,.2) -- (0,-.05) (-.3,-.05) -- (.3,-.05);},
}
```

natoapp6c/s/mortar

```
\tikzset{%
  natoapp6c/s/mortar/.pic={
    \path[draw] (0,-.15) circle(.05) (0,.-.1) -- (0,.2)
    ([shift=(225:.1)]0,.2) -- (0,.2) -- ([shift=(-45:.1)]0,.2);},
}
```

natoapp6c/s/motorized

```
\tikzset{%
  natoapp6c/s/motorized/.pic={\path[draw] (M.north) -- (M.south);},
  pics/natoapp6c/s/motorised/.style={natoapp6c/s/motorized},
}
```

natoapp6c/s/mortuary affairs

```
\tikzset{%
  natoapp6c/s/mortuary affairs/.pic={
    \path[draw] (-.1,-.2) rectangle (.1,.2)
      (0,-.17) -- (0,.17) (-.07,.1) -- (.07,.1);},
}
```

natoapp6c/s/mountain

```
\tikzset{%
  natoapp6c/s/mountain/.pic={
    \path[draw,fill=pgfstrokecolor] (0,.2) -- ++(-60:.7) -- ++(180:.7) -- cycle;
  },
}
```

natoapp6c/s/naval

```
\tikzset{%
  natoapp6c/s/naval/.pic={
      \def\arrow{(0,0) -- (-.02,0) -- ++(60:.04) -- ++(-60:.04) -- cycle}
      \begin{scope}[pic actions]
        \path[draw]
        (0,.13) circle (.08) (-.2,.04) -- (.2,.04) (0,.04)
        -- (0,-.25) (210:.25) arc (210:340:.25);
        \path[draw,shift=(210:.25),rotate=30] \arrow;
        \path[draw,shift=(340:.25),rotate=-30] \arrow;
      \end{scope}},
}
```

natoapp6c/s/navigation

```
\tikzset{%
  natoapp6c/s/navigation/.pic={
    \path[draw]
    (.17,-.2) -- (0,.2) -- (-.17,-.2)
    ($(-180:.17)+(0,.05)$) arc[radius=.17,start angle=-180,end angle=0];},
}
```

natoapp6c/s/navy task

```
\tikzset{%
  natoapp6c/s/navy task/.pic={
    \path[pic actions]
```

```
      (-0.25, -0.2) -- (-0.25, 0.1) -- (-0.15, 0.2)
      ( 0.25, -0.2) -- ( 0.25, 0.1) -- ( 0.15, 0.2);},
}
```

natoapp6c/s/non combatant

```
\tikzset{%
  natoapp6c/s/non combatant/.pic={
    \path[draw,fill=pgfstrokecolor]
    (-0.25, -0.2) --
    (-0.25, 0.05) --
    (-0.15, 0.05) --
    (-0.15, 0.2)  --
    (0.15, 0.2)   --
    (0.15, 0.05)  --
    (0.25, 0.05)  --
    (0.25, -0.2)  -- cycle;},
}
```

natoapp6c/s/non lethal weapon

```
\tikzset{%
  natoapp6c/s/non lethal weapon/.pic={%
    \pic[draw]{natoapp6c/s/weapon};%
    \pic[draw]{natoapp6c/s/weapon=non lethal};},
}
```

natoapp6c/s/nuclear

```
\tikzset{%
  natoapp6c/s/nuclear/.pic={
    \path[fill=pgfstrokecolor,pic actions] (0,0) circle(.05)
    (0:  .3) arc(0  :  60:.3) -- (  60:.1) arc(  60: 0:  .1) -- cycle
    (180:.3) arc(180: 120:.3) -- ( 120:.1) arc( 120: 180:.1) -- cycle
    (-60:.3) arc(-60:-120:.3) -- (-120:.1) arc(-120:-60: .1) -- cycle;
  },
}
```

natoapp6c/s/observer

```
\tikzset{%
  natoapp6c/s/observer/.pic={
    \path[pic actions] (0.25,-.2)--(-.25,-.2)--(0,.2)--cycle;},
}
```

natoapp6c/s/orbiter shuttle

```
\tikzset{%
  natoapp6c/s/orbiter shuttle/.pic={
    \path[pic actions]
    ($(0, 0.3)!0.35!(0.125, -0.15)$) --
    (0.125, -0.15) -- (-0.125, -0.15) --
    ($(-0.125, -0.15)!0.65!(0, 0.3)$)
    to[in=105, out=75] cycle
    (0, -0.20) -- (0, -0.15); },
}
```

natoapp6c/s/ordnance

```
\tikzset{%
  natoapp6c/s/ordnance/.pic={
    \path[draw] (0,0) ellipse(.2 and .15);
    \begin{scope}
      \clip (0,0) ellipse(.2 and .15) [reverseclip];
      \path[draw] (0,0) -- ++(50:.3)
      (0,0) -- ++(70:.3)
      (0,0) -- ++(110:.3)
      (0,0) -- ++(130:.3)
      ;
    \end{scope}},
}
```

natoapp6c/s/organisation

```
\tikzset{%
  pics/natoapp6c/s/organisation/.style={natoapp6c/s/group},
}
```

natoapp6c/s/over snow

```
\tikzset{%
  natoapp6c/s/over snow/.pic={
    \ifn@to@pp@below%
      \draw ([shift={(-.15,.15)}]M.south west) to[in=180, out=270]
      ++(.15,-.15) -- (M.south east);
    \else%
      \draw ([shift={(.3,.1)}]M.west) to[in=180, out=-90]
        ([shift={(.5,-.1)}]M.west) --
        ([shift={(-.3,-.1)}]M.east);
    \fi},
}
```

natoapp6c/s/pack animal

```
\tikzset{%
  natoapp6c/s/pack animal/.pic={
    \def\n@to@pp@tmp{0}
    \ifn@to@pp@below\def\n@to@pp@tmp{-.15}\fi
    \path[draw,shift={(0,\n@to@pp@tmp)}]
    (-.3,-.15) -- (-.15,.15) -- (0,-.15) -- (.15,.15) -- (.3,-.15);},
}
```

natoapp6c/s/patrol

```
\tikzset{%
  natoapp6c/s/patrol/.pic={
    \pic{natoapp6c/s/warfare vessel};
    \path[draw,fill=pgfstrokecolor] (0.125, 0) -- (0, 0.2) -- (-0.125, 0) -- cycle;},
}
```

natoapp6c/s/patrolling

```
\tikzset{%
  natoapp6c/s/patrolling/.pic={
    % OBS
    \path[draw]
    (0.25, 0.05) -- (-0.05, 0.05) -- (0.05, -0.05) -- (-0.4, -0.05)
    (-0.3, 0) -- (-0.4, -0.05) -- (-0.3, -0.1)
    node [natoapp6c/text,natoapp6c/small text,
    scale=.5,anchor=west,inner sep=0] at (0.25, 0.05) {P};
  },
}
```

natoapp6c/s/physician

```
\tikzset{%
  natoapp6c/s/physician/.pic={
    \pic{natoapp6c/s/medical};
    \path[draw] (0.1, 0.05) -- (-0.1, 0.05);},
}
```

natoapp6c/s/pipeline

```
\tikzset{%
  natoapp6c/s/pipeline/.pic={
    \path[draw] (-.15,-.15) rectangle (.15,.15)
    (-.3,.1) -- (-.15,.1) (-.3,-.1) -- (-.15,-.1)
```

```
    (.3,.1) -- (.15,.1) (.3,-.1) -- (.15,-.1)
    (-.05,.15) rectangle (.05,.25) (-.1,.25) rectangle (.1,.30);},
}
```

natoapp6c/s/poisoning

```
\tikzset{%
  natoapp6c/s/poisoning/.pic={
    \path[pic actions] (0, 0.055) circle (0.145)
    (0.3, 0) -- (-0.3, -0.2)
    (-0.3, 0) -- (0.3, -0.2);},
}
```

natoapp6c/s/postal

```
\tikzset{%
  natoapp6c/s/postal/.pic={
    \path[draw] (-.25,.25) -- (.08,.25)
    to [out=-90,in=120,looseness=1] (.25,-.25)
    to [out=150,in=-90,looseness=1] (-.25,.25);
  },
}
```

natoapp6c/s/printed media

```
\tikzset{%
  natoapp6c/s/printed media/.pic={
    \path[pic actions] (0.2, 0) -- (-0.2, 0)
    (0, 0.1) circle (0.085)
    (0, -0.1) circle (0.085);},
}
```

natoapp6c/s/psychological

```
\tikzset{%
  natoapp6c/s/psychological/.pic={
    \path[pic actions] (-.25,.15) -- (-.1,.15) -- (.1,.25)
      -- ++(0,-.5) -- (-.1,-.15) -- (-.25,-.15) -- cycle
      (.1,.15) -- (.25,.15)
      (.1,.05) -- (.25,.05)
      (.1,-.05) -- (.25,-.05)
      (.1,-.15) -- (.25,-.15);},
}
```

natoapp6c/s/quarry

```
\tikzset{%
  natoapp6c/s/quarry/.pic={
    \path[draw] (-.2,-.2) -- (.18,.18) (.2,-.2) -- (-.18,.18)
      (25:.255) arc(25:65:.255)
      (115:.255) arc(115:155:.255);
      %([shift={(115:.08)}]-.1,.1) arc (115:155:.08)
      %([shift={(70:.08)}].1,.1) arc (70:110:.08);
    },
}
```

natoapp6c/s/quartermaster

```
\tikzset{%
  natoapp6c/s/quartermaster/.pic={
    \path[draw] (-.4,.1) -- (.1,.1) (.25,.1) circle(.15)
      (-.3,.1) -- (-.3,-.15) (-.15,.1) -- (-.15,-.15)
      (-.3,-.08) -- (-.15,-.08);},
}
```

natoapp6c/s/radar

```
\tikzset{%
  natoapp6c/s/radar/.pic={%
    \path[draw] (-.2,.2) arc (150:300:.25) (-.24,.01) -- (0,.2) --
    (0,0) -- (.2,.2);},
}
```

natoapp6c/s/radio

```
\tikzset{%
  natoapp6c/s/radio/.pic={%
    \path[draw] (-.2,.2) -- (-.13,.25) -- (-.07,.2) -- (0,.25) --
    (.07,.2) -- (.13,.25) -- (.2,.2) (0,.25) -- (0,-.05) (0,-.15) circle(.1);},
}
```

natoapp6c/s/radio relay

```
\tikzset{%
  natoapp6c/s/radio relay/.pic={%
    \path[draw] (-.2,.25) -- (.2,.25) (0,.25) -- (0,-.05) (0,-.15) circle(.1);},
}
```

natoapp6c/s/radio relay line of sight

```
\tikzset{%
  natoapp6c/s/radio relay line of sight/.pic={%
    \path[draw] (0,0) circle(.2);
    \path[fill=pgfstrokecolor] (0,0) -- (45:.2) arc(45:-45:.2) -- cycle;
    \path[fill=pgfstrokecolor] (0,0) -- (135:.2) arc(135:225:.2) -- cycle;},
}
```

natoapp6c/s/radio teletype

```
\tikzset{%
  natoapp6c/s/radio teletype/.pic={%
    \path[draw] (-.2,.25) -- (.2,.25) (-.15,.18) -- (.15,.18)
                (0,.25) -- (0,-.25)
                ([shift=(30:.1)]0,-.15) arc(30:330:.1);},
}
```

natoapp6c/s/railroad

```
\tikzset{%
  natoapp6c/s/railroad/.pic={%
    \ifn@to@pp@below%
      \path[pic actions] (M.south west) -- (M.south east)
        ([shift={(.08,-0.08)}]M.south west) circle(.08)
        ([shift={(.24,-0.08)}]M.south west) circle(.08)
        ([shift={(-.08,-0.08)}]M.south east) circle(.08)
        ([shift={(-.24,-0.08)}]M.south east) circle(.08);
    \else
      \path[pic actions]  (-.45,.08) -- (.45,.08)
        (-.37,0) circle(0.08)
        (-.21,0) circle(0.08)
        (.21,0) circle(0.08)
        (.37,0) circle(0.08);
    \fi
   },
}
```

natoapp6c/s/reconnaissance

```
\tikzset{%
  natoapp6c/s/reconnaissance/.pic={%
    \path[draw] (M.north east)--(M.south west);},
}
\tikzset{
  natoapp6c/s/reconnaissance artillery/.pic={
    \path[draw] (M.north east)--(M.south west);,
```

```
    \path[pic actions,fill=pgfstrokecolor] circle(0.2);},
}
```

natoapp6c/s/recovery unmanned systems

```
\tikzset{%
  natoapp6c/s/recovery unmanned systems/.pic={%
    \path[draw] (-.5,.15) to [out=-80,in=180] (0,-.15) to
    [out=0,in=260] (.5,.15);},
}
```

natoapp6c/s/rifle

```
\tikzset{%
  natoapp6c/s/rifle/.pic={%
    \pic[draw]{natoapp6c/s/weapon=full};
    \pic[draw]{natoapp6c/s/weapon=rifle};},
}
```

natoapp6c/s/rising

```
\tikzset{%
  natoapp6c/s/rising/.pic={
    \path[draw,fill=pgfstrokecolor] (0, 0.2) -- (0, -0.167)
    (0.1, -0.2) -- (-0.1, -0.2) -- (0, 0.0);},
}
```

natoapp6c/s/riverine

```
\tikzset{%
  natoapp6c/s/riverine/.pic={%
    \ifn@to@pp@below%
      \path[pic actions] (M.south west)
        to [out=-90,in=-90,looseness=.5] (M.south east) -- cycle;
    \else%
      \path[pic actions] (-.5,.15) to [out=-80,in=180] (0,-.15) to
      [out=0,in=260] (.5,.15) -- cycle;
    \fi},
}
```

natoapp6c/s/rocket launcher

```
\tikzset{%
  pics/natoapp6c/s/rocket launcher/.is choice,
```

```
  pics/natoapp6c/s/rocket launcher/base/.style={
    code={
      \pic[draw]{natoapp6c/s/weapon=base};
      \pic[draw]{natoapp6c/s/weapon=rifle};
      \pic[yshift=-4,draw]{natoapp6c/s/weapon=rifle};
    }},
  pics/natoapp6c/s/rocket launcher/anti tank/.style={
    code={
      \pic[draw]{natoapp6c/s/rocket launcher=base};
      \pic[draw]{natoapp6c/s/weapon=anti tank};
    }},
  pics/natoapp6c/s/rocket launcher/single/.style={
    code={
      \pic[draw]{natoapp6c/s/rocket launcher=base};
      \pic[draw]{natoapp6c/s/weapon=bottom};}},
  pics/natoapp6c/s/rocket launcher/multiple/.style={
    code={
      \pic[draw]{natoapp6c/s/rocket launcher=single};
      \pic[yshift=-6,draw]{natoapp6c/s/weapon=multi fire};}},
  pics/natoapp6c/s/rocket launcher/single head/.style={
    code={%
      \pic[yshift=4,draw]{natoapp6c/s/weapon=rifle};}},
  pics/natoapp6c/s/rocket launcher/multiple head/.style={
    code={
      \pic[yshift=-4,draw]{natoapp6c/s/weapon=rifle};
      \pic[yshift=-6,draw]{natoapp6c/s/weapon=rifle};
    }},
  pics/natoapp6c/s/rocket launcher/.default=single,
}
```

natoapp6c/s/rotary wing

```
\tikzset{%
  natoapp6c/s/rotary wing/.pic={
    \path[pic actions]
      (0.44, 0.15) -- (0.44, -0.15) -- (-0.44, 0.15) -- (-0.44, -0.15) --
      cycle;},
}
```

natoapp6c/s/runway

```
\tikzset{%
  natoapp6c/s/runway/.pic={%
    \path[draw] (-.3,-.15) -- (.3,-.15) (-.2,-.2) -- (.2,.2);},
}
```

natoapp6c/s/sailing boat

```
\tikzset{%
  natoapp6c/s/sailing boat/.pic={%
    \path[draw]
    (-0.15, -0.2)  --
    ( 0.15, -0.2)   --
    ( 0.25, -0.025) --
    (-0.25, -0.025) -- cycle
    ( 0,    -0.025) -- (0, 0.2)
    (0.025,  0)     -- (0.025, 0.19) -- (0.225, 0) -- cycle;},
}
```

natoapp6c/s/satellite

```
\tikzset{%
  pics/natoapp6c/s/satellite/.is choice,
  pics/natoapp6c/s/satellite/none/.style={
    code={
      \iftikz@mode@fill
      \def\n@to@pp@next{\path[draw,fill=pgfstrokecolor,pic actions]}
      \else
      \def\n@to@pp@next{\path[pic actions]}
      \fi
      \n@to@pp@next
      ( 0.45,  0.075) rectangle ( 0.15,  -0.075)
      ( 0.075, 0.075) rectangle (-0.075, -0.075)
      (-0.45,  0.075) rectangle (-0.15,  -0.075)
      ( 0.15,  0) -- (0.075, 0)
      (-0.15,  0) -- (-0.075, 0);
    }},
  pics/natoapp6c/s/satellite/astronomical/.style={
    code={
      \begingroup\tikz@picmode
        \pic{natoapp6c/s/satellite=none};
      \endgroup
      \path[pic actions]
      (0.04, 0.075) rectangle (-0.04, 0.2)
      (0.02, -0.075) rectangle (-0.02, -0.2);}},
  pics/natoapp6c/s/satellite/bio/.style={
    code={
      \begingroup\tikz@picmode
      \pic[yshift=-1]{natoapp6c/s/satellite=none};
      \endgroup
      \path[pic actions]
      (-0.075, 0.13) circle (0.07)
      ($(-0.075, 0.13) + (60:0.07)$) --
      ++(-30:0.22) -- ++(0, -0.025) -- (-0.005, 0.13) -- cycle;
    }},
  pics/natoapp6c/s/satellite/communications/.style={
    code={
      \begingroup\tikz@picmode
      \pic[yshift=-1]{natoapp6c/s/satellite=none};
      \endgroup
```

```
      \path[pic actions]
      (0, 0.075) -- (0, 0.125)
      (0, 0.125) arc (270:340:0.25 and 0.1)
      (0, 0.125) arc (270:200:0.25 and 0.1);
    }},
 pics/natoapp6c/s/satellite/navigation/.style={
    code={
      \begingroup\tikz@picmode
      \pic[yshift=-3.75,scale=.9]{natoapp6c/s/satellite=none};
      \endgroup
      \pic[scale=.5,yshift=3.5]{natoapp6c/s/navigation};
    }},
  pics/natoapp6c/s/satellite/earth observing/.style={
    code={
      \begingroup\tikz@picmode
      \pic[yshift=3.75, scale=0.9]{natoapp6c/s/satellite=none};
      \endgroup
      \path[pic actions]
      (0, 0.065) -- +(315:0.125)
      (0, 0.065) -- +(225:0.125)
      (0, -0.12) circle (0.08);
    }},
  pics/natoapp6c/s/satellite/tether/.style={
    code={
      \begingroup\tikz@picmode
      \pic[yshift=-3.75, scale=0.9]{natoapp6c/s/satellite=none};
      \endgroup
      \path[pic actions]
      (0, -0.066) -- +(30:0.3)
      (0, -0.066) +(30:0.375) circle(0.075);
    }},
  pics/natoapp6c/s/satellite/small/.style={
    code={
      \begingroup\tikz@picmode
      \pic[scale=0.6]{natoapp6c/s/satellite=none};
      \endgroup
      \path[pic actions]
      (0.05,  0.2)  -- ( 0,   0.1) -- (-0.05,  0.2)
      (0.05, -0.2)  -- ( 0,  -0.1) -- (-0.05, -0.2)
      (-0.4,  0.05) -- (-0.3, 0)   -- (-0.4,  -0.05)
      ( 0.4,  0.05) -- ( 0.3, 0)   -- ( 0.4,  -0.05);
    }},
  pics/natoapp6c/s/satellite/reconnaissance/.style={
    code={
      \pic[yshift=-1,fill=pgfstrokecolor]{natoapp6c/s/satellite=none};
      \path[pic actions]
      (-0.075, -0.05) -- +(250:0.1)
      (-0.025, -0.05) -- +(260:0.1)
      ( 0.025, -0.05) -- +(280:0.1)
      ( 0.075, -0.05) -- +(290:0.1);
    }},
  pics/natoapp6c/s/satellite/.default=none,
}
```

natoapp6c/s/sea mine

```
\tikzset{%
  pics/natoapp6c/s/sea mine/.is choice,
  pics/natoapp6c/s/sea mine/top half/.style={
    code={\path[draw,join=bevel,pic actions]
      (.2,0) arc(0:35:.2 and .175) --
      (42:.34 and .3) -- (48:.34 and .3) --
      % ($(45:.1) + (40:.2)$) -- ($(45:.1)+(50:.2)$) --
      (55:.2 and .175) arc(50:75:.2 and .175) --
      (80:.26 and .23) -- (100:.26 and .23) --
      (105:.2 and .175) arc(100:125:.2 and .175) --
      (132:.34 and .3) -- (138:.34 and .3) --
      %($(135:.1)+(130:.2)$) -- ($(135:.1)+(140:.2)$) --
      (145:.2 and .175) arc(145:180:.2 and .175);
    }},
  pics/natoapp6c/s/sea mine/bottom half/.style={
    code={
      \path[pic actions] (.2,0) arc(0:-180:.2);}},
  pics/natoapp6c/s/sea mine/full/.style={
    code={
      \pic[fill=pgfstrokecolor]{natoapp6c/s/sea mine/top half};
      \pic[fill=pgfstrokecolor]{natoapp6c/s/sea mine/bottom half};}},
  pics/natoapp6c/s/sea mine/neutralised/.style={
    code={
      \begin{scope}[even odd rule]
        \clip [rotate=42]  (-.4,-.015) rectangle (.4,.015) [reverseclip];
        \clip [rotate=-42] (-.4,-.015) rectangle (.4,.015) [reverseclip];
        \pic {natoapp6c/s/sea mine=full};
      \end{scope}
    }},
  pics/natoapp6c/s/sea mine/neutralized/.style=natoapp6c/s/sea mine/neutralised,
  pics/natoapp6c/s/sea mine/.default=full,
}
```

natoapp6c/s/seabed installation

```
\tikzset{%
  natoapp6c/s/seabed installation/.pic={%
    \path[pic actions]
    (-0.25, -0.2)   --
    ( 0.25, -0.2)   --
    ( 0.25, -0.075) --
    ( 0.05, -0.075) --
    ( 0.05,  0.025) --
    (-0.125, 0.025) --
    (-0.125, 0.2)   --
    (-0.25,  0.2)   -- cycle;},
}
```

natoapp6c/s/search

```
\tikzset{%
  natoapp6c/s/search/.pic={%
    \path[draw] (-.3,-.2)--(0,-.4)--(.3,-.2) (0,.4)--(0,-.4);},
}
```

natoapp6c/s/searching

```
\tikzset{%
  natoapp6c/s/searching/.pic={%
    \path[pic actions]
    (-0.4, 0)
    arc (180:0:0.1)
    arc (180:360:0.1)
    arc (180:0:0.1)
    arc (180:270:0.1) -- +(0.1, 0)
    (0.3, -0.05) -- (0.4, -0.1) -- (0.3, -0.15);},
}
```

natoapp6c/s/semi trailer truck

```
\tikzset{%
  natoapp6c/s/semi trailer truck/.pic={
    \pic[scale=.75,xshift=-2,draw]{natoapp6c/s/utility vehicle};
    \path[pic actions] (0.21, -0.025) -- (0.35, -0.025)
    (0.35, 0.05) -- (0.35, -0.1);},
}
```

natoapp6c/s/sensor

```
\tikzset{%
  natoapp6c/s/sensor/.pic={%
    \path[fill=pgfstrokecolor] (-.3,0) arc (270:360:.3) arc (180:270:.3) arc
    (90:180:.3) arc (0:90:.3);},
}
```

natoapp6c/s/ship

```
\tikzset{%
  natoapp6c/s/ship/.pic={%
    \path[pic actions]
    (-0.2, -0.2)  --
    ( 0.2, -0.2)  --
```

```
    ( 0.35, 0.05) --
    ( 0.15, 0.05) --
    ( 0.15, 0.2)  --
    (-0.15, 0.2)  --
    (-0.15, 0.05) --
    (-0.35, 0.05) --
    cycle;},
}
```

natoapp6c/s/signal

```
\tikzset{%
  natoapp6c/s/signal/.pic={%
    \path[draw] (M.north west) -- (0,-.1) -- (0,.1) -- (M.south east);},
}
```

natoapp6c/s/signals intelligence

```
\tikzset{%
  natoapp6c/s/signals intelligence/.pic={%
    \path[draw] (-.2,.2) -- (-.13,.25) -- (-.07,.2) -- (0,.25) --
    (.07,.2) -- (.13,.25) -- (.2,.2) (0,.25) -- (0,-.2);},
}
```

natoapp6c/s/ski

```
\tikzset{%
  natoapp6c/s/ski/.pic={
    \path[draw] (-.15,-.15) -- (.1,.2) (.15,-.15) -- (-.1,.2)
      (-.1,-.2) -- (-.2,-.1)
      (.1,-.2) -- (.2,-.1);
    },
}
```

natoapp6c/s/sled

```
\tikzset{%
  natoapp6c/s/sled/.pic={
    \ifn@to@pp@below%
      \draw ([shift={(-.15,.15)}]M.south west) to[in=180, out=-90]
        ++(.15,-.15) -- (M.south east) to[in=-90, out=0]
        ([shift={(.15,.15)}]M.south east);
    \else%
      \draw ([shift={(.3,.1)}]M.west) to[in=180, out=-90]
        ([shift={(.5,-.1)}]M.west) --
        ([shift={(-.5,-.1)}]M.east) to[in=-90, out=0]
```

```
        ([shift={(-.3,.1)}]M.east);
    \fi
    },
}
```

natoapp6c/s/small squashed text

```
\tikzset{%
  pics/natoapp6c/s/small squashed text/.style={
    code={\n@to@pp@text@smallsquashed{#1};}},
}
```

natoapp6c/s/small text

```
\tikzset{%
  pics/natoapp6c/s/small text/.style={code={\n@to@pp@text@small{#1};}},
}
```

natoapp6c/s/sniper

```
\tikzset{%
  natoapp6c/s/sniper/.pic={%
    \path[draw] (-.2,.2)--(-.05,.2) (.05,.2)--(.2,.2) (0,.15)--(0,-.2);},
}
```

natoapp6c/s/space station

```
\tikzset{%
  natoapp6c/s/space station/.pic={
    \path[join=bevel,pic actions]
    (-80:.15 and .06) -- (0.025, 0.175) arc(0:180:0.025) -- (-100:.15 and .06)
    ($(80:.25 and 0.1)+(0,-.0125)$) arc(80:-260:.25 and .1) --
    (-260:.15 and .06)              arc (-260:80:.15 and .06) -- cycle
    (-82:.25 and .1) -- (0.025, -0.175) arc(360:180:0.025) -- (-98:.25 and .1);
  },
}
```

natoapp6c/s/squashed text

```
\tikzset{%
  pics/natoapp6c/s/squashed text/.style={code={\n@to@pp@text@squashed{#1};}},
}
```

natoapp6c/s/submarine

```
\tikzset{%
  natoapp6c/s/submarine/.pic={
    \path[fill=pgfstrokecolor,pic actions]
    (0.4, 0) --
    (0.25, 0.15) --
    (-0.25, 0.15) --
    (-0.4, 0) --
    (-0.25, -0.15) --
    (0.25, -0.15) -- cycle;},
}
```

natoapp6c/s/submersible

```
\tikzset{%
  natoapp6c/s/submersible/.pic={
    \path[pic actions]
    ($(0, -0.05) + (106.6:0.35 and 0.15)$)
    arc (106.6:433.4:0.35 and 0.15) |- (0, 0.2) -| cycle;
  },
}
```

natoapp6c/s/supply

```
\tikzset{%
  natoapp6c/s/supply/.pic={
    \path[pic actions]
    ($(M.east)-(0,.25)$)--($(M.west)-(0,.25)$);},
}
```

natoapp6c/s/surface combatant

```
\tikzset{%
  natoapp6c/s/surface combatant/.pic={
    \pic {natoapp6c/s/warfare vessel};
    \path[draw,fill=pgfstrokecolor]
    (0.12, 0.05) --
    (0.12, 0.14) --
    (0.06, 0.14) --
    (0.06, 0.2) --
    (0.24, 0.2) --
    (0.24, 0.272) --
    (0.06, 0.272) --
    (0.06, 0.35) --
    (-0.06, 0.35) --
    (-0.06, 0.272) --
```

```
    (-0.24, 0.272) --
    (-0.24, 0.2) --
    (-0.06, 0.2) --
    (-0.06, 0.14) --
    (-0.12, 0.14) --
    (-0.12, 0.05) -- cycle;},
}
```

natoapp6c/s/survey

```
\tikzset{%
  natoapp6c/s/survey/.pic={
    \path[draw,fill=pgfstrokecolor,pic actions]
    (0, -0.1) -- (0, 0.195) -- (0.25, 0.0475) -- cycle;
    \path[pic actions] (0.1, -0.2) -- (0, -0.1) -- (-0.1, -0.2);},
}
```

natoapp6c/s/tactical satellite

```
\tikzset{%
  natoapp6c/s/tactical satellite/.pic={
    \path[fill=pgfstrokecolor,draw]
    (-.3,-.2) rectangle(-.15,.2)
    (.15,-.2) rectangle( .3,.2)
    (-.075,-.15) rectangle (.075,.15)
    (-.15,0) -- (.15,0)
    (0,-.15) -- (0,-.3);
    \path[draw] (-.2,-.35) to [out=40,in=140,looseness=1] (.2,-.35);},
}
```

natoapp6c/s/tank

```
\tikzset{%
  natoapp6c/s/tank/.pic={%
    \pic[draw]{natoapp6c/s/vehicle};
    \path[pic actions] ( 0.35,  0.2) -- (-0.35,  0.2);},
}
```

natoapp6c/s/text

```
\tikzset{%
  pics/natoapp6c/s/text/.style={code={%
      \n@to@pp@dbg{3}{Text: `#1'}%
      \n@to@pp@text@normal{#1};}},
}
```

natoapp6c/s/topographic

```
\tikzset{%
  natoapp6c/s/topographic/.pic={
    \path[draw] (0,.05) -- (0,.2)
       (0,.05) -- (-.1,-.2)
       (0,.05) -- (.1,-.2)
       (-30:.15) arc[radius=.15,start angle=-30,end angle=-150];},
}
```

natoapp6c/s/torpedo

```
\tikzset{%
  natoapp6c/s/torpedo/.pic={
    \path[draw,fill=pgfstrokecolor,pic actions]
    (-0.35,  0) --
    (-0.3,   0.075) --
    ( 0.25,  0.075) --
    ( 0.35, -0.075) --
    ( 0.35,  0.075) --
    ( 0.25, -0.075) --
    (-0.3,  -0.075) -- cycle;},
}
```

natoapp6c/s/towed

```
\tikzset{%
  natoapp6c/s/towed/.pic={
    \ifn@to@pp@below%
      \path[pic actions] (M.south east) -- (M.south west)
      ([shift={(.08,0)}]M.south east) circle(.08)
      ([shift={(-.08,0)}]M.south west) circle(.08);
    \else%
      \path[draw] (-.32,0) -- (.32,0) (-.4,0) circle(.08) (.4,0) circle(.08);%
    \fi},
}
```

natoapp6c/s/tracked

```
\tikzset{%
  natoapp6c/s/tracked/.pic={
    \ifn@to@pp@below%
      \path[pic actions]
      ([shift={(.08,-.16)}]M.south west)
      arc [radius=.08,start angle=-90,end angle=-270]
      -- ([shift={(-.08,0)}]M.south east)
```

```
      arc [radius=.08,start angle=90,end angle=-90]
      -- cycle;
    \else%
      \path[pic actions]
      (-.3,-.1) arc [radius=.1,start angle=-90,end angle=-270]
      -- (.3,.1) arc [radius=.1,start angle=90,end angle=-90]
      -- cycle;
    \fi},
}
```

natoapp6c/s/train locomotive

```
\tikzset{%
  natoapp6c/s/train locomotive/.pic={
    \path[pic actions]
    (.35,-.3)--(-.35,-.3)--(-.35,.3)--(0,.3)--(0,0)--(0.35, 0)--cycle;},
}
```

natoapp6c/s/transportation

```
\tikzset{%
  natoapp6c/s/transportation/.pic={
    \path[pic actions] (0,0) circle(.2)
    (180:.2) --   (0:.2)
    (225:.2) --  (45:.2)
    (270:.2) --  (90:.2)
    (315:.2) -- (135:.2) ;},
}
```

natoapp6c/s/unexploded ordnance

```
\tikzset{%
  natoapp6c/s/unexploded ordnance/.pic={
    \begin{scope}[transparency group=knockout]
      \path[draw,fill=pgfstrokecolor,pic actions] (0,0) circle(.2);
      \pic[opacity=0]{natoapp6c/s/small squashed text=UXO};
    \end{scope}},
}
```

natoapp6c/s/unmanned

```
\tikzset{%
  natoapp6c/s/unmanned/.pic={
    \path[pic actions]
      (0,-0.1)
      --(0.45,0.05)
```

```
      --(0.45,0.1)
      --(0,0.025)
      --(-0.45,0.1)
      --(-0.45,0.05)
      --cycle;},
}
```

natoapp6c/s/utility vehicle

```
\tikzset{%
  natoapp6c/s/utility vehicle/.pic={%
    \pic[draw]{natoapp6c/s/vehicle};
    \path[pic actions]
    (0.35, 0.3) to[in=-90, out=-90, looseness=1] (-0.35, 0.3); },
}
```

natoapp6c/s/vehicle

```
\tikzset{%
  natoapp6c/s/vehicle/.pic={
    \path[pic actions]
    (-0.35,  0.2) -- (-0.35, -0.2) -- ( 0.35, -0.2) -- ( 0.35, 0.2)
    (-0.35, -0.2) -- (-0.35, -0.3)
    (0.35,  -0.2) -- ( 0.35, -0.3)
    (-0.35,  0.2) -- (-0.35,  0.3)
    (0.35,   0.2) -- ( 0.35,  0.3);}
}
```

natoapp6c/s/video imagery

```
\tikzset{%
  natoapp6c/s/video imagery/.pic={
    \path[pic actions]
    (-0.4, 0.2) -- (-0.4, -0.2) -- (0.05, -0.2) -- (0.2, 0.2) -- cycle
    (0.075, -0.15) -- (0.4, -0.15)
    (0.16, 0.1) -- (0.4, 0.1);
    \path[draw,fill=pgfstrokecolor,pic actions](0.38,-.2) rectangle (0.42,.15);},
}
```

natoapp6c/s/warfare vessel

```
\tikzset{%
  natoapp6c/s/warfare vessel/.pic={
    \path[draw,fill=pgfstrokecolor] (0, -0.2) -- (0.3, 0.05) -- (-0.3, 0.05) -- cycle;},
}
```

natoapp6c/s/water

```
\tikzset{%
  natoapp6c/s/water/.pic={
    \path[pic actions]
    (-0.3, 0.05) -- (0, 0.05) to[in=90, out=0] (0.3, -0.2)
    (0, 0.05) -- (0, 0.2)
    (0.075, 0.2) -- (-0.075, 0.2);},
}
```

natoapp6c/s/wheeled

```
\tikzset{%
  pics/natoapp6c/s/wheeled/.is choice,
  pics/natoapp6c/s/wheeled/and tracked/.style={
    code={
      \ifn@to@pp@below%
        \path[pic actions]
          ([shift={(.4,-.16)}]M.south west)
          arc [radius=.08,start angle=-90,end angle=-270]
          -- ([shift={(-.08,0)}]M.south east)
          arc [radius=.08,start angle=90,end angle=-90]
          -- cycle
          ([shift={(.08,-.08)}]M.south west) circle(.08);
      \else%
        \path[pic actions]
        (-.1,-.08) arc [radius=.08,start angle=-90,end angle=-270]
        -- (.32,.08) arc [radius=.08,start angle=90,end angle=-90]
        -- cycle
        (-.4,0) circle(0.08);
      \fi}},
  pics/natoapp6c/s/wheeled/limited/.style={
    code={
      \ifn@to@pp@below%
        \path[pic actions] (M.south west) -- (M.south east)
           ([shift={(.08,-.08)}]M.south west) circle(.08)
           ([shift={(-.08,-.08)}]M.south east) circle(.08);
      \else
        \path[pic actions] (-.4,.08) -- (.4,.08)
          (-.32,0) circle(0.08) (.32,0) circle(0.08);
     \fi}},
  pics/natoapp6c/s/wheeled/cross country/.style={
    code={\pic{natoapp6c/s/wheeled=limited};
      \ifn@to@pp@below%
        \path[pic actions] ([shift={(0,-.08)}]M.south) circle(.08);
      \else
        \path[pic actions] (0,0) circle(0.08);
     \fi}},
  pics/natoapp6c/s/wheeled/semi/.style={
     code={\pic{natoapp6c/s/wheeled=limited};
```

```
      \ifn@to@pp@below%
        \path[pic actions] ([shift={(.24,-.08)}]M.south west) circle(.08);
      \else
        \path[pic actions] (-.16,0) circle(0.08);
     \fi}},
  pics/natoapp6c/s/wheeled/.default=limited,
}
```

5.6.22 Some extra MIL-STD symbols

Extra NATO App6(c) symbol (from MIL-STD)

natoapp6c/s/prison

```
\tikzset{%
  natoapp6c/s/prison/.pic={
    \path[pic actions] (-.3,-.3)rectangle(.3,.3)
    (-.23,-.30)--(-.23, .3)
    ( .23,-.30)--( .23, .3)
    (-.08,-.30)--(-.08,-.2)
    (-.08,-.15) circle (.05)
    (-.08,-.1) --(-.08, .3)
    ( .08,-.30)--( .08,-.2)
    ( .08,-.15) circle (.05)
    ( .08,-.1) --( .08, .3)
    (0,.15) circle(.07 and .1);
  },
}
```

5.6.23 Some Kriegspiel-like symbols

Now some symbols. We do not define a whole lot, since we do not need that for Kriegspiel-like counters.

```
\tikzset{
  pics/kriegspiel/s/.unknown/.code={
    \message{^^JTry regular ‘natoapp6c/s/\pgfkeyscurrentname’}
    % \pic[pic actions,draw=black]{natoapp6c/s/\pgfkeyscurrentname};
    \pgfkeysalso{/tikz/pics/natoapp6c/s/\pgfkeyscurrentname/.try}
  },
  ks debug frame/.style={
    draw=none,
    %draw=magenta,
    %dashed,
  },
  kriegspiel/s/infantry/.pic={
    \coordinate(a) at (M.south west);
    \coordinate(b) at ($(M.north east)+(0,-.2)$);
    \@ifundefinedcolor{pgffillcolor}{}{
      \path[fill=pgffillcolor](a)rectangle(b);}
    \path[pic actions,fill=none](a)rectangle(b);
    \path[pic actions,fill=none](a)--(b);
```

```
    \path[pic actions,fill=none] let
    \p1=(a),\p2=(b) in (\x2,\y1)--(\x1,\y2);
    \path[fill=pgfstrokecolor] let
    \p2=(b) in (-.05,\y2)rectangle++(.1,.2);
    \draw[ks debug frame](M.south west)rectangle(M.north east);
  },
  kriegspiel/s/reconnaissance/.pic={
    \coordinate(a) at (M.south west);
    \coordinate(b) at ($(M.north east)+(0,-.2)$);
    \@ifundefinedcolor{pgffillcolor}{}{
      \path[fill=pgffillcolor](a)rectangle(b);}
    \path[pic actions,fill=none](a)rectangle(b);
    \path[fill=pgfstrokecolor] (a)--(b)--(a|-b)--cycle;
    \path[fill=pgfstrokecolor] let
    \p2=(b) in
    (-.05,\y2)--++(0,.2)--++(-10:.4)--++(-170:.3)--(.05,\y2)--cycle;
    \draw[ks debug frame](M.south west)rectangle(M.north east);
  },
  kriegspiel/s/artillery/.pic={
    \coordinate(a) at (M.south west);
    \coordinate(b) at ($(M.north east)+(0,-.5)$);
    \@ifundefinedcolor{pgffillcolor}{}{
      \path[fill=pgffillcolor](a)rectangle(b);}
    \path[pic actions,fill=none](a)rectangle(b);
    %\path[pic actions](a)rectangle(b);
    \foreach \s in {-.8,0,.8}{
      \path[fill=pgfstrokecolor] let
      \p2=(b),%
      \n1={\y2+\pgflinewidth} in
      (\s-.04,\y2)rectangle++( .08,.5)
      ($(\s-.18,\n1)+(0,.05)$)rectangle++( .08,.2)
      ($(\s+.18,\n1)+(0,.05)$)rectangle++(-.08,.2);
    }
    \draw[ks debug frame](M.south west)rectangle(M.north east);
  },
  kriegspiel/s/reconnaissance artillery/.pic={
    \coordinate(a) at (M.south west);
    \coordinate(b) at ($(M.north east)+(0,-.5)$);
    \@ifundefinedcolor{pgffillcolor}{}{
      \path[fill=pgffillcolor](a)rectangle(b);}
    \path[pic actions,fill=none](a)rectangle(b);
    %\path[pic actions](a)rectangle(b);
    \path[fill=pgfstrokecolor] (a)--(b)--(a|-b)--cycle;
    \foreach \s in {-.8,0,.8}{
      \path[fill=pgfstrokecolor] let
      \p2=(b),%
      \n1={\y2+\pgflinewidth} in
      (\s-.04,\y2)rectangle++( .08,.5)
      ($(\s-.18,\n1)+(0,.05)$)rectangle++( .08,.2)
      ($(\s+.18,\n1)+(0,.05)$)rectangle++(-.08,.2);
    }
    \draw[ks debug frame](M.south west)rectangle(M.north east);
  }
```

```
}
```

\n@to@pp@s@ll

A list of all defined symbols

```
\def\n@to@pp@s@ll{
  weapon=base,
  weapon=top,
  weapon=bottom,
  weapon=rifle,
  weapon=machine gun,
  weapon=grenade launcher,
  weapon=missile launcher,
  weapon=non lethal,
  weapon=multi fire,
  weapon=air defence,
  weapon=anti tank,
  weapon=full,
  weapon,
  type=light,
  type=medium,
  type=heavy,
  type=vlight,
  type=vmedium,
  type=vheavy,
  type,
  above corps support,
  air assault with organic lift,
  air decoy,
  air assault,
  air defence,
  air strip,
  air traffic,
  airship,
  airborne,
  ammunition,
  amphibious,
  amphibious warfare ship,
  analysis,
  arrest,
  artillery,
  anti tank anti armour,
  antenna,
  armoured,
  armoured fighting vehicle,
  armoured personnel carrier,
  arctic,
  automobile,
  balloon,
  bar,
  base,
  bicycle equipped,
```

```
boat,
booby trap,
bottomed,
bridge=none,
bridge=fixed,
bridge=folding,
bridge=hollow,
bridge,
capsule,
carrier,
chemical biological radiological nuclear,
civilian military cooperation,
civilian police,
civilian telecommunications,
coast guard vessel,
combat support,
combatant,
combined arms,
computer system,
control,
convoy,
corps support,
crime,
decoy,
direct communications,
direction finding,
diving=none,
diving=military,
diving,
drilling,
earthmover,
electric power,
electronic ranging,
electronic warfare wide,
engineer,
enhanced location reporting system,
environmental protection,
explosion,
finance,
fishing vessel,
fire protection,
fixed and rotary wing,
fixed wing,
flame thrower,
floating,
surfaced,
food,
fuel,
grenade launcher=none,
grenade launcher=non lethal,
grenade launcher,
graffiti,
group,
```

```
gun=base,
gun=air defence,
gun=anti tank,
gun=direct,
gun=recoilless,
gun,
headquarters,
house,
howitzer,
in position,
individual,
infantry,
intermodal,
jagged wave,
jam,
jamming,
jetski,
killing,
labour,
land mine=personnel,
land mine=tank,
land mine=none,
land mine,
land missile,
laser,
launcher,
laundry,
machine gun,
main gun,
maintenance,
medic,
medical,
medical treatment,
mine,
mine clearing equipment,
mine warfare vessel,
missile,
missile launcher=base,
missile launcher=none,
missile launcher=air defence,
missile launcher=anti tank,
missile launcher=surface to surface,
missile launcher,
mobile advisor and support,
moored,
mortar,
motorized,
mortuary affairs,
mountain,
naval,
navigation,
navy task,
non combatant,
```

```
20085   non lethal weapon,
20086   nuclear,
20087   observer,
20088   orbiter shuttle,
20089   ordnance,
20090   organisation,
20091   over snow,
20092   pack animal,
20093   patrol,
20094   patrolling,
20095   physician,
20096   pipeline,
20097   poisoning,
20098   postal,
20099   printed media,
20100   psychological,
20101   quarry,
20102   quartermaster,
20103   radar,
20104   radio,
20105   radio relay,
20106   radio relay line of sight,
20107   radio teletype,
20108   railroad,
20109   reconnaissance,
20110   recovery unmanned systems,
20111   rifle,
20112   rising,
20113   riverine,
20114   rocket launcher=base,
20115   rocket launcher=anti tank,
20116   rocket launcher=single,
20117   rocket launcher=multiple,
20118   rocket launcher=single head,
20119   rocket launcher=multiple head,
20120   rocket launcher,
20121   rotary wing,
20122   runway,
20123   sailing boat,
20124   satellite=none,
20125   satellite=astronomical,
20126   satellite=bio,
20127   satellite=communications,
20128   satellite=navigation,
20129   satellite=earth observing,
20130   satellite=tether,
20131   satellite=small,
20132   satellite=reconnaissance,
20133   satellite,
20134   sea mine=top half,
20135   sea mine=bottom half,
20136   sea mine=full,
20137   sea mine=neutralised,
```

```
  sea mine=neutralized,
  sea mine,
  seabed installation,
  search,
  searching,
  semi trailer truck,
  sensor,
  ship,
  signal,
  signals intelligence,
  ski,
  sled,
  small squashed text=TXT,
  small text=TXT,
  sniper,
  space station,
  squashed text=TXT,
  submarine,
  submersible,
  supply,
  surface combatant,
  survey,
  tactical satellite,
  tank,
  text=TXT,
  topographic,
  torpedo,
  towed,
  tracked,
  train locomotive,
  transportation,
  unexploded ordnance,
  unmanned,
  utility vehicle,
  vehicle,
  video imagery,
  warfare vessel,
  water,
  wheeled=and tracked,
  wheeled=limited,
  wheeled=cross country,
  wheeled=semi,
  wheeled
}
```

A Generate draft VASSAL module

We can use the code you wrote for your game pieces (counters, maps, tables), to generate a draft VASSAL module. To that end, use the document class wgexport, and some simple macros to export your graphics to a single PDF. A provided Python script then processes this to generate the draft VASSAL module.

The generated VASSAL module is not the final thing, but it is a good start.

A.1 Example

Suppose we have defined counters and markers like

```
allied 1 id      axis 1 ad     out of supply
allied 2 ad      axis 2 ad     game turn
allied 3 abid    axis 3 ic
```

via Tikz styles. Also assume that we have macros

```
\board   \oob    \charts   \front
```

which produces tikzpictures to the board, OOBs, charts, and cover, respectively. All this is defined in our package `mygame`. Of course that we have our rules in the file `game.pdf`.

We prepare a simple LaTeX source file

```
\documentclass{wgexport}
\usepackage{mygame}
\begin{document}
\begin{imagelist}  %% Records image meta info
  \chitimages{{%
     {allied 1 id,allied 2 ad,allied 3 abid}/Allied,%
     {axis 1 ad,axis 2 ad,axis 3 ic}/Axis,%
     {out of supply, game turn}/Markers}}
  \info{Board}{board}{} \board
  \info{OOB}{oob}{}     \oob
  \info{Charts}{chart}{}\chart
  \info{Cover}{front}{} \front
\end{imagelist}
\end{document}
```

When we run LaTeX on this, we will get a PDF where each page is a separate image and the page is cropped to image. *In addition* we will get a CSV (comma-separated-values) file `export.csv` which contains some meta information about each page. In particular, it identifies the name of each page, the category, and sub category of the image.

For chits, the name of the image is the style name (e.g., `game turn`). For other images, it is the first argument to `\info` above.

The category is for chits is always `counter`. For other images, it is the second argument to the `\info` macro (e.g., `board`).

The category of an image is important later on when we generate the VASSAL module. Recognised categories are

- `counter` for counter images. Such an image will trigger the creation of a VASSAL game piece.
- `board` for board images. Images of this kind will result in VASSAL board (or Map) elements.
- `oob` for Order of Battle tables. This will also result in a VASSAL map being created, but one that is displayed as a pop-up and with a rectangular grid. This is useful for placing units in an Order of Battle chart.

- `chart` for charts. These images will be made VASSAL charts — i.e., pop-up windows which contains some graphics for the players reference.
- `front` for the cover image. This will become the module splash image. Only one such image (the first) will be used.

Other categories may be used, and the corresponding image will be added to the VASSAL module. However, they will no be processed in any specific way.

The *sub-category* is mainly used for counters. Above, we gave the sub-categories `Allied`, `Axis`, and `Markers`. The sub-categories will help to identify the factions of the game, and counter prototypes will be made for each category. The sub-categories of `board`, `charts`, `oob`, and `front` has no or little effect.

One we have processed the file above to generate our PDF (Say `export.pdf`), then we can process it (and the CSV file) with a Python script to make our draft VASSAL module

```
export.py export.pdf export.csv -o Game.vmod -t Game -v 0.1 \
    -d "My game" -r rules.pdf
```

This will generate the draft module `Game.vmod`. Note that we add the rules (`-r rules.pdf`) to the module so that the module is complete.

Once the module has been generated, one can open it in the VASSAL editor and further customise it. For example, the grids used in the boards needs to be adjusted, and one may want to make initial set-ups or add all counters to the OOB.

Of course, running the Python script will overwrite all changes, so perhaps it is a good idea to work on a copy of the output file.

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