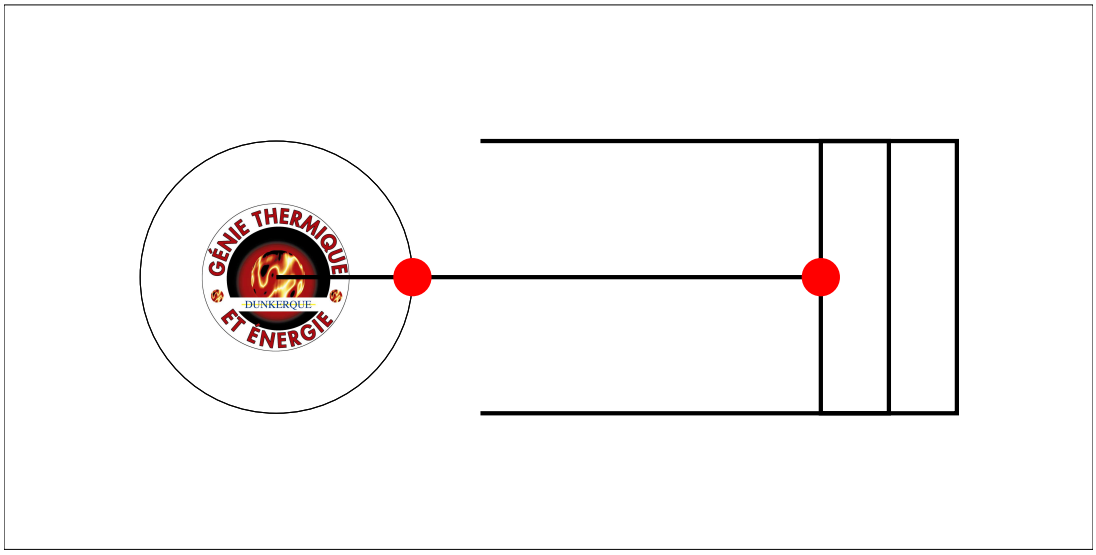
Visual TikZ

Version 0.66

Jean Pierre Casteleyn
IUT Génie Thermique et Énergie
Dunkerque, France

Updated on May 31, 2018



Objectives :

- One image per command or parameter.
- the minimum amount of text possible.
- the most complete possible update after update.
- keep the same structure as VisualPSTricks

Remarks : Minimal code is given to show the effect of a command or a parameter. The effects are sometime exaggerated for clarity .To consult the documentation, I have given the number of the Section in pgfmanual

You can contact me at my personal email to

- let me know the mistakes found (please indicate the page)
- give me your commentaries, your suggestions ...

What's new :

- chains library added 67
- through library added 60
- turtle library added 185
- positioning library added 56
- Tikzsymbols package added 156
- Tikzducks package updated 150
- shapes packages updated 91

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This work has the LPPL maintenance status 'maintained'.
The Current Maintainer of this work is M. Jean Pierre Casteleyn.

Thanks to:
Till Tantau , Alain Matthes , Jim Diamond , Falk Rühl , Axel Kielhorn , Nils Fleischhacker , Michel Fruchart , Ben Vitecek

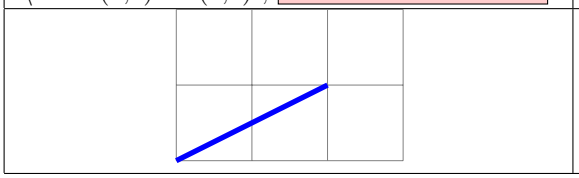
Contents

1 Tikz loading

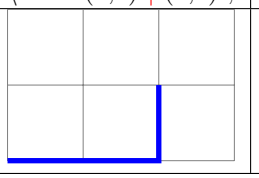
Load package : \usepackage{tikz}

2 Basic figures

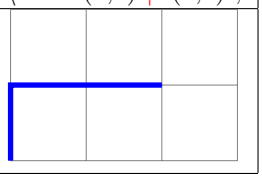
\draw (0,0) - - (2,1) ; PGFmanual section : 14-2



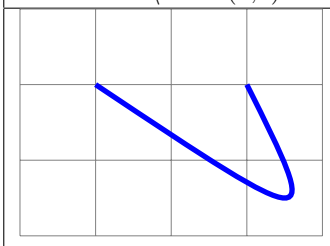
\draw (0,0)-| (2,1) ;



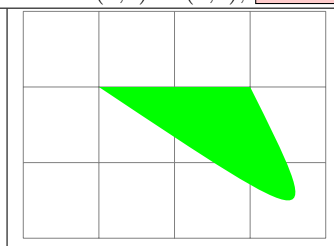
\draw (0,0) |- (2,1) ;



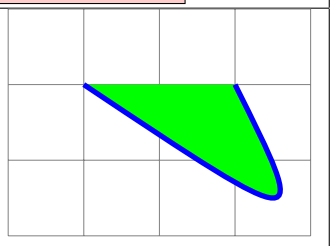
\draw (0,2) . . controls (3,0) .. (2,2); PGFmanual section : 14-3



\draw

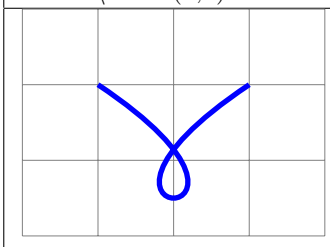


\fill

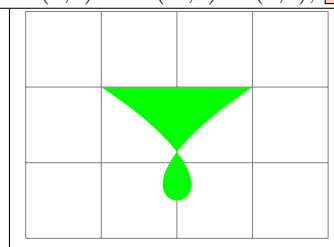


\filldraw

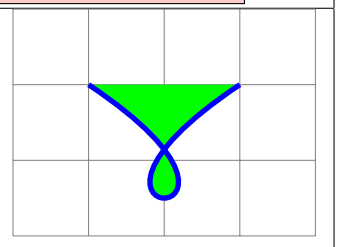
\draw (0,2) . . controls (3,0) and (-1,0) .. (2,2); PGFmanual section : 14-3



\draw

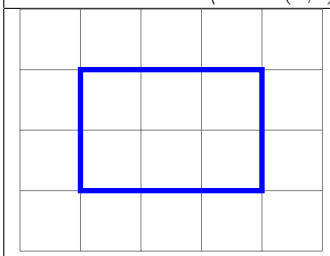


\fill



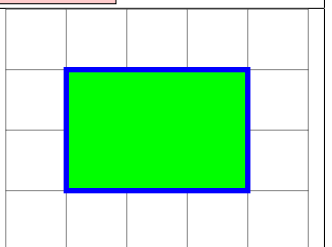
\filldraw

\draw (0,0) rectangle (3,2); PGFmanual section : 14-4



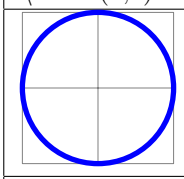
\draw

\fill

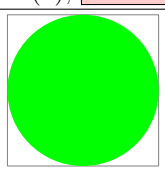


\filldraw

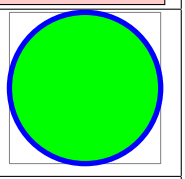
\draw (1,1) circle (1); PGFmanual section : 14-6



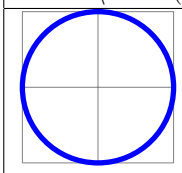
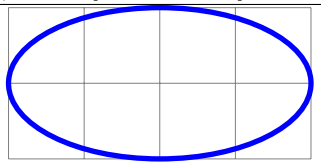
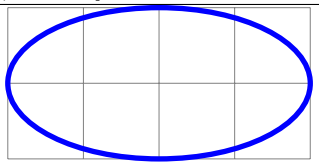
\draw

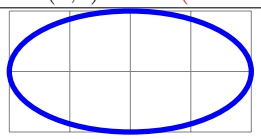
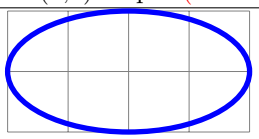


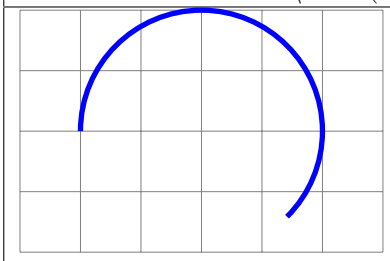
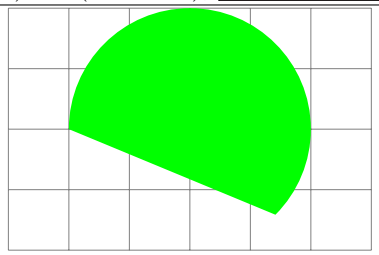
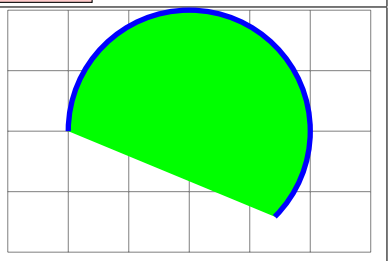
\fill

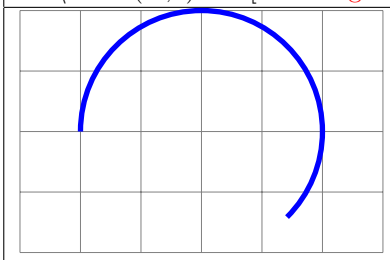
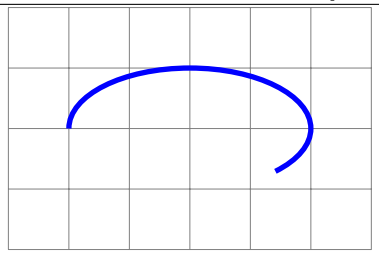
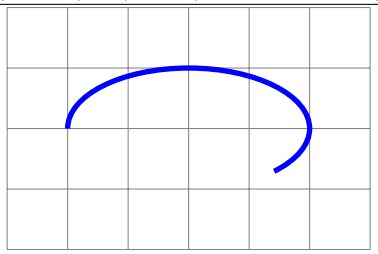


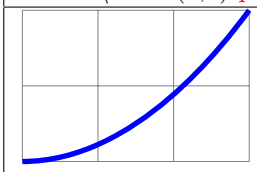
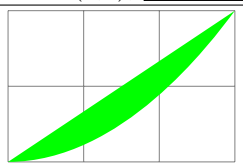
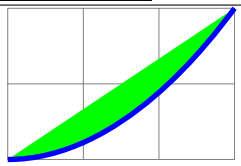
\filldraw

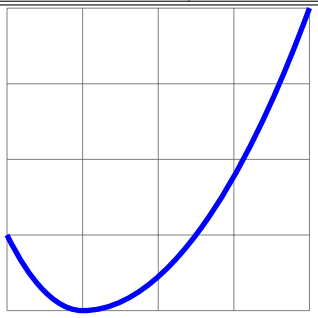
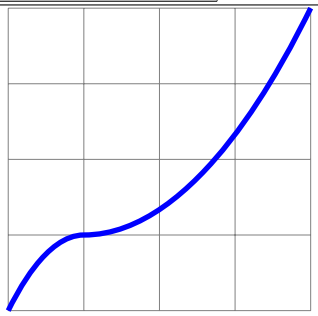
\draw (1,1) circle [radius=1cm];		\draw (1,1)ellipse [x radius=2cm,y radius=1cm]
		
radius=1cm	x radius=2cm,y radius=1cm	

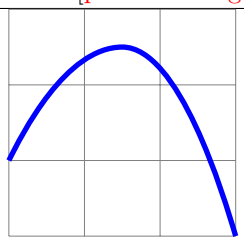
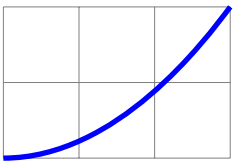
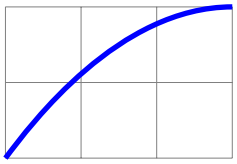
\draw (1,1) circle (2 and 1);	\draw (1,1) ellipse (2 and 1);
	

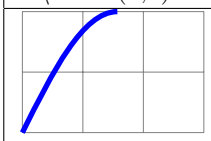
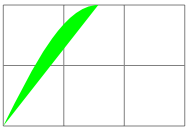
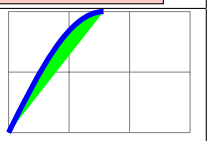
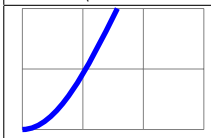
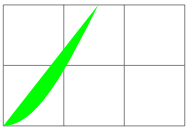
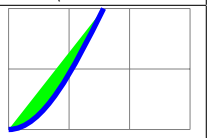
\draw (-2,0) arc (180:-45:2); PGFmanual section : 14-7		
		
\draw	\fill	\filldraw

\draw (-2,0) arc [start angle=180, end angle=-45,radius=1]		\draw (-2,0) arc (180:-45:2 and 1)
		
radius=1	x radius=1,y radius=.5	

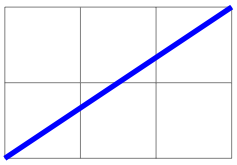
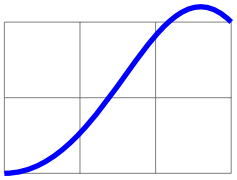
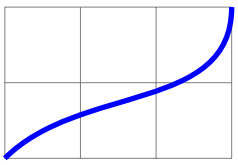
\draw (0,0) parabola (3,2); PGFmanual section : 14-9		
		
\draw	\fill	\filldraw

	
\draw(0,1) parabola bend (1,0) (4,4);	\draw(0,0) parabola[bend pos=0.25] (4,4);

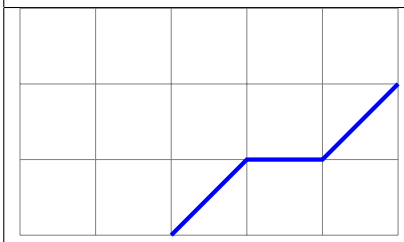
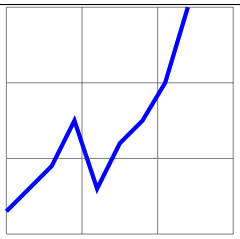
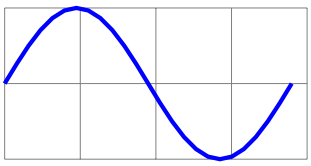
\draw(0,1) parabola [parabola height=2cm] (3,0);	\draw(0,0) parabola[bend at start] (3,2);	
		
	[bend at start]	[bend at end]

\draw (0,0) sin (1.57,2); PGFmanual section : 14-10		
		
\draw	\fill	\filldraw
		
\draw (0,0) cos (1.57,2);		

PGFmanual section : 14-13

		
\draw (0,0) to (3,2);	\draw[out=0] (0,0) to (3,2);	\draw [in=-90] (0,0) to (3,2);
see section 7.6 page 51		

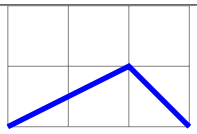
Drawing with plot PGFmanual section : 14-12 PGFmanual section : 22

list of coordinates	file of coordinates	mathematical equation
		
plot coordinates {(2,0) (3,1) (4,1) (5,2)}	plot file {table.dat}	plot (\x,{sin(\x)})
voir page 160		

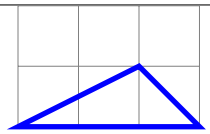
3 Path and edge

3.1 Path

PGFmanual section : 14

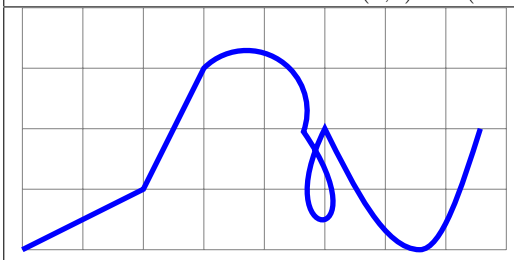


\draw (0,0) - - (2,1) - - (3,0) ;

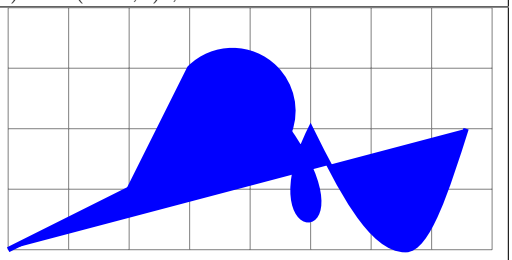


\draw (0,0) - - (2,1) - - (3,0) - - cycle ;

\draw (0,0) - - (2,1) - - (3,3) arc (135:-20:1) .. controls (6,0) and (4,0) .. (5,2) sin (6.57,0) cos (7.57,2) ;

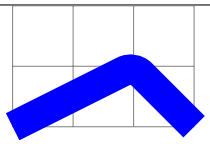


\draw

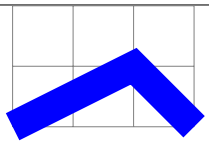


\filldraw

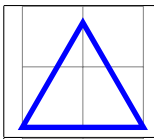
PGFmanual section : 14-5



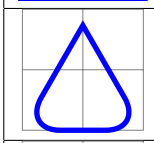
\draw [rounded corners] (0,0) – (2,1) – (3,0) ;



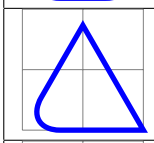
\draw [sharp corners] (0,0) - - (2,1) - - (3,0) ;



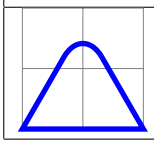
\draw [rounded corners=0.5cm] (0,0) - - (1,1.732) - - (2,0) - - cycle ;



\draw (0,0) - - (1,1.732) [rounded corners=0.5cm] - - (2,0) - - cycle ;

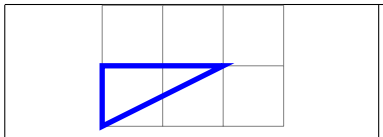


\draw (0,0) - - (1,1.732) - - (2,0)[rounded corners=0.5cm] - - cycle ;

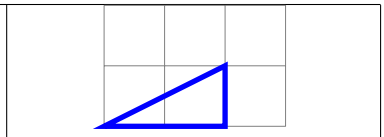


\draw [rounded corners=0.5cm] (0,0) - - (1,1.732)[sharp corners] - - (2,0) - - cycle ;

PGFmanual section : 14-2-2

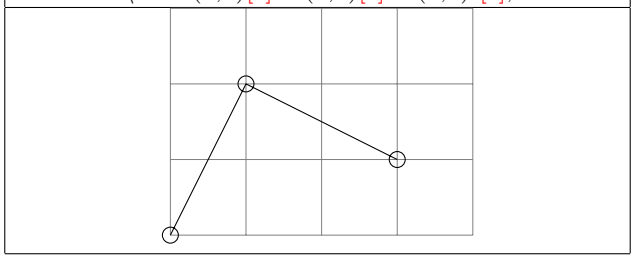


\draw (0,0) - - (2,1) -| cycle ;



\draw (0,0) - - (2,1) |- cycle ;

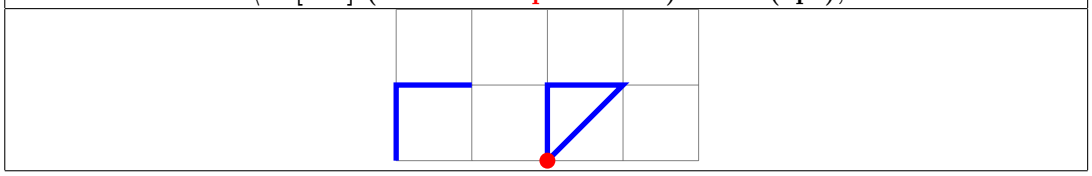
```
\tikz [c/.style={insert path={circle[radius=3pt]}}]
  \draw(0,0)[c] -- (1,2)[c] -- (3,1) [c];
```



Path interrupted PGFmanual section : 14-1

```
\draw (0.5,0.5) - -(2.5,0.5) (0.5,1.5) - -(2.5,1.5);
```

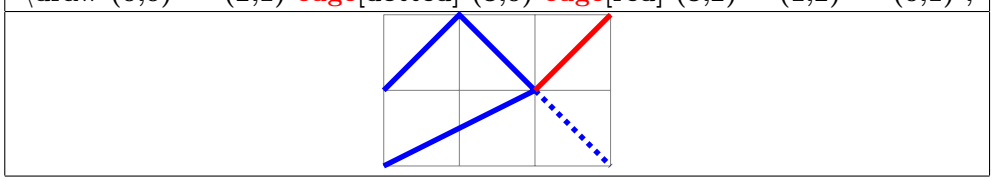
```
\draw (0,0) - - (0,1) - - (1,1) (2,0) - - (2,1) - - (3,1) - - (current subpath start);
  \fill[red] (current subpath start) circle (3pt);
```



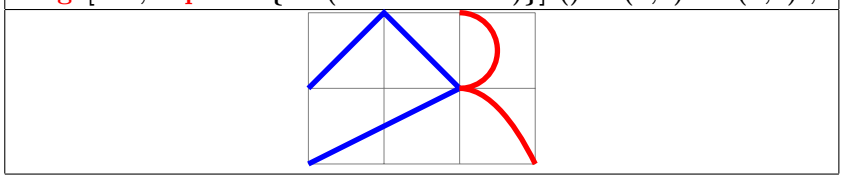
3.2 Pathes in a path : edge

PGFmanual section : 17-12

```
\draw (0,0) - - (2,1) edge[dotted] (3,0) edge[red] (3,2) - -(1,2) - - (0,1) ;
```



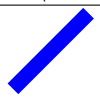
```
\draw (0,0) - - (2,1) edge([red,to path={parabola (3,0)} ] ()
  edge[red,to path={arc(-90 : 90 : 0.5)}] () - -(1,2) - - (0,1) ;
```



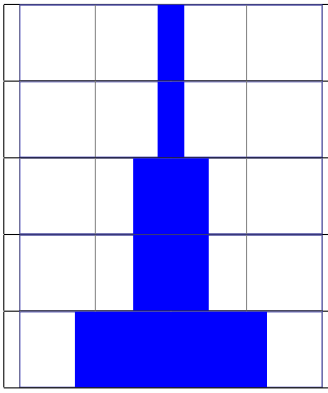
4 Parameters

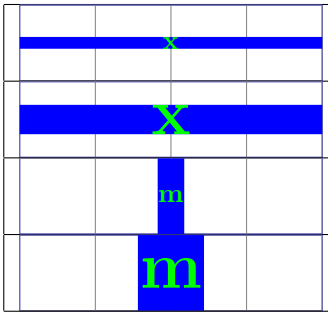
4.1 Line width

PGFmanual section : 15-3-1

\tikz \draw[line width=.2cm] (0,0) - - (1,1);			
			
[line width=.2cm]	[ultra thin] (0.1pt)	[very thin] (0.2pt)	[thin] (0.4pt)
			
[semithick] (0.6pt)	[thick] (0.8pt)	[very thick] (1.2pt)	[ultra thick] (1.6pt)

4.2 Dimensions available

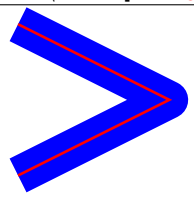
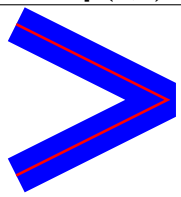
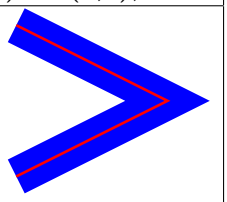
	\draw[line width=10pt] (2,0) to (2,1);
	\draw[line width=10bp] (2,0) to (2,1);
	\draw[line width=10mm] (2,0) to (2,1);
	\draw[line width=1cm] (2,0) to (2,1);
	\draw[line width=1in] (2,0) to (2,1);

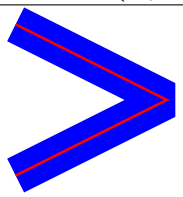
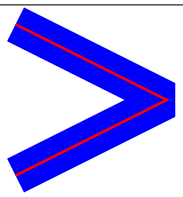
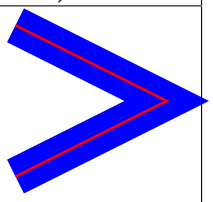
	\draw[line width=1ex] (0,0.5) to (4,.5);
	\Huge \draw[line width=1ex] (0,0.5) to (4,.5);
	\draw[line width=1em] (2,0) to (2,1);
	\Huge \draw[line width=1em] (2,0) to (2,1);

4.3 Terminators

		
[line cap=rect]	[line cap=butt]	[line cap=round]

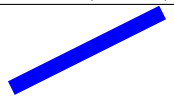
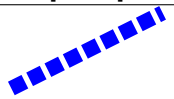
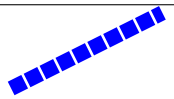
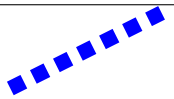
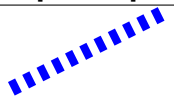
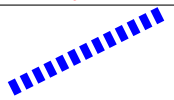
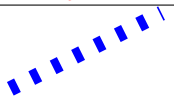
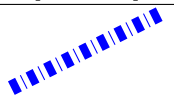
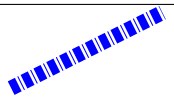
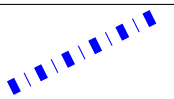
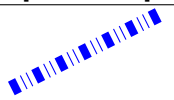
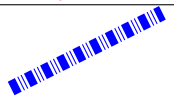
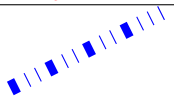
4.4 Lines junction

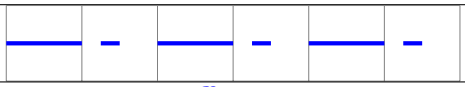
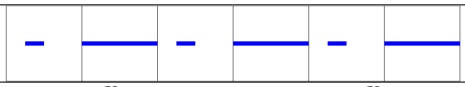
\draw[line join=round] (0,0) - - (2,1) - - (0,2);		
		
[line join=round]	[line join=bevel]	[line join=miter]

\draw[miter limit=1] (0,0) - - (2,1) - - (0,2); (By default : miter limit=10)		
		
miter limit=1	miter limit=2	miter limit=3

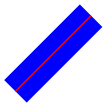
4.5 Line styles

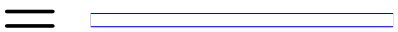
PGFmanual section : 15-3-2

\tikz \draw[solid,line width=2mm] (0,0) - - (2,1);		
		
[solid]		
		
[dotted]	[densely dotted]	[loosely dotted]
		
[dashed]	[densely dashed]	[loosely dashed]
		
[dash dot]	[densely dash dot]	[loosely dash dot]
		
[dash dot dot]	[densely dash dot dot]	[loosely dash dot dot]


[dash pattern= on 1cm off 0.25cm on 0.25cm off 0.5cm]

[dash pattern=on 1cm off .25cm on .25cm off .5cm,dash phase=1cm]

PGFmanual section : 15-3-4

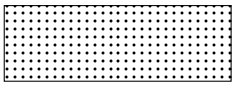
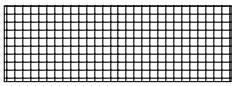
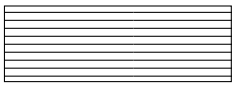
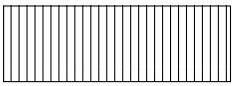
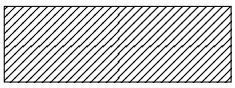
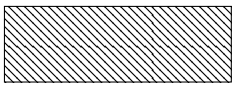
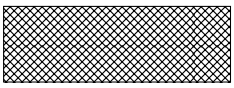
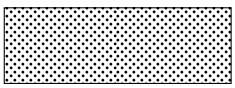
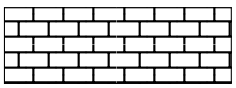
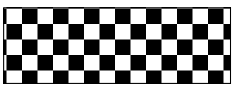
\tikz \draw[line width=.2cm,double] (0,0) - - (1,1);			
			
double	draw=blue,double=red	double distance=.3cm	double distance between line centers =.3cm

\Huge = \tikz \draw[double equal sign distance] (0,0) - - (4,0);	
	
\Huge	\large

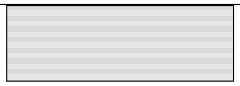
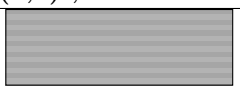
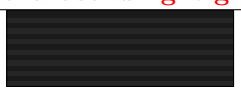
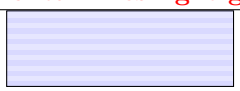
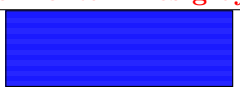
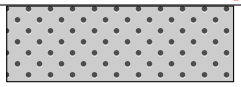
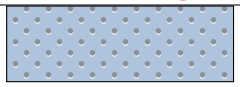
4.6 Fillings

PGFmanual section : 15-5-1 PGFmanual section : 60

Load package : \usetikzlibrary{patterns}

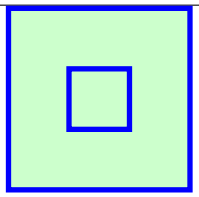
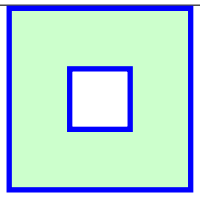
\draw[pattern= dots] (0,0) - - (3,1);		
		
dots	fivepointed stars	sixpointed stars
		
grid	horizontal lines	vertical lines
		
north east lines	north west lines	rosshatch
		
crosshatch dots	bricks	checkerboard

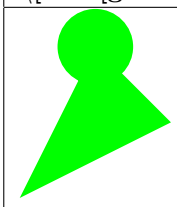
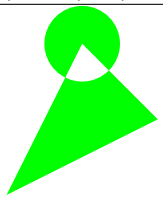
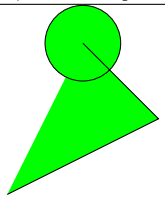
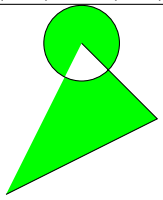

\draw[pattern=fivepointed stars,pattern color=red] (0,0) rectangle (3,1);

\draw[pattern=checkerboard light gray] (0,0) - - ((3,2) ;		
		
checkerboard light gray	horizontal lines light gray	horizontal lines gray
		
horizontal lines dark gray	horizontal lines light blue	horizontal lines dark blue
		
crosshatch dots gray	crosshatch dots light steel blue	

4.7 Filling rule

PGFmanual section : 15-5-2

nonzero rule (By default)	
	
\filldraw [fill=green!20] (0,0) - - (0,3) - - (3,3) - - (3,0) - - cycle (1,1) - - (1,2) - - (2,2) - -(2,1) - - cycle ;	\filldraw [fill=green!20] (0,0) - - (0,3) - - (3,3) - - (3,0) - - cycle (1,1) - - (2,1) - - (2,2) - -(1,2) - - cycle;

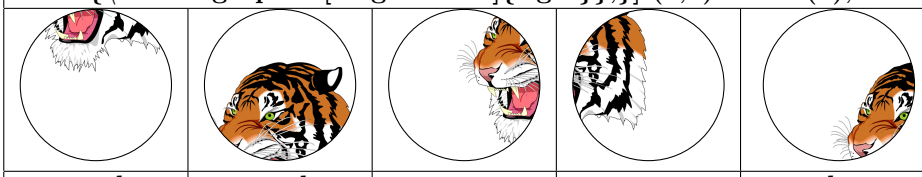
even odd rule		\filldraw[fill=green] (0,0) – (2,1) - - (1,2) circle (.5cm);	
\[fill=[green] (0,0) - - (2,1) - - (1,2) circle (.5cm);			
			
[fill=green]	[even odd rule,fill=green]	[fill=green]	[even odd rule,fill=green]

4.8 Filling with an image

PGFmanual section : 15-6

\draw [path picture={ \node at (path picture bounding box.center) {\includegraphics[height=3cm]{tiger}};}] (0,1) circle (1);		
		
(0,1) circle (1)	(0,0) - - (-1,1) - - (0,2) - - (1,1) - - cycle	(1,0) parabola[parabola height=2cm] (3,0)

\draw [path picture={ \node at (path picture bounding box.north) {\includegraphics[height=3cm]{tiger}};}] (0,1) circle (1);



north | south | east | west | south east

4.9 Shading

4.9.1 Shadings available

PGFmanual section : 15-7

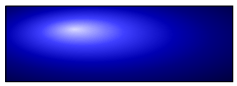
\shade (0,0) rectangle (3,1);

\shadedraw (0,0) rectangle (3,1);

\shadedraw[shading=axis](0,0) rectangle (3,1);

axis

radial



ball

[left color=red]

[right color=green]

left color=red,right color=green

[top color=red]

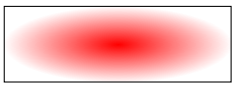
[bottom color=green]

middle color=red

shading angle=90

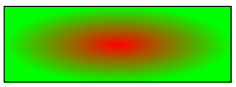
right color=green
[shading angle=45]

left color=red
shading angle=-45



inner color=red

outer color=green



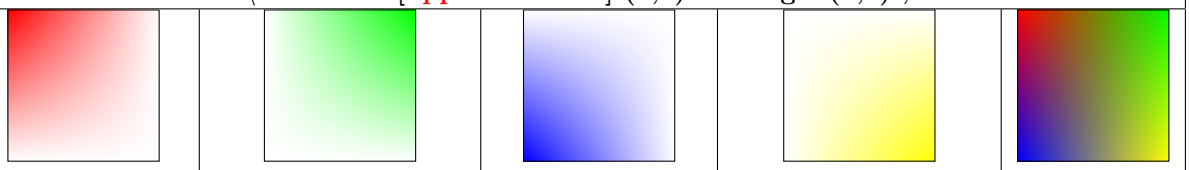
inner color=red outer color=green

4.9.2 Shading library

PGFmanual section : 65

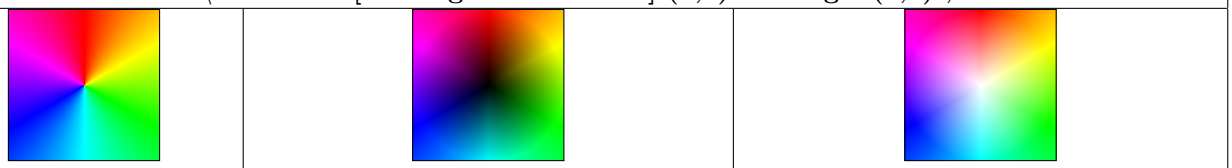
Load package : \usetikzlibrary{shadings}

\shadedraw[upper left=red] (0,0) rectangle (2,2) ;

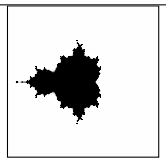


upper left=red | upper right=green | lower left=blue | lower right=yellow

\shadedraw[shading=color wheel] (0,0) rectangle (2,2) ;



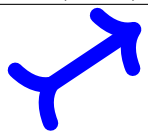
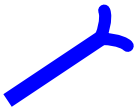
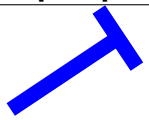
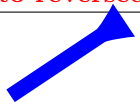
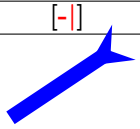
shading=color wheel | shading=color wheel black center | shading=color wheel white center



shading=Mandelbrot set

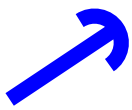
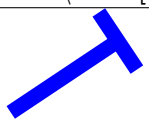
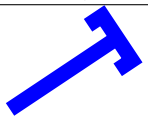
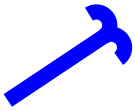
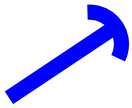
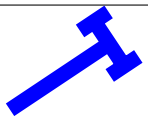
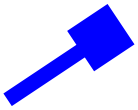
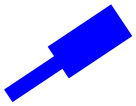
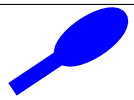
4.10 Extremities

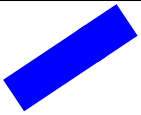
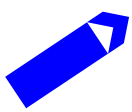
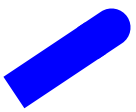
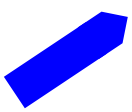
4.10.1 TikZ package

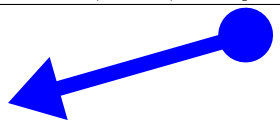
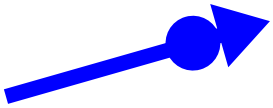
\tikz \draw[->,line width=.2cm,blue] (0,0) - - (1.5,1);			
			
[->]	[<-]	[<->]	[>->]
			
[-to]	[-to reversed]	[-o]	[-|]
			
[-latex]	[-latex reversed]	[-stealth]	[-stealth reversed]

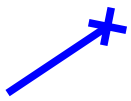
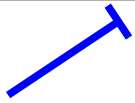
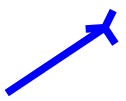
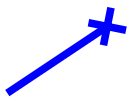
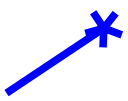
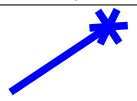
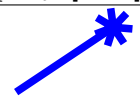
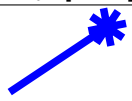
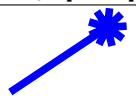
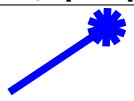
4.10.2 "library arrow.meta"

Load package : \usetikzlibrary{arrows.meta}

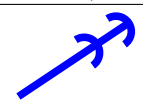
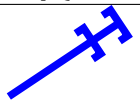
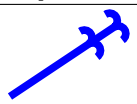
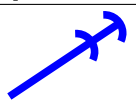
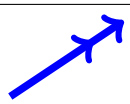
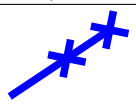
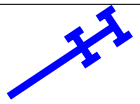
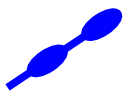
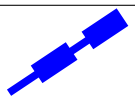
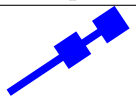
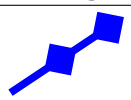
\tikz \draw[-Arc Barb,line width=.2cm,blue] (0,0) - - (1.5,1) ;				
				
-Arc Barb	-Bar	-Bracket	-Hooks	-Stealth
				
-Parenthesis	-Straight Barb	-Tee Barb	-Classical TikZ Rightarrow	-Square
				
-Circle	-Implies, double	-Rectangle	-Computer Modern Rightarrow	-Turned Square
			[-To]	
				
-Diamond	-Ellipse	-Kite	[-Latex]	-Triangle

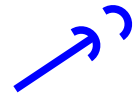
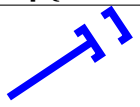
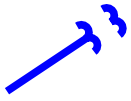
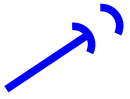
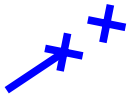
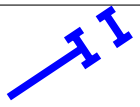
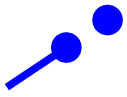
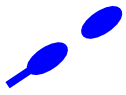
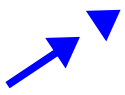
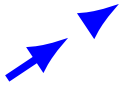
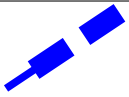
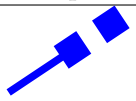
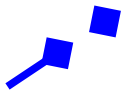
\tikz \draw[-Butt Cap,line width=.2cm,blue] (0,0) - - (1.5,1) ;				
				
-Butt Cap	-Fast Round	-Fast Triangle	-Round Cap	-Triangle Cap

\tikz \draw[Triangle-Circle,line width=.2cm,blue] (0,0) - - (3.5,1) ;		
		
Triangle-Circle	{Circle[] Triangle[]}	{Circle[] . Triangle[] Triangle[] }

\tikz \draw[-Rays],line width=.1cm,blue] (0,0) - - (1.5,1);				
				
Rays	{Rays[n=2]}	{Rays[n=3]}	{Rays[n=4]}	{Rays[n=5]}
				
{Rays[n=6]}	{Rays[n=7]}	{Rays[n=8]}	{Rays[n=9]}	{Rays[n=10]}

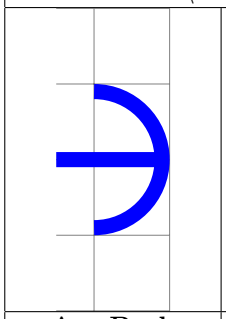
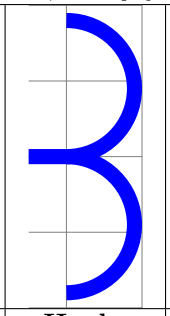
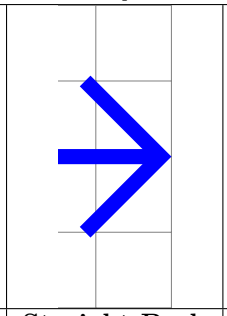
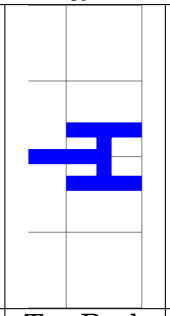
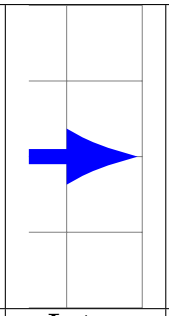
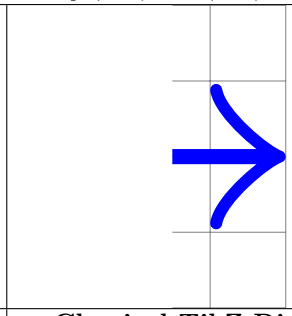
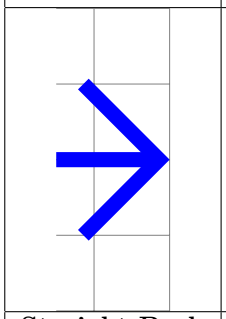
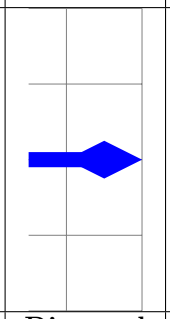
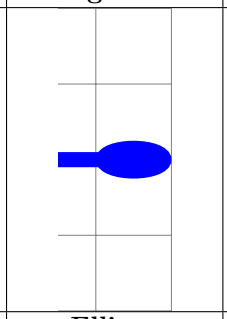
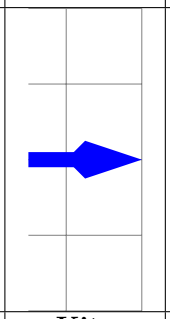
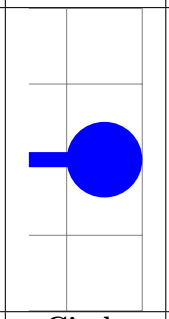
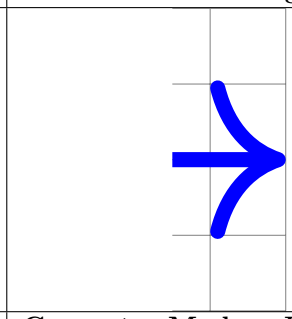
Parameter sep PGFmanual section : 16-4-2

\tikz \draw[-{Arc Barb[sep=.25cm] Arc Barb[ ]},line width=.1cm,blue] (0,0) - - (1.5,1);					
					
Arc Barb	Bracket	Hooks	Parenthesis	Classical TikZ Rightarrow	Rays
					
Straight Barb	Tee Barb	Circle	Ellipse	Computer Modern Rightarrow	Triangle
					
Latex	Kite	Rectangle	Square	Stealth	Turned Square

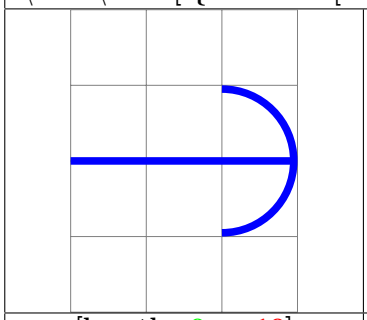
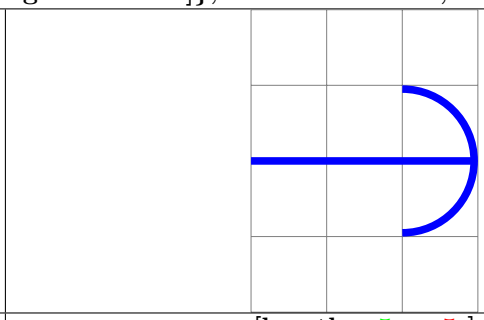
\tikz \draw[-{Arc Barb[sep=.25cm] • Arc Barb[ ]},line width=.1cm,blue] (0,0) - - (1.5,1);					
					
Arc Barb	Bracket	Hooks	Parenthesis	Classical TikZ Rightarrow	Rays
					
Straight Barb	Tee Barb	Circle	Ellipse	Computer Modern Rightarrow	Triangle
					
Latex	Kite	Rectangle	Square	Stealth	Turned Square

Parameter length PGFmanual section : 16-3-1

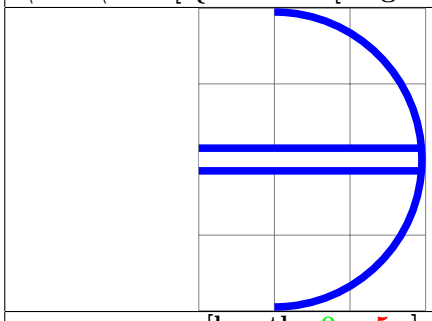
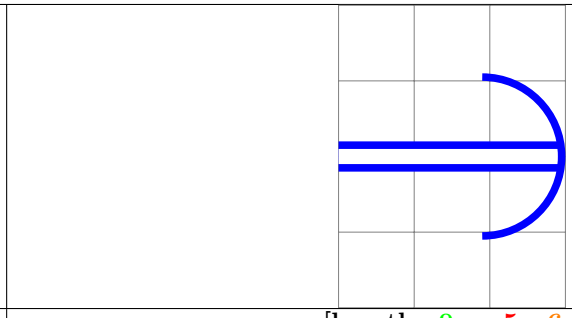
\tikz \draw[-{Arc Barb[length=1cm]},line width=.2cm,blue] (0,0) - - (1,1);

					
Arc Barb	Hooks	Straight Barb	Tee Barb	Latex	Classical TikZ Rightarrow
					
Straight Barb	Diamond	Ellipse	Kite	Circle	Computer Modern Rightarrow

\tikz \draw[-{Arc Barb[length=0cm 10]},line width=.1cm,blue] (0,0) - - (3,1);

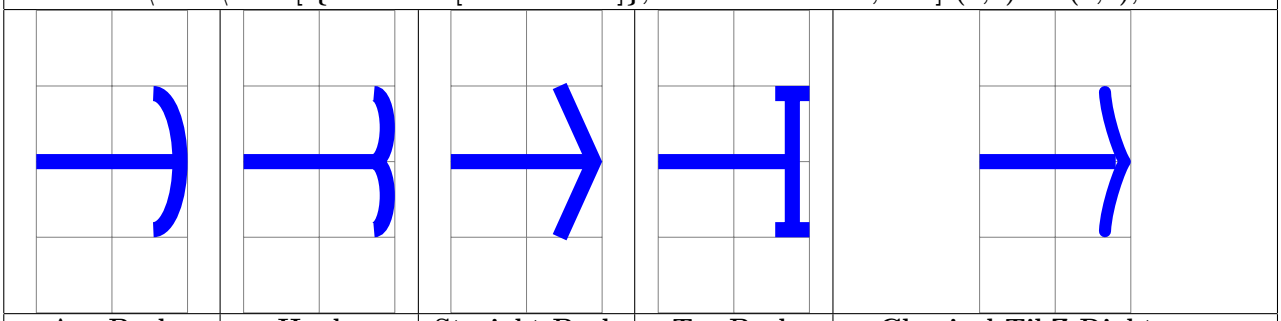
	
[length=0cm 10]	[length=.5cm 5]
0cm + 10 x .1cm = 1cm	.5cm + 5 x .1cm = 1cm

\tikz \draw[-{Arc Barb[length=0cm 5]},line width=.1cm,blue,double,double distance = 2 mm] (0,0) - - (3,1

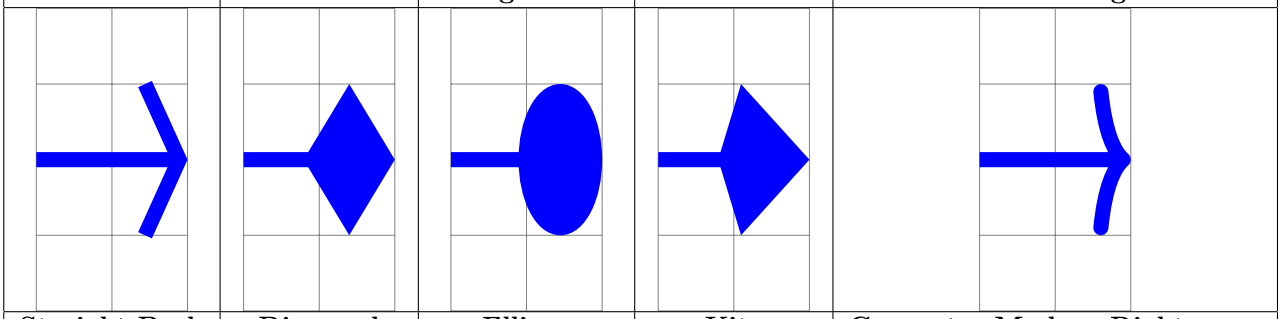
	
[length=0cm5]	[length=0cm 5 .6]
0cm + 5 x (.1cm + 2 mm + .1cm) = 2cm	0cm + 5 x (.6 x .1cm+ (1-.6)(.1cm+ 2 mm+.1cm) = 11 mm

Parameter width PGFmanual section : 16-3-1

\tikz \draw[-{Arc Barb[width=2cm]},line width=.2cm,blue] (0,0) - - (1,1);

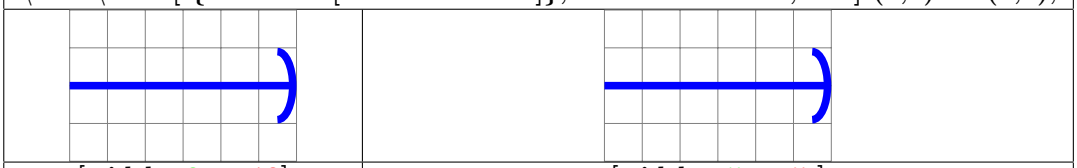


Arc Barb	Hooks	Straight Barb	Tee Barb	Classical TikZ Rightarrow



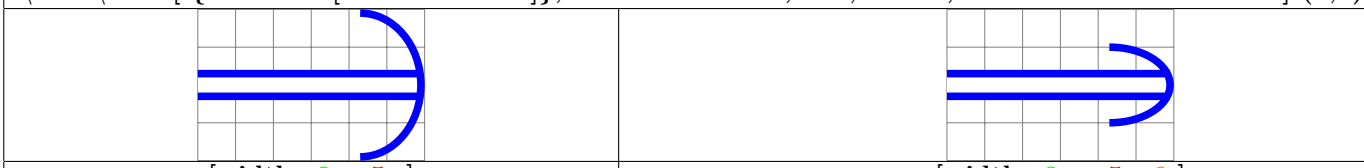
Straight Barb	Diamond	Ellipse	Kite	Computer Modern Rightarrow

\tikz \draw[-{Arc Barb[width=0cm 10]},line width=.1cm,blue] (0,0) - - (3,1);



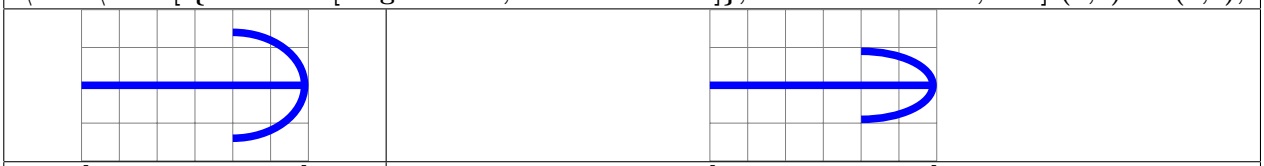
[width=0cm 10]	[width=.5cm 5]
0cm + 10 x .1cm = 1cm	.5cm + 5 x .1cm = 1cm

\tikz \draw[-{Arc Barb[width=0cm 5]},line width=.1cm,blue,double,double distance = 2 mm] (0,0) - - (3,1



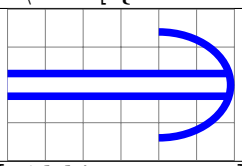
[width=0cm5]	[width=0cm 5 .6]
0cm + 5 x (.1cm + 2 mm + .1cm) = 2cm	0cm + 5 x (.6 x .1cm+ (1-.6)(.1cm+ 2 mm+=.1cm) = 11 mm

\tikz \draw[-{Arc Barb[length=1cm,width=0cm 1.5]},line width'=.1cm,blue] (0,0) - - (3,1);



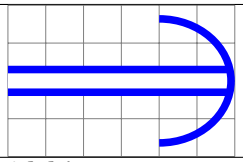
[width'=0cm 1.5]	[width'=.5cm .5]
0cm + 1.5 x 1cm = 1.5cm	.5cm + .5 x 1cm = 1cm

\tikz \draw[-{Arc Barb[length=1cm,width'=0cm 1.5]},line width=.1cm,blue,double,double distance = 2 mm



[width'=0cm 1.5]

0cm + 1.5 x 1cm = 1.5cm

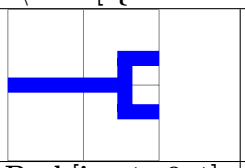


[width'=0cm 1.5 .6]

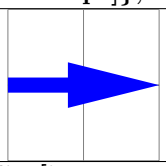
0cm + 1.5 x (.6 x 1cm+ (1-.6)(1cm+ 2 mm+1cm) = 11 mm

Parameter inset PGFmanual section : 16-3-1

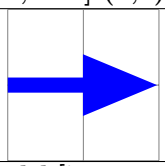
\tikz \draw[-{Tee Barb[inset=0pt]},line width=.2cm,blue] (0,0) - - (1,1);



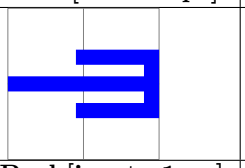
Tee Barb[inset=0pt]



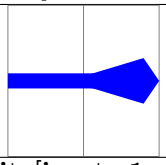
Kite[inset=0pt]



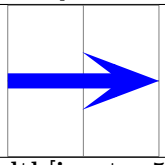
Stealth[inset=0pt]



Tee Barb[inset=1cm]

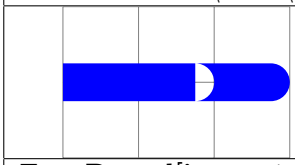


Kite[inset=1cm]

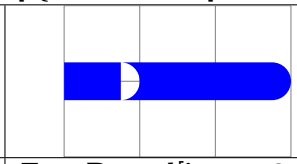


Stealth[inset=.5cm]

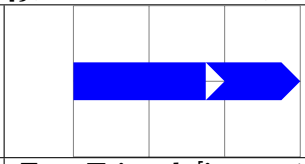
\tikz \draw[-{Fast Round[inset=1cm]},line width=.2cm,blue] (0,0) - - (1,1);



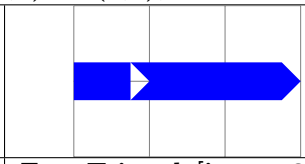
Fast Round[inset=1cm]



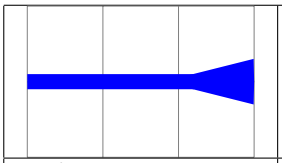
Fast Round[inset=2cm]



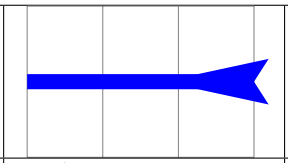
Fast Triangle[inset=1cm]



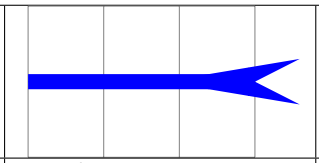
Fast Triangle[inset=2cm]



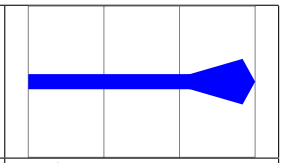
inset=1cm 1



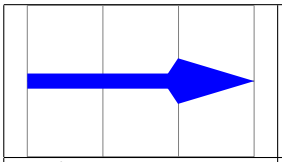
inset=1cm 2



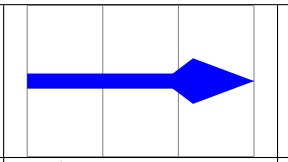
inset=1cm 4



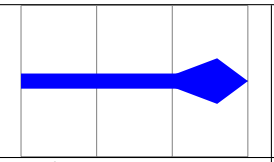
inset=1cm .2



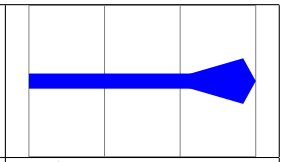
inset=0cm 1



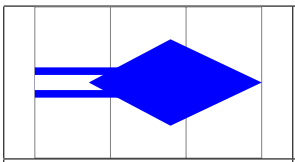
inset=0cm 2



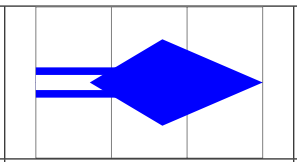
inset=0cm 4



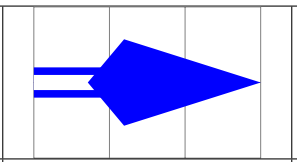
inset=0cm .2



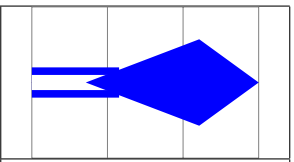
inset=0cm .2



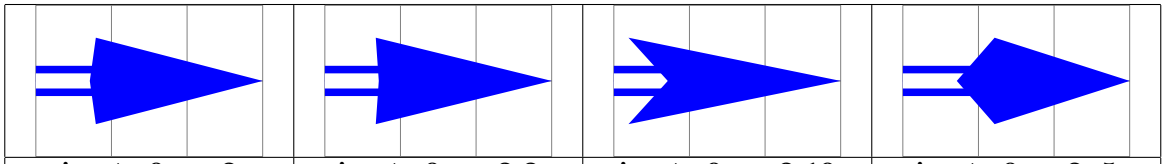
inset=0cm .2 2



inset=0cm .2 10



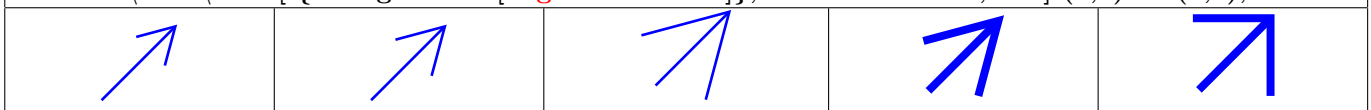
inset=0cm 2 .5



inset=0cm .2	inset=0cm .2 2	inset=0cm .2 10	inset=0cm 2 .5

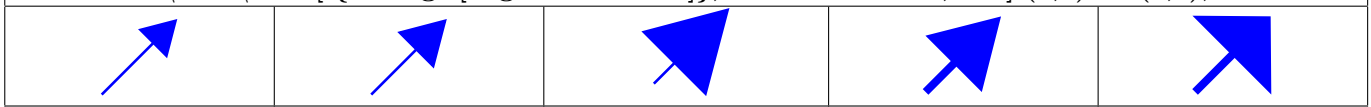
Parameter angle PGFmanual section : 16-3-1

\tikz \draw[-{Straight Barb[angle=60:.5cm 1]},line width=.2cm,blue] (0,0) - - (1,1);



[angle=60:.5cm 1]	[angle=60:.5cm 1]	[angle=60:.5cm 20]	[angle=60:.5cm 5]	[angle=90:.5cm 5]

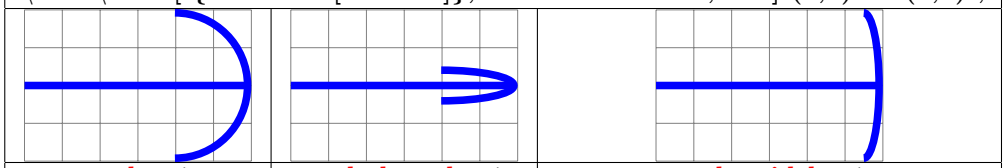
\tikz \draw[-{Triangle[angle=60:.5cm 1]},line width=.2cm,blue] (0,0) - - (1,1);



[angle=60:.5cm 1]	[angle=60:.5cm 1]	[angle=60:.5cm 20]	[angle=60:.5cm 5]	[angle=90:.5cm 5]

Parameter scale PGFmanual section : 16-3-2

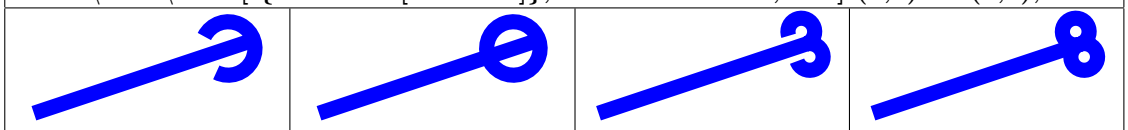
\tikz \draw[-{Arc Barb[scale=4]},li ne width=.1cm,blue] (0,0) - - (3,0) ;



scale=4	scale length=4	scale width=4

Parameter arc PGFmanual section : 16-3-3

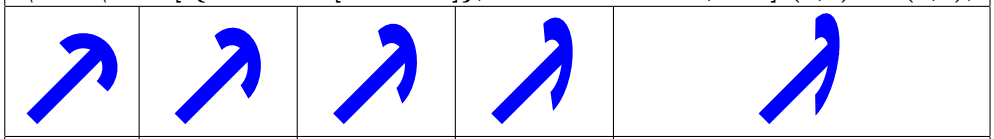
\tikz \draw[-{Arc Barb[arc=270]},line width=.2cm,blue] (0,0) - - (3,1);



Arc Barb[arc=270]	Arc Barb[arc=360]	Hooks[arc=270]	Hooks[arc=360]

Parameter slant PGFmanual section : 16-3-4

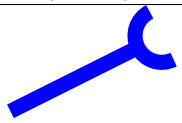
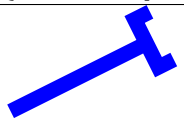
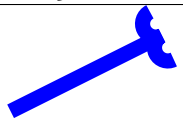
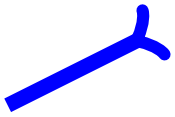
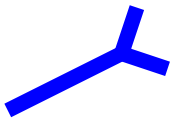
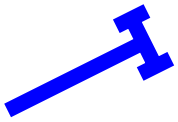
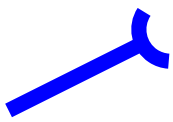
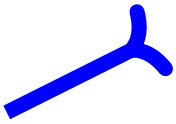
\tikz \draw[-{Arc Barb[slant=.3]},line width=.2cm,blue] (0,0) - - (1,1);

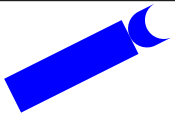
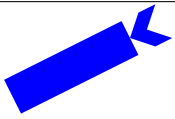
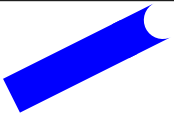
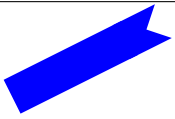


slant=0	slant=0.3	slant=0.5	slant=0.8	slant=1

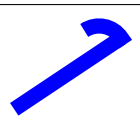
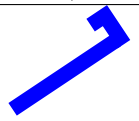
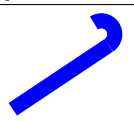
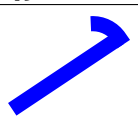
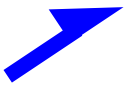
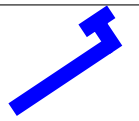
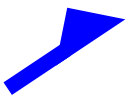
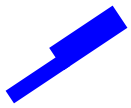
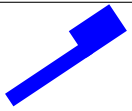
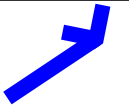
\tikz \draw[-{Arc Barb[slant=.5]},line width=.2cm,blue] (0,0) - - (1,1);				
				
Arc Barb	Bracket	Hooks	Parenthesis	Classical TikZ Rightarrow
				
Straight Barb	Tee Barb	Circle	Diamond	Ellipse
				
Kite	Latex	Rectangle	Square	Stealth
				
Turned Square	Fast Round	Fast Triangle	Round Cap	Triangle Cap

Parameter reversed **PGFmanual section : 16-3-5**

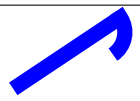
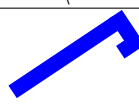
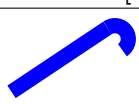
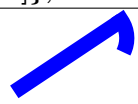
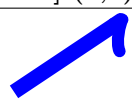
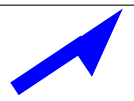
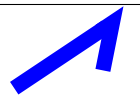
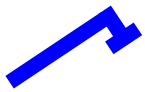
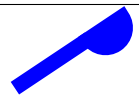
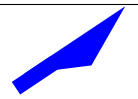
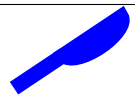
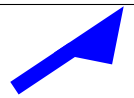
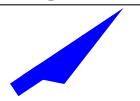
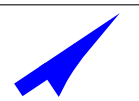
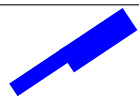
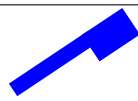
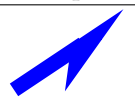
\tikz \draw[-{Arc Barb[reversed]},line width=.2cm,blue] (0,0) - - (2,1) ;			
			
Arc Barb	Bracket	Hooks	Classical TikZ Rightarrow
			
Straight Barb	Tee Barb	Parenthesis	Computer Modern Rightarrow

\tikz \draw[-{Fast Round[reversed]},line width=.5cm,blue] (0,0) - - (2,1);			
			
Fast Round	Fast Triangle	Round Cap	Triangle Cap

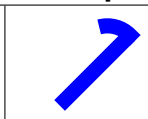
Parameter left PGFmanual section : 16-3-5

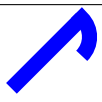
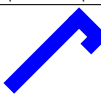
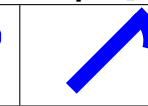
\tikz \draw[-{Arc Barb[left]},line width=.2cm,blue] (0,0) - - (1.5,1);					
					
Arc Barb	Bracket	Hooks	Parenthesis	Classical TikZ Rightarrow	Triangle
					
Straight Barb	Tee Barb	Circle	Diamond	Ellipse	Turned Square
					
Kite	Latex	Rectangle	Square	Stealth	Rays

Parameter right PGFmanual section : 16-3-5

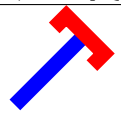
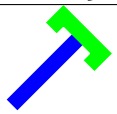
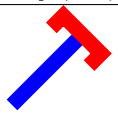
\tikz \draw[-{Arc Barb[right]},line width=.2cm,blue] (0,0) - - (1.5,1);					
					
Arc Barb	Bracket	Hooks	Parenthesis	Classical TikZ Rightarrow	Triangle
					
Straight Barb	Tee Barb	Circle	Diamond	Ellipse	Turned Square
					
Kite	Latex	Rectangle	Square	Stealth	Rays

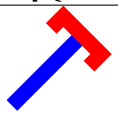
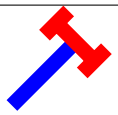
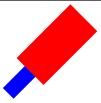
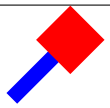
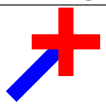
Parameter harpoon PGFmanual section : 16-3-5

\tikz \draw[-{Arc Barb[harpoon]},line width=.2cm,blue] (0,0) - - (1,1);						
						
Arc Barb	Bracket	Hooks	Parenthesis	Classical TikZ Rightarrow	Straight Barb	Tee Barb

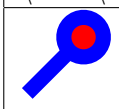
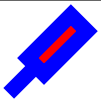
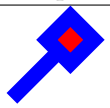
\tikz \draw[-{Arc Barb[harpoon,swap]},line width=.2cm,blue] (0,0) - - (1,1);						
						
Arc Barb	Bracket	Hooks	Parenthesis	Classical TikZ Rightarrow	Straight Barb	Tee Barb

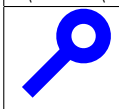
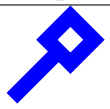
Parameter color PGFmanual section : 16-3-6

\tikz \draw[-{Arc Barb[color=red},line width=.2cm,blue] (0,0) - - (1,1);		
		
Bracket[color=red]	Bracket[color=green]	Bracket[red]

\tikz \draw[-{Arc Barb[red},line width=.2cm,blue] (0,0) - - (1,1);				
				
Arc Barb	Bracket	Hooks	Parenthesis	Classical TikZ Rightarrow
				
Straight Barb	Tee Barb	Circle	Diamond	Ellipse
				
Kite	Latex	Rectangle	Square	Stealth
				
Triangle	Turned Square	Rays		

Parameter fill PGFmanual section : 16-3-6

\tikz \draw[-{Circle[fill=red]},line width=.2cm,blue] (0,0) - - (1,1);				
				
Circle	Diamond	Ellipse	Kite	Triangle
				
Latex	Rectangle	Square	Stealth	Turned Square

\tikz \draw[-{Circle[fill=none]},line width=.2cm,blue] (0,0) - - (1,1);				
				
Circle	Diamond	Ellipse	Kite	Triangle
				
Latex	Rectangle	Square	Stealth	Turned Square

Parameter open PGFmanual section : 16-3-6

\tikz \draw[-{Circle[open]},line width=.2cm,blue] (0,0) - - (1.5,1) ;

Circle	Diamond	Ellipse	Kite	Triangle
Latex	Rectangle	Square	Stealth	Turned Square

Parameter line cap : round or butt PGFmanual section : 16-3-7

\tikz \draw[-{Arc Barb[line cap=butt]},line width=.2cm,blue] (0,0) - - (1,1);

Arc Barb	Bracket	Hooks	Parenthesis	Ellipse	Rectangle	Square	Stealth
Straight Barb	Tee Barb	Diamond	Kite	Latex	Triangle	Turned Square	Rays

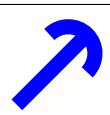
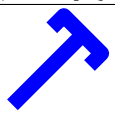
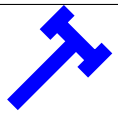
\tikz \draw[-{Arc Barb[line cap=round]},line width=.2cm,blue] (0,0) - - (1,1);

Arc Barb	Bracket	Hooks	Parenthesis	Ellipse	Rectangle	Square	Stealth
Straight Barb	Tee Barb	Diamond	Kite	Latex	Triangle	Turned Square	Rays

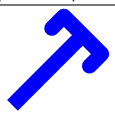
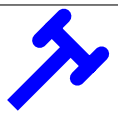
Parameter line join : round or miter PGFmanual section : 16-3-7

\tikz \draw[-{Arc Barb[line join=miter]},line width=.2cm,blue] (0,0) - - (1,1);

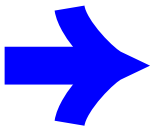
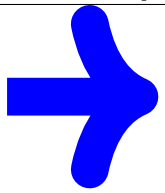
Arc Barb	Bracket	Hooks	Parenthesis	Ellipse	Rectangle	Square	Stealth
Straight Barb	Tee Barb	Diamond	Kite	Latex	Triangle	Turned Square	Rays

\tikz \draw[-{Arc Barb[line cap=round]},line width=.2cm,blue] (0,0) - - (1,1);							
							
Arc Barb	Bracket	Hooks	Parenthesis	Ellipse	Rectangle	Square	Stealth
							
Straight Barb	Tee Barb	Diamond	Kite	Latex	Triangle	Turned Square	Rays

Parameter round PGFmanual section : 16-3-7

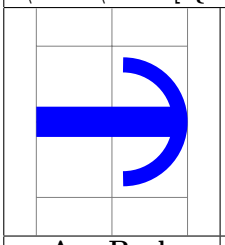
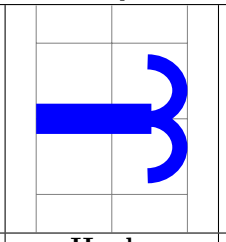
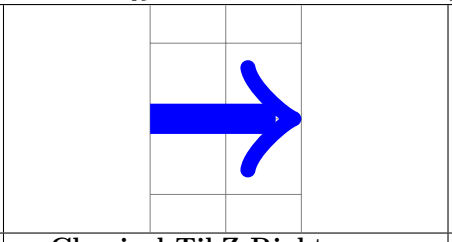
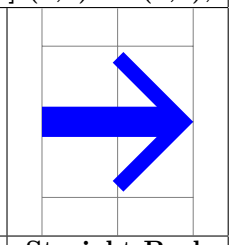
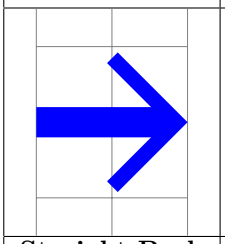
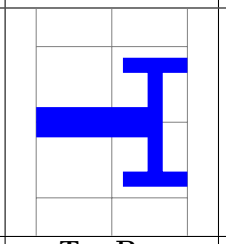
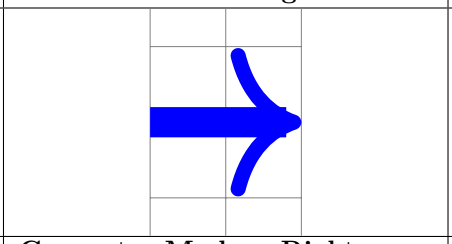
\tikz \draw[-{Arc Barb[round]},line width=.2cm,blue] (0,0) - - (1,1);							
							
Arc Barb	Bracket	Hooks	Parenthesis	Ellipse	Rectangle	Square	Stealth
							
Straight Barb	Tee Barb	Diamond	Kite	Latex	Triangle	Turned Square	Rays

Parameter sharp PGFmanual section : 16-3-7

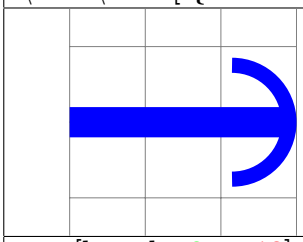
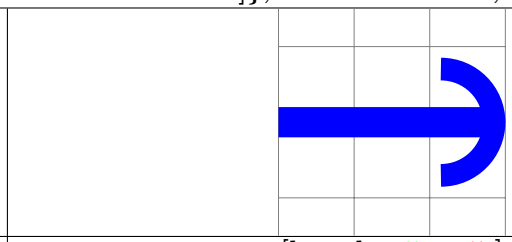
\tikz \draw[-{Classical TikZ Rightarrow[sharp]},line width=.2cm,blue] (0,0) - - (2,0)) ;			
-{Classical TikZ Rightarrow[sharp]}		-{Computer Modern Rightarrow[sharp]}	
			
sharp	[ ]	sharp	[ ]

Parameter line width PGFmanual section : 16-3-7

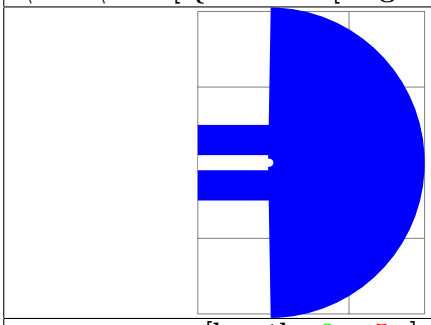
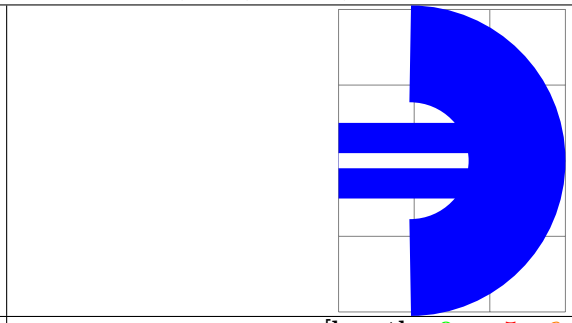
\tikz \draw[-{Arc Barb[line width=.2cm]},line width=.4cm,blue] (0,0) - - (2,0);

			
Arc Barb	Hooks	Classical TikZ Rightarrow	Straight Barb
			
Straight Barb	Tee Bar	Computer Modern Rightarrow	

\tikz \draw[-{Arc Barb[line width=0cm 10]},line width=.1cm,blue] (0,0) - - (3,1);

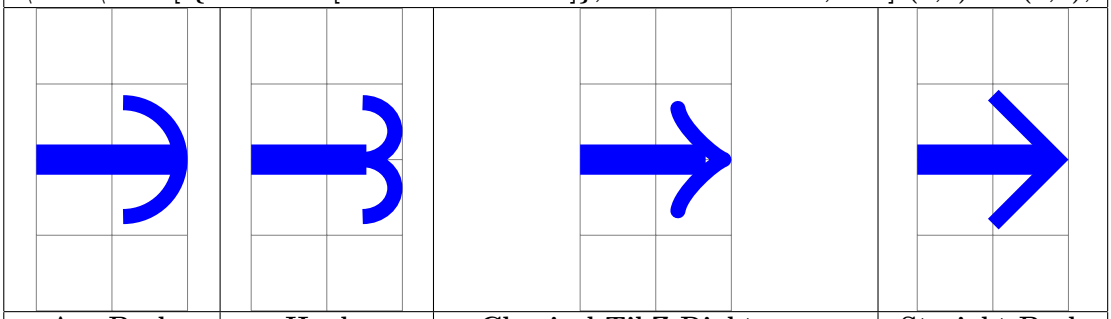
	
[length=0cm 10]	[length=.5cm 5]
0cm + 10 x .1cm = 1cm	.5cm + 5 x .1cm = 1cm

\tikz \draw[-{Arc Barb[length=0cm 5]},line width=.1cm,blue,double,double distance = 2 mm] (0,0) - - (3,1

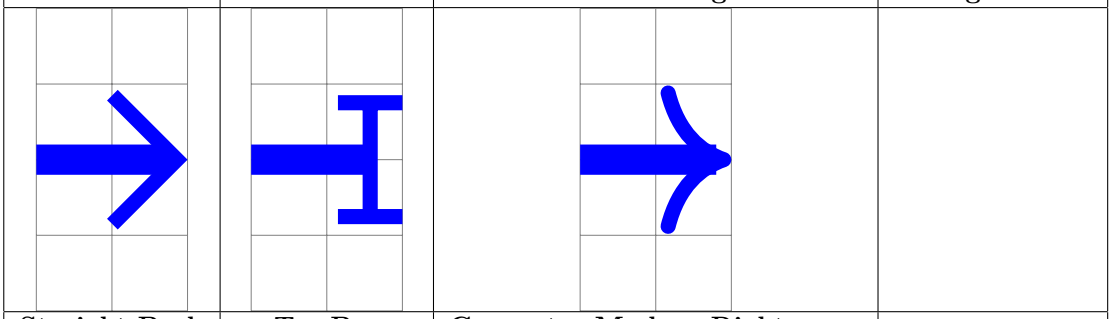
	
[length=0cm5]	[length=0cm 5 .6]
0cm + 5 x (.1cm + 2 mm + .1cm) = 2cm	0cm + 5 x (.6 x .1cm+ (1-.6)(.1cm+ 2 mm+.1cm) = 11 mm

Parameter line width' PGFmanual section : 16-3-7

```
\tikz \draw[-{Arc Barb[line width'=.2cm]},line width=.4cm,blue] (0,0) - - (1,1);
```

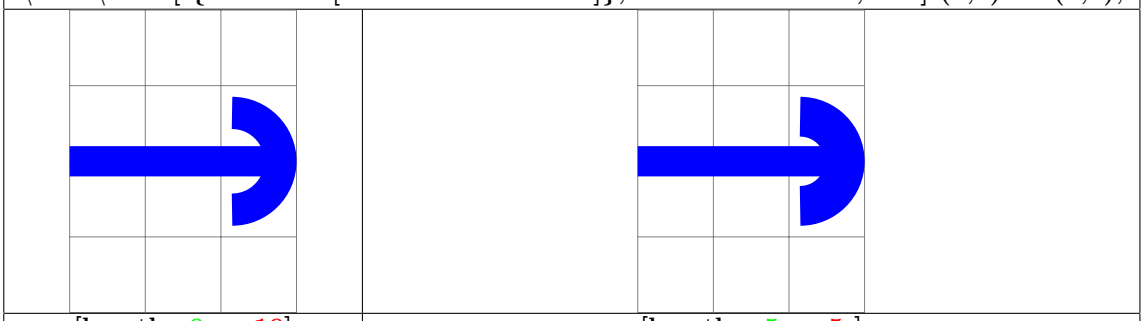


Arc Barb	Hooks	Classical TikZ Rightarrow	Straight Barb



Straight Barb	Tee Bar	Computer Modern Rightarrow	

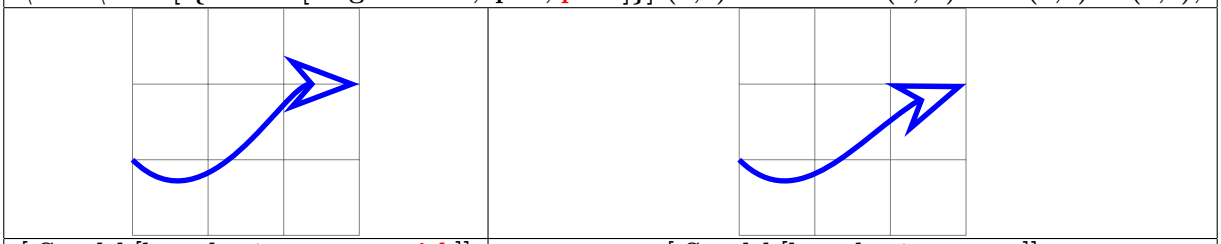
```
\tikz \draw[-{Arc Barb[line width=0cm 10]},line width'=.1cm,blue] (0,0) - - (3,1);
```



[length=0cm 10]	[length=.5cm 5]
0cm + 10 x .1cm = 1cm	.5cm + 5 x .1cm = 1cm

Parameter quick PGFmanual section : 16-3-8

```
\tikz \draw[-{Stealth[length=1cm,open,quick]}] (0,0) .. controls (1,-1) and (2,1) .. (3,1);
```

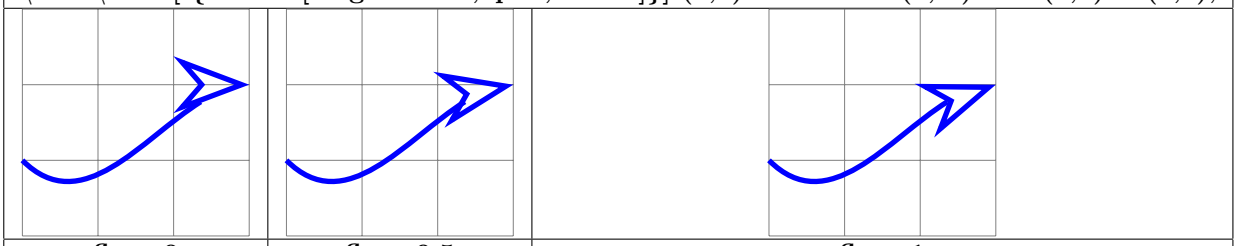


[-Stealth[length=1cm,open,quick]]	[-Stealth[length=1cm,open]]

Parameter bending PGFmanual section : 16-3-8

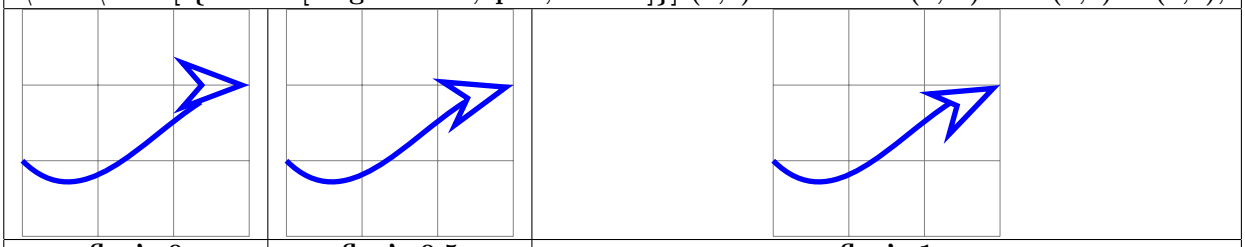
Load package : \usetikzlibrary{bending}

\tikz \draw[-{Stealth[length=1cm,open,flex=0]}] (0,0) .. controls (1,-1) and (2,1) .. (3,1);



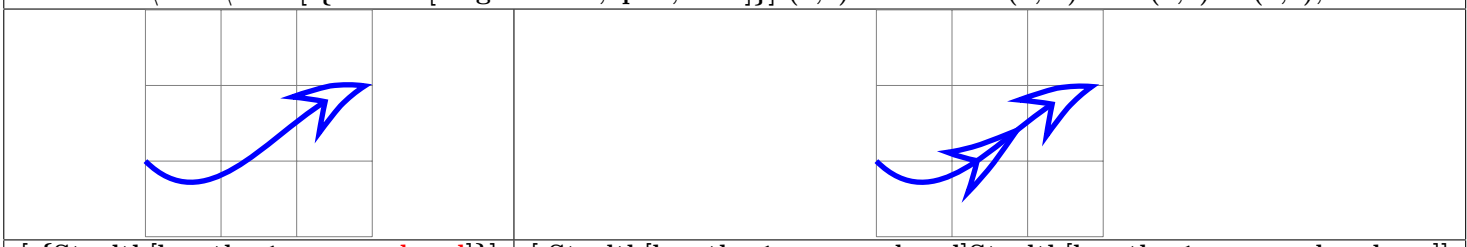
flex=0	flex=0.5	flex=1

\tikz \draw[-{Stealth[length=1cm,open,flex'=0]}] (0,0) .. controls (1,-1) and (2,1) .. (3,1);



flex'=0	flex'=0.5	flex'=1

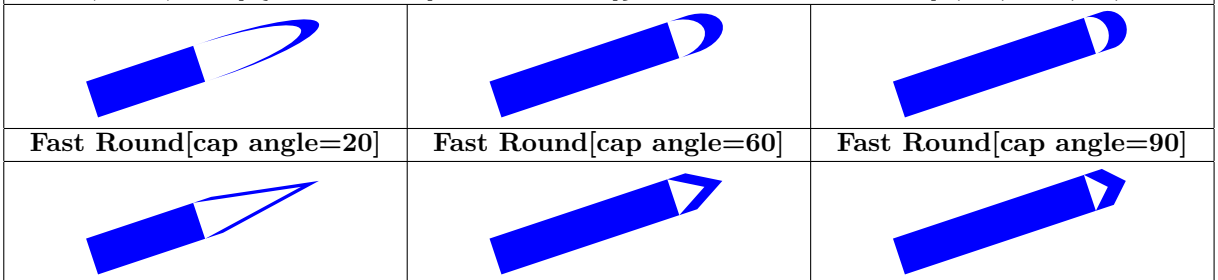
\tikz \draw[-{Stealth[length=1cm,open,bend]}] (0,0) .. controls (1,-1) and (2,1) .. (3,1);



[-{Stealth[length=1cm,open,bend]}]	[-Stealth[length=1cm,open,bend]Stealth[length=1cm,open,bend,sep]]

Parameter cap angle PGFmanual section : 16-5-4

\tikz \draw[-{Fast Round[cap angle=60]},line width=.2cm,blue] (0,0) - - (3,1);



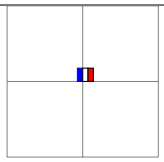
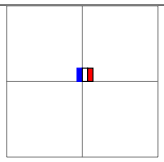
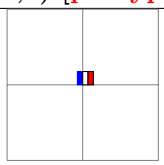
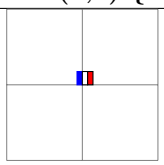
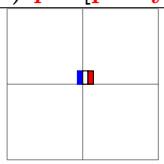
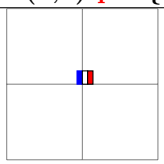
Fast Round[cap angle=20]	Fast Round[cap angle=60]	Fast Round[cap angle=90]
Fast Triangle[cap angle=20]	Fast Triangle[cap angle=60]	Fast Triangle[cap angle=90]

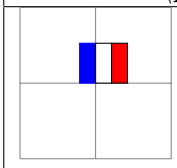
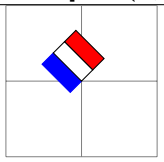
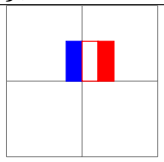
5 Small pictures

5.1 Own small pictures

PGFmanual section : 14-19 PGFmanual section : 18

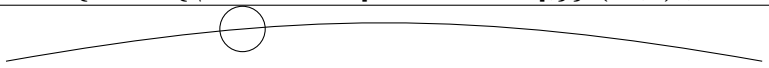
Création	Utilisation
\tikzset{dfr/.pic={\filldraw[blue] (-2pt,0) rectangle (0,5pt) ; \filldraw[fill=white] (0,0) rectangle (2pt,5pt); \filldraw[fill=red] (2pt,0) rectangle (4pt,5pt); }}	\tikz \pic {dfr};

Positioning	
	
\pic at (1,1) [pic type = dfr];	\pic at (1,1) {dfr};
	
\path (1,1) pic [pic type= dfr];	\path (1,1) pic {dfr};
	
\pic [at={(1,1)}] [pic type= dfr];	\pic [at={(1,1)}] {dfr};

\pic[scale=3] at (1,1) {dfr};		
		
[scale=3]	[scale=3,rotate=45]	[scale=3,red]

\tikz [scale=4] \pic at (0,0) {dfr}; \pic at (.5,0) [transform shape] {dfr};	

On a path
\tikz \draw (0,0) to [out=10,in=170] pic [near start] {dfr} pic {dfr} pic [sloped, near end] {dfr} (10,0);

\draw (0,0) to [out=10,in=170] pic [pos=.3] {code={\draw circle [radius=3mm];}} (10,0) ;


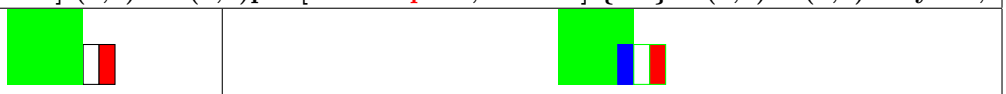
Définition :
```
\tikzset{ my pic/.pic = {
\path [pic actions] (0,0) circle[radius=3mm];
\draw (-3mm,-3mm) rectangle (3mm,3mm); } }
```

Utilisation : `\pic [red] {my pic}`

[red]	[draw]	[draw=red]	[draw, shading=ball]	[fill=red!50]

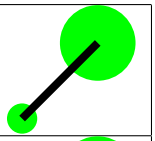
```
\tikz \pic foreach \x in {1,1.5,...,10} at (\x,0) {dfr};
```

```
\fill [green] (0,0) - - (1,0)pic [behind path,scale=3] {dfr} -- (1,1) -- (0,1) -- cycle ;
```

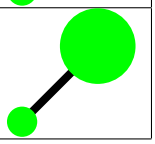


[behind path,scale=3]	[scale=3]

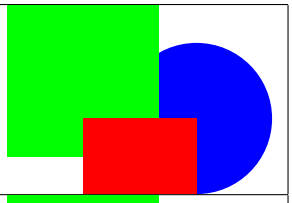
```
\tikzset{ pics/mon cercle/.style = { background code =
{ \fill circle [radius=#1]; } } }
\tikz [fill=green] \draw[line width=3pt] (0,0) pic {mon
cercle=2mm} - - (1,1) pic {mon cercle=5mm};
```



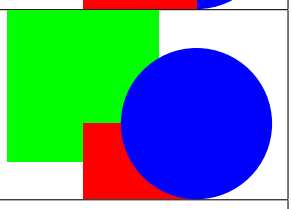
```
\tikzset{ pics/mon cercle/.style = { foreground code =
{ \fill circle [radius=#1]; } } }
\tikz [fill=green] \draw[line width=3pt] (0,0) pic {mon
cercle=2mm} - - (1,1) pic {mon cercle=5mm};
```



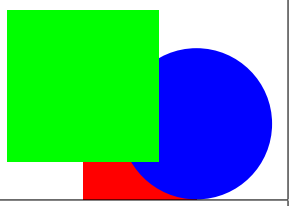
```
\fill [green](-1,0) - - (1,0)
pic [pics/background code={\fill[blue] (0.5,0.5) circle (1cm );}
, pics/code=\fill[red] (-1,-.5) rectangle (0.5,0.5); ]
{} - - (1,2) - - (-1,2) - - cycle ;
```



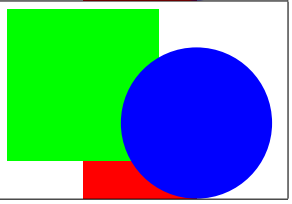
```
\fill [green] (-1,0) - - (1,0)
pic [pics/foreground code=\fill[blue] (0.5,0.5) circle (1cm );
,pics/code={\fill[red] (-1,-.5) rectangle (0.5,0.5);} ]
{} - - (1,2) - - (-1,2) - - cycle ;
```



```
\fill [green](-1,0) - - (1,0)
pic [pics/background code={\fill[blue] (0.5 , 0.5) circle (1cm
);}
,pics/code={\fill[red] (-1 , -0.5) rectangle (0.5 , 0.5);},behind
path ]
{} - - (1,2) - - (-1,2) - - cycle ;
```



```
\fill [green] (-1,0) - - (1,0)
pic [pics/foreground code={\fill[blue] (0.5 , 0.5) circle (1cm );}
, pics/code={\fill[red] (-1,-.5) rectangle (0.5 , 0.5);},behind
path ]
{} - - (1,2) - - (-1,2) - - cycle ;
```



5.2 Drawing angles

PGFmanual section : 39

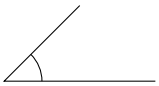
Load package : \usetikzlibrary{angles}

```
\tikz \draw (2,0) coordinate (A) - - (0,0) coordinate (B)
- - (1,1) coordinate (C) pic [draw] {angle};
```

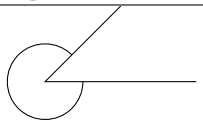
pic [draw] {angle}

pic [fill] {angle}

```
\tikz \draw (2,0) coordinate (X) - - (0,0) coordinate (Y)
- - (1,1) coordinate (Z) pic [draw] {angle= X- -Y- -Z};
```



pic [draw] {angle= X- -Y- -Z}

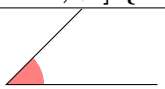


pic [fill] {angle = Z- -Y- -X}

By default : angle= A- -B- -C

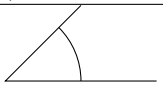
```
\tikz \draw (2,0) coordinate (A) - - (0,0) coordinate (B)
- - (1,1) coordinate (C) pic [draw,->] {angle};
```

pic [draw,->] {angle}



pic [fill,fill=red!50] {angle}

```
\tikz \draw (2,0) coordinate (A) - - (0,0) coordinate (B)
- - (1,1) coordinate (C) pic [draw,angle radius=1cm] {angle};
```



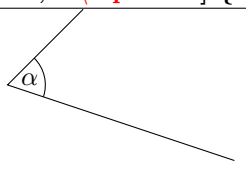
pic [draw,angle radius=1cm] {angle}

pic [fill,angle radius=1cm] {angle}

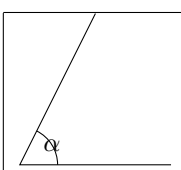
By default : angle radius=5mm

Load package : \usetikzlibrary{quotes}

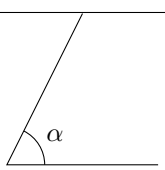
```
\tikz \draw (3,0) coordinate (A) - - (0,1) coordinate (B) - - (1,2) coordinate (C)
pic [draw,"$\alpha$ "] {angle};
```




```
\tikz \draw (2,0) coordinate (A)
- - (0,0) coordinate (B) - - (1,2) coordinate (C)
pic [draw, " $\alpha$", angle eccentricity=1]] {angle};
```



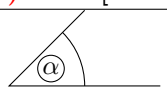
angle eccentricity=1



angle eccentricity=1.5

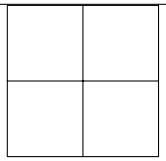
By default : angle eccentricity= 0.6

```
\tikz { \draw (2,0) coordinate (A) - - (0,0) coordinate (B) - - (1,2) coordinate (C)
pic (xxx) [draw,"$\alpha$",angle radius= 1cm ] {angle};
\draw (xxx)circle [radius=5pt] ; }
```



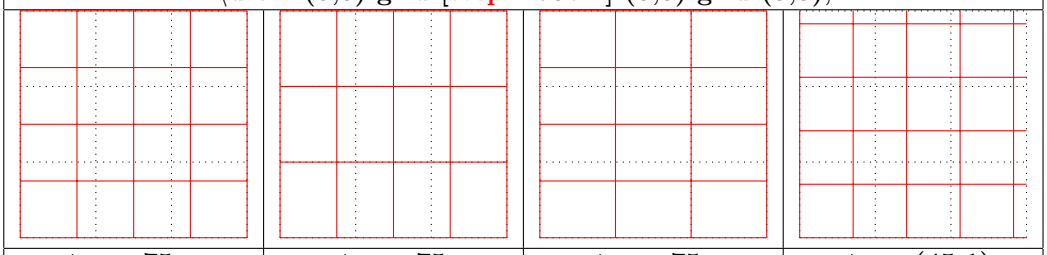
6 Coordinates

6.1 Grid



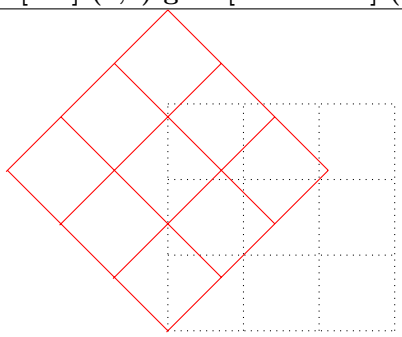
\draw (0,0) grid (2,2); PGFmanual section : 14-8

\draw (0,0) grid [step=.75cm] (0,0) grid (3,3);

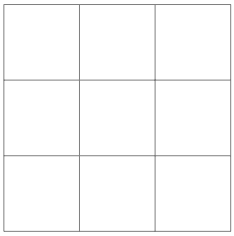


step=.75cm | x step=.75cm | ystep=.75cm | step=(45:1)

\draw[red] (0,0) grid [rotate=45] (3,3);



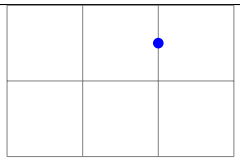
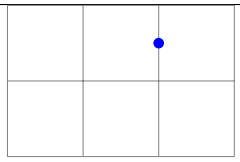
\draw[help lines] (0,0) grid (3,3);



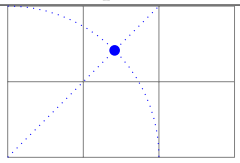
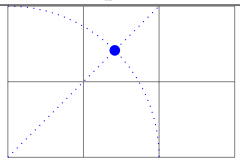
6.2 Coordinates

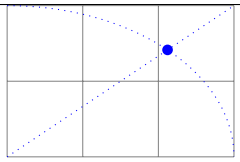
PGFmanual section : 13-2-1

6.2.1 Canvas coordinates

explicit	implicit
	
\fill (canvas cs:x=2cm,y=1.5cm) circle (2pt);	\fill (2cm,1.5cm) circle (2pt);

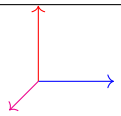
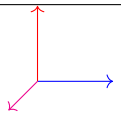
6.2.2 Polar coordinates

explicit	implicit
	
\fill (canvas polar cs:angle=45,radius=2cm) circle (2pt);	\fill (45:2cm) circle (2pt);

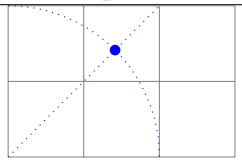
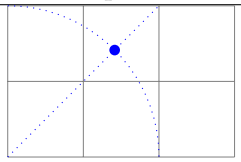


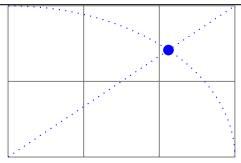
```
\fill (canvas polar cs:angle=45,x radius=3cm,y radius=2cm) circle (2pt);
```

6.2.3 xyz coordinates

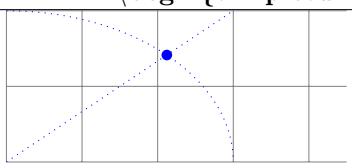
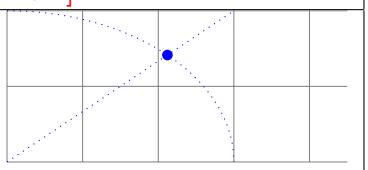
	
\draw (0,0) - - (xyz cs:x=1); \draw[red] (0,0) - - (xyz cs:y=1); \draw[magenta] (0,0) - - (xyz cs:z=1);	\draw (0,0) - - (1,0,0); \draw[red] (0,0) - - (0,1,0); \draw[magenta] (0,0) - - (0,0,1);

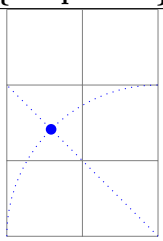
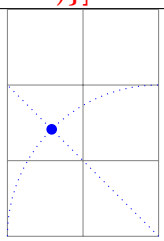
6.2.4 Coordinate system xyz polar

explicit	implicit
	
\fill (xyz polar cs:angle=45,radius=2) circle (2pt);	\fill (45:2cm) circle (2pt);



\fill (xyz polar cs:angle=45,x radius=3,y radius=2) circle (2pt);

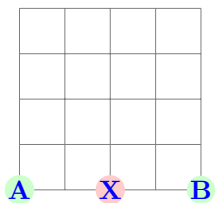
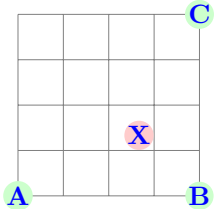
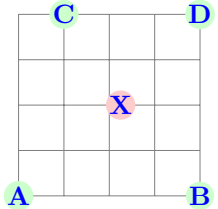
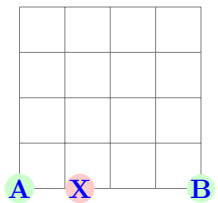
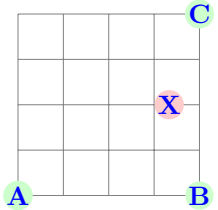
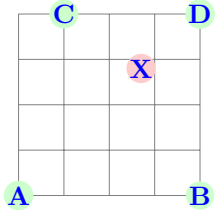
\begin{tikzpicture}[x=1.5cm,y=1cm]	
	
\fill (xyz polar cs:angle=45,radius=2) circle (2pt);	\fill (45:2cm) circle (2pt);

\begin{tikzpicture}[x={(0cm,1cm)},y={(-1cm,0cm)}]	
	
\fill (xyz polar cs:angle=45,radius=2) circle (2pt);	\fill (45:2cm) circle (2pt);

6.2.5 Barycentric coordinates

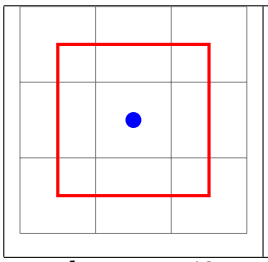
PGFmanual section : 13-2-2

\node [circle,fill=red!20] at (barycentric cs:A=0.6,B=0.3) {X};

		
A=0.3,B=0.3	A=0.4,B=0.4 ,C=.4	A=0.5,B=0.5,C=.5,D=.5
		
A=0.6,B=0.3	A=0.2,B=0.4 ,C=.6	A=0.2,B=0.4,C=.6,D=.8

6.2.6 Named coordinates: nodes

PGFmanual section : 13-2-3

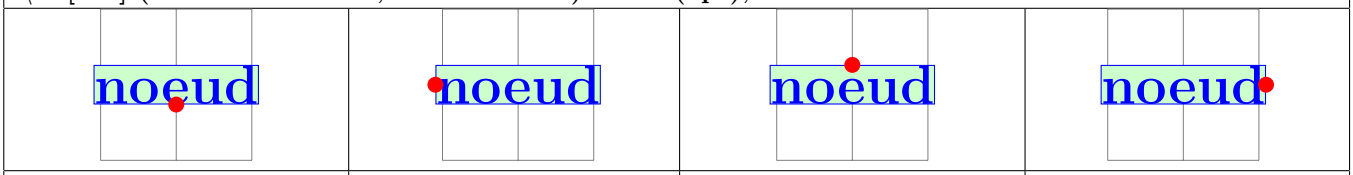


```
\coordinate (centre) at(1.5,1.5) ;
\coordinate (A) at (.5,.5) ;
\coordinate (B) at (2.5,2.5) ;

\fill (centre) circle (3pt);
\draw[red] (A) rectangle (B) ;
```

see also page 49

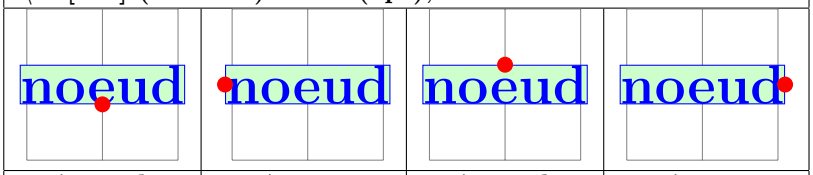
6.2.7 Coordinates relative to a node

```
\node [draw,fill=green!20,] (A) at (1,1) {\huge noeud};
\fill[red] (node cs:name=A,anchor=south) circle (3pt);
```



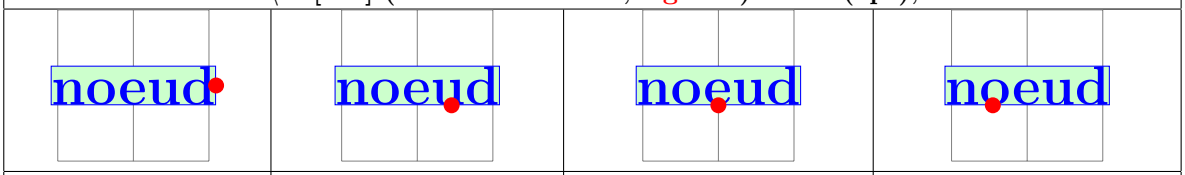
name=A,anchor=south	name=A,anchor=west	name=A,anchor=north	name=A,anchor=east

```
\node [draw,fill=green!20,] (A) at (1,1) {\huge noeud};
\fill[red] (A.south) circle (3pt);
```



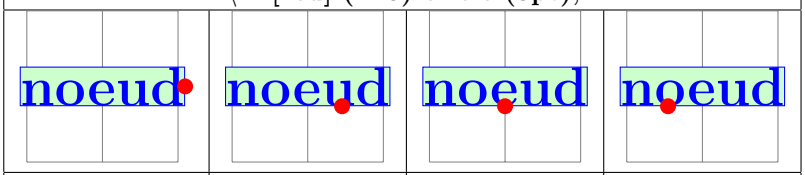
A.south	A.west	A.north	A.east

```
\fill[red] (node cs:name=A,angle=0) circle (3pt);
```



name=A,angle=0	name=A,angle=-30	nname=A,angle=-90	name=A,angle=-150

```
\fill[red] (A.0) circle (3pt);
```



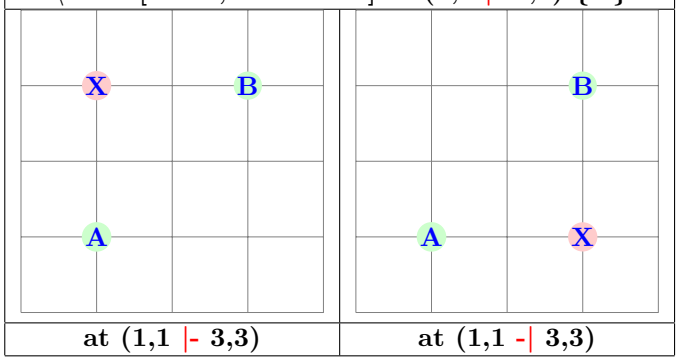
A.0	A.-30	A.-90	A.-150

see also page 106

6.2.8 Coordinates relative to two points

PGFmanual section : 13-3-1

```
\node [circle,fill=red!20] at (1,1 |- 3,3) {X}
```



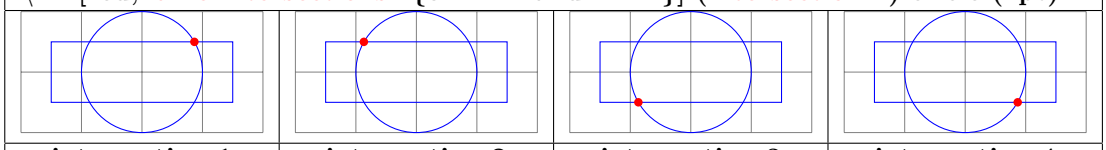
at (1,1 |- 3,3) | at (1,1 -| 3,3)

6.2.9 Coordinates relative to an intersection

PGFmanual section : 13-3-2

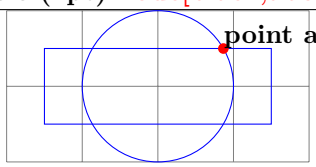
Load package : \usetikzlibrary{intersections}

```
\draw [name path=XXX] (2,1) circle (1cm);
\draw [name path=YYY] (0.5,0.5) rectangle +(3,1);
\fill [red,name intersections={of=xxx and YYY}] (intersection-1) circle (2pt)
```

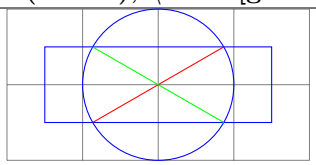


intersection-1 | intersection-2 | intersection-3 | intersection-4

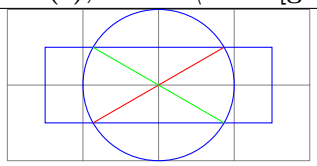
```
\fill [red, name intersections={of=XXX and YYY}]
(intersection-1) circle (2pt) node[black,above right] {point a} ;
```



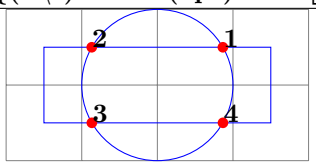

```
\fill [red, name intersections={of=XXX and YYY, name=ZZZ}];
\draw [red] (ZZZ-1) - - (ZZZ-3); \draw [green] (ZZZ-2) - - (ZZZ-4);
```



```
\fill [red, name intersections={of=XXX and YYY , by={a,b,c,d}}];
    \draw [red] (a) - - (c);        \draw [green] (b) - - (d);
```



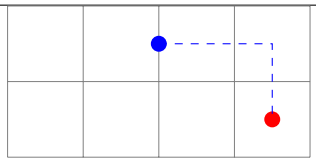
```
\fill [name intersections={of=XXX and YYY, name=i, total=\t}] [red]
\foreach \s in {1,...,\t} {(i-\s) circle (2pt) node[black,above right] {\s}}
```



6.2.10 Calculated positions with “pgfmath”

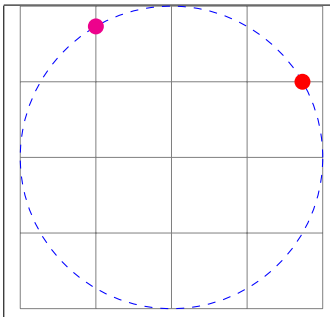
PGFmanual section : 13-2-1

Package automatically loaded with Tikz



explicit : \fill [red] (canvas cs:x=2cm+1.5cm,y=1.5cm-1cm) circle (3pt);

implicit : \fill [red] (2cm+1.5cm,1.5cm-1cm) circle (3pt);

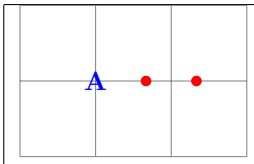


```
\draw[dashed] (2,2) circle (2);
\fill [red](2+ 2*cos 30 , 2+2*sin 30) circle (3pt);
\fill[magenta] (2+2*cos{(120)} , 2+2*sin{(120)}) circle (3pt);
```

6.2.11 Calculated positions with “calc library calc”

PGFmanual section : 13-5

Load package : \usetikzlibrary{calc}

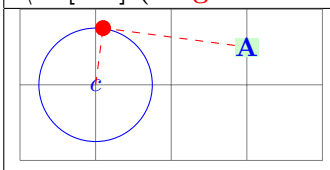



```
\node (a) at (1,1) {A};
\fill [red] ($(a) + 2/3*(1cm,0)$) circle (2pt);
\fill [red] ($(a) + 4/3*(1cm,0)$) circle (2pt);
```

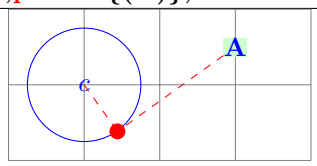
6.2.12 Tangents with “calc library”

PGFmanual section : 13-2-4

```
\node[fill=green!20] (a) at (3,1.5) {A};
\fill[red] (tangent cs:node=c,point={(A)},solution=1);
```



solution=1

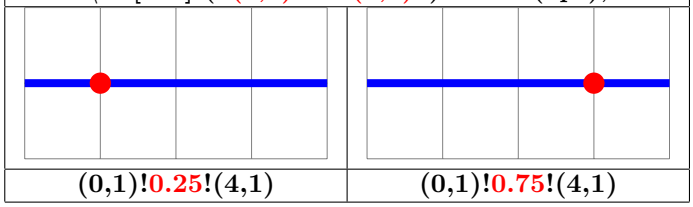


solution=2

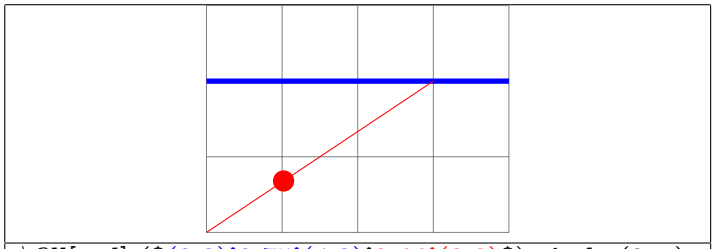
6.2.13 Percentage position

PGFmanual section : 13-5-3

```
\fill[red] ($(0,1)!.25!(4,1)$) circle (4pt);
```



(0,1)!0.25!(4,1) | (0,1)!0.75!(4,1)

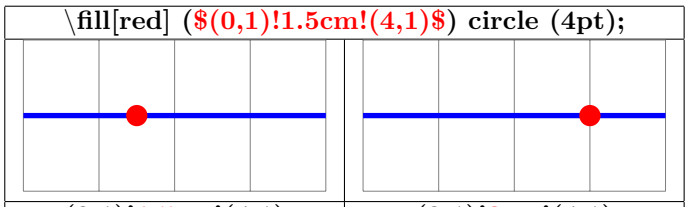


```
\fill[red] ($(0,2)!0.75!(4,2)!0.66!(0,0)$) circle (2pt);
```

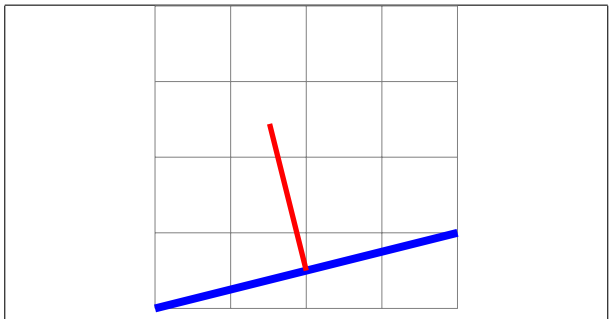
6.2.14 Position at a given distance

PGFmanual section : 13-5-4

```
\fill[red] ($(0,1)!1.5cm!(4,1)$) circle (4pt);
```



(0,1)!1.5cm!(4,1) | (0,1)!3cm!(4,1)

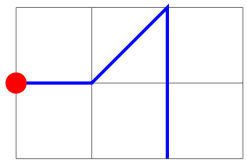
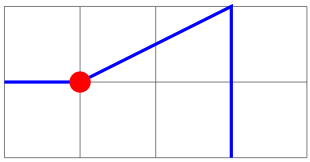
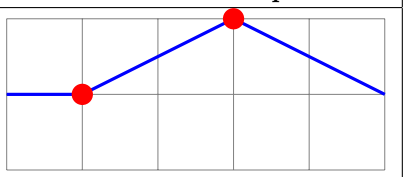


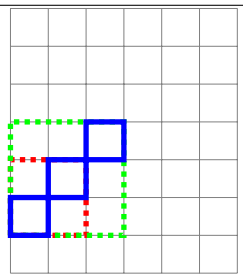
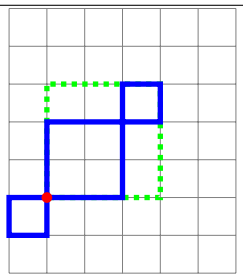
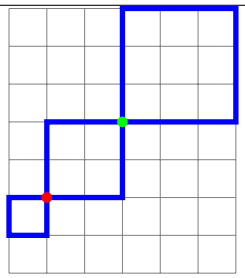
```
\draw (2,.05) - - ($ (2,0.5)!2cm!90:(4,1) $);
```

6.2.15 Relative coordinates

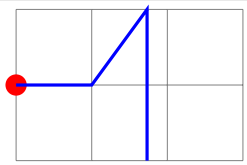
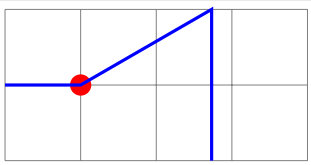
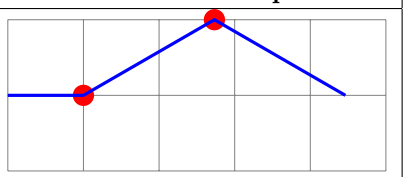
Cartesian coordinates

PGFmanual section : 13-4-1

relative to the origin	relative to a position	relative to the last position
		
(0,0) - - (1,0) - - (2,1) - - (2,-1)	(0,0) - - (1,0) - - +(2,1) - - +(2,-1)	(0,0) - - (1,0) - - ++(2,1) - - ++(2,-1)

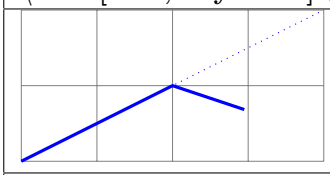
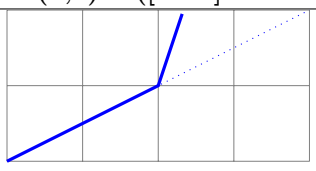
		
\draw (0,0) rectangle (1,1) rectangle (2,2) rectangle (3,3);	\draw (0,0) rectangle (1,1) rectangle +(2,2) rectangle +(3,3);	\draw (0,0) rectangle (1,1) rectangle ++(2,2) rectangle ++(3,3);

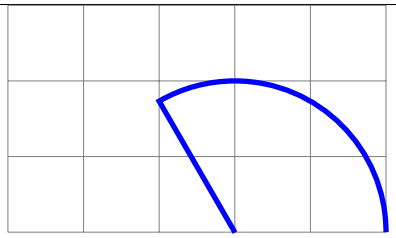
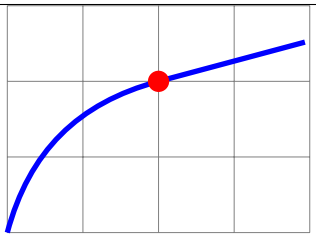
Polar

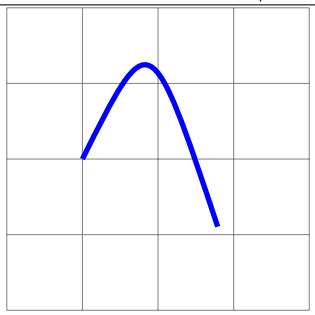
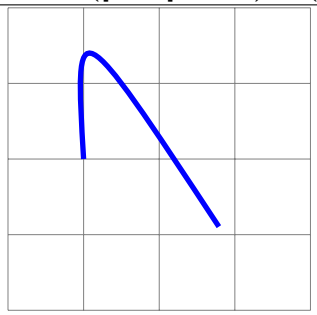
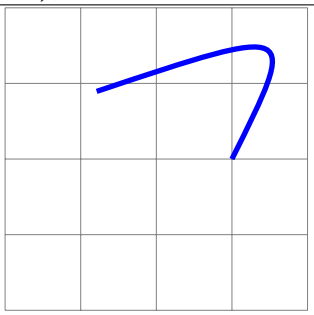
relative to the origin	relative to a position	relative to the last position
		
(0:0) - - (0:1) - - (30:2) - - (-30:2)	(0:0) - - (0:1) - - +(30:2) - - +(-30:2)	(0:0)- - (0:1) - - ++(30:2) - - ++(-30:2)

Relative polar coordinate

PGFmanual section : 13-4-2

\draw[blue,very thick] (0,0) – (2,1) – ([turn]-45:1cm);	
	
([turn]-45:1cm)	([turn]45:1cm)

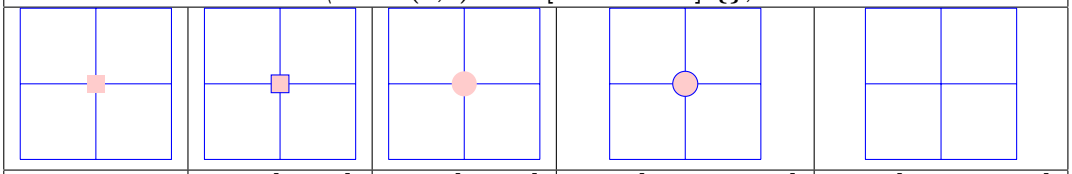
	
\draw (4,0) arc (0 :120 :2) - - ([turn]90:2cm) ;	\draw (0,0) to [bend left] (2,2) - - ([turn]0:2cm);

\draw(1,2) .. controls ([turn]0:2cm) .. ([turn]-90:2cm);		
		
([turn]0:2cm) .. ([turn]-90:2cm)	([turn]30:2cm) .. ([turn]-90:2cm)	([turn]0:2cm) .. ([turn]90:2cm)

7 Nodes

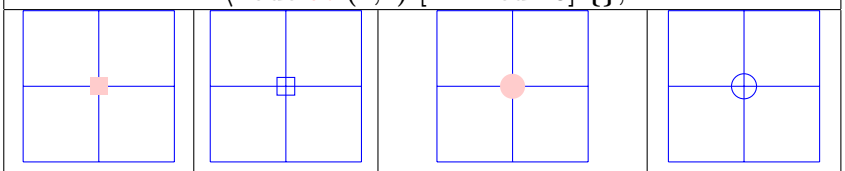
7.1 Creation of nodes

\draw (1,1) node[fill=red!20] {};



By default | node[draw] | node[circle] | node[circle,draw] | node[coordinate]

\node at (1,1) [fill=red!20] {};



[fill=red!20] | [draw] | [circle,fill=red!20] | [circle,draw]

Other type of nodes see page 90

```
\draw (0,0) node at (1,0) {1} node at (2,0) {2}
node at (3,0) {3} node at (4,0) {4} node at (5,0) {5};
```

1 2 3 4 5

```
\draw(0,0) node foreach \x in {1,2,...,5}
at (\x,0) {\x};
```

1 2 3 4 5

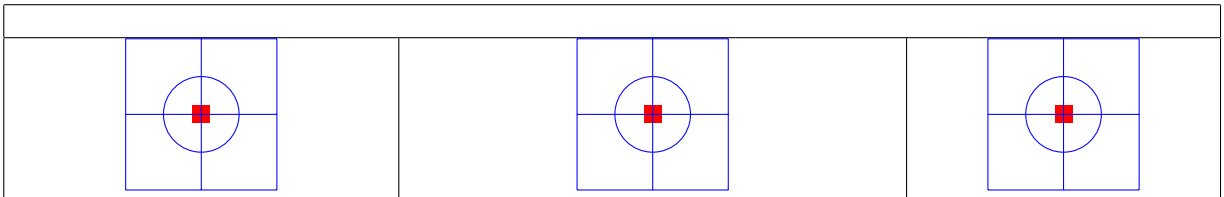
```
\draw[every node/.style={draw,red}](0,0) node foreach \x in {1,2,...,5} at (\x,0) {\x};
```

1 2 3 4 5

```
\draw[every rectangle node/.style={draw,red},
every circle node/.style={draw,double}]
(0,0) node at (1,0) {1} node[circle] at (2,0) {2}
node[circle] at (3,0) {3} node at (4,0) {4} node at (5,0) {5};
```

1 2 3 4 5

7.2 Node name



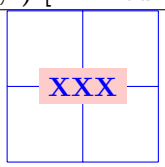
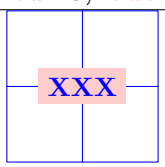
\node[name=A] at (0,0) {}
\draw (A) circle (.5);

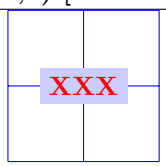
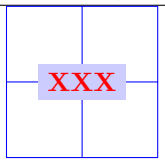
\node[name=A,alias=B] at (0,0) {}
\draw (B) circle (.5);

\node(C) at (0,0) {}
\draw (C) circle (.5);

7.3 Node contents

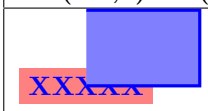
PGFmanual section : 17-2-1

\node at (1,1) [fill=red!20]{XXX} ;	\node at (1,1) [fill=red!20,node contents=XXX] {};
	

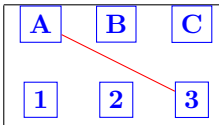
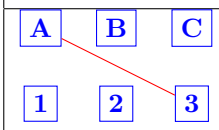
\node[red] at (1,1) [fill=blue!20] {XXX} ;	\node[red] at (1,1) [fill=blue20,node contents=XXX] {};
	

7.4 Behind or in front

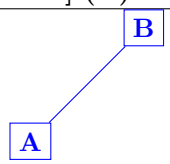
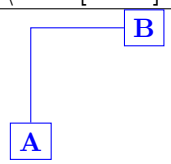
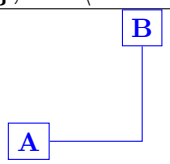
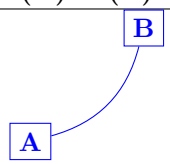
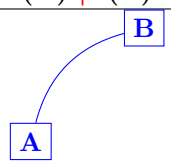
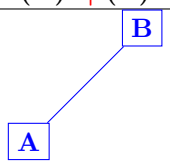
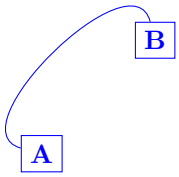
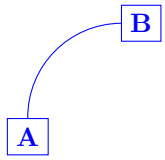
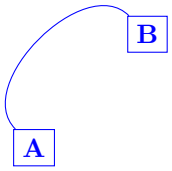
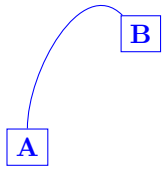
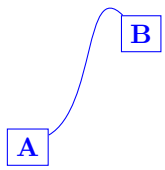
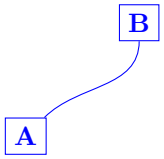
\tikz \fill [fill=blue!50, draw=blue, very thick] (0,0)
node [behind path, fill=red!50] {XXXXX}
- - (1.5,0) - - (1.5,1) - - (0,1) ;

	
behind path	in front of path

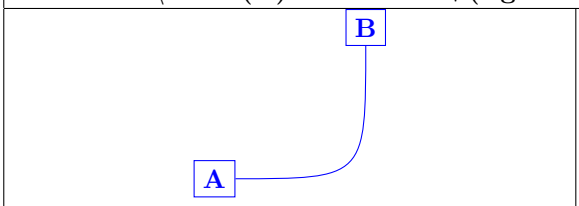
7.5 Name prefix or name suffix

	\draw[name prefix = top-] node (A) at (1,1) {A} node (B) at (2,1) {B} node (C) at (3,1) {C}; \draw[name prefix = bottom-] node (1) at (1,0) {1} node (2) at (2,0) {2} node(3) at (3,0) {3}; \draw [red] (top-A) – (bottom-3);
	\draw[name suffix = -top] node (A) at (1,1) {A} node (B) at (2,1) {B} node (C) at (3,1) {C}; \draw[name suffix = -bottom] node (1) at (1,0) {1} node (2) at (2,0) {2} node(3) at (3,0) {3}; \draw [red] (A -top) - - (3 -bottom);

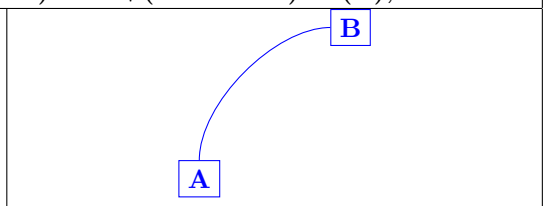
7.6 Links

\node[draw] (A) at (0,0) {A}; \node[draw] (B) at (1.5,1.5) {B}; \draw (A) - - (B)		
		
(A)- - (B)	(A) |- (B)	(A) -| (B)
		
(A) to [bend right] (B)	(A) to [bend left] (B)	(A) to[bend left=0] (B)
		
(A) to[bend left=120] (B)	(A) to[bend left=45] (B)	(A) to[bend left=90] (B)
		
(A) to[out=90] (B)	(A) to[out=30] (B)	(A) to[in=-90] (B)

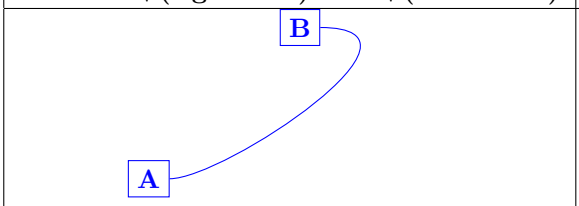
\draw (A) .. controls +(right:2cm) and +(down:2cm) .. (B);



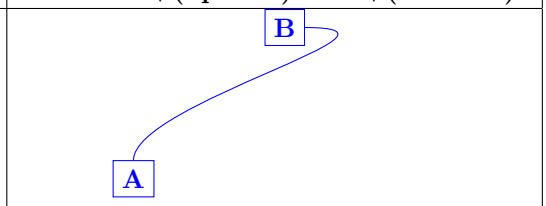
controls +(right:2cm) and +(down:2cm)



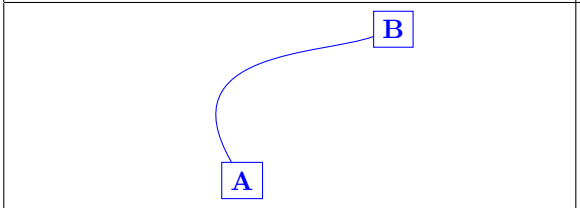
controls +(up:1cm) and +(left:1cm)



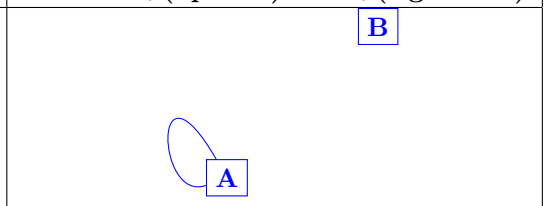
controls +(right:1cm) and +(right:2cm)



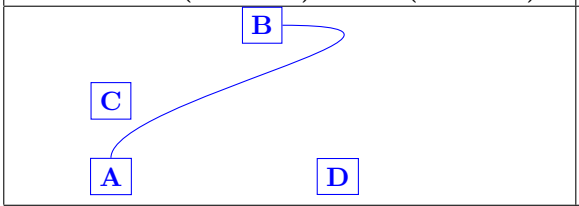
controls +(up:1cm) and +(right:2cm)



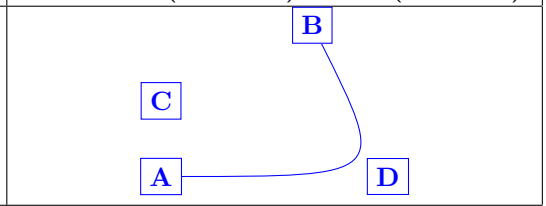
controls +(120:2cm) and +(200:1cm)



controls +(120:2cm) and +(200:1cm)



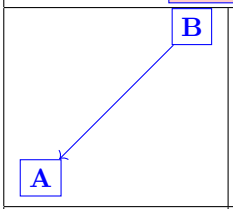
controls +(C) and +(D)



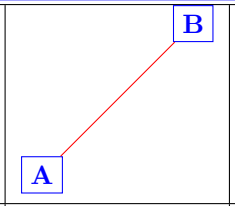
controls +(D)

\node[draw] (A) at (0,0) {A}
\node[draw] (B) at (2,2) {B} edge [->] (A);

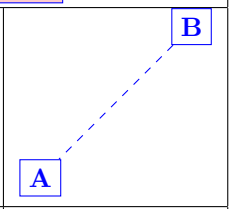
PGFmanual section : 17-12-1



[->]

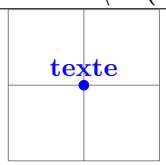
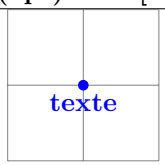
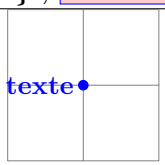
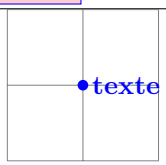
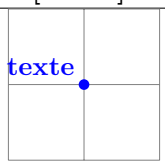
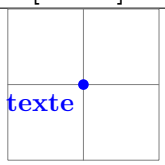
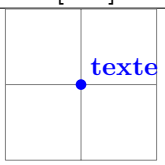
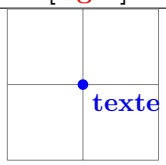
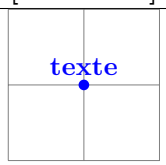
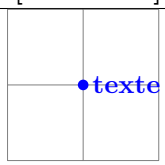
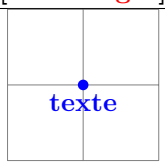
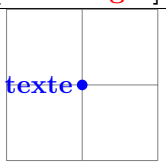
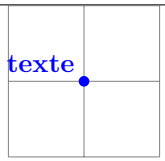
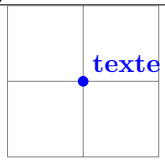
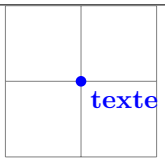
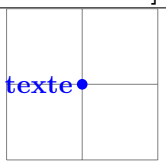


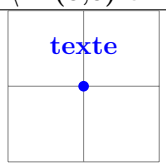
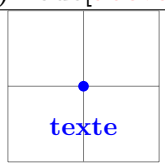
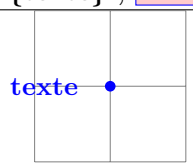
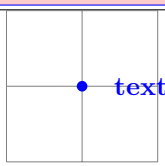
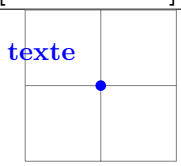
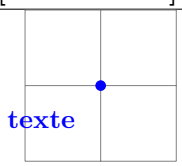
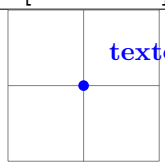
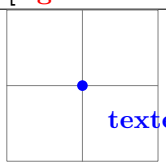
[red]



[dashed]

7.7 Node labels

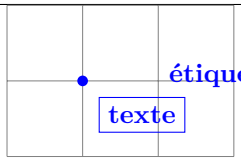
\fill(0,0) circle (2pt) node[above] {texte} ; PGFmanual section : 17-5-2			
			
[above]	[below]	[left]	[right]
			
[above left]	[below left]	[above right]	[below right]
			
[anchor=south]	[anchor=west]	[anchor=north]	[anchor=east]]
			
[anchor=south east]	[anchor=south west]	[anchor=north west]	[anchor==north east]

\fill(0,0) circle (2pt) node[above=.3cm] {texte} ; PGFmanual section : 17-5-2			
			
[above=.3cm]	[below=.3cm]	[left=.3cm]	[right=.3cm]]
			
[above left=.3cm]	[below left=.3cm]	[above right=.3cm]	[below right=.3cm]]

\shorthandoff{:} [1]
\node [draw,label=right:texte] {}
\shorthandon{:}

texte	texte	texte	texte	texte
label=right	label=left	label=above	label=below	label=45

\fill(0,0) circle (2pt) node[below right=.3cm,draw,label=45:étiquette] {texte} ;



7.8 The Pin Option

PGFmanual section : 17-10-3

\shorthandoff{:} \node[circle,draw,blue,pin=texte] {} ; \shorthandon{:} [1]

texte	texte	texte
[circle,pin=texte]	[circle,pin=60:texte]	[circle,pin=right:texte]

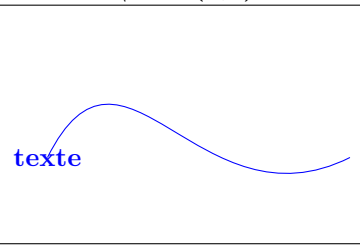
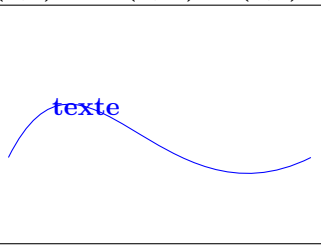
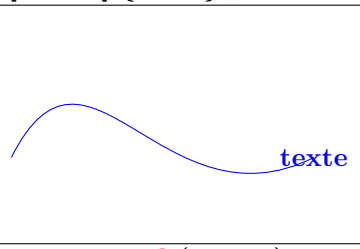
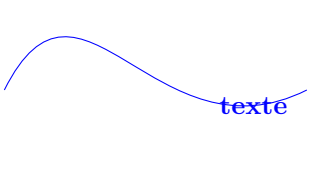
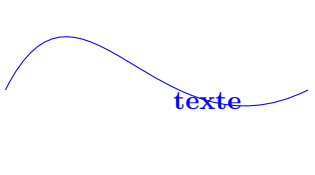
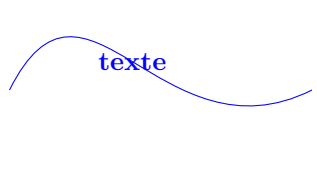
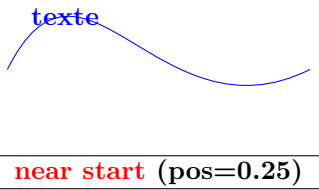
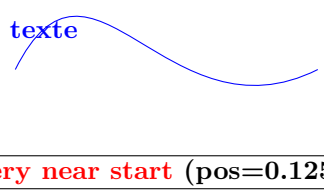
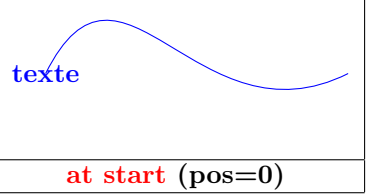
\tikz[pin position=60] \node [circle,pin=texte] {} ;

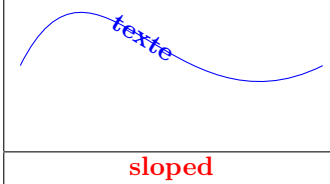
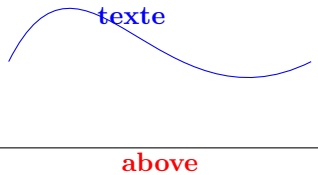
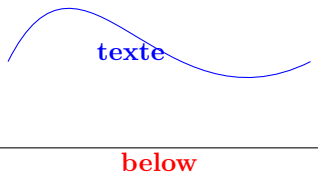
texte	texte	texte
[pin position=60]	[pin distance=0 cm]	[pin distance=2 cm]
By default : above	By default : 3 ex	

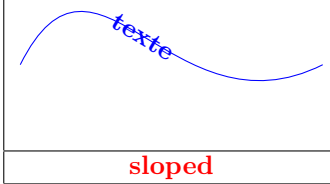
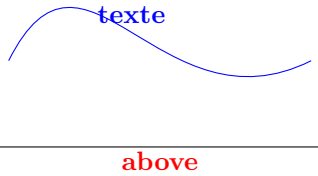
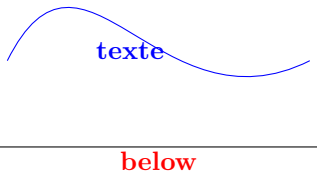
[1] Only useful when the package babel is loaded with the frenchb option

7.9 Nodes on a path

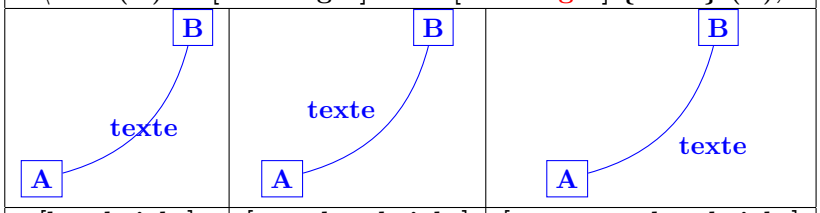
PGFmanual section : 17-8

\draw(0,0) .. controls (1,2) and (2,-1) .. (4,0) node[at end] {texte} ;		
		
pos=0	pos=.33	at end (pos=1)
		
very near end (pos=0.875.)	near end (pos=0.75)	midway (pos=0.5)
		
near start (pos=0.25)	very near start (pos=0.125)	at start (pos=0)

\draw(0,0) .. controls (1,2) and (2,1) .. (4,0) node[sloped,midway] {texte} ;		
		
sloped	above	below

\draw(0,0) .. controls (1,2) and (2,1) .. (5,0) node[sloped,midway,allow upside down] {texte} ;		
		
sloped	above	below

\draw(A) to [bend right] node [bend right] {texte} (B);

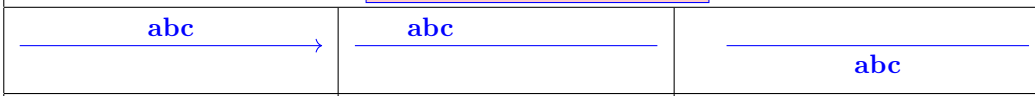


[bend right] | [auto,bend right] | [auto,swap,bend right]

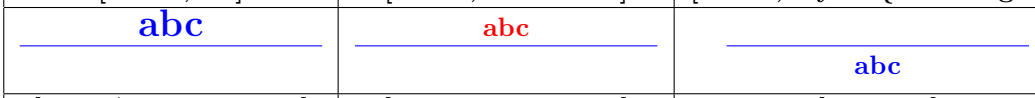
7.10 Nodes on an edge

\draw(0,0) edge [”abc”, ->] (4,0);

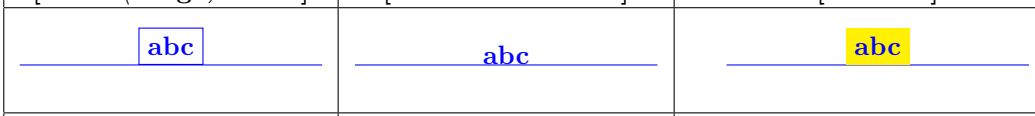
PGFmanual section : 17-12-2



[”abc”, ->] | [”abc”, near start] | [”abc”, style={auto=right}]



[font=\Large,”abc”] | [”abc” color=red] | [”abc” ’]



[”abc” draw] | [”abc” inner sep=0pt] | [”abc” fill ,fill=yellow]

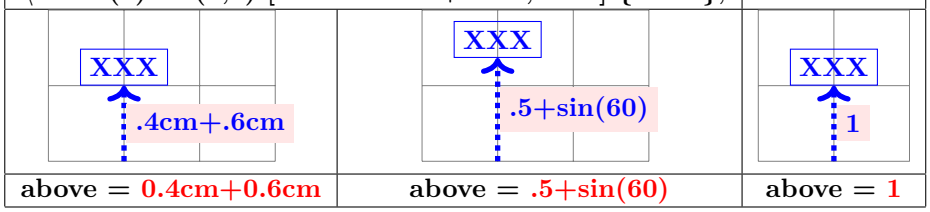
\draw[every edge quotes/.style={fill=yellow}] (0,0) edge [”abc”] (4,0);

7.11 Positionnement relatif de nœuds

Load package : \usetikzlibrary{positioning}

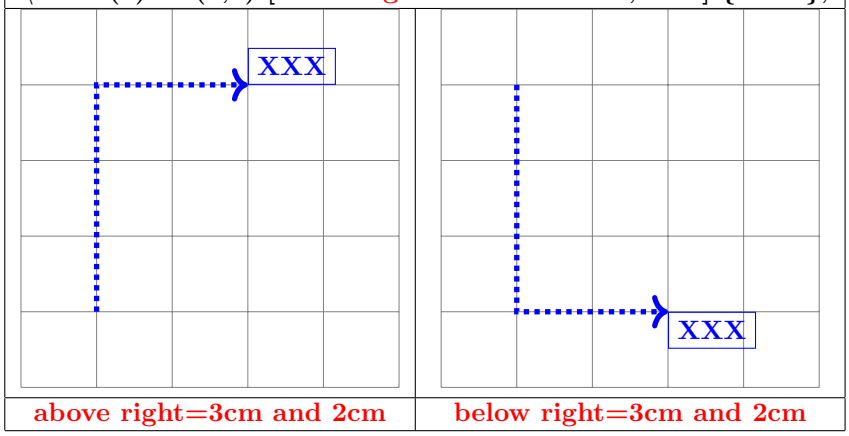
PGFmanual section : 17-5-3

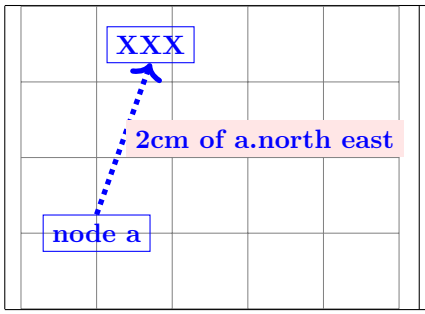
\node (a) at (1,0) [above=.4cm+.6cm,draw] {XXX};



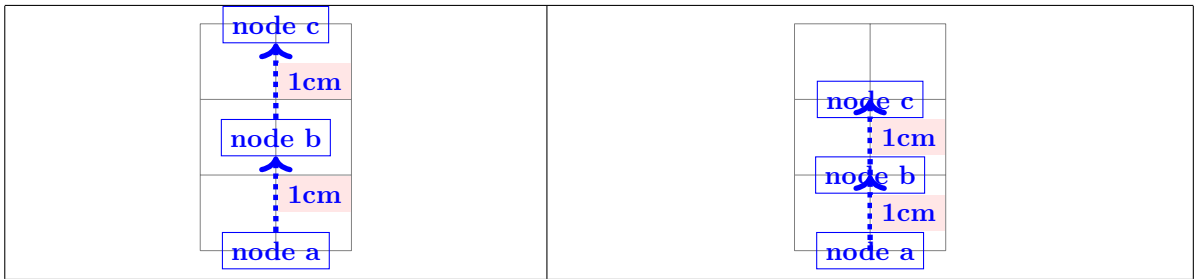
above = 0.4cm+0.6cm | above = .5+sin(60) | above = 1

```
\node (a) at (1,0) [above right=3cm and 2cm,draw] {XXX};
```



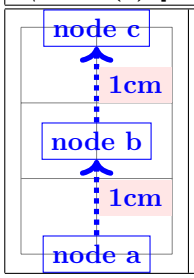



```
\node (a) at (1,1) {node a};
\node (b) [above=2cm of a.north east] {XXX};
```

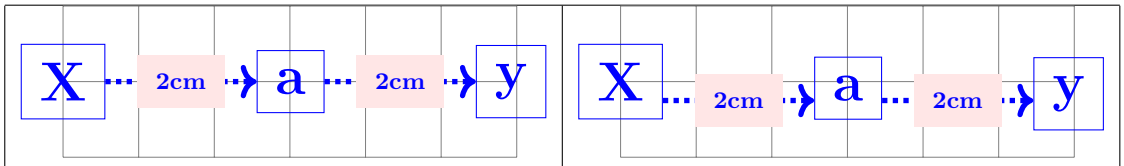



```
\node (a) at (1,0) {node a};
\node (b) [above=1cm of a] {node b};
\node (c) [above=1cm of b] {node c};
```

```
\node (a) at (1,0) {node a};
\node (b) [on grid,above=1cm of a] {node b};
\node (c) [on grid,above=1cm of b] {node c};
```




```
\begin{tikzpicture}[every node/.style=draw,node distance=1mm]
\node (a1) at (1,0) {node a};
\node (b) [above=of a] {node b};
\node (c) [above=of b] {node c};
\end{tikzpicture}
```



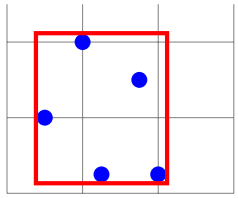

```
\node[draw] (X) at (0,0) {X};
\node[draw] (a) [right=of X] {a};
\node[draw] (y) [right=of a] {y};
```

```
\node[draw] (X) at (0,0) {X};
\node[draw] (a) [base right=of X] {a};
\node[draw] (y) [base right=of a] {y};
```

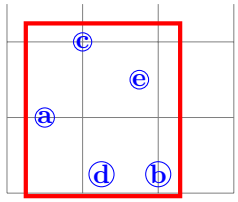
7.12 Fitting nodes

Load package : \usetikzlibrary{fit}

PGFmanual section : 52

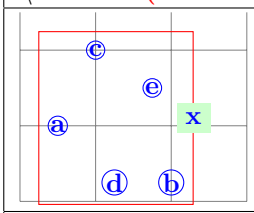


```
\fill  (.5,1) circle (3pt);
\fill  (2,.25) circle (3pt);
\fill  (1,2) circle (3pt);
\fill  (1.25,0.25) circle (3pt);
\fill  (1.75,1.5) circle (3pt);
\node[draw=red,ultra  thick,fit={(.5,1)  (2,.25)  (1,2)
(1.25,0.25) (1.75,1.5) }] {} ;
```

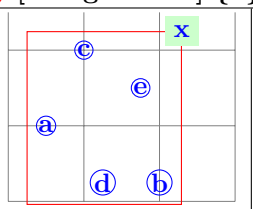



```
[dot/.style={inner sep=0pt,draw,circle,blue}]
\node[dot] (a) at (.5,1) {a};
\node[dot] (b) at (2,.25) {b};
\node[dot] (c) at (1,2) {c};
\node[dot] (d) at (1.25,0.25) {d};
\node[dot] (e) at (1.75,1.5) {e};
\node[draw=red,ultra thick,fit=(a) (b) (c) (d) (e)] {}
```

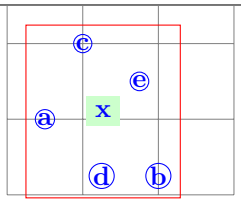
```
\node[draw=red,ultra thick,fit=(a) (b) (c) (d) (e)] (xxx) {}
\node at (xxx.east) [fill=green!20] {x};
```



xxx.east

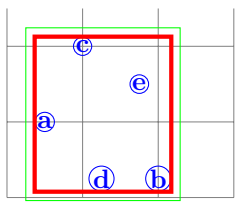


xxx.north east

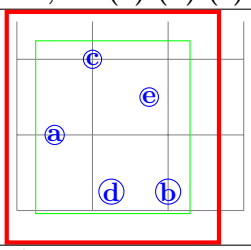


xxx.center

```
\node [draw=green,fit=(a) (b) (c) (d) (e)] ;
\node [inner sep=0pt,draw=red,fit=(a) (b) (c) (d) (e)] ;
```

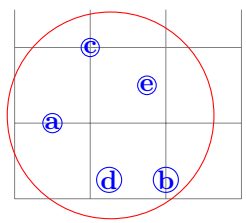


inner sep=0pt

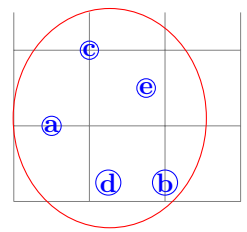


inner sep=.5cm

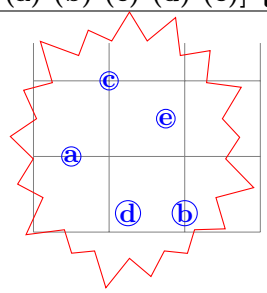
```
\node[circle,draw=red,inner sep=0pt,fit=(a) (b) (c) (d) (e)] {};
```



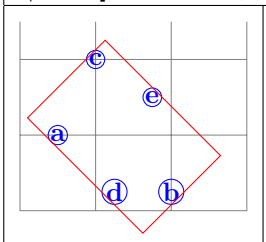
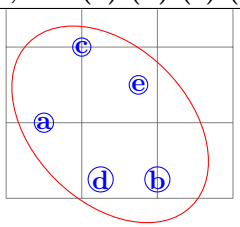
circle



ellipse



shape=starburst (see section 17)

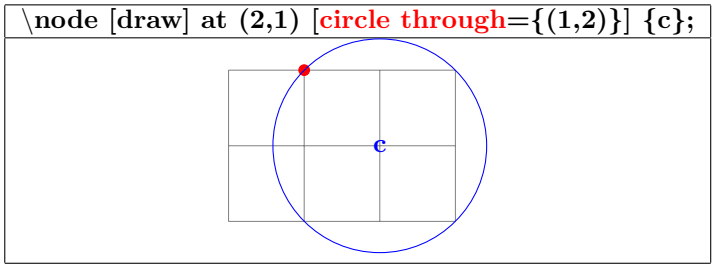
\node[draw=red, rotate fit=45, fit=(a) (b) (c) (d) (e)] {};	
	
rotate fit=45	**ellipse, rotate fit=45**

7.13 Circle defined by two points

Load package : \usetikzlibrary{through}

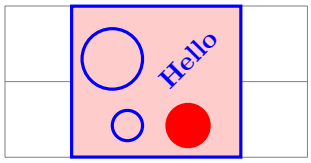
PGFmanual section : 71

```
\node [draw] at (2,1) [circle through={(1,2)}] {c};
```

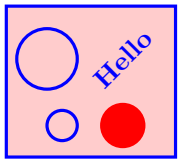


7.14 Matrices and Alignment

PGFmanual section : 20



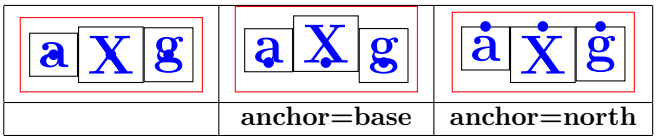

```
\node [matrix,fill=red!10,draw=blue,very thick] at (2,1)
{
\draw (0,0) circle (4mm); & \node [rotate=45] Hello; \\
\draw (0.2,0) circle (2mm); & \fill[red] (0,0) circle
(3mm); \\
};
```



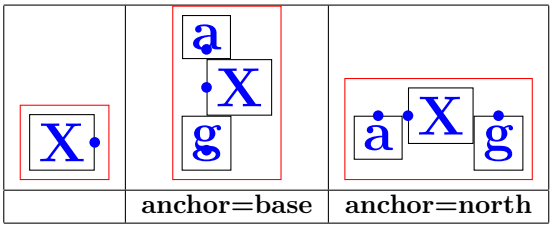

```
\matrix [fill=red!10,draw=blue,very thick]
{
\draw (0,0) circle (4mm); & \node [rotate=45] Hello; \\
\draw (0.2,0) circle (2mm); & \fill[red] (0,0) circle
(3mm); \\
};
```

7.14.1 Cell Pictures

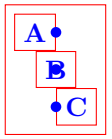
PGFmanual section : 20-3



	anchor=base	anchor=north

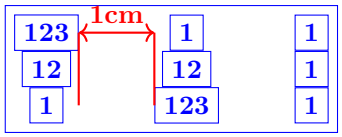


	anchor=base	anchor=north

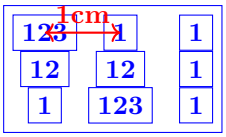



```
\matrix [draw=red,nodes=draw] {
\node[left] A; \fill[blue] (0,0) circle (2pt); \ \
\node B; \fill[blue] (0,0) circle (2pt);\ \
\node[right] C; \fill[blue] (0,0) circle (2pt); \ \
};
```

\matrix [draw,column sep=1cm,nodes=draw]

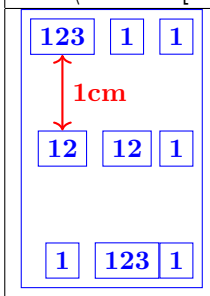


column sep=1cm

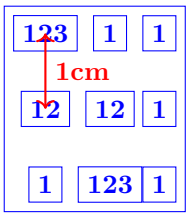


column sep={1cm,between origins }

```
\matrix [draw,row sep=1cm,nodes=draw]
```

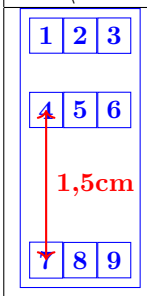


row sep=1cm

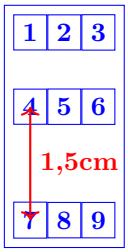


row sep={1cm,between origins }

```
\matrix [ row sep=5mm,draw,nodes=draw]
{ \node {1}; & \node {2}; & \node {3}; \\
\node {4} ; & \node {5}; & \node {6}; \\ [1cm]
\node {7}; & \node{8}; & \node{9}; \\ }
```

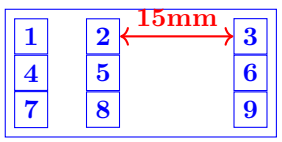


[1cm]

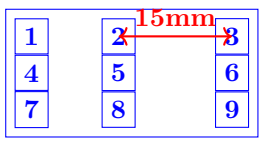


[1cm,between origins]

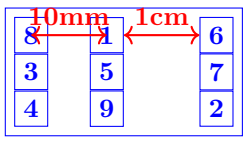
```
\matrix [ column sep=5mm,draw,nodes=draw]
{ \node {1}; & \node {2}; & \node {3}; \\
\node {4} ; & \node {5}; & [1cm]\node {6}; \\
\node {7}; & \node{8}; & \node{9}; \\ }
```



[1cm]



[1cm,between origins]



7.14.2 Cell Styles and Options

```
\matrix [nodes=draw,nodes={fill=blue!10,minimum size=1cm}]
```

1	2	3
4	5	6
7	8	9

\matrix[row 2/.style={red}]		
8 1 6 3 5 7 4 9 2	8 1 6 3 5 7 4 9 2	8 1 6 3 5 7 4 9 2
row 2/.style={red}	column 2/.style={red}	row 2 column 2/.style={red}

\matrix[column 1/.style={anchor=west}]		
12345 67890 123 67 1 6	12345 67890 123 67 1 6	12345 67890 123 67 1 6
[column 1/.style=anchor=west]	[column 1/.style=anchor=east]	[column 1/.style=anchor=base]

\matrix[matrix of nodes,every odd column/.style=red]			
a b c d e f g h i j k l	a b c d e f g h i j k l	a b c d e f g h i j k l	a b c d e f g h i j k l
every odd column	every even column	every odd row	every even row

\matrix [draw,matrix of nodes,execute at begin cell={(}]
(1 (2 (4 (6 (9

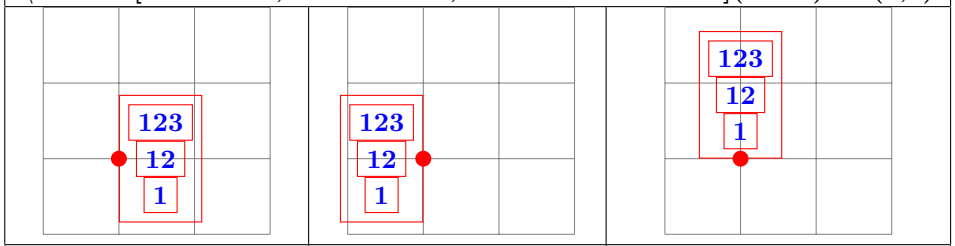
\tikz [matrix of nodes/.style={ execute at begin cell=\node\bgroup , execute at end cell=m^2\egroup; }] \matrix [draw,matrix of nodes]
1 m^2 2 m^2 4 m^2 6 m^2 8 m^2 9 m^2

\matrix [raw,matrix of nodes, execute at empty cell=\node{- -};]
1 2 – 4 – 6 – – 9

7.14.3 Anchoring a Matrix

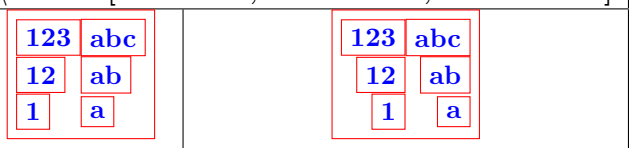
PGFmanual section : 20-4

```
\matrix [draw=red,nodes=draw,matrix anchor=east](XXX) at (1,1)
```

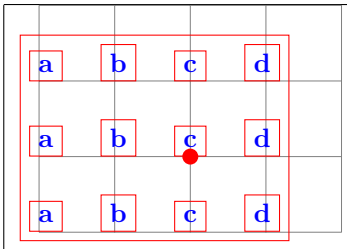


matrix anchor=west | matrix anchor=east | matrix anchor=south

```
\matrix [draw=red,nodes=draw,anchor=west]
```



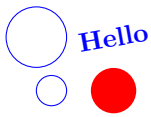
anchor=west | anchor=east




```
\matrix[draw=red,nodes=draw,
matrix anchor=inner node.south, anchor=base,
row sep=5mm,column sep=5mm] at (2,1)
{
\node {a}; & \node {b}; & \node {c}; & \node {d}; \\
\node {a}; & \node {b}; & \node(inner node){c}; & \node
{d}; \\
\node{a}; & \node {b}; & \node{c}; & \node {d}; \\
};
```

7.14.4 Considerations Concerning Active Characters

PGFmanual section : 20-5




```
\tikz \matrix [ampersand replacement=\| ]
{
\draw (0,0) circle (4mm); \|  \node[rotate=10] {Hello}; \\
\draw (0.2,0) circle (2mm); \|  \fill[red] (0,0) circle (3mm); \\
};
```

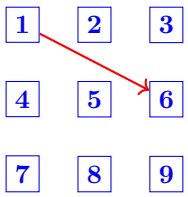
7.15 Matrix Library

Load package : \usetikzlibrary{matrix}

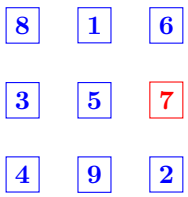
PGFmanual section : 57-1

1 2 3
4 5 6
7 8 9

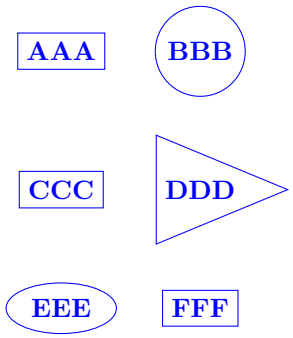
```
\begin{tikzpicture}
\matrix [matrix of nodes]
{
1   &   2   &   3   \\
4   &   5   &   6   \\
7   &   8   &   9   \\
};
\end{tikzpicture}
```



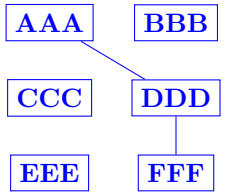

```
\begin{tikzpicture}
\matrix (XXX) [matrix of nodes,column sep=.5cm,row
sep=.5cm,every node/.style=draw]
{
1   &   2   &   3   \\
4   &   5   &   6   \\
7   &   8   &   9   \\
};
\draw[thick,red,->] (XXX-1-1) - - (XXX-2-3) ;
\end{tikzpicture}
```



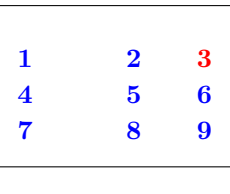

```
1 & 2 &     3     \\
4 & 5 & |[red]| 6 \\
7 & 8 &     9     \\
```



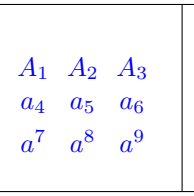

```
    AAA      &        |[circle]| BBB        \\
    CCC      &  |[isosceles triangle]| DDD  \\
|[ellipse]| EEE  &            FFF           \\
```



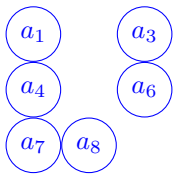

```
\matrix [matrix of nodes,column sep=.5cm,row
sep=.5cm,every node/.style=draw]
{
                |(a)| AAA  &  |(b)| BBB  \\
                |(c)| CCC  &  |(d)| DDD  \\
                |(e)| EEE  &  |(f)| FFF  \\
};
\draw (a) - - (d);
\draw (d) - - (f);
```



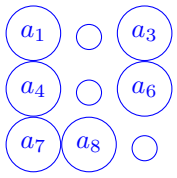

```
1 & [1cm ] 2 & [5mm ] |[red]| 3 \\
4 &     5   &         6         \\
7 &     8   &         9         \\
```




```
\matrix [matrix of math nodes]
{
A_1   &   A_2   &   A_3   \\
a_4   &   a_5   &   a_6   \\
a^7   &   a^8   &   a^9   \\
};
```



```
\matrix [matrix of math nodes,nodes=circle,draw]
{
A__1   &          &   A__3   \\
a__4   &          &   a__6   \\
a__ 7  &   a__ 8  &          \\
};
```



```
\matrix [matrix of math nodes,nodes=circle,draw ,nodes
in empty cells]
{
A__1   &          &   A__3   \\
a__4   &          &   a__6   \\
a__ 7  &   a__ 8  &          \\
};
```

7.15.1 Characters in Matrices of Nodes

PGFmanual section : 57-2

aaa	bbb
ccc	
eee	fff

```
\matrix [matrix of nodes,nodes={text width=2cm,draw}
]
{
aaa & bbb \\
ccc \\
eee & fff \\
};
```

1	aaa bbb ccc
2	ddd

```
\matrix [matrix of nodes,nodes={text width=2cm,draw}
]
{
1 & & {aaa \\ bbb \\ ccc }  \\
2 & & ddd \\
};
```

7.15.2 Delimiters

PGFmanual section : 57-3

\matrix [matrix of math nodes,left delimiter=( ]

$\begin{pmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{pmatrix}$	$\begin{Bmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{Bmatrix}$	$\overline{\begin{matrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{matrix}}$	$\underbrace{\begin{matrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{matrix}}$
left delimiter=(	right delimiter=\}	above delimiter=|	below delimiter=\rmoustache

```
\tikz \node [fill=red!20,text width=2cm,left delimiter=\{ ]
{Ceci est une démonstration d'un texte sur une largeur de 2cm.};
```

Ceci est une démonstration d'un texte sur une largeur de 2cm.

7.16 Chaine de nœuds

7.16.1 Starting and Continuing a Chain

Load package : \usetikzlibrary{chains}

PGFmanual section : 46-2

```
\begin{tikzpicture}[start chain]
\node [on chain] {A};
\node [on chain] {B};
\node [on chain] {C};
\end{tikzpicture}
```

A B C

```
\begin{tikzpicture}[start chain, node distance= 0.5 cm]
```

A B C

```
\begin{tikzpicture}[start chain=going below ]
```

A

B

C

```
\begin{tikzpicture}[start chain=going left ]
```

C B A

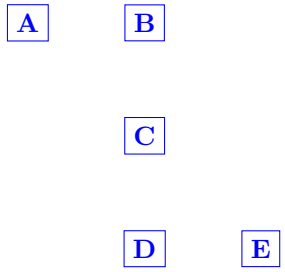
```
\begin{tikzpicture}[start chain, every node/.style=draw ]
```

A B C

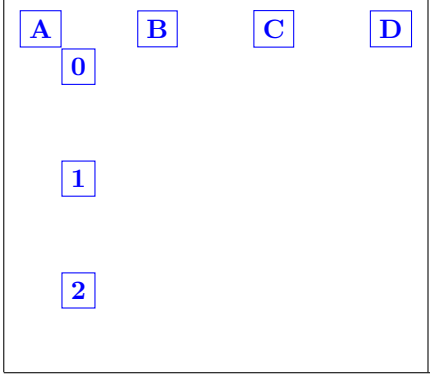
2 1 0

A B C D

```
\begin{tikzpicture}[start chain=1 going right ,
start chain=2 going left]
\node [draw,on chain=1] {A};
\node [draw,on chain=1] {B};
\node[draw,on chain=1] {C};
\node [draw,on chain=2] at (3,1) {0};
\node [draw,on chain=2] {1};
\node [draw,on chain=2] {2};
\node[draw,on chain=1] {D};
\end{tikzpicture}
```



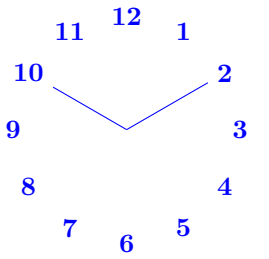

```
\begin{tikzpicture}[start chain going right] \node [draw,on
chain] {A};
\node [draw,on chain] {B};
\node [draw,continue chain=going below,on chain] {C};
\node[draw,on chain] {D};
\node [draw,continue chain=going right,on chain] {E};
\end{tikzpicture}
```



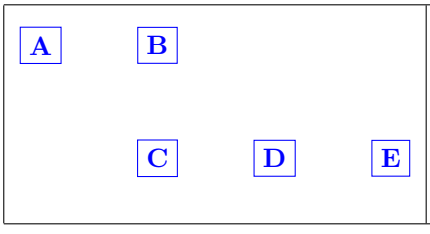

```
\begin{tikzpicture}[start chain going right]
{ [start chain=1]
\node [draw,on chain] {A};
\node [draw,on chain] {B};
\node [draw,on chain] {C};
}
{ [start chain=2]
\node[draw,on chain=2] {0};
\node[draw,on chain=2] {1};
\node[draw,on chain=2] {2};
}
{ [continue chain=1]
\node [draw,on chain] {D};
}
\end{tikzpicture}
```

7.16.2 Nodes on a Chain

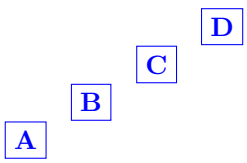
PGFmanual section : 46-3



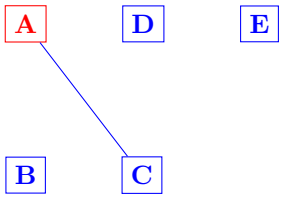

```
\begin{tikzpicture}[start chain=XXX placed
{at=(\tikzchaincount*-30+90:1.5)}]
\foreach \i in {1,...,12}
\node [on chain] {\i};
\draw (0,0) -- (XXX-10);
\draw (0,0) -- (XXX-2);
\end{tikzpicture}
```



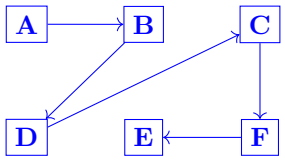

```
\begin{tikzpicture}[start chain]
\node [draw,on chain] {A};
\node [draw,on chain] {B};
\node [draw,on chain=going below] {C};
\node [draw,on chain] {D};
\node [draw,on chain] {E};
\end{tikzpicture}
```




```
\begin{tikzpicture}[start chain=going
{at=(\tikzchainprevious,shift=(30:1)}]
\node [draw,on chain] {A};
\node [draw,on chain] {B};
\node [draw,on chain] {C};
\node [draw,on chain] {D};
\end{tikzpicture}
```




```
\begin{tikzpicture}
\node [draw,red] (A) at (0,2) {A};
{ [start chain]
\node [draw,on chain] {B};
\node [draw,on chain] {C};
\chainin (A) [join];
\node [draw,on chain] {D};
\node [draw,on chain] {E};
}
\end{tikzpicture}
```



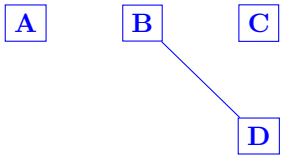

```
\begin{tikzpicture}
\matrix [matrix of nodes,column sep=5mm,row sep=5mm] ,ev-
ery node/.style=draw
{
|(a) | A & |(b) | B & |(c) | C \\
|(d) | D & |(e) | E & |(f) | F \\
};
{ [start chain,every on chain/.style={join=by ->}]
\chainin (a); \chainin(b); \chainin(d);
\chainin (c); \chainin(f); \chainin(e); } \end{tikzpicture}
```

7.16.3 Joining Nodes on a Chain

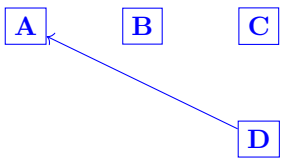
PGFmanual section : 46-4


```
\begin{tikzpicture}[start chain]
\node [draw,on chain] {A};
\node [draw,on chain,join] {B};
\node [draw,on chain] {C};
\node [draw,on chain,join] {D};
\end{tikzpicture}
```


```
\begin{tikzpicture}[start chain, every on chain/.style=join,
every join/.style=->]
\node [draw,on chain] {A};
\node [draw,on chain,join] {B};
\node [draw,on chain] {C};
\node [draw,on chain,join] {D};
\end{tikzpicture}
```



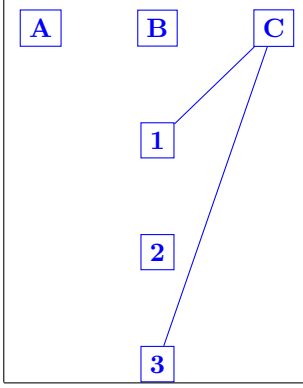

```
\begin{tikzpicture}[start chain]
\node [draw,on chain] {A};
\node [draw,on chain] {B};
\node [draw,on chain] {C};
\node [draw,on chain=going below,join=with chain-2 ] {D};
\end{tikzpicture}
```




```
\begin{tikzpicture}[start chain]
\node [draw,on chain] {A};
\node [draw,on chain] {B};
\node [draw,on chain] {C};
\node [draw,on chain=going below,join=with chain-1 by {blue,<-} ]
{D};
\end{tikzpicture}
```

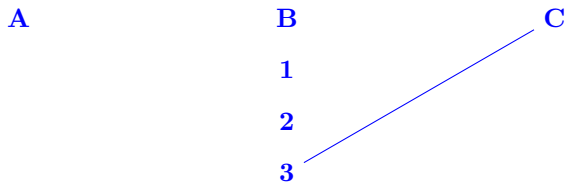
7.16.4 Branches

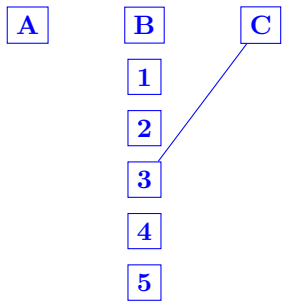
PGFmanual section : 46-5



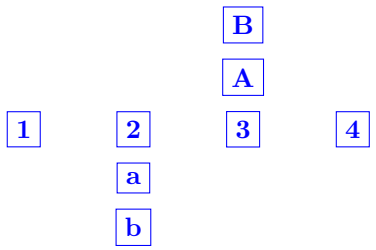

```
\begin{tikzpicture}
{ [start chain=XXX]
\node [draw,on chain] {A};
\node [draw,on chain] {B};
{ [start branch=YYY going below]
\node [draw,on chain] {1};
\node [draw,on chain] {2};
\node [draw,on chain] {3};
}
\node [ draw,on chain,join=with XXX/YYY-end,
join=with XXX/YYY-2] {C};
}
\end{tikzpicture}
```

```
\begin{tikzpicture}[ node distance=.2cm and 3cm]
```





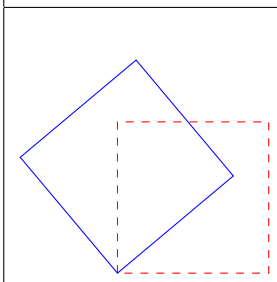
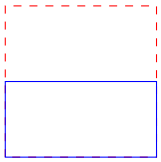
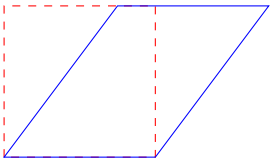
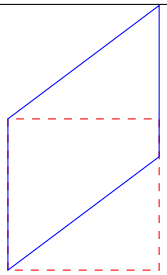
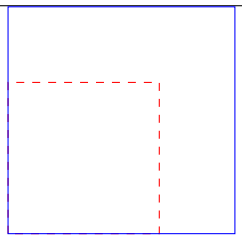
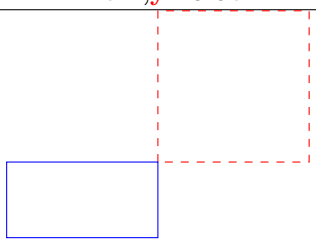
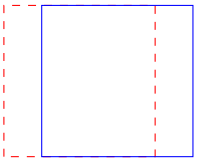
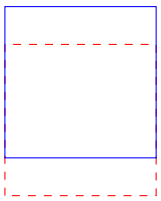

```
\begin{tikzpicture}[ node distance=2mm and 1cm]
{ [start chain=XXX]
\node [draw,on chain] {A};
\node [draw,on chain] {B};
{ [start branch=YYY going below]
\node [draw,on chain] {1};
\node [draw,on chain] {2};
\node [draw,on chain] {3}; }
\node [draw,on chain,join=with XXX/YYY-end] {C};
{ [continue branch=YYY]
\node [on chain] {4};
\node [on chain] {5}; }
}
\end{tikzpicture}
```




```
\begin{tikzpicture}[node distance=2mm and 1cm, every
node/.style=draw]
{ [start chain]
\node [on chain] {1};
\node [on chain] {2};
{ [start branch=XXX going below] }
\node [on chain] {3};
{ [start branch=YYY going above] }
\node [on chain] {4};
{ [continue branch=XXX ]
\node [on chain] {a};
\node [on chain] {b};}
{ [continue branch=YYY ]
\node [on chain] {A};
\node [on chain] {B}; }
```

8 Transformations

PGFmanual section : 25-3

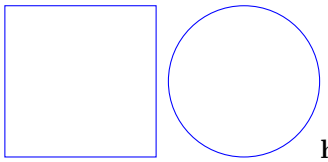
\draw[rotate,blue] (0,0) rectangle (2,2) ;			
			
rotate=40	x=1cm,y=0.5cm	xslant=0.75	yslant=0.75
			
scale=1.5	scale=-1	xshift=0.5cm	yshift=0.5cm

9 Placing the picture

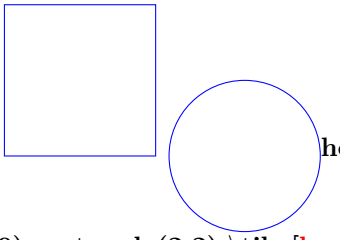
9.1 In the text

9.1.1 Without offset

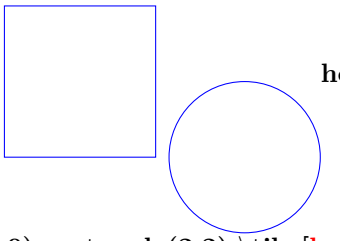
PGFmanual section : 12-2

picture in the text  here is the following code : \tikz \draw (0,0) rectangle(2,2);\tikz \draw (0,0) circle (1);

9.1.2 With zero offset

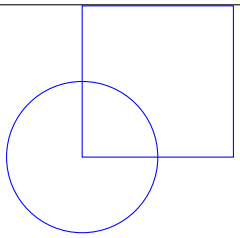
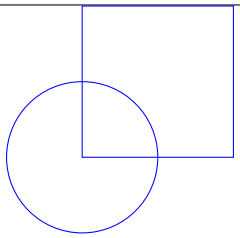
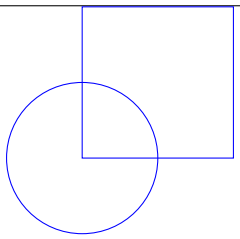
picture in the text  here is the following code : \tikz[baseline=0pt] \draw (0,0) rectangle(2,2);\tikz[baseline=0pt] \draw (0,0) circle (1);

9.1.3 With an offset

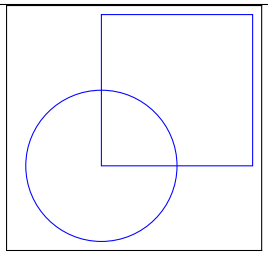
picture in the text  here is the following code : \tikz[baseline=1cm] \draw (0,0) rectangle(2,2);\tikz[baseline=1cm] \draw (0,0) circle (1);

9.2 In a tikzpicture environment

PGFmanual section : 12-1

text before  text after	text before \tikzpicture[blue] \draw (0,0) rectangle(2,2); \draw (0,0) circle (1); \end{tikzpicture} text after
text before  text after	text before \begin{tikzpicture}[blue,baseline=0pt] \draw (0,0) rectangle(2,2); \draw (0,0) circle (1); \end{tikzpicture} text after
text before  text after	text before \begin{tikzpicture}[blue,baseline=1cm] \draw (0,0) rectangle(2,2); \draw (0,0) circle (1); \end{tikzpicture} text after

9.3 In a fbox environment

text before  text after	text before
	\fbox{
	\begin{tikzpicture}[blue,baseline=0pt]
	\draw (0,0) rectangle(2,2);
	\draw (0,0) circle (1);
	\end{tikzpicture}
	}
	text after

9.4 Bounding box

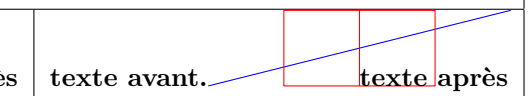
PGFmanual section : 15-8

\draw [use as bounding box] (1,0) rectangle (2,1); \draw[blue] (-1,0) - - (3,1);	
texte avant  texte après	texte avant texte après
(1,0) rectangle (2,1)	(0,0) rectangle (0,0)

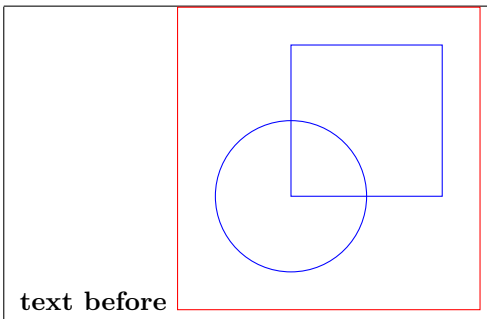
```
texte avant. \begin{tikzpicture} [trim left=1cm]
\draw[blue] (-1,0) - - (3,1); \draw[red] (0,0) grid (2,1);
\end{tikzpicture}texte après
```

texte avant. texte après

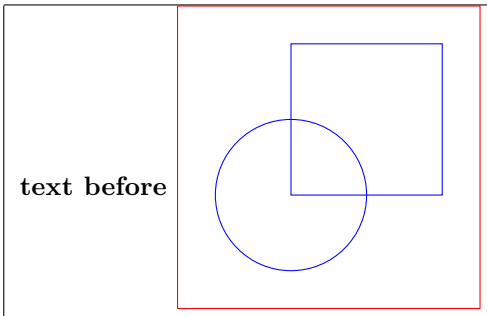
[trim left=1cm]



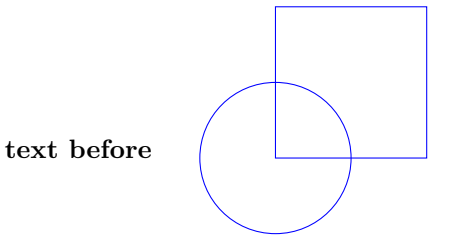
[trim right= 1cm]




```
text before
\tikzpicture[blue]
\draw [red,use as bounding box] (-1.5,-1.5) rectangle (2.5,2.5);
\draw (0,0) rectangle(2,2);
\draw (0,0) circle (1);
\end{tikzpicture}
text after
```




```
text before
\begin{tikzpicture}[blue,baseline=0pt]
\draw [red,use as bounding box] (-1.5,-1.5) rectangle (2.5,2.5);
\draw (0,0) rectangle(2,2);
\draw (0,0) circle (1);
\end{tikzpicture}
text after
```

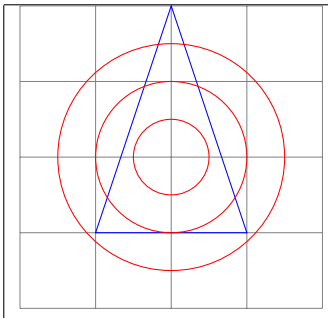



```
text before
\begin{tikzpicture}[blue,baseline=0pt]
\useasboundingbox (-1.5,-1.5) rectangle (2.5,2.5);
\draw (0,0) rectangle(2,2);
\draw (0,0) circle (1);
\end{tikzpicture}
text after
```

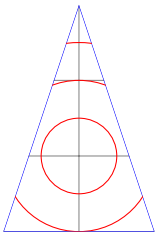
```
\begin{tikzpicture}[blue]
\fill (0,0) circle (5pt);
\fill (2,1) circle (5pt);
\draw[red] (current bounding box.south west) rectangle (current bounding box.north east);
\end{tikzpicture}
```

9.5 Clipping the picture

PGFmanual section : 15-9

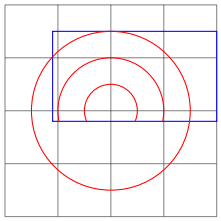


no clipping



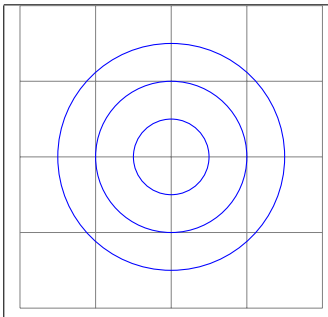
```
\clip (-1,-1) - -(0,2) - - (1,-1) - - cycle;
```

9.6 Partial clipping

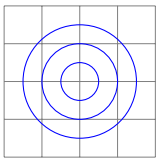


```
\tikzpicture[red,scale=.7]
\draw[help lines] (-2,-2) grid (2,2);
\draw[blue] (-1.1,-0.2) rectangle (2,1.5);
\draw (0,0) circle (1.5);
\clip (-1.1,-0.2) rectangle (2,1.5);
\draw (0,0) circle (.5);
\draw (0,0) circle (1);
\endtikzpicture
```

9.6.1 Scaling



Normal size



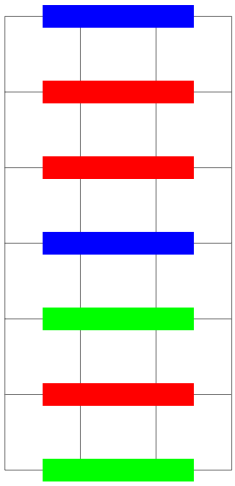
```
\tikzpicture[blue,scale=.5]
```

10 Scope

10.1 Environment Scope

PGFmanual section : 12-3

```
\begin{tikzpicture}[line width = 3mm]

\draw (0.5,6) - - (2.5,6);

\scope[red]
\draw (0.5,5) - - (2.5,5);
\draw (0.5,4) - - (2.5,4);
\end{scope}

\draw (0.5,3) - - (2.5,3);

\scope[green]
\draw (0.5,2) - - (2.5,2);
\draw [red] (0.5,1) - - (2.5,1);
\draw (0.5,0) - - (2.5,0);
\end{scope}

\end{tikzpicture}
```



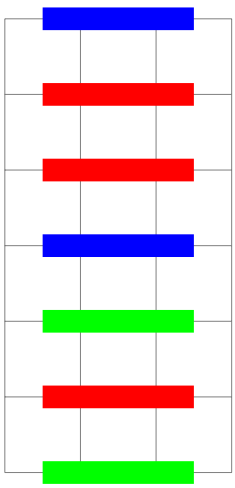
10.2 library scopes

10.2.1 Shorthand for Scope Environments

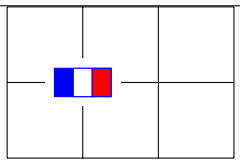
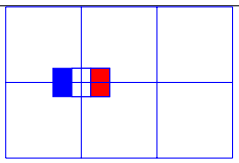
PGFmanual section : 12-3-2

Load package : \usetikzlibrary{scopes}

```
\begin{tikzpicture}[line width = 3mm]

\draw (0.5,6) - - (2.5,6);

{ [red]
\draw (0.5,5) - - (2.5,5);
\draw (0.5,4) - - (2.5,4);
}

\draw (0.5,3) - - (2.5,3);

{ [green]
\draw (0.5,2) - - (2.5,2);
\draw [red] (0.5,1) - - (2.5,1);
\draw (0.5,0) - - (2.5,0);
}

\end{tikzpicture}
```



10.2.2 Single Command Scopes

	
\node [fill=white] at (1,1) {\DFR}; \scoped [on background layer] \draw (0,0) grid (3,2);	\node [fill=white] at (1,1) {\DFR}; \draw (0,0) grid (3,2);

11 Absolute position on a page

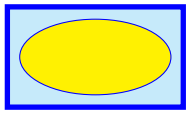
```
\begin{tikzpicture}[remember picture,overlay]
\fill(current page.north) circle (5pt) node[below left=4mm] \Huge north ;
\fill(current page.north east) circle (5pt) node[below left=4mm] \Huge north east ;
\fill(current page.north west) circle (5pt) node[below right=4mm] \Huge north west ;
\fill(current page.east) circle (5pt) node[above left=4mm] \Huge east ;
\fill(current page.center) circle (5pt) node[above left=4mm] \Hugecenter ;
\fill(current page.west) circle (5pt) node[above right=4mm] \Huge west ;
\fill(current page.south) circle (5pt) node[above right=4mm] \Huge south ;
\fill(current page.south west) circle (5pt) node[above right=4mm] \Huge south west ;
\fill(current page.south east) circle (5pt) node[above left=4mm] \Huge south east ;
\end{tikzpicture}
```

```
\begin{tikzpicture}[remember picture,overlay]
\node [opacity=.15] at (current page.center) {\includegraphics[width=8cm]{tiger} };
\end{tikzpicture}
```

```
\begin{tikzpicture}[remember picture,overlay]
\draw[dotted,opacity=.4] (current page.south west) - - (current page.north east)
      node[near start] {\Huge TIKZ} ;
\end{tikzpicture}
```

12 Background

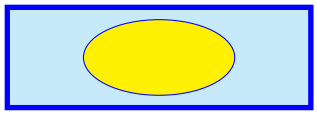
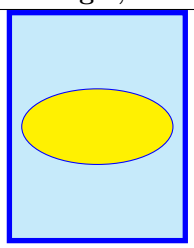
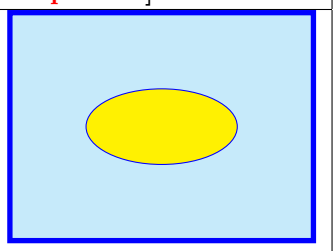
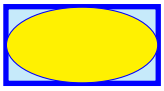
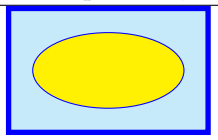
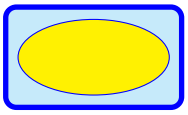
12.1 Framing



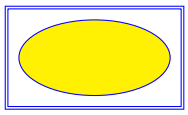
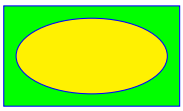
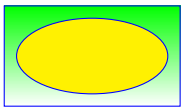
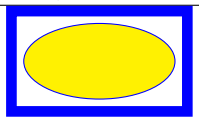
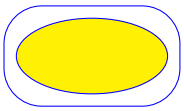
[1]

```
\begin{tikzpicture}[show background rectangle]
\filldraw[fill=yellow] (0,0) ellipse (1 and .5 );
\end{tikzpicture}

Other syntax :
\begin{tikzpicture}[framed]
```

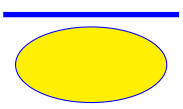
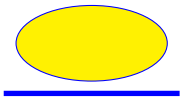
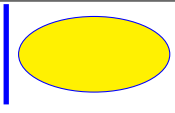
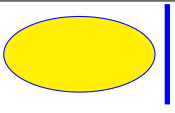
12.1.1 Options

[show background rectangle,inner frame xsep=1cm]		
		
inner frame xsep=1cm	inner frame ysep=1cm	inner frame sep=1cm
By default: inner frame xsep=1ex , inner frame ysep=1ex		
		
tight background	loose background	rounded corners
(inner frame sep = 0pt)	(inner frame sep = 2ex)	

12.1.2 Style

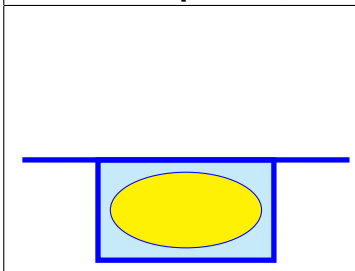
[background rectangle/.style={double,draw=blue},framed]				
				
double	fill=green	top color=green	line width=4pt	rounded corners=0.5cm

12.2 Partial framing

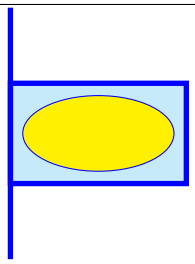
			
show background top	show background bottom	show background left	show background right

[1] \tikzset{background rectangle/.style={fill=cyan!20,draw=blue,line width=2pt}}

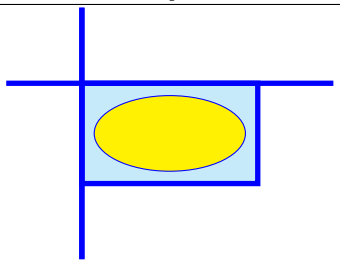
[framed,show background top,outer frame xsep=1cm]



outer frame xsep=1cm



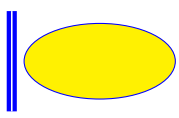
outer frame ysep=1cm



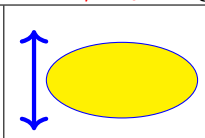
outer frame sep=1cm

12.2.1 Style

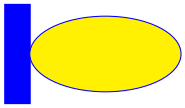
```
\begin{tikzpicture}[show background left,
    [background left/.style={double,ultra thick,draw=blue}]
```



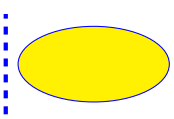
double



<->

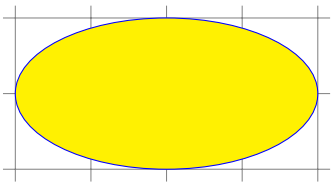


line width=10pt



dashed

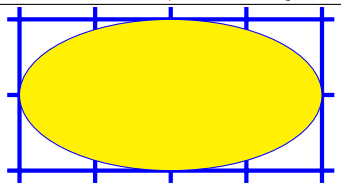
12.2.2 Gridding



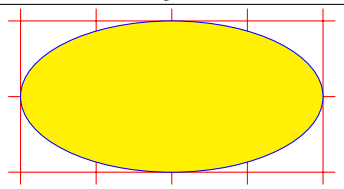
```
\begin{tikzpicture}[show background grid]
\filldraw[fill=yellow] (0,0) ellipse (2 and 1);
\end{tikzpicture}

Other syntax :
\begin{tikzpicture}[gridded]
```

12.2.3 Style

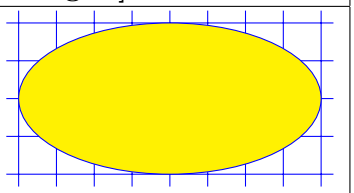
[background grid/.style={ultra thick,draw=blue},show background grid]



ultra thick ,draw=blue,draw=blue

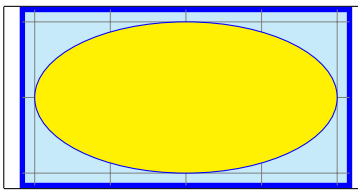


draw=red



step=.5cm,draw=blue

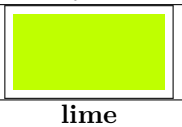
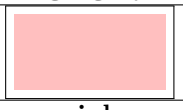
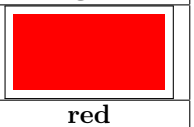
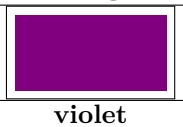
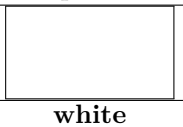
12.2.4 Framing and gridding

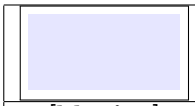


```
\begin{tikzpicture}[framed , gridded ]
\filldraw[fill=yellow] (0,0) ellipse (2 and 1);
\end{tikzpicture}
```

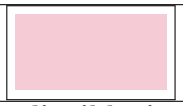
13 Defining your own colors

13.1 Basic colors

				
black	blue	brown	cyan	darkgray
				
gray	green	lightgray	lime	magenta
				
olive	orange	pink	purple	red
				
teal	violet	white	yellow	

				
[blue!10]	[blue!30]	[blue!50]	[blue!70]	[blue!90]

13.2 Colors mixing

			
[blue!30!red]	[red!80!blue!20]	[red!80!blue!50]	[red!80!blue!50!black!40]

13.3 Naming a color

PGFmanual section : 15-2

13.3.1 Percentage of red , green and blue

```
\definecolor{macouleur}{rgb}{.75,0.5,0.25}
(75% de rouge 50% de vert 25% de bleu)
\fill [macouleur] (0,0) rectangle (2,1);
```

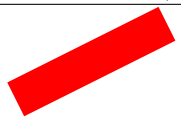
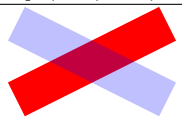
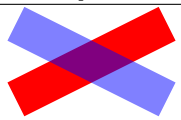
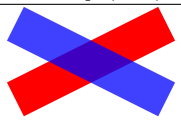
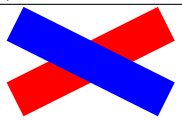
13.3.2 From existing color

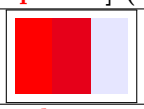
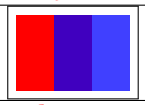
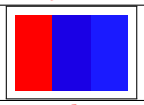
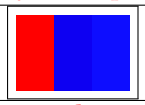
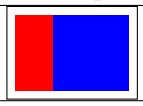
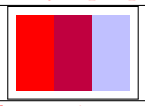
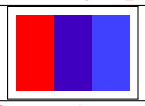
```
\colorlet{monrouge}{red!25}
\fill [monrouge] (0,0) rectangle (2,1);
```

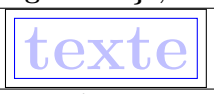
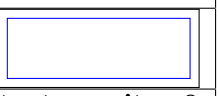
```
\colorlet{monviolet}{red!25!blue}
\fill [monviolet] (0,0) rectangle (2,1);
```

14 Opacity

PGFmanual section : 23-2

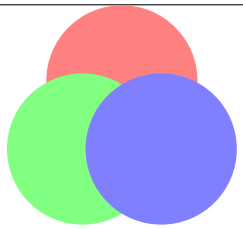
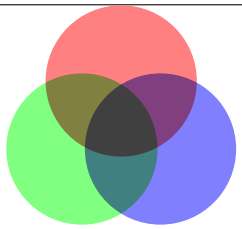
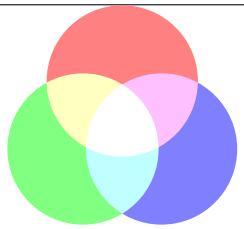
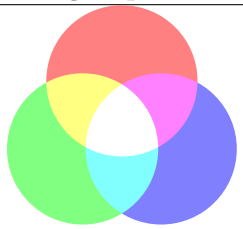
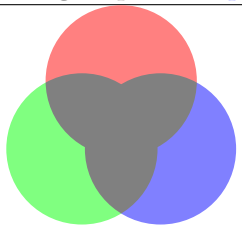
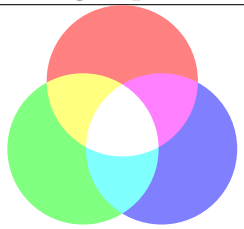
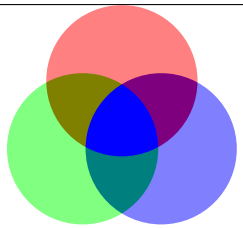
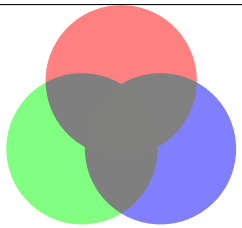
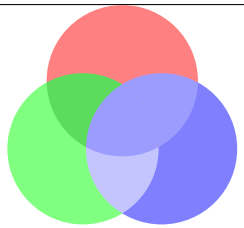
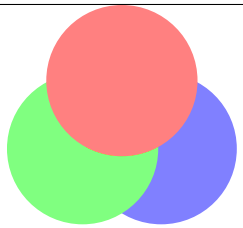
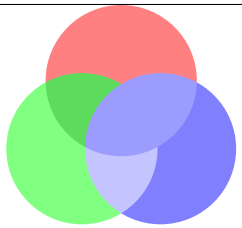
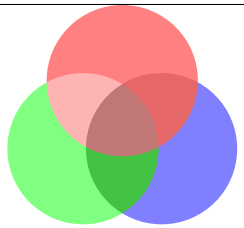
\draw[red] (0,0) – (2,1); \draw [blue,draw opacity=0] (0,1) - - (2,0);				
				
draw opacity=0	draw opacity=0.25	draw opacity=0.5	draw opacity=0.75	draw opacity=1

\fill[red] (0,0) rectangle (1,1); \fill[blue,transparent] (0.5,0) rectangle (1.5,1);			
			
transparent	ultra nearly transparent	very nearly transparent	nearly transparent
			
semitransparent	nearly opaque	very nearly opaque	ultra nearly opaque
			
opaque	fill opacity=.25	fill opacity=.5	fill opacity=.75

\node at (1,1) [text opacity=1] { \Huge texte} ;				
				
text opacity=1	text opacity=0.75	text opacity=0.5	opacity=0.25	text opacity=0

14.1 Blend Modes

PGFmanual section : 23-3

		
blend group=normal	blend group=multiply	blend group=screen
		
blend group=overlay	blend group=darken	blend group=lighten
		
blend group=difference	blend group=exclusion	blend group=hue
		
blend group=saturation	blend group=color	blend group=luminosity

Error message Unknow blend mode !			
blend group=colordodge	blend group=colorburn	blend group=hardlight	blend group=softlight

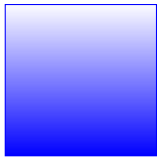
14.2 Fading

Load package : \usetikzlibrary{fadings}

14.2.1 Preset patterns

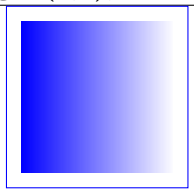
PGFmanual section : 51

\fill [blue,path fading=north] (-1,-1) rectangle (1,1);

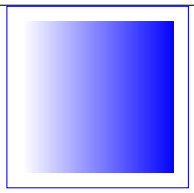


path fading=north

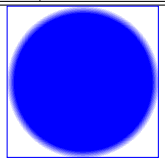
path fading=south



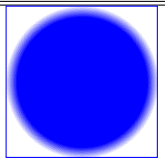
path fading=east



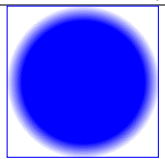
path fading=west



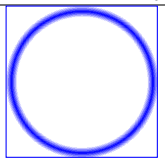
path fading=circle with fuzzy edge 10 percent



path fading=circle with fuzzy edge 15 percent



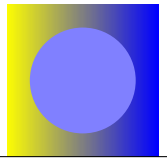
path fading=circle with fuzzy edge 20 percent

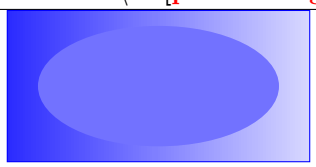
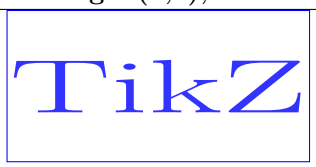
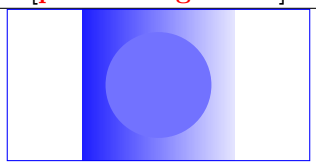
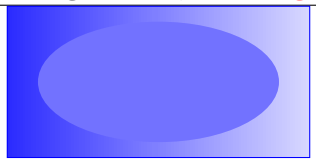
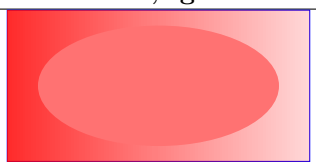
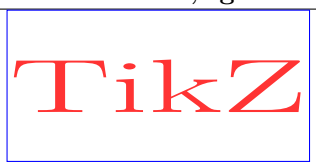


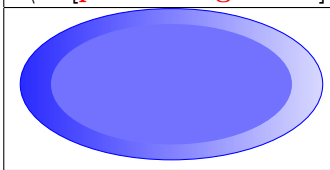
path fading=fuzzy ring 15 percent

14.2.2 Own patterns of fading with tikzfadingfrompicture

PGFmanual section : 23-4-1

Creation	*Visualization*
\tikzfadingfrompicture[name=filtre] \shade[left color=yellow,right color=blue!100] (0,0) rectangle (2,2); \fill[blue!50] (1,1) circle (0.7); \end{tikzfadingfrompicture}	
\tikzfadingfrompicture[name=tikz] \node [draw,text=transparent!20] {\fontfamily{ptm}\fontsize{25}{25}\bfseries\selectfont TikZ}; \end{tikzfadingfrompicture}	

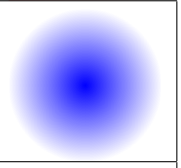
Use in a frame	
\fill[path fading=filtre] (-2,-1) rectangle (2,1);	
	
[path fading=filtre]	[path fading=tikz]
	
[path fading=filtre ,fit fading=false]	[path fading=tikz,fit fading=false]
	
left color=blue,right color=red	[path left color=blue,right color=red
	
[path fading=filtre ,red]	[path fading=tikz,red]

Use in an ellipse	
\fill[path fading=filtre] (-2,-1) ellipse (2 and 1);	
	
[path fading=filtre]	[path fading=tikz]

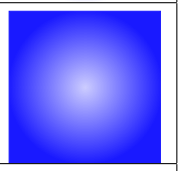
14.3 Creating fading patterns with tikzfading

```
\tikzfading[name=fade right, left color=transparent!0, right color=transparent!100]

\tikz \filldraw [red,path fading=fade right] (-1,-1) rectangle (1,1);
```

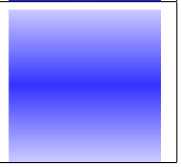
```
\tikzfading[name=fade out, inner color=transparent!0, outer color=transparent!100]

\tikz \filldraw [blue,path fading=fade out] (-1,-1) rectangle (1,1);
```



```
\tikzfading[name=fade inside, inner color=transparent!80, outer color=transparent!10]

\tikz \filldraw [blue,path fading=fade inside] (-1,-1) rectangle (1,1);
```



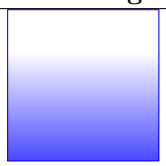
```
\tikzfading[name=middle, top color=transparent!80, bottom color=transparent!80, middle color=transparent!20]

\tikz \filldraw [blue,path fading=middle] (-1,-1) rectangle (1,1);
```



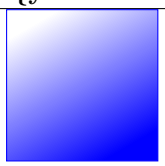
14.3.1 Modification of the fading pattern

PGFmanual section : 23-4-2

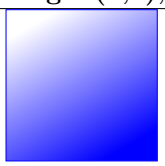
```
\fill [blue,path fading=north,fading transform={yshift=-.5cm}] (-1,-1) rectangle (1,1);
```



fading transform={yshift=-.5cm}



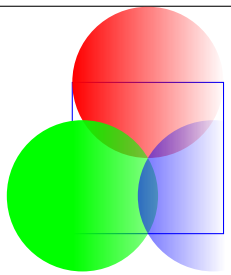
fading transform={yshift=-.5cm}



fading angle=30

PGFmanual section : 23-4-3

```
\begin{tikzpicture}
\draw (-1,-1) rectangle (1,1);
\path [scope fading=east] (-1,-1) rectangle (1,1);
\fill[red] ( 90:1) circle (1);
\fill[green] (210:1) circle (1);
\fill[blue] (330:1) circle (1);
\end{tikzpicture}
```



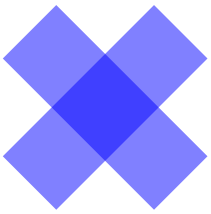
```
\tikz \node [black,scope fading=south,fading angle=45,text width=5cm]
{ VisualTIKZ VisualTIKZ VisualTIKZ VisualTIKZ VisualTIKZ VisualTIKZ VisualTIKZ VisualTIKZ VisualTIKZ VisualTIKZ VisualTIKZ VisualTIKZ };
```

VisualTIKZ VisualTIKZ
VisualTIKZ VisualTIKZ
VisualTIKZ VisualTIKZ
VisualTIKZ VisualTIKZ
VisualTIKZ VisualTIKZ
VisualTIKZ VisualTIKZ
VisualTIKZ

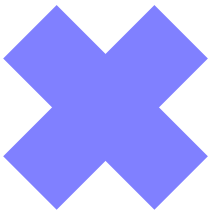
14.4 Transparency Groups

PGFmanual section : 23-5

```
\begin{tikzpicture}[opacity=.5]
\draw [line width=1cm] (0,0) – (2,2);
\draw [line width=1cm] (0,2) – (2,0);
\end{tikzpicture}
```



[opacity=.5]



[opacity=.5,transparency group]

Not working !

```
\begin{tikzpicture}
\shade [left color=red,right color=blue] (-2,-1) rectangle (2,1);
\begin{scope}[transparency group=knockout]
\fill][white] (-1.9,-.9) rectangle (1.9,.9);
\node [opacity=0] TikZ;
\end{scope}
\end{tikzpicture}
```

15 Create command

Load package : Warning: the creation of the command must be placed before \begin{document} !

syntax :\newcommand{\name}[number of variables]{Description}

Example : command with one variable :
Creation

```
 \newcommand
 {\maboite}[1]{                  % command named “maboite” with one variable
 \begin{center}                  % centering the box
 \tikzpicture \node[fill=yellow  % a yellow text box
 ,text centered                  % centering the text in the box
 ,text width=.5\linewidth]       %  to set the width of the box
 #1} ; \end{center}              % #1 will be replaced by the variable
 }
```

Utilisation : \maboite{contenu}

Load package : contenu

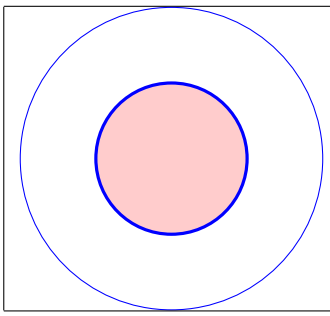
Example : command without variable :
creation

```
\newcommand{\DFR}{ \tikzpicture[scale=.25] \draw [fill=blue](0,0) rectangle (3,1.5);
\draw [fill=white](1,0) rectangle (2,1.5); \draw[fill=red](2,0) rectangle (3,1.5);\endtikzpicture }
```

Utilisation : \DFR 

16 Creating styles

16.1 Styles without variable



```
\begin{tikzpicture} [mon style/.style={draw=blue, fill=red!20, very thick}]
\draw (0,0) circle (2cm);
\draw[mon style] (0,0) circle (1cm);
\end{tikzpicture}
```

16.2 Styles with variable

```
\begin{tikzpicture} [mon style/.style={draw=#1, thick, fill=#1!50, scale=.5}]
\filldraw [mon style=red] (0,0) rectangle (2,1);
\filldraw [mon style=blue] (3,0) rectangle (5,1);
\end{tikzpicture}
```

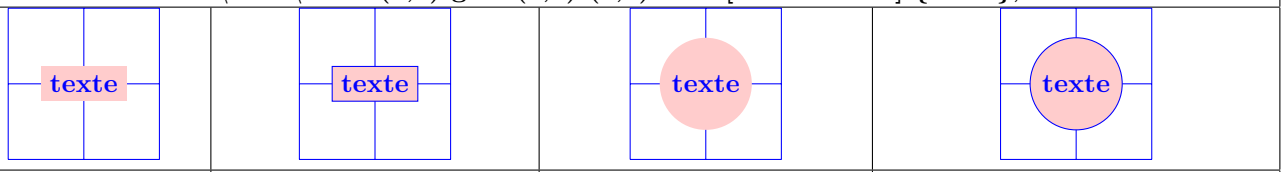
With a default value

```
\begin{tikzpicture} [mon style/.style={draw=#1,fill=#1!20,very thick},
mon style/default=black]
\filldraw [mon style] (0,0) rectangle (2,1);
\filldraw [mon style=blue] (3,0) rectangle (5,1);
\end{tikzpicture}
```

17 Text highlighting

17.1 In a TikZ node

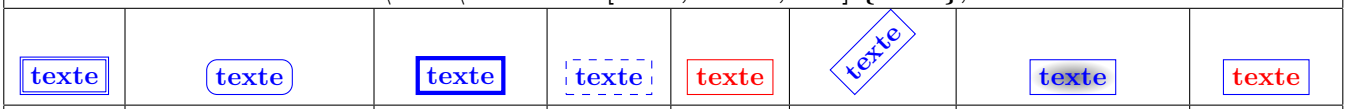
\tikz \draw (0,0) grid (2,2) (1,1) node[fill=red!20] {texte};



node[fill=red!20]	node[fill=red!20,draw]	node[fill=red!20,circle]	node[fill=red!20,circle,draw]

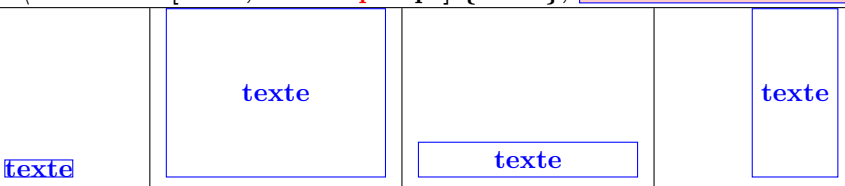
17.1.1 Options

\tikz \draw node[draw,double,blue] {texte};



double	rounded corners	ultra thick	dashed	red	rotate=45	shading=radial	text=red

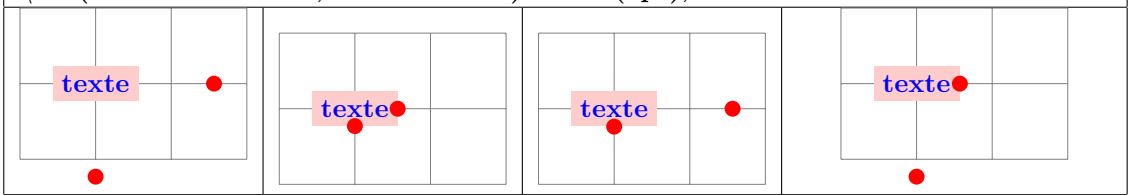
\tikz \draw node[draw,inner sep=0pt] {texte}; PGFmanual section : 17-2-3



inner sep=0pt	inner sep=1cm	inner xsep=1cm	inner ysep=1cm

By default : 0.3333em

\node [fill=red!20,outer sep=1cm] (A) at (1,1) {texte}; PGFmanual section : 17-2-3
\fill (node cs:name=A,anchor=east) circle (3pt);
\fill (node cs:name=A,anchor=south) circle (3pt);

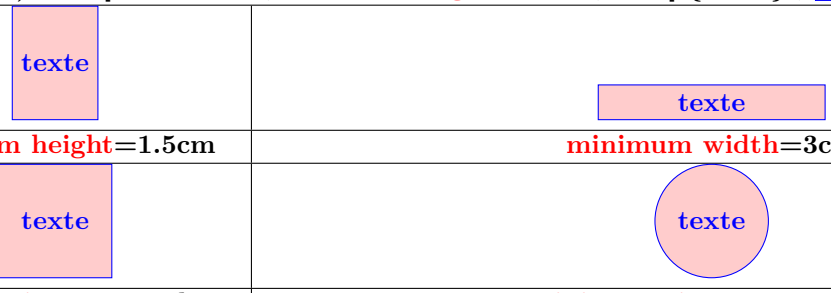


outer sep=1cm	outer sep=0pt	outer xsep=1cm	outer ysep=1cm

By default : 0.5\pgflinewidth

17.1.2 Minimum size

\draw((0,0) node[fill=blue!20,minimum height=1.5cm,draw] {texte} ; PGFmanual section : 17-2-3



minimum height=1.5cm	minimum width=3cm
minimum size=1.5cm,draw	minimum size=1.5cm,circle

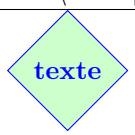
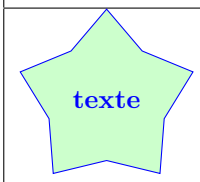
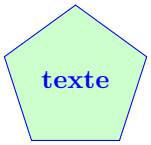
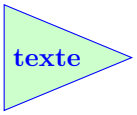
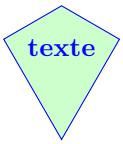
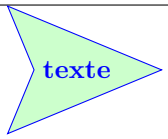
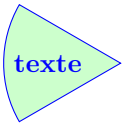
17.2 Geometric Shapes nodes

Load package : \usetikzlibrary{shapes.geometric}

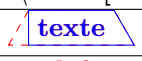
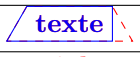
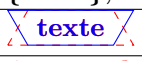
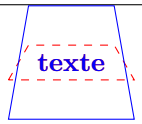
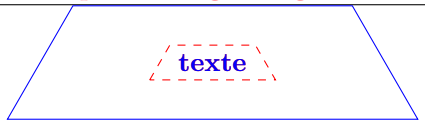
PGFmanual section : 67-3

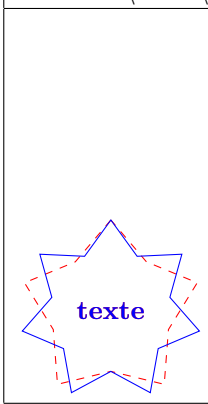
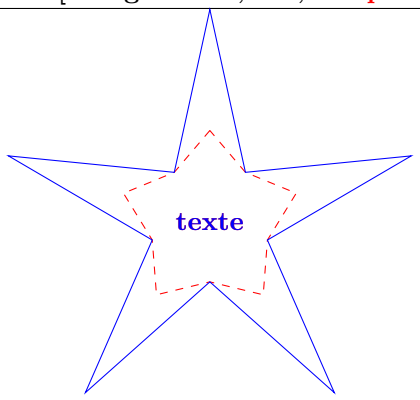
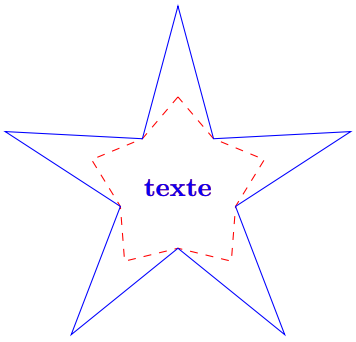
17.2.1 Available shapes

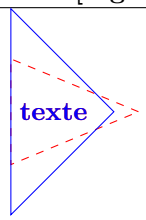
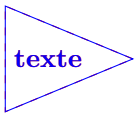
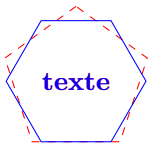
2 syntaxes :
\tikz \node[fill=green!20,shape=diamond,draw,blue] {texte};
\tikz \node[fill=green!20,diamond,draw] {texte};

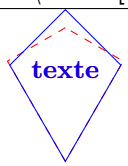
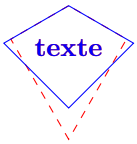
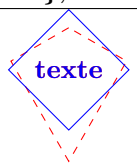
			
diamond	ellipse	trapezium	semicircle
			
star	regular polygon	isosceles triangle	kite
			
dart	circular sector	cylinder	

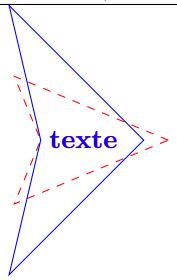
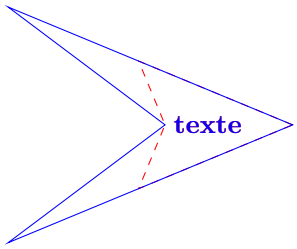
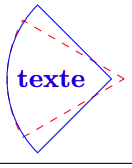
17.2.2 Options

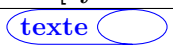
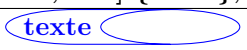
\node [trapezium,draw,trapezium left angle=90,draw,blue] {texte};		
		
trapezium left angle=90	trapezium right angle=90	trapezium angle=120
		
minimum height=1.5cm trapezium stretches=true	minimum height=1.5cm trapezium stretches=false	minimum width=1.5cm trapezium stretches

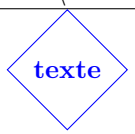
\tikz \node [fill=green!20,star,star points=6,draw] {texte};		
		
star points=7	star point height = 2cm	star point ratio = 3
By default5	By default.5cm	By default1.5

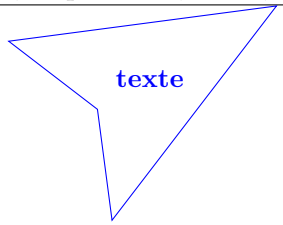
\node [isosceles triangle,isosceles triangle apex angle=90,draw,blue] {texte}; \node [regular polygon, regular polygon sides=6,draw,blue] {texte};		
		
isosceles triangle apex angle=90	isosceles triangle stretches	regular polygon sides=6

\node [kite,kite upper vertex angle=90,draw,blue] {texte};		
		
kite upper vertex angle=90	kite lower vertex angle=90	kite vertex angles=90
initially 120	initially 60	

\node [dart,dart tip angle=90,draw,blue] {texte};		
		
dart tip angle=90	dart tail angle=90	circular sector angle=90
initially 45	initially 135	initially 60

\node [cylinder,aspect=2,draw,blue] {texte};	
	
aspect=2	aspect=4
	
cylinder uses custom fill, cylinder end fill=yellow	cylinder uses custom fill, cylinder body fill=yellow

\draw(0,0) node[shape aspect=1,diamond,draw] {texte} ;			
			
shape aspect=1	shape aspect=2	shape aspect=3	shape aspect=4

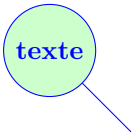
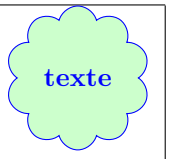
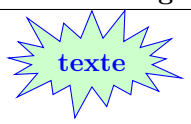
\draw node[shape border rotate=30,shape=dart, draw, shape border uses incircle] {texte};


17.3 Symbol Shapes nodes

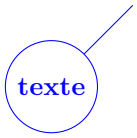
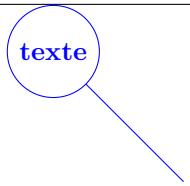
Load package : \usetikzlibrary{shapes.symbols}

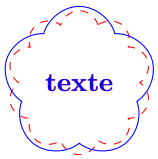
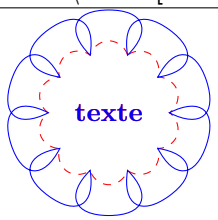
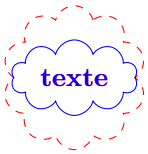
PGFmanual section : 67-4

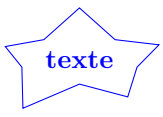
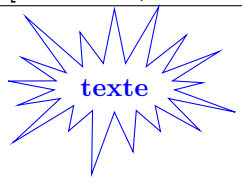
17.3.1 Available shapes

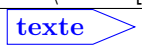
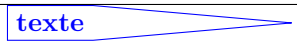
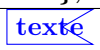
		
forbidden sign	magnifying glass	cloud
		
starburst	signal	tape

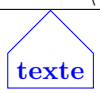
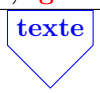
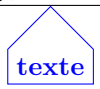
17.3.2 Options

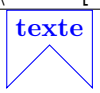
\node[magnifying glass,magnifying glass handle angle=45,draw,blue] {texte} ;		
		
magnifying glass handle angle=45	magnifying glass handle aspect=3	line width=1ex
By default : -45	By default : 1.5	

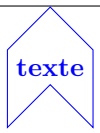
\node [cloud,cloud puffs=5,draw,blue] {texte};			
			
cloud puffs=5	cloud puff arc=270	cloud ignores aspect=false	cloud ignores aspect=true
By default: 10	By default: 135	By default: true	

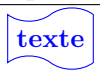
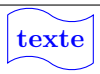
\node [starburst,starburst points=5,draw,blue] {texte};			
			
starburst points=5	starburst point height=1cm	random starburst=50	random starburst=0

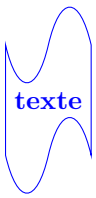
\node [signal,signal pointer angle=45,draw,blue] {texte};		
		
signal pointer angle=45	signal pointer angle=10	signal pointer angle=300
By default : signal pointer angle= 90		

\node [signal,signal to=above,draw,blue] {texte};			
			
signal to=above	signal to=below	signal to=right	signal to=above

\tikz [signal to=nowhere] \node [signal,signal from=above=45,draw,blue] {texte};			
			
signal from=above	signal from=below	signal from=right	signal from=above

	
signal from=east , signal to=west	signal from=south, signal to=north

\tikz \node [tape, draw,tape bend top=out and in] {texte};		
		
tape bend top=out and in	tape bend bottom=out and in	tape bend bottom=in and in
		
tape bend top=none	tape bend bottom=out and in tape bend top=out and in	tape bend bottom=in and out tape bend top=in and out (By default)

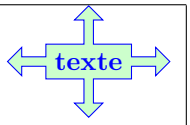
\tikz \node [tape, draw, tape bend height=1cm,blue] {texte};

By default : tape bend height = 5pt

17.4 Arrow Shapes nodes

Load package : \usetikzlibrary{shapes.arrows}

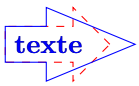
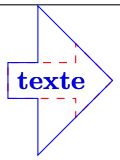
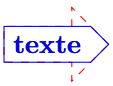
PGFmanual section : 67-5

17.4.1 Available shapes

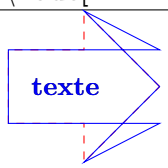
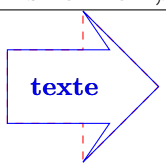
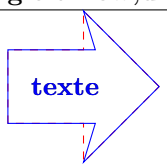
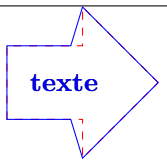
		
single arrow	double arrow	arrow box

17.4.2 Options

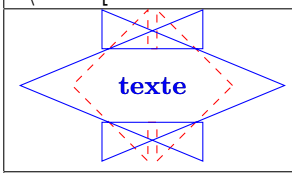
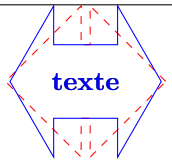
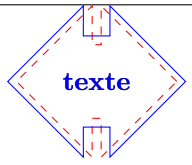
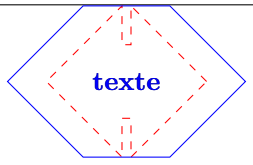
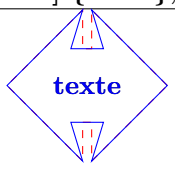
\node[single arrow,draw,single arrow tip angle=45] {texte};
\node[single arrow,draw,single arrow head extend=.75cm] {texte};

				
angle=45	angle=120	extend=.75cm]	extend=0cm	extend=-1mm
By default: single arrow tip angle= 90		By default: single arrow head extend=0.5cm		

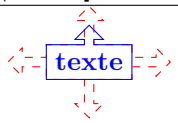
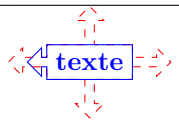
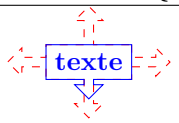
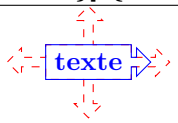
\node[minimum size=2cm,single arrow,draw,single arrow head indent=1cm,blue] {texte};

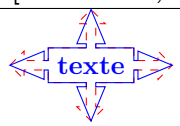
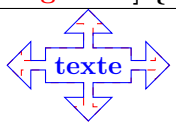
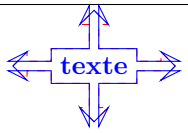
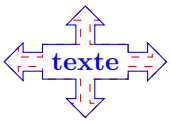
			
indent=1cm	indent=10pt	indent=1ex	indent=-1ex

\node[minimum size=2cm,double arrow,draw,double arrow tip angle=45] {texte};
\node[minimum size=2cm,double arrow,draw,double arrow head extend=1ex] {texte};
\node[minimum size=2cm,double arrow,draw,double arrow head indent=1ex] {texte};

				
angle=45	angle=120	extend=1ex	extend=0	indent=1ex

\node [arrow box, draw, arrow box arrows={north:.25cm}] {texte};

			
{north:.25cm}	{west:.25cm}	{south:.25cm}	{east:.25cm}
By default : 0.5 cm			

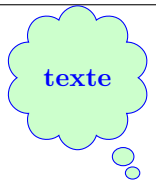
\node [arrow box, draw, arrow box tip angle=45] {texte};	
	
arrow box tip angle=45	arrow box head extend=.25cm
By default: 90	By default: 0.125cm
	
arrow box head indent=.25cm	arrow box shaft width=.25cm
By default : 0cm	By default : 0.125cm

17.5 Callout Shapes nodes

Load package : \usetikzlibrary{shapes.callouts}

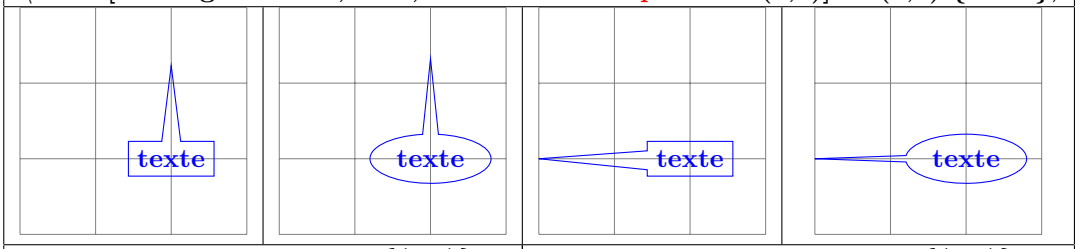
PGFmanual section : 67-7

17.5.1 Available shapes

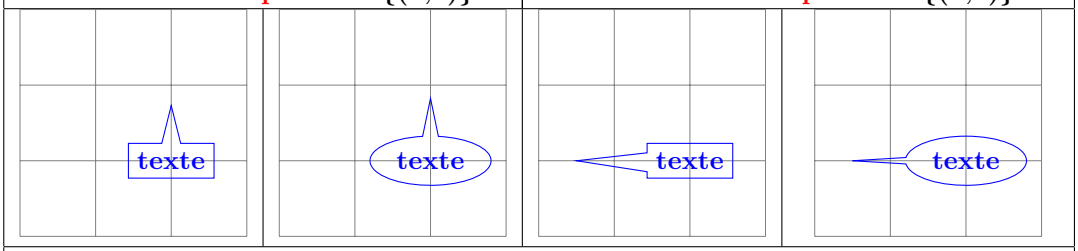
		
ellipse callout	rectangle callout	cloud callout

17.5.2 Options

\node [rectangle callout,draw,callout absolute pointer=(0,1)] at (2,1) {texte};

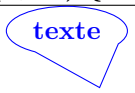


callout relative pointer={(0,1)}	callout absolute pointer={(0,1)}



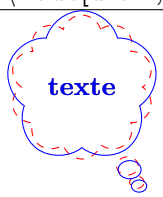
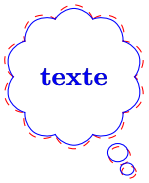
callout pointer shorten=.5cm

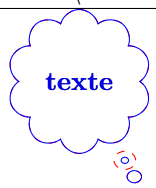
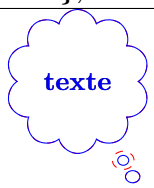
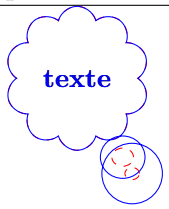
\node [ellipse callout,draw,callout pointer arc=1] at (0,1.5) {texte};

		
callout pointer arc=1	callout pointer arc=30	callout pointer arc=90

By default : callout pointer arc=15

\node[draw,cloud callout, aspect=2.5] {texte};

		
cloud puffs=5	aspect=2.5	cloud puff arc=120

<table>
<tr><td colspan="3">\node [draw,cloud callout,callout pointer start size=.1] {texte};</td></tr>
<tr><td> 
</td><td> 
</td><td> 
</td></tr>
<tr><td>callout pointer start size=.1</td><td>start size=.8cm</td><td>start size=20pt and 1pt</td></tr>
<tr><td colspan="3">By default : callout pointer start size =.2 of callout</td></tr>
<tr><td> 
</td><td> 
</td><td> 
</td></tr>
<tr><td>callout pointer end size=.5</td><td>callout pointer end size=.8cm</td><td>callout pointer segments=3</td></tr>
<tr><td colspan="2">By default : callout pointer start size = .1 of callout</td><td>By default : segments=2</td></tr>
</table>

17.6 Miscellaneous Shapes nodes

Load package : \usetikzlibrary{shapes.misc}

PGFmanual section : 67-8

17.6.1 Available shapes

texte	texte	texte	texte
cross out	strike out	rounded rectangle	chamfered rectangle

17.6.2 Options

Options for “rounded rectangle” :

\node [draw, rounded rectangle,rounded rectangle arc length=270] {texte};

texte	texte	texte	texte	texte
270	180	120	90	45

\node [draw, rounded rectangle,rounded rectangle west arc=concave] {texte};
\node [draw, rounded rectangle,rounded rectangle left arc=concave] {texte};

texte	texte	texte	texte
concave	convex	none	

\node [draw, rounded rectangle,rounded rectangle east arc=concave] {texte};
\node [draw, rounded rectangle,rounded rectangle right arc=concave] {texte};

texte	texte	texte
concave	convex	none

Options for “chamfered rectangle” :

\node [draw, chamfered rectangle,chamfered rectangle angle=30] {texte};

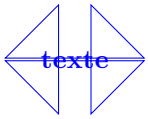
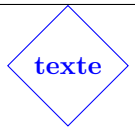
texte	texte	texte	texte
10	30	60	80
By default: 45			

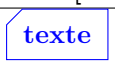
\node [draw, chamfered rectangle,chamfered rectangle xsep=10pt] {texte};

texte	texte	texte	texte	texte
xsep=0pt	xsep=5pt	xsep=10pt	xsep=-10pt	xsep=2cm
By default: 0.666ex				

\node [draw, chamfered rectangle,chamfered rectangle ysep=10pt] {texte};

texte	texte	texte	texte	texte
ysep=0pt	ysep=5pt	ysep=10pt	ysep=-10pt	ysep=1cm

\node [draw, chamfered rectangle,chamfered rectangle ysep=10pt] {texte};				
				
sep=0pt	sep=5pt	sep=10pt	sep=-10pt	sep=1cm

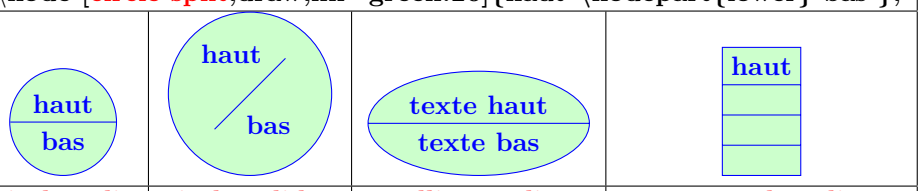
\node [draw, chamfered rectangle,chamfered rectangle corners=north west] {texte};		
		
north west	{north east, south east}	{north east, south west}

17.7 Shapes with Multiple Text Parts

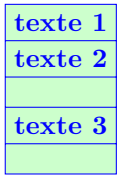
Load package : \usetikzlibrary{shapes.multipart}

PGFmanual section : 67-6

\node [circle split,draw,fill=green!20]{haut \nodepart{lower} bas };



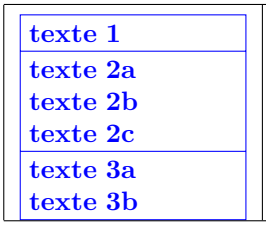
circle split | circle solidus | ellipse split | rectangle split



\node[rectangle split,rectangle split parts=5,
draw]
{texte 1
\nodepart{second} texte 2
\nodepart{four} texte 3};

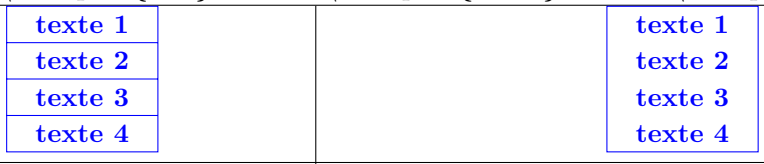
By default: rectangle split parts=4

\node [rectangle split,rectangle split parts=3,rectangle split horizontal,draw,blue]
{texte1\nodepart{two}texte2\nodepart{three}texte3};



\node[rectangle split,rectangle split parts=5,
draw]
{texte 1
\nodepart{second} texte 2a \\texte 2b \\
texte 2c
\nodepart{three} texte 3a \\ texte 3b };

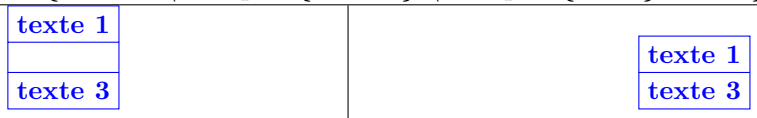
\node[rectangle split, draw,blue,minimum size = 2cm,rectangle split draw splits= true]
{texte 1 \nodepart{two} texte 2 \nodepart{three} texte 3 \nodepart{four} texte 4};



rectangle split draw splits= true
By default

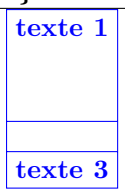
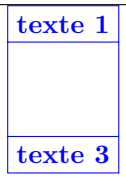
rectangle split draw splits= false

\node [rectangle split,rectangle split parts=3,draw,rectangle split ignore empty parts=false]
{texte 1 \nodepart{second} \nodepart{third}texte 3};

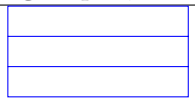
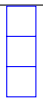


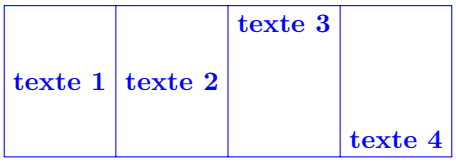
rectangle split ignore empty parts=false | rectangle split ignore empty parts=true

\node [rectangle split,rectangle split parts=3,draw,rectangle split empty part depth=1cm] {texte 1 \nodepart{second} \nodepart{third}texte 3};

	
rectangle split empty part depth=1cm	text depth=1cm
By default: 0ex	By default: 0ex
	
rectangle split empty part height=1cm	text height=1cm
By default: 1ex	By default: 1ex

\node [rectangle split,rectangle split parts=3,draw,rectangle split empty part width=1cm] {};

	
rectangle split empty part width=2cm	By default: 1ex

	\node[rectangle split, draw,blue,minimum size = 2cm, rectangle split part align={center, left,right}] {texte 1 \nodepart{two} texte 2 \nodepart{three} texte 3 \nodepart{four} texte 4};
	\node[rectangle split, draw,blue,minimum size = 2cm, rectangle split horizontal, rectangle split part align={center,base, top,bottom}] {texte 1 \nodepart{two} texte 2 \nodepart{three} texte 3 \nodepart{four} texte 4};

	\node[rectangle split, draw,blue, minimum width=1cm, rectangle split part fill={red, green,cyan}]{};

17.8 Text attributes

17.8.1 Position

PGFmanual section : 17-4-3

\tikz \draw (0,0) node[fill=blue!10,text width=2cm,text justified]
{Ceci est une démonstration d'un texte sur une largeur de 2cm};

Ceci est une démonstration d'un texte sur une largeur de 2cm.	Ceci est une démonstration d'un texte sur une largeur de 2cm	Ceci est une démonstration d'un texte sur une largeur de 2cm .	Ceci est une démonstration d'un texte sur une largeur de 2cm .
without option	text justified	text centered	text ragged
Ceci est une démonstration d'un texte sur une largeur de 2cm.	Ceci est une démonstration d'un texte sur une largeur de 2cm .	Ceci est une démonstration d'un texte sur une largeur de 2cm .	Ceci est une démonstration d'un texte sur une largeur de 2cm .
text badly ragged	text badly centered	align=center	align=flush center
Ceci est une démonstration d'un texte sur une largeur de 2cm .	Ceci est une démonstration d'un texte sur une largeur de 2cm .	Ceci est une démonstration d'un texte sur une largeur de 2cm .	Ceci est une démonstration d'un texte sur une largeur de 2cm .
align=justify	align=flush right	align=right	align=flush left

AAA BBB CCC DDD	\tikz \node [draw] { \begin{tabular}{|c|c|} \hline AAA & BBB \\ \hline CCC & DDD \\ \hline \end{tabular} };

\tikz[align=left] \node[draw] {AAA \\ BBBBBBBB \\ CC};

AAA BBBBBBBB CC	AAA BBBBBBBB CC	AAA BBBBBBBB CC
[align=left]	[align=center]	[align=right]

\tikz[align=left] \node[draw] {AAA \\ [1cm] BBBBBBBB };	
AAA BBBBBBBB	BBBBBBBB AAA
[1cm]	[-1cm]

17.8.2 Colors and Fonts

Texte.	*Texte.*	*Texte.*	Texte.	Texte.	Texte.
[text= red]	[font=\itshape]	[font=\slshape]	[font=\scshape]	[font=\upshape]	[font=\bfseries]

17.8.3 Font Sizes

\tikz \draw (0,0) node[font=\tiny]{Texte.}						
Texte.	Texte.	Texte.	Texte.	Texte.	Texte.	Texte.
\tiny	\footnotesize	\small	\large	\Large	\huge	\Huge

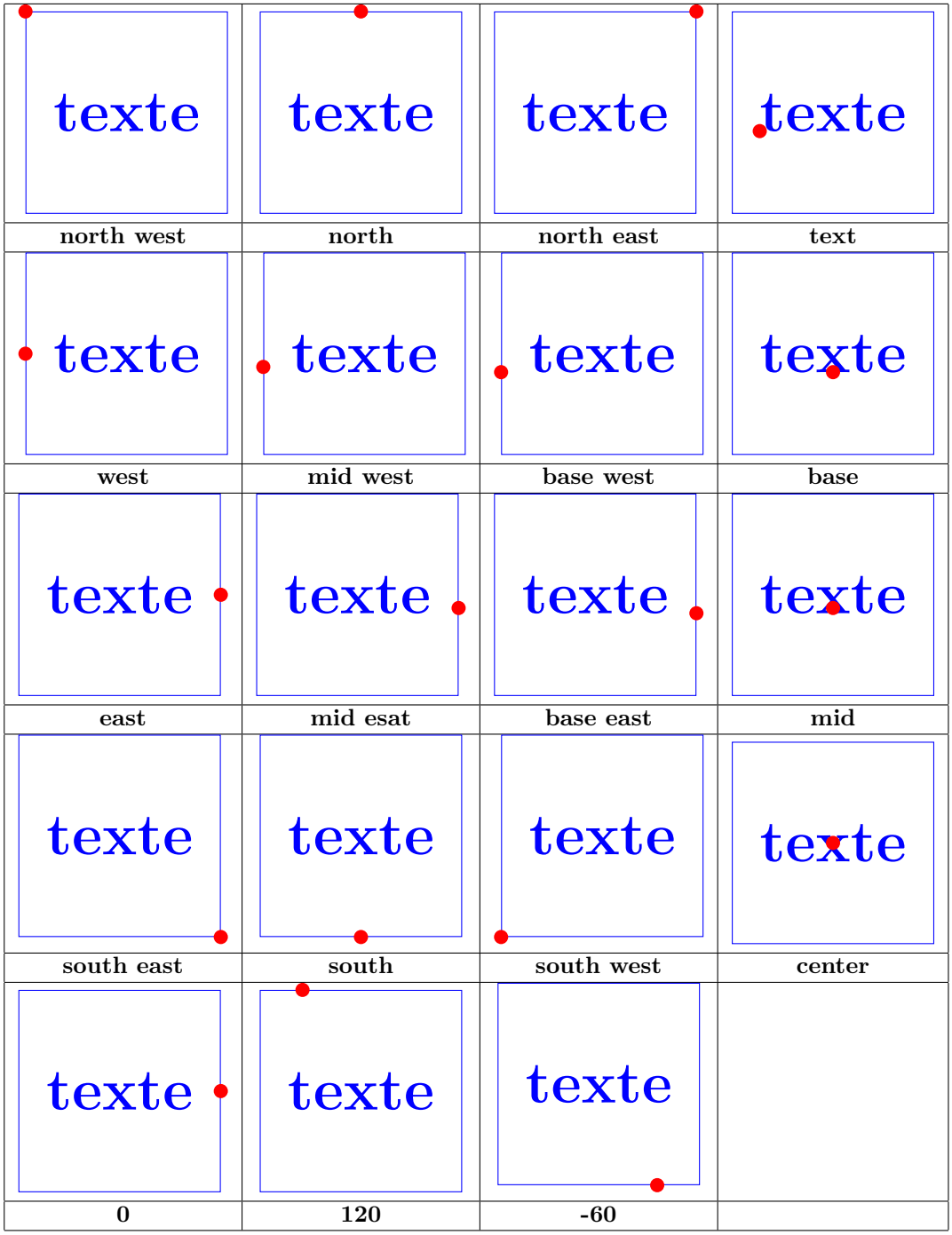
PGFmanual section : 17-4-4

Texte.	Texte.	Texte.
text height=1cm	text depth=1cm	text height=0.5cm, text depth=0.5cm

17.9 Positions on a node

17.9.1 For all types of node

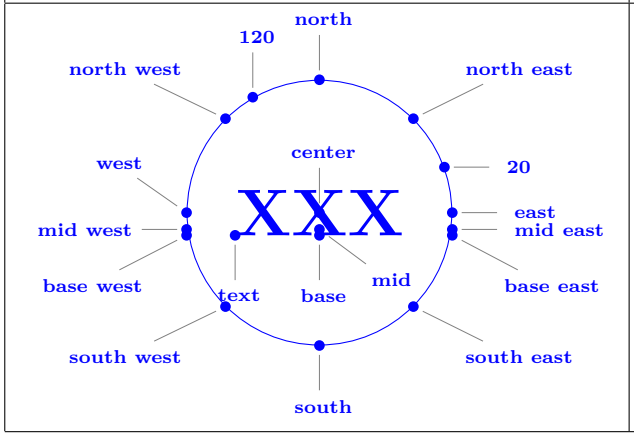
PGFmanual section : 17-5-1



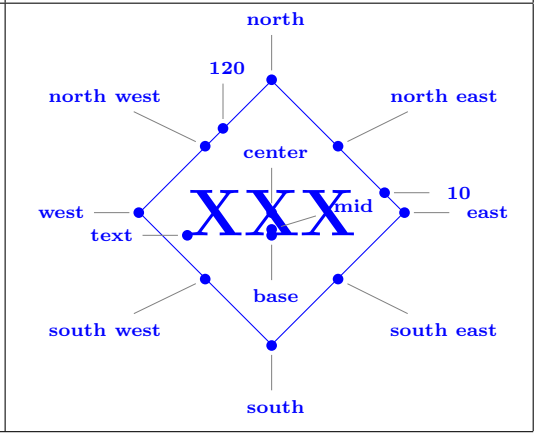
17.9.2 Specific to a node

see PGFmanual section : 67

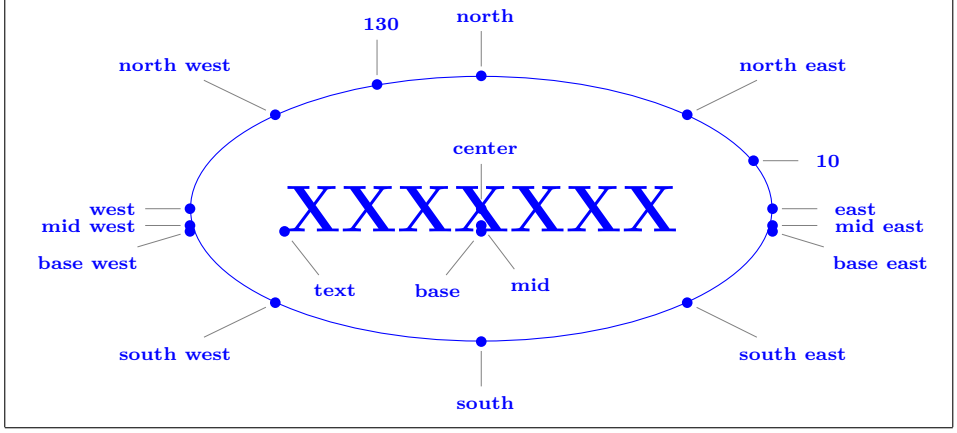
shape=circle



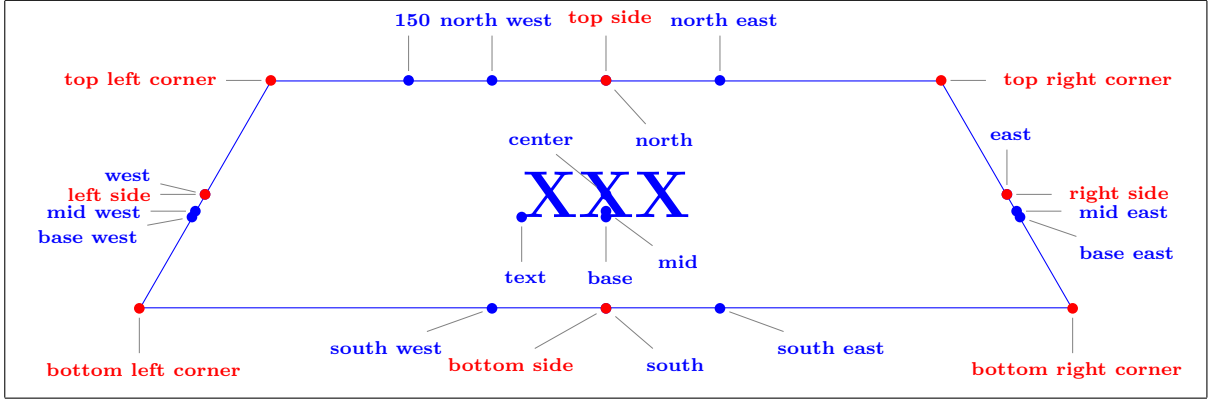
shape=diamond



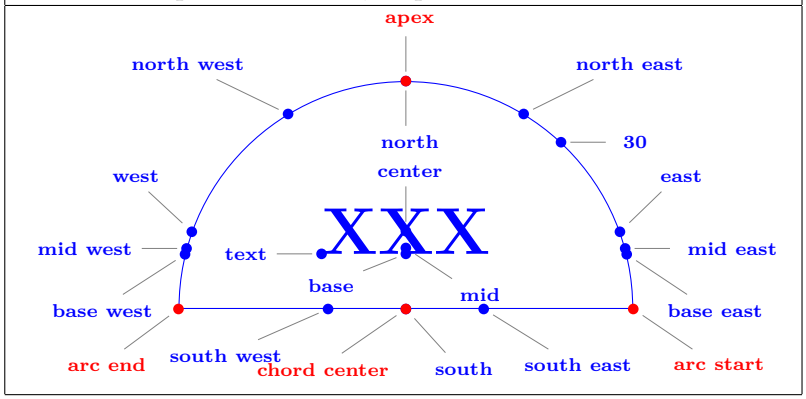
shape=ellipse



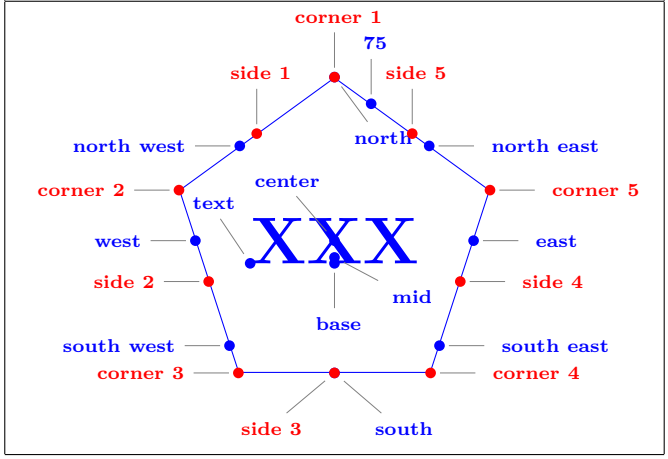
shape=trapezium



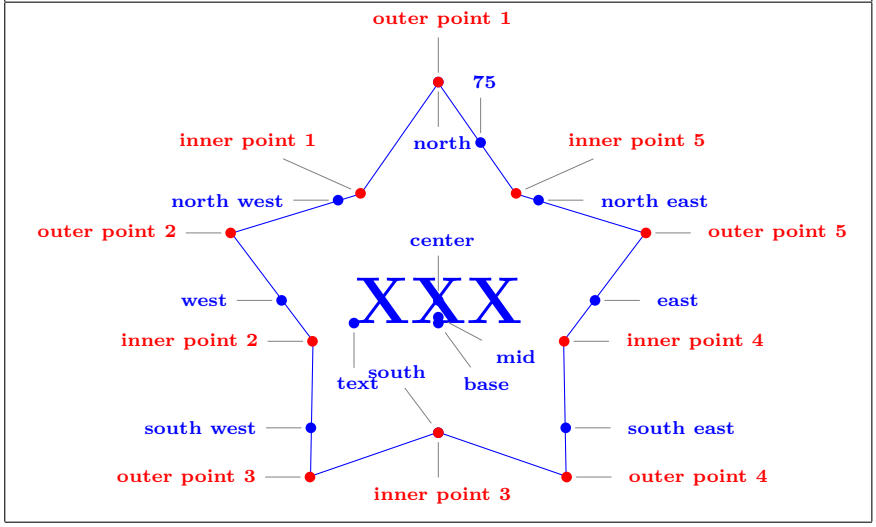
shape=semicircle,shape border rotate=0



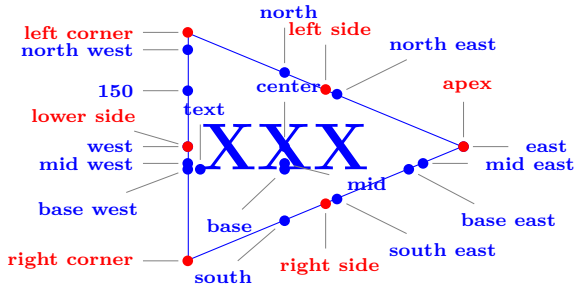
shape=regular polygon



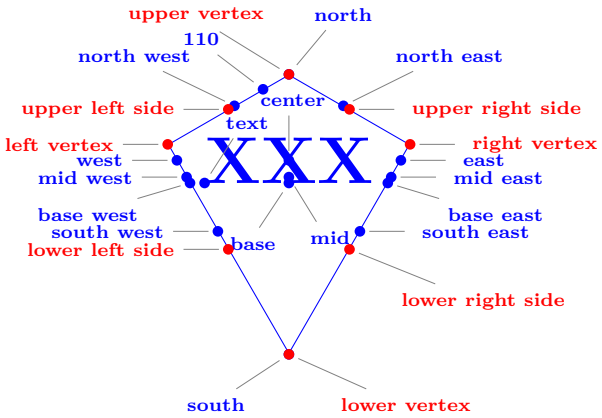
shape=star



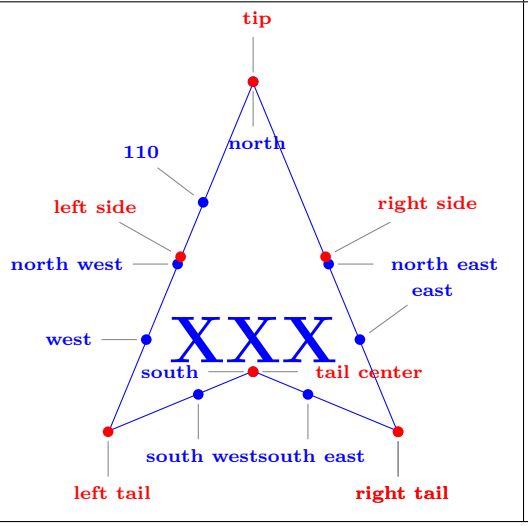
shape= isosceles triangle



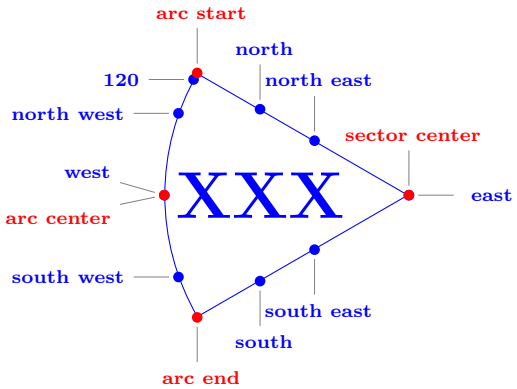
shape= kite



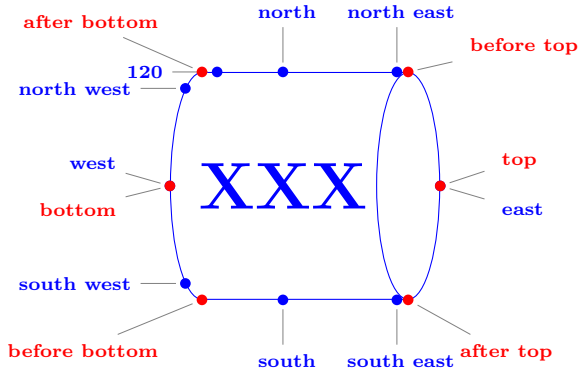
shape= dart



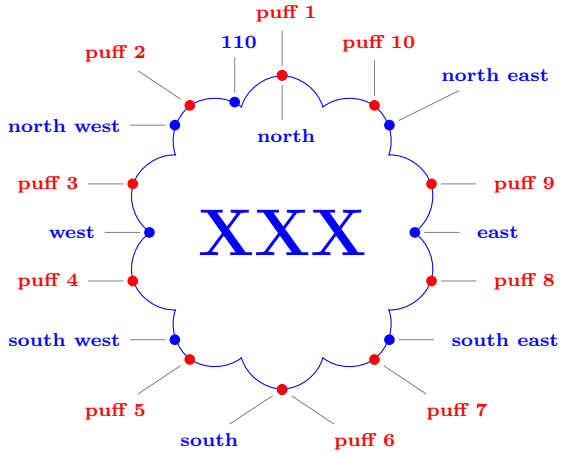
shape= circular sector



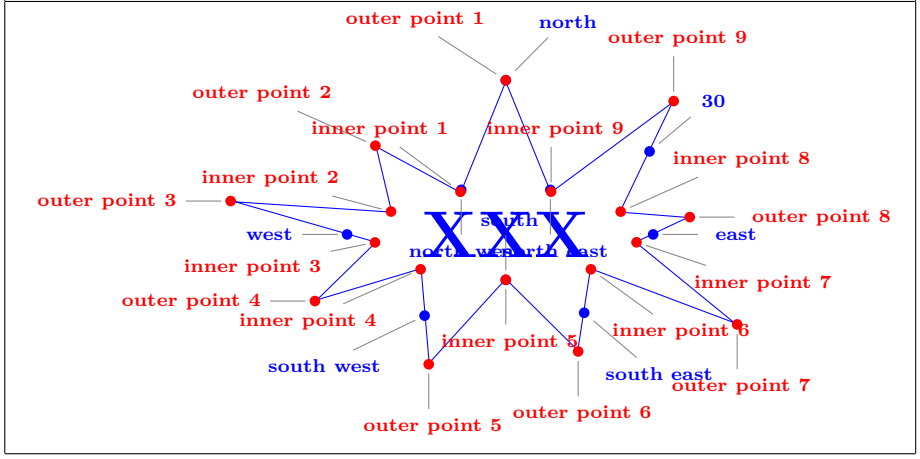
shape=cylinder



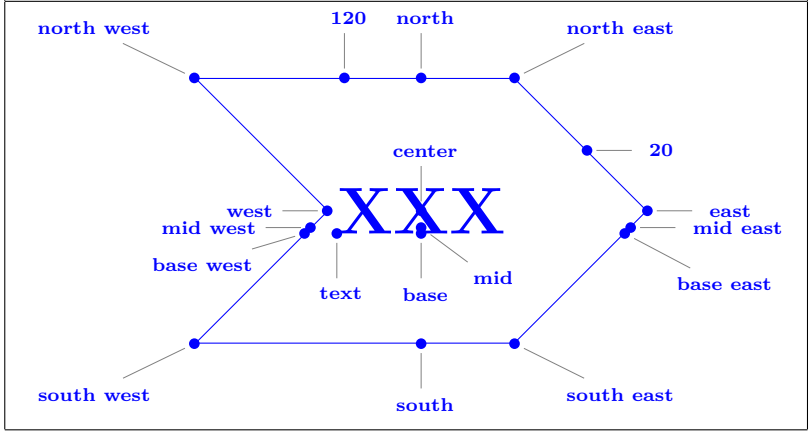
shape=cloud



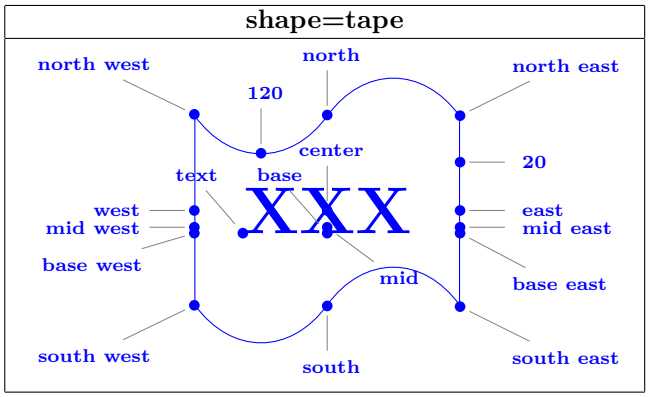
shape=starburst



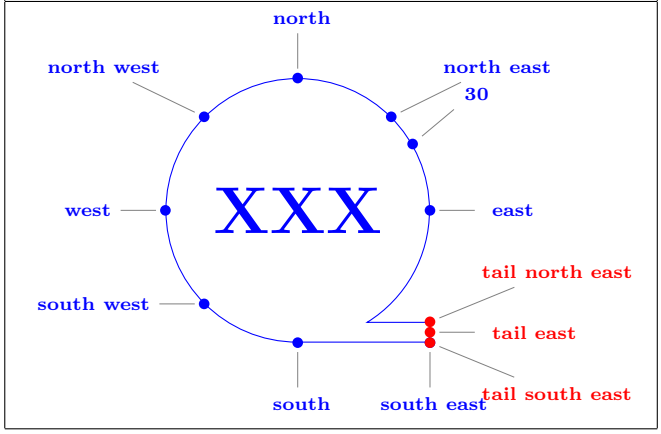
shape=signal



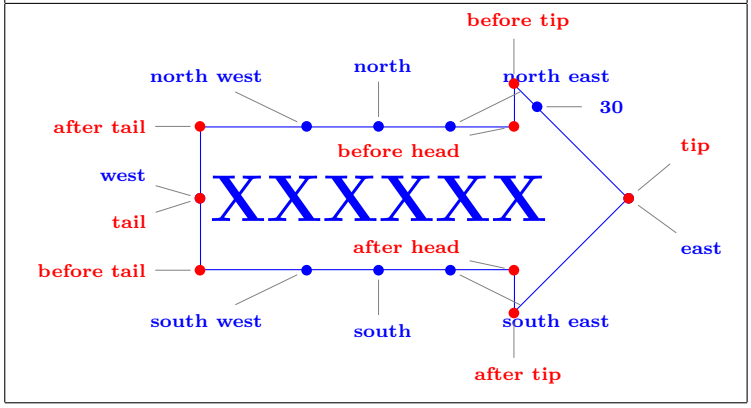
shape=tape



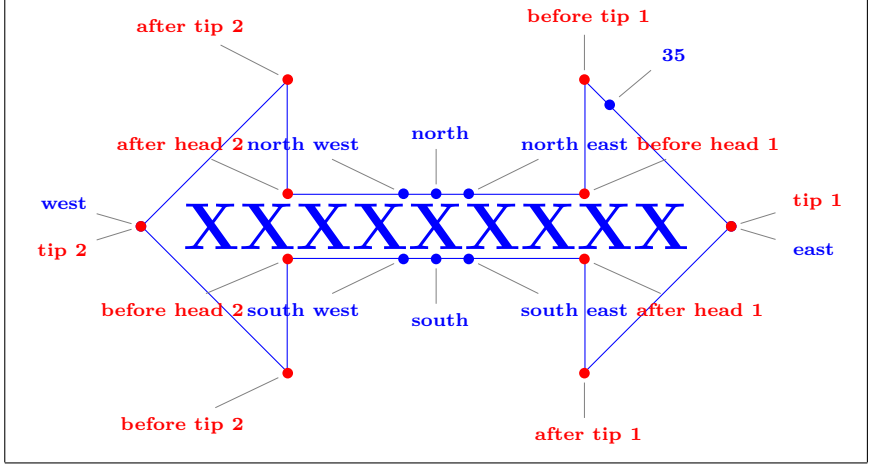
shape=magnetic tape



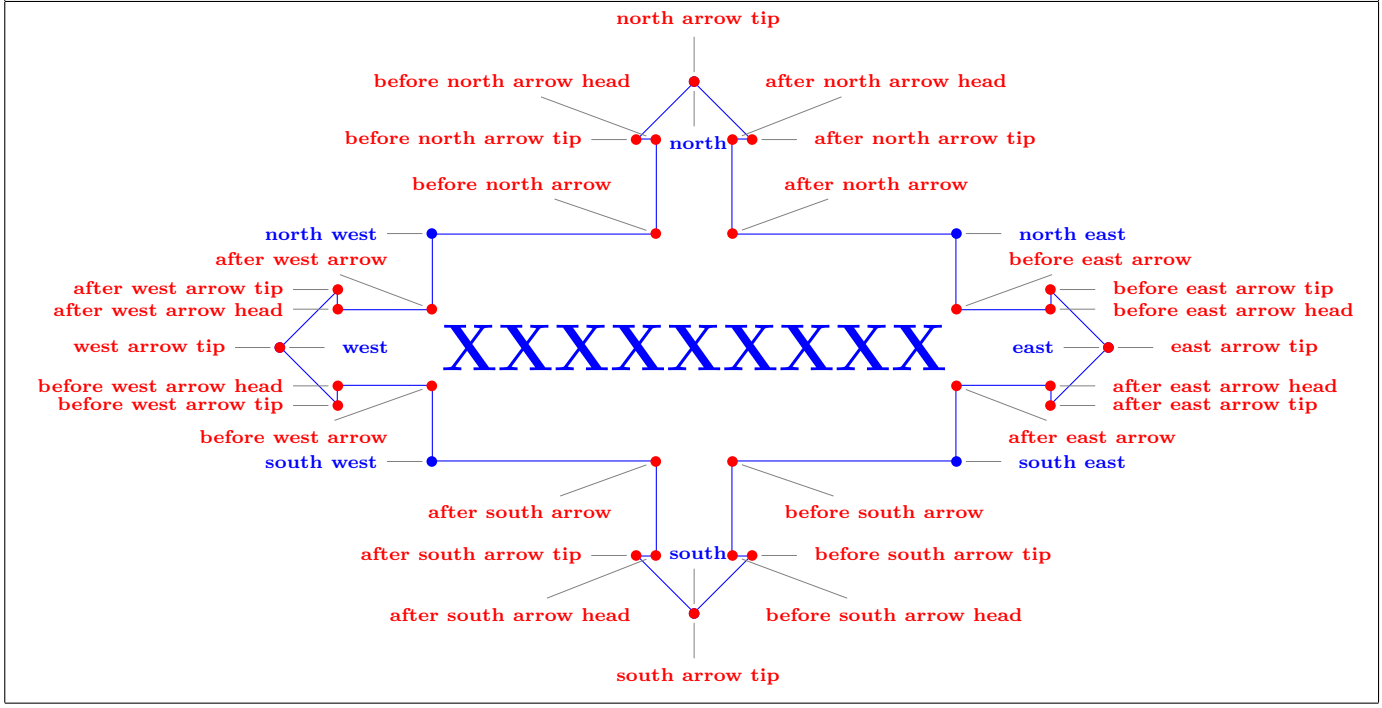
shape=single arrow



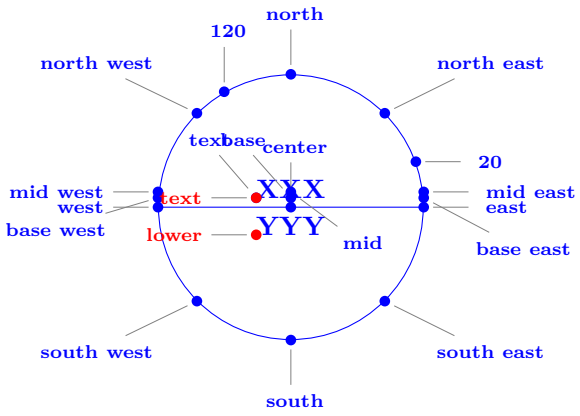
shape=double arrow



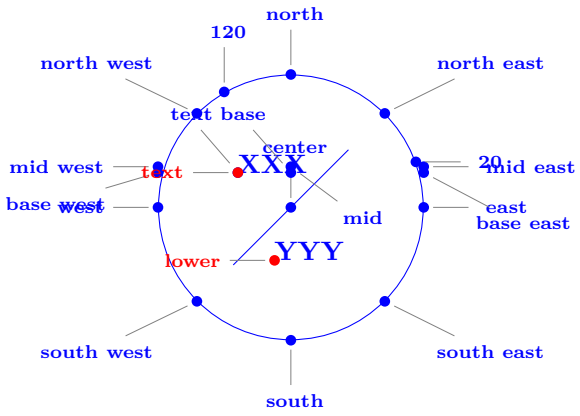
shape=arrow box



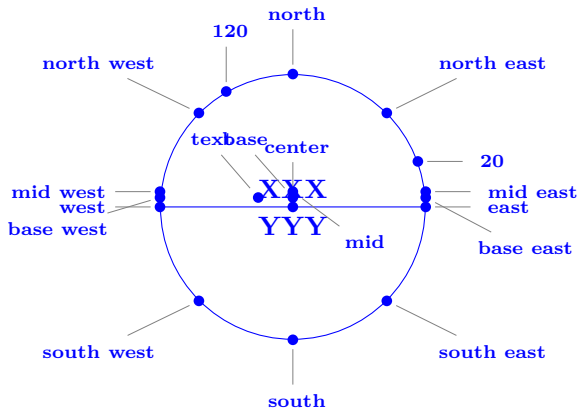
shape=circle split



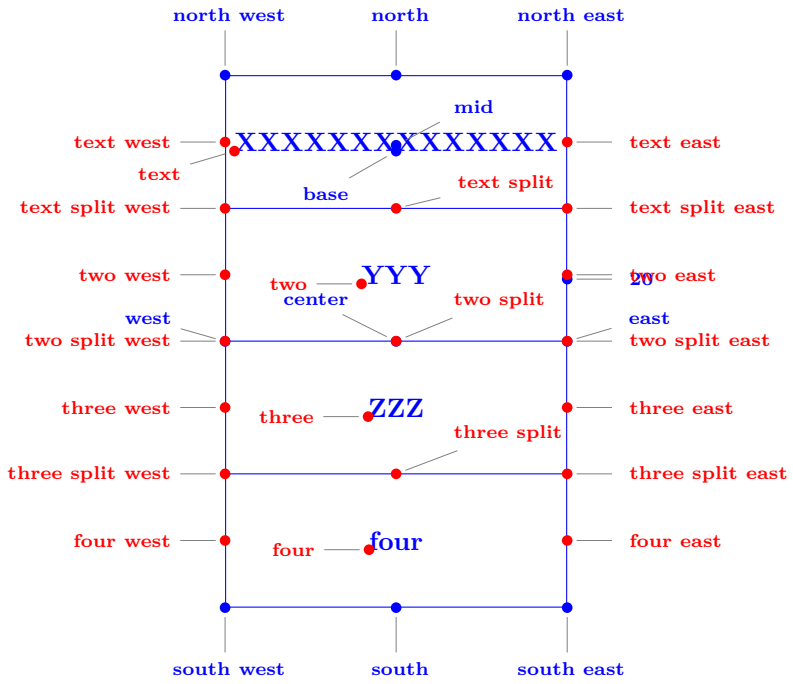
shape=circle solidus



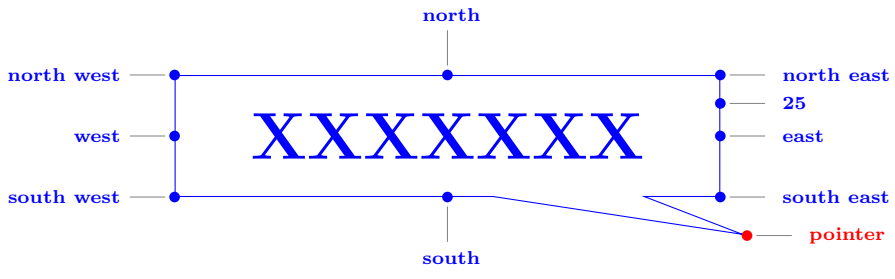
shape=ellipse split



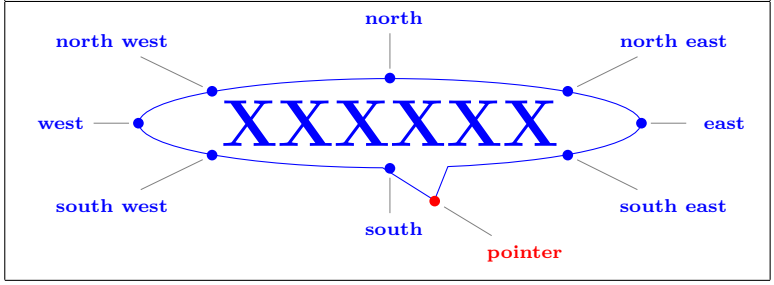
shape=rectangle split



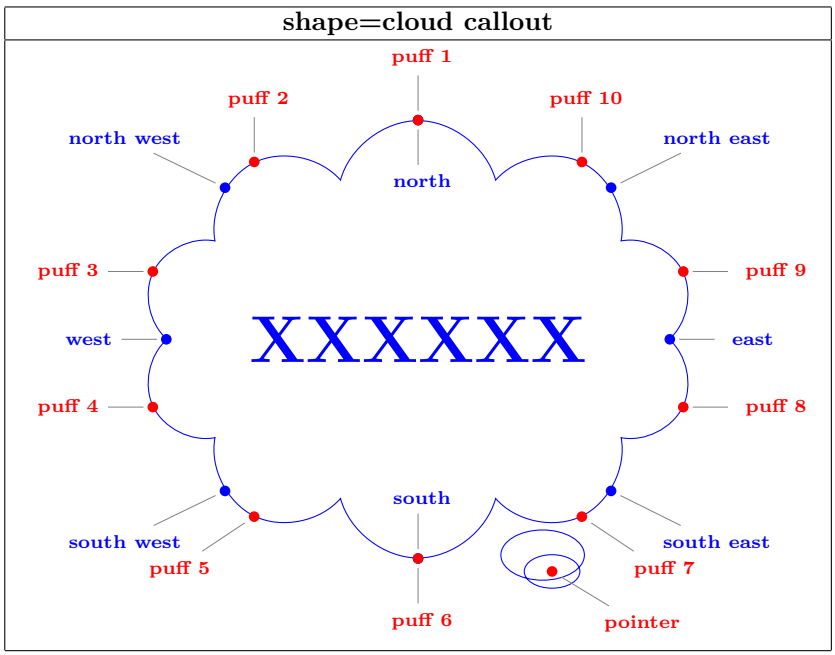
shape=rectangle callout



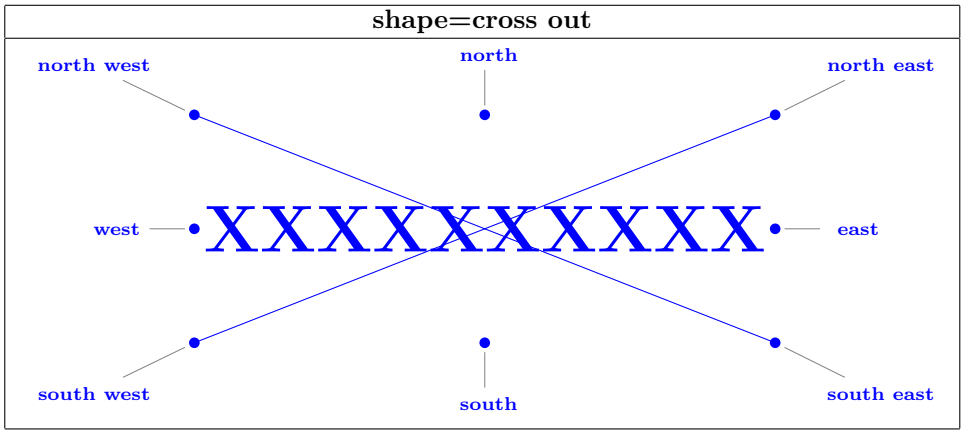
shape=ellipse callout



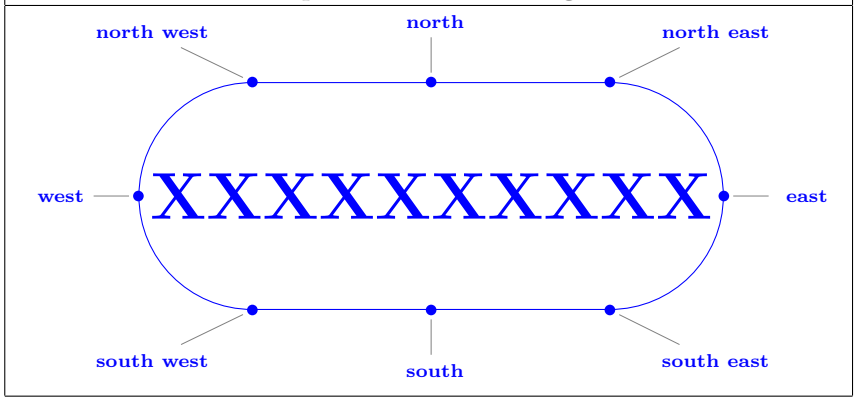
shape=cloud callout



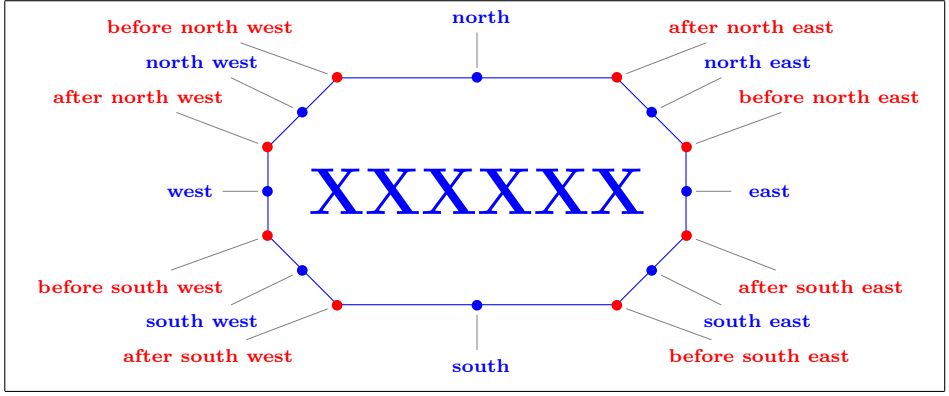
shape=cross out



shape=rounded rectangle



shape=chamfered rectangle

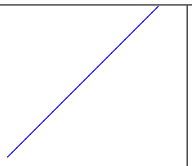
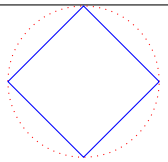
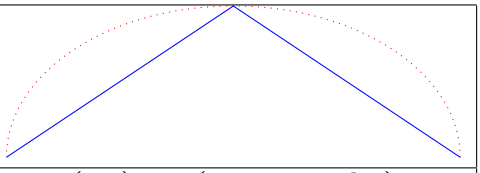


18 Decorations

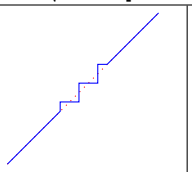
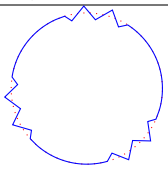
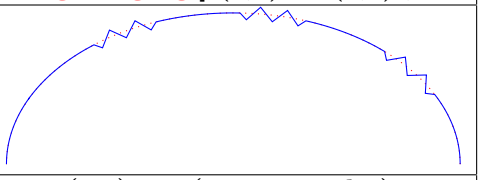
18.1 Library “decorations.pathmorphing”

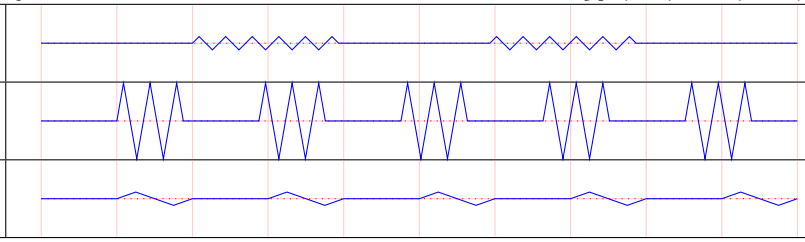
PGFmanual section : 48-2

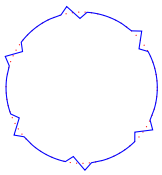
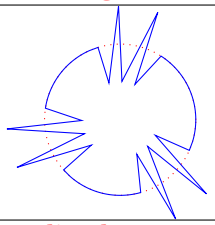
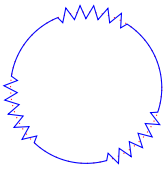
18.1.1 “lineto”

		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2)

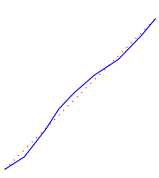
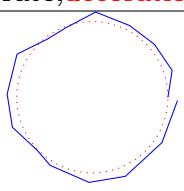
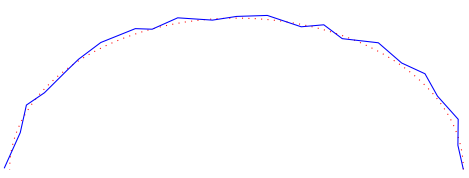
18.1.2 “straight zigzag”

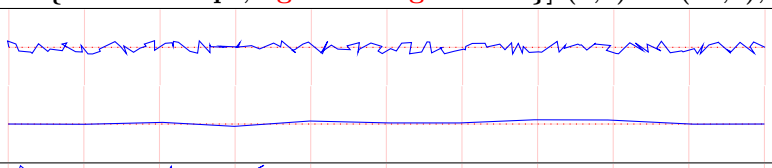
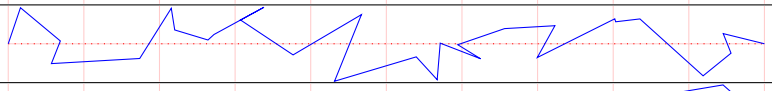
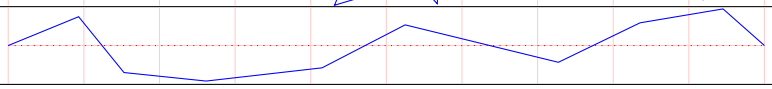
\draw[decorate,decoration=straight zigzag] (0,0) - - (2,2) ;		
		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2);

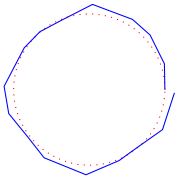
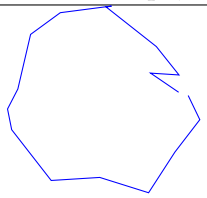
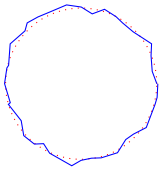
\draw[decorate,decoration={straight zigzag,meta-segment length=2cm}] (0,0) - - (10,0);		By default
meta-segment length=2cm		1cm
amplitude=0.5cm		2.5pt
segment length=1cm		10pt

\draw[decorate,decoration= {straight zigzag,meta-segment length=0.5cm}] (1,1) circle (1);		
		
meta-segment length=2cm	amplitude=0.5cm	segment length=5pt

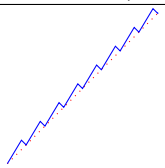
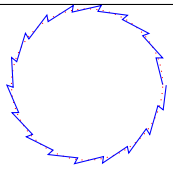
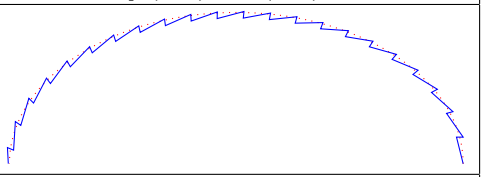
18.1.3 “random steps”

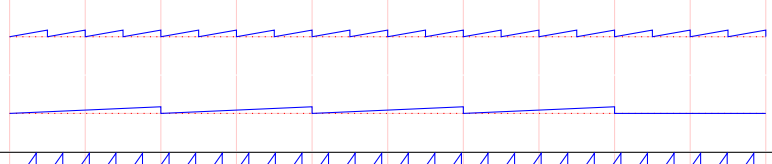
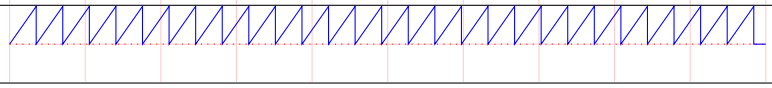
\draw[decorate,decoration=random steps] (0,0) - - (2,2) ;		
		
(0,0) – (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2)

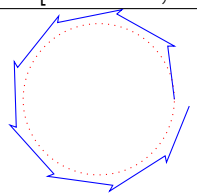
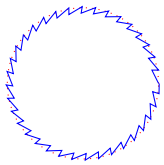
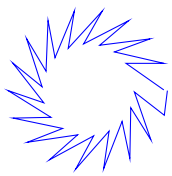
\draw[decorate,decoration={random steps,segment length=2cm}] (0,0) - - (10,0);		By default
segment length=2pt segment length=1cm		10pt
amplitude=0.5cm		2.5pt
amplitude=0.5cm ,segment length=1cm		

\draw[decorate,decoration= {random steps,segment length=2cm}] (1,1) circle (1);		
		
meta-segment length=2cm	amplitude=0.5cm	segment length=5pt

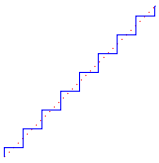
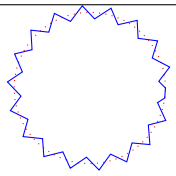
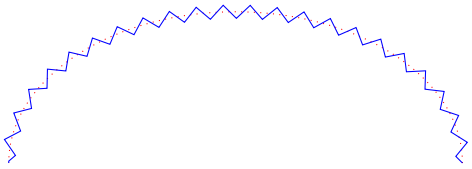
18.1.4 “saw”

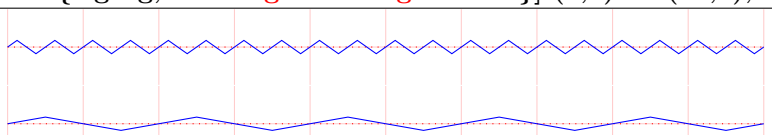
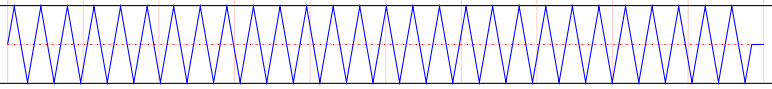
\draw[decorate,decoration=saw] (0,0) - - (2,2) ;		
		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2);

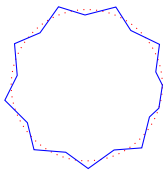
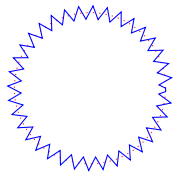
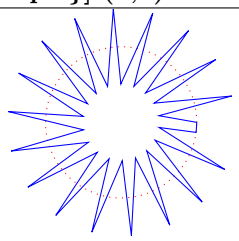
\draw[decorate,decoration={saw,meta-segment length=0.5cm}] (0,0) - - (10,0);		By default
segment length=0.5cm segment length=2cm		10 pt
amplitude=0.5cm		2.5 pt

\draw[decorate,decoration={saw,segment length=20pt}] (1,1) circle (1);		
		
segment length=20pt	segment length=5pt	amplitude=0.5cm

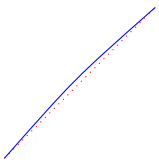
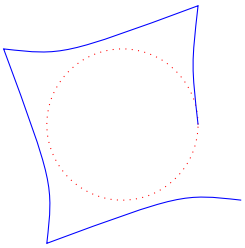
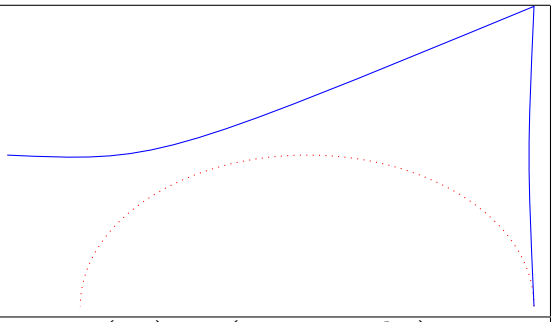
18.1.5 “zigzag”

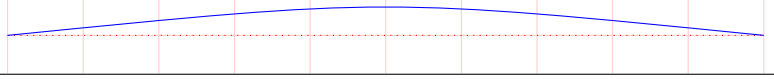
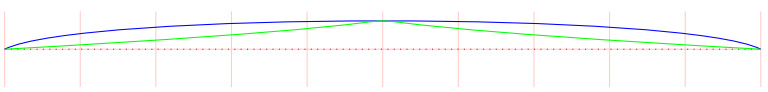
\draw[decorate,decoration=zigzag] (0,0) - - (2,2) ;		
		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2);

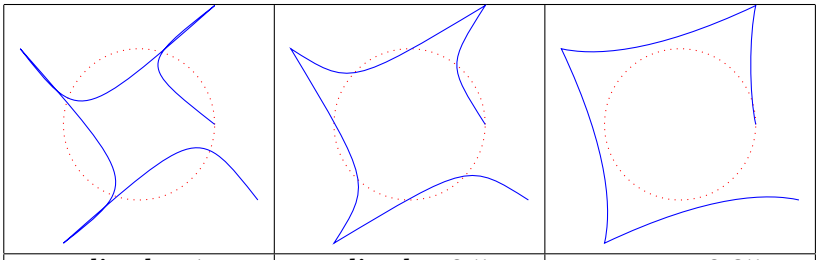
\draw[decorate,decoration={zigzag,meta-segment length=2cm}] (0,0) - - (10,0);		By default
segment length=0.5cm segment length=2cm		10pt
amplitude=0.5cm		2.5 pt

\draw[decorate,decoration= {saw,segment length=20pt }] (1,1) circle (1);		
		
segment length=20pt	segment length=5pt	amplitude=0.5cm

18.1.6 “bent”

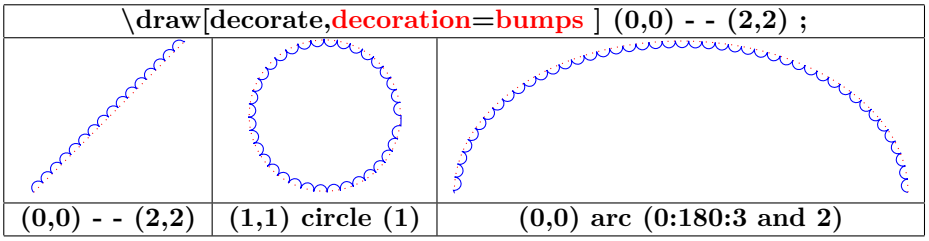
		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2);

\draw[decorate,decoration={bent,amplitude=0.5cm}] (0,0) – (10,0);		By default
amplitude=0.5cm		2.5 pt
aspect=0.1 (en bleue) aspect=0.9 (en vert) amplitude=0.5cm		0.5

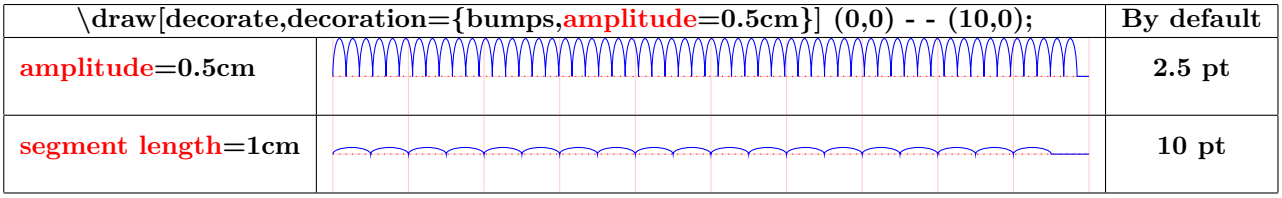


amplitude=1cm	amplitude=0.5cm	aspect=0.25

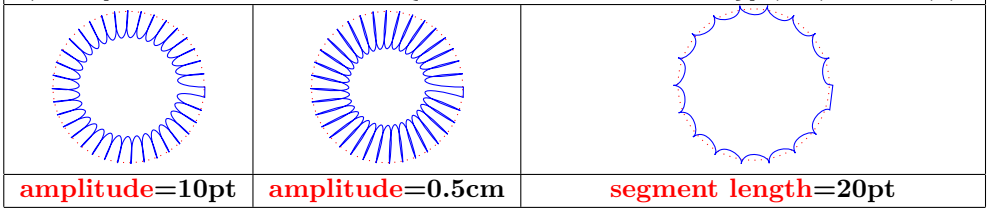
18.1.7 “bumps”



\draw[decorate,decoration=bumps] (0,0) - - (2,2) ;		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2)

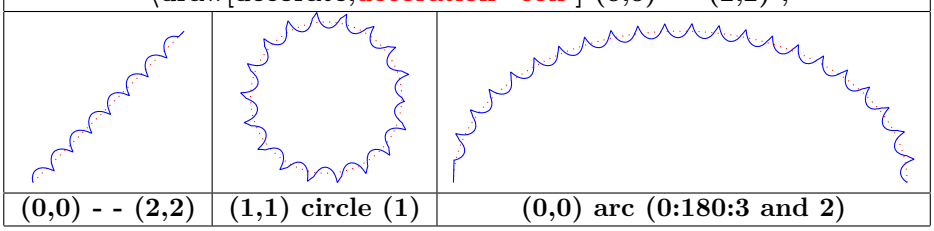


\draw[decorate,decoration={bumps,amplitude=0.5cm}] (0,0) - - (10,0);		By default
amplitude=0.5cm		2.5 pt
segment length=1cm		10 pt

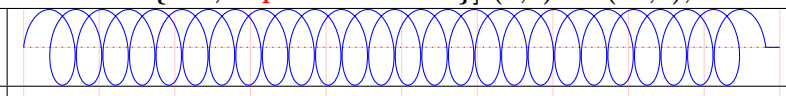
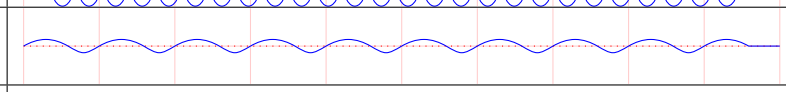
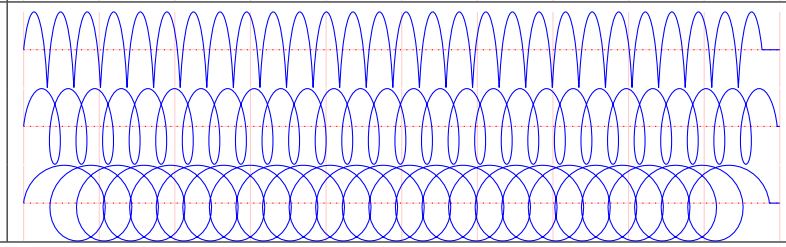


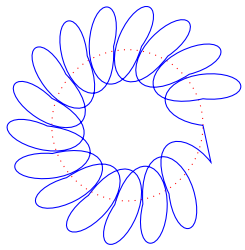
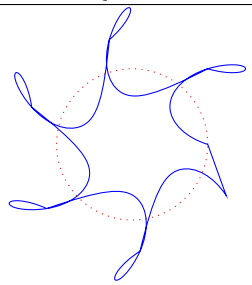
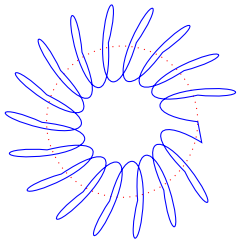
\draw[decorate,decoration= {bumps,amplitude=10pt}] (1,1) circle (1);		
amplitude=10pt	amplitude=0.5cm	segment length=20pt

18.1.8 “coil”

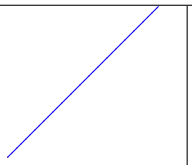
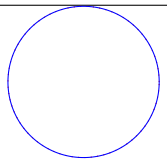
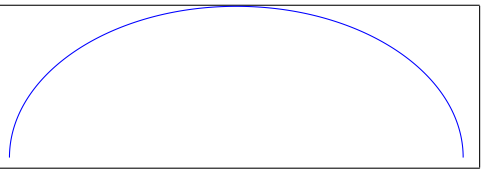


\draw[decorate,decoration=coil] (0,0) - - (2,2) ;		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2)

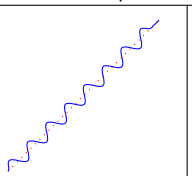
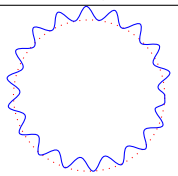
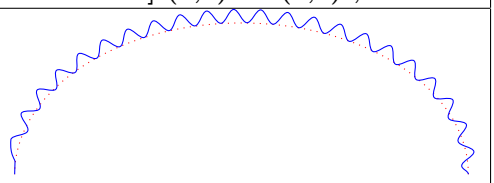
\draw[decorate,decoration={coil,amplitude=0.5cm}] (0,0) - - (10,0);		By default
amplitude=0.5cm		2.5 pt
segment length=1cm		10 pt
aspect=0.1 (amplitude=0.5cm) aspect=0.3 aspect=0.9		0.5

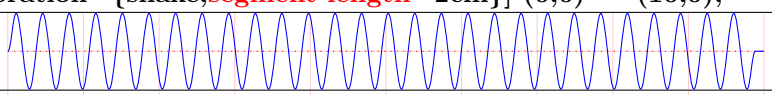
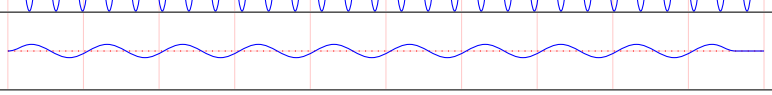
\draw[decorate,decoration= {coil,amplitude=0.5cm}] (1,1) circle (1);		
		
amplitude=0.5 cm	segment length=1cm amplitude=0.5cm	aspect=0.25 amplitude=0.5cm

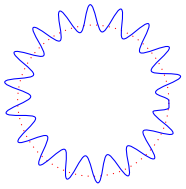
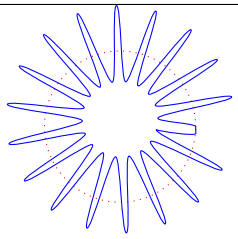
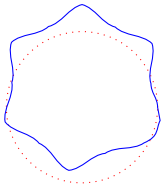
18.1.9 “curveto”

		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2)

18.1.10 “snake”

\draw[decorate,decoration=snake] (0,0) - - (2,2) ;		
		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2)

\draw[decorate,decoration={snake,segment length=2cm}] (0,0) - - (10,0);		By default
amplitude=0.5cm		2.5 pt
segment length=1cm		10 pt

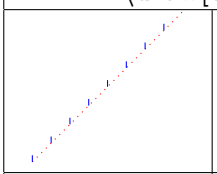
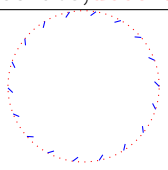
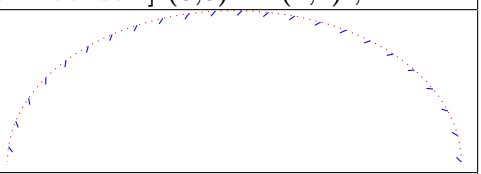
\draw[decorate,decoration= snake, amplitude=5pt] (1,1) circle (1);		
		
amplitude=5pt	amplitude=0.5cm	segment length=5pt

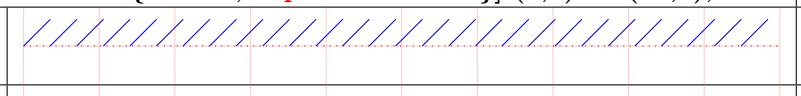
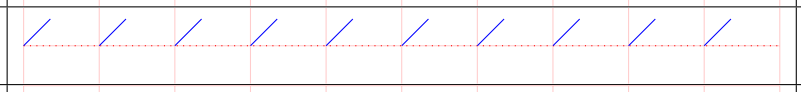
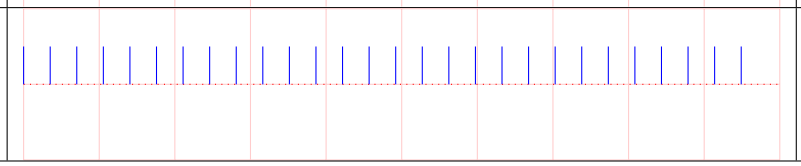
18.2 Library “decorations.pathreplacing”

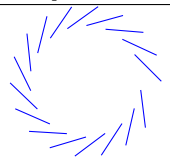
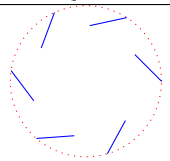
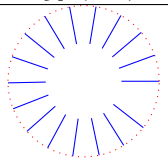
Load package : \usetikzlibrary{decorations.pathreplacing}

PGFmanual section : 48-3

18.2.1 “border”

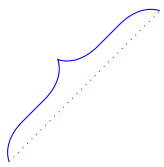
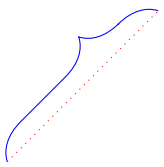
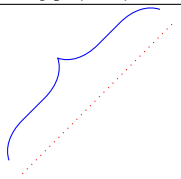
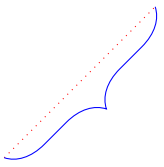
\draw[decorate,decoration=border] (0,0) - - (2,2) ;		
		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2)

\draw[decorate,decoration={border,amplitude=0.5cm}] (0,0) - - (10,0);		By default
amplitude=0.5cm		2.5 pt
segment length=1cm , amplitude=0.5cm		10 pt
angle=90 , amplitude=0.5cm		45

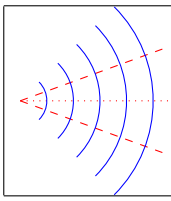
\draw[decorate,decoration= {border,amplitude=0.5cm}] (1,1) circle (1);		
		
amplitude=0.5cm	segment length=1cm ,amplitude=0.5cm	angle=90 ,amplitude=0.5cm

18.2.2 “brace”

	\draw [decorate,decoration=brace] (0,0) - - (3,1);

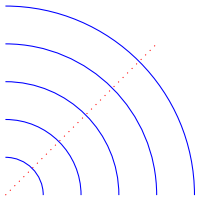
\draw[decorate,decoration= {brace,amplitude=0.5cm}] (1,1) circle (1); ;			
			
amplitude=0.5cm	aspect=0.65 ,amplitude = 0.5cm	raise= 0.25cm ,amplitude = 0.5cm	mirror ,amplitude = 0.5cm
By default: 2.5	By default: 0.5	By default: 0	

18.2.3 ” expanding waves”

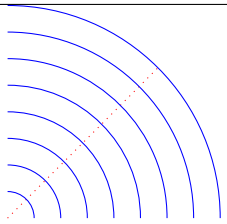


```
\draw [dashed,red](0,0) - - (20:2) ;
\draw [dashed,red](0,0) - - (-20:2) ;
\draw [decorate,decoration={expanding waves}](0,0) - -
(2,0) ;
```

```
\draw[decorate,decoration= {expanding waves,segment length=0.5cm}] (1,1) circle (1);
```



segment length=0.5cm
By default: 10pt



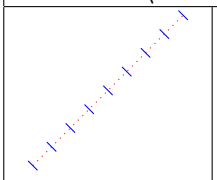
angle=45
By default: 20

18.2.4 “moveto”

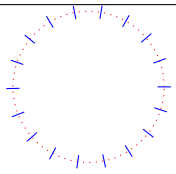
see page 140

18.2.5 “ticks”

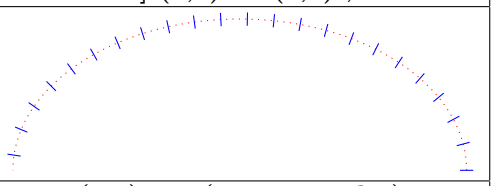
```
\draw[decorate,decoration=ticks ] (0,0) - - (2,2) ;
```



(0,0) - - (2,2)



(1,1) circle (1)

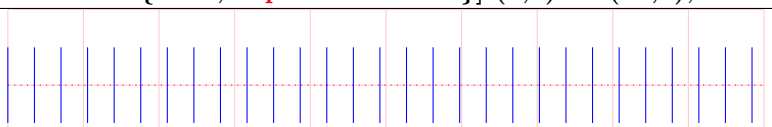


(0,0) arc (0:180:3 and 2)

```
\draw[decorate,decoration={ticks,amplitude=0.5cm}] (0,0) - - (10,0);
```

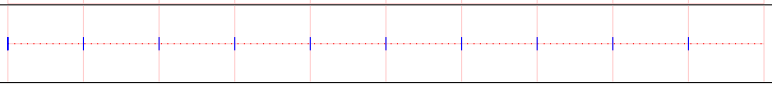
By default

amplitude=0.5cm



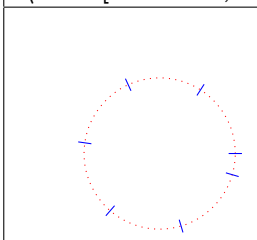
2.5 pt

segment length=1cm

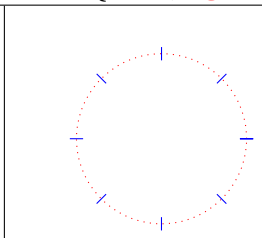


10 pt

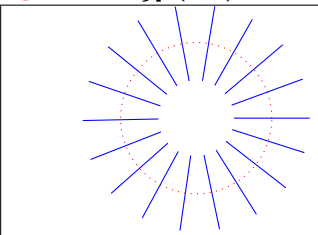
```
\draw[decorate,decoration= {ticks,segment length=1cm}] (1,1) circle (1);
```



segment length=1cm
(1,1) circle (1)

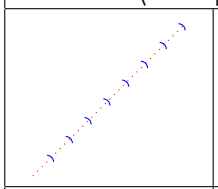
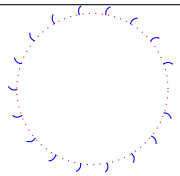
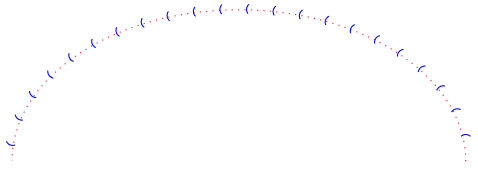


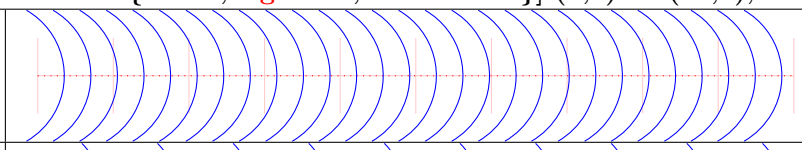
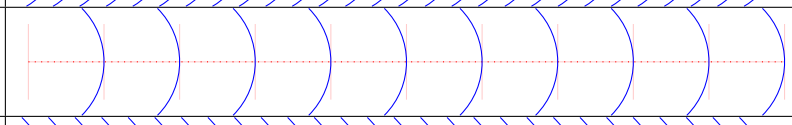
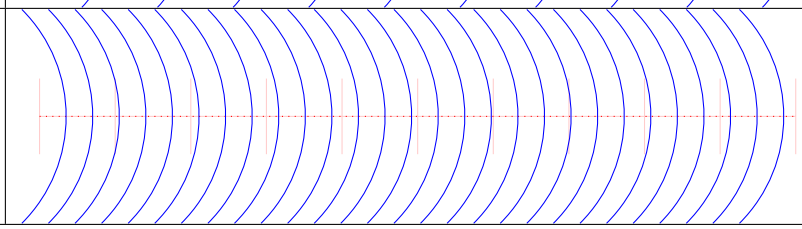
segment length=pi*8
(1,1) circle (32pt)

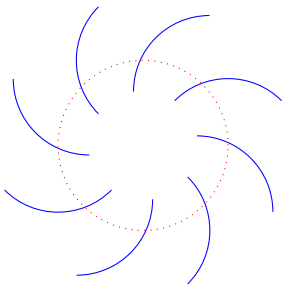
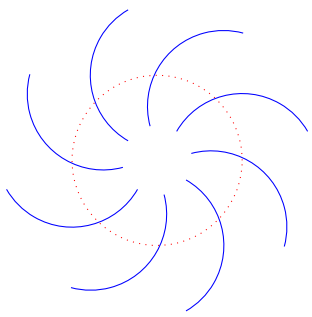
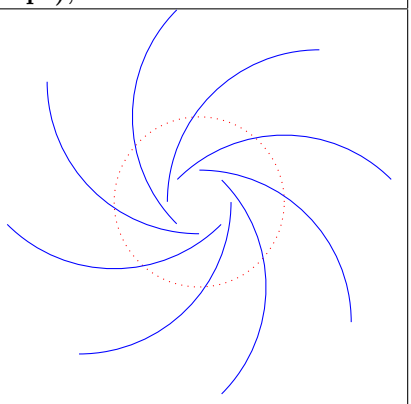


amplitude=0.5cm
(1,1) circle (1)

18.2.6 ” waves”

\draw[decorate,decoration=waves] (0,0) - - (2,2) ;		
		
(0,0) - - (2,2)	(1,1) circle (1)	(0,0) arc (0:180:3 and 2)

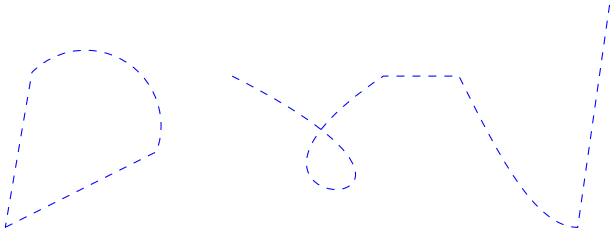
\draw[decorate,decoration={waves,angle=60,radius=1cm}] (0,0) - - (10,0);		By default
angle=60		45
segment length=1cm		10 pt
radius=2cm		10 pt

\draw[decorate,decoration= {waves,segment length=pi*8, radius=1cm}] (1,1) circle (32pt);		
		
segment length = pi*8	angle=60 , segment length = pi*8	radius=2cm , segment length = pi*8

18.2.7 “show path construction”

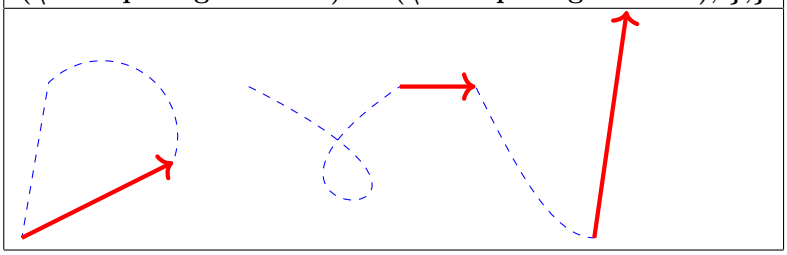
path to decorate

```
\draw [blue,dashed] (0,0) - - (2,1) arc (-20:135:1) - - cycle
(3,2) .. controls (7,0) and (2,0) .. (5,2) - - (6,2) sin (7.57,0) - - (8,3) ;
```



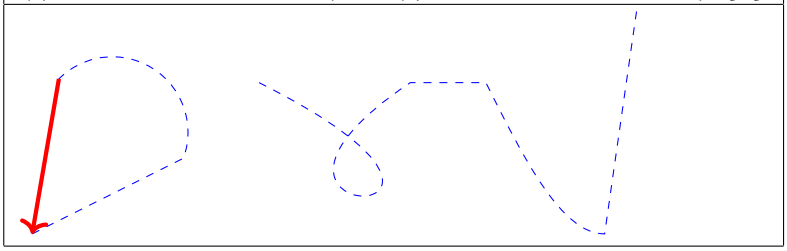
Linear components : “lineto”

```
decoration={ show path construction,
lineto code={ \draw [red,ultra thick,->]
(\tikzinputsegmentfirst) - - (\tikzinputsegmentlast); },}
```



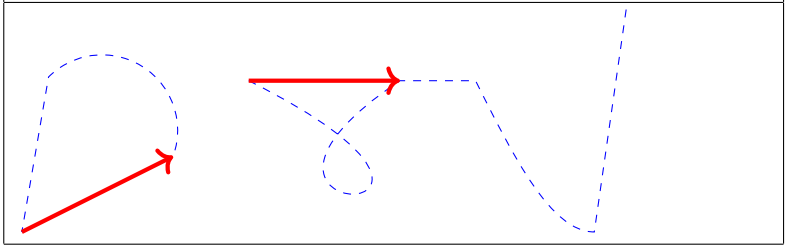
Path terminations : “closepath”

```
decoration={ show path construction,
closepath code={ \draw [red,ultra thick,->]
(\tikzinputsegmentfirst) - - (\tikzinputsegmentlast); },}
```



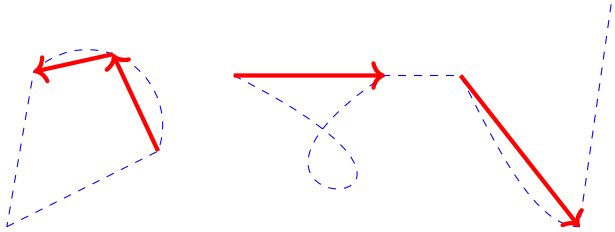
Broken paths : “moveto”

```
decoration={ show path construction,
moveto code={ \draw [red,ultra thick,->]
(\tikzinputsegmentfirst) - - (\tikzinputsegmentlast); },}
```

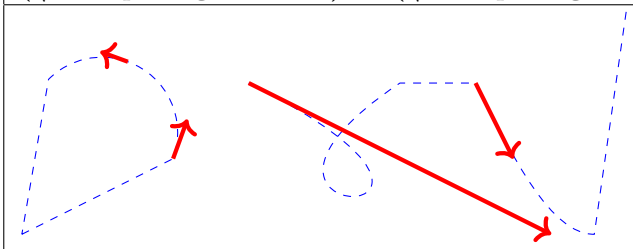


Curved segments : “curveto”

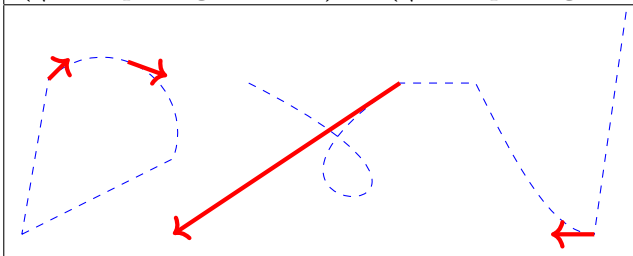
```
decoration={ show path construction,
curveto code={ \draw [red,ultra thick,->]
(\tikzinputsegmentfirst) - - (\tikzinputsegmentlast); },}
```



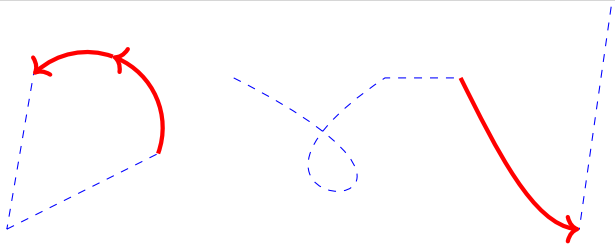
```
decoration={ show path construction,
curveto code={ \draw [red,ultra thick,->]
(\tikzinputsegmentfirst) - - (\tikzinputsegmentsupporta); },}
```



```
decoration={ show path construction,
curveto code={ \draw [red,ultra thick,->]
(\tikzinputsegmentlast) - - (\tikzinputsegmentsupportb); },}
```



```
decoration={ show path construction,
curveto code={ \draw [red,ultra thick,->]
(\tikzinputsegmentfirst) .. controls (\tikzinputsegmentsupporta)
and (\tikzinputsegmentsupportb) .. (\tikzinputsegmentlast) ; },}
```



.. controls (7,0) and (2,0) .. (5,2) don’t work !

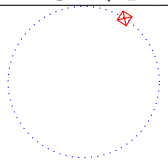
18.3 Library “decorations.markings”

Load package : \usetikzlibrary{decorations.markings}

PGFmanual section : 48-4

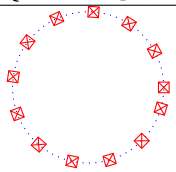
18.3.1 Personal mark at one position

```
\draw [decorate,decoration={markings,mark=at position 1cm
with { \draw[red] (-2pt,-2pt) - - (2pt,2pt); \draw[red](2pt,-2pt) - - (-2pt,2pt);
\draw[red] (-2pt,-2pt) rectangle (2pt,2pt); }}] (1,1) circle (1);
```

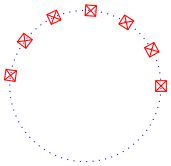


18.3.2 Marks between positions with step size

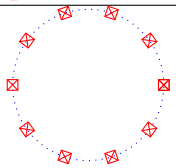
```
\draw[decorate,{markings,mark=between positions 0 and 1 step 5mm with ... }] (1,1) circle (1);;
```



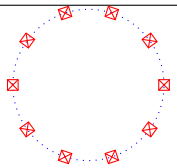
mark=between positions 0 and 1 step 5mm



between positions 0 and 0.5 step 5mm



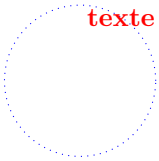
mark= between positions 0 and 1 step 1/10



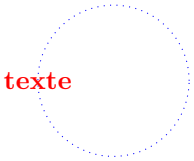
between positions 0 and 1 step0.1

18.3.3 Marks with a text node

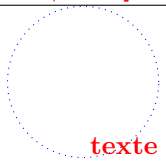
```
decoration={markings,mark=at position 1cm with \node[red]{texte}}
```



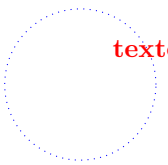
at position 1cm



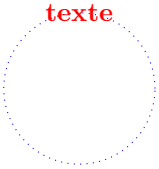
at position 0.5



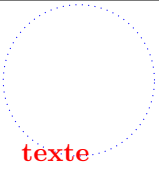
at position -1cm



at position 1cm/2

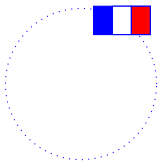
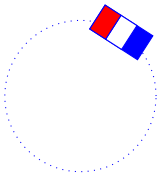
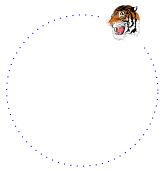
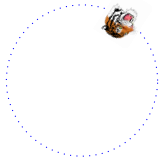


at position 0.5/2

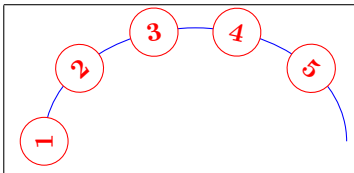
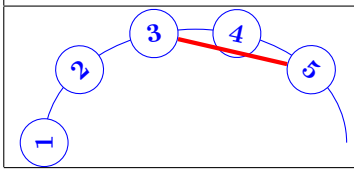


at position -0.5/2

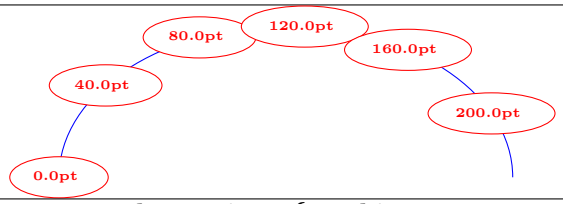
18.3.4 Mark with a picture node

\draw [decorate,decoration={markings,mark=at position 1cm with \node{\DFR}; }] (1,1) circle (1);	
	
\node{\DFR}	\node[transform shape]{\DFR}
	
\node{ \includegraphics[width=0.5cm]{tiger} }	\node[transform shape]{ \includegraphics[width=0.5cm]{tiger} }

18.3.5 Numbered marks

	decoration={markings, mark=between positions 0 and 1 step 0.2 with { \node [draw , circle ,fill=white, name= marque-\pgfkeysvalueof{/pgf/decoration/mark info/sequence number}, transform shape] {\pgfkeysvalueof{/pgf/decoration/mark info/sequence number}};}}
	\draw [red,ultra thick] (marque-3) - - (marque-5);

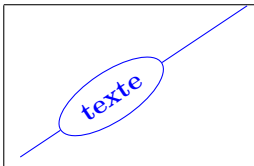
18.3.6 Marks info



decoration={markings,
mark=between positions 0 and 1 step 40pt with
{ \node [red,draw,ellipse,fill=white,font=\tiny]
{\pgfkeysvalueof{/pgf/decoration/mark info/distance from start} };} }

/pgf/decoration/reset marks (no value)
/pgf/decoration/mark connection node=node name (no default, initially empty)

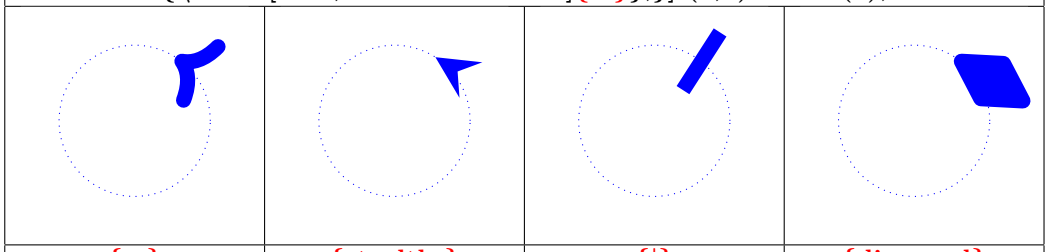
18.3.7 Mark with a connection node




```
\draw [decorate,decoration={markings,
mark connection node=mon noeud,mark=at position 0.4 with
{\node [draw,ellipse,blue,transform shape] (mon noeud)
{texte};}}]
(0,0) -- (3,2) ;
```

18.3.8 Arrow Tip Markings

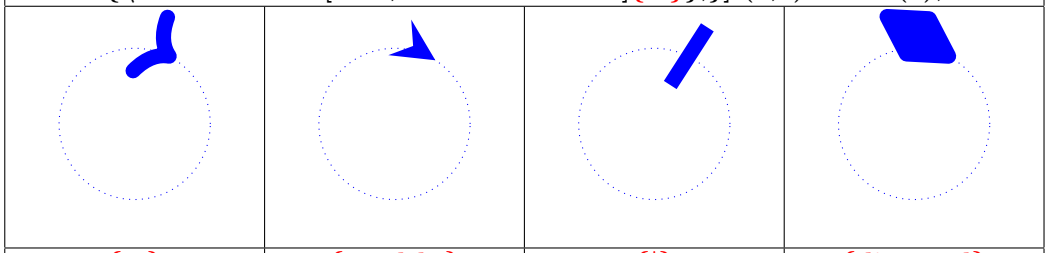
```
\draw[decorate,decoration={ markings,mark=at position 1cm with
{\arrow[blue,line width=2mm]{>}};}] (1,1) circle (1);
```



{>}	{stealth }	{|}	{diamond}

Other possibilities see page 21

```
\draw[decorate,decoration={markings,mark=at position 1cm with
{\arrowreversed[blue,line width=2mm]{>}};}] (1,1) circle (1);
```



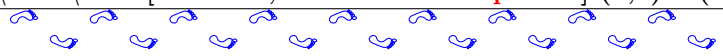
{>}	{stealth }	{|}	{diamond}

18.4 Library “decorations.footprints”

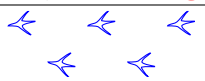
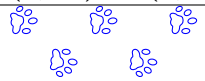
Load package : \usetikzlibrary{decorations.footprints}

PGFmanual section : 48-5-2

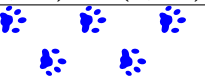
\tikz \draw[decorate,decoration=footprints] (0,0) – (10,0);



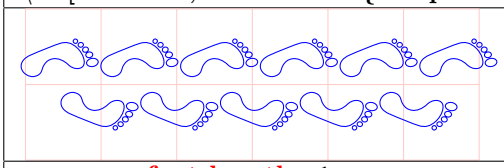
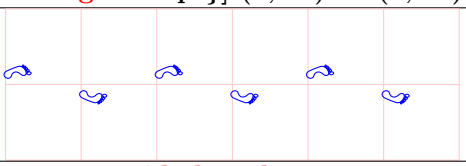
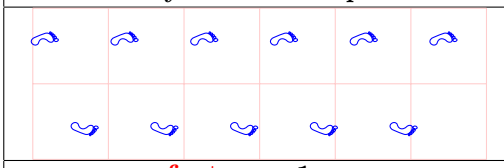
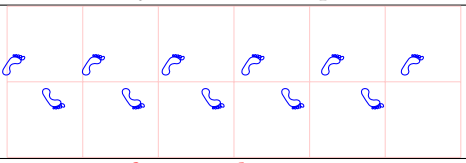
\draw[decorate,decoration={footprints,foot of = gnome }] (0,2.5) - - (3,2.5);

			
foot of = gnome	foot of = human (By default)	foot of = bird	foot of = felis silvestris

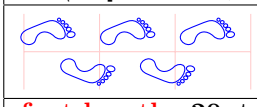
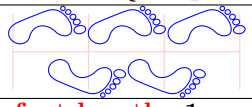
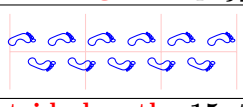
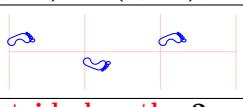
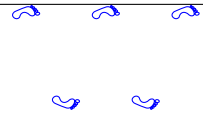
\fill[decorate,decoration={footprints,foot of = gnome}] (0,2.5) - - (3,2.5);

			
foot of = gnome	foot of = human	foot of = bird	foot of = felis silvestris

\fill[decorate,decoration={footprints,foot length=20pt}] (0,2.5) - - (3,2.5);

	
foot length=1cm	stride length=2cm
By default : 10pt	By default : 30pt
	
foot sep=1cm	foot angle = 45
By default : 4pt	By default : 10

\fill[decorate,decoration={footprints,foot length=20pt}] (0,2.5) - - (3,2.5);

			
foot length=20pt	foot length=1cm	stride length=15pt	stride length=2cm
By default : foot length=10pt		By default : stride length=30pt	
			
foot sep=10pt	foot sep=1cm	foot angle = -45	foot angle = 45
By default : foot sep=4pt		By default : foot angle=10	

18.5 Library “decorations.shapes”

18.5.1 Introduction

Load package : \usetikzlibrary{decorations.shapes}

PGFmanual section : 48-5-3

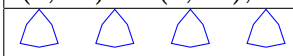
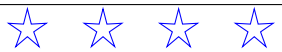
\draw[decorate,decoration=crosses] (0,0) - - (3,0);		
× × × × × × × × ×	▷ ▷ ▷ ▷ ▷ ▷ ▷ ▷ ▷ ▷	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
crosses	triangles	shape backgrounds

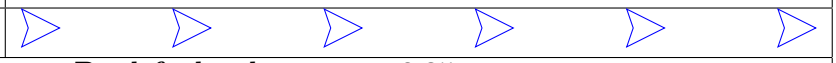
\draw[decorate,decoration={crosses,segment length=1cm}](0,0) - - (10,0);	
segment length = 1cm	× × × × × × × × × ×
shape width = 1cm	
shape height = 1cm	
shape size = 1cm	
By default: shape width = shape height = 2.5pt	

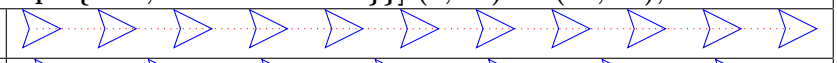
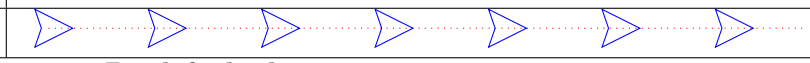
18.5.2 “shape backgrounds”

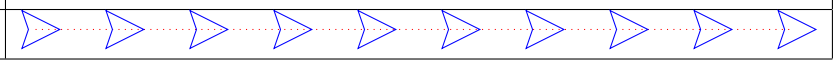
\draw[decorate with=dart] (0,2.5) - - (3,2.5);			
▷▷▷▷▷▷▷▷▷▷▷▷▷▷	◇◇◇◇◇◇◇◇◇◇◇◇◇◇	□□□□□□□□□□□□□□	○○○○○○○○○○○○○○
dart	diamond	rectangle	circle
☆☆☆☆☆☆☆☆☆☆☆☆☆☆	⬠⬠⬠⬠⬠⬠⬠⬠⬠⬠⬠⬠⬠⬠	▱▱▱▱▱▱▱▱▱▱▱▱▱▱	♡♡♡♡♡♡♡♡♡♡♡♡♡♡
star	regular polygon	signal	kite
Other possibilities or parameters see from page 91			

Shapes available	
Syntax	\draw[decorate,decoration={ shape backgrounds,shape=dart, shape size=.5cm,shape sep=1cm}] (0,0) - - (10,0);
Other syntax	\draw[decorate with=dart,decoration={shape size=.5cm,shape sep=1cm}] (0,0) – (10,0);
dart	
rectangle	
cloud	
star	
starburst	
tape	
kite	
signal	
By default: shape= circle	
Other possibilities see page 91	

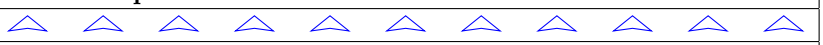
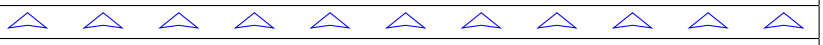
Parameters			
\draw[decorate with=star,star points=3,decoration={shape size=.5cm,shape sep=1cm}] (0,2.5) - - (3,2.5);			
			
star points=3	star points=4	star points=5	star points=8
\draw[decorate with=star,paint=green,decoration={shape size=.5cm,shape sep=1cm}] (0,2.5) - - (3,2.5);			
			
paint=green	double	ultra thick	star point ratio = 3

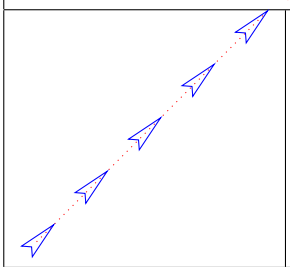
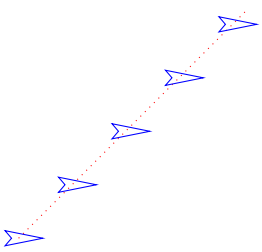
Spacing	
\draw[decorate with=dart,decoration={shape size=.5cm, shape sep=1cm}] (0,2.5) - - (10,2.5);	
shape sep={1cm}	
shape sep={2cm}	
By default: shape sep= 0.25cm	

Type of spacing	
\draw[decorate with=dart,decoration={shape size=.5cm, shape sep={1cm,between centers}}] (0,2.5) - - (10,2.5);	
between centers	
between borders	
By default: between centers	

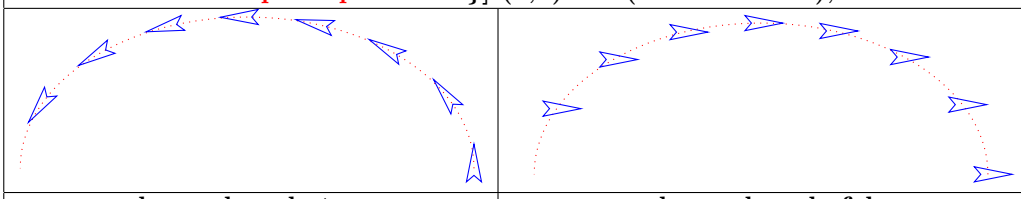
Automatic spacing	
\draw[decorate with=dart,decoration={shape size=.5cm, shape evenly spread=5}] (0,0) - - (10,0);	
shape evenly spread=5	
shape evenly spread=10	

Orientation :

” shape border rotate “	
shape border rotate=90	
shape border rotate=45	
shape border rotate=180	

“shape sloped”	
\draw[decorate with=dart,decoration={shape width=.5cm,shape sep=1cm, shape sloped=true }] (0,0) - - (3,3);	
	
shape sloped=true	shape sloped=false
By default: shape sloped=true	

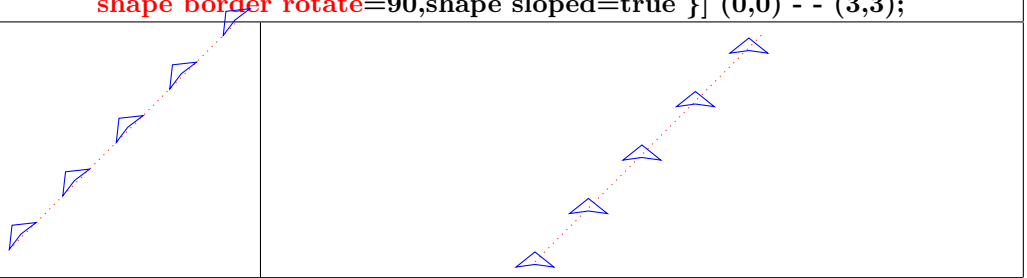
\draw[decorate with=dart,decoration={shape width=.5cm,shape sep=1cm, shape sloped=true}] (0,0) arc (0:180:3 and 2);



shape sloped=true	shape sloped=false

By default: shape sloped=true

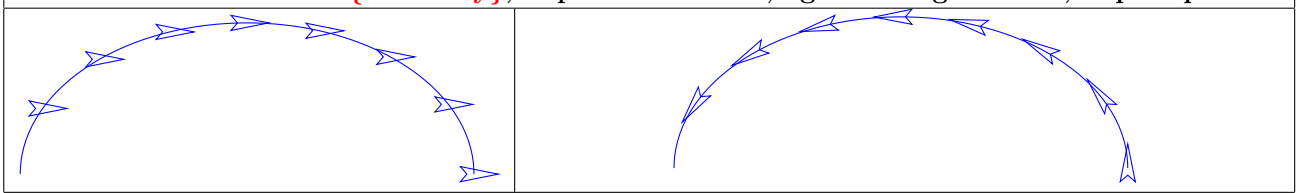
\draw[decorate with=dart,decoration={shape width=.5cm,shape sep=1cm, shape border rotate=90,shape sloped=true }] (0,0) - - (3,3);



shape sloped=true	shape sloped=false

"shift only"

decoration= transform={shift only},shape width=5mm,segment length=.5cm,shape sep=1cm

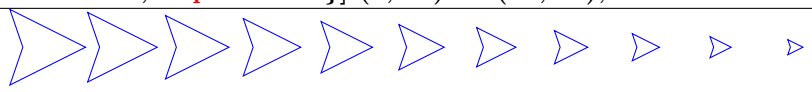
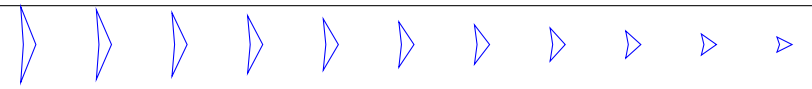
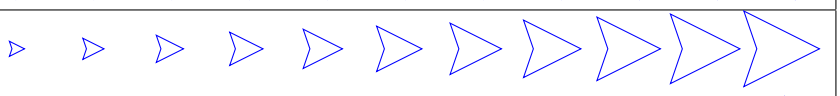
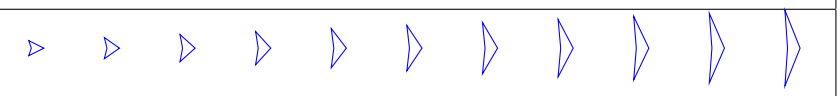


avec	sans

Dimensions

\draw[decorate with=dart,decoration={shape size=.5cm, shape height= 1cm }] (0,0) - - (10,0);

shape height=1cm	
shape width=1cm	
shape size=1cm	

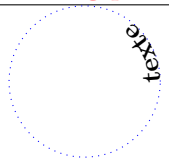
\draw[decorate with=dart,decoration={shape size=.5cm, shape start size=1cm,shape scaled }] (0,2.5) - - (10,2.5);	
shape start size=1cm	
shape start height=1cm	
shape start width=1cm	
shape end size=1cm	
shape end height=1cm	
shape end width=1cm	

18.6 Library “decorations.text”

Load package : \usetikzlibrary{decorations.text}

PGFmanual section : 48-6

\draw[decorate,decoration={text along path,text={texte}}] (1,1) circle (1);



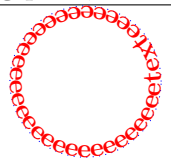
Text too long

\draw[decorate,decoration={text along path,
text={Un Deux Trois Quatre Cinq Six sept Huit Neuf Dix}}] (1,1) circle (1);

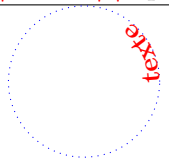
Text format

\draw [decorate,decoration={text along path, text=avant |\red | texte | | après }]

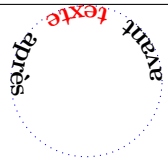
text={avant |\red|texte|| après }



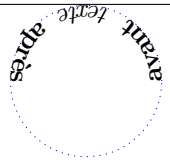
text={ |\red|texte|| }



text={ |\red|texte|| {} }



avant | \red| texte || après

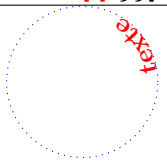


avant | \it| texte || après

avant | \Huge| texte || après

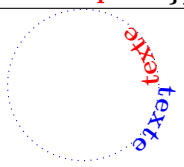
\draw [decorate,decoration={text along path,
text={avant |\Large|Visual |+\bf\color{red}|Tikz|| après }}] (1,1) circle (1);

\draw [decorate,decoration={text along path,text format delimiters={[}{]},
text={ [\red] texte [ ] }}] (1,1) circle (1);



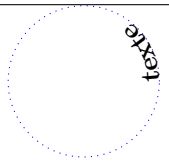
Text orientation

```
\draw[decorate,decoration={text along path,text={texte},
text color=blue, reverse path }] (1,1) circle (1);
```

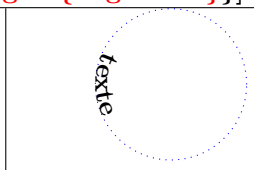


Text position

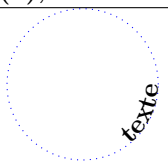
```
\draw[decorate,decoration={ text along path,text={texte},
text align={align=left}}] (1,1) circle (1);
```



align={align=left }

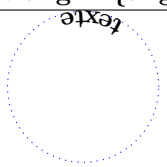


align={align=center }

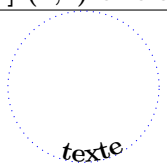


align={align=right }

```
\draw[ decorate,decoration={text along path,text={texte},
text align={align=left,left indent=1cm} } ] (1,1) circle (1);
```



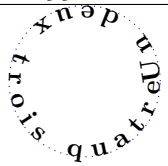
align={align=left,left indent=1cm}



align={align=right,right indent=1cm}

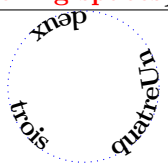
Fit to path

```
\draw [decoration={text along path, text={Un deux trois quatre },
text align={fit to path}}, decorate] (1,1) circle (1);
```



Fit to path stretching spaces

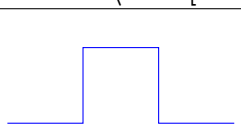
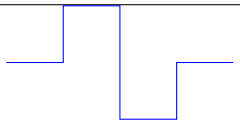
```
\draw [decoration={text along path, text={Un deux trois quatre },
text align={fit to path stretching spaces}}, decorate] (1,1) circle (1);
```

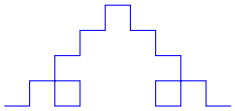
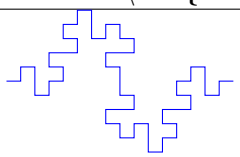


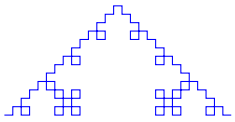
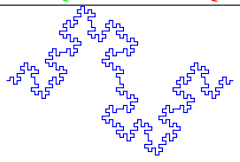
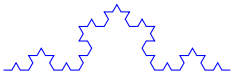
18.7 Library “decorations.fractals”

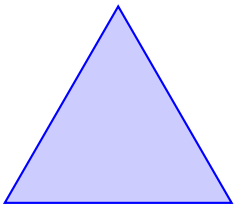
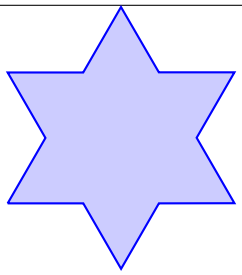
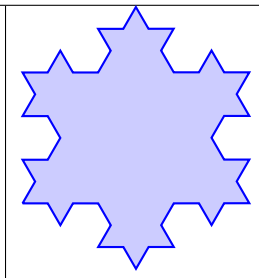
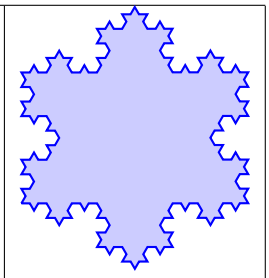
Load package : \usetikzlibrary{decorations.fractals}

PGFmanual section : 48-7

\draw[decorate,decoration=Koch curve type 1] (0,0) - - (3,0);			
			
Koch curve type 1	Koch curve type 2	Koch snowflake	Cantor set

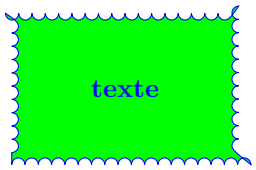
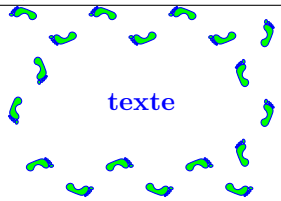
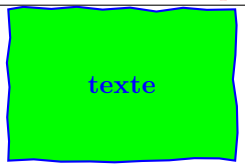
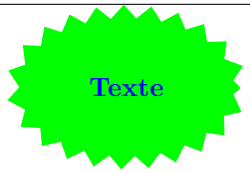
\begin{tikzpicture}[decoration=Koch curve type 1] \draw decorate { decorate { (0,0) – (3,0) }}; \end{tikzpicture}			
			
Koch curve type 1	Koch curve type 2	Koch snowflake	Cantor set

\draw decorate { decorate { decorate { (0,0) - - (3,0) } } };			
			
Koch curve type 1	Koch curve type 2	Koch snowflake	Cantor set

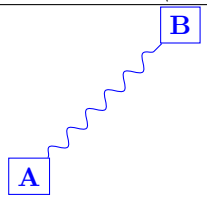
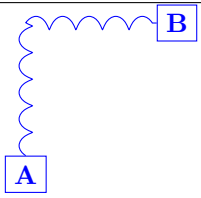
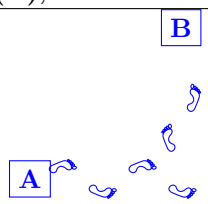
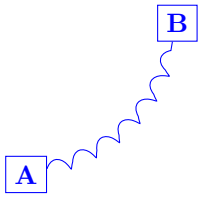
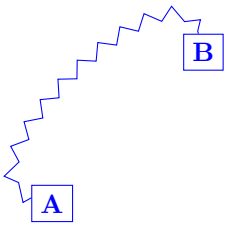
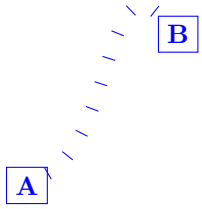
			
sans	1 decorate	2 decorate	3 decorate

18.8 Applications

18.8.1 Node decoration

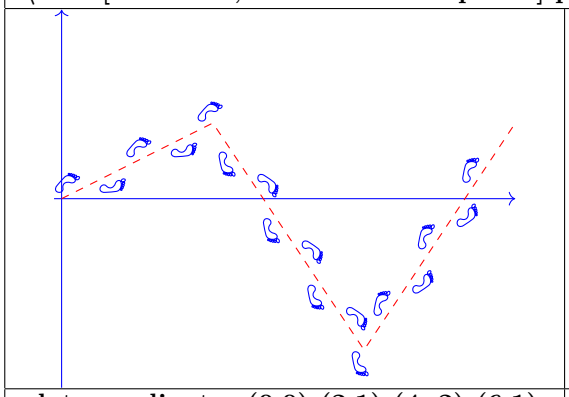
\node [draw,decorate,decoration={bumps, minimum height=2cm, minimum width=3cm}] {texte};	
	
decoration=bumps	decoration=footprints
	
decoration={random steps , amplitude = 1pt }	starburst,decoration={random steps, segment length=3pt , amplitude=2pt}
	
ellipse,decoration=zigzag	decoration= {text along path,text= {Un Deux Trois Quatre Cinq Six Sept Huit Neuf} }

18.8.2 Node link decoration

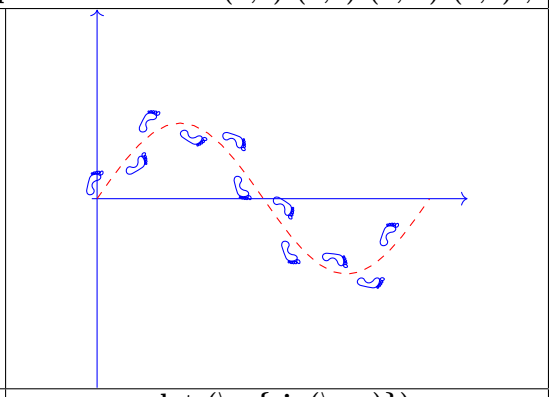
\draw [decorate,decoration=snake](A) – (B);		
		
decoration=snake (A)- - (B)	decoration=coil (A) |- (B)	decoration=footprints (A) -| (B)
		
decoration=coil (A) to [bend right] (B)	decoration=zigzag (A) to[bend left=120] (B)	decoration=ticks (A) to[out=30] (B)

18.8.3 Graph decoration

\draw[decorate,decoration=footprints] plot coordinates (0,0) (2,1) (4,-2) (6,1) ;



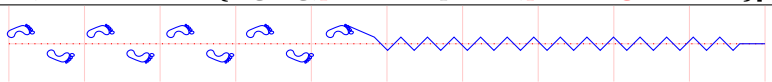
plot coordinates (0,0) (2,1) (4,-2) (6,1)



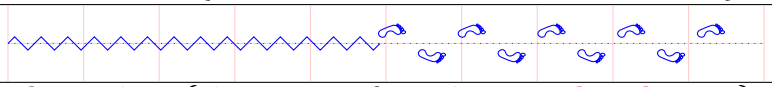
plot (\x,{sin(\x r)})

18.8.4 Various decoration

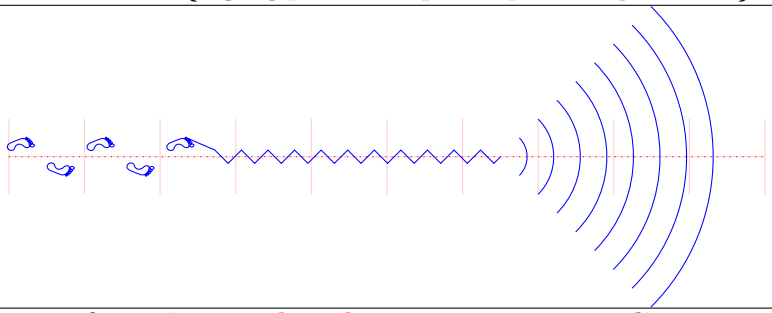
\draw [decorate, decoration={zigzag,pre=footprints,pre length=5cm}](0,0) – (10,0);



decoration={zigzag,pre=footprints,pre length=5cm}

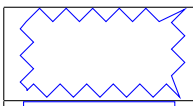


decoration={zigzag,post=footprints,post length=5cm}



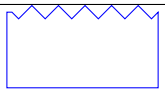
decoration={zigzag,pre=footprints,pre length=3cm, ,post=expanding waves,post length=3cm}

18.8.5 Partial decoration

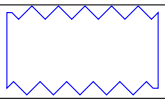


\draw [decorate,decoration=zigzag] (0,0) – (2,0) – (2,1) – (0,1)– cycle;

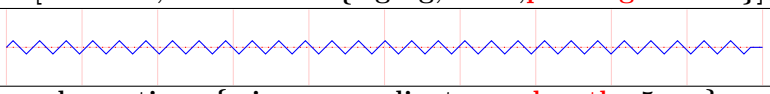
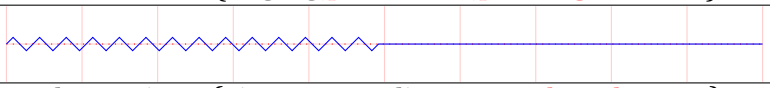
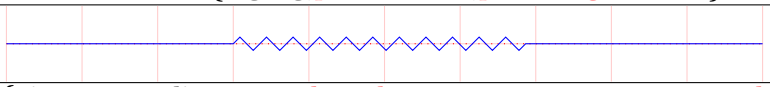
\draw [decoration=zigzag] (0,0) – (2,0) decorate{– (2,1)} – (0,1)– cycle;

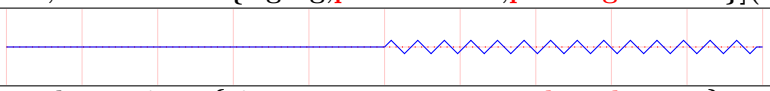
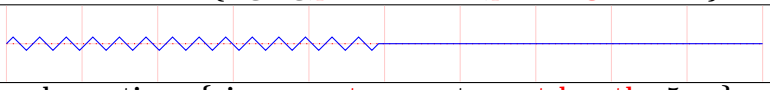
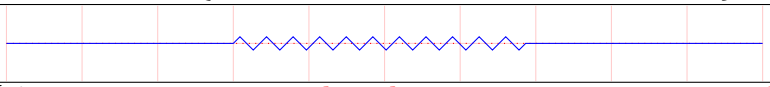


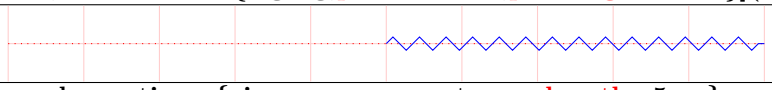
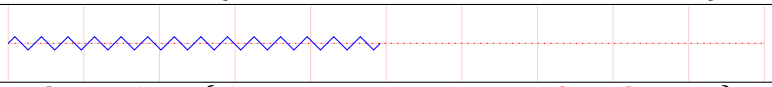
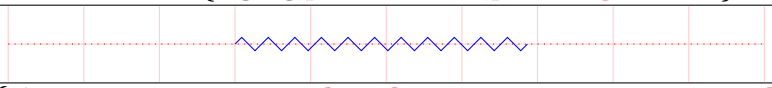
\draw [decorate,decoration=zigzag] (0,0) – (2,0) – (2,1) – decorate{(0,1)}– cycle;



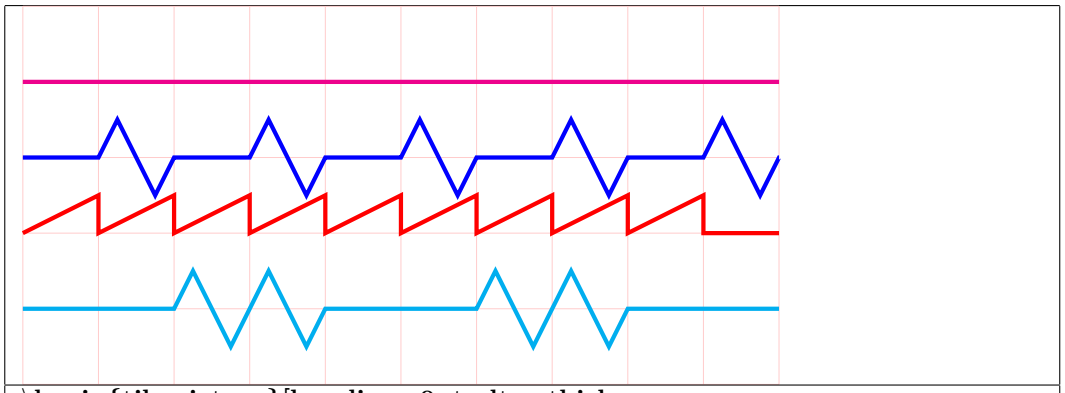
\draw [decorate,decoration=zigzag] (0,0) decorate{– (2,0)} – (2,1) – decorate{(0,1)}– cycle;

“lineto” \draw [decorate, decoration={zigzag,lineto,pre length=5cm}](0,0) – (10,0);

decoration={ zigzag,pre=lineto,pre length=5cm }

decoration={zigzag,post=lineto,post length=5cm}

decoration={zigzag,pre=lineto,pre length=3cm, ,post=curveto,post length=3cm}

“curveto”
\draw [decorate, decoration={zigzag,pre=curveto,pre length=5cm}](0,0) – (10,0);

decoration={zigzag,pre=curveto,pre length=5cm}

decoration={zigzag,post=curveto,post length=5cm}

decoration={zigzag,pre=curveto,pre length=3cm, ,post=curveto,post length=3cm}

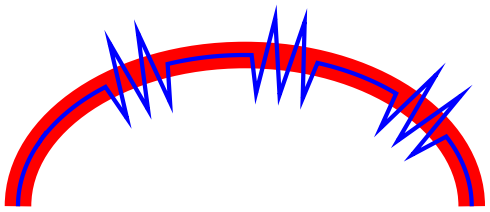
“moveto”
\draw [decorate, decoration={zigzag,pre=moveto,pre length=5cm}](0,0) – (10,0);

decoration={zigzag,pre=moveto,pre length=5cm}

decoration={zigzag,post=moveto,post length=5cm}

decoration={zigzag,pre=moveto,pre length=3cm, ,post=moveto,post length=3cm}

18.8.6 Global and partial parameters



```
\begin{tikzpicture}[baseline=0pt,ultra thick,
decoration={straight zigzag,amplitude=0.5cm,segment length=1cm}]
\draw[red!20,ultra thin] (0,-2) grid (10,3);
\draw[magenta] (0,2) -- (10,2);
\draw[blue,decorate] (0,1) -- (10,1);
\draw[red,{decorate,decoration=saw}] (0,0) -- (10,0);
\draw[cyan,decorate,decoration=meta-segment length=2cm] (0,-1) -- (10,-1);
\end{tikzpicture}
```

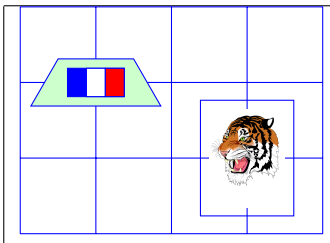
18.8.7 Path and its decoration "Postaction"



```
\draw [postaction={decorate,blue,draw,ultra thick,
decoration={straight zigzag,amplitude=0.5cm}}]

[red,line width = 10pt ] (0,0) arc (0:180:3 and 2);
```

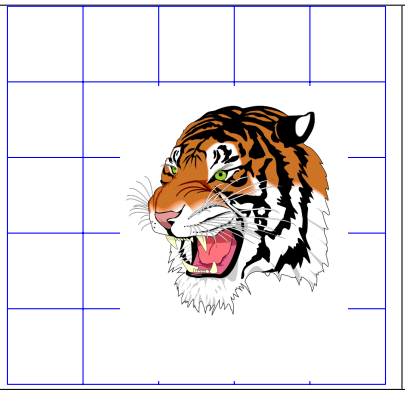
19 Pictures in a TikZ picture

19.0.1 In a node



```
\begin{tikzpicture}
\draw (0,0) grid (5,3);
\node [fill=green!20,trapezium,draw] at (1,2) {\DFR };
88
\node [draw] at (3,1) {\includegraph-
ics[width=1cm]{tiger} };
\end{tikzpicture}
```

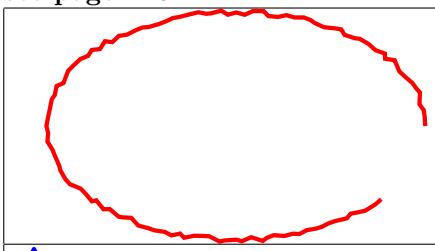
19.0.2 With pgfdeclareimage



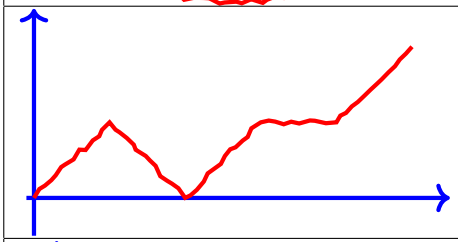
```
\pgfdeclareimage[width=3cm]{ttt}{tiger}

\begin{tikzpicture}
\draw (0,0) grid (5,5);
\draw (3,2) node {\pgfuseimage{ttt}} ;
\end{tikzpicture}
```

20 Freehand drawing

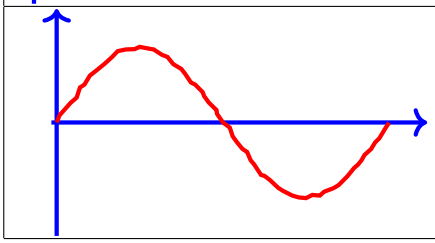
see page 116



```
\draw[decorate,decoration={random steps,
amplitude=1pt,segment length=3pt}] (0,0)
arc (0:320:2.5 and 1.5);
```



```
\draw[decorate,decoration={random steps,
amplitude=1pt,segment length=3pt}] plot
coordinates (0,0) (1,1) (2,0) (3,1) (4,1) (5,2);
```



```
\draw[decorate, decoration={random steps,
amplitude=1pt,segment length=3pt}] plot
(\x,sin(\x r));
```

21 Special effect

21.1 Tikzpeople

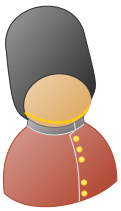
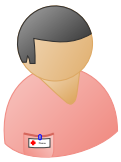
Load package : \usepackage{tikzpeople} [4] [a]

[a] conflit \usetikzlibrary{patterns} page 17 : placer cette commande en premier

\tikz \node[alice] at (0,0) ;	

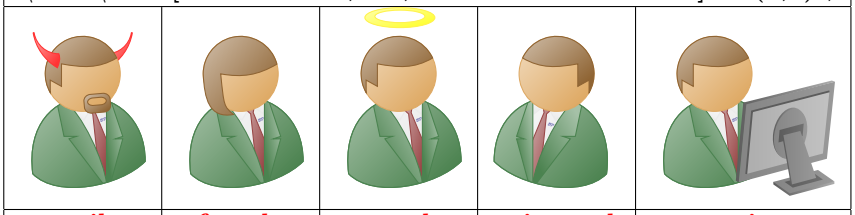
21.1.1 available characters

\tikz \node[alice,minimum size=1.5cm] at (0,0) ;

						
alice	bob	bride	builder	businessman	charlie	chef
						
conductor	cowboy	criminal	dave	graduate	groom	guard
						
jester	judge	mexican	nun	nurse	physician	pilot
						
police	priest	sailor	santa	surgeon		

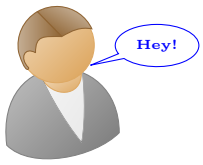
21.1.2 Options

\tikz \node[businessman,evil,minimum size=1.5cm] at (0,0) ;



evil | female | good | mirrored | monitor

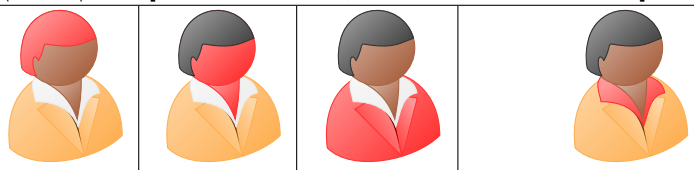
21.1.3 Anchor specific




```
\begin{tikzpicture}[blue]
\node[name=a,shape=bob,minimum size=1.5cm] {};
\node at (1.25,.5) [ellipse callout, draw, callout absolute pointer{(a.mouth)}, font=\tiny] Hey!;
\end{tikzpicture}
```

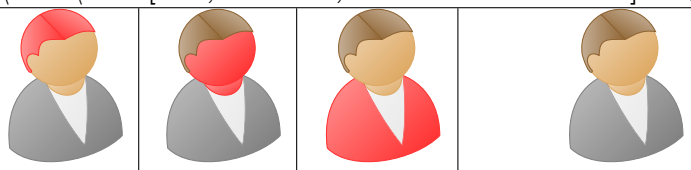
21.1.4 Colors

\tikz \node[alice,hair=red,minimum size=1.5cm] at (0,0) ;



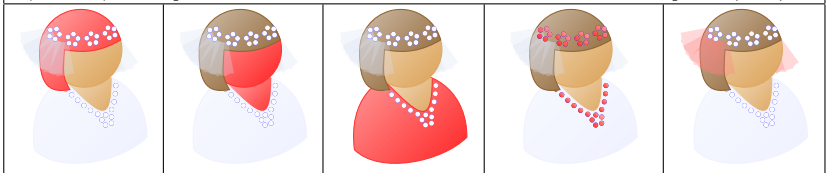
hair=red | skin=red | shirt=red | details=red

\tikz \node[bob,hair=red,minimum size=1.5cm] at (0,0) ;



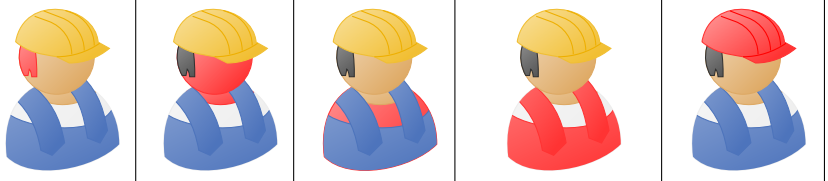
hair=red | skin=red | shirt=red | details=red

\tikz \node[bride,hair=red,minimum size=1.5cm] at (0,0) ;



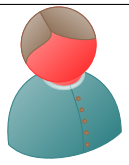
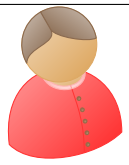
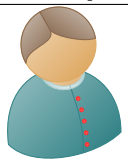
hair=red | skin=red | shirt=red | pearls=red | veil=red

\tikz \node[builder,hair=red,minimum size=1.5cm] at (0,0) ;



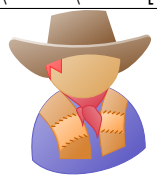
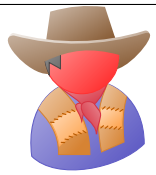
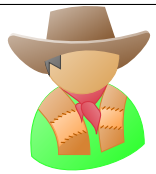
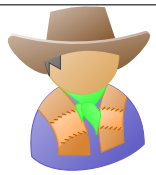
hair=red | skin=red | shirt=red | trousers=red | hat=red

\tikz \node[businessman,hair=red,minimum size=1.5cm] at (0,0) ;					
					
hair=red	skin=red	shirt=red	tie=red	undershirt=red	monogram=red

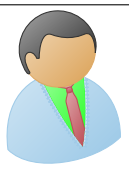
\tikz \node[charlie,hair=red,minimum size=1.5cm] at (0,0) ;			
			
hair=red	skin=red	shirt=red	buttons=red

\tikz \node[chef,hair=red,minimum size=1.5cm] at (0,0) ;				
				
hair=red	skin=red	shirt=red	hat=red	details=red

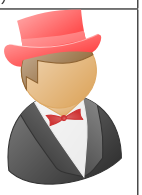
\tikz \node[conductor,hair=red,minimum size=1.5cm] at (0,0) ;				
				
hair=red	skin=red	shirt=red	hat=red	hatshield=red
				
undershirt=red	shirt=red	hatbadge=red	badge=red	

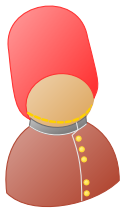
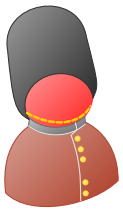
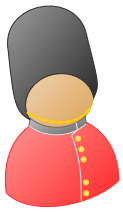
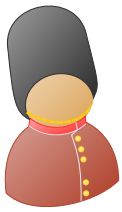
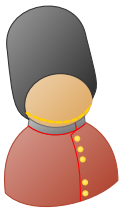
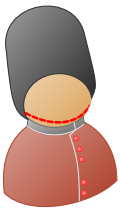
\tikz \node[cowboy,hair=red,minimum size=1.5cm] at (0,0) ;			
			
hair=red	skin=red	shirt=green	hat=red
			
patches=red	tie=green	stitching=red	vest=red

\tikz \node[criminal,hat=red,minimum size=1.5cm] at (0,0) ;			
			
hat=red	skin=red	shirt=red	details=red

\tikz \node[dave,hair=red,minimum size=1.5cm] at (0,0) ;				
				
hair=red	skin=red	shirt=red	undershirt=green	tie=green

\tikz \node[graduate,hair=red,minimum size=1.5cm] at (0,0) ;					
					
hair=red	skin=red	shirt=red	undershirt=red	stripes=red	hat=red

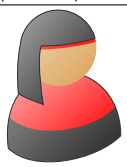
\tikz \node[groom,hair=red,minimum size=1.5cm] at (0,0) ;					
					
hair=red	skin=red	shirt=red	undershirt=green	tie=green	hat=red

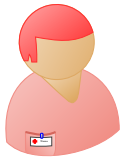
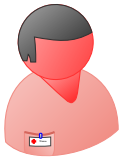
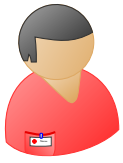
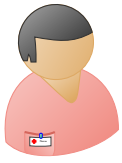
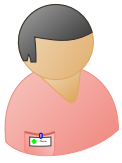
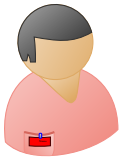
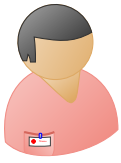
\tikz \node[guard,hat=red,minimum size=1.5cm] at (0,0) ;					
					
hat=red	skin=red	shirt=red	collar=red	lining=red	details=red

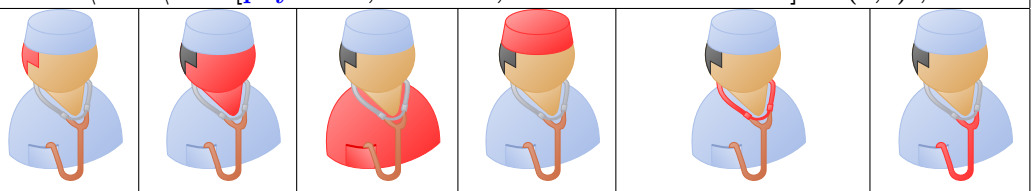
\tikz \node[jester,hat=red,minimum size=1.5cm] at (0,0) ;					
					
hair=red	skin=red	shirt=yellow	hat=red	pattern=yellow [2]	details=blue

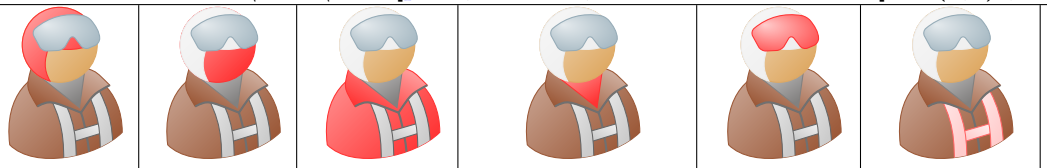
\tikz \node[judge,hair=red,minimum size=1.5cm] at (0,0) ;				
hair=red	skin=red	shirt=red	undershirt=red	hairshadow=red

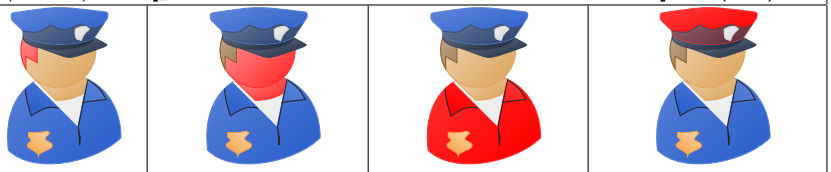
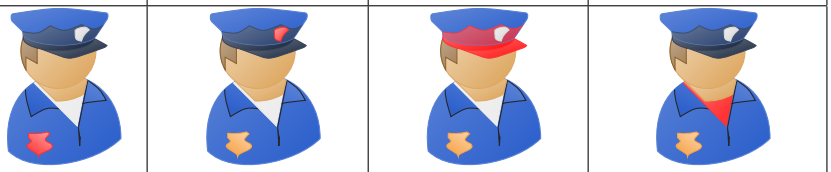
\tikz \node[mexican,hair=red,minimum size=1.5cm] at (0,0) ;						
						
hair=red	skin=red	shirt=red	hat=green	ringtop=red	ringmid=red	ringbot=yellow

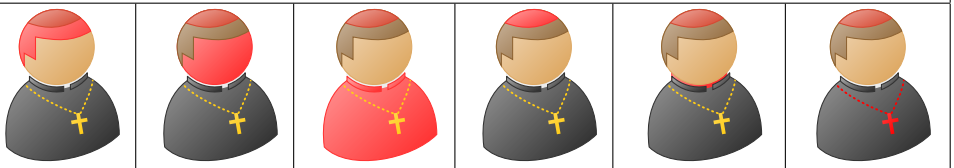
\tikz \node[nun,plaid=red,minimum size=1.5cm] at (0,0) ;		
		
plaid=red	skin=red	shirt=red

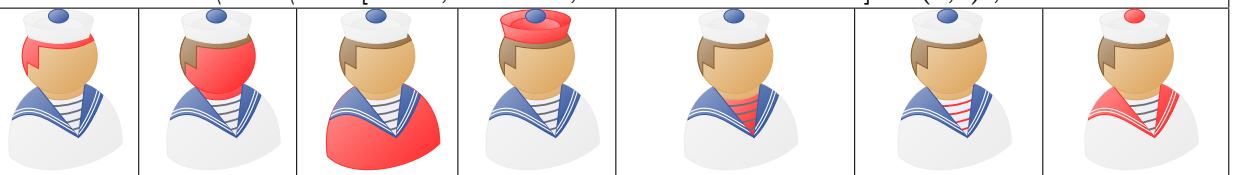
\tikz \node[nurse,hair=red,minimum size=1.5cm] at (0,0) ;						
						
hair=red	skin=red	shirt=red	badgeclip=green	redcross=green	badge=red	badgename=red

\tikz \node[physician,hair=red,minimum size=1.5cm] at (0,0) ;					
					
hair=red	skin=red	shirt=red	hat=red	stethoscope=red	tube=red

\tikz \node[pilot,hat=red,minimum size=1.5cm] at (0,0) ;						
						
hat=red	skin=red	shirt=red	undershirt=red	visor=red	straps=red	decoration=red

\tikz \node[police,hair=red,minimum size=1.5cm] at (0,0) ;			
			
hair=red	skin=red	shirt=red	hat=red
			
badge=red	hatbadge=red	hatshield=red	undershirt=red

\tikz \node[priest,hair=red,minimum size=1.5cm] at (0,0) ;					
					
hair=red	skin=red	shirt=red	hat=red	collar=red	cross=red

\tikz \node[sailor,hair=red,minimum size=1.5cm] at (0,0) ;						
						
hair=red	skin=red	shirt=red	hat=red	undershirt=red	stripes=red	details=red

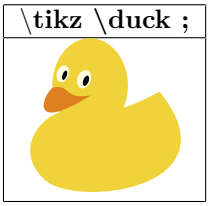
\tikz \node[santa,hat=green,minimum size=1.5cm] at (0,0) ;				
				
hat=green	skin=green	shirt=green	beard=green	details=green

\tikz \node[surgeon,hat=red,minimum size=1.5cm] at (0,0) ;				
				
hat=red	skin=red	shirt=red	hair=red	mask=red

21.2 Ducks

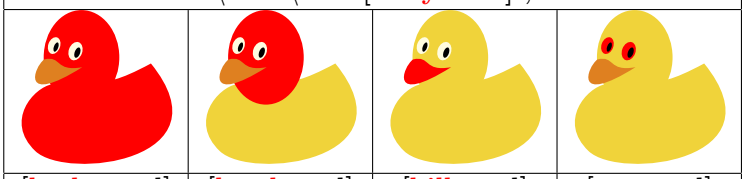
Load package : \usepackage{tikzducks} [5]

\tikz \duck ;



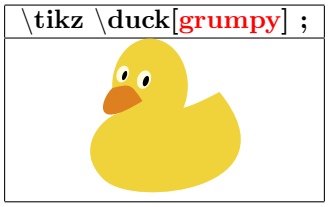
21.2.1 Options

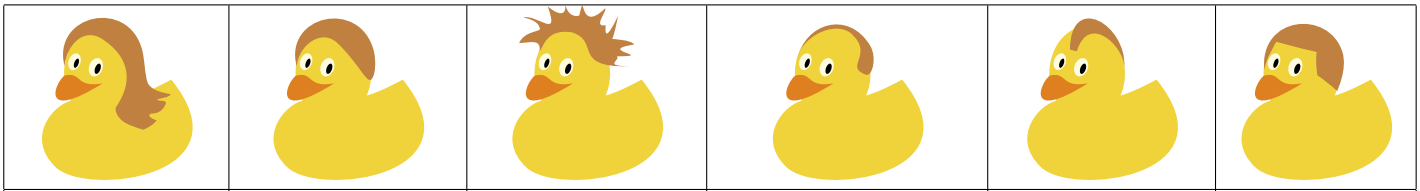
\tikz \duck[body=red] ;



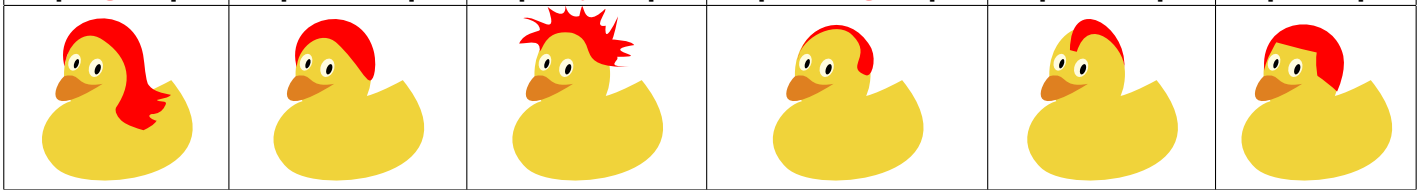
[body=red] [head=red] [bill=red] [eye=red]

\tikz \duck[grumpy] ;

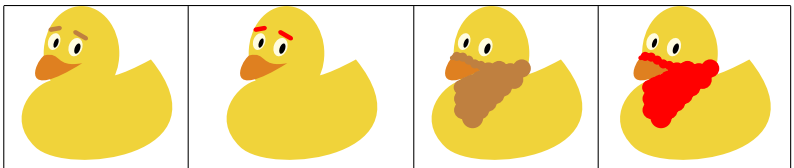




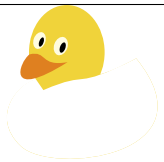
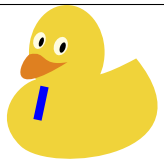
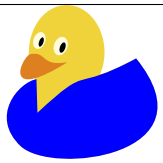
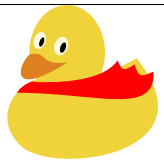
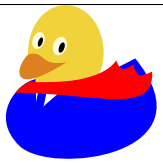
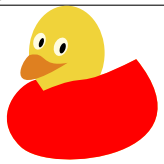
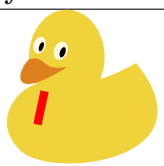
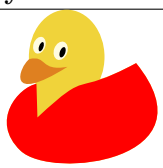
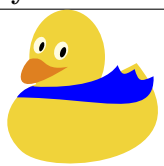
[longhair] [shorthair] [crazyhair] [recedinghair] [mohican] [mullet]

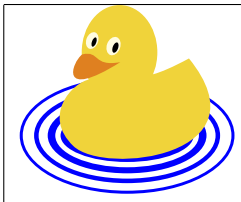
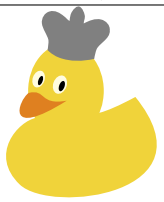
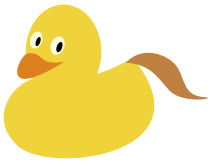
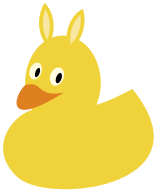
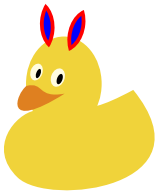
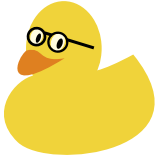


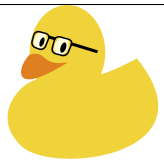
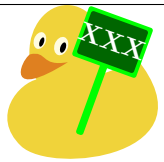
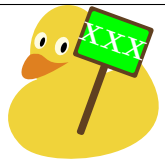
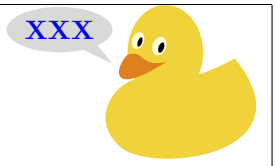
[longhair=red] [shorthair=red] [crazyhair=red] [recedinghair=red] [mohican=red] [mullet=red]

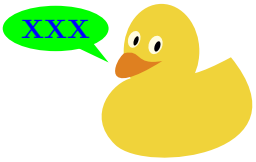
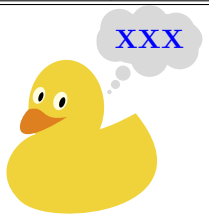
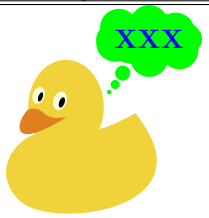
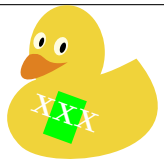
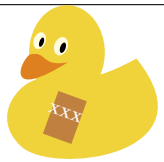
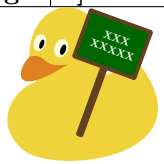


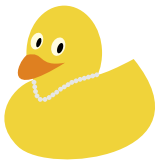
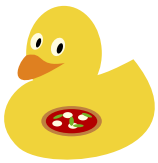
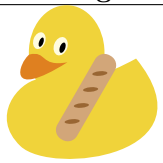
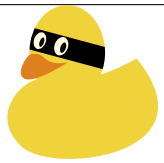
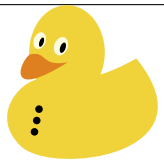
[eyebrow] [eyebrow=red] [beard] [beard=red]

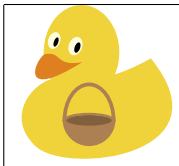
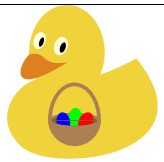
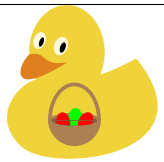
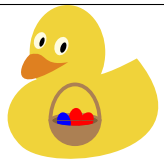
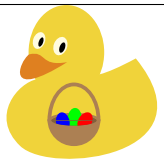
				
[tshirt]	[tie]	[jacket]	[cape]	[tshirt,tie ,jacket ,cape]
By defaultwhite	By defaultblue	By defaultblue	By defaultred	
				
[tshirt=red]	[tie=red]	[jacket=red]	[cape=blue]	

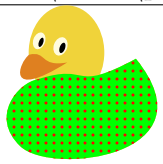
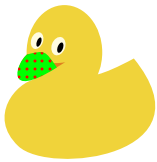
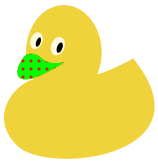
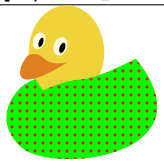
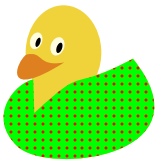
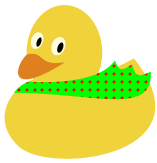
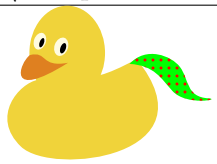
				
[water]	[alien]	[hat]	[tophat]	[cap]
				
[santa]	[graduate]	[graduate,tassel]	[beret]	[peakedcap]
				
[crown]	[queencrown]	[kingcrown]	[sheep]	[horsetail]
				
[crozier]	[unicorn]	[bunny]	[bunny=red,inear=blue]	[witch]
				
[magicwand]	[magichat]	[magichat, magicstars]	[glasses]	[sunglasses]

				
[squareglasses]	[signpost=42]	[signpost=XXX, signcolour=green]	[signpost=XXX, signback=green]	[speech={XXX}]

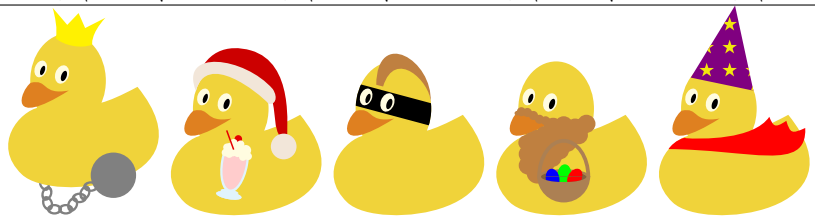
			
[speech=XXX, bubblecolour=green]	[think={XXX}]	[think=XXX, bubblecolour=green]	[book={XXX}]
			
[book=XXX, bookcolour=green]	\tikz \duck[book= \scalebox{0.5}{XXX}]	\tikz \duck[signpost=\scalebox{0.4}{ \parbox{2cm} \centering XXX ; XXXXX}]	

				
[cricket]	[hockey]	[football]	[lightsaber]	[torch]
				
[prison]	[necklace]	[icecream]	[icecream, flavoura=green]	[icecream, flavourb=green]
				
[icecream, flavourc=green]	[chef]	[rollingpin]	[cake]	[pizza]
				
[baguette]	[milkshake]	[wine]	[mask]	[buttons]

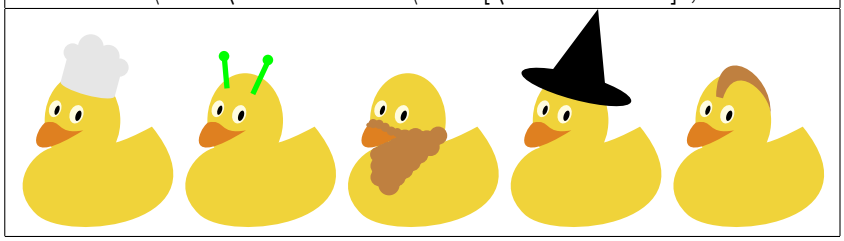
				
[basket]	[easter]	[easter,egga=red]	[easter,eggb=red]	[easter,eggc=red]

\tikz \duck \path[preaction={fill,green},pattern=dots, pattern color=red] \duckpathbody ;			
			
\duckpathbody	\duckpathgrumpybill	\duckpathbill	\duckpathtshirt
			
\duckpathjacket	\duckpathcape	\duckpathshorthair	\duckpathlonghair
			
\duckpathcrazyhair	\duckpathrecedinghair	\duckpathcrown	\duckpathmohican
			
\duckpathmullet	\duckpathqueencrown	\duckpathkingcrown	\duckpathdarthvader
			
\duckpathhorsetail			

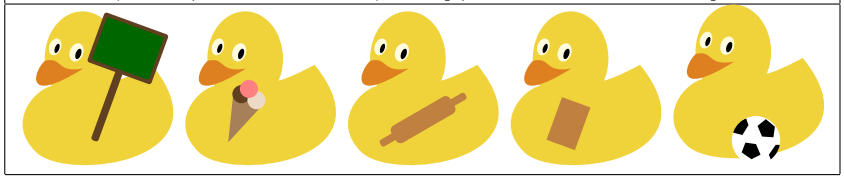
21.2.2 Random ducks

\tikz \randuck ; \tikz \randuck ; \tikz \randuck ; \tikz \randuck ; \tikz \randuck ;


```
\tikz \shuffleducks \duck[\randomhead] ;
```

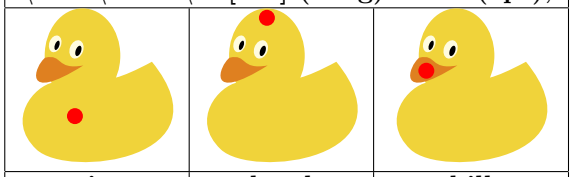


```
\tikz \shuffleducks \duck[\randomaccessories] ;
```



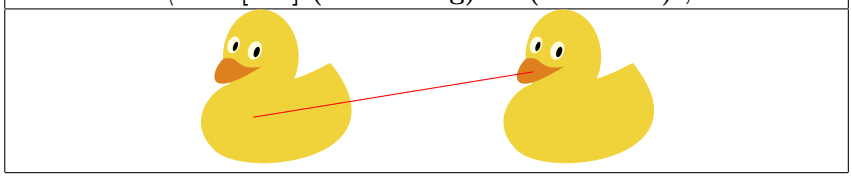
21.2.3 Coordinates

```
\tikz \duck \fill[red] (wing) circle (3pt);
```

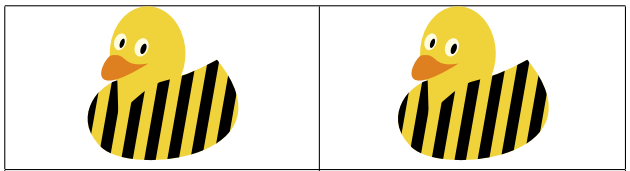


wing	head	bill

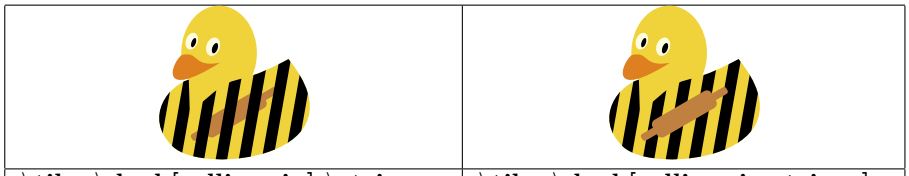
```
\tikz \duck[name=XXX]
\begin{scope} [xshift=4cm] \duck[name=YYY] \end{scope}
\draw[red] (XXX-wing) - - (YYY-bill) ;
```



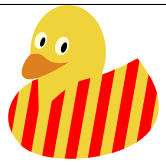
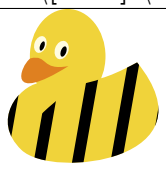
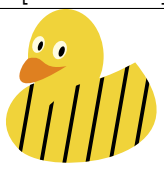
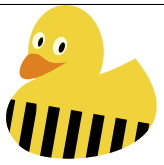
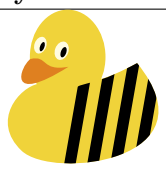
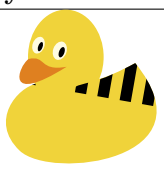
21.2.4 Stripes

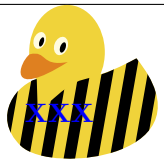
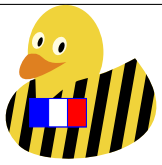


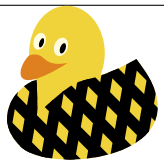
\tikz \duck \stripes ;	\tikz \duck[stripes] ;



\tikz \duck[rollingpin] \stripes ;	\tikz \duck[rollingpin,stripes] ;

\tikz \[duck] \stripes[color=red];			
			
[color=red]	[distance=.5]	[width=.05]	[height=1]
By defaultblack	By default0.3	By default0.15	By default2.7
			
[rotate=45]	[initialx=1]	[initialy=1]	
By default-10	By default0.1	By default-0.3	

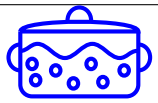
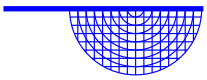
\tikz \[duck] \stripes[emblem=XXX];		
		
[emblem=XXX]	[emblem={\includegraphics [width=6mm]{LogoIUT} }]	[emblem={\DFR}]
		\DFR : see page 88


\tikz \duck[stripes={ \stripes \stripes[rotate=45] }] ;

21.3 symbol

Load package : \usepackage{tikzsymbols} [6]

☺		
\Smiley	\Smiley[3]	\Smiley[5][green]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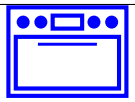
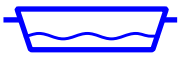
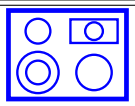
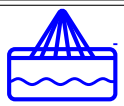
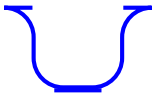
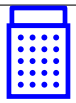
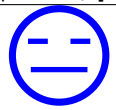
	\pot[5]	\fryingpan[5]	\eggbeater[5]	\sieve[5]
				
	\Purierstab[5]	\Dreizack[5]	\Backblech[5]	\Ofen[5]
	\blender[5]	\trident[5]	\bakingplate[5]	\oven[5]
				
	\Pfanne[5]	\Herd[5]	\Saftpresse[5]	\Schussel[5]
	\pan[5]	\cooker[5]	\squeezer[5]	\bowl[5]
				
	\Schaler[5]	\Reibe[5]	\Flasche[5]	\Nudelholz[5]
	\peeler[5]	\grater[5]	\bottle[5]	\rollingpin[5]

				
\Smiley[5]	\Sadey[5]	\Neutrey[5]	\Changey[5]{0}	\cChangey[5]{0}
				
\Annoey[5]	\Laughey[5]	\Winkey[5]	\oldWinkey[5]	\Sey[5]
				
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	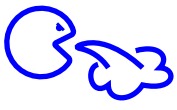			
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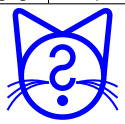
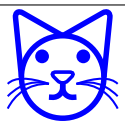
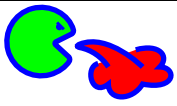
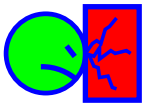
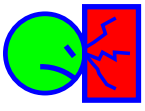
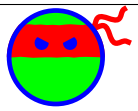
				
\SchrodingersCat[5]{0}	\Ninja[5]	\Sleepey[5]	\NiceReapey[5]	

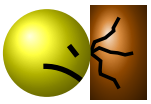
				
\Changey[5]{-2}	\Changey[5]{-1}	\Changey[5]{0}	\Changey[5]{1}	\Changey[5]{2}

				
\cChangey[5]{-2}	\cChangey[5]{-1}	\cChangey[5]{0}	\cChangey[5]{1}	\cChangey[5]{2}

		
\SchrodingersCat[5]{-1}	\SchrodingersCat[5]{0}	\SchrodingersCat[5]{1}

			
\Laughey[5][green][red]	\Innocey[5][green][red]	\Tongey[5][green][red]	\Nursey[5][green][red]
			
\Vomey[5][green][red]	\Walley[5][green][red]	\rWalley[5][green][red]	

	
\Ninja[5][green][red][blue]	\Sleepey[5][green][red][blue]

				
\dSmiley[5]	\dSadey[5]	\dNeutrey[5]	\dChangey[5]{0}	\dcChangey[5]{0}
				
\dAnnoey[5]	\dLaughey[5]	\dWinkey[5]	\dSey[5]	\dXey[5]
				
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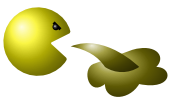
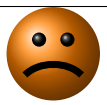
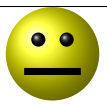
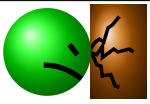
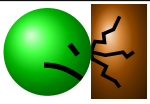
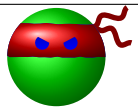
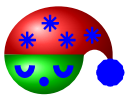
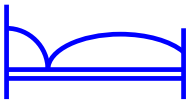
				
\dVomey[5]	\dNursey[5]	\dTongey[5]	\dSleepey[5]	\olddWinkey[5]

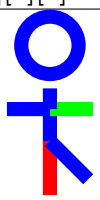
				
\dChangey[5]{-2}	\dChangey[5]{-1}	\dChangey[5]{0}	\dChangey[5]{1}	\dChangey[5]{2}

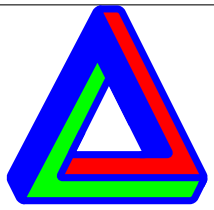
				
\dcChangey[5]{-2}	\dcChangey[5]{-1}	\dcChangey[5]{0}	\dcChangey[5]{1}	\dcChangey[5]{2}

			
\dLaughey[5][green][red]	\dInnocey[5][green][red]	\dTongey[5][green][red]	\dNursey[5][green][red]
	 [red]	 [red]	
\dVomey[5][green][red]	\dWalley[5][green][red]	\drWalley[5][green][red]	

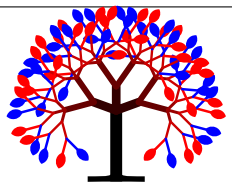
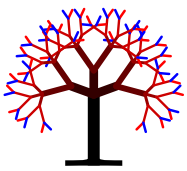
	
\dNinja[5][green][red][blue]	\dSleepey[5][green][red][blue]

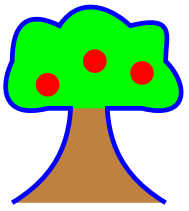
				
\Strichmaxerl[5]	\Candle[5]	\Fire[5]	\Coffeecup[5]	\Chair[5]
				
\Bed[5]	\Tribar[5]	\Moai[5]	\Snowman[5]	

\Strichmaxerl[10][0][0][0][0]				
				
[0][0][0][0]	[45][0][0][0]	[0][45][0][0]	[0][0][45][0]	[0][0][0][-45]



\Tribar[10][green][red][blue]

	
\BasicTree[10]{black}{red}{blue}{leaf}	\BasicTree[10]{black}{red}{blue}{}

				
\Springtree[10]	\Summertree[10]	\Autumntree[10]	\Wintertree[10]	\WorstTree[10]

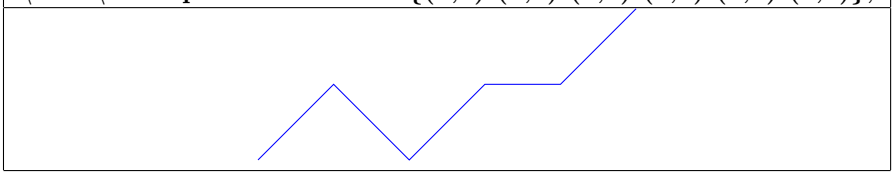
22 Creating Graphs

22.1 Graph with TikZ

22.1.1 From a list of points

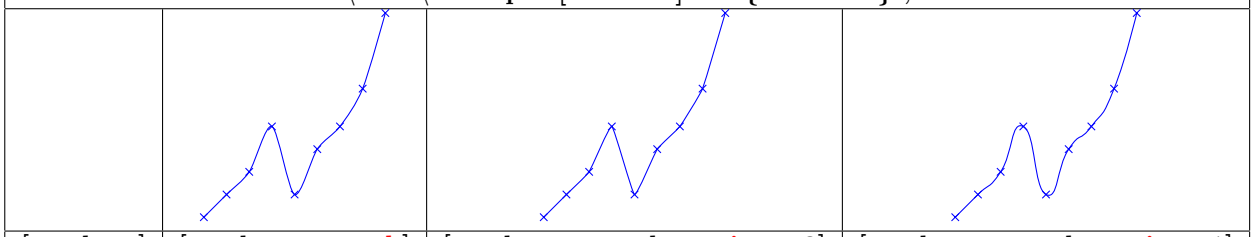
PGFmanual section : 22-2

```
\tikz \draw plot coordinates {(0,0) (1,1) (2,0) (3,1) (4,1) (5,2)};
```



22.1.2 From a data file

```
\tikz \draw plot[mark=x] file {table.dat} ;
```



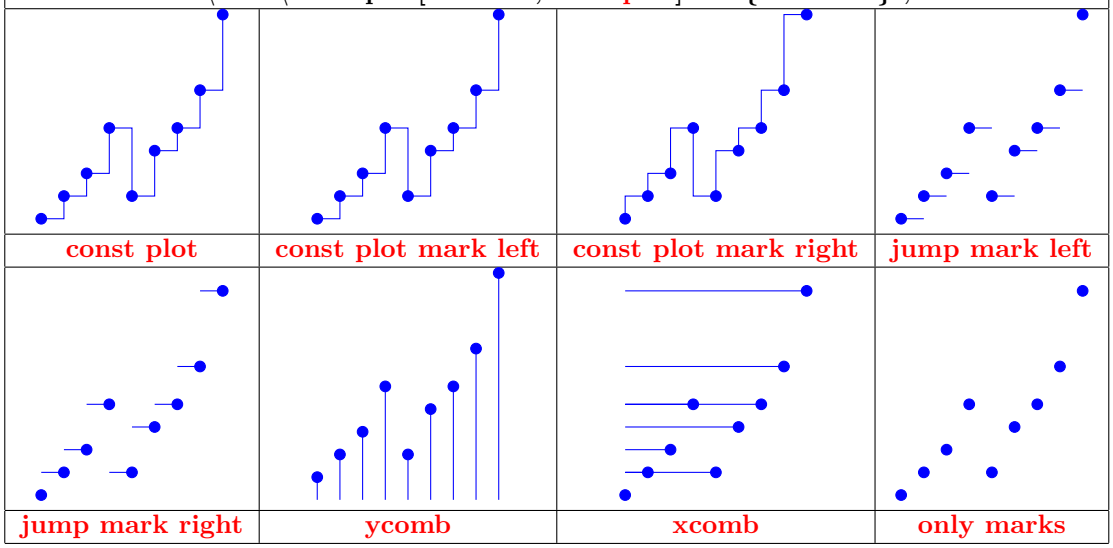
[mark=x]	[mark=x,smooth]	[mark=x,smooth,tension=.2]	[mark=x,smooth,tension=1]

By default: tension= 0:55

content of the file table.dat	
0.0	0.3
0.3	0.6
0.6	0.9
0.9	1.5
1.2	0.6
1.5	1.2
1.8	1.5
2.1	2.0
2.4	3.0

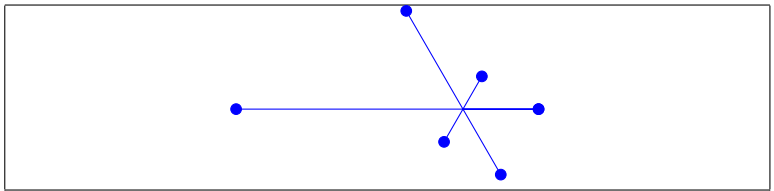
22.1.3 Graph types

\tikz \draw plot[mark=*,const plot] file {table.dat} ;



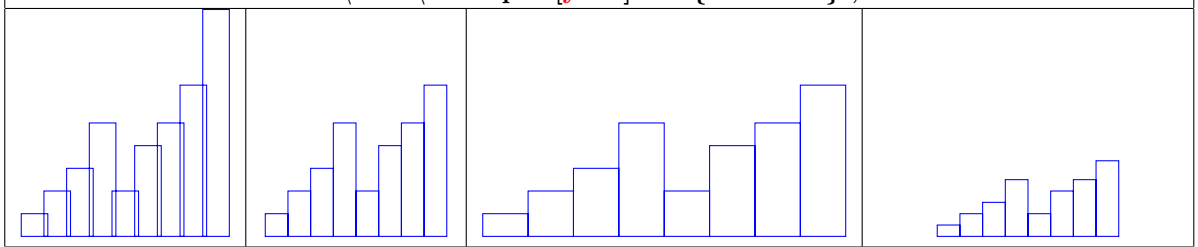
const plot | const plot mark left | const plot mark right | jump mark left

jump mark right | ycomb | xcomb | only marks

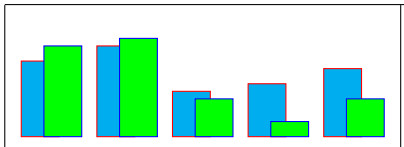


\tikz \draw plot[polar comb,mark=*]coordinates
{(0:1) (60:0.5) (120:1.5) (180:3) (240:.5) (300:1) (0:1)};

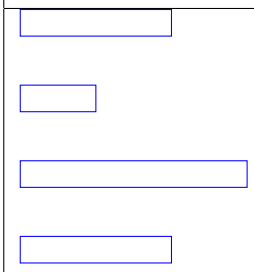
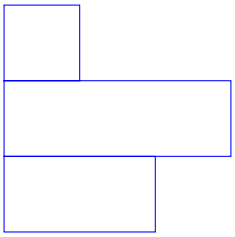
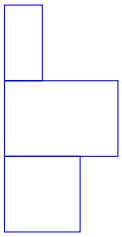
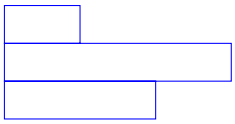
\tikz \draw plot[ybar] file {table.dat} ;



[ybar] | [ybar interval] | [ybar interval,x=2cm] | [ybar interval,y=.5cm]

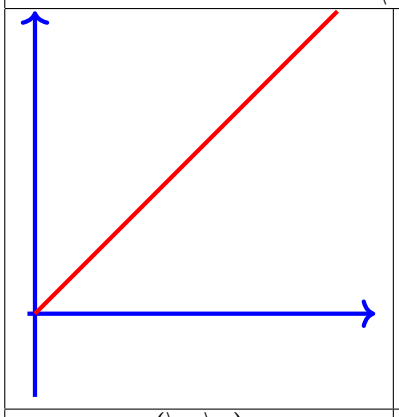


```
\begin{tikzpicture}
\draw[red,fill=cyan,ybar,bar width=.5cm]
        plot coordinates {(0,1) (1,1.2) (2,.6) (3,.7) (4,.9)};
\draw[blue,fill=green,ybar,bar width=.5cm,bar shift=.3cm]
        plot coordinates {(0,1.2) (1,1.3) (2,.5) (3,.2) (4,.5)};
\end{tikzpicture}
```

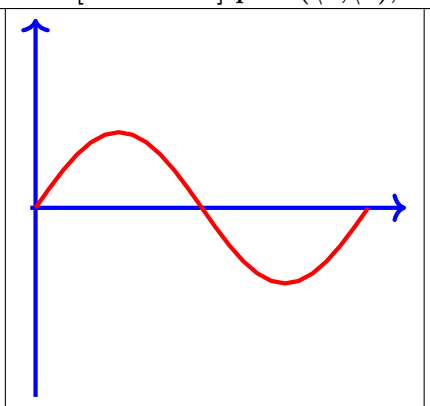
\tikz \draw plot[xbar interval] file {table.dat} ;			
			
[xbar]	[xbar interval]	[xbar interval,x=.5cm]	[xbar interval,y=.5cm]

22.1.4 Graph of a function

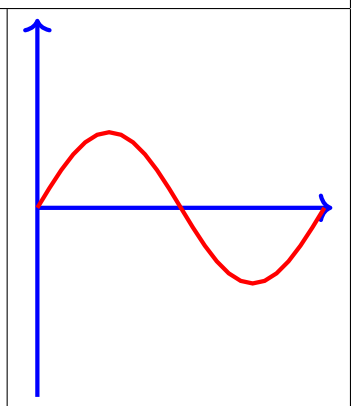
```
\draw [color=red] plot (\x,\x);
```



(\x,\x)



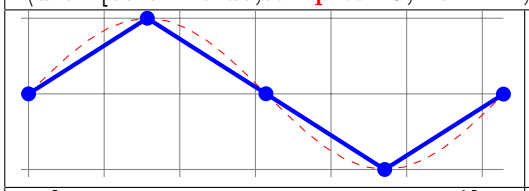
(\x,{sin(\x r)})
x en radian



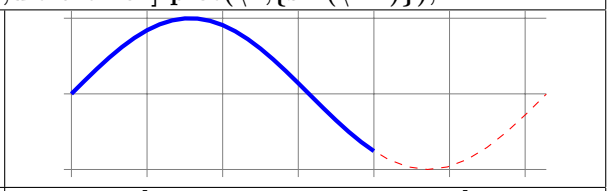
(\x,{sin(\x)})
x en degré

Options

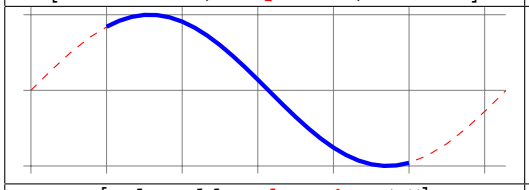
```
\draw[color=red,dashed] plot(\x,{sin(\x r)});
\draw[color=blue,samples=5,mark=*,ultra thick] plot(\x,{sin(\x r)});
```



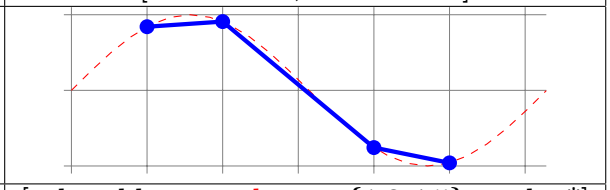
[color=blue,samples=5,mark=*]



[color=blue,domain=0:4]



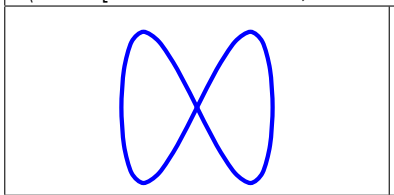
[color=blue,domain=1:5]



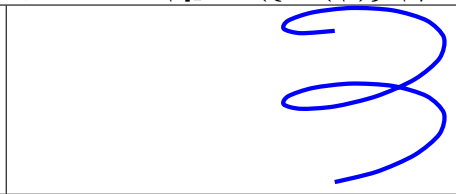
[color=blue,samples at={1,2,4,5},mark=*]

22.1.5 Parametric function

```
\draw[domain=-3.141:3.141,smooth,variable=\t]plot ({sin(\t r)},{sin(2 *\t r)});
\draw[domain=0:720,smooth,variable=\t]plot ({sin(\t)},\t/360,{cos(\t)});
```



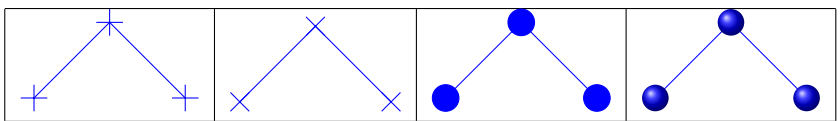
({sin(\t r)},{sin(2 *\t r)})



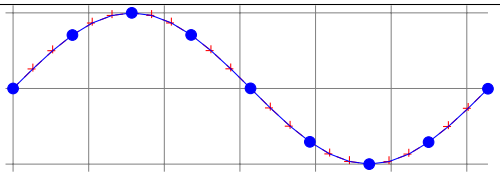
({sin(\t)},\t/360,{cos(\t)})

22.2 Marks

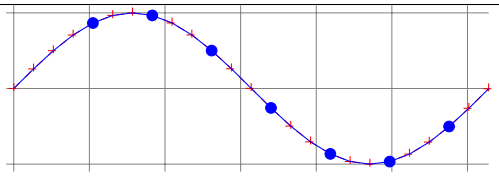
22.2.1 Marks with TikZ



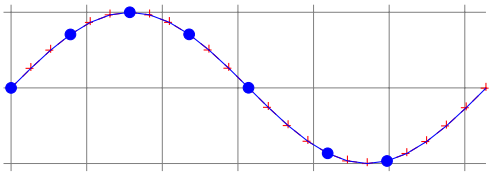
mark=+ | mark=x | mark=* | mark=ball



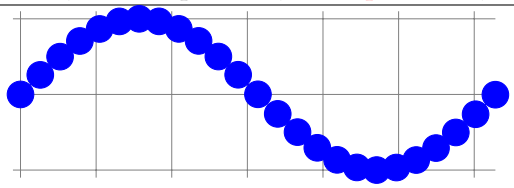
[color=blue,mark repeat=3,mark=*]



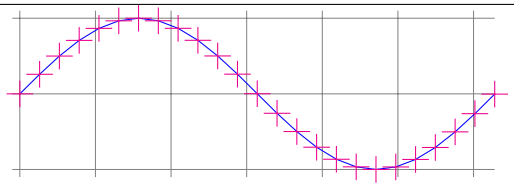
[color=blue,mark repeat=3,mark phase=5,mark=*]



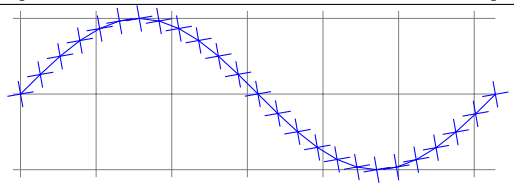
[color=blue,mark indices=1,4,...,15,17,20,mark=*]



[color=blue,mark size=5pt,mark=*]



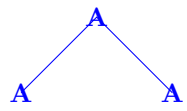
mark options={color=magenta},mark=+



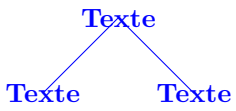
mark options={rotate=10},mark=+

22.2.2 Marks with text mark

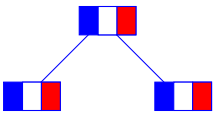
\draw[mark=text ,text mark=A,mark size=5pt] coordinates {(0,0) (1,1) (2,0)};



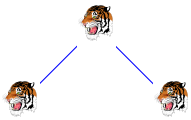
text mark=A



text mark=Texte



text mark=\DFR 88

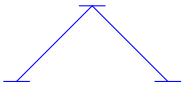
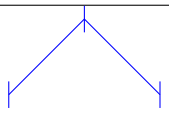
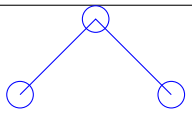
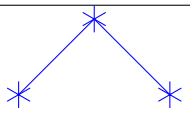
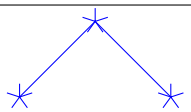
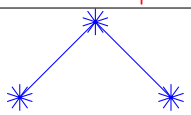
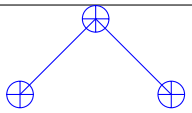
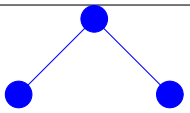
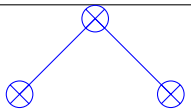
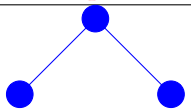
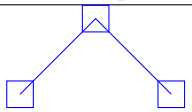
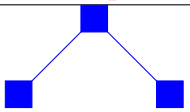
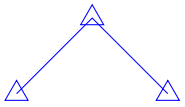
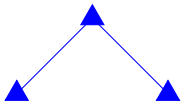
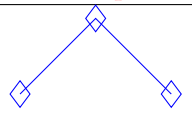
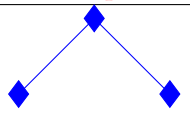
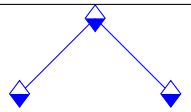
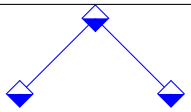
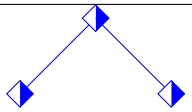
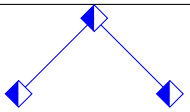
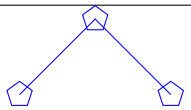
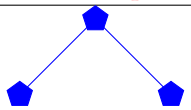
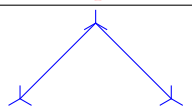
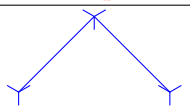
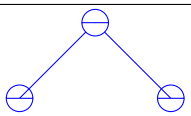
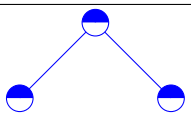
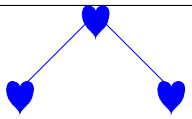
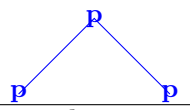


text mark={\includegraphics[width=.5cm]{tiger}}

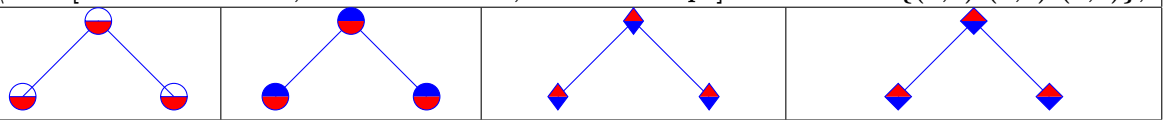
22.2.3 Marks with plotmarks library

Load package : \usetikzlibrary{plotmarks}

PGFmanual section : 63

			
mark=-	mark=|	mark=o	mark=asterisk
			
mark=star	mark=10-pointed star	mark=oplus	mark=oplus*
			
mark=otimes	mark=otimes*	mark=square	mark=square*
			
mark=triangle	mark=triangle*	mark=diamond	mark=diamond*
			
mark=halfdiamond*	mark=halfsquare*	mark=halfsquare right*	mark=halfsquare left*
			
mark=pentagon	mark=pentagon*	mark=Mercedes star	mark=Mercedes star flipped
			
mark=halfcircle	mark=halfcircle*	mark=heart	mark=text

```
\draw[mark=halfcircle,mark color=red,mark size=5pt] coordinates {(0,0) (1,1) (2,0)};
```



mark=halfcircle	mark=halfcircle*	mark=halfdiamond*	mark=halfsquare*

22.3 Graph with Gnuplot

```
\draw[color=red] plot[id=sin] function{sin(x)} ;
```

==> plot[id=sin] create the file “sin.gnuplot”
==> Open the file “sin.gnuplot” with the program gnuplot : creation of the file “sin.table”
==> Use the datafile “sin.table”

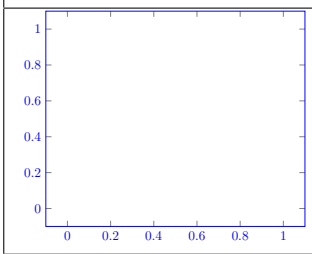
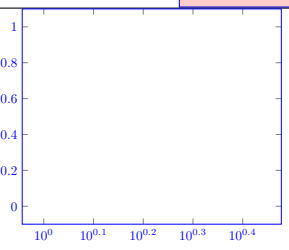
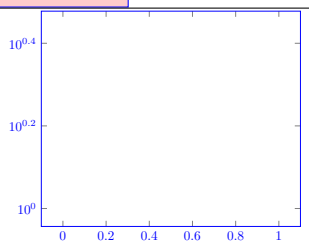
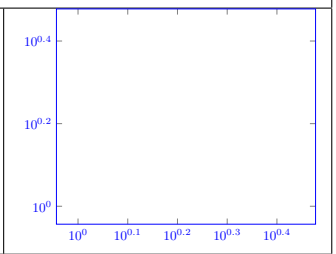
23 Creation of a graph with pgfplots

Load package : \usepackage{pgfplots} [2]

23.1 2D Graph

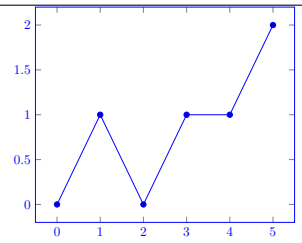
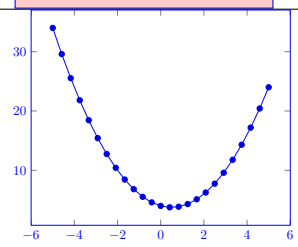
23.1.1 Axes

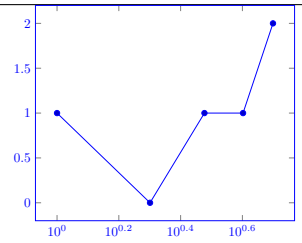
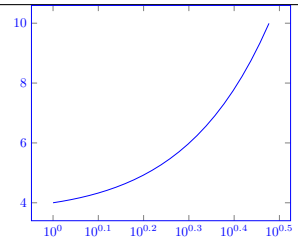
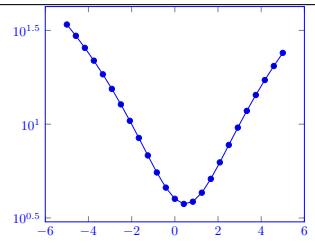
pgfplots section : 4-1

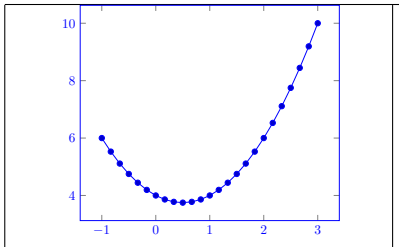
			
\axis \end{axis}	\semilogxaxis \end{semilogxaxis}	\semilogyaxis \end{semilogyaxis}	\loglogaxis \end{loglogaxis}

23.2 Drawing of the graph

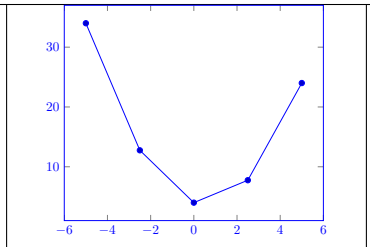
pgfplots section : 4-2

		
\addplot coordinates {(0,0) (1,1) (2,0) (3,1) (4,1) (5,2)};	\addplot {x^2 - x +4};	\addplot gnuplot[id=sin]{sin(x)};

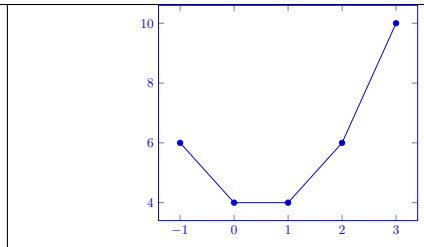
		
axes : semilogxaxis	axes : semilogxaxis	axes : semilogyaxis
\addplot coordinates {(0,0) (1,1) (2,0) (3,1) (4,1) (5,2)};	\addplot {x^2 - x +4};	\addplot {x^2 - x +4};



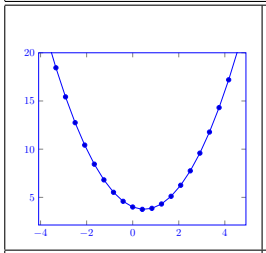
\begin{axis}[domain=-1:3]



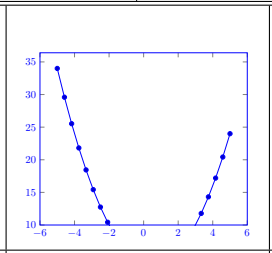
\begin{axis}[samples=5]



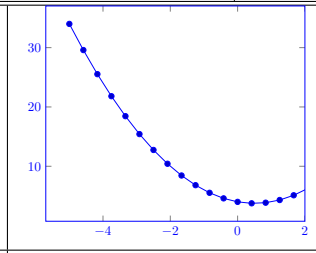
\begin{axis}[domain=-1:3,samples=5]



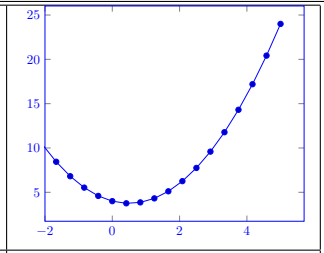
ymax=20



ymin=10

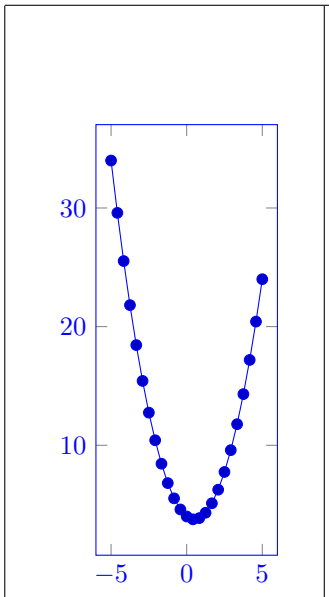


xmax=2

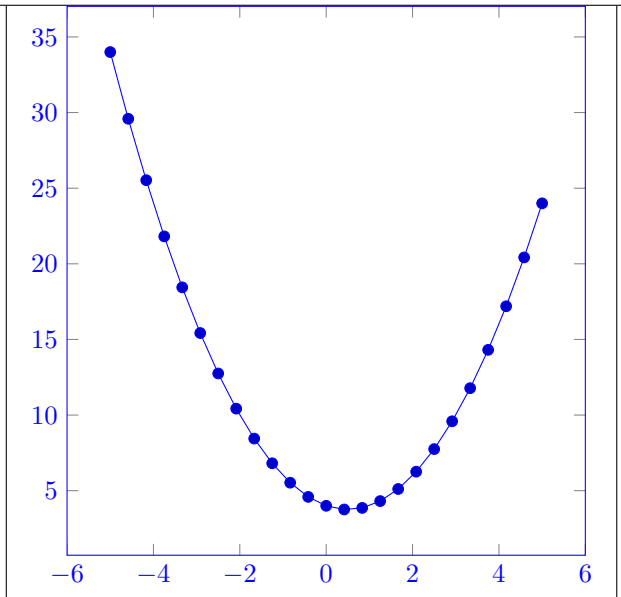


xmin=-2

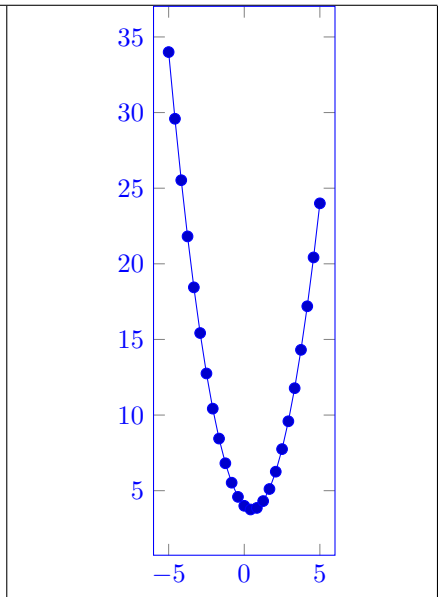
23.2.1 Xunit and Yunit



\begin{axis}[x=.2cm]

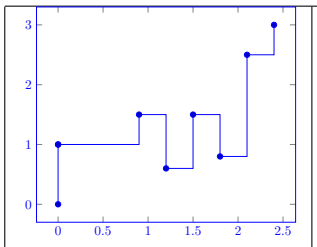


\begin{axis}[y=.2cm]

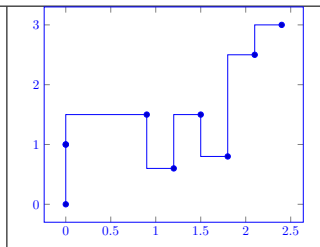


\begin{axis}[x=.2cm,y=.2cm]

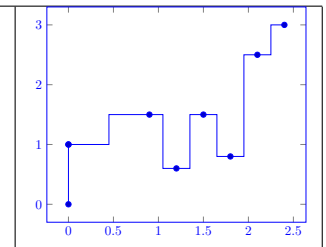
23.2.2 Graph type



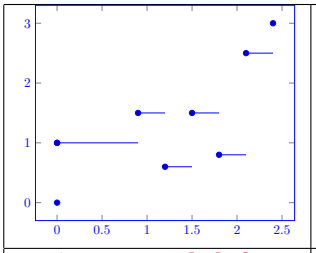
const plot



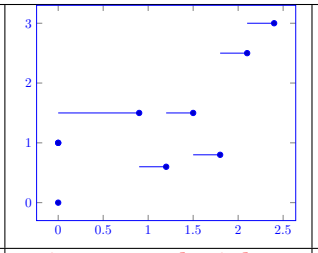
const plot mark right



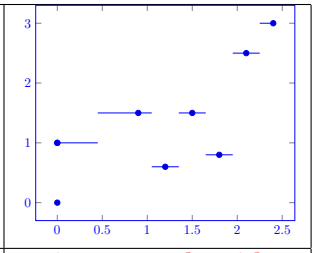
const plot mark mid



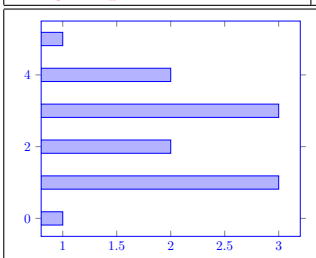
jump mark left



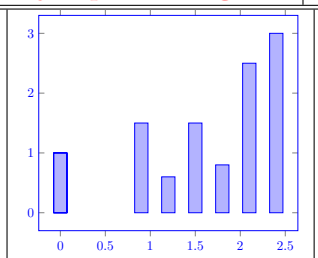
jump mark right



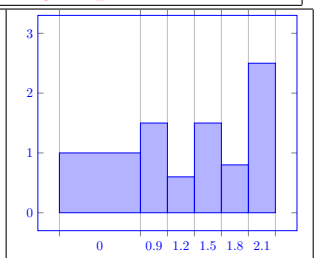
jump mark mid



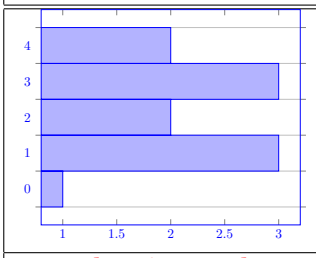
xbar



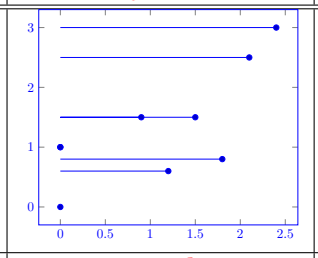
ybar



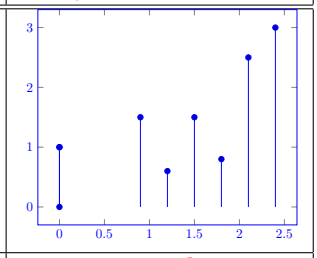
ybar interval



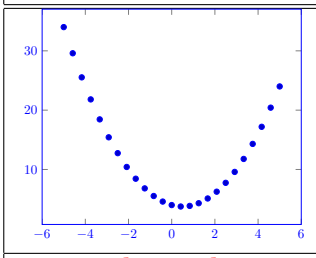
xbar interval



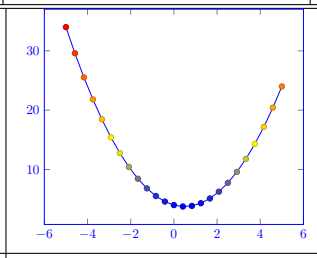
xcomb



ycomb



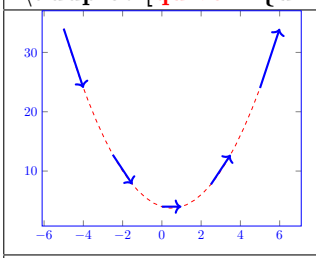
only marks

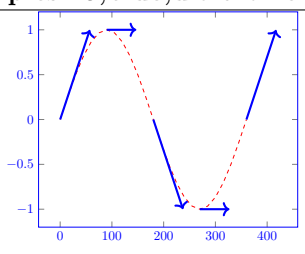


scatter

mesh

```
\addplot [quiver={u=1,v=2*x}],->,samples=5,blue,ultra thick] {x^2 - x +4};
```

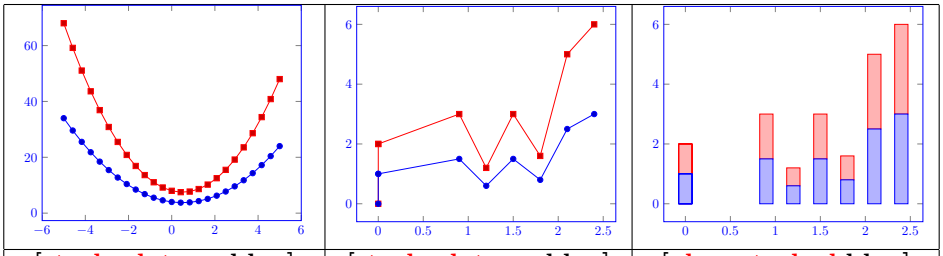




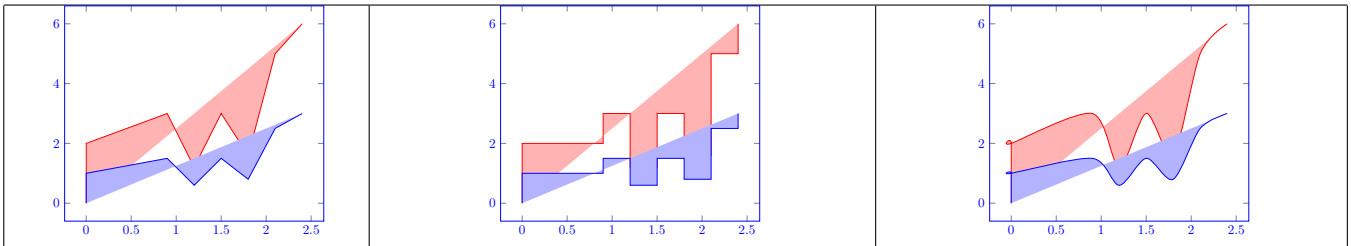
quiver=u=1,v=2*x

quiver={u=180/3.14,v=cos(x)}

By default: u=0 et v = 0

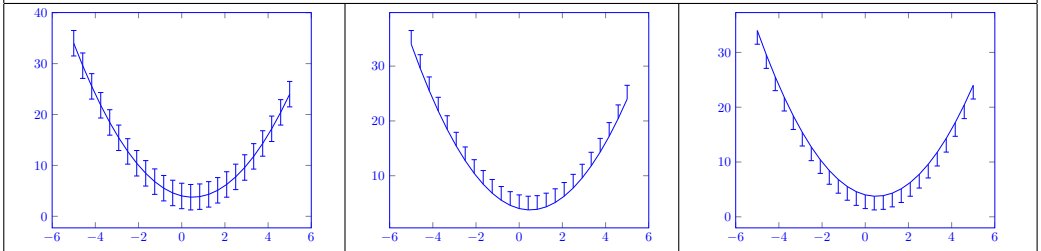


[stack plots=y,blue] | [stack plots=y,blue] | [ybar stacked,blue]



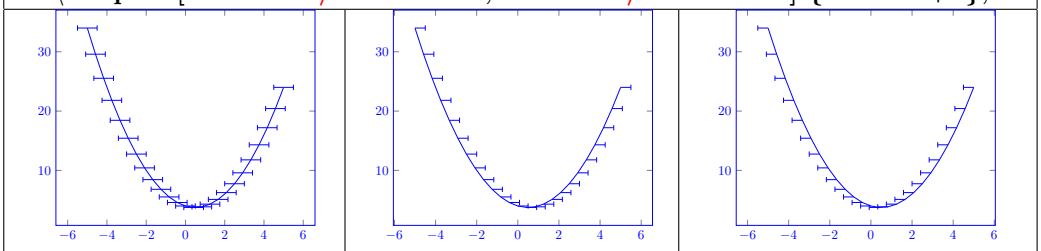
[stack plots=y,area style] | [const plot,stack plots=y,area style] | [stack plots=y,area style,smooth]

\addplot [error bars/y dir=both,error bars/y fixed =2.5] {x^2 - x +4};



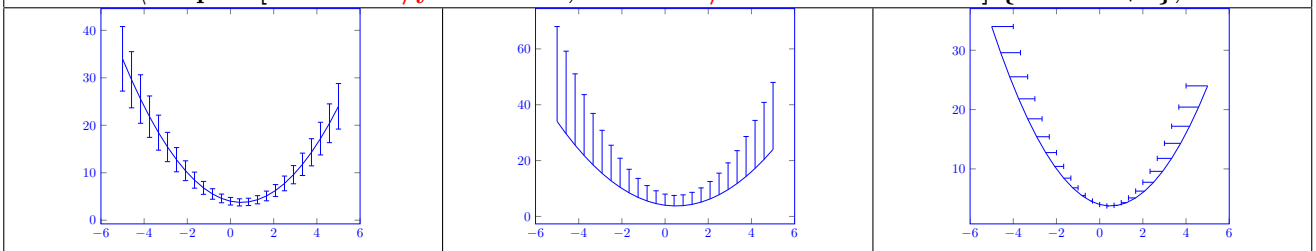
error bars/y dir =both | error bars/y dir =plus | error bars/y dir =minus

\addplot [error bars/x dir=both,error bars/x fixed =.5] {x^2 - x +4};



error bars/x dir =both | error bars/x dir =plus | error bars/x dir =minus

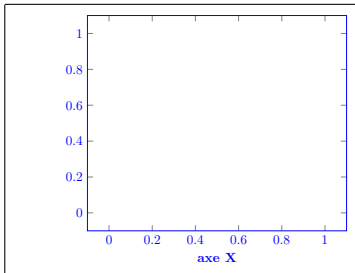
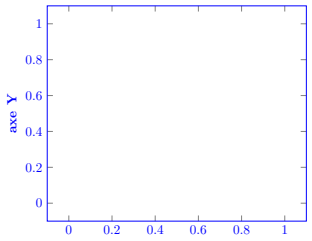
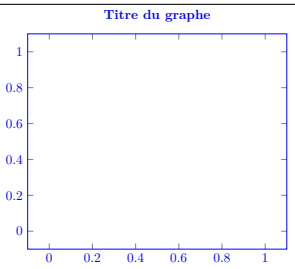
\addplot [error bars/y dir=both,error bars/x fixed relative =.2] {x^2 - x +4};



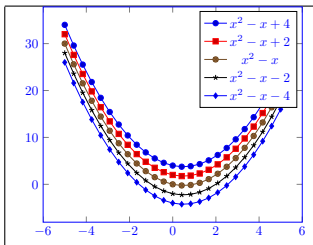
error bars/y fixed relative =.2 | error bars/y fixed relative =1 | error bars/x fixed relative =.2

23.3 Graph information

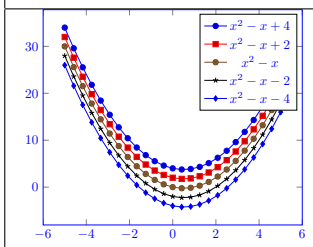
23.3.1 Titles

		
\begin{axis}[xlabel=axe X]	\begin{axis}[ylabel=axe Y]	\begin{axis}[title=Titre du graphe]

23.3.2 Legend

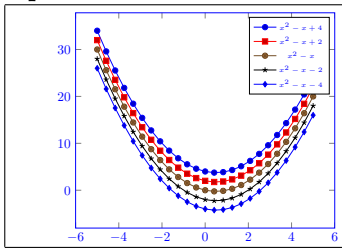
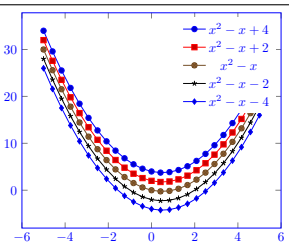
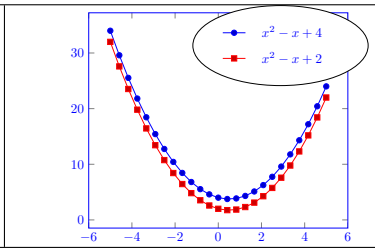


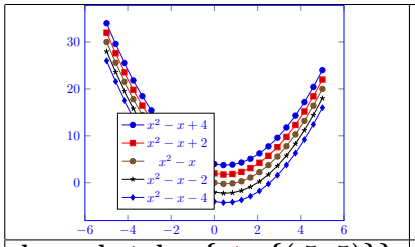
```
\begin{axis}
\addplot {x^2 - x +4};
\addplot {x^2 - x +2};
\addplot {x^2 - x };
\addplot {x^2 - x -2 };
\addplot {x^2 - x -4 };

\legend{$x^2 - x +4$,$x^2 - x +2$,$x^2 - x $,$x^2 - x -2 $,$x^2 - x -4 $}
\end{axis}
```



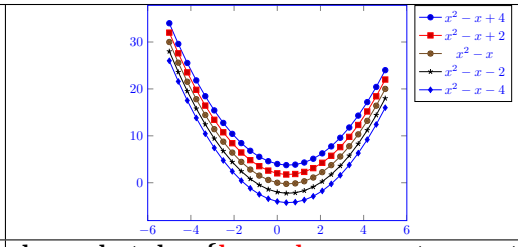
```
\begin{axis}[legend entries= {$ x^2 - x +4 $,$ x^2 - x +2 $,$ x^2 - x $,$ x^2 - x -2 $,$ x^2 - x -4 $} ]

\addplot {x^2 - x +4};
\addplot {x^2 - x +2};
\addplot {x^2 - x };
\addplot {x^2 - x -2 };
\addplot {x^2 - x -4 };
\end{axis}
```

Options

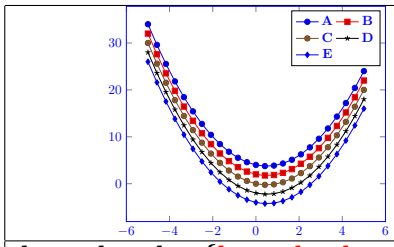
		
legend style={font=\tiny}	legend style={draw=none}	legend style={shape=ellipse}



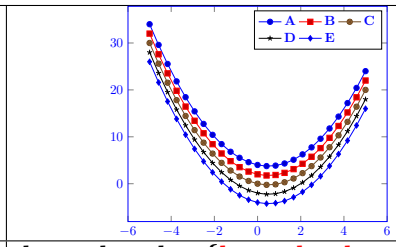
legend style={at={(.5,.5)}}



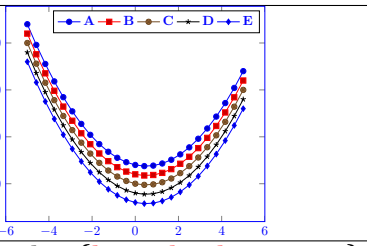
legend style={legend pos=outer north east}



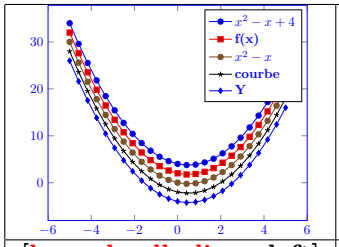
legend style={legend columns=2}



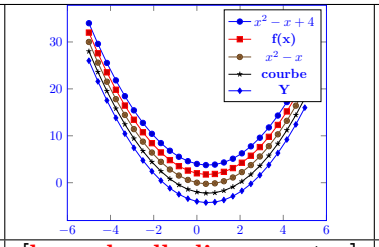
legend style={legend columns=3}



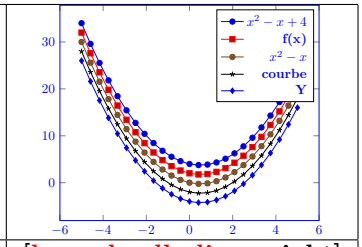
legend style={legend columns=-1}



[legend cell align=left]

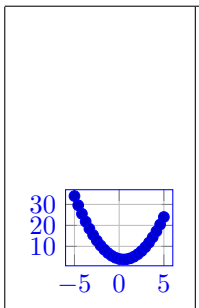


[legend cell align=center]

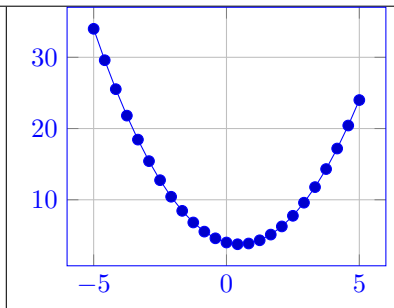


[legend cell align=right]

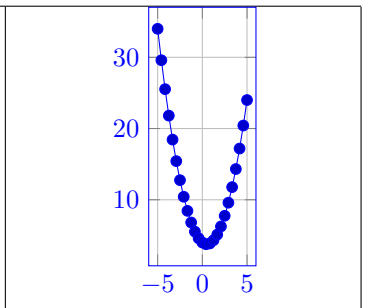
23.3.3 Size of the graph



width=3cm

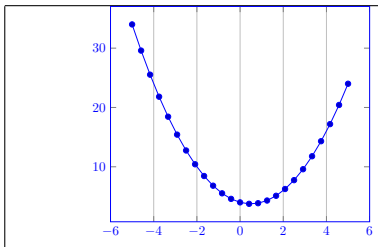


height=5cm

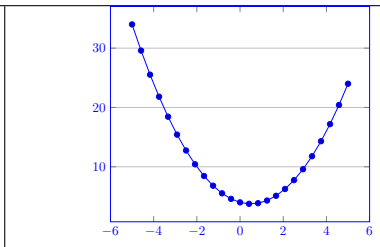


width=3cm,height=5cm

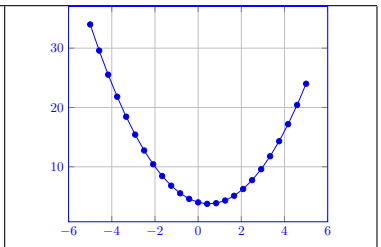
23.3.4 Grids



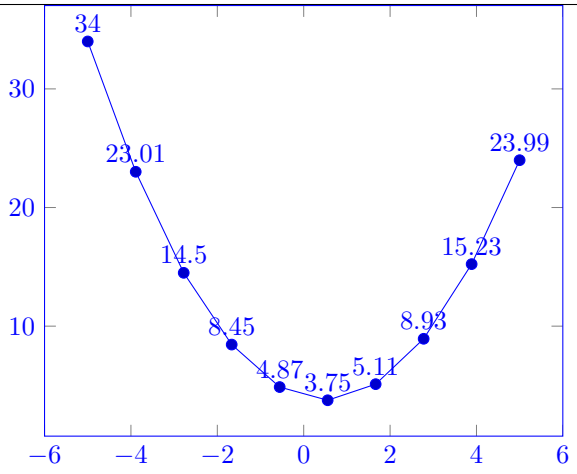
\begin{axis}[xmajorgrids=true]



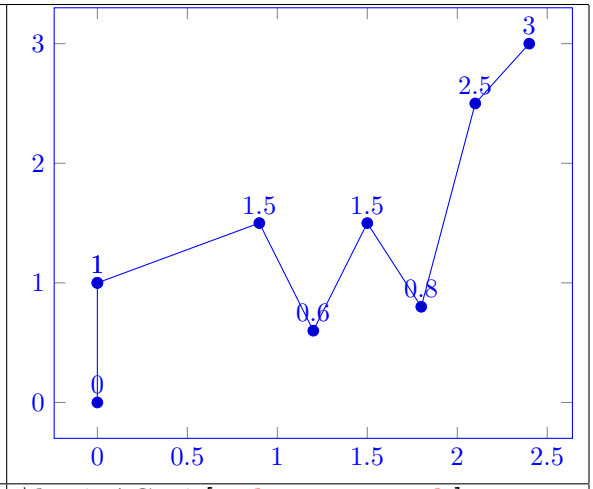
\begin{axis}[ymajorgrids=true]



\begin{axis}[grid=major]



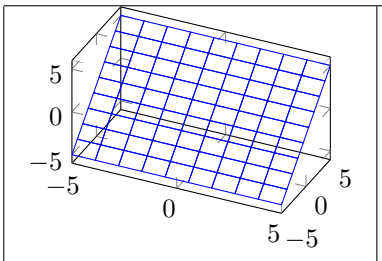

```
\beginACaxis[nodes near coords,samples=10]
\addplot {x^ 2- x +4};
```



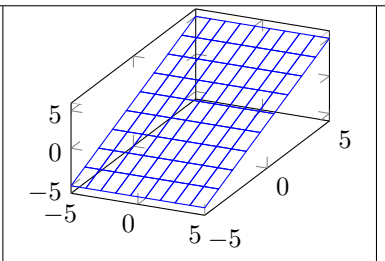

```
\beginACaxis[nodes near coords]
\addplot file table2.dat;
```

24 3D graph

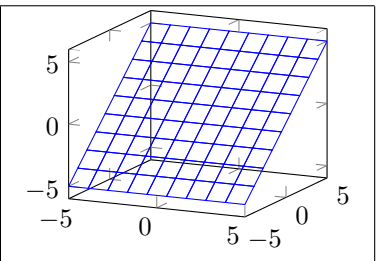
24.0.1 Axes



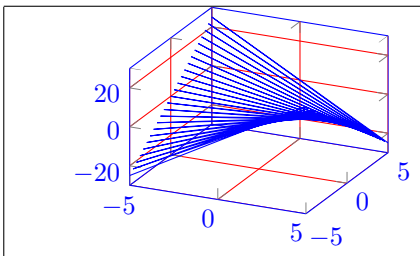
plot box ratio=2 1 1



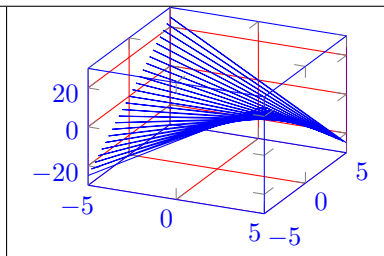
plot box ratio=1 2 1



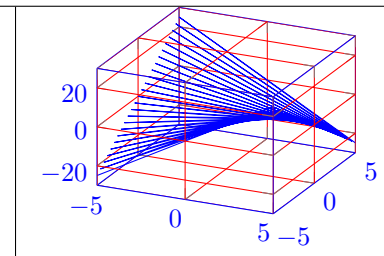
plot box ratio=1 1 2



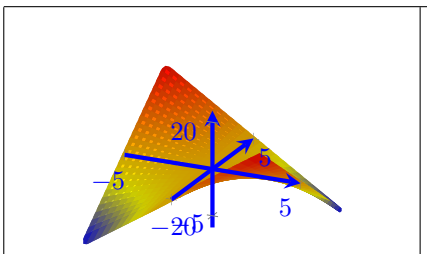
3d box=background (By default)



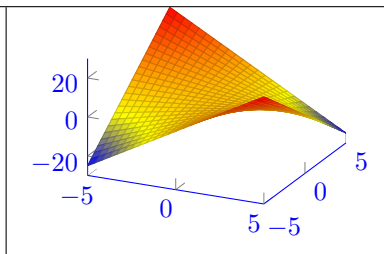
3d box=complete



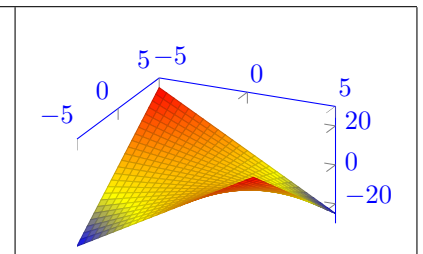
3d box=complete*



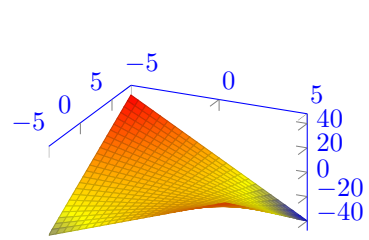
axis lines=center,axis on top

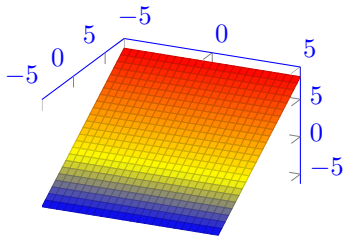


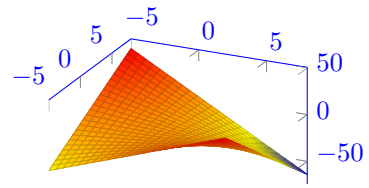
axis lines*=left

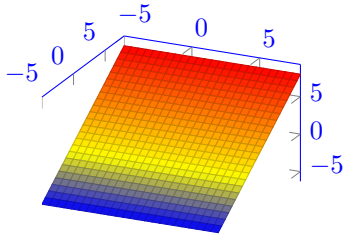


axis lines*=right

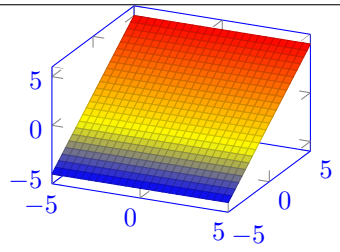
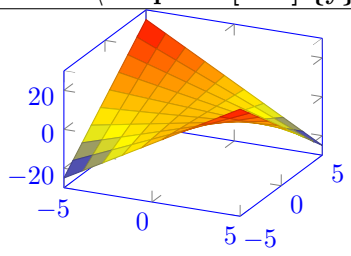


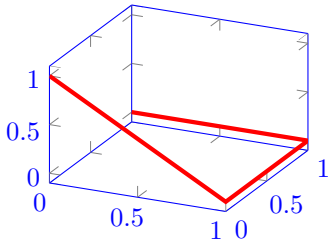
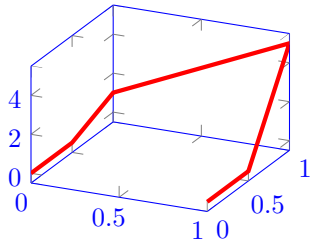
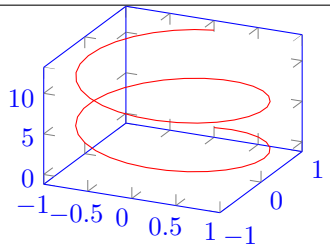






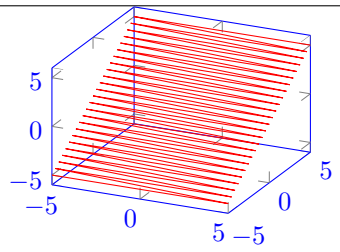
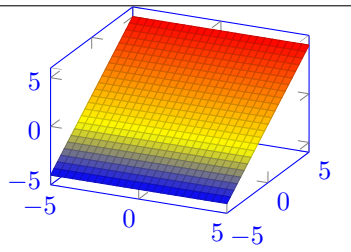
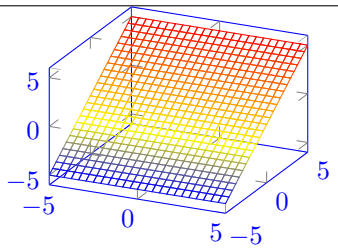
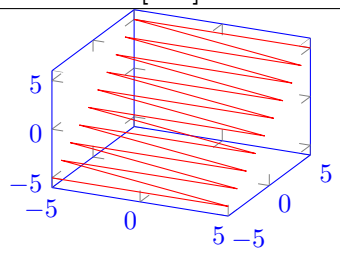
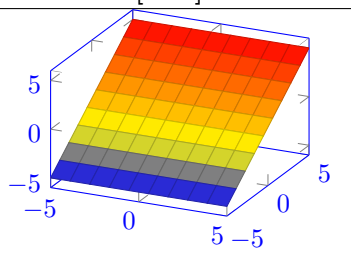
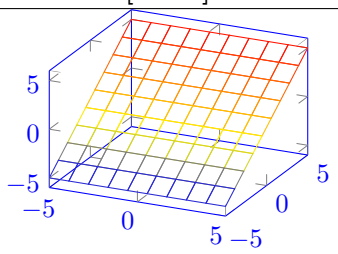
24.0.2 Graph drawing

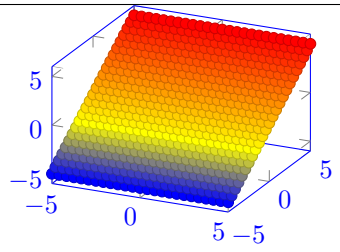
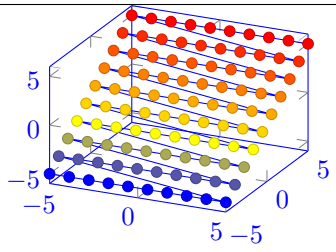
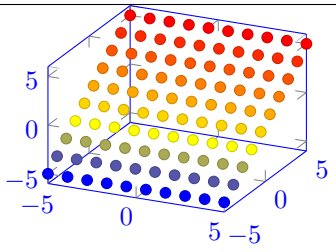
\addplot3 [surf] {y};		
		
{y}	{-x*y}	gnuplot[id=sinxy]{sin(x)*sin(y)};

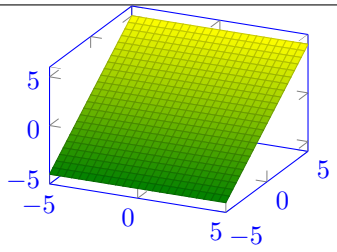
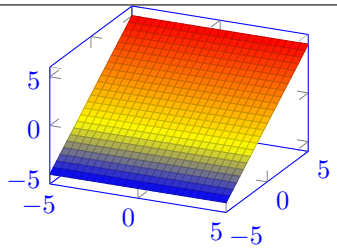
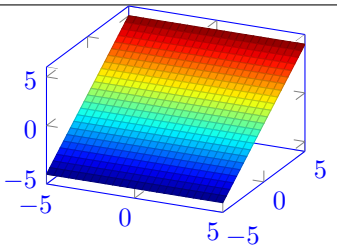
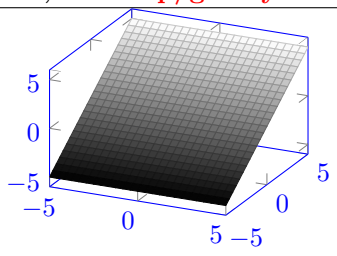
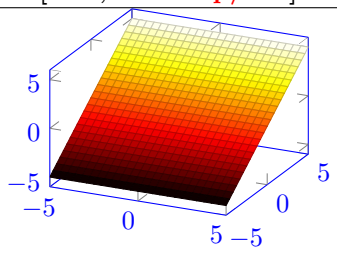
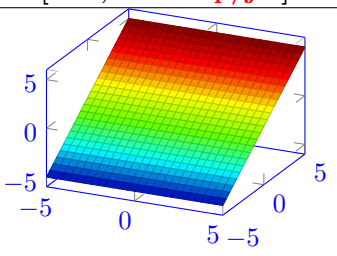
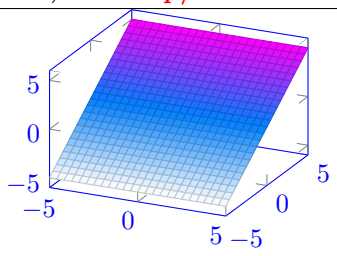
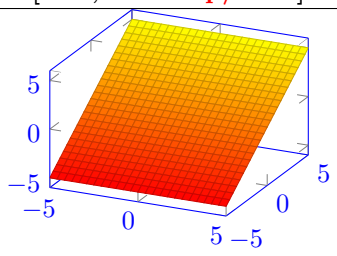
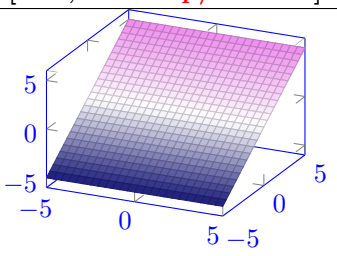
		
coordinates {(0,0,1) (1,0,0) (1,1,0) (0,1,0)};	file {table3.dat};	{sin(x)},{cos(x)},{x/60});

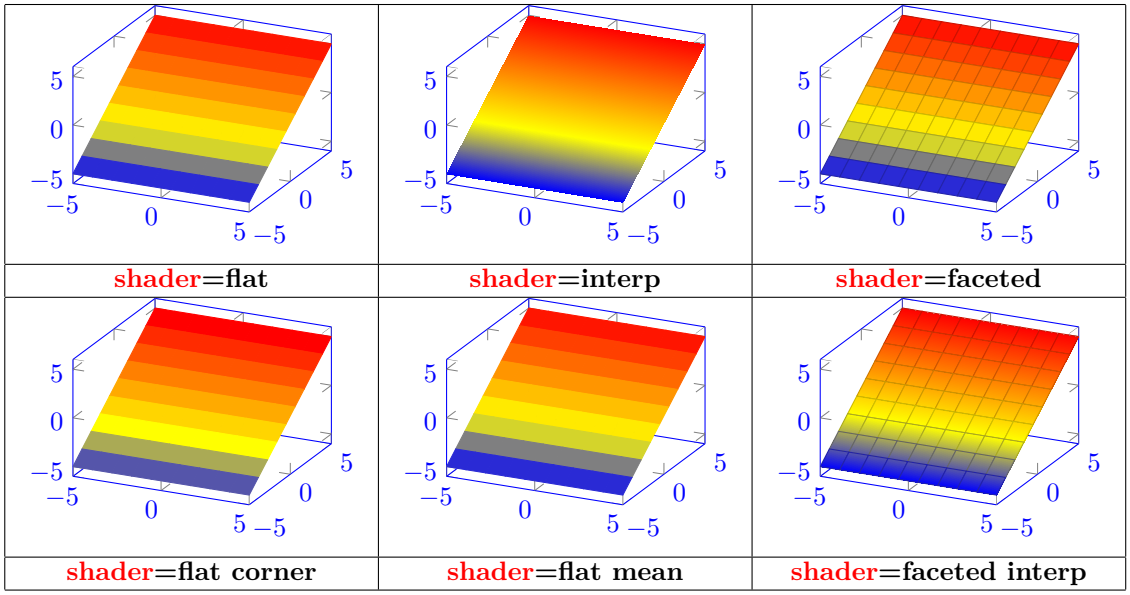
content of the file table3.dat		
0	0	0
0	0.5	0
0	1	1
1	1	5
1	0.5	0
1	0	0

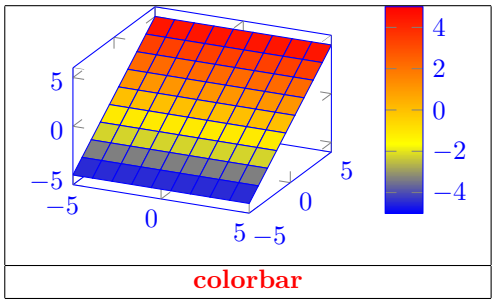
24.0.3 Aspect

		
[red]	[surf]	[mesh]
		
[red,samples=10]	[surf,samples=10]	[mesh,samples=10]

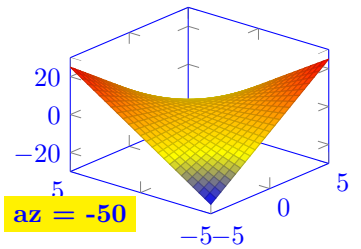
		
[scatter]	[scatter,samples=10]	[scatter,samples=10,only marks]

		
[surf,colormap/greenyellow]	[surf,colormap/hot]	[surf,colormap/jet]
		
[surf,colormap/blackwhite]	[surf,colormap/hot2]	[surf,colormap/bluered]
		
[surf,colormap/cool]	[surf,colormap/redyellow]	[surf,colormap/violet]



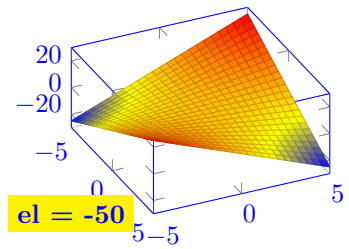


24.0.4 Viewpoint



Azimut

view/az= angle from - 50 to +50



Elevation

view/el= angle from - 50 to +50

25 Table of a function variation

Load package : \usepackage{tkz-tab} [3]

25.1 Creation of the table

1° ligne	a	b	c
2° ligne			

```
\begin{tikzpicture}
\tkzTabInit{1° ligne / 1 ,2° ligne /1 } { a , b, c }
\end{tikzpicture}
```

25.1.1 Options

Row width

1° ligne	a	b	c
2° ligne			
3° ligne			

```
\tikz \tkzTabInit{1° ligne '/1 , 2° ligne /.5 , 3° ligne /1.5 }{a , b , c };
```

First column width

x	a	b	c

```
\tkzTabInit[lgt=4]{ x / 1}{ a , b , c };
By default: lgt==2 cm
```

Space between two values

x	a	b	c

```
\tkzTabInit[espcl=1]{ x / 1}{ a , b , c };
By default: espcl=2 cm
```

Margin

x	a	b	c

```
\tkzTabInit[deltacl=1]{ x / 1}{ a , b , c };
By default: deltacl=0.5 cm
```

Line width

x	a	b	c

\tkzTabInit[dlw=2pt]{ x / 1}{ a , b , c };
By default: lw=0,4 pt

No cadre

x	a	b	c

\tkzTabInit[nocadre]{ x / 1}{ a , b , c };
By default: nocadre=false

Coloring

\tkzTabInit [color,colorT = yellow]{1°ligne/1 , 2°ligne/1}{ a , b }

1°ligne	a	b
2°ligne		

[color,colorT = yellow]

1°ligne	a	b
2°ligne		

[color,colorC = cyan]

1°ligne	a	b
2°ligne		

[color,colorL = green]

1°ligne	a	b
2°ligne		

[color,colorV = magenta]

By default: color = false colorT=colorC=colorL=colorV =white

25.2 Creation of a sign row

x	a	b	c
$f(x)$	2	4	

\tkzTabLine{ t, 2,t ,4 ,t }

x	a	b	c
$f(x)$	0	2	0	4	0

\tkzTabLine{ z, 2, z ,4 ,z }

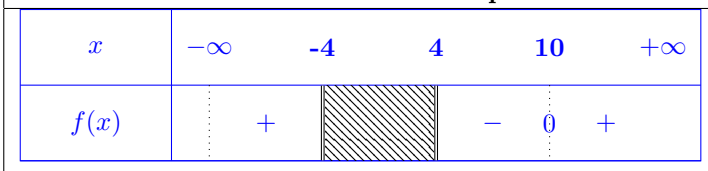
x	a	b	c
$f(x)$		2	4	

\tkzTabLine{ d, 2, d ,4 ,d }

x	a	b	c
$f(x)$	1	3	4	5

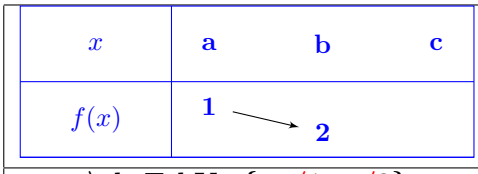
\tkzTabLine{ 1, h, 3 ,4 ,5 }

Example

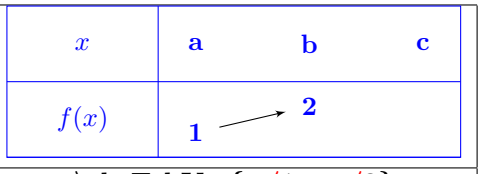



```
\begin{tikzpicture}
\tkzTabInit[espcl=1.5]{$x$ / 1 ,$f(x)$ /1 } { −∞ , -4, 4 , 10 , +∞ }
\tkzTabLine{ t,+, d ,h ,d,-,z,+ }
\end{tikzpicture}
```

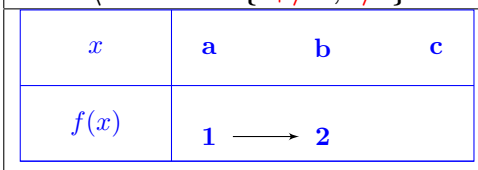
25.3 Creation of a variation row



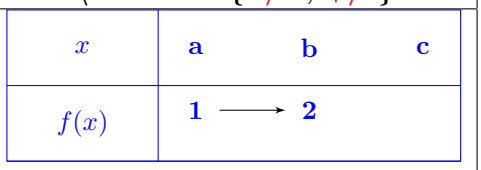

```
\tkzTabVar{ +/1 , -/2}
```



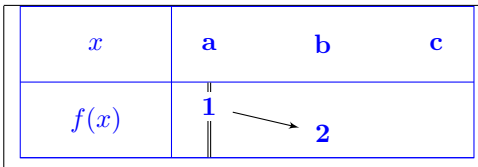

```
\tkzTabVar{ -/1 , +/2}
```



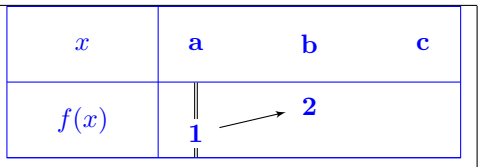

```
\tkzTabVar{-/1 , -/2}
```



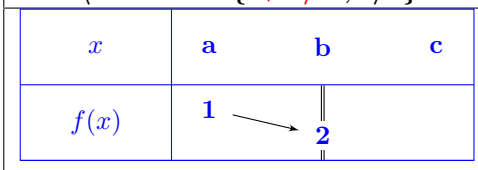

```
\tkzTabVar{ +/1 , +/2 }
```



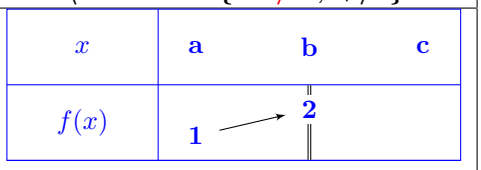

```
\tkzTabVar{ +C/1 , -/2}
```



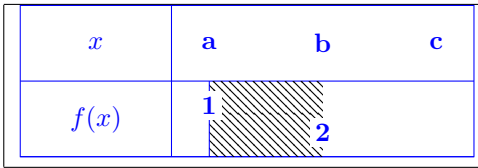

```
\tkzTabVar{ -C/1 , +/2}
```



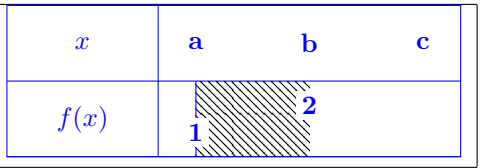

```
\tkzTabVar{-/1 , -C/2}
```



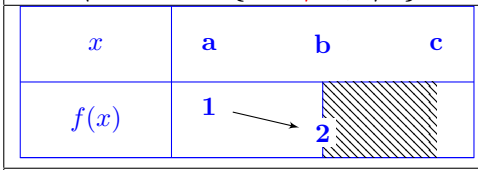

```
\tkzTabVar{ +/1 , +C/2 }
```



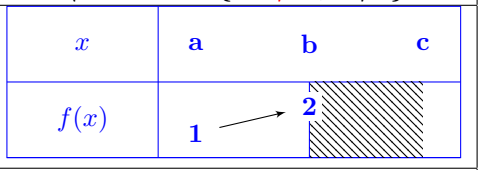

```
\tkzTabVar{ +H/1 , -/2}
```



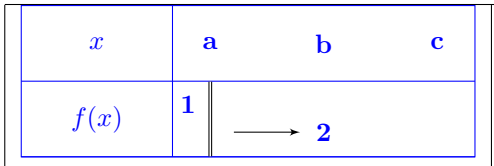

```
\tkzTabVar{ -H/1 , +/2}
```



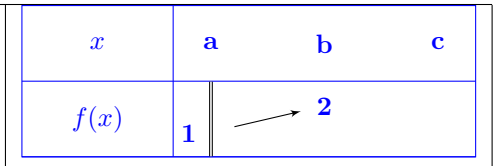

```
\tkzTabVar{-/1 , -H/2}
```



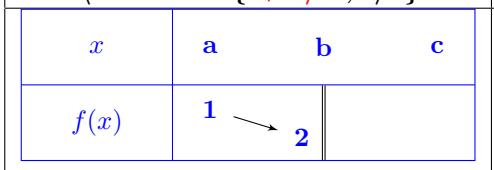

```
\tkzTabVar{ +/1 , +H/2 }
```



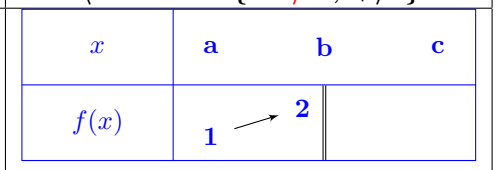
\tkzTabVar{ +D/1 , -/2}



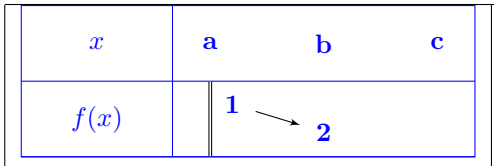
\tkzTabVar{ -D/1 , +/2}



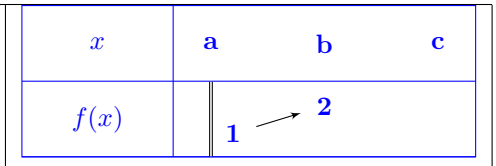
\tkzTabVar{-/1 , -D/2}



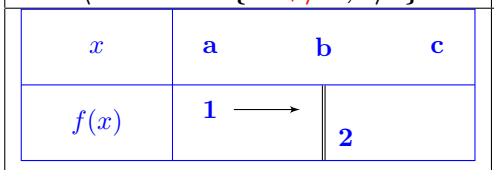
\tkzTabVar{ +/1 , +D/2 }



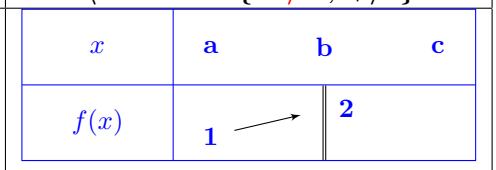
\tkzTabVar{ D+/1 , -/2}



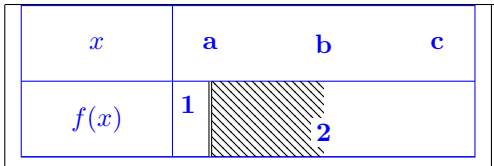
\tkzTabVar{D-/1 , +/2}



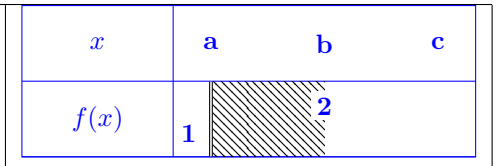
\tkzTabVar{-/1 , D-/2}



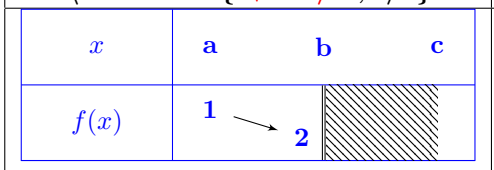
\tkzTabVar{ +/1 , D+/2 }



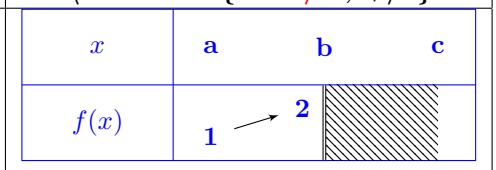
\tkzTabVar{ +DH/1 , -/2}



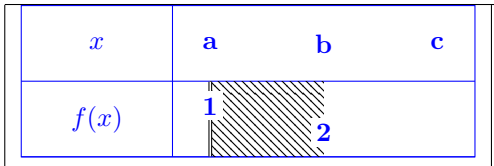
\tkzTabVar{ -DH/1 , +/2}



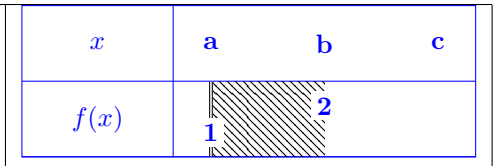
\tkzTabVar{-/1 , -DH/2}



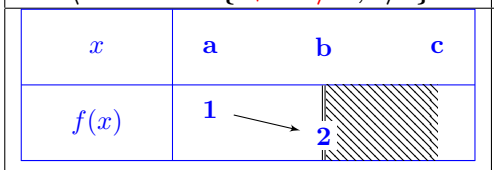
\tkzTabVar{ +DH/1 , +/2 }



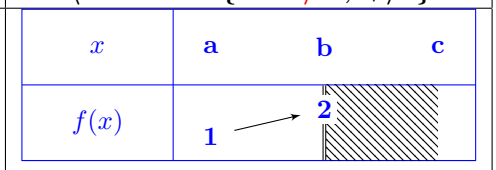
\tkzTabVar{ +CH/1 , -/2}



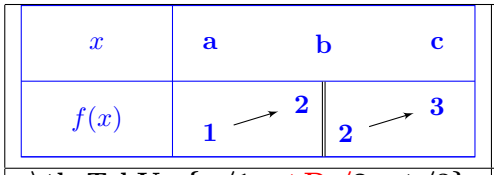
\tkzTabVar{ -CH/1 , +/2}



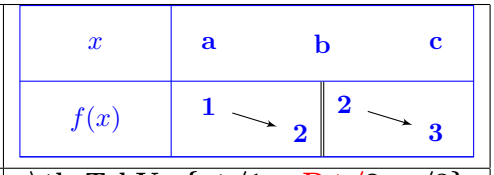
\tkzTabVar{-/1 , -CH/2}



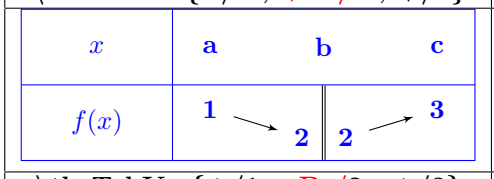
\tkzTabVar{ +/1 , +CH/2 }



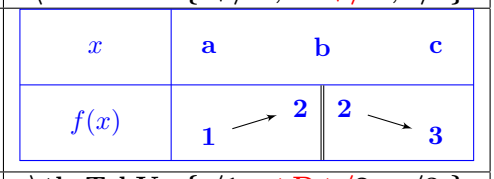
\tkzTabVar{ -/1 , +D-/2 , +/3}



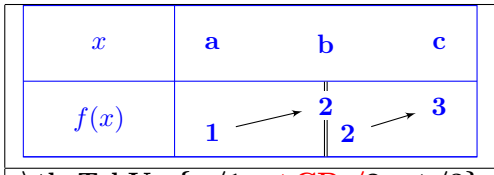
\tkzTabVar{ +/1 , -D+/2 , -/3}



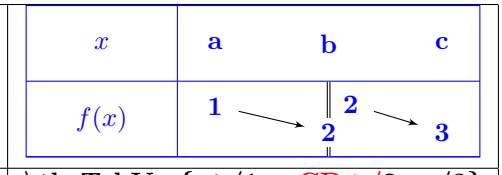
\tkzTabVar{+/1 , -D-/2 , +/3}



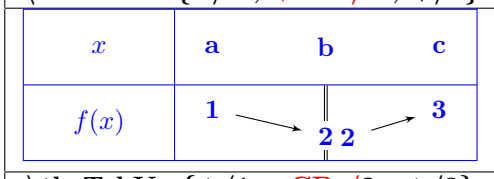
\tkzTabVar{-/1 , +D+/2 , -/3 }



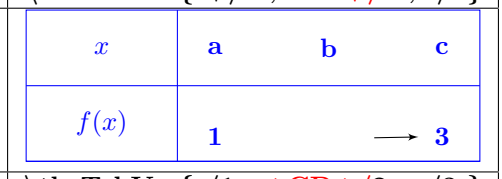
\tkzTabVar{ -/1 , +CD-/2 , +/3}



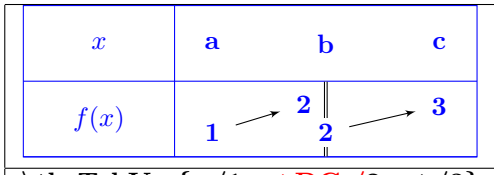
\tkzTabVar{ +/1 , -CD+/2 , -/3}



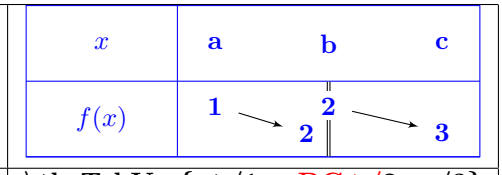
\tkzTabVar{+/1 , -CD-/2 , +/3}



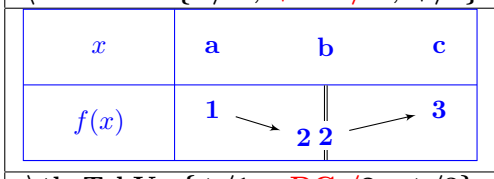
\tkzTabVar{-/1 , +CD+/2 , -/3 }



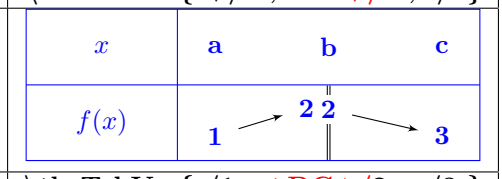
\tkzTabVar{ -/1 , +DC-/2 , +/3}



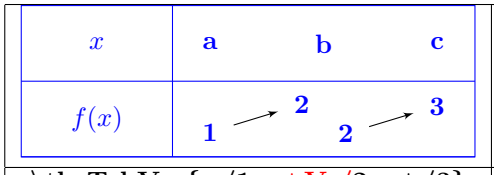
\tkzTabVar{ +/1 , -DC+/2 , -/3}



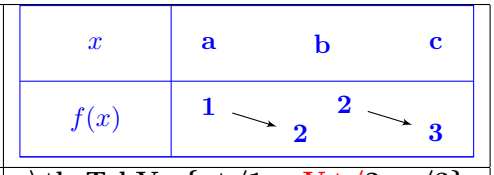
\tkzTabVar{+/1 , -DC-/2 , +/3}



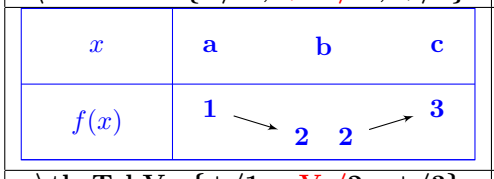
\tkzTabVar{-/1 , +DC+/2 , -/3 }



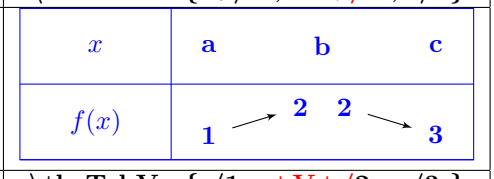
\tkzTabVar{ -/1 , +V-/2 , +/3}



\tkzTabVar{ +/1 , -V+/2 , -/3}

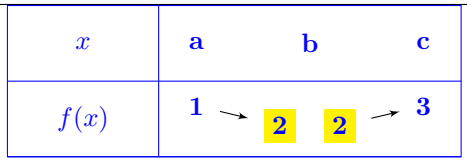


\tkzTabVar{+/1 , -V-/2 , +/3}



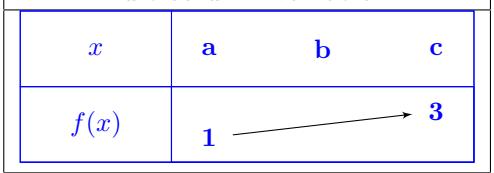
\tkzTabVar{-/1 , +V+/2 , -/3 }

Emphasizing a value



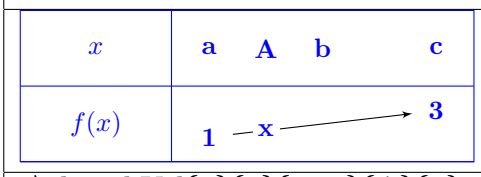
\tkzTabVar{+/1 , -V-/\colorbox{yellow}{2} , +/3}

Multicolumn variation

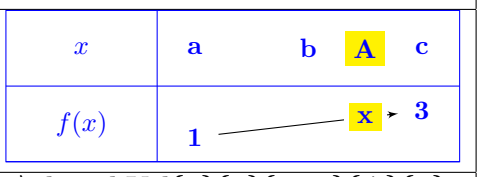


\tkzTabVar{-/1 , R/ , +/3}

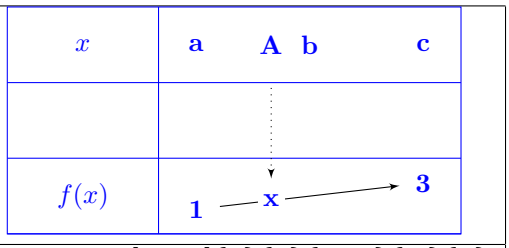
Intermediate values



\tkzTabVal{1}{3}{0.25}{A}{x}

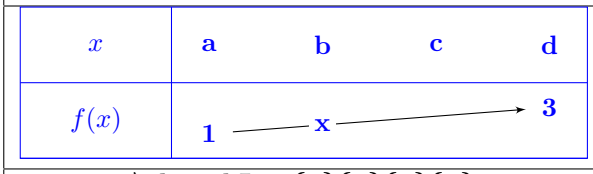


\tkzTabVal{1}{3}{0.75}{A}{x}

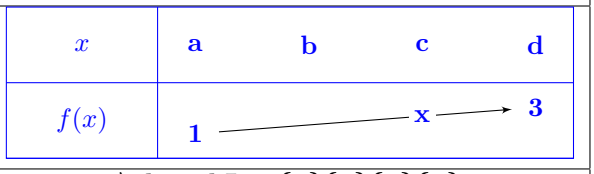


\tkzTabVal[draw]{1}{3}{0.25}{A}{x}

Picture insertion



\tkzTabIma{1}{4}{2}{x}

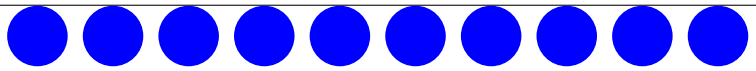


\tkzTabIma{1}{4}{3}{x}

26 Repetitions

Package used : "pgffor" (automatically loaded with TikZ)

26.1 One variable repetition

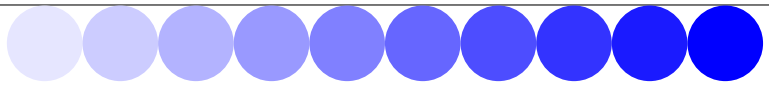


```
\tikz \foreach \x in {1,...,10} \fill[blue](\x,0) circle (0.4cm);
```

Variable \x : position en X

26.2 Two variables repetition

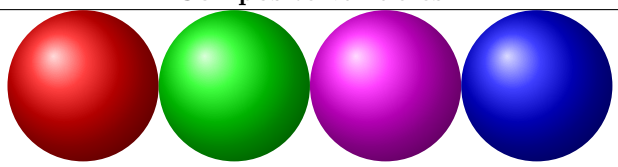
Numerical variables



```
\tikz \foreach \pos/\y in {1/10,2/20,3/30,4/40,5/50,6/60,7/70,8/80,9/90,10/100}
    \fill[color=blue!\y](\pos,0) circle (0.5cm);
```

Variable \pos : position en X Variable \y : couleur

Composite variables



```
\tikz \foreach \x/\col in 1/red,3/green,5/magenta,7/blue \shade[ball color=\col](\x,0) circle (1);
```

Variable \x : position en X Variable \col : couleur

Variables with a step

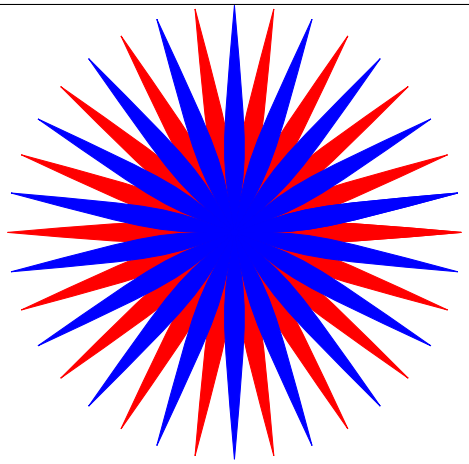
1,3	2,3	3,3	4,3	7,3	8,3	9,3	10,3
1,2	2,2	3,2	4,2	7,2	8,2	9,2	10,2
1,1	2,1	3,1	4,1	7,1	8,1	9,1	10,1

```
\begin{tikzpicture}
\foreach \x in{1,2,...,4,7,8,...,10}
\foreach \y in {1,...,3}
{ \draw (\x,\y) +(-.5,-.5) rectangle ++(.5,.5); \draw (\x,\y)
node\x,\y; }
\end{tikzpicture}
```

Variable \x : position en X Variable \y : position en Y

List example	
1, 2, 3, 4, 5, 6,	\foreach \x in {1,...,6} {\x, }
1, 3, 5, 7, 9, 11,	\foreach \x in {1,3,...,11} {\x, }
Z, X, V, T, R, P, N,	\foreach \x in {Z,X,...,M} {\x, }
2^1, 2^2, 2^3, 2^4, 2^5, 2^6, 2^7,	\foreach \x in {2^1,2^...,2^7} {\x, }
$0cm$, $0.5cm$, $1cm$, $1.5cm$, $2cm$, $2.5cm$, $3cm$,	\foreach \x in {0cm,0.5cm,...cm,3cm} {\x, }
A_1, B_1, C_1, D_1, E_1, F_1, G_1, H_1,	\foreach \x in {A_1,..._1,H_1} {\x, }

Calculation on variables

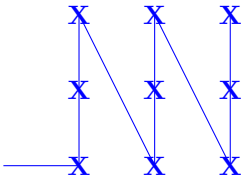


```
\begin{tikzpicture}
\foreach \x in 0,20,...,360{ \filldraw[red] (0,0) .. controls (\x+10:1)
.. (\x:1) .. controls (\x-10:1) .. (0,0);}
\foreach \x in 10,30,...,370{ \filldraw[blue] (0,0) .. controls (\x+10:3)
.. (\x:3) .. controls (\x-10:3) .. (0,0);}
\end{tikzpicture}
```

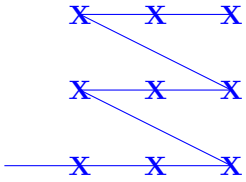
Variable \x : angle

26.3 Nested loops

Order of the nested loops



```
\begin{tikzpicture}
\draw (0,0)
\foreach \x in {1,2,3}
\foreach \y in {0,1,2}
{– (\x,\y) node{X}};
\end{tikzpicture}
```



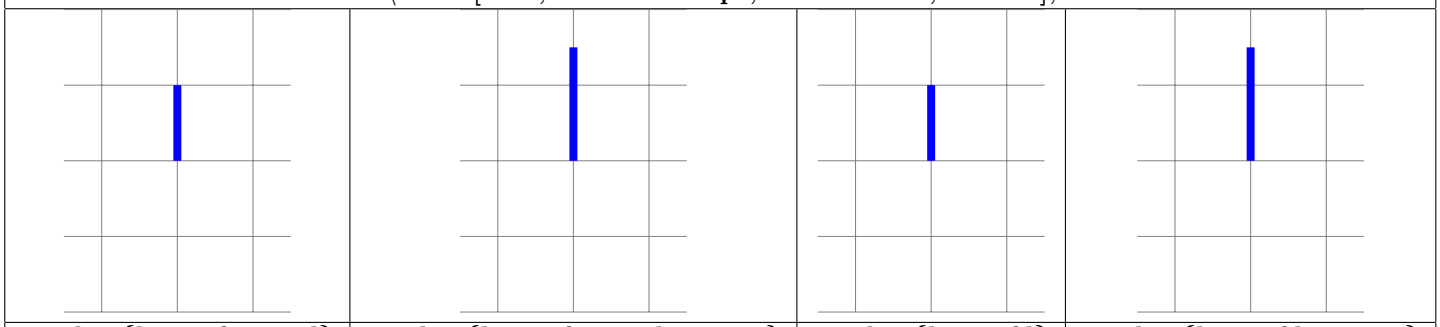
```
\begin{tikzpicture}
\draw (0,0)
\foreach \y in {0,1,2}
\foreach \x in {1,2,3}
{– (\x,\y) node{X}};
\end{tikzpicture}
```

27 turtle graphics

Load package : \usetikzlibrary{turtle}

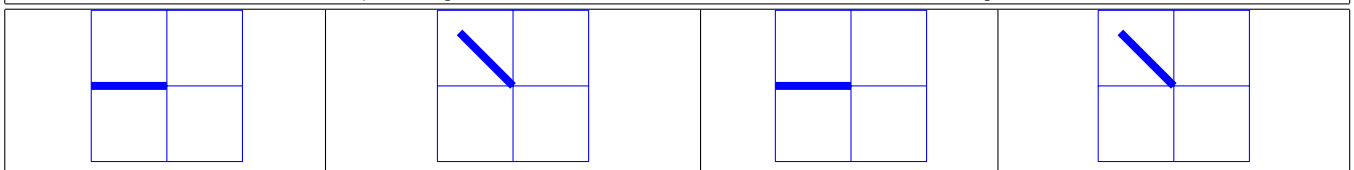
PGFmanual section : 73

\draw [blue,line width=3pt,turtle=home,forward];



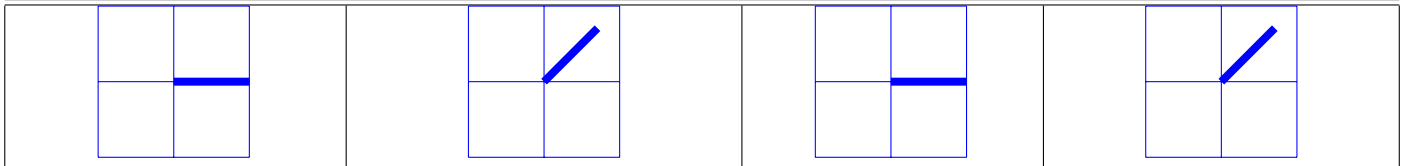
turtle={home,forward} | turtle={home,forward=1.5cm} | turtle={home,fd} | turtle={home,fd=1.5cm}

\draw [blue,line width=3pt,turtle=home,left,fd];



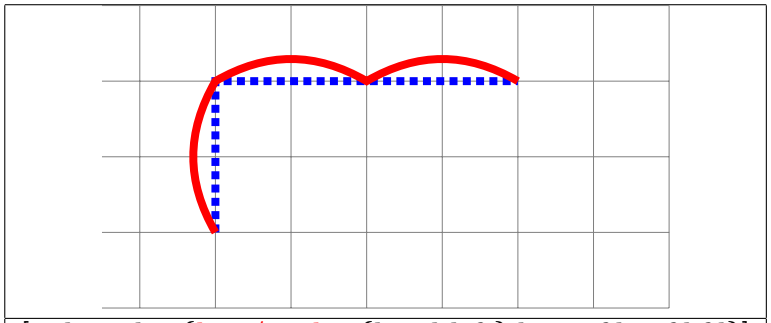
turtle={home,left,fd} | turtle={home,left=45,fd} | turtle={home,lt,fd} | turtle={home,lt=45,fd}

\draw [blue,line width=3pt,turtle=home,right,fd];

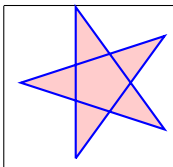


turtle={home,right,fd} | turtle={home,right=45,fd} | turtle={home,rt,fd} | turtle={home,rt=45,fd}

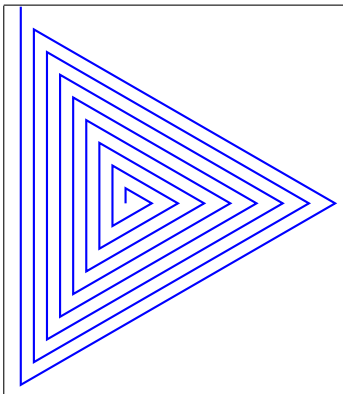
[->,turtle=home,rt,fd,fd,lt,fd,lt,fd] | [->,turtle/distance=2cm,turtle=home,rt,fd,fd,lt,fd,lt,fd]



[red,turtle={how/.style={bend left},home,fd,rt,fd,fd}]



```
\filldraw[turtle/distance=2cm,thick,blue,fill=red!20]
[ turtle=home ]
\foreach \i in {1,...,5}
[ turtle={forward,right=144} ] ;
```

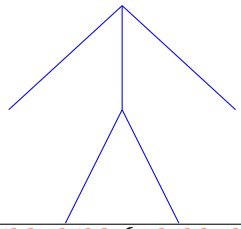


```
\draw[thick,blue]
[ turtle=home ]
\foreach \i in {1,...,25}
[turtle={forward=\i/5,right=120} ] ;
```

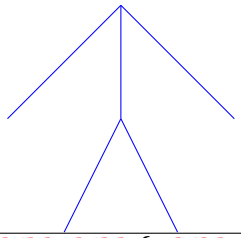
28 Tree diagram

PGFmanual section : 21

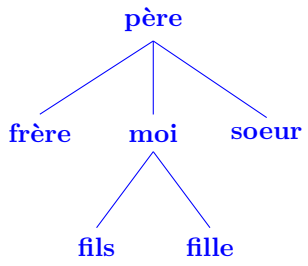
28.1 Structure



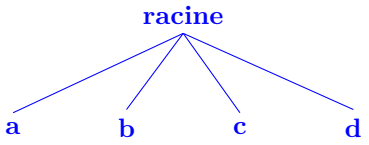
```
\node {} child child { child child } child ;
```



```
\coordinate child child { child child } child ;
```

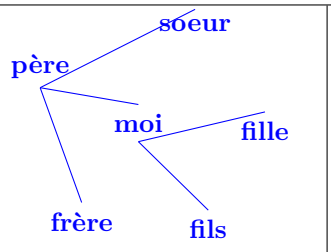



```
\begin{tikzpicture}
\node {père}
child {node {frère}}
child {node {moi}
child {node {fils}}
child {node {fille}}}
child {node{soeur}};
\end{tikzpicture}
```

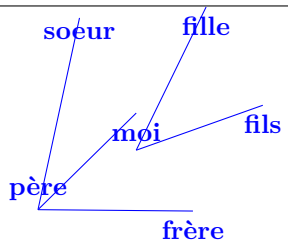



```
\node {racine} child foreach \name in {a,b,c,d} {node {\name}};
```

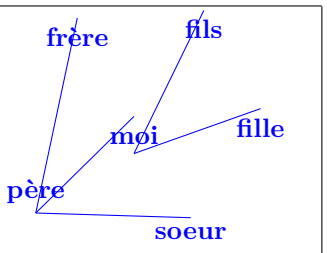
28.2 Orientation



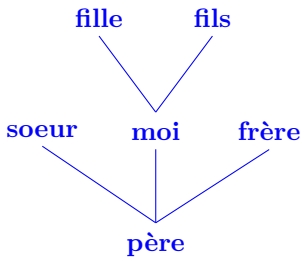

```
\node {père}[grow=-30]
```



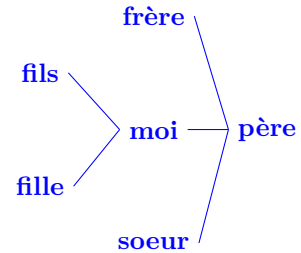

```
\node {père}[grow=30]
```



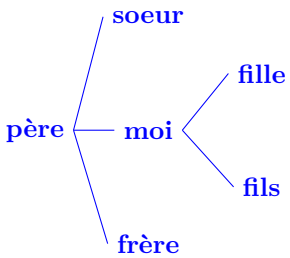

```
\node {père}[grow'=30]
```



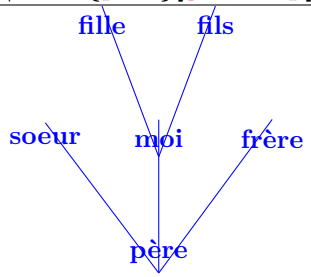
\node {père}[grow=up]



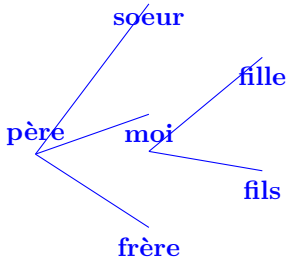
\node {père}[grow=left]



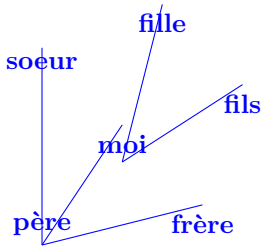
\node {père}[grow=right]



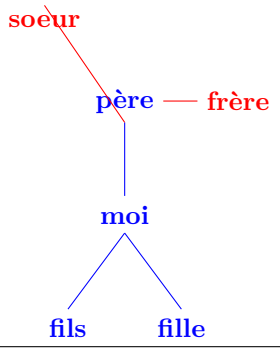
\node {père}[grow=north]



\node {père}[grow=east]



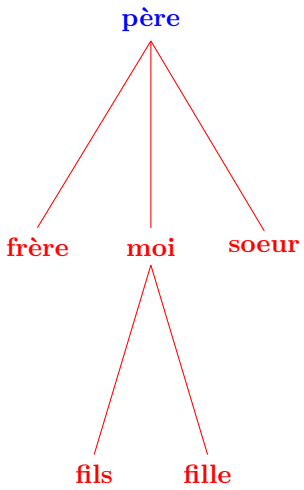
\node {père}[grow=north east]



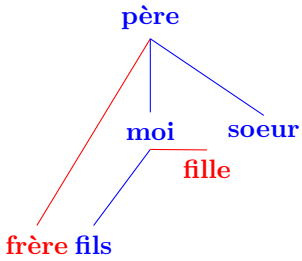

```
\node {père}
child[grow=right,red] {node {frère}}
child {node {moi}
child {node {fils}}
child {node {fille}}}
child[grow=north west,red] {node{soeur}};
```

28.3 Distance

28.4 Parent-child distance

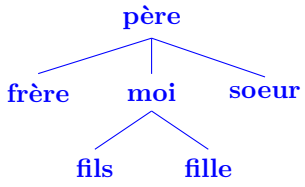
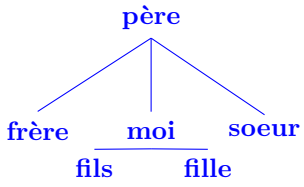


\node {père}[level distance=3cm,red]

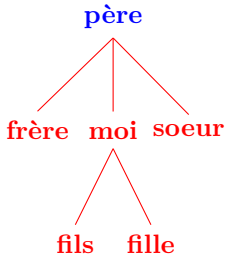
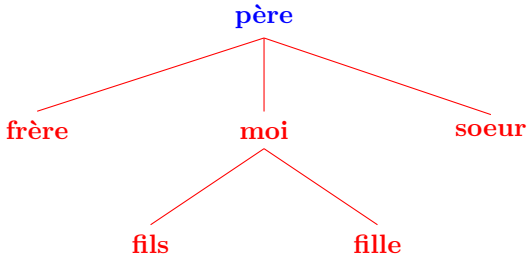


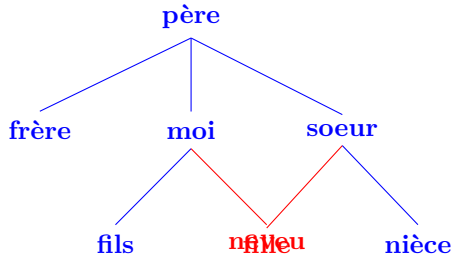
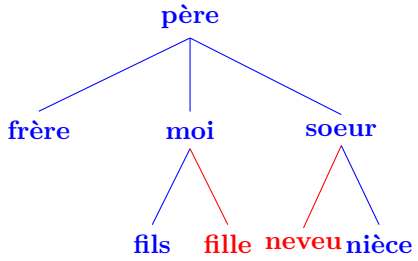
child[level distance=3cm,red] {node {frère}}
child[level distance=.5cm,red] {node {fille}}

By default : level distance=15 mm

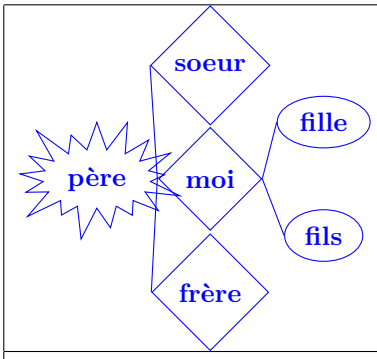
	
\node {père}[level 1/.style={level distance=1cm}]	\node {père}[level 2/.style={level distance=.5cm}]

28.5 Two children distance

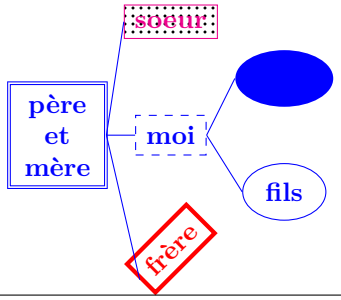
	
\node {père}[sibling distance=1cm,red]	\node {père}[sibling distance=3cm,red]
By default : sibling distance=15 mm	

Problem	solution
	
[sibling distance=2cm]	[level 1/.style=sibling distance=2cm, level 2/.style=sibling distance=1cm]

28.6 Nodes customization

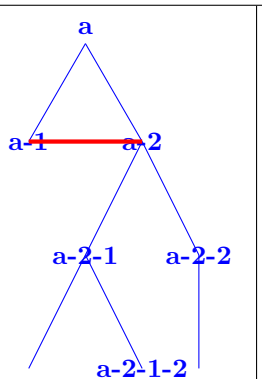



```
\node[starburst [1] ,draw] {père}[grow=right]

child {node[diamond,draw] frère}
child {node[diamond,draw] moi
child {node[ellipse,draw] fils}
child {node[ellipse,draw] fille}}
child {node[diamond,draw] soeur};
```



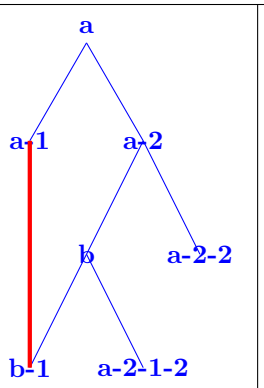

```
\node[rectangle,double,draw,text width=1cm,text centered]
{père}[grow=right,level distance=2cm]

child {node[red,ultra thick,draw,rotate=45] {frère}}
child {node[blue,dashed, draw] {moi}
child {node[ellipse,draw] {fils}}
child {node [ellipse,fill] {fille}}}
child {node [magenta,pattern=dots,draw] {soeur}};
```

28.6.1 Nodes name

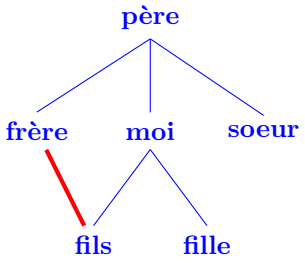



```
\node (a) {a}
child
child {
child {child child}
child {child }
};
\node at (a-1) {a-1};
\node at (a-2) {a-2};
\node at (a-2-2) {a-2-2};
\node at (a-2-1) {a-2-1};
\node at (a-2-1-2) {a-2-1-2};

\draw[red,ultra thick] (a-1) -- (a-2);
```

[1] Other types of nodes see section 17

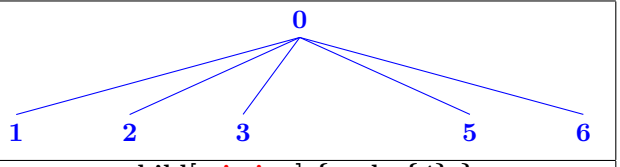



```
\node (a) {a}
child
child
child coordinate (b) child child
child
;
\node at (a-1) {a-1};
\node at (a-2) {a-2};
\node at (b) {b};
\node at (a-2-2) {a-2-2};
\node at (b-1) {b-1};
\node at (a-2-1-2) {a-2-1-2};

\draw[red,ultra thick] (a-1) -- (b-1);
```



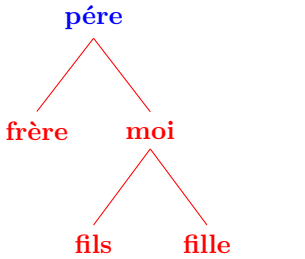

```
\node (a) {père}
child {node (b) {frère}}
child {node (c) {moi}
child {node (d) {fils}}
child {node (e) {fille}}}
child {node (f) {soeur}};

\draw[red,„ultra thick] (b) -- (d);
```

28.6.2 Missing a node

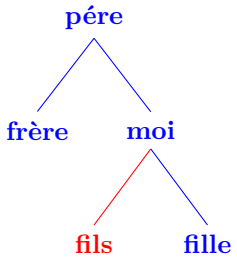



```
child[missing] {node {4} }
```

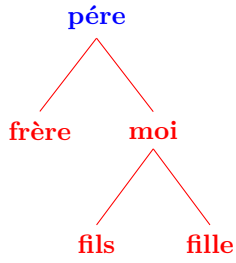
28.6.3 Attachment point modification



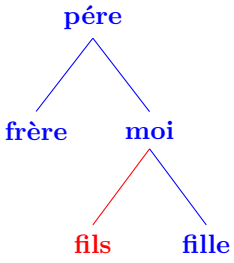

```
\node {pére} [child anchor=east,red]
child {node {frère}}
child { node {moi}
child {node {fils}}
child {node {fils}} };
```




```
\node {pére}
child {node {frère}}
child { node {moi}
child [child anchor=west,red] {node {fils}}
child {node {fils}} };
```

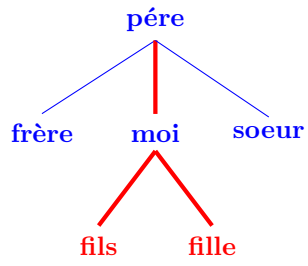



```
\node {père} [parent anchor=east,red]
child {node {frère}}
child { node {moi}
child {node {fils}}
child {node {fils}} };
```

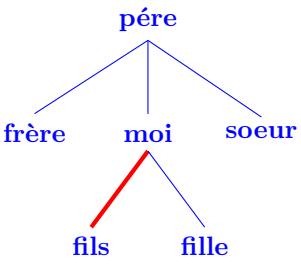



```
\node {père}
child {node {frère}}
child { node {moi}
child [parent anchor=west,red] {node {fils}}
child {node {fils}} };
```

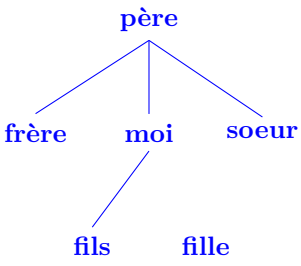
28.6.4 Links



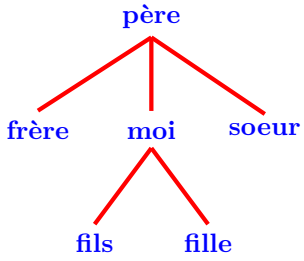

```
child {node {moi}
edge from parent[red,ultra thick]
```




```
child {node {fils}
edge from parent[red,ultra thick] }
```



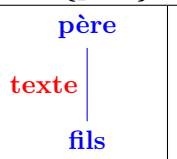

```
child { node {fille}
edge from parent[draw=none] }
```



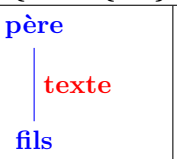

```
[edge from parent/.style={draw,red,ultra thick}]
\node {père}
```

28.6.5 Labels on link

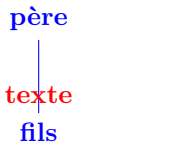
```
\node {père} child {node {fils} edge from parent node[left,red] {texte}};
```



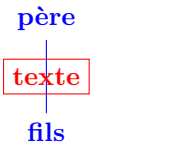
node[left,red]



node[right,red]



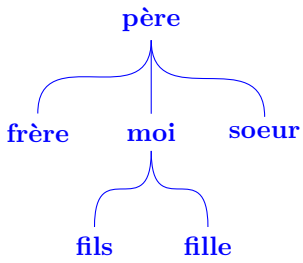
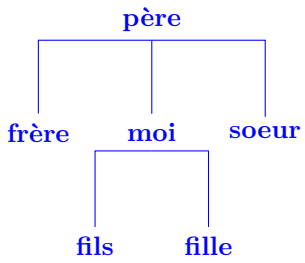
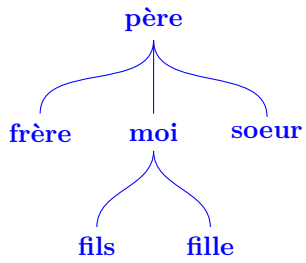
node[near end,red]



node[draw,red]

28.6.6 Links customization

[edge from parent path= {(\tikzparentnode.south) .. controls +(0,-1) and +(0,1) .. (\tikzchildnode.north)}]

		
.. controls +(0,-1) and +(0,1) ..	-|	to[in=90,out=-90]

see links available : section 7.6

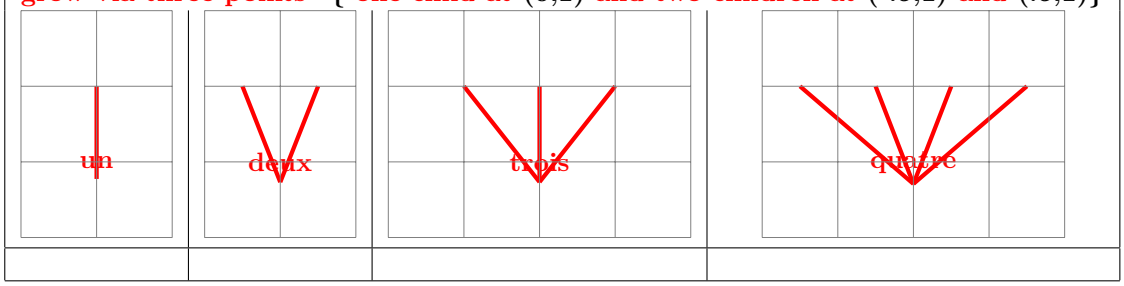
28.7 More options with « library trees »

Load package : \usetikzlibrary{trees}

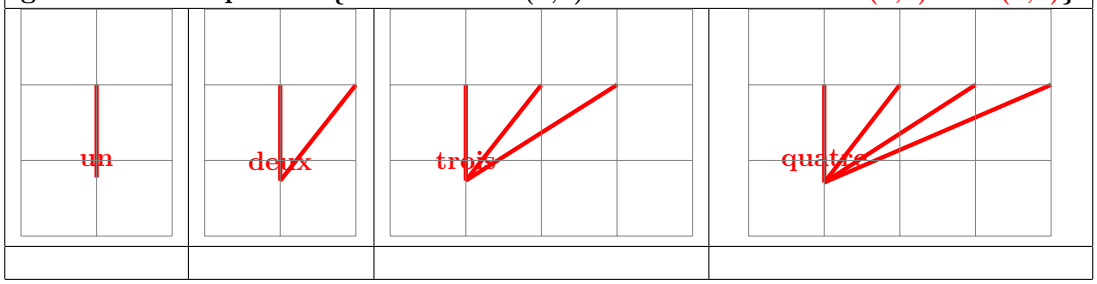
PGFmanual section : 72

28.7.1 One child and two childrenn position

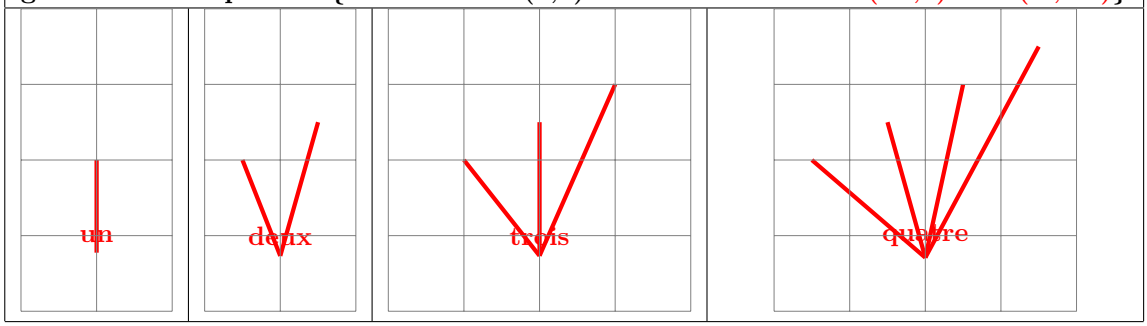
grow via three points={ one child at (0,1) and two children at (-.5,1) and (.5,1)}



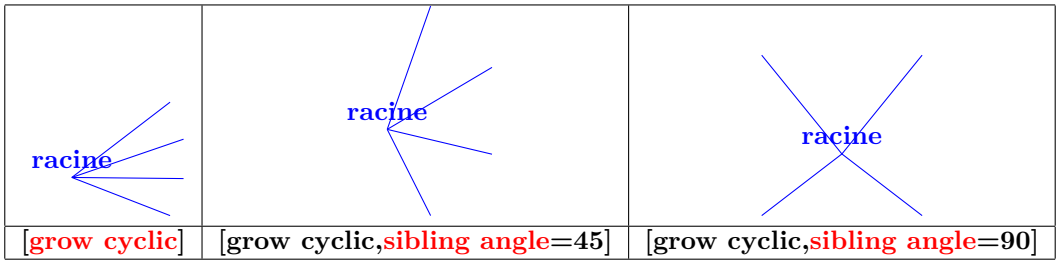
grow via three points={ one child at (0,1) and two children at (0,1) and (1,1)}



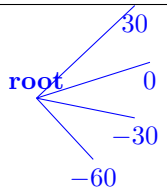
grow via three points={ one child at (0,1) and two children at (-.5,1) and (.5,1.5)}



28.7.2 Angular linking

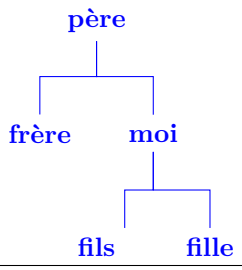


[grow cyclic] | [grow cyclic,sibling angle=45] | [grow cyclic,sibling angle=90]

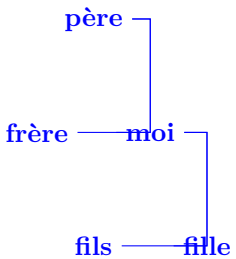



```
\node {racine} [clockwise from=30,sibling angle=30]

child {node {$30$} }
child {node {$0$} }
child {node {$-30$} }
child {node {$-60$ } };
```

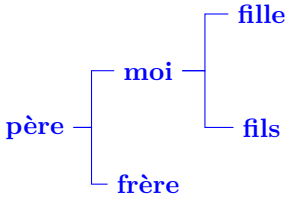
28.7.3 Forking links




```
\node {père} [edge from parent fork down]

child {node {frère}}
child {node {moi}
child [child anchor=north east] {node {fils}}
child {node {fille}}
};
```




```
\node {père} [edge from parent fork right]

child {node {frère}}
child {node {moi}
child {node {fils}}
child {node {fille}}
};
```



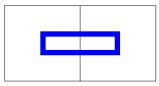
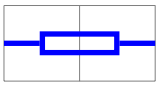

```
\node {père} [edge from parent fork right,grow=right]

child {node {frère}}
child {node {moi}
child {node {fils}}
child {node {fille}}
};
```

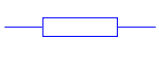
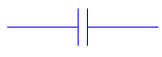
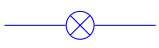
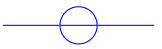
29 Electrical Engineering Circuits

Load package : \usepackage{circuits.ee.IEC}

29.1 Symbols

PGFmanual section : 47-4

On a node	On a path
	
\node [circuit ee IEC] at (1,0.5) to [resistor] {} ;	\draw [circuit ee IEC](0,0.5) to [resistor] (2,.5) ;

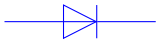
Basic Elements			
\draw [circuit ee IEC] (0,.5) to [resistor] (2,.5) ;			
PGFmanual section : 47-4-3			
			
[resistor]	[inductor]	[capacitor]	[battery]
		 ;	
[bulb]	[current source]	[voltage source]	[ground]
PGFmanual section : 47-4-4			
			
[diode]	[Zener diode]	[Schottky diode]	[tunnel diode]
			
[backward diode]	[breakdown diode]		
PGFmanual section : 47-4-5			
			
[contact]	[make contact]	[break contact]	

Alternate appearance		
\draw [circuit ee IEC,set resistor graphic=var resistor IEC graphic] (0,0.5) to [resistor] (2,0.5) ;		
		
resistor	inductor	diode
		
Zener diode	Schottky diode	tunnel diode
		
backward diode	breakdown diode	make contact

Symbol Size

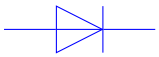
PGFmanual section : 47-2-1

```
\draw [circuit ee IEC] (0,0.5) to [diode,large circuit symbols] (2,0.5) ;
```



huge circuit symbols	large circuit symbols	medium circuit symbols	small circuit symbols	tiny circuit s
(10pt)	(8pt)	(7pt)	(6pt)	(5pt)

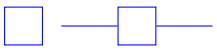
```
\draw [circuit ee IEC,circuit symbol unit=14pt] (0,0.5) to [diode] (2,0.5) ;
```



circuit symbol unit=14pt	circuit symbol size=width 3 height 1	circuit symbol size=width 1 height 5
	don't work !	

Declaring New Symbols

PGFmanual section : 47-2-2



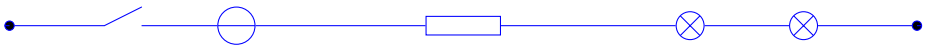
```
\begin{tikzpicture} [circuit declare symbol=xxx,
set xxx graphic={draw,shape=rectangle,minimum
size=5mm}]
\node [xxx] at (.5,.5) ;
\draw[circuit ee IEC] (1,.5) to [xxx] (3,.5) ;
\end{tikzpicture}
```

shape=circle	shape=dart	shape=star	shape=forbidden sign

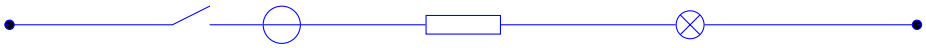
voir les “different shape libraries”see the different shape libraries

Placement of symbol on a path

```
\draw [circuit ee IEC] (0,0.5) to [contact={at start},make contact={very near start},voltage source={near
resistor, bulb={near end}, bulb={very near end},contact={at end}] (12,0.5) ;
```



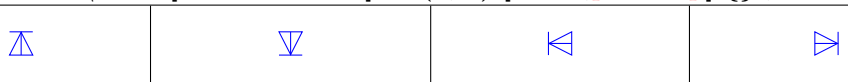
```
\draw [circuit ee IEC] (0,0.5) to [contact={ pos=0 },make contact={pos=0.2},voltage source={pos=0.3
resistor={ pos=0.5 }, bulb={pos=0.75 },contact={pos =1 }] (12,0.5) ;
```



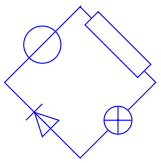
Symbol orientation

PGFmanual section : 47-2-3

```
\node [circuit ee IEC] at (1,.5) [diode,point up] {} ;
```



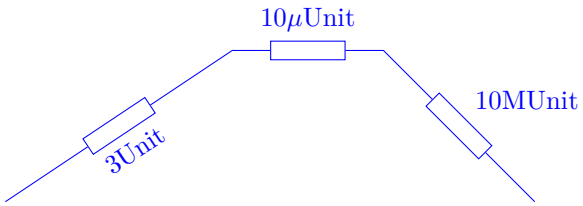
[diode,point up]	[diode,point down]	[diode,point left]	[diode,point right]

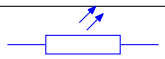
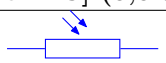
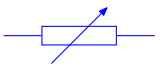
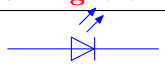
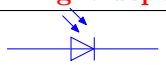
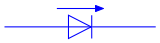
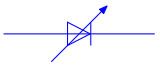
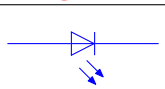
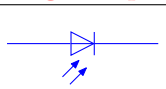
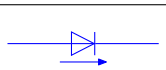
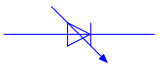
Automatic orientation	
	\draw [circuit ee IEC] (0,0) to [voltage source] (1,1) to [resistor] (2,0) to [bulb] (1,-1) to [diode] (0,0) ;

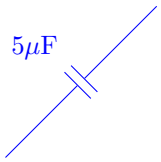
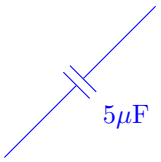
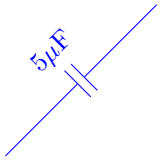
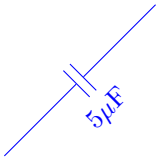
29.2 Annotations

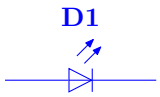
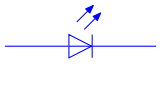
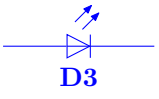
Indicating Current Directions PGFmanual section : 47-4-2	
\draw [circuit ee IEC] (0,0.5) to [current direction] (2,0.5) ;	
[current direction]	[current direction']

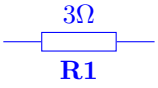
Units available PGFmanual section : 47-4-6				
\node [draw,circuit ee IEC] at(1,.5) [ampere=5] {}				
5A □	5V □	5 □	5S □	5H □
[ampere=5]	[volt=5]	[ohm=5] don't work !	[siemens=5]	[henry=5]
5F □	5C □	5VA □	5W □	5Hz □
[farad=5]	[coulomb=5]	[voltampere=5]	[watt=5]	[hertz=5]
5kA □	5mA □	5μA □	5kW □	5MW □
[ampere=5k]	[ampere=5m]	[ampere=5\mu]	[watt=5k]	[watt=5M]

Declare unit PGFmanual section : 47-2-4
\tikz[circuit ee IEC,circuit declare unit={xxx}{ Unit}] \draw (0,0) to[resistor={xxx' sloped=3}] (3,2) to [resistor={xxx= 10\mu}] (5,2) to [resistor={xxx= 10M}]


Annotations PGFmanual section : 47-4-7			
\draw [circuit ee IEC] (0,0.5) to [resistor=light emitting] (2,0.5) ;			
			
[resistor=light emitting]	[resistor=light dependent]	[resistor=direction info]	[resistor=adjustable]
			
[diode=light emitting]	[diode=light dependent]	[diode=direction info]	[diode=adjustable]
			
[diode=light emitting']	[diode=light dependent']	[diode=direction info']	[diode=adjustable']

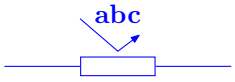
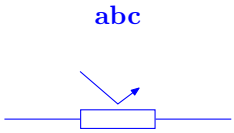
Units position PGFmanual section : 47-2-4	
\draw [circuit ee IEC] (0,0) to [capacitor={farad=5\mu}] (2,2) ;	
	
[capacitor={farad=5\mu}]	[capacitor={farad'=5\mu}]
	
[capacitor={farad sloped=5\mu}]	[capacitor={farad' sloped=5\mu}]

Info Labels PGFmanual section : 47-2-4		
\draw [circuit ee IEC] (0,0.5) to [diode={light emitting={info=D1}}] (2,0.5) ;		
		
[diode={light emitting={info=D1}}]	[diode={light emitting={info'=D2}}]	[diode={light emitting,info'

On a node	On a path
	
[resistor,info=3Ω,info'=R1]	[resistor={info=3Ω,info'=R1}]

	
[resistor,point up,info=center:3Ω]	[resistor,point up,info=center:3Ω]

\node [voltage source,direction info={volt=10}] {}		\node [voltage source,direction info'={volt=10}] {}	
			
{volt=10} or {->,volt=10}	{volt'=10} or {->,volt'=10}	{volt=10} or {->,volt=10}	{volt'=10} or {->,volt'=10}
			
{<-,volt=10}	{<-,volt=10}	{<-,volt=10}	{<-,volt'=10}

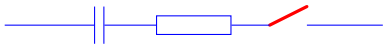
Declare annotation PGFmanual section : 47-2-5	
	\tikzset{circuit declare annotation={XXX}{9pt} { (-0.5cm,0.5cm) edge[to path={- -(0pt,2pt) - - (8pt,8pt)}] ()} } \tikz[blue,circuit ee IEC] \draw (0,0) to [resistor=XXX] (3,0);
	\tikzset{circuit declare annotation={xxx}{ 9pt } } { (-0.5cm,0.5cm) edge[to path={- -(0pt,2pt) - - (8pt,8pt)}] ()} } \tikz[blue,circuit ee IEC] \draw (0,0) to [resistor={xxx={info=abc}}] (3,0);
	\tikzset{circuit declare annotation={xxx}{1cm } } { (-0.5,0.5) edge[to path={- -(0pt,2pt) - - (8pt,8pt)}] ()} } \tikz[blue,circuit ee IEC] \draw (0,0) to [resistor={xxx={info=abc}}] (3,0);

Theming Symbols

PGFmanual section : 47-2-6

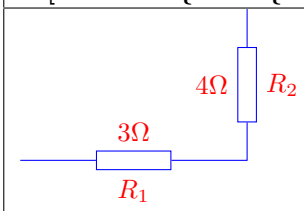
```
\draw[circuit symbol lines/.style={draw,red,very thick}] (0,0)
to [capacitor={near start},resistor, make contact={near end}] (5,0);
```

```
\draw[circuit symbol wires/.style={draw,red,very thick}] (0,0)
to [capacitor={near start},resistor, make contact={near end}] (5,0);
```

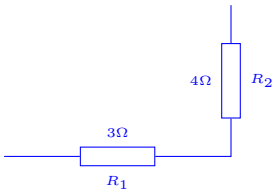


```
\draw[circuit symbol open/.style={thick,draw,red,fill=yellow}] (0,0)
to [capacitor={near start},resistor, make contact={near end}] (5,0);
```

```
\tikz[blue,circuit ee IEC,every info/.style=red]
\draw (0,0) to[resistor={info={$3\Omega$},info'={$R_1$}}] (3,0)
to[resistor={info={$4\Omega$},info'={$R_2$}}] (3,2);
```

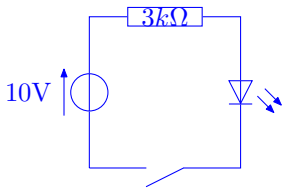
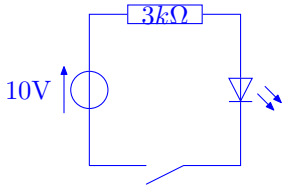
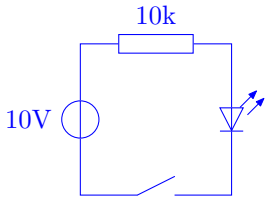


every info/.style=red



every info/.style={font=\tiny}

29.3 Example

3 methods for the same circuit	
	\begin{tikzpicture}[blue,circuit ee IEC] \draw (0,0) to [voltage source={direction info={->,volt=10}}] (0,2) to [resistor={info=center:$3 k\Omega$}] (2,2) to [diode=light emitting] (2,0) to [make contact] (0,0); \end{tikzpicture}
	\begin{tikzpicture}[blue,circuit ee IEC] \draw (0,0) to [voltage source={direction info={->,volt=10}}] ++(up:2) to [resistor={info=center:$ 3 k\Omega$}] ++(right:2) to [diode=light emitting] ++(down:2) to [make contact] ++(left:2) ; \end{tikzpicture}
	\begin{tikzpicture}[blue,circuit ee IEC] \node (A) at (0,1) [voltage source,point up,volt=10]{}; \node (B) at (1,2) [resistor,ohm=10k] {}; \node (C) at (2,1) [diode=light emitting,point down] {} ; \node (D) at (1,0) [make contact] {}; \draw (A) |- (B) -| (C) |- (D) -| (A); \end{tikzpicture}

30 Logical circuits

International Electrotechnical Commission :

Load package : \usepackage{circuits.logic.IEC}

American logic gates :

Load package : \usepackage{circuits.logic.US}

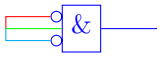
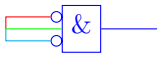
logic symbols used in A. Croft, R. Davidson, and M. Hargreaves (1992), Engineering Mathematics, Addison-Wesley, 82–95 :

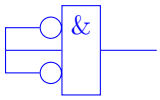
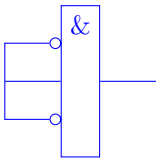
Load package : \usepackage{circuits.logic.CDH}

Basic Elements		
\node [circuit logic IEC] at (1,.5) [and gate] {A} ; PGFmanual section : 47-3-2		
		
[circuit logic IEC] and gate	[circuit logic US] and gate	[circuit logic CDH] and gate
		
[circuit logic IEC] nand gate	[circuit logic US] nand gate	[circuit logic CDH] nand gate
		
[circuit logic IEC] or gate	[circuit logic US] or gate	[circuit logic CDH] or gate
		
[circuit logic IEC] nor gate	[circuit logic US] nor gate	[circuit logic CDH] nor gate
		
[circuit logic IEC] xor gate	[circuit logic US] xor gate	[circuit logic CDH] xor gate
		
[circuit logic IEC] xnor gate	[circuit logic US] xnor gate	[circuit logic CDH] xnor gate
		
[circuit logic IEC] not gate	[circuit logic US] not gate	[circuit logic CDH] not gate
		
[circuit logic IEC] buffer gate	[circuit logic US] buffer gate	[circuit logic CDH] buffer gate

Labelled		
\node [circuit logic IEC] at (1,.5) [and gate] {A} ; PGFmanual section : 47-3-1		
		
[circuit logic IEC]	[circuit logic US]	[circuit logic CDH]

Orientation		
PGFmanual section : 47-3-1		
\node [circuit logic IEC] at (1,.5) [and gate,point down] {A} ;		
		
[circuit logic IEC]	[circuit logic US]	[circuit logic CDH]
\node [circuit logic IEC] at (1,.5) [and gate,point up] {A} ;		
		
[circuit logic IEC]	[circuit logic US]	[circuit logic CDH]
\node [circuit logic IEC] at (1,.5) [and gate,point left] {A} ;		
		
[circuit logic IEC]	[circuit logic US]	[circuit logic CDH]

inputs exit	
PGFmanual section : 47-3-3	
	\node [and gate IEC, draw, logic gate inputs={inverted ,normal , inverted }] at (1,.5) (A) {}; \draw [red] (A.input 1) -| (0,0.5); \draw[green] (A.input 2) -| (0,0.5); \draw[cyan] (A.input 3) -| (0,0.5); \draw (A.output) -| (2,0.5);
	\node [and gate IEC, draw, logic gate inputs={ini}] at (1,.5) (A) {}; \draw [red] (A.input 1) -| (0,0.5); \draw[green] (A.input 2) -| (0,0.5); \draw[cyan] (A.input 3) -| (0,0.5); \draw (A.output) -| (2,0.5);

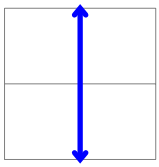
input parameter	
\node [and gate IEC, draw, logic gate inputs=ini,logic gate inverted radius=4pt] at (1,.5) (A) {}; PGFmanual section : 47-3-3	
	
logic gate inverted radius=4pt	logic gate input sep=0.5cm

symbol parameter		
\node [circuit logic IEC,and gate IEC symbol=AND] at (1,.5) [and gate] {} PGFmanual section : 47-3-5		
		
and gate IEC symbol =AND	logic gate IEC symbol color =red	logic gate IEC symbol align ={bottom, right}

Composant parameter		
\node [circuit logic IEC,very thick] at (1,.5) [and gate] {} PGFmanual section : 47-3-5		
		
very thick	fill=blue!10	fill=blue!10, logic gate IEC symbol color=black

31 Optics

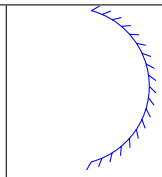
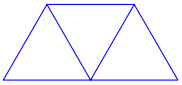
Load package : \usepackage{optics} [8]



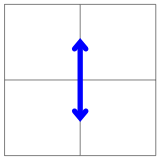
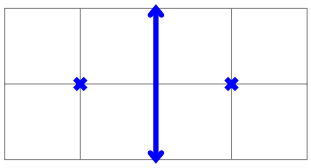
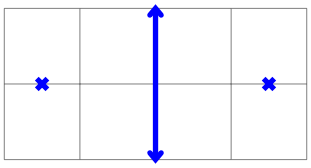
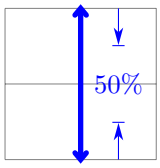
```
\begin{tikzpicture}[blue,line width=2pt]
\draw[help lines] (-1,-1) grid (1,1);
\node[use optics,lens] (L) at (0,0) ;
\end{tikzpicture}
```

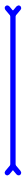
31.1 Optic components

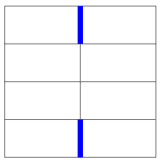
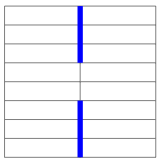
31.1.1 Components available

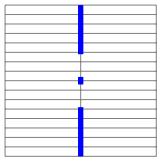
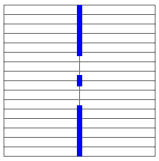
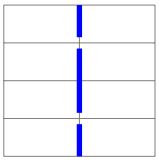
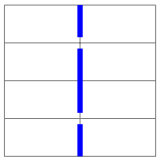
Éléments optiques			
\tikz[use optics,blue] \node[lens] (L) at (0,0) {};			
			
lens	slit	double slit	mirror
 			
convex mirror	concave mirror	polarizer	beam splitter	double amici prism
			
thin optics element	thick optics element	heat filter	screen
diffraction grating	grid	semi-transparent mirror	diaphragm

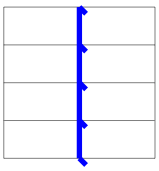
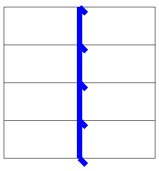
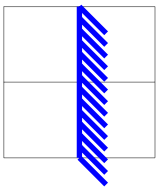
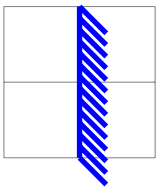
31.1.2 Parameters

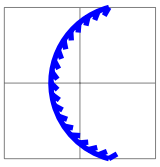
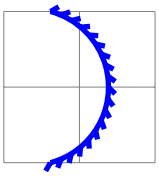
\node[lens,object height=1cm] (L) at (0,0) {};			
			
object height=1cm By default 2cm	draw focal points By default empty	focal length=1.5cm By default 1cm	focal height=0.5 By default 0.8 (80%)

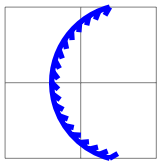
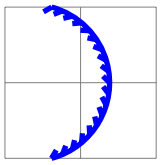
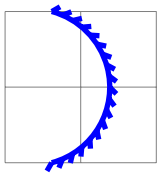
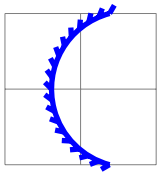
Lens type	
\node[lens,lens type=converging] (L) at (0,0) {};	
	
lens type=converging	lens type=diverging

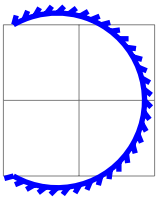
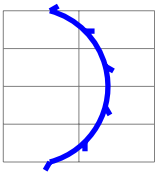
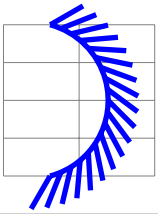
slit parameters	
\node[slit,slit height=0.5] (L) at (0,0) {};	
	
slit height=0.5	slit height=0.5cm
By default 0.075 (7.5%)	

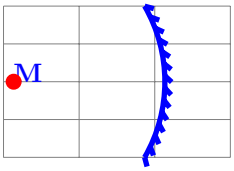
Double slit parameters			
\node[double slit,slit height=0.15] (L) at (0,0) {};			
			
slit height=0.15	slit height=0.25cm	slit separation=0.5	double slit, slit separation=1cm
By default 0.075 (7.5% x 2cm = 1.5 mm)		By default 0.2 (20% x 2cm = 4mm)	

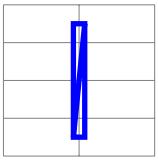
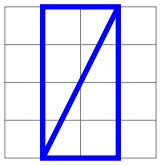
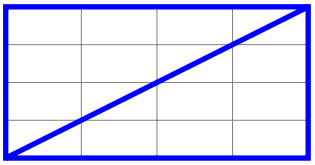
mirror parameters	
\node[mirror,mirror decoration separation=0.25] (L) at (0,0) {};	
	
mirror decoration separation=0.25	mirror decoration separation=0.5cm
By default 0.15cm	
	
mirror decoration amplitude=0.25	mirror decoration amplitude=1cm
By default 0.125cm	

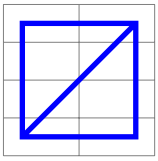
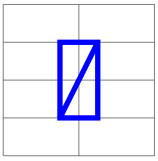
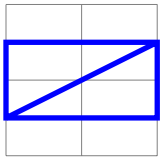
spherical mirror type	
\node[convex mirror](L) at (0,0) {};	
	
convex mirror	concave mirror
spherical mirror, spherical mirror type=convex	spherical mirror, spherical mirror type=concave

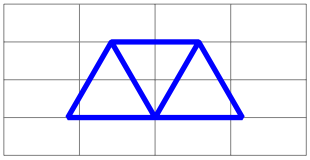
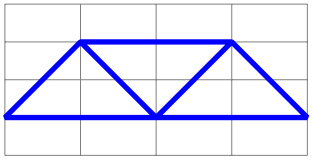
spherical mirror orientation	
\node[convex mirror, spherical mirror orientation=ltr](L) at (0,0) {};	
	
convex mirror, spherical mirror orientation=ltr	convex mirror, spherical mirror orientation=rtl
	
concave mirror spherical mirror orientation=ltr	concave mirror, spherical mirror orientation=rtl

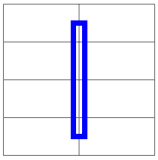
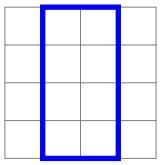
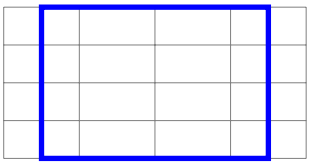
\node[spherical mirror, spherical mirror angle=240](L) at (0,0) {};		
		
spherical mirror angle=240	mirror decoration separation=0.25	mirror decoration amplitude=0.5cm
By default 150	By default 0.15cm	By default 0.125cm

\node[spherical mirror, spherical mirror angle=from_radius(2cm)](L) at (0,0) {};


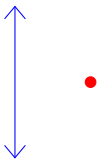
\node[polarizer, object height=1.5cm](L) at (0,0) {};		
		
object height=1.5cm	object aspect ratio=0.5	object aspect ratio=2
By default 2cm	By default 0.2	

\node[beam splitter,object height=1.5cm](L) at (0,0) {};		
		
object height=1.5cm	object aspect ratio=.5	object aspect ratio=2

\node[double amici prism,prism height=1cm](L) at (0,0) {};	
	
prism height=1cm	prism apex angle=90
By default 1.5cm	By default 60

\node[thick optics element,object height=1.5cm](L) at (0,0) {};		
		
object height=1.5cm	object aspect ratio=0.5	object aspect ratio=1.5

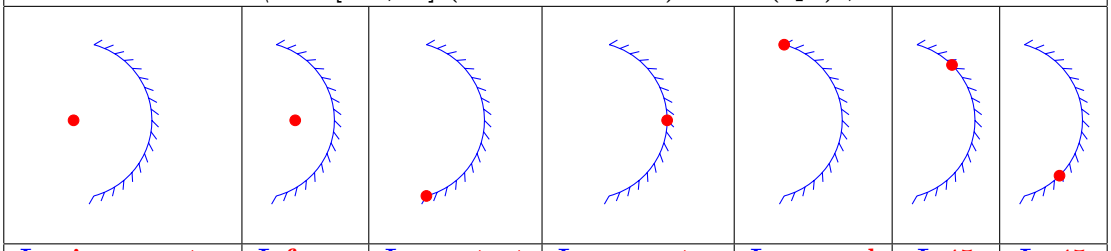
31.1.3 Anchors

\node[lens] (L) at (0,0) {} ; \node[red,fill] (L.lens north) circle (2pt) ;				
				
(L.lens north)	(L.lens south)	(L.east focus)	(L.west focus)	(L.center)

\node[slit, slit height=0.5] (L) at (0,0) {} ; \node[red,fill] (L.slit north) circle (2pt) ;		
(L.slit north)	(L.slit south)	(L.slit center)

\node[double slit,slit height=0.2,slit separation=0.5] (L) at (0,0) {} ; \node[red,fill] (L.slit 1 north) circle (2pt) ;					
(L.slit 1 north)	(L.slit 1 south)	(L.slit 1 center)	(L.slit 2 north)	(L.slit 2 south)	(L.slit 2 center)

\node[spherical mirror] (L) at (0,0) {} ;
\node[red,fill] (L.mirror center) circle (2pt) ;

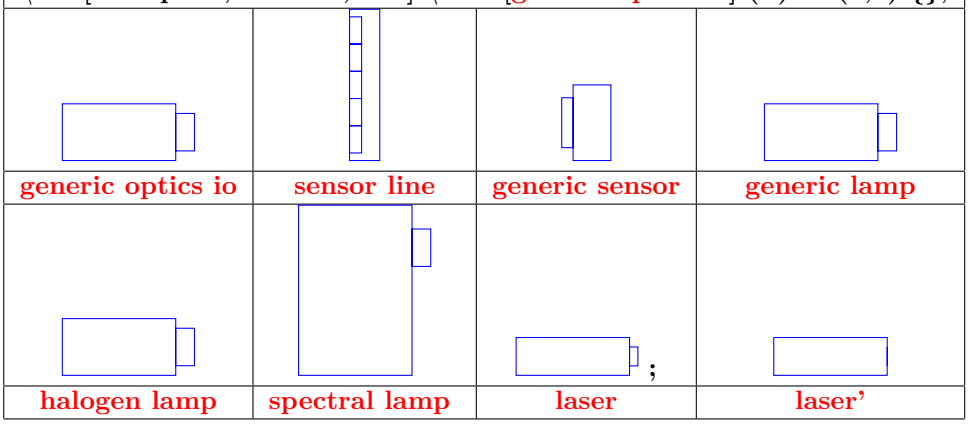


L.mirror center	L.focus	L.arc start	L.arc center	L.arc end	L.45	L.-45

31.2 Lights and sensors

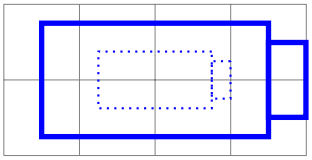
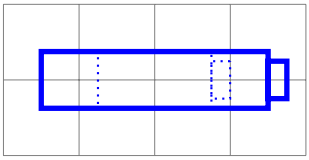
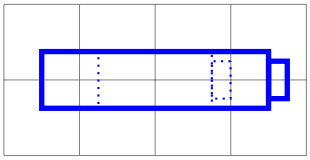
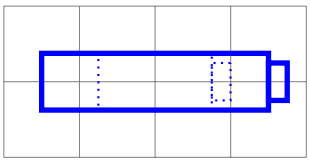
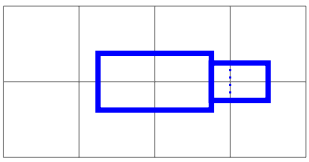
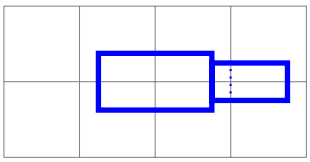
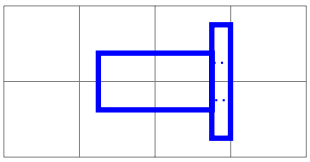
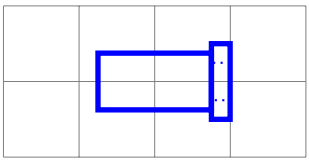
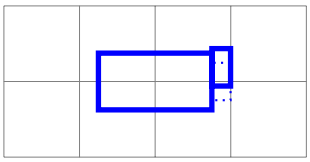
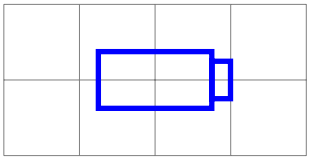
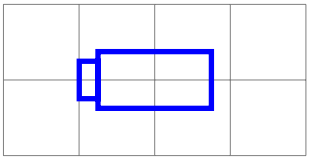
31.2.1 Available

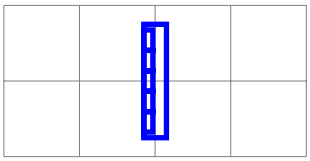
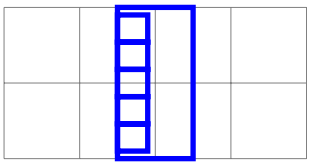
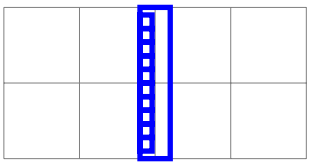
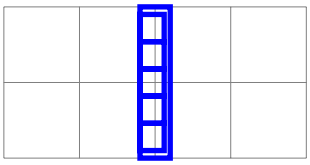
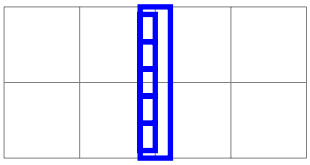
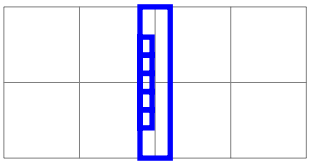
\tikz[use optics,scale=.5,blue] \node[generic optics io] (L) at (0,0) {};



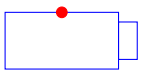
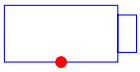
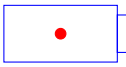
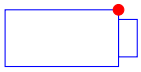
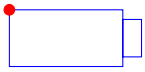
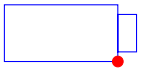
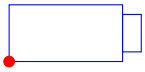
generic optics io	sensor line	generic sensor	generic lamp
halogen lamp	spectral lamp	laser ;	laser'

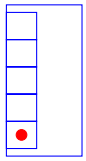
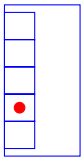
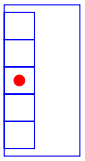
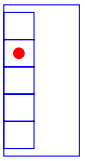
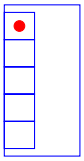
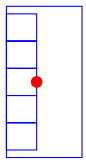
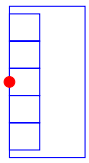
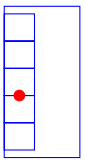
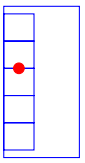
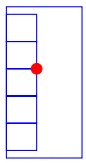
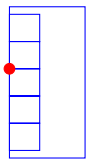
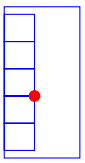
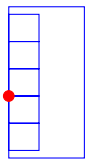
31.2.2 Parameters

\node[generic optics io, io body height=1.5cm](L) at (0,0) {};		
Same parameters for generic sensor , generic lamp , halogen lamp , spectral lamp,laser		
		
io body height=1.5cm	io body aspect ratio=4	io body width=4
By default 0.75cm	By default 2	
		
io body width=3cm	io aperture width=1	io aperture width=1cm
	By default 0.33	
		
io aperture height=2	io aperture height=1cm	io aperture shift=0.25
By default 0.66		By default 0
		
io orientation=ltr	io orientation=rtl	
By default ltr		

\node[sensor line, sensor line height=1.5cm](L) at (0,0) {};		
		
sensor line height=1.5cm	sensor line aspect ratio=0.5	sensor line pixel number=10
By default 2cm	By default 0.2	By default 5
		
sensor line pixel width=0.8	sensor line pixel width=0.2cm	sensor line inner ysep=0.2
By default0.4		By default 0.05

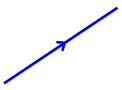
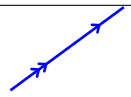
31.2.3 Anchors

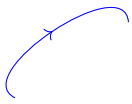
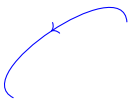
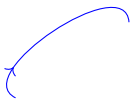
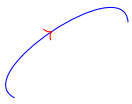
				
s.body north	s.body south	s.body east	s.body west	s.body cent
				
s.body north east	s.body north west	s.body south east	s.body south west	
				
s.aperture north	s.aperture south	s.aperture east	s.aperture west	s.aperture cer
				
s.aperture north east	s.aperture north west	s.aperture south east	s.aperture south west	

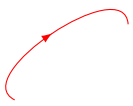
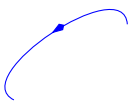
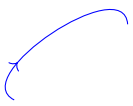
				
s.pixel 1 center	s.pixel 2 center	s.pixel 3 center	s.pixel 4 center	s.pixel 5 center
				
s.pixel 3 east	s.pixel 3 west	s.pixel 3 south	s.pixel 3 north	
				
s.pixel 3 north east	s.pixel 3 north west	s.pixel 3 south east	s.pixel 3 south west	

31.3 Tools

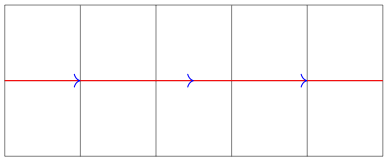
31.3.1 Marks on the ray

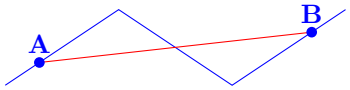
\draw [->-] (0,0) – (1.5,1;					
					
[->-]	[-<-]	[-> >-]	[->n-={n=4}]	[->n={n=5,at=0.25}]	[-> >-=at=0.25, ->-={at=0.75}]

\draw [put arrow] (0,0) to[bend left=120] (2,0);			
			
[put arrow]	[put arrow={arrow'}]	[put arrow={at=0.2}]	[put arrow={style=red}]

		
[red,put arrow={arrow=latex}]	[put arrow={arrow'=Kite}]	[put arrow={pos=.25}]
		By default pos=0.5

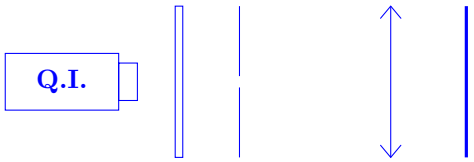
```
\draw[red, put arrow/every arrow/.style={blue}, put arrow={at=0.2},
put arrow={at=0.5}, put arrow={at=0.8}] (0,0) – (5,0);
```






```
\begin{tikzpicture}[use optics,blue]
\draw[put coordinate=A at 0.1,put coordinate=B at 0.9]
(0,0) - - (1.5,1) - - (3, 0) - - (4.5,1);
\draw[red] (A) - - (B);
\fill(A) circle (2pt) node[above] {A} ;
\fill(B) circle (2pt) node[above] {B} ;
\end{tikzpicture}
```

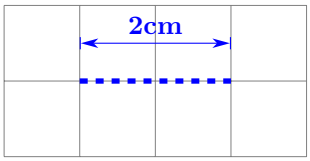
Point A à 10% , point B à 90%



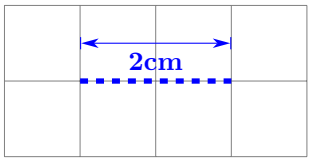

```
\begin{tikzpicture}[use optics]
\node[halogen lamp] (quartz iode) at (0,0) {Q.I.};
\node[heat filter,right=0.5cm of quartz iode.aperture east]
(AC) {};
\node[slit,right=0.75cm of AC] (fente) {};
\node[lens,right=2cm of fente] (L) {};
\node[screen,right=3cm of fente] (screen) {};
\end{tikzpicture}
```

31.3.2 Dimensions indicating

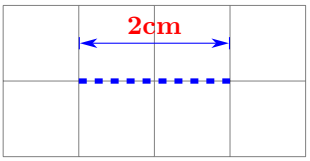
```
\draw (0,0) to[short dim arrow={label=2cm}] (2,0);
```



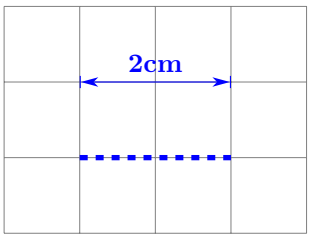
[dim arrow={label=2cm}]



to[dim arrow={label'=2cm}]

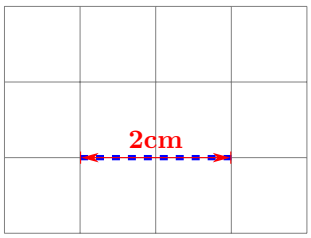


[dim arrow={label=2cm
label style/.append style=r

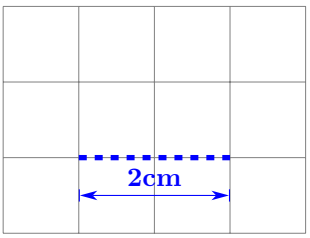


[dim arrow={label=2cm,raise=1cm}]

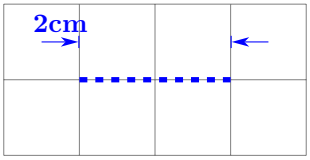
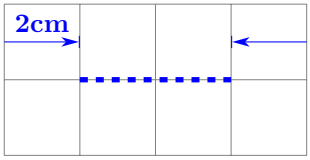
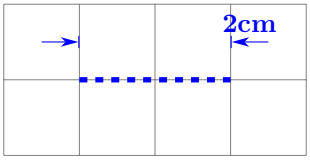
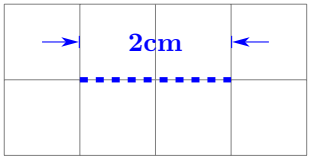
By default raise = 0.5cm



[dim arrow={label=2cm,no raise},red]



[dim arrow'={label=2cm

\draw (0,0) to[short dim arrow={label=2cm}] (2,0);	
	
[short dim arrow={label=2cm}]	[short dim arrow={label=2cm,arrow length=1cm}]
	By default arrow length= 5mm
	
[short dim arrow={label=2cm,label near end}]	[short dim arrow={label=2cm,label near middle}]
By default label near start	

32 Animate a TikZ picture

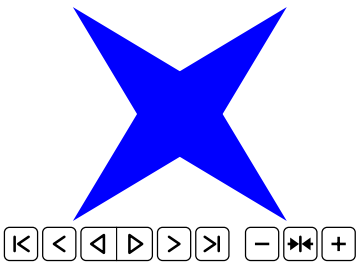
Load package : \usepackage{animate} [7]

32.1 Animation from picture files

first frame	second and last frame
	
\includegraphics{XXX1}	\includegraphics{XXX2}

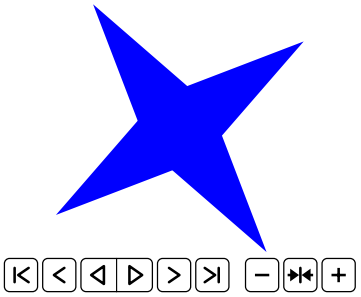
\animategraphics:	
[controls,	:Inserts control buttons
loop	:animation restarts automatically
autoplay]	:Start animation automatically
{4}	:4 frame per second
{XXX}	:file base name
{1}	:number of the first frame
{2}	:number of the last frame

32.2 Animateinline



```
\animateinline[controls,loop,autoplay]{5}

% first frame
\begin{tikzpicture}  \fill[blue] (45:2) - - (135:.5)- - (225:2)- -(315:.5)
- - cycle; \fill[blue] (45:.5) - - (135:2)- - (225:.5)- -(315:2) - - cycle;
\end{tikzpicture}
% second frame
\newframe
\begin{tikzpicture}
\fill[blue] (0:2) - - (90:.5)- - (180:2)- -(270:.5) - - cycle;
\fill[blue] (0:.5) - - (90:2)- - (180:.5)- -(270:2) - - cycle;
\end{tikzpicture}

\end{animateinline}
```

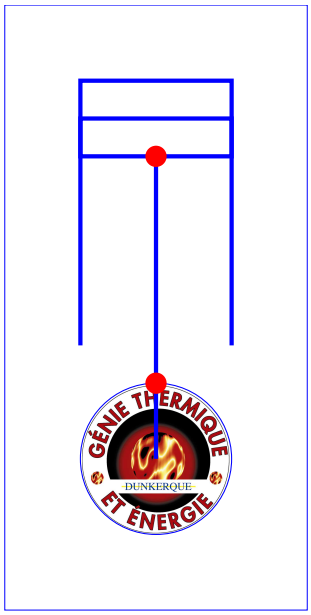
32.3 Multiframe



```
\begin{animateinline}[poster=first,controls, palindrome]{12}
\multiframe{29}{iAngle=80+10, Rdim=2.0+-0.2}{
\begin{tikzpicture}
\fill[blue] (\iAngle+45:\Rdim) - - (\iAngle+135:.5)- -
(\iAngle+225:\Rdim)- -(\iAngle+315:.5) - - cycle;
\fill[blue] (\iAngle+45:.5) - - (\iAngle+135:\Rdim)- - (\iAn-
gle+225:.5)- -(\iAngle+315:\Rdim) - - cycle;
\end{tikzpicture} }
\end{animateinline}
```

The first letter of the variable name determines his type

entier	initiale : i ou I
réelles	initiale : n, N, r ou R
longueurs	initiale : d ou D




```
\begin{animateinline}[autoplay,loop]{12}
\multiframe{24}{iAngle=0+15,icol=0+5}{\begin{tikzpicture}
\draw[line width=0pt] (-2,-3) rectangle(6,3);
\draw (0,0) node[fill=white,circle,rotate=\iAngle]
{\includegraphics[width=2cm]{LogoIUT}} (0,0) circle (1);
\draw (0,0) circle (1);
\coordinate (abc) at (${sqrt(9-sin(\iAngle)*sin(\iAngle))+cos(\iAngle)}*(1,0)$)
;
\coordinate (xyz) at (\iAngle:1);
\draw[ultra thick] (0,0) - -(xyz);
\draw[ultra thick] (xyz) - - (abc) ;
\fill[color=blue!\icol] (abc)++(0.5,-1) rectangle (5,1) ;
\draw[ultra thick] (abc) ++(0,-1) rectangle ++(.5,2) ;
\draw[ultra thick] (1.5,1) - - (5,1) - - (5,-1) - - (1.5,-1);
\fill[red] (xyz) circle (4pt);
\fill[red] (abc) circle (4pt);
\end{tikzpicture}}
\end{animateinline}
```

33 Packages studied in this document

Basic TikZ package :		
name	Load package	documentation [1]
tikz	\usepackage{tikz}	pgfmanual.pdf

Other packages		
name	see page	documentation [2]
animate	216	animate.pdf
tikz-optics	206	tikz-optics.pdf
pgfplots	166	pgfplots.pdf
tikzpeople	143	tikzpeople.pdf
tikzducks	150	tikzducks-doc.pdf
tikzsymbols	156	tikzsymbols.pdf
tkz-tab	177	tkz-tab-screen.pdf

Optional library (documentation : pgfmanual.pdf)		
name	**see page**	**Load package**
angles	**37**	**\usetikzlibrary{angles}**
arrows.meta	**21**	**\usetikzlibrary{arrows.meta}**
bending	**34**	**\usetikzlibrary{bending}**
backgrounds	**79**	**\usetikzlibrary{backgrounds}**
calc	**45**	**\usetikzlibrary{calc}**
chains	**67**	**\usetikzlibrary{chains}**
circuits.ee.IEC	**196**	**\usetikzlibrary{circuits.ee.IEC}**
circuits.logic.IEC	**202**	**\usetikzlibrary{circuits.logic.IEC}**
circuits.logic.US	**202**	**\usetikzlibrary{circuits.logic.US}**
circuits.logic.CDH	**202**	**\usetikzlibrary{circuits.logic.CDH}**
fit	**58**	**\usetikzlibrary{fit}**
decorations.footprints	**130**	**\usetikzlibrary{decorations.footprints}**
decorations.fractals	**137**	**\usetikzlibrary{decorations.fractals}**
decorations.markings	**127**	**\usetikzlibrary{decorations.markings}**
decorations.pathmorphing	**116**	**\usetikzlibrary{decorations.pathmorphing}**
decorations.pathreplacing	**122**	**\usetikzlibrary{decorations.pathreplacing}**
decorations.shapes	**131**	**\usetikzlibrary{decorations.shapes}**
decorations.text	**135**	**\usetikzlibrary{decorations.text}**
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