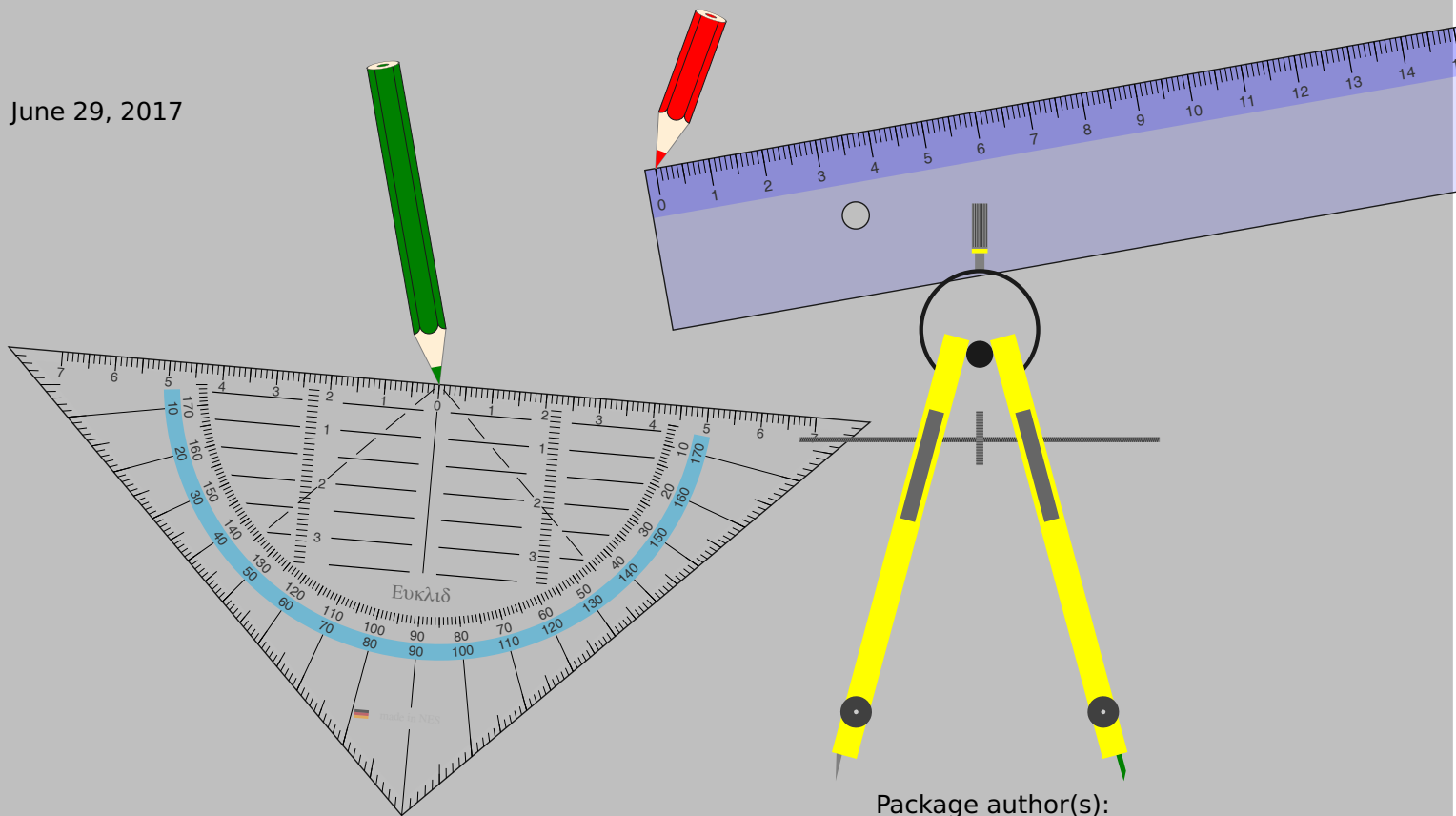


PSTricks

pst-geometrictools v 1.0

A PSTricks package to draw a protractor, a ruler, a compass and pencils

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Package author(s):
Thomas Söll

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The package `pst-geometrictools` offers some customizable options to setup a *protractor*, a *ruler*, a *compass* and *pencils* to the users' wishes. Some geometric tools are predefined and ready-to-use for the customer to be able to present some pixel-free graphics showing the handling of some geometric tools.

The geometric tools can be scaled, rotated, positioned, colored as wanted, even labeled—if wanted.

These tools were already available since years within diverse examples—however not yet packaged together in pure PostScript. This was done within this package.

We recommend to use the package `pst-eucl` (by *Dominique Rodriguez*) which makes it easy to position the tools precisely.

Have fun to use it!

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1 How to use the commands

1.1 \psProtractor

```
\psProtractor [Options] {angle} (coordinates of the origin)
\psProtractor [Options] {angle} (coordinates of the origin) (coordinates of a second point)
```

The command `\psProtractor` contains the options `ProScale=`, `ProLineCol=`, `ProFillCol=`, `OwnerTxt=`, `MadeTxt=`, `PSfont0=`, `fontsize0=`, `PSfontM=`, `fontsizeM=`, `country=` and `Ghost=`.

Name	Default	Meaning
<code>ProScale</code>	1	scale factor
<code>ProFillCol</code>	gray!60	transparent fill color of the protrace
<code>ProLineCol</code>	cyan	linecolor of the protrace
<code>OwnerTxt</code>	T.S.	Name of the owner
<code>MadeTxt</code>	Made in NES	Made in wherever
<code>PSfont0</code>	Symbol	PSfont for the owner
<code>fontsize0</code>	10pt	fontsize for the owner
<code>PSfontM</code>	Times-Roman	PSfont for Made in wherever
<code>fontsizeM</code>	6pt	fontsize for Made in wherever
<code>country</code>	Germany	Permissible values: Germany, France
<code>Ghost</code>	false	true: not showing the protrace itself, but getting the nodes of its verices

This above introduced command `\psProtractor` automatically provides three nodes of the vertices of the protractor which are named as follows: `GeodrA`, `GeodrB`, `GeodrC`

These nodes maybe very helpful.

The command `\psProtractor` offers a positioning

- either by one point and an angle of rotation
- or by two points (and an additional angle of rotation)

1.2 \psRuler

```
\psRuler [Options] {angle} (coordinates of origin)
\psRuler [Options] {angle} (coordinates of origin) (coordinates of a second point)
```

The command `\psRuler` contains the options `RulerScale=` and `RulerFillCol=`.

Name	Default	Meaning
<code>RulerScale</code>	1	scale factor of the ruler
<code>RulerFillCol</code>	gray	color of the ruler

The command `\psRuler` offers a positioning

- either by one point and an angle of rotation
- or by two points (and an additional angle of rotation)

1.3 \psCompass

<code>\psCompass</code>	<code>[Options]</code>	<code>{radius}</code>	<i>(coordinates of origin)</i>
<code>\psCompass</code>	<code>[Options]</code>	<code>{radius}</code>	<i>(coordinates of origin) (coordinates of a second point)</i>

The command `\psCompass` contains the options `PoCAngle=`, `MCAngle=`, `PoCLength`, `PoCFillCol=`, `PoCMineCol=`, `RadVS=`, `AngleVS=`, `RadMul=` and `PoCScale=`.

Name	Default	Meaning
PoCAngle	0	angle of rotation
PoCLength	5	length of the compass
PoCFillCol	gray!60	color of the compass
PoCMineCol	gray!60	color of the mine
PoCScale	1	scaling factor
MCAngle	false	suppresses the initial angle, when two points are given
RadVS	RVS	PostScript value for the radius
AngleVS	AVS	PostScript value for the angle
RadMul	1	multiplication factor for the radius

The command `\psCompass` offers a positioning

- either by one point and the radius—a rotation is set with `[PoCAngle=30]`.
- or by two points (the radius and initial angle then are calculated automatically)—if one sets an additional rotation with `[PoCAngle=30]`, these two angles are automatically added. If one will suppress the initial rotation, then set `[MCAngle=false]`. Using `RadVS=<unique name>` and `AngleVS=<unique name>` you can use the values of the radius respectively the angle within some PostScript calculations. When you like to use a radius other than the distance between the two points that automatically calculates the radius, use `RadMul=<decimal number>` to multiply the initial radius with this factor.

1.4 \psPencil

<code>\psPencil</code>	<code>[Options]</code>	<code>{angle}</code>	<i>(coordinates of the cone end)</i>
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The command `\psPencil` contains the options `PenScale=`, `PenLength=`, `pencilColA=` and `pencilColB=`.

Name	Default	Meaning
PenScale	1	scale factor
PenLength	5	length of the pencil
pencilColA	red	color of the pencil
pencilColB	HolzCol	color of the wooden cone end

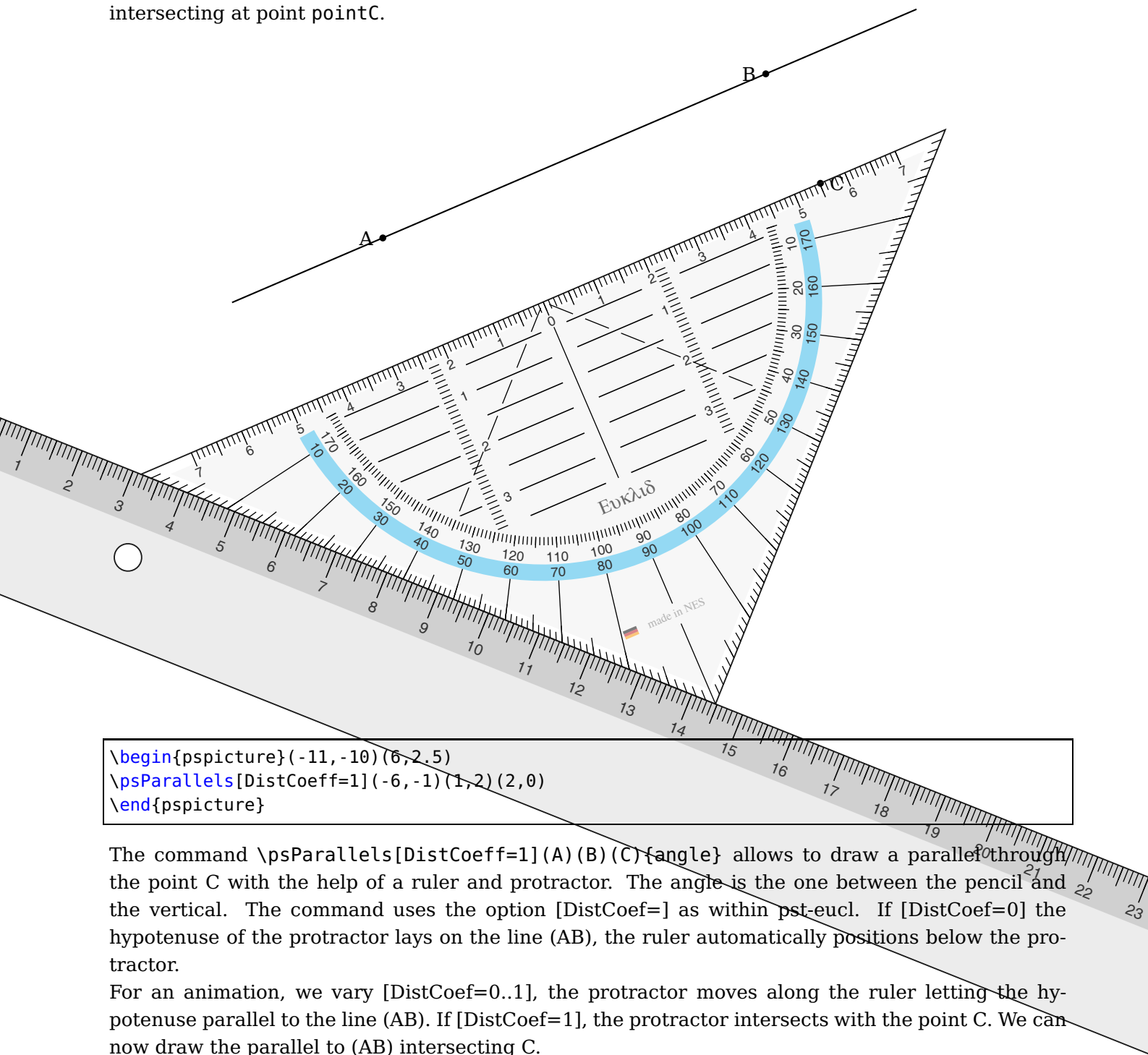
1.5 \psParallels (Idea and realization by Manuel Luque)

```
\psParallels [Options] (pointA) (pointB) (pointC) {angle}
```

The command `\psParallels` contains the option `DistCoeff=`.

Name	Default	Meaning
DistCoeff	1	relative distance between (AB) and C

This command is made to directly draw a line parallel to the line containing pointA and pointB intersecting at point pointC.

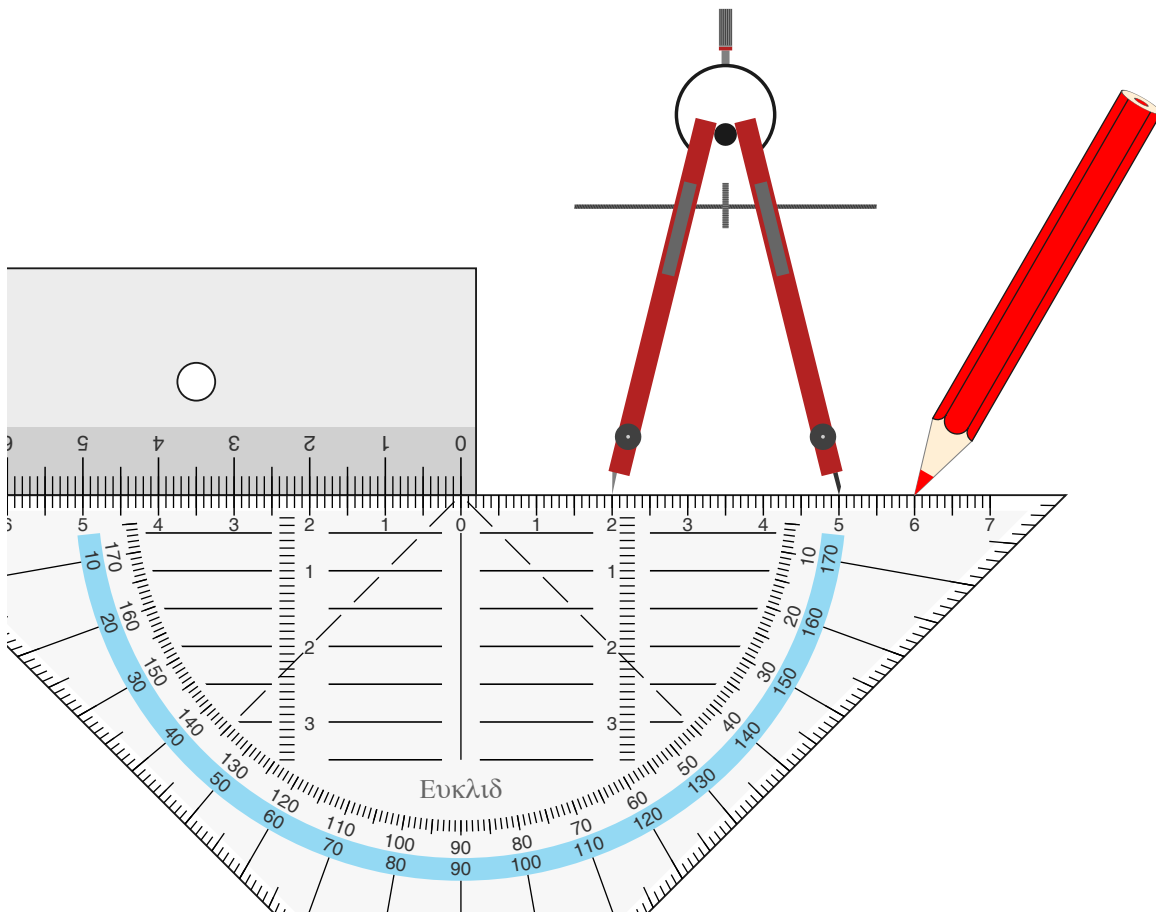


```
\begin{pspicture}(-11,-10)(6,2.5)
\psParallels[DistCoeff=1](-6,-1)(1,2)(2,0)
\end{pspicture}
```

The command `\psParallels[DistCoeff=1](A)(B)(C){angle}` allows to draw a parallel through the point C with the help of a ruler and protractor. The angle is the one between the pencil and the vertical. The command uses the option `[DistCoeff=]` as within `pst-eucl`. If `[DistCoeff=0]` the hypotenuse of the protractor lays on the line (AB), the ruler automatically positions below the protractor.

For an animation, we vary `[DistCoeff=0..1]`, the protractor moves along the ruler letting the hypotenuse parallel to the line (AB). If `[DistCoeff=1]`, the protractor intersects with the point C. We can now draw the parallel to (AB) intersecting C.

2 Basic Examples



```
\begin{pspicture}*(-6,-5.5)(10,7)
\psProtractor{0}{(0,0)% origin of the protractor
\psRuler{0}{(0,0)% origin of the ruler
\psPencil{-30}{(6,0)% origin of the pencil
\psCompass{3}{(2,0)% origin of the compass
\end{pspicture}
```

We see, that the origins of the *protractor* and *ruler*, *compass* and respectively the *cone end of the pencil* are positioned at $(0|0)$, $(2|0)$, $(6|0)$. Adding an angle rotates the objects around their origins. For the *protractor* and *ruler*, there are two ways to position them:

- one point and an angle, like:

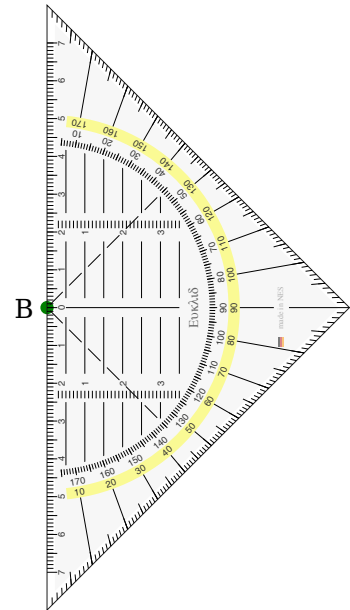
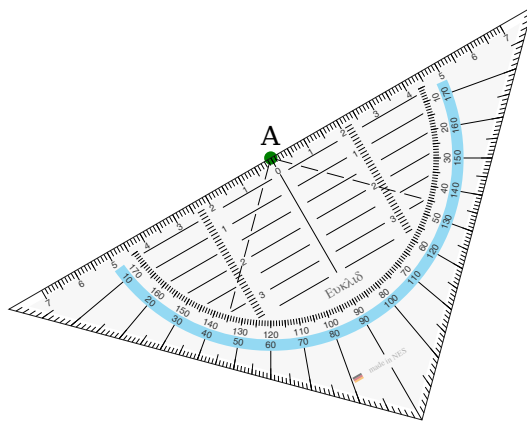
```
\psProtractor [Options] {<angle>}{<point>}
\psRuler [Options] {<angle>}{<point>}
```

This is quite self-explanatory. The origin is positioned at the point and the tool is rotated around this point by the chosen angle.

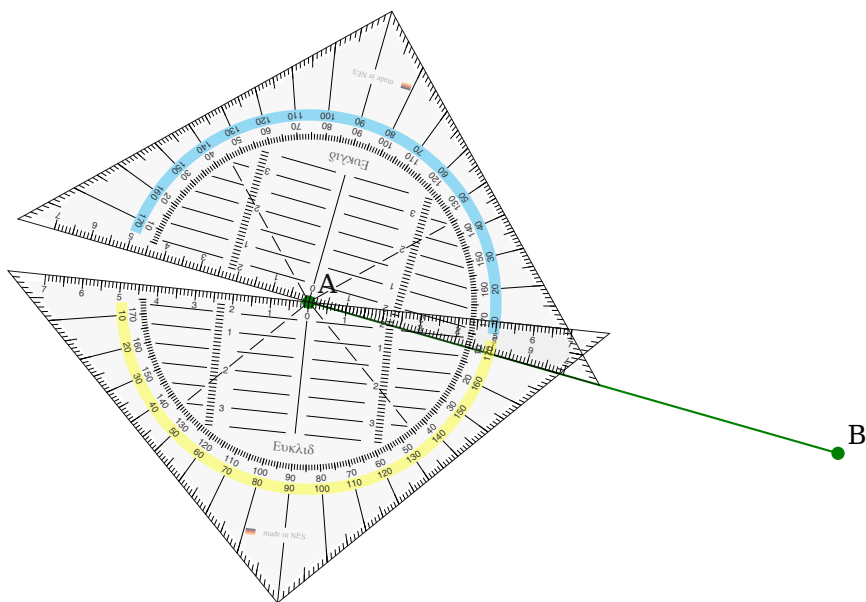
- two points and an additional angle, like:

```
\psProtractor [Options] {<additional angle>}{<pointA>}{<pointB>}
\psRuler [Options] {<additional angle>}{<pointA>}{<pointB>}
```

The origin of the tool is set to pointA. The hypotenuse of the protractor is aligned to the line between pointA and pointB, when the additional angle is chosen to 0.

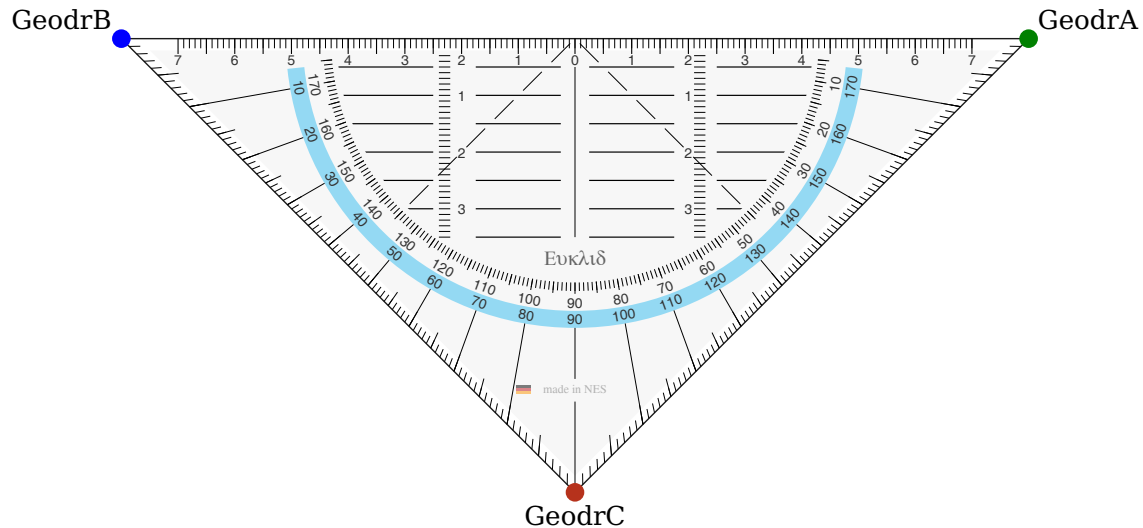


```
\begin{pspicture}(-8,-6.5)(8,2)
\pnode(-2,-1){A}\psdot[linecolor=Green,dotsize=5pt](A)\uput[90](A){A}
\pnode(5,-2){B}\psdot[linecolor=Green,dotsize=5pt](B)\uput[180](B){B}
\psProtractor[ProScale=0.5]{30}(A)
\psProtractor[ProLineCol=Yellow,ProScale=0.5]{90}(B)
\end{pspicture}
```



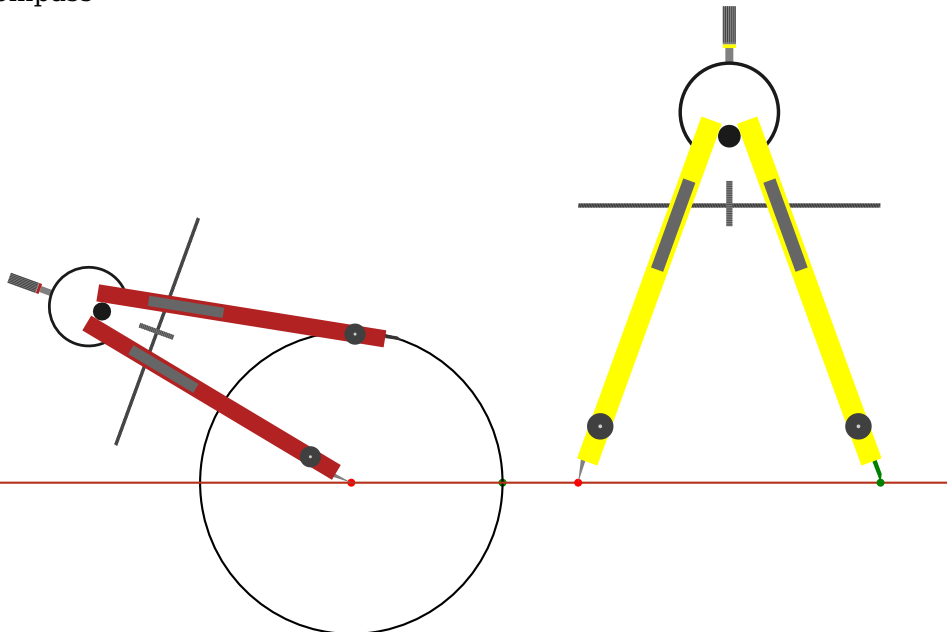
```
\begin{pspicture}(-8,-6.5)(5,2)
\pnode(-2,-2){A}\psdot[linecolor=Green,dotsize=5pt](A)\uput[45](A){A}
\pnode(5,-4){B}\psdot[linecolor=Green,dotsize=5pt](B)\uput[45](B){B}
\pcline[linecolor=Green](A)(B)
\psProtractor[ProScale=0.5]{0}(A)(B)
\psProtractor[ProLineCol=Yellow,ProScale=0.5]{190}(A)(B)
\end{pspicture}
```


The predefined nodes of a protractor.



```
\begin{pspicture}(-8,-6.5)(5,0.3)
\psProtractor[ProScale=0.75]{0}{0,0}
\psdot[linecolor=Green,dotsize=7pt](GeodrA)\uput[45](GeodrA){GeodrA}
\psdot[linecolor=Blue,dotsize=7pt](GeodrB)\uput[135](GeodrB){GeodrB}
\psdot[linecolor=BrickRed,dotsize=7pt](GeodrC)\uput[-90](GeodrC){GeodrC}
\end{pspicture}
```

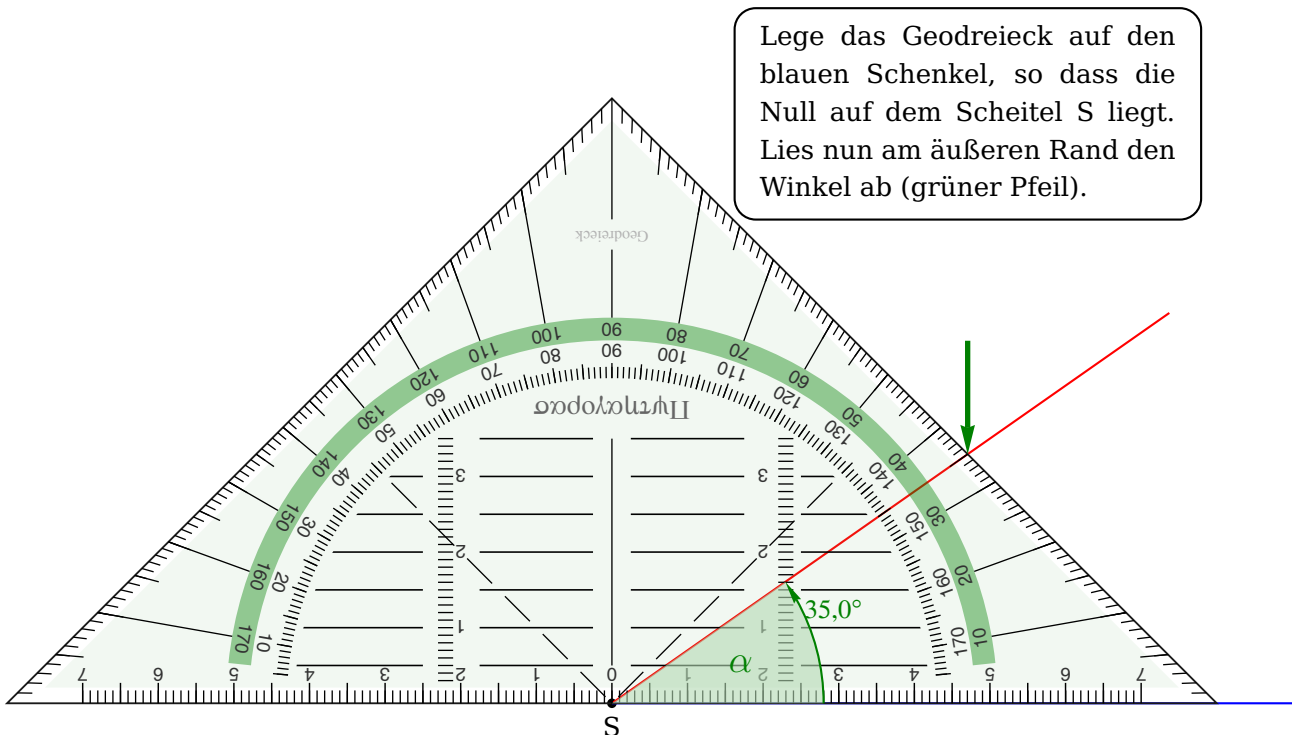
Compass



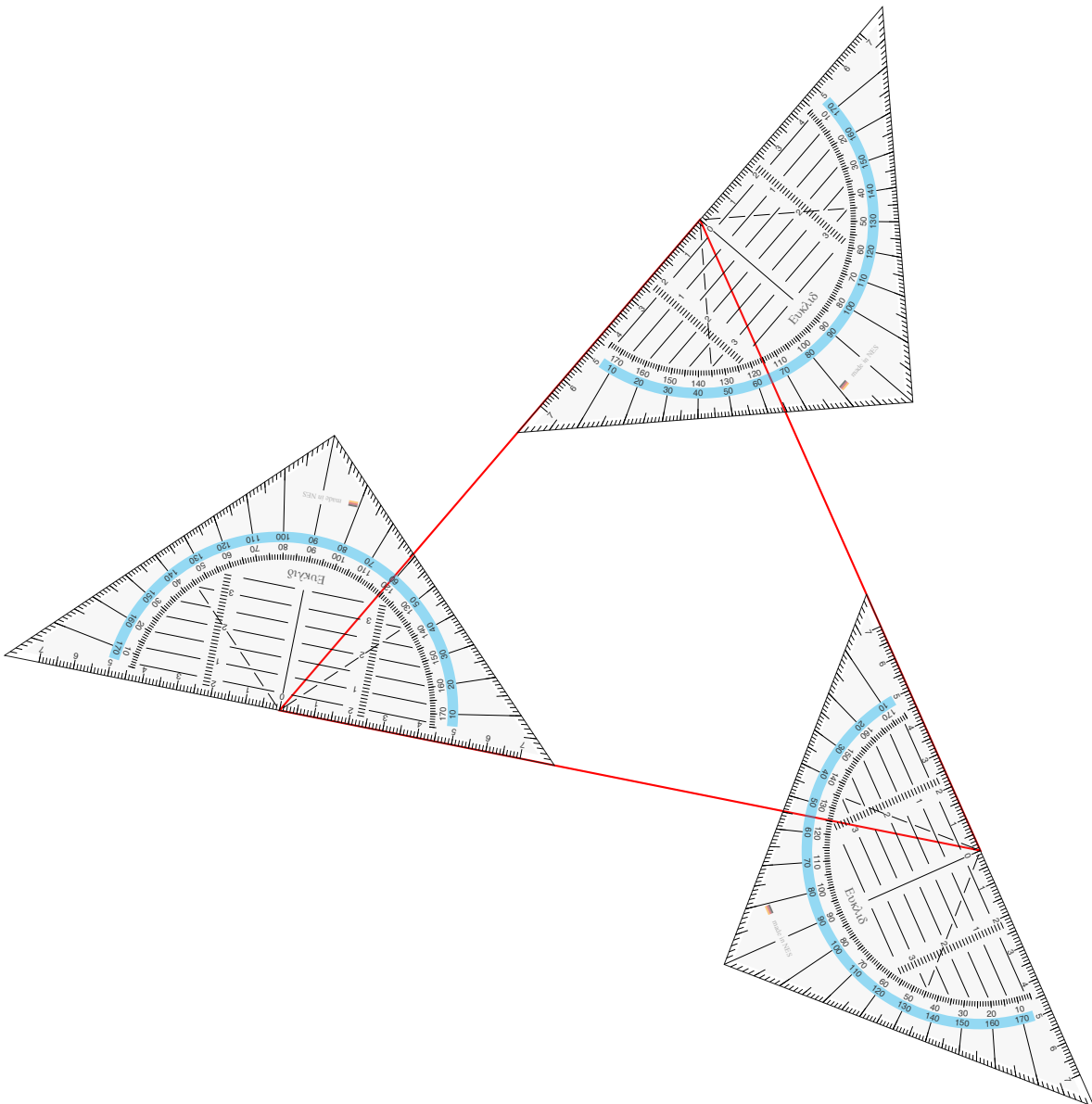
```
\begin{pspicture}(-6,-2)(6,6)%
\pnode(-1,0){A}\psdot[dotsize=3pt,linecolor=red](A)
\pnode(1,0){B}\psdot[dotsize=3pt,linecolor=Green](B)
\pscircle(A){2}
\pcline[linecolor=BrickRed,nodesepA=-9,nodesepB=-6](A)(B)
\psCompass[PoCAngle=70,PoCScale=0.8]{2}(A)
\pnode(2,0){A}\psdot[dotsize=3pt,linecolor=red](A)
\pnode(6,0){B}\psdot[dotsize=3pt,linecolor=Green](B)
\psCompass[PoCScale=1,PoCFillColor=Yellow,PoCAngle=0,PoCMineCol=Green]{5}(A)(B)
\end{pspicture}
```

3 Advanced examples

Measuring the angles of a given triangle.



```
\newpsstyle{WkMessung}{linestyle=none,AngleValue=true,ArcColor=Green,arrows=->,WedgeOpacity
=0.6,WedgeColor=Green!30,LabelSep=1.6,MarkAngleRadius=2.8,linecolor=Green,decimals=1,
comma,xShift=-6,yShift=9}
\newpsstyle{GeoDrG}{country=G,ProScale=1,ProLineCol=Green,ProFillCol=Green!50,OwnerTxt={
Pythagoras},MadeTxt={Geodreieck}}
\begin{pspicture}(0,-1)(17,10)
\pnode(8,0){S}\uput[d](S){S}\psdot(S)
\pnode(17,0){B}
\rput(S){\pnode(7;35){C}}
\pcline[linecolor=blue,nodesepB=-0](S)(B)
\pcline[linecolor=red,nodesepB=-2](S)(C)
\psProtractor[style=GeoDrG]{0}(S)(B)
\psIntersectionPoint(S)(C)(GeodrB)(GeodrC){D}% pstricks-add
\pcline[linecolor=Green,arrowinset=0.1,arrowlength=2,linewidth=2pt]{->}([offset=1.5cm]D)(D)
\psGetAngleABC[style=WkMessung](B)(S)(C){\Large\color{Green}\alpha}% pst-eucl
\rput([offset=4.5]D){\psframebox[framesep=6pt,framearc=0.2]{
\begin{minipage}[t]{5.5cm}
Lege das Geodreieck auf den blauen Schenkel, so dass die Null auf dem Scheitel S liegt.
Lies nun am \{"a{u}{\ss}eren Rand den Winkel ab (gr\{u}ner Pfeil).
\end{minipage}
}}
\end{pspicture}
```

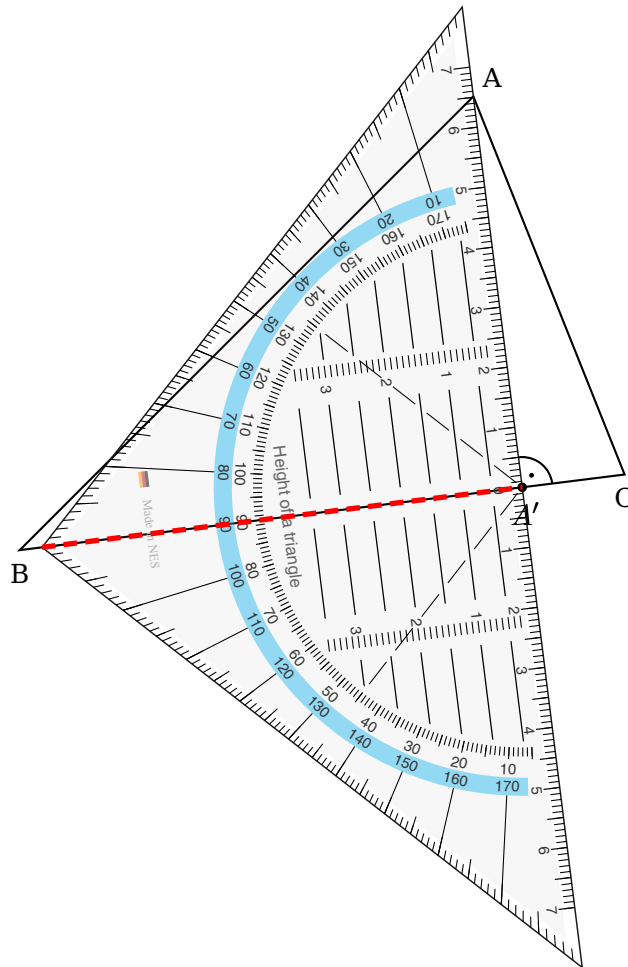


```

\begin{pspicture}(-9,-6)(7,10)
\pnode(1,7){A}
\pnode(-5,0){B}
\pnode(5,-2){C}
\pspolygon[linecolor=red](A)(B)(C)
\psProtractor[ProScale=0.5]{0}(A)(B)
\psProtractor[ProScale=0.5]{0}(B)(C)
\psProtractor[ProScale=0.5]{0}(C)(A)
\end{pspicture}

```

Constructing the height of a given triangle.



```
\begin{pspicture}(-6,-4.5)(5,8)
\pnode(1,7){A}
\pnode(-5,1){B}
\pnode(3,2){C}
\uput[ur](A){A}
\uput[d](B){B}
\uput[d](C){C}
\pspolygon(A)(B)(C)
\pstProjection{B}{C}{A}[A']% pst-eucl
\psProtractor[ProScale=0.8,OwnerTxt={Height of a triangle},MadeTxt={Made in NES},PSfont0=
  Helvetica,PSfontM=Times-Roman,fontsize0=8,fontsizeM=6]{0}(A')(A)
\pcline[linecolor=red,linestyle=dashed,linewidth=2pt](GeodrC)(A')
\pstRightAngle[RightAngleType=german]{C}{A'}{A}% pst-eucl
\end{pspicture}
```

4 List of all optional arguments for pst-geometrictools

Key	Type	Default
Ghost	boolean	true
ProLineCol	ordinary	cyan
ProFillCol	ordinary	gray!60
ProScale	ordinary	1
OwnerTxt	ordinary	Euklid
MadeTxt	ordinary	made in NES
PSfontO	ordinary	Symbol
fontsizeO	ordinary	10
PSfontM	ordinary	Times-Roman
fontsizeM	ordinary	6
country	ordinary	Germany
PenScale	ordinary	1
PenLength	ordinary	5
pencilColA	ordinary	red
pencilColB	ordinary	HolzCol
RulerFillCol	ordinary	cyan!60
RulerScale	ordinary	1
MCAngle	boolean	true
PoCLength	ordinary	5
PoCAngle	ordinary	0
PoCFillCol	ordinary	PoCRed
PoCMineCol	ordinary	black!80
PoCScale	ordinary	1
RadVS	ordinary	RVS
AngleVS	ordinary	AVS
RadMul	ordinary	1
DistCoeff	ordinary	1

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