pst-geometric-tools v 1.1
A PSTricks package to draw a protractor, a ruler, a compass and pencils

September 16, 2017

Package author(s):
Thomas Söll
Contents

1 How to use the commands .......................... 4
  1.1 \psProtractor ....................................... 4
  1.2 \psRuler ........................................... 4
  1.3 \psCompass ...................................... 5
  1.4 \psPencil ......................................... 5
  1.5 \psParallels (Idea and realization by Manuel Luque) .. 6

2 Basic Examples .................................... 7

3 Advanced examples .................................. 10

4 List of all optional arguments for pst-geometric tools 13
The package \texttt{pst-geometrictools} offers some customizable options to setup a \textit{protractor}, a \textit{ruler}, a \textit{compass} and \textit{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 \texttt{pst-eucl} (by Dominique Rodriguez) which makes it easy to position the tools precisely.

Have fun to use it!

This program can redistributed and/or modified under the terms of the LaTeX Project Public License Distributed from CTAN archives in directory macros/latex/base/lppl.txt; either version 1.3c of the License, or (at your option) any later version.
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=, PSfontO=, fontsizeO=, PSfontM=, fontsizeM=, country= and Ghost=.

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

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=.

<table>
<thead>
<tr>
<th>Name</th>
<th>Default</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>RulerScale</td>
<td>1</td>
<td>scale factor of the ruler</td>
</tr>
<tr>
<td>RulerFillCol</td>
<td>gray</td>
<td>color of the ruler</td>
</tr>
</tbody>
</table>

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 \texttt{\psCompass}

\texttt{\psCompass\ [Options]\ \{radius\}\ (coordinates\ of\ origin)}
\texttt{\psCompass\ [Options]\ \{radius\}\ (coordinates\ of\ origin)\ (coordinates\ of\ a\ second\ point)}

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

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

The command \texttt{\psCompass} offers a positioning

- either by one point and the radius—a rotation is set with \texttt{[PoCAngle=30]}.

- or by two points (the radius and initial angle then are calculated automatically)—if one sets an additional rotation with \texttt{[PoCAngle=30]}, these two angles are automatically added. If one will suppress the initial rotation, then set \texttt{[MCAngle=false]}. Using \texttt{RadVS=<unique \ name>} and \texttt{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 \texttt{RadMul=<decimal \ number>} to multiply the initial radius with this factor.

1.4 \texttt{\psPencil}

\texttt{\psPencil\ [Options]\ \{angle\}\ (coordinates\ of\ the\ cone\ end)}

The command \texttt{\psPencil} contains the options \texttt{PenScale=}, \texttt{PenLength=}, \texttt{pencilColA=} and \texttt{pencilColB=}.

<table>
<thead>
<tr>
<th>Name</th>
<th>Default</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PenScale</td>
<td>1</td>
<td>scale factor</td>
</tr>
<tr>
<td>PenLength</td>
<td>5</td>
<td>length of the pencil</td>
</tr>
<tr>
<td>pencilColA</td>
<td>red</td>
<td>color of the pencil</td>
</tr>
<tr>
<td>pencilColB</td>
<td>HolzCol</td>
<td>color of the wooden cone end</td>
</tr>
</tbody>
</table>
1.5 \texttt{\textbackslash psParallels} (Idea and realization by Manuel Luque)

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

The command \texttt{\textbackslash psParallels} contains the option \texttt{DistCoeff=}.

<table>
<thead>
<tr>
<th>Name</th>
<th>Default</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DistCoeff</td>
<td>1</td>
<td>relative distance between (AB) and C</td>
</tr>
</tbody>
</table>

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 \texttt{\textbackslash 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 \texttt{[DistCoeff=} as within \texttt{pst-eucl}. If \texttt{[DistCoeff=0]} the hypotenuse of the protractor lays on the line (AB), the ruler automatically positions below the protractor.

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

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:
  ```latex
  \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:
  ```latex
  \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,-2){A}\psdot[linestyle=Green,dotsize=5pt]{A}\rput[90](A){A}
\pnode(5,-2){B}\psdot[linestyle=Green,dotsize=5pt]{B}\rput[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[linestyle=Green,dotsize=5pt]{A}\rput[45](A){A}
\pnode(5,-4){B}\psdot[linestyle=Green,dotsize=5pt]{B}\rput[45](B){B}
\psline[linestyle=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)(B)
\pnode(2,0){A}\psdot[dotsize=3pt,linecolor=red](A)
\pnode(6,0){B}\psdot[dotsize=3pt,linecolor=Green](B)
\psCompass[PoCScale=1,PoCFillCol=Yellow,PoCAngle=0,PoCMineCol=Green]{5}(A)(B)
\end{pspicture}
3 Advanced examples

Measuring the angles of a given triangle.

Lege das Geodreieck auf den blauen Schenkel, so dass die Null auf dem Scheitel S liegt. Lies nun am äußeren Rand den Winkel ab (grüner Pfeil).

\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]{$\alpha$}}
\begin{minipage}{5.5cm}
Lege das Geodreieck auf den blauen Schenkel, so dass die Null auf dem Scheitel S liegt.
Lies nun am äußeren Rand den Winkel ab (grüner 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}% pst-eucl
\psProtractor[ProScale=0.8,OwnerTxt={Height of a triangle},MadeTxt={Made in NES},PSfontO=Helvetica,PSfontM=Times-Roman,fontsizeO=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-geometricstools

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghost</td>
<td>boolean</td>
<td>true</td>
</tr>
<tr>
<td>ProLineCol</td>
<td>ordinary</td>
<td>cyan</td>
</tr>
<tr>
<td>ProFillCol</td>
<td>ordinary</td>
<td>gray!60</td>
</tr>
<tr>
<td>ProScale</td>
<td>ordinary</td>
<td>1</td>
</tr>
<tr>
<td>OwnerTxt</td>
<td>ordinary</td>
<td>Euklid</td>
</tr>
<tr>
<td>MadeTxt</td>
<td>ordinary</td>
<td>made in NES</td>
</tr>
<tr>
<td>PSfontO</td>
<td>ordinary</td>
<td>Symbol</td>
</tr>
<tr>
<td>fontsizeO</td>
<td>ordinary</td>
<td>10</td>
</tr>
<tr>
<td>PSfontM</td>
<td>ordinary</td>
<td>NimbusRomNo9L-Regu</td>
</tr>
<tr>
<td>fontsizeM</td>
<td>ordinary</td>
<td>6</td>
</tr>
<tr>
<td>country</td>
<td>ordinary</td>
<td>Germany</td>
</tr>
<tr>
<td>PenScale</td>
<td>ordinary</td>
<td>1</td>
</tr>
<tr>
<td>PenLength</td>
<td>ordinary</td>
<td>5</td>
</tr>
<tr>
<td>pencilColA</td>
<td>ordinary</td>
<td>red</td>
</tr>
<tr>
<td>pencilColB</td>
<td>ordinary</td>
<td>HolzCol</td>
</tr>
<tr>
<td>RulerFillCol</td>
<td>ordinary</td>
<td>cyan!60</td>
</tr>
<tr>
<td>RulerScale</td>
<td>ordinary</td>
<td>1</td>
</tr>
<tr>
<td>MCAngle</td>
<td>boolean</td>
<td>true</td>
</tr>
<tr>
<td>PoCLength</td>
<td>ordinary</td>
<td>5</td>
</tr>
<tr>
<td>PoCAngle</td>
<td>ordinary</td>
<td>0</td>
</tr>
<tr>
<td>PoCFillCol</td>
<td>ordinary</td>
<td>PoCRed</td>
</tr>
<tr>
<td>PoCMineCol</td>
<td>ordinary</td>
<td>black!80</td>
</tr>
<tr>
<td>PoCScale</td>
<td>ordinary</td>
<td>1</td>
</tr>
<tr>
<td>RadVS</td>
<td>ordinary</td>
<td>RVS</td>
</tr>
<tr>
<td>AngleVS</td>
<td>ordinary</td>
<td>AVS</td>
</tr>
<tr>
<td>RadMul</td>
<td>ordinary</td>
<td>1</td>
</tr>
<tr>
<td>DistCoeff</td>
<td>ordinary</td>
<td>1</td>
</tr>
</tbody>
</table>
Index

AngleVS, 5

country, 4

DistCoeff, 6

fontsizeM, 4

fontsizeO, 4

Ghost, 4

Keyword

AngleVS, 5
country, 4
DistCoeff, 6
fontsizeM, 4

Ghost, 4
MadeTxt, 4
MCAngle, 5
OwnerTxt, 4
pencilColA, 5
pencilColB, 5
PenLength, 5
PenScale, 5
PoCAngle, 5
PoCFillCol, 5
PoCLength, 5
PoCMineCol, 5
PoCScale, 5
ProFillCol, 4
ProLineCol, 4
ProScale, 4
\psCompass, 5
PSfontM, 4
PSfontO, 4
\psParallels, 6
\psPencil, 5
\psProtractor, 4, 7
\psRuler, 4, 7
pst-eucl, 3
pst-geometrictools, 3
pencilColA, 5
pencilColB, 5
PenLength, 5
PenScale, 5
PoCAngle, 5
PoCFillCol, 5
PoCLength, 5
PoCMineCol, 5
PoCScale, 5
ProFillCol, 4
ProLineCol, 4
ProScale, 4
\psCompass, 5
PSfontM, 4
PSfontO, 4
\psParallels, 6
\psPencil, 5
\psProtractor, 4, 7
\psRuler, 4, 7
pst-eucl, 3
pst-geometrictools, 3
RadMul, 5
RadVS, 5
RulerFillCol, 4
RulerScale, 4

Macro

\psCompass, 5
\psParallels, 6
\psPencil, 5
\psProtractor, 4, 7
\psRuler, 4, 7
MadeTxt, 4