

# SOROBAN abacus

package `pgf-soroban`

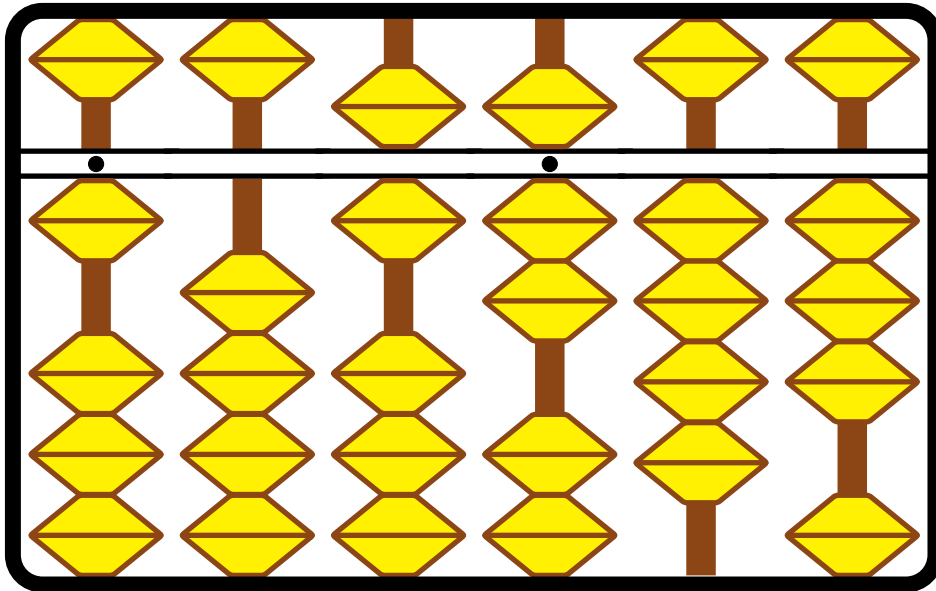
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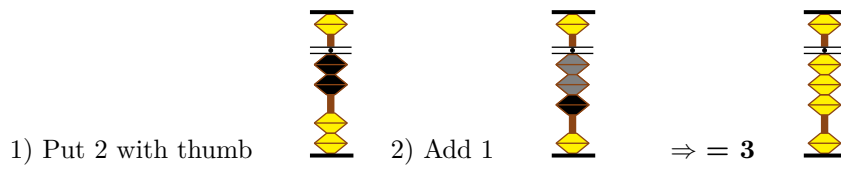
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# 1 Original size

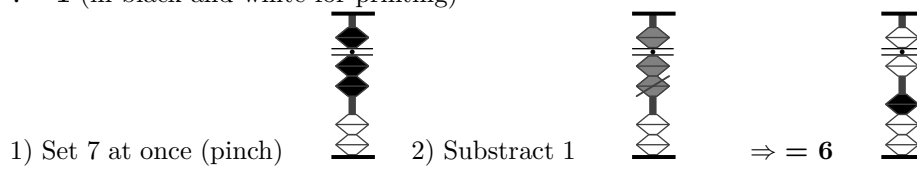


# 2 Example of use

Step 1  $2 + 1$  (in colours)



$7 - 1$  (in black and white for printing)



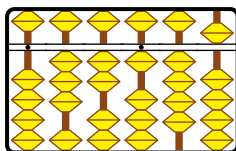
### 3 Using the package

In the preamble, insert the instruction `\usepackage{pgf-soroban}`<sup>1</sup>. There is no need to load the corresponding graphics package as the packages are required by the soroban package.

The package also sets a base unit as 1 mm, as well as other lengths; this draws a soroban of the normal size as used in schools, shops, . . . If one wants to change the size, one sets the units by `\ladj{0.25}` (here  $\frac{1}{4}$  of the normal size). That instruction can be used any time in the document to change the size for some part if required.

To draw a soroban, one draws rod(s) with the required bids in the right position and add either a frame or just top and bottom parts of the frame. One can then add some bids in other colours and also cross some bids.

Let's draw a soroban representing the number 321.45 in small size: 0.25.



line	tikz/pgf	PStricks
1	<code>\ladj{0.25}</code>	<code>\psset{unit=0.25mm}</code>
2	<code>\begin{tikzpicture}</code>	<code>\begin{pspicture}(-2,-2)(122,76)</code>
3	<code>\tigr{1}{0}{1}</code>	<code>\tigr{1}{0}{1}</code>
4	<code>\tigr{2}{3}{0}</code>	<code>\tigr{2}{3}{0}</code>
5	<code>\tigr{3}{2}{0}</code>	<code>\tigr{3}{2}{0}</code>
6	<code>\tigr{4}{1}{1}</code>	<code>\tigr{4}{1}{1}</code>
7	<code>\tigr{5}{4}{0}</code>	<code>\tigr{5}{4}{0}</code>
8	<code>\tigr{6}{5}{0}</code>	<code>\tigr{6}{5}{0}</code>
9	<code>\cadre{6}</code>	<code>\cadre{6}</code>
10	<code>\end{tikzpicture}</code>	<code>\end{pspicture}</code>

Line 1 defines the size, lines 2 and 10 create the picture environment, lines 3–8 draw the rods and line 9 creates the frame.

It is not necessary for tikz to specify the dimensions of the picture as the package reserves the area needed for the created graphic.<sup>2</sup>

To draw a rod, one uses the command `\tigr`. The syntax is:

$$\text{\tigr}[\langle st \rangle]{\langle nu \rangle}{\langle val \rangle}{\langle un \rangle}$$

The `<nu>` argument numbers the rods from left to right. `<val>` is the number to be represented on the rod from 0 to 9. The `<un>` argument tells that there is a dot on the central bar (1) or not (0); there is normally a dot for the unit, thousand, million, . . . ranks.

<sup>1</sup> There is a corresponding package `pst-soroban.sty` for use with Pstricks.

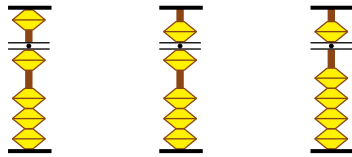
<sup>2</sup> For Pstricks (`pst-soroban`), one has to give the dimensions of the picture, otherwise the drawing would have no size and would overlap the surrounding text. One gives some space before and below `((-2,-2))` and after above. The picture is 74.6 units high and 20\* number of rods wide (here `(122,76)`). Of course, if one adds something before, under, after or above the soroban, one has to adjust the corresponding part of the frame dimension.

The `<st>` argument is optional and tells at which position the drawing is started; the default value is 1. This is interesting when one wants to put more than one drawing on a line:

```

\begin{tikzpicture}
\tige{1}{1}{1}
\barres{1}
\tige{5}{1}{6}{1}
\barres[5]{1}
\tige{9}{1}{5}{1}
\barres[9]{1}
\end{tikzpicture}

```



In this example, there is no frame but only parts of it above and below; this is created with the `\barres` command. The syntaxes for the frame and top/bottom lines are:

`\cadre[<st>]{<nb>}` and `\barres[<st>]{<nb>}`.

The optional `<st>` arguments are the same as the one of `\tige`, the `<nb>` argument tell how many rods have to be covered.

If one wants to colour a specific bid , one can achieve this with `\binoire`:

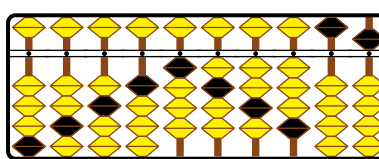
`\binoire[<st>]{<nu>}{<pos>}{<col>}`

`<st>` and `<nu>` arguments are the same as for `\tige`; the `<col>` argument defines the colour and the `<pos>` argument tells which bid has to be coloured as shown in the following example.

```

\begin{tikzpicture}
\tige{1}{0}{1}
\tige{2}{0}{1}
\tige{3}{0}{1}
\tige{4}{0}{1}
\tige{5}{4}{1}
\tige{6}{4}{1}
\tige{7}{4}{1}
\tige{8}{4}{1}
\tige{9}{0}{1}
\tige{10}{5}{1}
\cadre{10}
\binoire{1}{1}{black}
\binoire{2}{2}{black}
\binoire{3}{3}{black}
\binoire{4}{4}{black}
\binoire{5}{5}{black}
\binoire{6}{6}{black}
\binoire{7}{7}{black}
\binoire{8}{8}{black}
\binoire{9}{9}{black}
\binoire{10}{10}{black}
\end{tikzpicture}

```



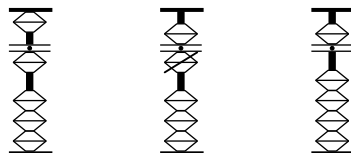
The `\barbil` command allows to cross a bid (see example below); the syntax is:

$$\backslash\text{barbil}[\langle st \rangle]{\langle nu \rangle}{\langle pos \rangle}$$

The arguments `<st>`, `<nu>` and `<pos>` have the same meaning as those of `\binoire`.

Finally, one can change the overall colours of the rods and the bids, for example to print in black and white. This is done by changing the values of the `\colbil` (for the bids) and `\coltig` (for the rods) commands; by default there are “yellow” and “brun” (new brown colour defined in the package).

```
\renewcommand{\colbil}{white}
\renewcommand{\coltig}{black}
\begin{tikzpicture}
\tige{1}{1}{1}
\barres{1}
\tige[5]{1}{6}{1}
\barbil[5]{1}{5}
\barres[5]{1}
\tige[9]{1}{5}{1}
\barres[9]{1}
\end{tikzpicture}
```



## References

- [1] Kjell Magne Fauskes. *PGF and TikZ examples gallery*. <http://www.fauskes.net/pgftikzexamples/>, 2007.
- [2] Kjell Magne Fauskes. *PGF and TikZ resources*. <http://www.fauskes.net/pgftikzexamples/resources/>, 2007.
- [3] Michel Goossens, Frank Mittelbach, Sebastian Rahtz, Denis Roegel, and Herbert Voß. *The L<sup>A</sup>T<sub>E</sub>X Graphics Companion*. Addison-Wesley Publishing Company, Reading, Mass., 2007.
- [4] Alain Matthes. *TikZ/PGF*. <http://www.altermundus.fr/pages/pdflatex/tikz.html>, 2007.
- [5] Andrew Mertz and William Slough. *Graphics with PGF and TkZ*. <http://www.tug.org/pracjourn/2007-1/mertz/>, 2007.
- [6] Till Tantau. *PGF and TikZ – Graphic systems for TeX*. <http://sourceforge.net/projects/pgf>, 2007.
- [7] Till Tantau. *TikZ and PGF. Manual for version 1.18*. <http://sourceforge.net/projects/pgf>, 2007.