suanpan-l3—算盘 (Abacus) 排版宏包 ⟹ English Version

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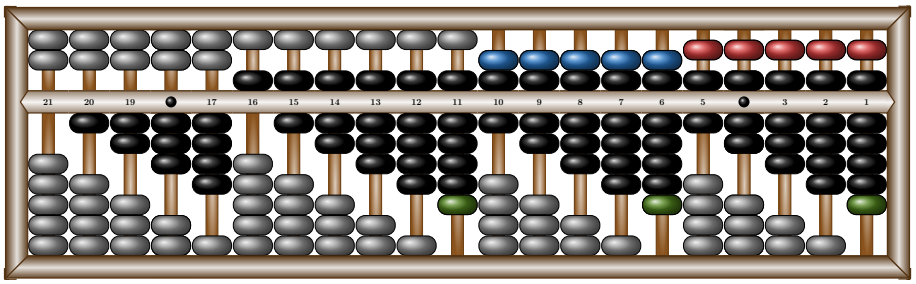
摘要

suanpan-l3 是一个基于 l3draw 和 TikZ 绘图宏包，用 Expl3 开发的中国传统 7 珠圆珠算盘排版宏包，它能够实现使用普通上珠、下珠和底珠、顶珠及悬珠的算盘排版。该宏包提供了唯一的一个 suanpan 算盘排版环境及仅在该环境中使用的 \rod、\rods、\bid、\bids、\rodmark和\mkframe档杆、算珠着色、横梁标记和边框排版命令。同时，该宏包还提供了\suanpanset命令用于对算盘外观进行设置。



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*https://gitee.com/nwafu_nan/suan-pan

1 引言

suanpan-l3 宏包是一个基于 l3draw 和 TikZ 绘图宏包，用 Expl3 开发的中国传统 7 珠圆珠算盘排版宏包，它利用 l3draw 宏包，通过 l3coffin 容器的平移变换，将使用 TikZ 宏包绘制的算珠、档杆、边框等基本图元组装成算盘，从而实现算盘的排版。

由于圆珠是通过圆角矩形实现的，因此当算珠数量较多时，绘制耗时较长，其编译速度较慢。

2 用户接口

2.1 suanpan 算盘排版环境

suanpan `\begin{suanpan}[⟨外观选项⟩]`

```
.....
\end{suanpan}
```

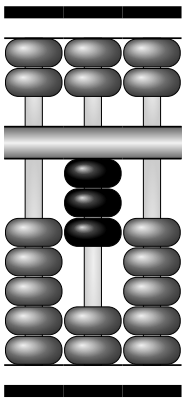
按可选项设置的 [⟨外观选项⟩] 实现算盘排版。

在 suanpan 环境中，可以通过专用命令\rod(排版算盘的一个档位)，\rods(排版一组档位)，\bid(指定算珠颜色)，\bids(指定内/外珠颜色)，\rodmark(为档位添加标记)，\mkframe(排版边框) 按需实现算盘排版。

在 [⟨外观选项⟩] 中可以通过 key-value 的方式设置线宽、颜色、缩放比例等外观属性。

通过 [⟨外观选项⟩] 设置的外观参数仅对 suanpan 环境局部有效。

注意: suanpan 环境中**不可以出现空行**。



```
\centering
% 为便排版，进行缩放
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rod{1}{0}
  \rod{2}{3}
  \rod{3}{0}
\end{suanpan}
```

2.2 suanpan 环境中的专用命令

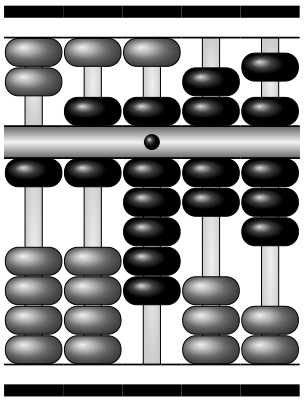
2.2.1 \rod单一档位排版命令

\rod `\rod {⟨档位编号⟩} {⟨档位数字⟩}`

用于排版 {⟨档位编号⟩}(基于 1，从左向右进行编号) 参数指定的算盘档位，本档的计数值由 {⟨档位数字⟩} 参数指定。

{⟨档位数字⟩} 支持 [0, 20] 内的数字，其中 [0, 9] 内的数字采用常规 4 个下珠结合 1 个上珠的方法进行表示，[10, 15] 内的数字则需要额外使用“底珠”和“顶珠”进行表示，[16, 20] 内的数字则需要再额外使用“悬珠”进行表示。

宏包还为\rod命令同时提供了\rod*星号命令用于排版在横梁上带有计位点 (圆点) 的档位。



```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rod{1}{1}   % 常规档位
  \rod{2}{6}
  \rod*{3}{10} % 计位点，使用底珠
  \rod{4}{12}  % 使用顶珠
  \rod{5}{18}  % 使用悬珠
\end{suanpan}
```

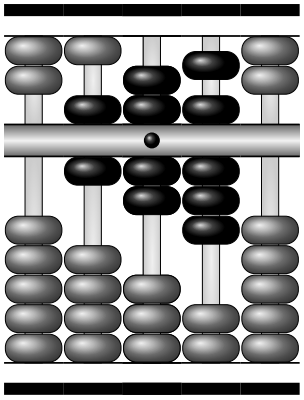
2.2.2 \rods一组档位排版命令

\rods \rods {⟨数字列表⟩}

用于排版在 {⟨数字列表⟩} 中用逗号分隔的一组数字指定的档位，各档位编号基于 1，从左向右进行自动编号。

{⟨数字列表⟩} 中的各档位数字支持 [0, 20] 内的数字，其中 [0, 9] 内的数字采用常规 4 个下珠结合 1 个上珠的方法进行表示，[10, 15] 内的数字则需要额外使用“底珠”和“顶珠”进行表示，[16, 20] 内的数字则需要再额外使用“悬珠”进行表示。

注意: 宏包并没有为\rods命令提供在横梁排版计位点的档位的操作。如果需要，则可以使用\rod*命令对指定档位进行覆盖绘制。



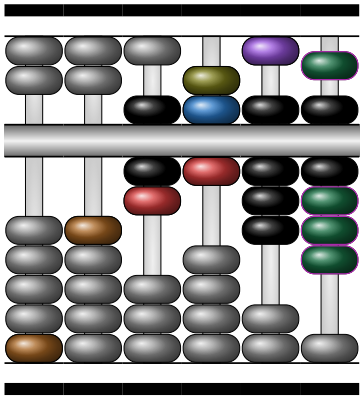
```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 6, 12, 18, 0}
  \rod*{3}{12}
\end{suanpan}
```

2.2.3 \bid算珠着色命令

\bid \bid {⟨档位编号⟩}{⟨位置列表⟩}{⟨填充颜色⟩}[⟨绘制颜色⟩]

用于将 {⟨档位编号⟩} 指定的档位中，用逗号分隔的 {⟨位置列表⟩} 中指定的所有算珠的填充色设置为 {⟨填充颜色⟩} 指定的颜色，将其绘制颜色设置为可选项 [⟨绘制颜色⟩](默认为内珠绘制颜色)。

一个档位中的 {⟨算珠位置⟩} 自下向上，按“$1, 2, \cdots, 11$”的顺序进行编号。其中下珠占“$1, 2, \cdots, 7$”的位置，上珠占 “$8, 9, 10$”的位置，悬珠占“11”的位置。



```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 0, 7, 11, 8, 19}
  \bid{1}{1}{brown5}
  \bid{2}{5}{brown5}
  \bid{3}{6}{red5}
  \bid{4}{7}{red5}
  \bid{4}{8}{azure5}
  \bid{4}{9}{yellow5}
  \bid{5}{10}{violet5}
  \bid{6}{4,5,6,11}{teal4}[magenta5]
\end{suanpan}
```

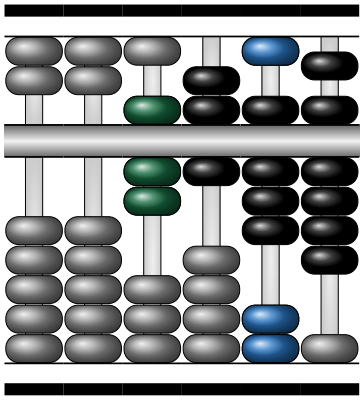
2.2.4 \bids内珠或外珠着色命令

\bids `\bids {⟨档位编号⟩}{⟨档位数字⟩}{⟨填充颜色⟩}`

用于将 {⟨档位编号⟩} 指定的档位中，所有 {⟨档位数字⟩} 的内珠设置为 {⟨填充颜色⟩} 指定的颜色。同时，该命令还将算珠绘制颜色设置内珠绘制颜色 (innerdrawcolor)。

宏包还为\bids命令同时提供了\bids*星号命令用于设置该档所有外珠的颜色。此时，算珠绘制颜色设置外珠绘制颜色 (outerdrawcolor)。

注意: 该命令只能选择内珠或外珠进行着色，不能同时选择内珠和外珠。



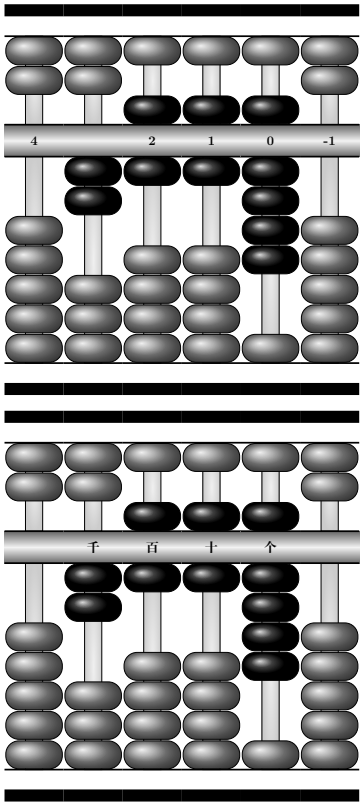
```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 0, 7, 11, 8, 19}
  \bids{3}{7}{teal4}
  \bids*{5}{8}{azure5}
\end{suanpan}
```

2.2.5 \rodmark横梁标记命令

\rodmark `\rodmark [⟨起始档位⟩]{⟨标记列表⟩}`

用于从 [⟨起始档位⟩] 可选项指定的档位开始，用 {⟨标记列表⟩} 中逗号分隔的标记在算盘横梁上为各档位添加标记。

注意: 如果 {⟨标记列表⟩} 中的标记数量超出从 [⟨起始档位⟩] 开始的档位数，多余的标记将被忽略。在 {⟨标记列表⟩} 中，可以用一对 “{}” 分组符号表示空白标记。



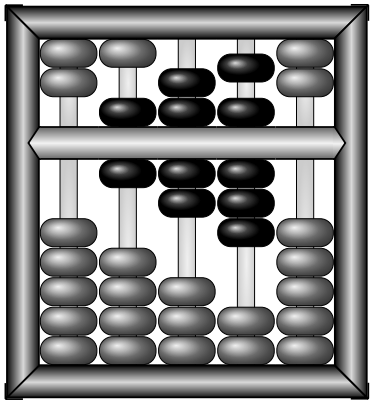

```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 2, 6, 6, 9, 0}
  \rodmark{4,{},2,1,0,-1,-2}
\end{suanpan}
```

```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 2, 6, 6, 9, 0}
  \rodmark[2]{千, 百, 十, 个}
\end{suanpan}
```

2.2.6 \mkframe边框排版命令

\mkframe \mkframe

用于排版算盘的边框。



```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 6, 12, 18, 0}
  \mkframe
\end{suanpan}
```

2.3 \suanpanset选项设置命令

\suanpanset \suanpanset {⟨外观选项⟩}

通过 {⟨外观选项⟩} 的 key-value 选项设置算盘的算珠、边框等元素的绘制颜色、填充颜色、线条宽度；各档位之间的间距、算珠之间的间距；算盘整体的缩放比例等外观属性。

通过\suanpan{⟨外观选项⟩} 设置的外观属性对后续所有算盘排版操作有效。

3 宏包选项

在 suanpan-l3 宏包中，算盘颜色、线条宽度、档位及算珠间距等算盘外观属性可以在引入宏包时通过 [⟨宏包选项⟩] 进行设置，也可以在 suanpan 环境的 [⟨外观选项⟩] 中进行局部设置，还可以通过\suanpanset命令进行全局或局部设置。

强烈建议在引用宏包时通过 [⟨宏包选项⟩] 为一个文档统一全局设置算盘外观属性，以节约编译时间。应避免频繁 suanpan 环境中使用 [⟨宏包选项⟩] 或使用\suanpanset命令设置算盘外观属性。

suanpan-l3 宏包选项是一个英文逗号分隔的选项列表，其选项是 {⟨*key*⟩}={⟨*value*⟩} 形式。部分选项的 {⟨*value*⟩} 可以省略。对于同一选项，后续设置会覆盖以前设置。

suanpan-l3 宏包采用 LaTeX3 风格的键值设置，支持不同类型以及多种层次的选项设定。键值列表中，“=” 左右的空格不影响设置。但需注意，参数列表中**不可以出现空行**。

布尔型的参数 {⟨选项⟩}=true中的 “=true” 可以省略。

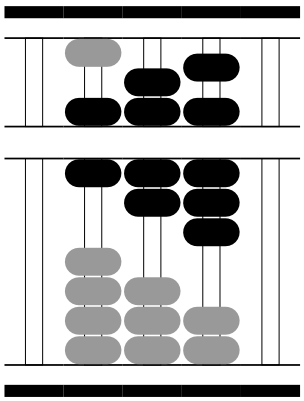
3.1 草稿模式

draft = ⟨草稿模式⟩ (init: false)

设置草稿模式。

[⟨*draft*⟩] 选项会将算珠用圆角线冒直线实现绘制，取消所有高光效果，从而加快编译速度。同时，[⟨*draft*⟩] 选项还会将空档算珠绘制选项 [⟨*empty*⟩] 设置为 false，也就是不绘制空档上的算珠。

注意: 在草稿模式下算盘排版会与期望的排版结果有出入。



```
% \usepackage[draft]{suanpan}
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}[draft]
  \rods{0, 6, 12, 18, 0}
\end{suanpan}
```

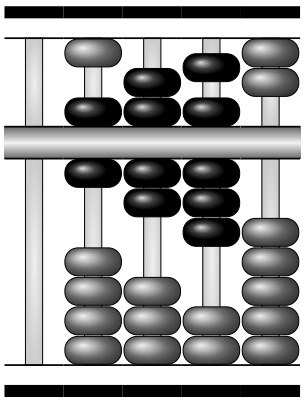
3.2 是否绘制空档算珠

empty = ⟨空档⟩ (init: true)

设置是否绘制空档算珠。

[⟨*empty*⟩] 选项用于选择是否绘制空档上的算珠，如果不绘制，在一定程度上可以加快编译速度。

注意: 如有需要，可以使用\bid或\bids*命令为空档绘制算珠。



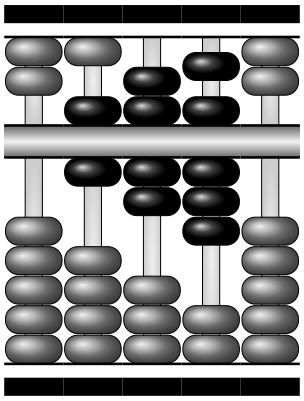
```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}[empty = false]
  \rods{0, 6, 12, 18, 0}
  \bids*{5}{0}{gray6}
\end{suanpan}
```

3.3 线宽

linewd = ⟨线宽⟩ (init: 2pt)

设置算盘绘制中的线宽。

[⟨*linewd*⟩] 选项用于设置算盘边框内线线宽，同时会将边框外线设置为 linewd 的 7.00 倍，将档杆和算珠线宽设置为 linewd 的 0.2 倍。

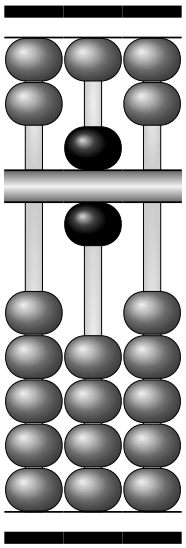


```
\centering
\suanpanset{scale = 0.65, linewd = 3pt}
\begin{suanpan}
  \rods{0, 6, 12, 18, 0}
\end{suanpan}
```

3.4 算珠高度

bidh = ⟨算珠高度⟩ (init: 12mm)

设置算珠高度。

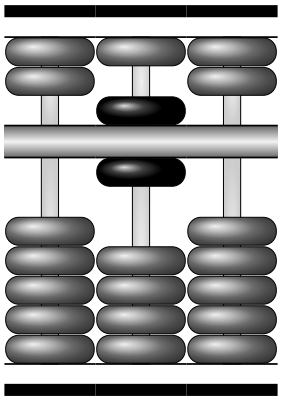


```
\centering
\suanpanset{scale = 0.65, bidh = 18mm}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

3.5 算珠直径

bidd = ⟨算珠直径⟩ (init: 23mm)

设置算珠直径。



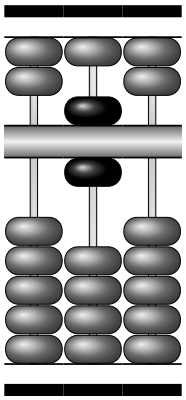
```
\centering
\suanpanset{scale = 0.65, bidd = 36mm}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

3.6 档杆直径

rodd = ⟨档杆直径⟩ (init: 7mm)

设置档杆直径。

NOTE: 档杆直径 rodd 应该小于算珠直径 bidd。

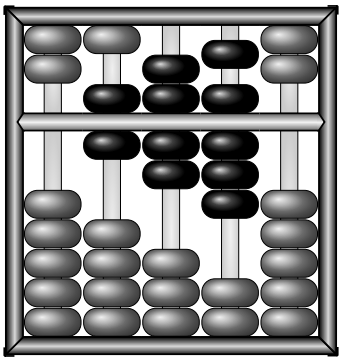


```
\centering
\suanpanset{scale = 0.65, rodd = 3mm}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

3.7 边框宽度

framew = ⟨边框宽度⟩ (init: 13mm)

设置边框宽度。

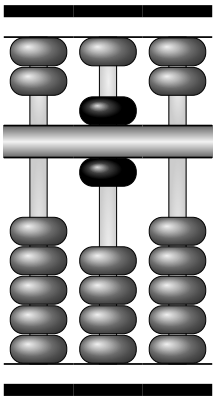


```
\centering
\suanpanset{scale = 0.65, framew = 7mm}
\begin{suanpan}
  \rods{0, 6, 12, 18, 0}
  \mkframe
\end{suanpan}
```

3.8 档位间距

rodsep = ⟨档位间距⟩ (init: 3.0pt)

设置算盘各档间的间距。



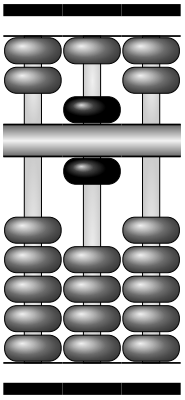
```
\centering
\suanpanset{scale = 0.65, rodsep = 15pt}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

注意: 修改档位间距会改变算盘排版的宽度。

3.9 算珠间距

bidsep = ⟨算珠间距⟩ (init: 1.8pt)

设置算珠间的间距。



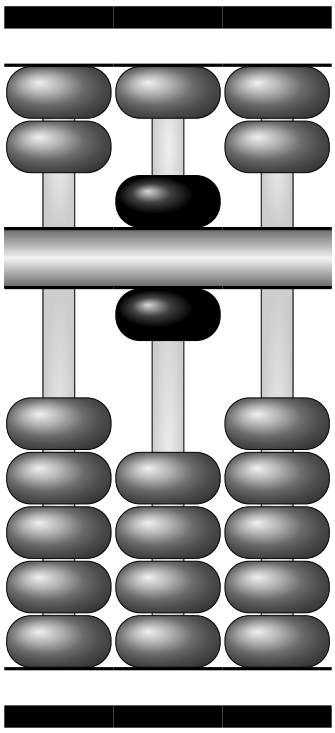
```
\centering
\suanpanset{scale = 0.65, bidsep = 4pt}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

注意: 修改算珠间距不会改变算盘的尺寸，但算珠高度会发生变化。另外，过小的算珠高度会造成算珠圆角的畸变。

3.10 缩放比例

scale = ⟨缩放比例⟩ (init: 1.0)

设置算盘输出结果的整体缩放比例。

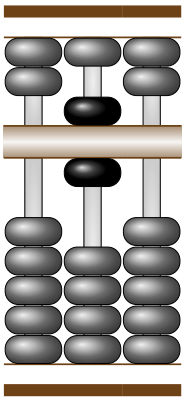


```
\centering
\suanpanset{scale = 1.20}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

3.11 边框颜色

framedraw = ⟨边框颜色⟩ (init: black)

设置算盘边框颜色。



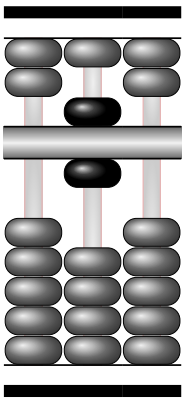
```
\centering
\suanpanset{scale = 0.65, framedraw = brown3}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

注意: 边框颜色包括内外边框和横梁颜色。

3.12 档杆绘制颜色

roddraw = ⟨档杆绘制颜色⟩ (init: black)

设置档杆绘制颜色。

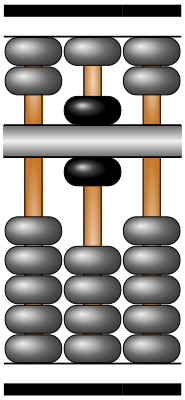


```
\centering
\suanpanset{scale = 0.65, roddraw = red8}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

3.13 档杆填充颜色

rodfill = ⟨档杆填充颜色⟩ (init: white)

设置档杆填充颜色。

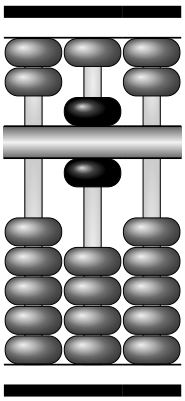


```
\centering
\suanpanset{scale = 0.65, rodfill = brown6}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

3.14 外珠绘制颜色

outerdraw = ⟨外珠绘制颜色⟩ (init: black)

设置档杆上外珠[1]绘制颜色。



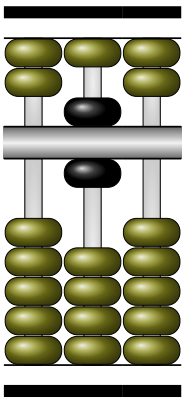
```
\centering
\suanpanset{scale = 0.65, outerdraw = red8}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

3.15 外珠填充颜色

outerfill = ⟨外珠填充颜色⟩ (init: black!40)

设置外珠填充颜色。

[1] 外珠是指离梁不记数的算珠。

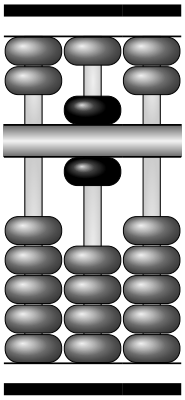


```
\centering
\suanpanset{scale = 0.65, outerfill = yellow6}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

3.16 内珠绘制颜色

innerdraw = ⟨内珠绘制颜色⟩ (init: black)

设置档杆上内珠[2]绘制颜色。

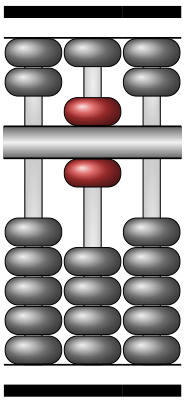


```
\centering
\suanpanset{scale = 0.65, innerdraw = red8}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

3.17 内珠填充颜色

innerfill = ⟨内珠填充颜色⟩ (init: black)

设置内珠填充颜色。



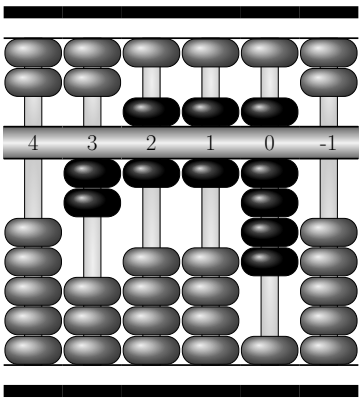
```
\centering
\suanpanset{scale = 0.65, innerfill = red5}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

3.18 标记字体

font = ⟨标记字体⟩ (init: \bfseries\Large)

设置标记字体。

[2]内珠是指靠梁记数的算珠。

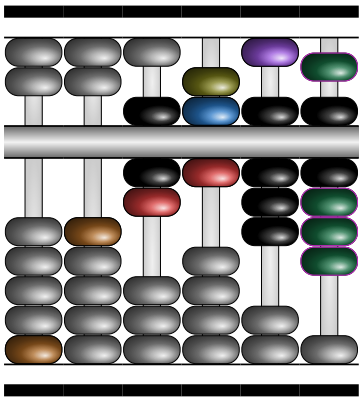



```
\centering
\suanpanset{scale = 0.65,
            font=\rmfamily\Huge}
\begin{suanpan}
  \rods{0, 2, 6, 6, 9, 0}
  \rodmark{4,3,2,1,0,-1}
\end{suanpan}
```

3.19 高光位置（角度）

bidspot = ⟨高光位置⟩ (init: 0)

设置算珠高光点的位置，用角度表示，逆时针为正。



```
\centering
\suanpanset{scale = 0.65, bidspot = 180}
\begin{suanpan}
  \rods{0, 0, 7, 11, 8, 19}
  \bid{1}{1}{brown5}
  \bid{2}{5}{brown5}
  \bid{3}{6}{red5}
  \bid{4}{7}{red5}
  \bid{4}{8}{azure5}
  \bid{4}{9}{yellow5}
  \bid{5}{10}{violet5}
  \bid{6}{4,5,6,11}{teal4}[magenta5]
\end{suanpan}
```

suanpan-l3 package for traditional Chinese 7-bids suanpan(abacus)

⟹ 中文版本

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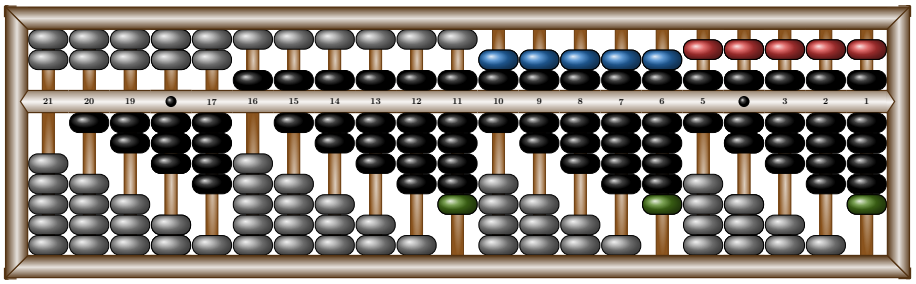
4 Introduction

suanpan-l3 is a traditional Chinese 7-bids suanpan drawing package utilizes l3draw and TikZ and is developed with Expl3. It can effectively manage both upper and lower bids, while also considering bottom bid, top bid, and hanging bid.

This package offers a unique environment for drawing suanpan, denoted as `suanpan`. Within this environment, 8 specialized macros are available for the creation of suanpan. The `\rod` macro is used to lay out a single rod, while the `\rod*` macro draws a counting point on this rod' s beam. The `\rods` macro is capable of laying out a set of rods. The `\bid` macro colors the specified bid. The `\bids` macro colors all inner bids that are near the beam, while the `\bids*` macro colors all outer bids that are far from the beam. The `\rodmark` macro mark all rods on beam. Lastly, the `\mkframe` macro is used to lay out the left and right frames of an abacus.

At the same time, the package offers customization options for suanpan, including line width, draw color, fill color, bid space, rod space, etc. These can be configured through package options, `suanpan` environment options, or the `\suanpanset` macro.



5 Interface

5.1 suanpan environment

suanpan
```
\begin{suanpan}[⟨options⟩]
.....
\end{suanpan}
```

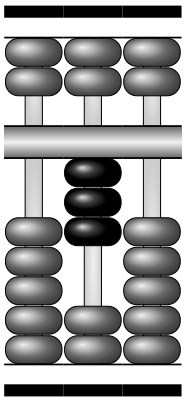
Typesetting 7-bids Chinese suanpan with `[⟨options⟩]`.

Within the `suanpan` environment, `\rod`, `\rod*`, `\rods`, `\bid`, `\bids`, `\bids*`, `\rodmark` and `\mkframe` 8 specialized macros are available for the creation of suanpan.

`[⟨options⟩]` is a key-value list for line width, draw color, fill color, bid space, rod space, etc.

`[⟨options⟩]` is environment's local setting.

NOTE: You should remove all blank line in `suanpan` environment.



```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rod{1}{0}
  \rod{2}{3}
  \rod{3}{0}
\end{suanpan}
```

5.2 suanpan's specialized macros

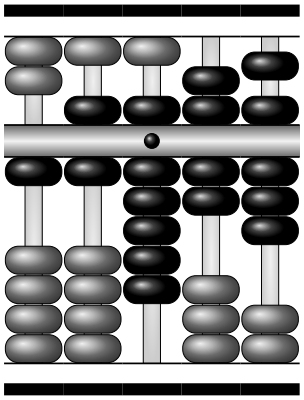
5.2.1 `\rod`—single rod

`\rod` `\rod {⟨num⟩} {⟨val⟩}`

The `\rod` macro is used to lay out a single rod.

The `{⟨num⟩}` argument numbers the rods from left to right. The `{⟨val⟩}` is the number to be represented on the rod from 0 to 20. For number within [0, 9], it is represented using 4 lower deck bids and 1 upper deck bid. Numbers within [10, 15] are represented additionally using bottom bid and top bid. For numbers within [16, 20], hanging bid is also required for representation.

The starred version `\rod*` will draw a counting point on this rod's beam.



```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rod{1}{1}   % normal rod
  \rod{2}{6}
  \rod*{3}{10} % counting point and
               % bottom bid
  \rod{4}{12}  % top bid
  \rod{5}{18}  % hanging bid
\end{suanpan}
```

5.2.2 \rods—a set of rods

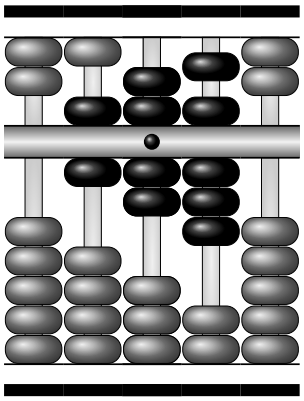
\rods \rods {⟨*val list*⟩}

The \rods macro is used to lay out a set of rods.

The {⟨*val list*⟩} is a value list of each rod seperated by commas. Each rod number is automatically numbered from left to right.

Each value in {⟨*val list*⟩} is the number to be represented on the rod from 0 to 20. For number within [0, 9], it is represented using 4 lower deck bids and 1 upper deck bid. Numbers within [10, 15] are represented additionally using bottom bid and top bid. For numbers within [16, 20], hanging bid is also required for representation.

NOTE: The starred version \rods* for counting point is not provided. Use the \rod* macro to overlay the specified rod for drawing.



```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 6, 12, 18, 0}
  \rod*{3}{12}
\end{suanpan}
```

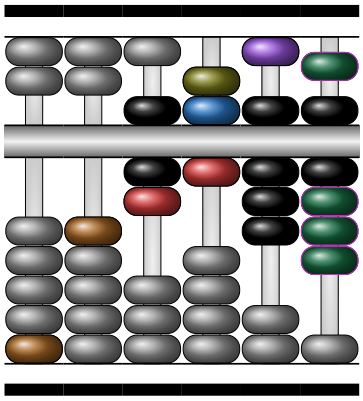
5.2.3 \bid—color bid

\bid \bid {⟨*num*⟩}{⟨*pos list*⟩}{⟨*fill color*⟩}[⟨*draw color*⟩]

The \bid macro fills the specified bid.

The {⟨*num*⟩} is the same as for \rod; the {⟨*fill color*⟩} argument defines the fill color and the comma-seperated {⟨*pos list*⟩} argument tells which bid has to be colored in {⟨*num*⟩} rod. The [⟨*draw color*⟩] option gives the draw color(default is inner bid draw color) .

The {⟨*pos*⟩} in a rod is numbered from the bottom up in the order $1, 2, \cdots, 11$. The lower deck bids occupies position $1, 2, \cdots, 7$, the upper deck bids occupies position $8, 9, 10$, and the hanging bead occupies position 11 between 9 and 10 .



```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 0, 7, 11, 8, 19}
  \bid{1}{1}{brown5}
  \bid{2}{5}{brown5}
  \bid{3}{6}{red5}
  \bid{4}{7}{red5}
  \bid{4}{8}{azure5}
  \bid{4}{9}{yellow5}
  \bid{5}{10}{violet5}
  \bid{6}{4,5,6,11}{teal4}[magenta5]
\end{suanpan}
```

5.2.4 `\bids`—color inner/outer bids

`\bids` `\bids {⟨num⟩}{⟨val⟩}{⟨color⟩}`

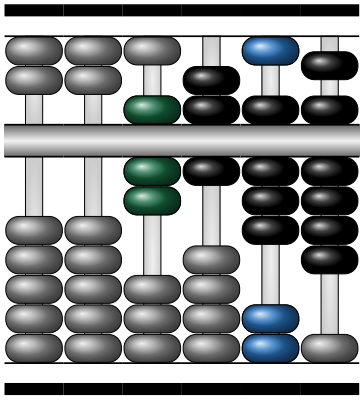
The `\bids` macro fills all inner bids that are near the beam.

`{⟨num⟩}` and `{⟨color⟩}` are the same as for `\bid`; the `{⟨val⟩}` argument is the same as for `\rod`.

The `{⟨color⟩}` is fill color for inner bids. it also set `innercolor` to be used for inner bids drawing color.

The starred version `\bids*` is used to color outer bids of `{⟨num⟩}` rod. it also set `outercolor` to be used for inner bids drawing color.

NOTE: This macro can only select the inner bids or the outer bids for coloring, you can't select both the inner and outer bids at the same time.



```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 0, 7, 11, 8, 19}
  \bids{3}{7}{teal4}
  \bids*{5}{8}{azure5}
\end{suanpan}
```

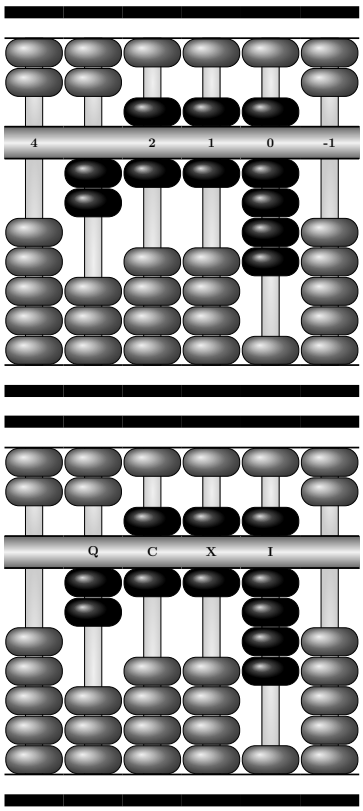
5.2.5 `\rodmark` rod(s) marking on beam

`\rodmark` `\rodmark [⟨st⟩]{⟨maker list⟩}`

The `\rodmark` macro marks the rod(s) on the beam.

The [⟨*st*⟩] argument is the start rod and {⟨*marker list*⟩} is the marker list.

NOTE: If the number of {⟨*marker List*⟩} exceeds the number of rods from [⟨*st*⟩], the excess markers will be ignored. In the {⟨*marker list*⟩}, it is possible to use a pair of "{}" grouping to indicate blank marker.



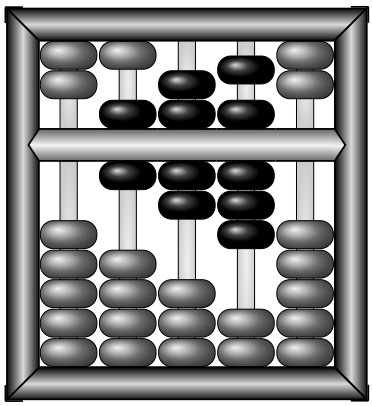

```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 2, 6, 6, 9, 0}
  \rodmark{4,{},2,1,0,-1,-2}
\end{suanpan}
```

```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 2, 6, 6, 9, 0}
  \rodmark[2]{Q,C,X,I}
\end{suanpan}
```

5.2.6 \mkframe—layout frame

`\mkframe` `\mkframe`

The `\mkframe` macro is used to lay out the frames of a suanpan.



```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}
  \rods{0, 6, 12, 18, 0}
  \mkframe
\end{suanpan}
```

5.3 \suanpanset

`\suanpanset` `\suanpanset {`⟨*options*⟩`}`

The `\suanpanset` macro offers customization options for suanpan, including line width, draw color, fill color, bid space, rod space, etc.

The `{`⟨*options*⟩`}` is a key-value list.

The `{`⟨*options*⟩`}` seted by the `\suanpanset` are valid for all subsequent `suanpan` environments.

6 options

The suanpan-l3 package offers customization options for abacus, including line width, draw color, fill color, bid space, rod space, etc. These can be configured through package `[`⟨*options*⟩`]`, `suanpan` environment `[`⟨*options*⟩`]`, or the `\suanpanset` macro.

It is strongly recommended that suanpan options be set globally for a document uniformly via `[`⟨*options*⟩`]` of packages to save compilation time. Frequent use of `[`⟨*options*⟩`]` in `suanpan` environments or use of the `\suanpanset` command to set suanpan options should be avoided.

The `[`⟨*options*⟩`]` is a comma-seperated list of options in the form `{`⟨*key*⟩`}={`⟨*value*⟩`}`. The `{`⟨*value*⟩`}` can be omitted for some options. For the same option, subsequent settings will override the previous one.

The suanpan-l3 package uses LaTeX3 style key settings, supporting different types and levels of options. In the key list, spaces around "=" do not affect the settings. However, it is important to note that blank lines are not allowed in the list.

The "`=true`" in the `{`⟨*option*⟩`}=true` for Boolean types can be omitted.

6.1 draft

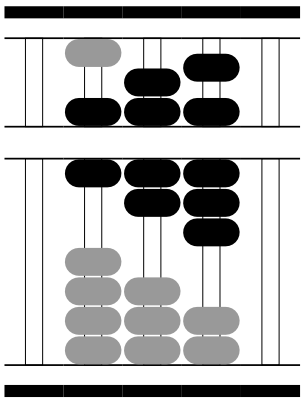
`draft = ⟨draft⟩` `(init: false)`

Draft mode.

The `[`⟨*draft*⟩`]` option speeds up compilation by drawing bids using round cap line, at same time it will remove all highlight of bid(s), rod(s) and frame.

At the same time `[`⟨*draft*⟩`]` option will set the `[`⟨*empty*⟩`]` option to `false` to remove all bids on empty rod.

NOTE: Suanpan layout in draft mode may differ from the desired layout.



```
% \usepackage[draft]{suanpan}
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}[draft]
  \rods{0, 6, 12, 18, 0}
\end{suanpan}
```

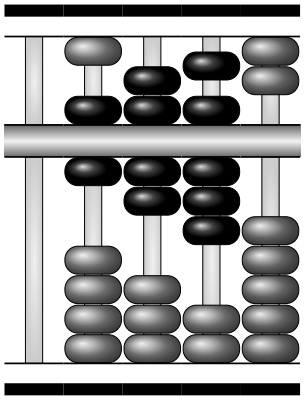
6.2 empty

`empty` = ⟨*empty*⟩ (init: true)

Remove bids on empty rod or not.

The [⟨*empty*⟩] option will remove all bids on empty rod.

NOTE: If necessary, you can use the `\bid` or `\bids*` macro to draw bid(s) for the empty rod.



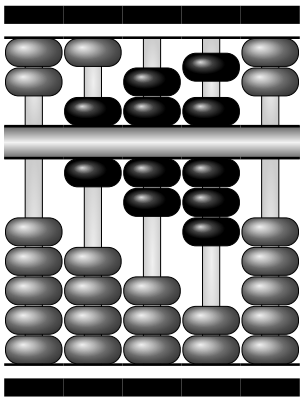
```
\centering
\suanpanset{scale = 0.65}
\begin{suanpan}[empty=false]
  \rods{0, 6, 12, 18, 0}
  \bids*{5}{0}{gray6}
\end{suanpan}
```

6.3 line width

`linewd` = ⟨*linewd*⟩ (init: 2pt)

Drawing line width.

The [⟨*linewd*⟩] is used to set the line width of the frame inner, and will also set the line width the frame outer to 7.00 times linewd, and the rod and bid line widths to 1.00 times linewd.

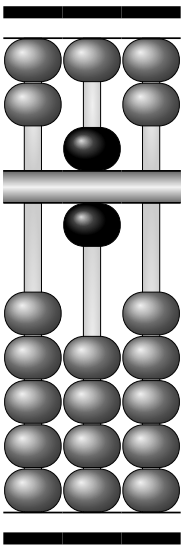


```
\centering
\suanpanset{scale = 0.65, linewd = 3pt}
\begin{suanpan}
  \rods{0, 6, 12, 18, 0}
\end{suanpan}
```

6.4 bid height

`bidh` = ⟨*bidh*⟩ (init: 12mm)

The height of bid.

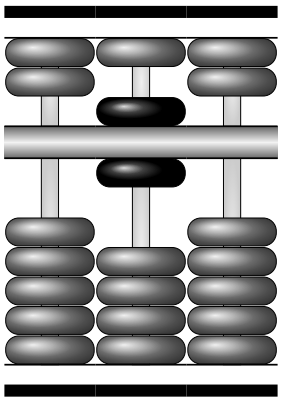


```
\centering
\suanpanset{scale = 0.65, bidh = 18mm}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

6.5 bid diameter

bidd = ⟨*bidd*⟩ (init: 23mm)

The diameter of bid.



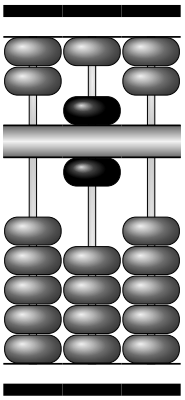
```
\centering
\suanpanset{scale = 0.65, bidd = 36mm}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

6.6 rod diameter

rodd = ⟨*rodd*⟩ (init: 7mm)

The diameter of rod.

NOTE: The rodd should be smaller than the bidd.

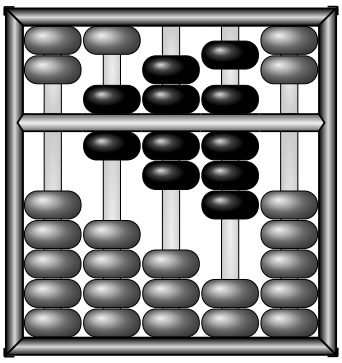


```
\centering
\suanpanset{scale = 0.65, rodd = 3mm}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

6.7 frame width

framew = ⟨*framew*⟩ (init: 13mm)

The width of frame.

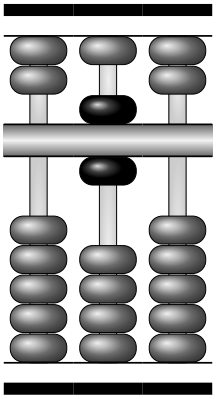


```
\centering
\suanpanset{scale = 0.65, framew = 7mm}
\begin{suanpan}
  \rods{0, 6, 12, 18, 0}
  \mkframe
\end{suanpan}
```

6.8 rod spacing

rodsep = ⟨*rodsep*⟩ (init: 3.0pt)

The spacing between suanpan rods.



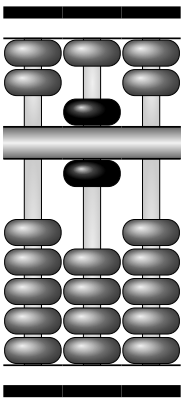
```
\centering
\suanpanset{scale = 0.65, rodsep = 15pt}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

NOTE: The [⟨*rodsep*⟩] will change the width of the suanpan.

6.9 bid spacing

bidsep = ⟨*bidsep*⟩ (init: 1.8pt)

The spacing between suanpan bids.



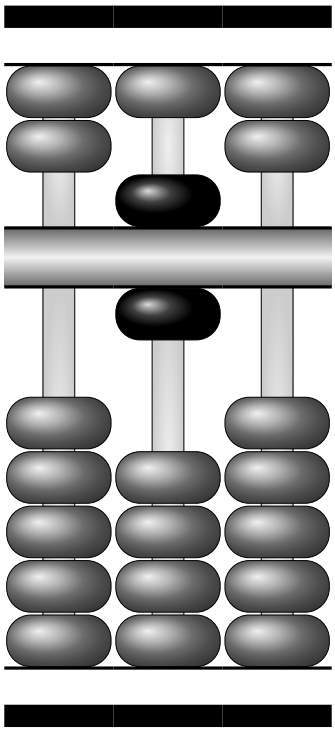
```
\centering
\suanpanset{scale = 0.65, bidsep = 4pt}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

NOTE: The [⟨*bidsep*⟩] does not change the size of the suanpan. But the height of each bid will be changed. In addition, too small an bid height will cause distortion of the rounded corners of the bid.

6.10 scale

scale = ⟨*scale*⟩ (init: 1.0)

Scaling factor of whole suanpan.

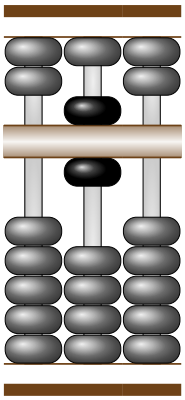


```
\centering
\suanpanset{scale = 1.20}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

6.11 frame color

framedraw = ⟨*framedraw*⟩ (init: black)

Frame drawing color.



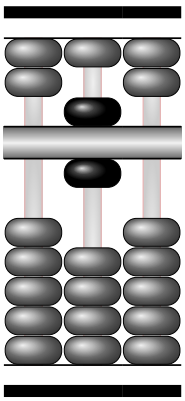
```
\centering
\suanpanset{scale = 0.65, framedraw = brown3}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

NOTE: Frame colors include inner and outer of frame and beam colors.

6.12 rod drawing color

roddraw = ⟨*roddraw*⟩ (init: black)

Rod drawing color.

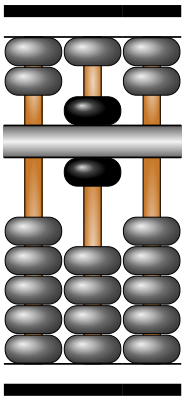


```
\centering
\suanpanset{scale = 0.65, roddraw = red8}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

6.13 rod filling color

`rodfill` = ⟨*rodfill*⟩ (init: white)

Rod filling color.

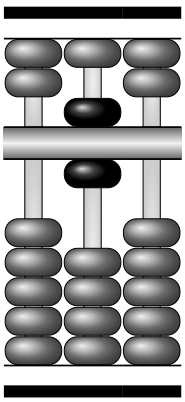


```
\centering
\suanpanset{scale = 0.65, rodfill = brown6}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

6.14 outer bids drawing color

`outerdraw` = ⟨*outerdraw*⟩ (init: black)

The outer bids[1] drawing color.



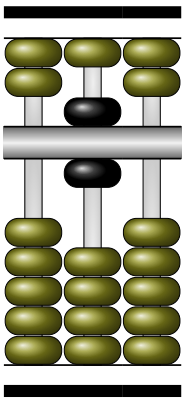
```
\centering
\suanpanset{scale = 0.65, outerdraw = red8}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

6.15 outer bids filling color

`outerfill` = ⟨*outerfill*⟩ (init: black!40)

The outer bids filling color。

[1] The outer bid is that is not counted away from the beam.

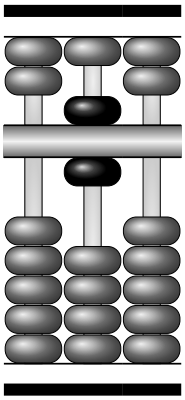


```
\centering
\suanpanset{scale = 0.65, outerfill = yellow6}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

6.16 inner bids drawing color

innerdraw = ⟨*innerdraw*⟩ (init: black)

The inner bids[2]drawing color.

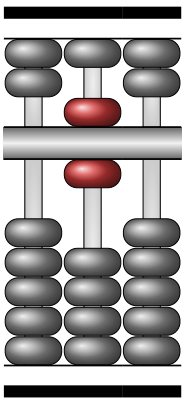


```
\centering
\suanpanset{scale = 0.65, innerdraw = red8}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

6.17 inner bids filling color

innerfill = ⟨*innerfill*⟩ (init: black)

The inner bids filling color.



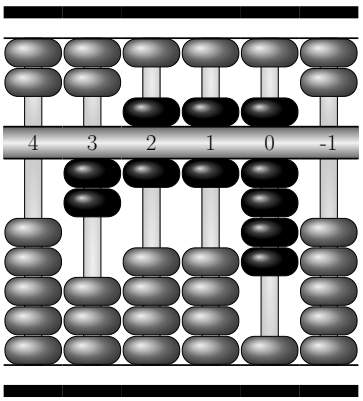
```
\centering
\suanpanset{scale = 0.65, innerfill = red5}
\begin{suanpan}
  \rods{0, 6, 0}
\end{suanpan}
```

6.18 mark font

font = ⟨*font*⟩ (init: \bfseries\Large)

The font of mark(s).

[2]The inner bid is that is counted near to the beam.

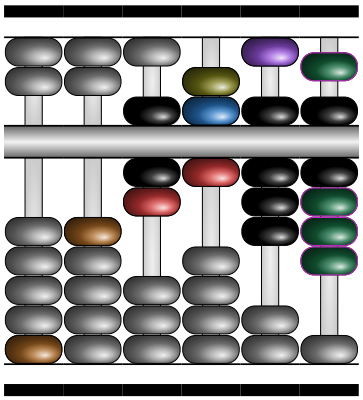



```
\centering
\suanpanset{scale = 0.65,
            font=\rmfamily\Huge}
\begin{suanpan}
  \rods{0, 2, 6, 6, 9, 0}
  \rodmark{4,3,2,1,0,-1}
\end{suanpan}
```

6.19 highlight pos/angle

bidspot = ⟨*bidspot*⟩ (init: 0)

The bid's highlight angle.



```
\centering
\suanpanset{scale = 0.65, bidspot = 180}
\begin{suanpan}
  \rods{0, 0, 7, 11, 8, 19}
  \bid{1}{1}{brown5}
  \bid{2}{5}{brown5}
  \bid{3}{6}{red5}
  \bid{4}{7}{red5}
  \bid{4}{8}{azure5}
  \bid{4}{9}{yellow5}
  \bid{5}{10}{violet5}
  \bid{6}{4,5,6,11}{teal4}[magenta5]
\end{suanpan}
```

Change History

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The italic numbers denote the pages where the corresponding entry is described, numbers underlined point to the definition, all others indicate the places where it is used.

R

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TEX and LATEX 2ε commands: