

The circledsteps package: circled numbers, circled steps and more

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1 Introduction

This package was born thanks to the discussion on tex.stackexchange.com, and with the help of the several authors that contributed to the answers. The base idea is to have a command that can create arbitrary “circled” text (numbers or letters) and that can work in normal text **and** in a node in a `tikzpicture` or derivative. That forbid to use `TikZ` itself for the circles — you can’t safely nest `tikzpictures`.

This package provides two things: the first one, macros to generate the circled text that use the original `pict2e` method, and then a (simple, to be taken as an example) set of macro to generate sequential circled numbers that can be referenced afterward.

The package loads (if not already loaded) the packages `pict2e`, `pictures`, `xcolor` and `pgfkeys` (the latter one is automatically loaded by `tikz`; you do not need `tikz` to use just `circledsteps`). Moreover, `etoolbox` is loaded to modify `pict2e` to have filled ovals.

The manual is for version v1.3. The main changes between version are listed below.

v1.3 Minor fixes to the manual; added a warning in case the patching of `picture.sty` fails.

v1.2 Added optional argument to the commands and make them sensitive to math mode (thanks to `@tallmarmot` for the suggestion and example code); fixed several bugs.

Added `fill color` for the circles background.

v1.1 Default to normal colors; keep the “red/blue” theme as optional. If you use the package option `redblue` or `legacy` you will have the same effect than

```
1 \pgfkeys{/csteps/inner color=red, /csteps/outer color=blue}
```

v1.0 Initial release.

2 Basic commands

The basic commands are:

<code>\Circled[]{}</code>	circled text using the package colors, text on the baseline
<code>\CircledTop[]{}</code>	circled text using the package colors, circle on the baseline
<code>\CircledText[]{}</code>	circled text using the current color ¹

¹it may fail when used in headers or footers, in the sense it can select the wrong color in case of page breaks.

The parameters for the output are controlled using `pgfkeys`; you can change them with `\pgfkeys` or `\tikzset`; you can obviously limit the effect of change using normal L^AT_EX scoping rules. Also, you can specify parameters (without the initial `/csteps/` as optional arguments to the commands.

The pseudo-color `none` means that the current color is used for both the text and the circle.

Parameter	Meaning	Default value
<code>/csteps/inner ysep</code>	vertical spacing	4pt
<code>/csteps/inner xsep</code>	horizontal spacing	4pt
<code>/csteps/inner color</code>	color of the text	none
<code>/csteps/outer color</code>	color of the circle	none
<code>/csteps/fill color</code>	background color of the circle	none

The usage of the package is better explained with examples.

This is normal text: ① is on the baseline, ② is on top.
 This is more evident if you have descendents, like p: ① and ②.
 You can set options as optional arguments, like ① or ②.
 Math mode is detected too: ① and ①.

```

1 This is normal text: \Circled{1} is on the
  baseline, \CircledTop{2} is on top.\par
2 This is more evident if you have descendents,
  like p: \Circled{p} and \CircledTop{p}.\par
3 You can set options as optional arguments, like \
  Circled[inner color=red]{R} or \CircledTop[
  outer color=green]{g}.\par
4 Math mode is detected too: \Circled{A} and $\
  Circled{A}^{\Circled{A}}$.

```

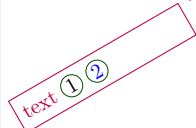
For big horizontal things the circle becomes oval: ②00 or ①99.

```

1 For big horizontal things the circle becomes oval
  : \Circled{200} or \CircledTop{199}.

```

Inside `tikz` they work ok:



```

1 Inside \texttt{tikz} they work ok:
2
3 \tikzset{/csteps/outer color=green!30!black}
4 \begin{tikzpicture}[scale=0.8, rotate=30,
5   text width=3cm, transform shape]
6   \node [draw,color=purple]{text \Circled{1}
7     \Circled[inner color=blue]{2}};
8 \end{tikzpicture}

```

If you like more breathing space: ①

② p ②00 ①99.

```

1 \pgfkeys{/csteps/inner ysep=10pt}
2 \pgfkeys{/csteps/inner xsep=10pt}
3 If you like more breathing space:
4 \Circled{1} \Circled{2} \Circled{p} \Circled{200}
  \Circled{199}.
5 \par\bigskip

```

If you want to change colors it's easy:

① ② ① p ②00 ①99.

```

1 \pgfkeys{/csteps/inner color=green}
2 \pgfkeys{/csteps/outer color=gray}
3 If you want to change colors it's easy:
4 \Circled{1} \Circled{2} \Circled{p} \Circled{200}
  \Circled{199}.
5 \par\bigskip

```

And you can have filled circles and ovals: ① ①99.

```

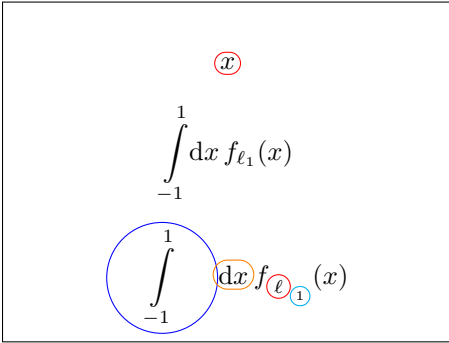
1 \pgfkeys{/csteps/inner color=yellow}
2 \pgfkeys{/csteps/outer color=red}
3 \pgfkeys{/csteps/fill color=black}
4 And you can have filled circles and ovals:
5 \Circled{\textbf{1}} \Circled{\textbf{199}}.
6 \par\bigskip

```

You can have inline numbers like ① or exponents^② and so on. They follow the current color: ① and ② automatically, as you can see: $1 + 1 \approx 3$. In-text circled numbers look better when a bit smaller, though, as you can see in ① for example.

- 1 You can have inline numbers like `\CircledText{1}` or
- 2 exponents`\textsuperscript{\CircledText{2}}` and so on.
- 3 `\textcolor{red}{They follow the current color: \CircledText{1} and \CircledText{2} automatically,}` as you can see: `\CircledText{1+1\approx3}`. In-text circled numbers look better when a bit smaller, though, as you can see in `\small\CircledText{1}` for example.

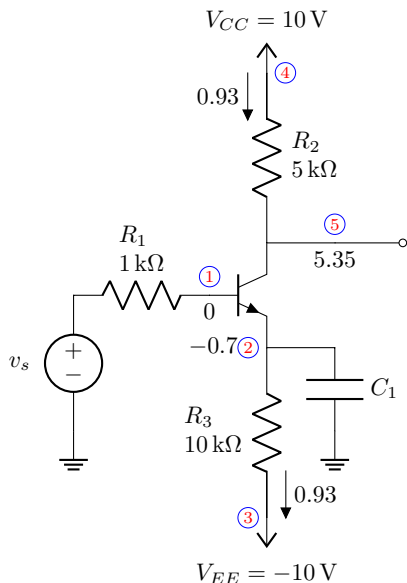
You can have also quite nice math mode effects, thanks to suggestion from @tallmarmot:



- 1 `[\Circled[outer color=red]{x}\]`
- 2 `[\int\limits_{-1}^1!\mathrm{d}x\,f_{\ell_1}(x)\]`
- 3 `[\Circled[outer color=blue]{\int\limits_{-1}^1}\]`
- 4 `\Circled[outer color=orange]{\mathrm{d}x}`
- 5 `f_{\Circled[outer color=red]{\ell_1}}_{\Circled[outer color=cyan]{1}}(x)\]`

3 Automatically generated numbers

The command `\cstep` will generate a circled number, starting from 1, that can be referenced with the normal `\label/\ref` mechanism.² You can reset the numbering with `\startcstep`. For example:



- ①: let's neglect (to be confirmed!) $I_B, V_B \approx 0\text{ V}$;
- ③: $I_{E1Q} = (V_{E1Q} - V_{EE})/R_3$;
- ④: $I_{C1Q} \approx 0.93\text{ mA}$;
- ⑤: $V_{CC} - R_2 I_{C2Q} = 5.35\text{ V}$; $V_{CE1Q} = 6.05\text{ V}$;

²Notice that in the example the numbers in the references on the right are blue due to `hyperref` configuration!

```

1 \tikzset{/csteps/inner color=red, /csteps/outer color=blue}
2 \newcommand{\circref}[1]{\CircledText{\small\textbf{\ref{#1}}}:}
3 \begin{circuitikz}[scale=0.9, baseline=(VCC), transform shape]
4   \draw (0,0) node[ground](GND){} to[V=$v_s$] ++(0,2)
5     to[R, l2^=$R_1$ and \SI{1}{k\ohm}, l2 valign=b] ++(2,0) coordinate(firstb);
6   \node [above] at(firstb) {\cstep\label{c:b1}};
7   \node [below] at(firstb) {0};
8   \draw (firstb) node[npn, anchor=B](Q1){};
9   \draw (Q1.E) node[left]{\num{-0.7}\cstep};
10  \draw (Q1.C) to[R, l2_=$R_2$ and \SI{5}{k\ohm}, f<=\num{0.93}] ++(0,2.5)
11    node[vcc](VCC){$V_{CC}=\SI{10}{V}$} ;
12  \draw (Q1.E) to[R, l2_=$R_3$ and \SI{10}{k\ohm},
13    f=\num{0.93}] ++(0,-2.5) node[vee](VEE){$V_{EE}=\SI{-10}{V}$}
14    node[left]{\cstep\label{c:ie1}};
15  \path (VCC) node[right]{\cstep\label{c:ic1}};
16  \draw (Q1.E) -- ++(1,0) coordinate(tmp) to[C=$C_1$] (tmp |- GND) node[ground]{};
17  \draw (Q1.C) -- ++(1,0) coordinate(g1) to[short, -o] ++(1,0);
18  \node [above] at(g1) {\cstep\label{c:g1}};
19  \node [below] at(g1) {\num{5.35}};
20 \end{circuitikz}\quad
21 \begin{minipage}[t]{0.5\linewidth}
22   %% minipage reset these..
23   \parindent=0pt\parskip=6pt plus 6pt minus 2pt\relax
24   \circref{c:b1} let's neglect (to be confirmed!) $I_B$, $V_B\approx\SI{0}{V}$;\par
25   \circref{c:ie1} $I_{E1_Q}=(V_{E1_Q}-V_{EE})/R_3$;\par
26   \circref{c:ic1} $I_{C1_Q} \approx\SI{0.93}{mA}$;\par
27   \circref{c:g1} $V_{CC}-R_{2I_{C2_Q}}= \SI{5.35}{V}$; $V_{CE1_Q}=\SI{6.05}{V}$;\par
28 \end{minipage}

```

4 Personalize it!

The definition of `CircledText` is simply the following one; you can get idea and define your own easily (beware of spaces at the end of the lines, though!):

```

1 \newcommand{\CircledText}[2] []{%
2   \CircledParamOpts{inner color=none, outer color=none, #1}{1}{#2}%
3 }

```

where `\CircledParamOpts` is a macro with three arguments: the first one is the list of options (without the `/csteps/` part), the second one is 1 if you want the circle content on the baseline and 0 if you want it on top of it, and finally the third one is the text to be “circled”.

Also the implementation of the `\cstep` command and relatives is quite simple, and you can play a lot with it to change things (formats, colors, the type of numbering, and so on):

```

1 \newcounter{cstepcnt}
2 \newcommand{\startcstep}{\setcounter{cstepcnt}{0}}
3 \newcommand{\resetcstep}{\setcounter{cstepcnt}{0}}
4 \newcommand{\cstep}{%
5   \refstepcounter{cstepcnt}%
6   \Circled{\scriptsize\arabic{cstepcnt}}%
7 }
8 \renewcommand{\thecstepcnt}{\arabic{cstepcnt}}

```