The geometry package

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Abstract

This package provides a flexible and complete user interface to page dimensions. You can specify them by using intuitive parameters to get your desired page layout. For example, if you want to set margins (the left, right, top and bottom margins) to 2cm from each edge of the paper, what you need is just \usepackage[margin=2cm]{geometry}.

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1 Preface to Version 3

The geometry package becomes even more flexible and powerful with the release of version 3. This new release contains major changes and enhancements in user interface, calculation schemes and the default settings of the page dimensions.

- New default layout.
  The ‘automatic’ centering is no longer default layout. Instead of centering, the idea of margin ratio and common values for default settings are introduced: the ratio of left (inner) margin to right (outer) margin is set 1:1 (2:3 for twoside), and the ratio of top to bottom is set 2:3. The margin ratios can be specified by newly introduced options, e.g. marginratio (see Section 3.2 and 5.3 for the detail). In addition, the spaces for the head and foot of the page are disregarded in calculating the placement of the text area by default. Furthermore the default scale of the type area is set to 0.7 with 70% of the width and height of the paper. If you want to use the old default layout of version 2.3 or earlier, add compat2 as a first option, e.g., \usepackage[compat2,left=1.5in]{geometry}, which sets the old default options [scale={0.8,0.9}, centering, includeheadfoot] and allows the subsequent options to behave as if they are used in the old version. See also Section 6.1 for the detail of the default layout.
• **Option** twosideshift is obsoleted.
  twoside and other geometry options can substitute for it. A new option bindingoffset might be also helpful to control margins for oneside/twoside. For the detail, see Section 5.3.

• **Option** includemp becomes independent of marginparwidth and marginparsep.
  In the previous version, marginparwidth or marginparsep automatically set includemp=true. Now if you want includemp mode, includemp should be set explicitly.

• **Options** nohead, nofoot and noheadfoot become order-dependent and overwritable
  In the previous version, these options was order-independent: nohead,headsep=10pt resulted in just nohead (\headsep=0pt, \headheight=0pt), for example. But now they are overwritable by subsequent options. The above case results in \headheight=0pt and \headsep=10pt.

• **A complete set of options** ignore* and include* for head, foot and marginpar.
  The previous version has only includemp, which denotes that the width of marginpar is included in the total body width. Now ignore\{head, foot, headfoot, mp, all\} and include\{head, foot, headfoot, all\} are newly added. If one of these ignore* is set, the corresponding space(s) are disregarded in auto-completion calculation. In version 3, ignoreall is set by default. So if you need to include the spaces for the head, foot and marginpar, the corresponding include* should be set explicitly. In addition, unlike the previous version, neither reversemp, marginparwidth nor marginparsep sets includemp automatically.

• **New option** lines.
  The option enables users to specify \textheight by the number of lines included in \textheight, e.g., lines=20.

• **New option** heightrounded.
  The option rounds \textheight to n-times (n: an integer) of \baselineskip plus \topskip to avoid “underfull vbox” in some cases.

• **New option** screen.
  To make presentation with PC and video projector, geometry option screen,centering with ‘slide’ documentclass would be the best choice.

• **New option** asymmetric.
  The option implements a twosided layout in which margins are not swapped on alternate pages and the marginal notes stay always on the same side.

• **New option** showframe.
  The option displays visible frames for the text area and page, and lines for the head and foot to check layout in detail. Therefore showframe.sty is excluded from the geometry package distribution.

• **New option** pass.
  The option disables auto-layout and all of the geometry settings except verbose and showframe. It can be used for checking out the page layout of the documentclass, other packages and manual settings without geometry.

See the text for the detail. All the new and modified options in this release are marked with ’⋆3’ and ’†3’ respectively.

2 Introduction

To set dimensions for page layout in \LaTeX{} is not straightforward. You need to adjust several \LaTeX{} native dimensions to place a text area where you want. If you want to center the text area in the paper you use, for example, you have to specify native dimensions as follows:
Without package `calc`, the above example would need more tedious settings. Package `geometry` provides an easy way to set page layout parameters. In this case, what you have to do is just
\begin{verbatim}
\usepackage[text={7in,10in},centering]{geometry}
\end{verbatim}
Besides centering problem, setting margins from each edge of the paper is also troublesome. But `geometry` also make it easy. If you want to set each margin 1.5in, you can go
\begin{verbatim}
\usepackage[margin=1.5in]{geometry}
\end{verbatim}
In both cases, the unspecified dimensions are automatically determined. The package will be also useful when you have to set page layout obeying the following strict instructions: for example,

The total allowable width of the text area is 6.5 inches wide by 8.75 inches high. The top margin on each page should be 1.2 inches from the top edge of the page. The left margin should be 0.9 inch from the left edge. The footer with page number should be at the bottom of the text area.

In this case, using `geometry` you can go
\begin{verbatim}
\usepackage[total={6.5in,8.75in},
  top=1.2in, left=0.9in, includefoot]{geometry}.
\end{verbatim}

Setting a text area on the paper in document preparation system has some analogy to placing a window on the background in the window system. The name `geometry` comes from the `-geometry` option used for specifying a size and location of a window in X Window System.

### 3 Page Geometry

#### 3.1 Layout Dimensions

To realize a straightforward setting for page layout, the following page structure is introduced: A paper contains a total body (printable area) and margins. The total body consists of a body (text area) with optional a header, a footer and marginal notes (marginpar). There are four margins: the left, right, top and bottom margins. For twosided documents, horizontal margins should be called the inner and outer margins.

- **paper**: total body and margins
- **total body**: body (text area)  (optional head, foot and marginpar)
- **margins**: left(inner), right(outer), top and bottom

Each margin is measured from the corresponding edge of a paper. For example, left margin (inner margin) means a horizontal distance between the left (inner) edge of the paper and that of the total body. Therefore the left and top margins defined in `geometry` are different from the native dimensions \textwidth and \textheight.

The layout parts and the corresponding dimension names used in this package are showed schematically in Figure 1. The dimensions for paper, total body and margins have the following relations.

\begin{align}
\text{paperwidth} &= \text{left} + \text{width} + \text{right} \\
\text{paperheight} &= \text{top} + \text{height} + \text{bottom}
\end{align}

The dimensions of the total body, width and height, are defined as follows:

\begin{align}
\text{width} &= \text{textwidth} + (\text{marginparsep} + \text{marginparwidth}) \\
\text{height} &= \text{textheight} + (\text{headheight} + \text{headsep} + \text{footskip})
\end{align}
Figure 1: Dimension names used in the geometry package. width = textwidth and height = textheight by default. left, right, top and bottom are margins. If margins on verso pages are swapped by twoside option, margins specified by left and right options are used for the inside and outside margins respectively. inner and outer are aliases of left and right respectively.

(a) default

(b) includehead and includefoot

Figure 2: includehead and includefoot include the head and foot respectively into total body. (a) height = textheight (default). (b) height = textheight + headheight + headsep + footskip if includehead and includefoot. If the top and bottom margins are fixed, includehead and includefoot make textheight shorter than default.

In Equation (3), width := textwidth by default, but marginparsep and marginparwidth are included in width if includemp option is set true. In Equation (4), height := textheight by default. If includehead is set to true, headheight and headsep are considered as a part of height in the the vertical completion calculation. In the same way, includefoot includes footskip. Note that options ignore* just exclude the corresponding spaces from textheight, but do not change those lengths themselves. Figure 2 shows how these options work. Each of the seven dimensions in the right-hand side of Equations (3) and (4) corresponds to the ordinary \LaTeX control sequence with the same name.

Figure 3 illustrates various layouts with different layout modes. The dimensions for a header and a footer can be controlled by nohead or nofoot mode, which sets each length to 0pt directly. On the other hand, options ignore* do not change the corresponding native dimensions.

3.2 Auto-Completion Scheme

Suppose that the paper size is pre-defined in Equation (1) or (2), if two dimensions out of the three dimensions in the right-hand side of each equation are specified, the rest of the dimensions can be determined by the specified ones. However, when none or only one of the three dimensions is specified, the rest of the dimensions can’t generally be determined without some assumptions.
Figure 3: Sample layouts for total body with different switches. (a) includeheadfoot, (b) includeall, (c) includefoot and (d) includefoot, includemp. If reversemp is set to true, the location of the marginal notes are swapped on every page. Option twoside swaps both margins and marginal notes on verso pages. Note that the marginal notes are printed on the page, even when ignoremp or includemp=false, but can fall off the page in some cases.
The geometry package has an auto-completion scheme with some default parameters to determine the unspecified dimensions independently for each direction. If the size of total body (i.e., width in the horizontal direction) is specified, the margins (left and right) can be determined with a default ratio of one margin to the other (left/right). If one margin is specified, the rest of dimensions can also be determined by the default margin ratio. Page margin setting by margin ratio was introduced in KOMA script\(^1\).

The default vertical margin ratio is \(2/3\), namely,

\[
\text{top} : \text{bottom} = 2 : 3 \quad \text{default.} \quad (5)
\]

As for the horizontal margin ratio, the default value depends on whether the document is onesided or twosided,

\[
\text{left (inner)} : \text{right (outer)} = \begin{cases} 
1:1 & \text{default for oneside}, \\
2:3 & \text{default for twoside}. 
\end{cases} \quad (6)
\]

Obviously the default horizontal margin ratio for oneside is ‘centering’.

For example, if one specifies right=2.4cm with a twosided layout in A4 paper (21.0cm×29.7cm), unspecified left and width are automatically determined using the default horizontal margin ratio (2/3) as follows:

\[
\text{left} = (\text{horizontal-margin-ratio}) \times \text{right} \\
= 2/3 \times 2.4\text{cm} = 1.6\text{cm} \quad (7)
\]

\[
\text{width} = \text{paperwidth} - \text{left} - \text{right} \\
= 21.0\text{cm} - 1.6\text{cm} - 2.4\text{cm} = 17.0\text{cm}. \quad (8)
\]

In this case, the vertical dimensions top, height and bottom are determined by the default vertical margin ratio with 2:3 and the default size of total body with 70% of the paper height:

\[
\text{height} = 0.7 \times \text{paperheight} \\
= 0.7 \times 29.7\text{cm} = 20.79\text{cm} \quad (9)
\]

\[
\text{top} = \frac{\left(\text{vertical-margin-ratio}\right)}{1 + \left(\text{vertical-margin-ratio}\right)} \times (\text{paperheight} - \text{height}) \\
= \frac{2}{2+3} \times (29.7\text{cm} - 20.79\text{cm}) \\
= 0.4 \times 8.91\text{cm} = 3.564\text{cm} \quad (10)
\]

\[
\text{bottom} = 0.6 \times 8.91\text{cm} = 5.346\text{cm} \quad (11)
\]

The auto-completion rules are shown in Table 1 and Equation (12). \(A, B\) and \(C\) in Table 1 are user-specified values, ∗ denotes unspecified ones. The right-hand side table shows the corresponding results of auto-completion. The unspecified values can be determined by \(A, B\) and \(L\) (paperwidth or paperheight). In Table 1, functions \(R(x)\) and \(M(x)\) are defined as follows:

\[
R(x) = L - x \\
M(x) = R(x) / (1 + \sigma) \quad (12)
\]

Here \(\sigma\) denotes the ratio of left margin (inner) to right margin (outer) or the ratio of top to bottom. To set \(\sigma\) as a geometry option, you can use \[h,v\marginratio\] options with a:b-type value, for example, \(hmarginratio=2:3\).

\[
h\text{marginratio} = \text{left} : \text{right} \quad (13)
\]

\[
v\text{marginratio} = \text{top} : \text{bottom} \quad (14)
\]

By default, \(\sigma\) is 1/1 (=1) for oneside and 2/3 for twoside in the horizontal direction, and 2/3 in the vertical. If none of three dimensions is specified in each direction, the default setting is used: width and height is set to 70% of the paper width and height respectively. If all the three dimensions would be specified, margins remain and width or height is ignored.

\(^1\)CTAN: macros/latex/contrib/supported/koma-script by Frank Neukam and Markus Kohm.
4 User Interface

4.1 General Features

The geometry options using the keyval interface ‘(key)=(value)’ can be set either in the optional argument to the \usepackage command, or in the argument of the \geometry macro. This macro, if necessary, should be used only in the preamble, i.e., before \begin{document}. In either case, the argument consists of a list of comma-separated keyval options. The main features of setting options are listed below.

- Multiple lines are allowed. (But blank lines are not allowed.)
- Any spaces between words are ignored.
- Options are basically order-independent.
  (There are some exceptions. See Section 7.1 for details.)

For example,
\begin{verbatim}
\usepackage[ a5paper , hmargin = { 3cm, \hspace{0.8in} } , height = 10in ]{geometry}
\end{verbatim}
is equivalent to
\begin{verbatim}
\usepackage[height=10in,a5paper,hmargin={3cm,0.8in}]{geometry}
\end{verbatim}

Some options are allowed to have sub-list, e.g. \{3cm,0.8in\}. Note that the order of values in the sub-list is significant. The above setting is also equivalent to the followings:
\begin{verbatim}
\usepackage{geometry}
\geometry{height=10in,a5paper,hmargin={3cm,0.8in}}
\end{verbatim}
or
\begin{verbatim}
\usepackage[a5paper]{geometry}
\geometry{hmargin={3cm,0.8in},height=8in}
\geometry{height=10in}.
\end{verbatim}

Thus, multiple use of \geometry just appends options.

Geometry supports package calc\textsuperscript{2}. For example,
\begin{verbatim}
\usepackage{calc}
\usepackage[textheight=20\baselineskip+10pt]{geometry}
\end{verbatim}

\textsuperscript{2}CTAN: macros/latex/required/tools
4.2 Option Types

Geometry options are categorized into four types:

1. **Boolean type**
   
   takes a boolean value (true or false). If no value, true is set by default.
   
   \[
   \langle \text{key} \rangle = \begin{cases} \text{true} & \text{false} \\ \text{false} & \text{true} \end{cases}
   \]

   Examples: verbose=true, includehead, twoside=false.

   Paper name is the exception. The preferred paper name should be set with no values. Whatever value is given, it is ignored. For instance, a4paper=XXX is equivalent to a4paper.

2. **Single-valued type**
   
   takes a mandatory value.
   
   \[
   \langle \text{key} \rangle = \langle \text{value} \rangle
   \]

   Examples: width=7in, left=1.25in, footskip=1cm, height=.86\paperheight.

3. **Double-valued type**
   
   takes a pair of comma-separated values in braces. The two values can be shortened to one value if they are identical.
   
   \[
   \langle \text{key} \rangle = \langle \{ \text{value1} \}, \{ \text{value2} \} \rangle
   \]

   Examples: hmargin={1.5in,1in}, scale=0.8, body={7in,10in}.

4. **Triple-valued type**
   
   takes three mandatory, comma-separated values in braces.
   
   \[
   \langle \text{key} \rangle = \langle \{ \text{value1} \}, \{ \text{value2} \}, \{ \text{value3} \} \rangle
   \]

   Each value must be a dimension or null. When you give an empty value or ‘*’, it means null and leaves the appropriate value to the auto-completion mechanism. You need to specify at least one dimension, typically two dimensions. You can set nulls for all the values, but it makes no sense.

   Examples:
   
   hdivide={2cm,*1cm}, vdivide={3cm,19cm,}, divide={1in,*1in}.

5 Option Specification

This section describes all the options provided by geometry.

5.1 Paper Size

The options below set paper/media size and orientation.

paper | papertype
-------|-------------------

specifies a paper name. The paper names available in geometry. paper=⟨paper-name⟩.

For example paper=a4paper, which is equivalent to just a4paper.

a0paper, a1paper, a2paper, a3paper, a4paper, a5paper, a6paper

b0paper, b1paper, b2paper, b3paper, b4paper, b5paper, b6paper

letterpaper, executivepaper, legalpaper

specifies paper name. They can typically be used with no values. Note that whatever value (even false) is given to this option, the value will be ignored. For example, the followings have the same effect: a5paper, a5paper=true, a5paper=false and a5paper=XXX.

* screen

a special paper size with (W,H) = (225mm,180mm). For presentation with PC and video projector, "screen,centering" with ‘slide’ documentclass would be useful.

paperwidth width of the paper. paperwidth=⟨length⟩.
paperheight  height of the paper. \text{paperheight}=(\text{length}).

papersize  width and height of the paper.
\text{papersize}=(\text{width},\text{height}) \text{ or } \text{papersize}=(\text{length}).

landscape  switches the paper orientation to landscape mode.

portrait  switches the paper orientation to portrait mode. This is equivalent to \text{landscape}=false.

Options for paper names (e.g., a4paper) and orientation (portrait and landscape) can be set as document class options. For example, you can set \documentclass[a4paper,landscape]{article}, then a4paper and landscape are processed in geometry as well. This is also the case for twoside and twocolumn (see also Section 5.4).

5.2 Body Size

The options specifying the size of \text{total body} are described in this section.

hscale  ratio of width of \text{total body} to \text{\paperwidth}. hscale=(h-scale), e.g., hscale=0.8 is equivalent to width=0.8\text{\paperwidth}. (0.7 by default)

vscale  ratio of height of \text{total body} to \text{\paperheight}, e.g., vscale=(v-scale). (0.7 by default)

vscale=0.9 is equivalent to height=0.9\text{\paperheight}.

scale  ratio of \text{total body} to the paper. scale=(h-scale),(v-scale) \text{ or } \text{scale}=(scale). (0.7 by default)

width | totalwidth  width of \text{total body}. width=(\text{length}) \text{ or } totalwidth=(\text{length}). This dimension should not be confused with \text{\textheight}. Generally, width \geq \text{\textwidth} because width includes the width of the marginal notes if includemp is set to true. If \text{\textwidth} and width are specified at the same time, width is ignored.

height | totalheight  height of \text{total body}, excluding header and footer by default. If includhead or includefoot is set, height includes the head or foot of the page as well as textheight. height=(\text{length}) \text{ or } totalheight=(\text{length}). If both \text{\textwidth} and height are specified, height will be ignored.

total  width and height of \text{total body}.

\text{total}=(\text{width},\text{height}) \text{ or } total=(\text{length}).

textwidth  modifies \text{\textwidth}, the width of \text{body} (the text are). \text{\textwidth}=(\text{length}).

textheight  modifies \text{\textheight}, the height of \text{body}. \text{\textheight}=(\text{length}).

\text{\textwidth}  \text{\textheight}  sets both \text{\textwidth} and \text{\textheight} of the body of page. \text{\textwidth}=(\text{\textwidth},\text{\textheight}) \text{ or } \text{\textwidth}=(\text{\textwidth}).

\*3 \text{\textwidth}  enables users to specify \text{\textheight} by the number of lines. \text{linese}=(\text{integer}).

\*3 include\text{\textwidth}  includes the head of the page, \text{\headheight} and \text{\headsep}, into \text{\textwidth}. It is set to false by default. It is opposite to \text{\ignorehead}. See Figure 2.

\*3 include\text{\textwidth}  includes the foot of the page, \text{\footskip}, into \text{\textwidth}. It is opposite to \text{\ignorefoot}. It is false by default. See Figure 2.

\*3 include\text{\textwidth}  sets both \text{\includehead} and \text{\includefoot} to true, which is opposite to \text{\ignoreheadfoot}. See Figure 2.

\*3 includemp  includes the margin notes, \text{\marginparwidth} and \text{\marginparsep}, into \text{\textwidth} when calculating horizontal calculation. In version 3, includemp is independent of options \text{\marginparwidth} and \text{\marginparsep}, and set to false by default.

\*3 includeall  sets both \text{\includeheadfoot} and includemp to true. See Figure 2 and Figure 3.

\*3 ignore\text{\textwidth}  disregards the head of the page, \text{\headheight} and \text{\headsep}, in determining vertical layout, but does not change those lengths. It is equivalent to \text{\includeheadfalse}. It is set to true by default. See also \text{\includehead}.

\*3 ignore\text{\textwidth}  disregards the foot of page, \text{\footskip}, in determining vertical layout, but does not change that length. This option is set to true by default. See also \text{\includefoot}.

\*3 ignore\text{\textwidth}  sets both \text{\ignorehead} and \text{\ignorefoot} to true. See also \text{\ignoreheadfoot}.
\*\*\*\*ignoremp\*\*\*\* disregards the marginal notes in determining the horizontal margins (true is set by default). If marginal notes fall off the page, the warning message will be displayed when verbose=true. See also Figure 3 and includemp.

\*\*\*\*ignoreall\*\*\*\* sets both ignoreheadfoot and ignoremp to true. See also includeall.

\*\*\*\*heightrounded\*\*\*\* This option rounds \textwidth to n-times (n: an integer) of \baselineskip plus \topskip to avoid “underfull vbox” in some cases. For example, if \textwidth is 486pt with \baselineskip 12pt and \topskip 10pt, then

\[
(39 \times 12pt + 10pt =) 478pt < 486pt < 490pt (= 40 \times 12pt + 10pt),
\]

as a result \textwidth is rounded to 490pt. heightrounded=false by default.

The following options can specify body and margins simultaneously with three comma-separated values in braces.

\*\*\*\*hdivide\*\*\*\* horizontal partitions (left, width, right). \texttt{hdivide=\{left margin, width, right margin\}}. Note that you should not specify all of the three parameters. The best way of using this option is to specify two of three and leave the rest with null(nothing) or ‘\*’. For example, when you set \texttt{hdivide=\{2cm, 15cm, \}}, the margin from the right-side edge of page will be determined calculating \textwidth - 2cm - 15cm.

\*\*\*\*vdivide\*\*\*\* vertical partitions (top, height, bottom). \texttt{vdivide=\{top margin, height, bottom margin\}}.

\*\*\*\*divide\*\*\*\* divide=\{A, B, C\} is interpreted as \texttt{hdivide=\{A, B, C\}} and \texttt{vdivide=\{A, B, C\}}.

\subsection{5.3 Margin Size}

The options specifying the size of visible margins are listed below.

- \*\*\*\*left | lmargin\*\*\*\* inner
  - left margin (for oneside) or inner margin (for twoside) of total body. In other words, the distance between the left (inner) edge of the paper and that of total body. \texttt{left=\{length\}}. inner has no special meaning, just an alias of left and lmargin.

- \*\*\*\*right | rmargin\*\*\*\* outer
  - right or outer margin of total body. \texttt{right=\{length\}}.

- \*\*\*\*top | tmargin\*\*\*\* top margin of the page. \texttt{top=\{length\}}. Note this option has nothing to do with the native dimension \texttt{tmargin}.

- \*\*\*\*bottom | bmargin\*\*\*\* bottom margin of the page. \texttt{bottom=\{length\}}.

- \*\*\*\*hmargin\*\*\*\* left and right margin. \texttt{hmargin=\{left margin, right margin\}} or \texttt{hmargin=\{length\}}.

- \*\*\*\*vmargin\*\*\*\* top and bottom margin. \texttt{vmargin=\{top margin, bottom margin\}} or \texttt{vmargin=\{length\}}.

- \*\*\*\*margin\*\*\*\* \texttt{margin=\{A, B\}} is equivalent to \texttt{hmargin=\{A, B\}} and \texttt{vmargin=\{A, B\}}. \texttt{margin=A} is automatically expanded to \texttt{hmargin=A} and \texttt{vmargin=A}.

\*\*\*\*hmarginratio\*\*\*\* horizontal margin ratio of left (inner) to right (outer). The value of \texttt{(ratio)} should be specified with colon-separated two values. Each value should be a positive integer less than 100 to prevent arithmetic overflow, e.g., 2:3 instead of 1:1.5. The default ratio is 1:1 for oneside, 2:3 for twoside.

\*\*\*\*vmarginratio\*\*\*\* vertical margin ratio of top to bottom. The default ratio is 2:3.

\*\*\*\*marginratio\*\*\*\* horizontal and vertical margin ratios. \texttt{marginratio=\{horizontal ratio, vertical ratio\}} or \texttt{marginratio=\{ratio\}}.

\*\*\*\*hcentering\*\*\*\* sets auto-centering horizontally and is equivalent to \texttt{hmarginratio=1:1}. It is set to true by default for oneside. See also \texttt{hmarginratio}.

\*\*\*\*vcentering\*\*\*\* sets auto-centering vertically and is equivalent to \texttt{vmarginratio=1:1}. The default is false. See also \texttt{vmarginratio}.

\*\*\*\*centering\*\*\*\* sets auto-centering and is equivalent to \texttt{marginratio=1:1}. See also \texttt{marginratio}. The default is false. See also \texttt{marginratio}.

\*\*\*\*marginratio\*\*\*\* horizontal and vertical margin ratios. \texttt{marginratio=\{horizontal ratio, vertical ratio\}} or \texttt{marginratio=\{ratio\}}.

\*\*\*\*hcentering\*\*\*\* sets auto-centering horizontally and is equivalent to \texttt{hmarginratio=1:1}. It is set to true by default for oneside. See also \texttt{hmarginratio}.

\*\*\*\*vcentering\*\*\*\* sets auto-centering vertically and is equivalent to \texttt{vmarginratio=1:1}. The default is false. See also \texttt{vmarginratio}.

\*\*\*\*centering\*\*\*\* sets auto-centering and is equivalent to \texttt{marginratio=1:1}. See also \texttt{marginratio}. The default is false. See also \texttt{marginratio}.
a) every page for oneside or odd pages for twoside

b) even (back) pages for twoside

bindingoffset

Figure 4: bindingoffset option. Note that twoside option swaps the horizontal margins and the marginal notes together with bindingoffset on even pages (see b), but asymmetric option suppresses the swap of the margins and marginal notes (but bindingoffset is still swapped).

twoside

switches on twoside mode with left and right margins swapped on verso pages. The option sets \twoside and \@mparswitch switches. See also asymmetric.

*3 asymmetric

implements a twosided layout in which margins are not swapped on alternate pages (by setting \oddsidemargin to \evensidemargin + bindingoffset) and in which the marginal notes stay always on the same side. This option can be used as an alternative to the twoside option. See also twoside.

*3 bindingoffset

removes a specified space from the lefthand-side of the page for oneside or the inner-side for twoside. bindingoffset=\langle length \rangle. This is useful if pages are bound by a press binding (glued, stitched, stapled ...). See Figure 4.

\texttt{hdivide} See description in Section 5.2.
\texttt{vdivide} See description in Section 5.2.
\texttt{divide} See description in Section 5.2.

5.4 Native Dimensions

The options below specify \LaTeX\ native dimensions and switches for page layout. See Figure 1. Note that unlike version 2.3, nohead, nofoot and noheadfoot become overwritable, in other words, just shorthand for setting the corresponding \LaTeX\ dimensions (\headheight, \headsep and \footskip) to 0pt.

\texttt{headheight} \texttt{headheight} modifies $\headheight$, height of header. headheight=\langle length \rangle or head=\langle length \rangle.
\texttt{headsep} modifies $\headsep$, separation between header and text (body). headsep=\langle length \rangle.
\texttt{footskip} \texttt{footskip} modifies $\footskip$, distance separation between baseline of last line of text and baseline of footer. footskip=\langle length \rangle or foot=\langle length \rangle.

*3 nohead

eliminates spaces for the head of the page, which is equivalent to both $\headheight=0pt$ and $\headsep=0pt$.

*3 nofoot

eliminates spaces for the foot of the page, which is equivalent to $\footskip=0pt$.

*3 noheadfoot

equivalent to nohead and nofoot.

\texttt{footnotesep}

changes the dimension $\skip\footins$, separation between the bottom of text body and the top of footnote text. $\headheight=0pt$, $\headsep=0pt$ and $\footskip=0pt$.

*3 marginparwidth \texttt{marginparwidth}

modifies $\marginparwidth$, width of the marginal notes. marginparwidth=\langle length \rangle.

Unlike version 2.3, it does not set includemp=true.

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\texttt{\textbackslash marginparsep} modifies \texttt{\textbackslash marginparsep}, separation between body and marginal notes. \texttt{\textbackslash marginparsep=\langle length\rangle}. Unlike version 2.3, it does not set \texttt{\textbackslash includemp=true}.

\texttt{\textbackslash nomarginpar} shrinks spaces for marginal notes to 0pt, which is equivalent to \texttt{\textbackslash marginparwidth=0pt} and \texttt{\textbackslash marginparsep=0pt}.

\texttt{\textbackslash columnsep} modifies \texttt{\textbackslash columnsep}, the separation between two columns in \texttt{twocolumn} mode.

\texttt{\textbackslash hoffset} modifies \texttt{\textbackslash hoffset}. \texttt{\textbackslash hoffset=\langle length\rangle}.

\texttt{\textbackslash voffset} modifies \texttt{\textbackslash voffset}. \texttt{\textbackslash voffset=\langle length\rangle}.

\texttt{\textbackslash offset} horizontal and vertical offset. \texttt{\textbackslash offset=\{\textbackslash hoffset, \textbackslash voffset\}} or \texttt{\textbackslash offset=\langle length\rangle}.

\texttt{\textbackslash twocolumn} sets \texttt{\textbackslash twocolumn} mode with \texttt{\@twocolumntrue}. \texttt{\textbackslash twocolumn=false} denotes \texttt{\textbackslash onecolumn} mode with \texttt{\@twocolumnfalse}.

\texttt{\textbackslash twoside} sets both \texttt{\@twosidetrue} and \texttt{\@mparswitchtrue}. See Section 5.3.

\texttt{\textbackslash textwidth} sets \texttt{\textbackslash textwidth} directly. See Section 5.2.

\texttt{\textbackslashtextheight} sets \texttt{\textbackslash textheight} directly. See Section 5.2.

\texttt{\textbackslash reversemp} \texttt{\textbackslash reversemarginpar} makes the marginal notes appear in the left (inner) margin with \texttt{\@reversemargintrue}. Unlike version 2.3 or earlier, it does not change \texttt{\textbackslash includemp} mode. This is \texttt{\textbackslash false} by default.

### 5.5 Drivers

Package \texttt{geometry} supports \texttt{dvips}, \texttt{dvipdfm}, \texttt{pdflatex} and \texttt{V\TeX} environment. These driver options are exclusive.

\texttt{\textbackslash dvips} writes the paper size in dvi output with the \texttt{\textbackslash special} macro. If you use \texttt{dvips} as a DVI-to-PS driver, for example, to print a document with \texttt{\textbackslash geometry\{a3paper,landscape\}} on A3 paper in landscape orientation, you don’t need options ”\texttt{-t a3 \textbackslash -t landscape}” to \texttt{dvips}. In version 3, this option sets an additional correction for landscape documents so that PostScript outputs shouldn’t be displayed upside down by PostScript viewers, e.g., Ghostscript. If you use \texttt{V\TeX} environment or \texttt{pdflatex} command, this option is automatically deselected and changed to the corresponding driver option. This option works with xdvi and \texttt{dviout} (though you may get some warnings).

\texttt{\textbackslash dvipdfm} works like \texttt{dvips} except landscape correction.

\texttt{\textbackslash pdftex} sets \texttt{\textbackslash pdfpagewidth} and \texttt{\textbackslash pdfpageheight} properly if \texttt{pdflatex} command is used for typeset. When \texttt{pdflatex} command is used, \texttt{pdftex} is automatically selected. On the other hand when one is not using \texttt{pdflatex} command this option is ineffective.

\texttt{\textbackslash vtex} sets dimensions \texttt{\textbackslash mediawidth} and \texttt{\textbackslash mediaheight} for \texttt{V\TeX}. This option is automatically selected when one is using \texttt{V\TeX} environment. On the other hand when one is not using \texttt{V\TeX} this option is ineffective.

Drivers options can be automatically changed depending on the typeset environment.

<table>
<thead>
<tr>
<th>environment</th>
<th>given driver option</th>
<th>→ resulted option</th>
</tr>
</thead>
<tbody>
<tr>
<td>latex</td>
<td>pdftex/vtex</td>
<td>→ none</td>
</tr>
<tr>
<td>pdflatex</td>
<td>any</td>
<td>→ pdftex</td>
</tr>
<tr>
<td>V\TeX</td>
<td>any</td>
<td>→ vtex.</td>
</tr>
</tbody>
</table>

### 5.6 Other Options

The other useful options are described here.

\texttt{\textbackslash verbose} displays parameter results on the terminal. \texttt{\textbackslash verbose=false} (default) still puts them into the log file.

\texttt{\textbackslash reset} sets back the layout dimensions and switches to the settings before \texttt{geometry} is loaded. Options given in \texttt{geometry\_cfg} are also cleared. Note that this cannot reset pass and mag with \texttt{\textbackslash truedimen}. \texttt{\textbackslash reset=false} has no effect and cannot cancel the previous \texttt{\textbackslash reset=(\textbackslash true)} if any. For example, when you go
with \ExecuteOptions{scale=0.9} in geometry.cfg, then as a result, landscape and left=2cm remain effective, and scale=0.9 and twoside are ineffective.

\textbf{mag} sets magnification value (\mag) and automatically modifies \hoffset and \voffset according to the magnification. \mag=value). Note that \textit{value} should be an integer value with 1000 as a normal size. For example, \mag=1414 with a4paper provides an enlarged print fitting in a3paper, which is 1.414 (=$\sqrt{2}$) times larger than a4paper. Font enlargement needs extra disk space. \textbf{Note that you should not specify \textit{mag} more than \textbf{once}}. Multiple \textit{mag} specification causes an error. See also \textit{truedimen} option.

\textbf{truedimen} changes all internal explicit dimension values into \textit{true} dimensions, e.g., 1in is changed to 1truein. Typically this option will be used together with \textit{mag} option. Note that this is ineffective against externally specified dimensions. For example, when you set “\mag=1440, margin=10pt, \textit{truedimen}”, margins are not ‘true’ but magnified. If you want to set exact margins, you should set like “\mag=1440, margin=10truept, \textit{truedimen}” instead.

\textbf{\textsuperscript{\textdagger}} \textbf{pass} disables all of the geometry options and calculations except \textit{verbose} and \textit{showframe}. It can be used for checking out the page layout of the documentclass, other packages and manual settings without \textit{geometry}.

\textbf{\textsuperscript{\textdagger}} \textbf{showframe} shows visible frames for the text area and page, and the lines for the head and foot on the first page.

\textbf{\textsuperscript{\textdagger}} \textbf{compat2} sets all kind of options so that \texttt{\usepackage[compat2]{geometry}} would behave as if one is using the old version (v2.3) with the old default layout: \texttt{[scale={0.8,0.9}, centering, includeheadfoot]}, which is here expressed by options available in version 3. Note this option should be set as a first option.

\section{Default Settings}

\subsection{Default Layout}

Let us recapitulate the default layout here. The \texttt{geometry} package has the following default page layout for onesided documents:

\begin{verbatim}
  scale=0.7, marginratio={1:1, 2:3}, ignoreall
\end{verbatim}

For twoside, the horizontal margin ratio is also set 2:3,

\begin{verbatim}
  scale=0.7, marginratio=2:3, ignoreall.
\end{verbatim}

Of course, you don’t need to set them explicitly. \texttt{\usepackage{geometry}} will internally set the above options. Additional options will overwrite the layout dimensions. For example,

\begin{verbatim}
  \usepackage[hmargin=2cm]{geometry}
\end{verbatim}

will overwrite horizontal dimensions, but use the default for vertical layout. Page dimensions specified by the documentclass being used and other direct settings before \texttt{geometry} is loaded are passed down to \texttt{geometry}.

Note version 2.3 or earlier had default layout different from the version 3. The old default options can be expressed with options available in the current version:

\begin{verbatim}
  scale={0.8,0.9}, centering, includeheadfoot.
\end{verbatim}

Adding \texttt{compat2} as a first option sets those options so that, for example,

\begin{verbatim}
  \usepackage[compat2, width=10cm]{geometry}
\end{verbatim}

would behave as if one is using the old version (v2.3).
6.2 Configuration File

One can set up a configuration file to make default options. To do this, produce a file `geometry.cfg` containing an `\ExecuteOptions` macro, for example,

`\ExecuteOptions{a4paper,dvips}`

and install it somewhere Tex can find it.

The options specified in the `geometry.cfg` can be cleared by option `reset`.

7 Relations Between Options

This section shows how complexity is solved when options are over-specified.

7.1 Order Dependence

The `geometry` options are basically order-independent, but there are some exceptions. For multiple specification of the same option, the last setting is adopted. For example,

`verbose=true, verbose=false`

obviously results in `verbose=false`. If you set

`hmargin={3cm,2cm}, left=1cm`

the left (or inner) margin is overwritten by `left=1cm`. As a result, it is equivalent to `hmargin={1cm,2cm}`.

The `reset` option removes all the geometry options (except `pass`) before it. If you set

`\documentclass[landscape]{article}
\usepackage[margin=1cm,twoside]{geometry}
\geometry{a5paper, reset, left=2cm}`

then `margin=1cm, twoside` and `a5paper` are removed. As a result, this case is equivalent to

`\documentclass[landscape]{article}
\usepackage[left=2cm]{geometry}`

7.2 Priority

There are several ways to set dimensions of the printable area: `scale`, `total`, `text` and `lines`. Basically specification with the more concrete dimension has the higher priority:

```
\begin{align*}
\text{low} & \longrightarrow \text{high} \quad \text{(priority)} \\
\{ \text{hscale} \} & < \{ \text{width} \} < \{ \text{textwidth} \} < \{ \text{lines} \} \\
\{ \text{vscale} \} & < \{ \text{height} \} < \{ \text{textheight} \}
\end{align*}
```

For example,

`\usepackage[hscale=0.8, textwidth=7in, width=18cm]{geometry}`

is the same as `\usepackage[textwidth=7in]{geometry}`. Another example:

`\usepackage[lines=30, scale=0.8, text=7in]{geometry}`

results in `[lines=30, textwidth=7in]`.

Options determining margin size also have priority rule: margin ratios versus margin length. For example, if both `marginratio=1:2` and `margin=1cm` are set at the same time, `margin=1cm` wins because `margin=1cm` is more concrete dimension than ratios. That is why normal margin options work well with default margin ratios (`marginratio={1:1, 2:3}` for oneside).

```
\begin{align*}
\text{low} & \longrightarrow \text{high} \quad \text{(priority)} \\
\{ \text{hmarginratio} \} & < \{ \text{hmargi}n \ or \ left \ & \ right \} \\
\{ \text{vmarginratio} \} & < \{ \text{vmargin} \ or \ top \ & \ bottom \} \\
\{ \text{marginratio} \} & < \{ \text{margin} \}
\end{align*}
```
8 Examples

- A onesided page layout with the text area centered in the paper. The examples below have the same result because the horizontal margin ratio is set 1:1 for oneside by default.
  - centering
  - marginratio=1:1
  - vcentering
- A twosided page layout with the inside offset for binding 1cm.
  - twoside, bindingoffset=1cm
In this case, textwidth is shorter than the case without bindingoffset=1cm by $0.7 \times 1\text{cm}$ (=0.7cm).
- A layout with the left, right, and top margin 3cm, 2cm and 2.5in respectively, with textheight of 40 lines, and with the head and foot of the page included in total body. The two examples below have the same result.
  - left=3cm, right=2cm, lines=40, top=2.5in, includeheadfoot
  - hmargin={3cm,2cm}, tmargin=2.5in, lines=40, includeheadfoot
- A layout with the height of total body 10in, the bottom margin 2cm, and the default width. The top margin will be calculated automatically. Each solution below results in the same page layout.
  - vdivide={*, 10in, 2cm}
  - bmargin=2cm, height=10in
  - bottom=2cm, textheight=10in
Note that dimensions for head and foot are excluded from height of total body. An additional includefoot makes \footskip included in totalheight. Therefore, in the two cases below, textheight in the former layout is shorter than the latter (with 10in exactly) by \footskip. In other words, height = textheight + \footskip when includefoot=true in this case.
  - bmargin=2cm, height=10in, includefoot
  - bottom=2cm, textheight=10in, includefoot
- A layout with textwidth and textheight 90% of the paper and with body centered. Each solution below results in the same page layout.
  - scale=0.9, centering
  - text={.9\paperwidth,.9\paperheight}, ratio=1:1
  - width=.9\paperwidth, vmargin=.1\paperheight, marginratio=1:1
  - hdivide={*,.9\paperwidth,*}, vdivide={*,.9\paperheight,*}
  - margin={.1\paperwidth,.1\paperheight}, marginratio=1:1
You can add heightrounded to avoid an “underfull vbox warning” like

\begin{verbatim}
Underfull \vbox (badness 10000) has occurred while \output is active.
\end{verbatim}

See Section 5.2 for the detail description about heightrounded.

- A layout with the width of marginal notes 3cm and included in the width of total body. The following examples are the same.
  - marginparwidth=3cm, includemp
  - marginpar=3cm, igoremp=false
- A layout the full scale body of the paper with A5 paper in landscape. The following examples are the same.
- a5paper, landscape, scale=1.0
- landscape=TRUE, paper=a5paper, margin=0pt

- A screen size layout appropriate to presentation with PC and video projector.

\documentclass{slide}
\usepackage[screen,margin=0.8in]{geometry}
...
\begin{slide}
...
\end{slide}

- A layout with fonts and spaces both enlarged from A4 to A3. In the case below, the resulted paper size is A3.

- a4paper, mag=1414.

If you want to have a layout with two times bigger fonts, but without changing paper size, you can go

- letterpaper, mag=2000, truedimen.

You can add dvips option, that is useful to preview it with proper paper size by dviout or xdvi.

- An old style setting with v2.3 or earlier

\usepackage[a4paper,mag=1200, truedimen, margin=2cm, twosideshift=10pt, headsep=7pt, headheight=14.5pt, marginparwidth=30pt]{geometry}

can be rewritten with options in version 3 without compat2:

\usepackage{calc}
\usepackage[a4paper,mag=1200, truedimen, margin=2cm, twoside, left=2cm+10pt, right=2cm-10pt, includeheadfoot, headsep=7pt, headheight=14.5pt, includemp, marginparwidth=30pt]{geometry}

In this case, includeall can be used instead of includeheadfoot and includemp.

- A complex page layout.

\usepackage[a5paper, landscape, twocolumn, twoside, left=2cm, hmarginratio=2:1, includemp, marginparwidth=43pt, bottom=1cm, foot=.7cm, includefoot, textheight=11cm, heightrounded, columnsep=1cm, dvips, verbose]{geometry}

Try typesetting it and checking out the result yourself. :-)

9 Known Problems

- With pdftex=true, mag \neq 1000 and truedimen, paperwidth and paperheight shown in verbose mode are different from the real size of the resulted PDF. The PDF itself is correct anyway.

- With pdftex=true, mag \neq 1000, no truedimen, and hyperref, hyperref should be loaded by \usepackage before geometry. Otherwise the resulted PDF size will become wrong.

- With crop package and mag \neq 1000, center option of crop doesn’t work well.
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