# The geometry package

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**Abstract**

This package provides an easy and flexible user interface to customize page layout. It implements auto-centering and auto-balancing mechanisms so that the users have only to give the least description for the page layout.

## Contents



## 1 Preface to Version 2

This new release contains three major changes:

- The geometry options using the *keyval* scheme can be set in the optional argument to the `\usepackage` command as well as in the (mandatory) argument of the `\geometry` macro. Therefore, you can go

  ```
  \usepackage[scale={0.7,0.8},nohead]{geometry}
  ```

  instead of

  ```
  \usepackage{geometry}
  \geometry{scale={0.7,0.8}, nohead}.
  ```

- Multiple use of `\geometry` macro is allowed. In the previous version `\geometry` command initialized layout dimensions before reading its options. In this release, however, `\geometry` just appends its options to the previously specified ones. Therefore,

  ```
  \usepackage[width=10cm, left=3cm]{geometry}
  \geometry{left=5cm}
  \geometry{vscale=0.8,nohead}
  ```

  is equivalent to

  ```
  \usepackage[width=10cm, left=5cm, vscale=0.8, nohead]{geometry}.
  ```

  If you want to reset layout dimensions and modes, you can use '`reset`' option.

- The shortened control sequences for `\paperwidth` and `\paperheight`, `\w` and `\h` respectively, were removed.

# 2 Introduction

To set dimensions for page layout in LaTeX is not straightforward. You need to adjust several LaTeX 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 LaTeX dimensions as follows:

```
\usepackage{calc}
\setlength\textwidth{8in}
\setlength\textheight{11in}
\setlength\oddsidemargin{(\paperwidth-\textwidth)/2 - 1in}
\setlength\topmargin{(\paperheight-\textheight
                      -\headheight-\headsep-\footskip)/2 - 1in}.
```

Without calc package, the above example would need more tedious settings. The geometry package provides an easy way to set page layout parameters. In this case, what you have to do is just

```
\usepackage[body={8in,11in}]{geometry}.
```

In addition to this centering problem, setting margins from each edge of the paper is also troublesome. However, with geometry package, you can go

```
\usepackage[margin=1.5in]{geometry}
```

if you want to set each margin 1.5in from each edge of the paper. In both cases, the remnant dimensions to be specified will be 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 first line on each page should begin 1.2 inches from the top edge of the page. The left margin should be 0.4 inch from the left edge.*

In this case, using geometry package you can go

```
\usepackage[body={6.5in,8.75in},
            top=1.2in, left=0.4in, nohead]{geometry}.
```

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), a header, a footer and a marginal note which is optional. There are four margins: left-, right-, top- and bottom-margin.

| | | |
|---|---|---|
| paper | : | total-body (printable area) and margins |
| total-body | : | head, body(text area), foot and marginal notes (option) |
| margins | : | left-, right-, top- and bottom-margin |

Each margin is measured from the corresponding edge of a paper. For example, left-margin means a horizontal distance between the left edge of the paper and that of the total body. Therefore the left-margin and top-margin defined in the geometry package are different from the ordinary LaTeX dimensions `\leftmargin` and `\topmargin`. The size of a body (text area) can be modified by `\textwidth` and `\textheight`.

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

$$\texttt{paperwidth} = \texttt{left} + \texttt{width} + \texttt{right} \quad (1)$$

$$\texttt{paperheight} = \texttt{top} + \texttt{height} + \texttt{bottom} \quad (2)$$

| Parts | Dimension names used in this package<br>Horizontal | Vertical |
|---|---|---|
| paper | `paperwidth` | `paperheight` |
| total-body | `width` or `totalwidth` | `height` or `totalheight` |
| body | `textwidth` | `textheight` |
| left margin | `left` or `lmargin` | — |
| right margin | `right` or `rmargin` | — |
| top margin | — | `top` or `tmargin` |
| bottom margin | — | `bottom` or `bmargin` |
| head | — | `headheight` and `headsep` |
| foot | — | `footskip` |
| marginal notes | `marginparwidth` and `marginparsep` | — |

Table 1: Page geometry parts and dimension names used in this package.

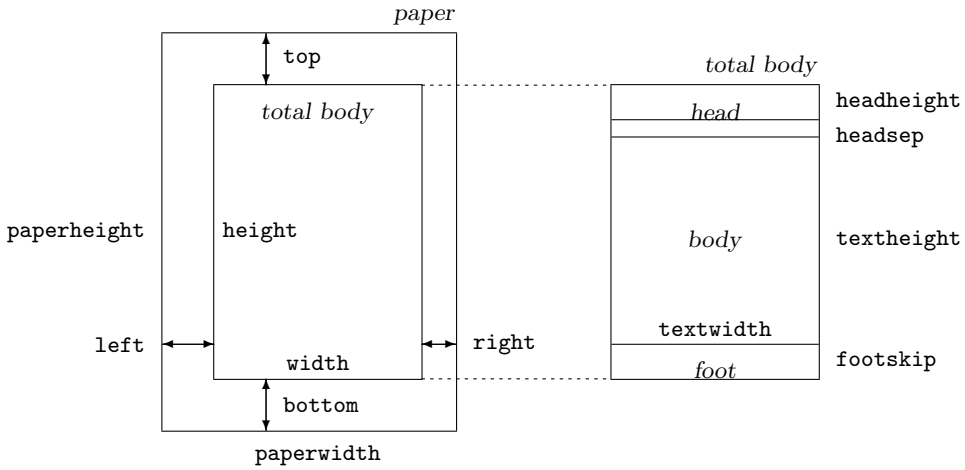


Figure 1: Dimension names for page geometry. If `includemp` is `false` (default), `width`=`textwidth`.

| Modes | Effects |
|---|---|
| `nohead` | sets `headheight=0pt, headsep=0pt`. |
| `nofoot` | sets `footskip=0pt`. |
| `noheadfoot` | equals `nohead` and `nofoot` |
| `includemp` | takes account of the dimensions for marginal notes when determining `width`: `width` := `textwidth` + `marginparsep` + `marginparwidth` |
| `reversemp` | makes the marginal notes appear in the left margin and sets `includemp` unless `includemp=false` exists. `reversemarginpar` results in the same effect. |

Table 2: Layout modes defined in this package and their effects.

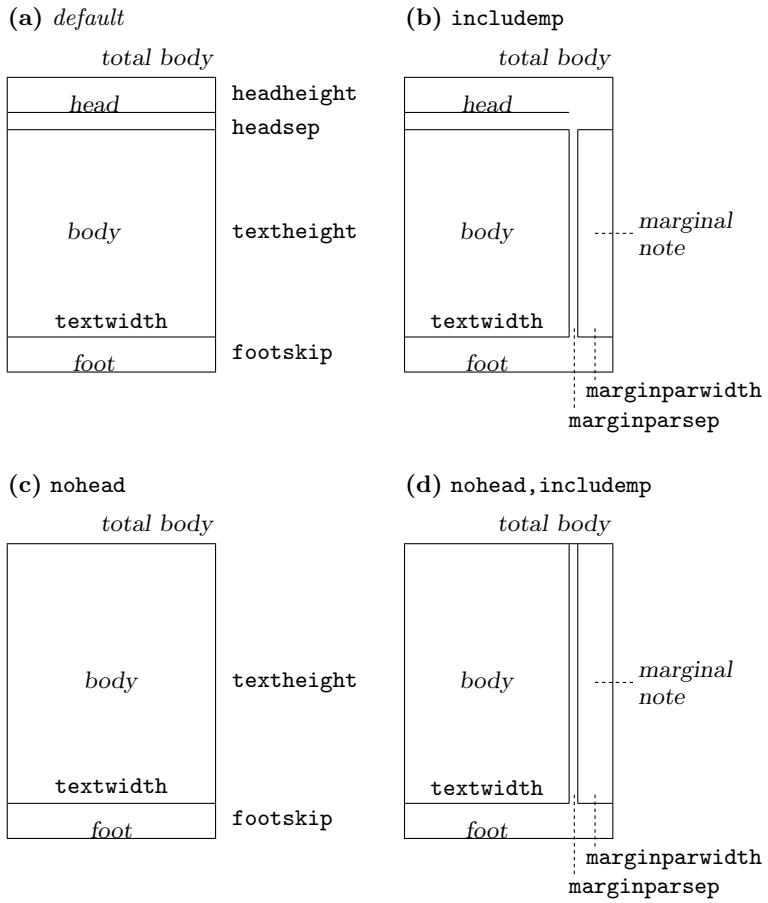


Figure 2: Sample layouts of total body with different layout modes. (a) default, (b) `includemp`, (c) `nohead`, and (d) `nohead` and `includemp`. Marginal note can be changed its placement from the right-hand to the left-hand side of the total body by `reversemp`. If both `twoside` and `includemp` are effective, marginal note will appear on the left (odd pages) and the right (even pages) by turns. Note that marginal notes can be printed even by default or `includemp=false`, but then the width of total body will not include that of marginal notes.

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

$$\texttt{width} := \texttt{textwidth} \quad (+\texttt{marginparsep} + \texttt{marginparwidth}) \tag{3}$$

$$\texttt{height} := \texttt{textheight} + \texttt{headheight} + \texttt{headsep} + \texttt{footskip} \tag{4}$$

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.

Table 2 shows layout modes defined in the geometry package, which are used to control layout dimensions and change relations between them. Figure 2 illustrates various layouts of total body with different layout modes. For example, when `includemp` mode is on, `width` takes account of lengths for marginal notes (`marginparsep` and `marginparwidth`) in the Equation (3) (See Figure 2(b)). The dimensions for a header and a footer can be controlled by `nohead` or `nofoot` mode, as well as direct specification. The geometry package can also deal with standard layout modes (options), i.e., `landscape`, `portrait`, `twoside` and paper size.

## 3.2 Completion Algorithm

The automatic completion of layout dimension is a distinguishing feature of this package. Suppose that the paper size is pre-defined in Equation (1) or (2), if two dimensions out of three in the right-hand side of each equation are given, the remnant dimension will be determined automatically. In addition, even when only one of three is given, the rest of dimensions will be determined using auto-balancing or auto-centering scheme. The completion rules are shown in Table 3 and Equation (5). In Table 3, $R_n$ ($n$=1, 2, 3) are the remnant lengths which can be

| Settings | | | | Results | | | |
|---|---|---|---|---|---|---|---|
| left | width | right | | left | width | right | |
| top | height | bottom | | top | height | bottom | |
| * | * | * | | $m$ | $\ell$ | $m$ | Default |
| $A$ | * | * | | $A$ | $R_1$ | $A$ | Balancing |
| * | * | $A$ | | $A$ | $R_1$ | $A$ | Balancing |
| * | $A$ | * | $\Longrightarrow$ | $R_2$ | $A$ | $R_2$ | Centering |
| $A$ | $B$ | * | | $A$ | $B$ | $R_3$ | |
| $A$ | * | $B$ | | $A$ | $R_3$ | $B$ | |
| * | $A$ | $B$ | | $R_3$ | $A$ | $B$ | |
| $A$ | $C$ | $B$ | | $A$ | $R_3$ | $B$ | Margins win. |

Table 3: Dimension completion rules. The mark '*' denotes the dimensions not specified. Each unspecified dimension will be given a proper value according the completion rule. See text for explanation of other symbols.

determined by $A$, $B$ and $L$ (`paperwidth` or `paperheight`) according the following relations.

$$\begin{aligned} R_1 &= L - 2A && \cdots \text{auto-balancing} \\ R_2 &= (L - A)/2 && \cdots \text{auto-centering} \\ R_3 &= L - A - B && \cdots \text{obvious completion} \end{aligned} \tag{5}$$

If none of three dimensions is specified in each direction, the default setting is used: $\ell$ and $m$ in horizontal direction are 80% and 10% of `paperwidth` respectively, 90% and 5% of `paperheight` vertically.

# 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 placed 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 6.2 for details.)

For example,

```
\usepackage[ a5paper ,  hmargin = { 3cm,
                .8in } , height
          =  10in ]{geometry}
```

is equivalent to

```
\usepackage[height=10in,a5paper,hmargin={3cm,0.8in}]{geometry}
```

Note that the order of values in the sub-list (e.g., `hmargin={3cm,0.8in}`) is significant. The above setting is equivalent to the followings:

```
\usepackage{geometry}
\geometry{height=10in,a5paper,hmargin={3cm,0.8in}}
```

or

```
\usepackage[a5paper]{geometry}
\geometry{hmargin={3cm,0.8in},height=8in}
\geometry{height=10in}.
```

Thus, multiple use of `\geometry` just appends options.

The geometry package supports the calc package[1]. For example,

```
\usepackage{calc}
\usepackage[textheight=20\baselineskip+10pt]{geometry}
```

[1] CTAN:`macros/latex/contrib/support/calc`

## 4.2 Option Types

There are five types of options:

1. **Boolean type**

   takes a boolean value (`true` or `false`). If no value, `true` is set for default.

   ⟨*key*⟩`=true` | `false`.
   ⟨*key*⟩ with no value is equivalent to ⟨*key*⟩`=true`.

   *Examples:* `verbose=true`, `nohead`, `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.

   ⟨*key*⟩=⟨*value*⟩.

   *Examples:* `width=8in`, `left=1.25in`, `footskip=1cm`, `height=.86\paperheight`.

3. **Two-valued type**

   takes a pair of comma-separated values in braces. The two values can be shortened to one value if they are identical.

   ⟨*key*⟩`= {`⟨*value1*⟩`,`⟨*value2*⟩`}`.
   ⟨*key*⟩=⟨*value*⟩ is equivalent to ⟨*key*⟩`= {`⟨*value*⟩`,`⟨*value*⟩`}`.

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

4. **Three-valued type**

   takes three mandatory, comma-separated values in braces.

   ⟨*key*⟩`= {`⟨*value1*⟩`,`⟨*value2*⟩`,`⟨*value3*⟩`}`

   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-calculation mechanism. One needs 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 List

## 5.1 Boolean Options

Boolean options are also called 'modes'. One can change various modes for page geometry.
The boolean options are listed below.

| | |
|---|---|
| `verbose` | typeouts warnings and a list of resulted page parameters. |
| `landscape` | switches the paper orientation to landscape mode. |
| `portrait` | switches the paper orientation to portrait mode. This is equivalent to `landscape=false`. |
| `twoside` | switches on two-sided printing. |
| `includemp` | takes account of spaces for margin notes (`\marginparwidth` and `\marginparsep`) when adjusting horizontal partition. |
| `reversemp` \| `reversemarginpar` | makes the marginal notes appear in the left margin and sets `includemp=true` unless `includemp=false` has been set explicitly. |
| `nohead` | eliminates spaces for the head of page, which is equivalent to `\headheight=0pt` and `\headsep=0pt`. |
| `nofoot` | eliminates spaces for the foot of page, which is equivalent to `\footskip=0pt`. |
| `noheadfoot` | eliminates spaces for the head and foot of page, which is equivalent to `nohead` and `nofoot`, i.e., `\headheight=0pt`, `\headsep=0pt` and `\footskip=0pt`. |

`dvips` writes the paper size in the PostScript output with the `\special` macro. If you use *dvips* as a DVI-to-PS driver, this option is very useful. For example, to print a document with `\geometry{a3paper,landscape}` on A3 paper in landscape mode, you don't need options "`-t a3 -t landscape`" to *dvips*. This option is ineffective and forced `false` if `pdftex` is `true`.

`pdftex` sets `\pdfoutput=1` and sets `\pdfpagewidth` and `\pdfpageheight` properly in the `\begin{document}` if *pdflatex* command is used for typeset. When you use *latex* command with `pdftex=true`, this option is ineffective and forced to be `false`. If `\pdfoutput=1` is already specified, this option is initialized to be `true`. You can set `pdftex=false` explicitly to output DVI, not PDF, when *pdflatex* is used. This option has priority over `dvips`.

`a0paper, a1paper, a2paper, a3paper, a4paper, a5paper,`
`b0paper, b1paper, b2paper, b3paper, b4paper, b5paper,`
`letterpaper, executivepaper, legalpaper`

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

`reset` initializes modes and layout dimensions to their defaults. Note that this option is ineffective against paper size (ex., `a4paper`) and lengths for header, footer and marginal notes (ex., `head`, `footskip`, `marginparwidth` and so on). `reset=false` has no effect and cannot cancel the previous `reset`(`=true`) if any.

Some of the above options may be given as document class options. For example, you can set `\documentclass[a4paper,landscape]{article}`, then `a4paper` and `landscape` are processed in the geometry package as well.

## 5.2 Single-Valued Options

The single-valued options with a mandatory value are listed below.

`paper` | `papername`
specifies a paper name. The available paper names are defined in the geometry package. `paper=`⟨*paper name*⟩. For example `paper=a4paper`, which is equivalent to just `a4paper` (see above).

`paperwidth` width of the paper. `paperwidth=`⟨*paper width*⟩.

`paperheight` height of the paper. `paperheight=`⟨*paper height*⟩.

`width` | `totalwidth`
width of the total body. `width=`⟨*width*⟩ or `totalwidth=`⟨*width*⟩. This dimension should not be confused with `textwidth`. Generally, `width` ≥ `textwidth` because `width` includes the width of marginal notes when `includemp` or dimensions for marginal notes is set. If `textwidth` and `width` are specified at the same time, `width` is ignored.

`height` | `totalheight`
height of the total body (including header and footer). `height=`⟨*height*⟩ or `totalheight=`⟨*height*⟩. If both `textheight` and `height` are specified, `height` will be ignored.

`left` | `lmargin`
left margin of the total body. In other words, the distance between the left edge of the paper and that of the total body. `left=`⟨*left margin*⟩.

`right` | `rmargin`
right margin of the total body. `right=`⟨*right margin*⟩.

`top` | `tmargin`
top margin of the total body. `top=`⟨*top margin*⟩.

`bottom` | `bmargin`
bottom margin of the total body. `bottom=`⟨*bottom margin*⟩.

`hscale` ratio of width of the total body to `\paperwidth`. `hscale=`⟨*h-ratio*⟩. `hscale=0.8` is equivalent to `width=0.8\paperwidth`.

`vscale` ratio of height of the total body to `\paperheight`. `vscale=`⟨*v-ratio*⟩. `vscale=0.9` is equivalent to `height=0.9\paperheight`.

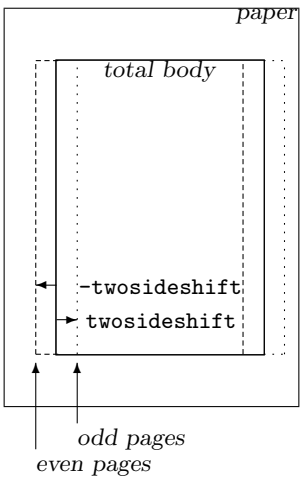


Figure 3: `twosideshift` option.

`textwidth` modifies `\textwidth`, width of text (body). `textwidth=`⟨*width*⟩.

`textheight` modifies `\textheight`, height of text (body). `textheight=`⟨*height*⟩.

`marginparwidth` | `marginpar`
modifies `\marginparwidth`, width of the marginal notes. When this option is set, `includemp` is also set `true` automatically. `marginparwidth=`⟨*length*⟩.

`marginparsep`
modifies `\marginparsep`, separation between body and marginal notes. `includemp` is also set `true` automatically. `marginparsep=`⟨*length*⟩.

`headheight` | `head`
modifies `\headheight`, height of header. `headheight=`⟨*length*⟩ or `head=`⟨*length*⟩.

`headsep` modifies `\headsep`, separation between header and text (body). `headsep=`⟨*length*⟩.

`footskip` | `foot`
modifies `\footskip`, distance separation between baseline of last line of text and baseline of footer. `footskip=`⟨*length*⟩ or `foot=`⟨*length*⟩.

`hoffset` modifies `\hoffset`. `hoffset=`⟨*length*⟩.

`voffset` modifies `\voffset`. `voffset=`⟨*length*⟩.

`twosideshift`
specifies extra space which is added to left-margin of odd-numbered pages and subtracted from that of even-numbered pages. `twoside` mode is also set. `twosideshift=`⟨*length*⟩. The default is 20pt. See Figure 3.

## 5.3 Two-Valued Options

The following list shows keys taking two values in braces or one value for short.

`papersize` width and height of the paper.
`papersize= {`⟨*width*⟩`,`⟨*height*⟩`}` or `papersize=`⟨*length*⟩.

`total` width and height of the total body.
`total= {`⟨*width*⟩`,`⟨*height*⟩`}` or `total=`⟨*length*⟩.

`body` | `text` textwidth and textheight of the body of page.
`body= {`⟨*width*⟩`,`⟨*height*⟩`}` or `body=`⟨*length*⟩.

`scale` ratio of the total body length to the paper's.
`scale= {`⟨*h-ratio*⟩`,`⟨*v-ratio*⟩`}` or `scale=`⟨*ratio*⟩.

`hmargin` left and right margin.
`hmargin= {`⟨*left margin*⟩`,`⟨*right margin*⟩`}` or `hmargin=`⟨*length*⟩.

`vmargin` top and bottom margin.
`vmargin= {`⟨*top margin*⟩`,`⟨*bottom margin*⟩`}` or `vmargin=`⟨*length*⟩.

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

`offset` horizontal and vertical offset.
`offset= {`⟨*hoffset*⟩`,`⟨*voffset*⟩`}` or `offset=`⟨*length*⟩.

### 5.4 Three-Valued Options

The keys taking three comma-separated values in braces are listed below.

`hdivide` horizontal partitions (left,width,right).
`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 `hdivide={2cm,15cm, }`, the margin from the rightside edge of page will be determined calculating `paperwidth-2cm-15cm`.

`vdivide` vertical partitions (top,height,bottom).
`vdivide= {`⟨*top margin*⟩`,`⟨*height*⟩`,`⟨*bottom margin*⟩`}`.

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

## 6 Relations Between Options

### 6.1 Option Priority

low ⟶ high (priority)

- $\left\{\begin{array}{l}\texttt{hscale}\\ \texttt{vscale}\end{array}\right\} < \left\{\begin{array}{l}\texttt{width}\\ \texttt{height}\end{array}\right\} < \left\{\begin{array}{l}\texttt{textwidth}\\ \texttt{textheight}\end{array}\right\}$,
- $\left\{\begin{array}{l}\texttt{head(height)}\\ \texttt{headsep}\\ \texttt{foot(skip)}\end{array}\right\} < \left\{\begin{array}{l}\texttt{nohead}\\ \texttt{nofoot}\\ \texttt{noheadfoot}\end{array}\right\}$,
- `dvips` < `pdftex`.

For example,

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

is the same as

```
\usepackage[textwidth=7in]{geometry}.
```

### 6.2 Order Dependence

The options defined in the geometry package are basically order-independent, but there are some exceptions. When redundant, overlap specification is given, 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-margin is overwritten by `left=1cm`. As a result, it is equivalent to `hmargin={1cm,2cm}`. The `reset` option initializes all the modes and settings for page layout. If you set

```
\documentclass[a4paper,landscape]{article}
\usepackage[margins=1cm,nohead]{geometry}
\geometry{reset, head=20pt}
```

then `landscape`, `margins=1cm` and `nohead` are ignored and `head=20pt` is set. Note that `reset` can't initialize paper size (`a4paper` in this case).

### 6.3 dvips and pdftex

The options `dvips` and `pdftex` are provided for driver support. They may be used for other packages that support them. In the geometry package, the `pdftex` option has priority over `dvips`. The table below shows relations between the typeset command, `\pdfoutput` and effective values for each driver option.

| command | `pdftex` | `dvips` |
|---|---|---|
| *latex* | `false` | *any* |
| *pdflatex* | `true` | `false` |
| | `false` | *any* |

where '*any*' means that one can choose `true` or `false`. When *pdflatex* command is used for typeset, the default value of the `pdftex` option is dependent upon the value of `\pdfoutput`: `true` if `\pdfoutput=1`, and `false` otherwise.

## 7 Default Settings

### 7.1 Default Option

The default option is

`scale={0.8,0.9}`.

Other layout parameters, such as paper size, orientation and lengths for header and footer, are set as defined in the documentclass you use. If you just go `\usepackage{geometry}` in the preamble, the package will set the default layout. Additional options will overwrite the layout dimensions. For example,

```
\usepackage[ hmargin=2cm ]{geometry}
```

will overwrite horizontal dimensions, but use the default for vertical layout.

### 7.2 Configuration File

You 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.

## 8 Examples

- Set the width of the total body to be 70% that of the paper. The total body is then centered horizontally. The following settings (each line) result in the same effect.
  - `hscale=0.7`,
  - `width=0.7\paperwidth`,
  - `hdivide={*,0.7\paperwidth,*}`,
  - `hmargin=0.15\paperwidth`,
  - `left=0.15\paperwidth`,
  - `left = .15\paperwidth, right= 0.15\paperwidth`,
  - `rmargin= .15\paperwidth`.

  For vertical layout, in this case, the default is used: `vscale=0.9`.
- Set the height of the total body to be `10in`, the bottom-margin `3cm`, and the width default. Then the top-margin will be calculated in the package.
  - `height=10in,bottom=2cm`,
  - `bmargin = 2cm ,totalheight= 10in`,
  - `vdivide = { *, 10in ,2cm }`,

  and so on.
- Set the left-, right-, and top-margin `3cm`, `2cm` and `2.5in` respectively. The page header is not used. The body is 40 lines of text in height.

– `left=3cm,right=2cm, nohead,`
`top=2.5in, textheight=40\baselineskip,`
– `hmargin={3cm, 2cm}, head=0pt, headsep=0pt`
`tmargin=2.5in, textheight=40\baselineskip,`
and so on.

- Modify the width of marginal notes to `3cm` and include marginal notes when adjusting horizontal partition

  – `marginpar=3cm`,
  – `marginparwidth=3cm`.
  In this case, `includemp` is not necessary because it is set automatically when dimension(s) for marginal note are specified.

  – `marginpar=3cm, reversemp`
  makes the marginal notes appear in the left margin.

- Use A5 paper in landscape mode and a full scale of the paper as the body.

  – `a5paper, landscape, scale=1.0 , noheadfoot`,
  – `landscape = TRUE, paper=a5paper, noheadfoot,`
  `total={\paperwidth,\paperheight}`,
  and so on.

- Get PDF output using *pdflatex* command for typeset.

  `% pdflatex foo`
  with
  `\documentclass[pdftex]{article}`
  `\usepackage{geometry}`
  or
  `\documentclass{article}`
  `\usepackage[pdftex]{geometry}`

  is equivalent to

  `% pdflatex '\pdfoutput=1 \input{foo}'`
  with
  `\documentclass{article}`
  `\usepackage{geometry}`.

# 9 Acknowledgements

I would like to thank Friedrich Flender, Piet van Oostrum and Keith Reckdahl for their pointing out bugs and suggesting improvements. I would like to thank Frank Bennett for many helpful comments.

# 10 The Code

1 ⟨∗package⟩

This package requires David Carlisle's keyval package.
2 `\RequirePackage{keyval}`

Internal switches are declared here.
3 `\newif\ifGeom@verbose`
4 `\newif\ifGeom@landscape`
5 `\newif\ifGeom@nohead`
6 `\newif\ifGeom@nofoot`
7 `\newif\ifGeom@includemp`
8 `\newif\ifGeom@passincmp`
9 `\newif\ifGeom@hbody`
10 `\newif\ifGeom@vbody`
11 `\newif\ifGeom@dvips`
12 `\newif\ifGeom@pdftex`

`\geom@cnth` `\geom@cntv` Counters for horizontal and vertical partitioning patterns.

```
\newcount\geom@cnth
\newcount\geom@cntv
```

`\geom@warning` Macor for printing warning messages.

```
\def\geom@warning#1{%
  \ifGeom@verbose\PackageWarningNoLine{geometry}{#1}\fi}
```

`\Geom@Dhscale` `\Geom@Dvscale` `\Geom@Dtwosideshift` The default values for the horizontal and vertical *scale*, and *twosideshift* are defined.

```
\def\Geom@Dhscale{0.8}
\def\Geom@Dvscale{0.9}
\def\Geom@Dtwosideshift{20pt}
```

`\geom@init` The macro for initializing modes and flags is defined here. This macro is called when geometry package is loaded and when `reset` option is specified.

```
\def\geom@init{%
  \Geom@hbodyfalse
  \Geom@vbodyfalse
  \let\Geom@width\undefined
  \let\Geom@height\undefined
  \let\Geom@textwidth\undefined
  \let\Geom@textheight\undefined
  \let\Geom@hscale\undefined
  \let\Geom@vscale\undefined
  \let\Geom@lmargin\undefined
  \let\Geom@rmargin\undefined
  \let\Geom@tmargin\undefined
  \let\Geom@bmargin\undefined
  \def\Geom@twosideshift{\Geom@Dtwosideshift}%
  \@twosidefalse
  \@mparswitchfalse
  \Geom@verbosefalse
  \Geom@landscapefalse
  \Geom@noheadfalse
  \Geom@nofootfalse
  \Geom@includempfalse
  \Geom@passincmpfalse
  \Geom@dvipsfalse
  \geom@initpdftex}
```

`\geom@initpdftex` This macro initializes `Geom@pdftex` switch, which appears in `\geom@init` macro.

```
\def\geom@initpdftex{%
\ifx\undefined\pdfpagewidth
  \Geom@pdftexfalse
\else
  \ifnum\pdfoutput=1\relax\Geom@pdftextrue\else\Geom@pdftexfalse\fi
\fi}
```

`\geom@setbool` Macro for setting boolean options.

```
\def\geom@setbool#1#2{%
  \csname #2\ifx\relax#1\relax true\else#1\fi\endcsname}
```

`\geom@checkbool` Macro used in `\geom@showparams` to print 'true' or nothing.

```
\def\geom@checkbool#1{%
  \csname ifGeom@#1\endcsname #1\space\else\fi}
```

`\geom@detiv` This macro determines the fourth length(`#4`) from `#1`(paperwidth or paperheight), `#2` and `#3`. It is used in `\geom@detall` macro.

```
\def\geom@detiv#1#2#3#4{% determine #4.
  \setlength\@tempdima{\@nameuse{paper#1}}%
  \setlength\@tempdimb{\@nameuse{Geom@#2}}%
  \addtolength\@tempdima{-\@tempdimb}%
  \setlength\@tempdimb{\@nameuse{Geom@#3}}%
  \addtolength\@tempdima{-\@tempdimb}%
  \ifdim\@tempdima<\z@
    \geom@warning{`#4' results in NEGATIVE (\the\@tempdima).%
    ^^J\@spaces Parameters of `#2' and `#3' should be shortened}%
  \fi
  \expandafter\edef\csname Geom@#4\endcsname{\the\@tempdima}}
```

\geom@detiiandiii This macro determines #2 and #3 from #1. The first argument can be width or height, which is expanded into dimensions of paper and total body. It is used in \geom@detall macro.

```
\def\geom@detiiandiii#1#2#3{% determine #2 and #3.
  \setlength\@tempdima{\@nameuse{paper#1}}%
  \setlength\@tempdimb{\@nameuse{Geom@#1}}%
  \addtolength\@tempdima{-\@tempdimb}%
  \divide\@tempdima\tw@
  \ifdim\@tempdima<\z@
    \geom@warning{`#2' and `#3' result in NEGATIVE (\the\@tempdima).%
                  ^^J\@spaces Parameter for `#1' should be shortened}%
  \fi
  \expandafter\edef\csname Geom@#2\endcsname{\the\@tempdima}%
  \expandafter\edef\csname Geom@#3\endcsname{\the\@tempdima}}
```

\geom@detall This macro determines partition of each direction. The first argument is h or v.

```
\def\geom@detall#1#2#3#4{%
  \@tempcnta\z@
  \if#1h
    \ifx\undefined\Geom@lmargin\else\advance\@tempcnta4\relax\fi
    \ifGeom@hbody\advance\@tempcnta2\relax\fi
    \ifx\undefined\Geom@rmargin\else\advance\@tempcnta1\relax\fi
    \geom@cnth\@tempcnta
  \else
    \ifx\undefined\Geom@tmargin\else\advance\@tempcnta4\relax\fi
    \ifGeom@vbody\advance\@tempcnta2\relax\fi
    \ifx\undefined\Geom@bmargin\else\advance\@tempcnta1\relax\fi
    \geom@cntv\@tempcnta
  \fi
  \ifcase\@tempcnta               % 0:(*,*,*)
    \if#1h
      \edef\Geom@width{\Geom@Dhscale\paperwidth}%
    \else
      \edef\Geom@height{\Geom@Dvscale\paperheight}%
    \fi
    \geom@detiiandiii{#2}{#3}{#4}%
  \or                             % 1:(*,*,S) goto (5)
    \geom@warning{`#3' was forced to equal `#4'}%
    \expandafter\edef\csname Geom@#3\endcsname{\@nameuse{Geom@#4}}%
    \geom@detiv{#2}{#3}{#4}{#2}%
  \or\geom@detiiandiii{#2}{#3}{#4}% 2:(*,S,*)
  \or\geom@detiv{#2}{#2}{#4}{#3}  % 3:(*,S,S)
  \or                             % 4:(S,*,*) goto (5)
    \geom@warning{`#4' was forced to equal `#3'}%
    \expandafter\edef\csname Geom@#4\endcsname{\@nameuse{Geom@#3}}%
    \geom@detiv{#2}{#3}{#4}{#2}%
  \or\geom@detiv{#2}{#3}{#4}{#2}  % 5:(S,*,S)
  \or\geom@detiv{#2}{#2}{#3}{#4}  % 6:(S,S,*)
  \or                             % 7:(S,S,S) goto (5)
    \geom@warning{Redundant specification in `#1'-direction.%
                  ^^J\@spaces `#2' (\@nameuse{Geom@#2}) is ignored}%
    \geom@detiv{#2}{#3}{#4}{#2}%
  \else\fi}
```

\geom@clean Macro for setting unspecified dimensions to be \undefined. This is used by \geometry macros.

```
\def\geom@clean{%
  \ifnum\geom@cnth<4\let\Geom@lmargin\undefined\fi
  \ifodd\geom@cnth\else\let\Geom@rmargin\undefined\fi
  \ifnum\geom@cntv<4\let\Geom@tmargin\undefined\fi
  \ifodd\geom@cntv\else\let\Geom@bmargin\undefined\fi
  \ifGeom@hbody\else
    \let\Geom@hscale\undefined
    \let\Geom@width\undefined
    \let\Geom@textwidth\undefined
  \fi
  \ifGeom@vbody\else
    \let\Geom@vscale\undefined
    \let\Geom@height\undefined
```

```
    \let\Geom@textheight\undefined
  \fi}
```

`\geom@parse@divide` Macro for parsing (h,v)`divide` options.

```
\def\geom@parse@divide#1#2#3#4{%
  \def\Geom@star{*}%
  \@tempcnta\z@
  \@for\Geom@tmp:=#1\do{%
    \expandafter\KV@@sp@def\expandafter\Geom@frag\expandafter{\Geom@tmp}%
    \edef\Geom@value{\Geom@frag}%
    \ifcase\@tempcnta\relax% cnta == 0
            \edef\Geom@key{#2}%
    \or     \edef\Geom@key{#3}%
    \else   \edef\Geom@key{#4}%
    \fi
    \@nameuse{Geom@set\Geom@key false}%
    \ifx\empty\Geom@value\else
    \ifx\Geom@star\Geom@value\else
      \setkeys{Geom}{\Geom@key=\Geom@value}%
    \fi\fi
    \advance\@tempcnta\@ne}%
  \let\Geom@star\relax}
```

`\geom@branch` Macro for branching an option's value into the same two values.

```
\def\geom@branch#1#2#3{%
  \@tempcnta\z@
  \@for\Geom@tmp:=#1\do{%
    \KV@@sp@def\Geom@frag{\Geom@tmp}%
    \edef\Geom@value{\Geom@frag}%
    \ifcase\@tempcnta\relax% cnta == 0
      \setkeys{Geom}{#2=\Geom@value}%
    \or% cnta == 1
      \setkeys{Geom}{#3=\Geom@value}%
    \else\fi
    \advance\@tempcnta\@ne}%
  \ifnum\@tempcnta=\@ne
    \setkeys{Geom}{#2=\Geom@value}%
    \setkeys{Geom}{#3=\Geom@value}%
  \fi}
```

`\geom@setpaper`

```
\def\geom@setpaper(#1,#2){\setlength\paperwidth{#1}%
                          \setlength\paperheight{#2}}
```

Various paper size are defined here.

```
\@namedef{Geom@a0paper}{\geom@setpaper(841mm,1189mm)}
\@namedef{Geom@a1paper}{\geom@setpaper(595mm,841mm)}
\@namedef{Geom@a2paper}{\geom@setpaper(420mm,595mm)}
\@namedef{Geom@a3paper}{\geom@setpaper(297mm,420mm)}
\@namedef{Geom@a4paper}{\geom@setpaper(210mm,297mm)}
\@namedef{Geom@a5paper}{\geom@setpaper(149mm,210mm)}
\@namedef{Geom@b0paper}{\geom@setpaper(1000mm,1414mm)}
\@namedef{Geom@b1paper}{\geom@setpaper(707mm,1000mm)}
\@namedef{Geom@b2paper}{\geom@setpaper(500mm,707mm)}
\@namedef{Geom@b3paper}{\geom@setpaper(353mm,500mm)}
\@namedef{Geom@b4paper}{\geom@setpaper(250mm,353mm)}
\@namedef{Geom@b5paper}{\geom@setpaper(176mm,250mm)}
\@namedef{Geom@letterpaper}{\geom@setpaper(8.5in,11in)}
\@namedef{Geom@legalpaper}{\geom@setpaper(8.5in,14in)}
\@namedef{Geom@executivepaper}{\geom@setpaper(7.25in,10.5in)}
```

The option keys are defined below.

`'paper'` `paper` takes paper name as its value. Available paper names are listed below.

```
\define@key{Geom}{paper}{\setkeys{Geom}{#1}}
```

‘a[0-5]paper’ ‘b[0-5]paper’ ‘letterpaper’ ‘legalpaper’ ‘executivepaper’ Thirteen standard paper names are available.

```
\define@key{Geom}{a0paper}[true]{\def\Geom@paper{a0paper}}
\define@key{Geom}{a1paper}[true]{\def\Geom@paper{a1paper}}
\define@key{Geom}{a2paper}[true]{\def\Geom@paper{a2paper}}
\define@key{Geom}{a3paper}[true]{\def\Geom@paper{a3paper}}
\define@key{Geom}{a4paper}[true]{\def\Geom@paper{a4paper}}
\define@key{Geom}{a5paper}[true]{\def\Geom@paper{a5paper}}
\define@key{Geom}{b0paper}[true]{\def\Geom@paper{b0paper}}
\define@key{Geom}{b1paper}[true]{\def\Geom@paper{b1paper}}
\define@key{Geom}{b2paper}[true]{\def\Geom@paper{b2paper}}
\define@key{Geom}{b3paper}[true]{\def\Geom@paper{b3paper}}
\define@key{Geom}{b4paper}[true]{\def\Geom@paper{b4paper}}
\define@key{Geom}{b5paper}[true]{\def\Geom@paper{b5paper}}
\define@key{Geom}{letterpaper}[true]{\def\Geom@paper{letterpaper}}
\define@key{Geom}{legalpaper}[true]{\def\Geom@paper{legalpaper}}
\define@key{Geom}{executivepaper}[true]{\def\Geom@paper{executivepaper}}
```

‘papersize’ ‘paperwidth’ ‘paperheight’

```
\define@key{Geom}{papersize}{\geom@branch{#1}{paperwidth}{paperheight}}
\define@key{Geom}{paperwidth}{\setlength\paperwidth{#1}%
                              \let\Geom@paper\undefined}
\define@key{Geom}{paperheight}{\setlength\paperheight{#1}%
                               \let\Geom@paper\undefined}
```

‘total’ ‘width’ ‘height’

```
\define@key{Geom}{total}{\geom@branch{#1}{width}{height}}
\define@key{Geom}{width}{\Geom@hbodytrue\edef\Geom@width{#1}}
\define@key{Geom}{height}{\Geom@vbodytrue\edef\Geom@height{#1}}
```

‘body’ ‘textwidth’ ‘textheight’

```
\define@key{Geom}{body}{\geom@branch{#1}{textwidth}{textheight}}
\define@key{Geom}{textwidth}{\Geom@hbodytrue\edef\Geom@textwidth{#1}}
\define@key{Geom}{textheight}{\Geom@vbodytrue\edef\Geom@textheight{#1}}
```

‘scale’ ‘hscale’ ‘vscale’

```
\define@key{Geom}{scale}{\geom@branch{#1}{hscale}{vscale}}
\define@key{Geom}{hscale}{\Geom@hbodytrue\edef\Geom@hscale{#1}}
\define@key{Geom}{vscale}{\Geom@vbodytrue\edef\Geom@vscale{#1}}
```

‘margin’ ‘hmargin’ ‘vmargin’ ‘lmargin’ ‘rmargin’ ‘tmargin’ ‘bmargin’

```
\define@key{Geom}{margin}{\geom@branch{#1}{lmargin}{tmargin}%
                          \geom@branch{#1}{rmargin}{bmargin}}
\define@key{Geom}{hmargin}{\geom@branch{#1}{lmargin}{rmargin}}
\define@key{Geom}{vmargin}{\geom@branch{#1}{tmargin}{bmargin}}
\define@key{Geom}{lmargin}{\edef\Geom@lmargin{#1}}
\define@key{Geom}{rmargin}{\edef\Geom@rmargin{#1}}
\define@key{Geom}{tmargin}{\edef\Geom@tmargin{#1}}
\define@key{Geom}{bmargin}{\edef\Geom@bmargin{#1}}
```

‘divide’ ‘hdivide’ ‘vdivide’ Provide useful ways to partition each direction of paper.

```
\define@key{Geom}{divide}{\geom@parse@divide{#1}{lmargin}{width}{rmargin}%
                          \geom@parse@divide{#1}{tmargin}{height}{bmargin}}
\define@key{Geom}{hdivide}{\geom@parse@divide{#1}{lmargin}{width}{rmargin}}
\define@key{Geom}{vdivide}{\geom@parse@divide{#1}{tmargin}{height}{bmargin}}
```

‘offset’ ‘hoffset’ ‘voffset’

```
\define@key{Geom}{offset}{\geom@branch{#1}{hoffset}{voffset}}
\define@key{Geom}{hoffset}{\setlength\hoffset{#1}}
\define@key{Geom}{voffset}{\setlength\voffset{#1}}
```

‘headheight’ ‘headsep’ ‘footskip’

```
\define@key{Geom}{headheight}{\Geom@noheadfalse\setlength\headheight{#1}}
\define@key{Geom}{headsep}{\Geom@noheadfalse\setlength\headsep{#1}}
\define@key{Geom}{footskip}{\Geom@nofootfalse\setlength\footskip{#1}}
```

```
\define@key{Geom}{marginparwidth}%
           {\ifGeom@passincmp\else\Geom@includemptrue\fi%
            \setlength\marginparwidth{#1}}
\define@key{Geom}{marginparsep}%
           {\ifGeom@passincmp\else\Geom@includemptrue\fi%
            \setlength\marginparsep{#1}}

\define@key{Geom}{verbose}[true]{%
            \lowercase{\geom@setbool{#1}}{Geom@verbose}}
\define@key{Geom}{reset}[true]{%
            \lowercase{\expandafter\csname if#1\endcsname\geom@init\fi}}
\define@key{Geom}{includemp}[true]{%
            \Geom@passincmptrue
            \lowercase{\geom@setbool{#1}}{Geom@includemp}}
\define@key{Geom}{reversemp}[true]{%
            \ifGeom@passincmp\else\Geom@includemptrue\fi%
            \lowercase{\geom@setbool{#1}}{@reversemargin}}
\define@key{Geom}{reversemarginpar}[true]{%
            \ifGeom@passincmp\else\Geom@includemptrue\fi%
            \lowercase{\geom@setbool{#1}}{@reversemargin}}
\define@key{Geom}{twoside}[true]{%
            \lowercase{\geom@setbool{#1}}{@twoside}%
            \lowercase{\geom@setbool{#1}}{@mparswitch}}
\define@key{Geom}{twosideshift}{\@twosidetrue\def\Geom@twosideshift{#1}}
\define@key{Geom}{nohead}[true]{%
            \lowercase{\geom@setbool{#1}}{Geom@nohead}}
\define@key{Geom}{nofoot}[true]{%
            \lowercase{\geom@setbool{#1}}{Geom@nofoot}}
\define@key{Geom}{noheadfoot}[true]{%
            \lowercase{\geom@setbool{#1}}{Geom@nohead}%
            \lowercase{\geom@setbool{#1}}{Geom@nofoot}}
\define@key{Geom}{landscape}[true]{%
            \lowercase{\geom@setbool{#1}}{Geom@landscape}}
\define@key{Geom}{portrait}[true]{%
            \lowercase{\expandafter\csname if#1\endcsname
            \Geom@landscapefalse\else\Geom@landscapetrue\fi}}
\define@key{Geom}{dvips}[true]{%
            \lowercase{\geom@setbool{#1}}{Geom@dvips}}
\define@key{Geom}{pdftex}[true]{%
            \lowercase{\geom@setbool{#1}}{Geom@pdftex}}
```

The key aliases are defined.

```
\let\KV@Geom@papername\KV@Geom@paper
\let\KV@Geom@totalwidth\KV@Geom@width
\let\KV@Geom@totalheight\KV@Geom@height
\let\KV@Geom@text\KV@Geom@body
\let\KV@Geom@left\KV@Geom@lmargin
\let\KV@Geom@right\KV@Geom@rmargin
\let\KV@Geom@top\KV@Geom@tmargin
\let\KV@Geom@bottom\KV@Geom@bmargin
\let\KV@Geom@head\KV@Geom@headheight
\let\KV@Geom@foot\KV@Geom@footskip
\let\KV@Geom@marginpar\KV@Geom@marginparwidth
```

`\geom@process` The main macro processing specified layout dimensions is defined.

```
\def\geom@process{
  \ifx\undefined\Geom@paper\else\@nameuse{Geom@\Geom@paper}\fi
  \ifGeom@landscape
    \setlength\@tempdima{\paperwidth}%
    \setlength\paperwidth{\paperheight}%
    \setlength\paperheight{\@tempdima}%
  \fi
  \ifGeom@nohead
    \setlength\headheight{0pt}%
    \setlength\headsep{0pt}%
```

```
\fi
\ifGeom@nofoot
  \setlength\footskip{0pt}%
\fi
\ifGeom@hbody
  \ifx\undefined\Geom@width
    \ifx\undefined\Geom@hscale
      \edef\Geom@width{\Geom@Dhscale\paperwidth}%
    \else
      \edef\Geom@width{\Geom@hscale\paperwidth}%
    \fi
  \fi
  \ifx\undefined\Geom@textwidth\else
    \setlength\@tempdima{\Geom@textwidth}%
    \ifGeom@includemp
      \addtolength\@tempdima{\marginparwidth}%
      \addtolength\@tempdima{\marginparsep}%
    \fi
    \edef\Geom@width{\the\@tempdima}%
  \fi
\fi
\ifGeom@vbody
  \ifx\undefined\Geom@height%
    \ifx\undefined\Geom@vscale%
      \edef\Geom@height{\Geom@Dvscale\paperheight}%
    \else
      \edef\Geom@height{\Geom@vscale\paperheight}%
    \fi
  \fi
  \ifx\undefined\Geom@textheight\else%
    \setlength\@tempdima{\Geom@textheight}%
    \addtolength\@tempdima{\headheight}%
    \addtolength\@tempdima{\headsep}%
    \addtolength\@tempdima{\footskip}%
    \edef\Geom@height{\the\@tempdima}%
  \fi
\fi
\geom@detall{h}{width}{lmargin}{rmargin}%
\geom@detall{v}{height}{tmargin}{bmargin}%
\setlength\textwidth{\Geom@width}%
\setlength\textheight{\Geom@height}%
\setlength\topmargin{\Geom@tmargin}%
\setlength\oddsidemargin{\Geom@lmargin}%
\ifGeom@includemp
  \addtolength\textwidth{-\marginparwidth}%
  \addtolength\textwidth{-\marginparsep}%
  \if@reversemargin
     \addtolength\oddsidemargin{\marginparwidth}%
     \addtolength\oddsidemargin{\marginparsep}%
  \fi
\fi
\addtolength\textheight{-\headheight}%
\addtolength\textheight{-\headsep}%
\addtolength\textheight{-\footskip}%
\addtolength\topmargin{-1in}%
\addtolength\oddsidemargin{-1in}%
\if@twoside
  \setlength\evensidemargin{\Geom@rmargin}%
  \addtolength\evensidemargin{-1in}%
  \setlength\@tempdima{\Geom@twosideshift}%
  \addtolength\oddsidemargin{\@tempdima}%
  \addtolength\evensidemargin{-\@tempdima}%
  \ifGeom@includemp
    \if@mparswitch
      \setlength\@tempdima{\marginparwidth}%
      \addtolength\@tempdima{\marginparsep}%
      \addtolength\evensidemargin{\@tempdima}%
```

```
        \if@reversemargin
          \addtolength\evensidemargin{-\marginparwidth}%
          \addtolength\evensidemargin{-\marginparsep}%
        \fi
      \fi
    \fi
  \else
    \setlength\evensidemargin{\oddsidemargin}%
  \fi}
```

`\geom@showparam` The macro for typeout of geometry status and LaTeX layout dimensions.

```
\def\geom@showparams{%
  \typeout{----------------------- Geometry parameters^^J%
  mode: %
  \ifx\undefined\Geom@paper\else
     \Geom@paper\space
  \fi
  \geom@checkbool{landscape}%
  \geom@checkbool{nohead}%
  \geom@checkbool{nofoot}%
  \geom@checkbool{includemp}%
  \if@reversemargin reversemp\space\fi%
  \if@twoside twoside\space\fi%
  \geom@checkbool{dvips}%
  \geom@checkbool{pdftex}^^J%
  h-parts: \Geom@lmargin, \Geom@width, \Geom@rmargin%
  \ifnum\geom@cnth=\z@\space(default)\fi^^J%
  v-parts: \Geom@tmargin, \Geom@height, \Geom@bmargin%
  \ifnum\geom@cntv=\z@\space(default)\fi^^J%
  \if@twoside
    twosideshift: \Geom@twosideshift^^J%
  \fi
  ----------------------- Page layout dimensions^^J%
  \string\paperwidth\space\space\the\paperwidth^^J%
  \string\paperheight\space\the\paperheight^^J%
  \string\textwidth\space\space\the\textwidth^^J%
  \string\textheight\space\the\textheight^^J%
  \string\oddsidemargin\space\space\the\oddsidemargin^^J%
  \string\evensidemargin\space\the\evensidemargin^^J%
  \string\topmargin\space\space\the\topmargin^^J%
  \string\headheight\space\the\headheight^^J%
  \string\headsep\@spaces\the\headsep^^J%
  \string\footskip\space\space\space\the\footskip^^J%
  \ifGeom@includemp
    \string\marginparwidth\space\the\marginparwidth^^J%
    \string\marginparsep\space\space\space\the\marginparsep^^J%
  \fi
  \string\hoffset\space\the\hoffset^^J%
  \string\voffset\space\the\voffset^^J%
  (1in=72.27pt, 1cm=28.45pt)^^J%
  -----------------------}}
```

Paper size is initialized only once here.

```
\let\Geom@paper\undefined
```

`\geom@setkey` `\ExecuteOptions` is replaced with `\geom@setkey` to make it possible to deal with 'key=value' as its argument.

```
\def\geom@setkey{\setkeys{Geom}}
\let\geom@origExecuteOptions\ExecuteOptions
\let\ExecuteOptions\geom@setkey
```

`reset` option is executed.

```
\ExecuteOptions{reset}
```

A local configuration file may define more options. To set A4 paper as default, `geometry.cfg` needs to contain `\ExecuteOptions{a4paper}`.

```
\InputIfFileExists{geometry.cfg}{}{}
```

The original definition for `\ExecuteOptions` macro is restored.

```
\let\ExecuteOptions\geom@origExecuteOptions
```

`\ProcessOptionsWithKV` This macros can process package options using 'key=value' scheme. The code was borrowed from the hyperref package written by Sebastian Rahtz.

```
\def\ProcessOptionsWithKV#1{%
  \let\@tempa\@empty
  \@for\CurrentOption:=\@classoptionslist\do{%
    \@ifundefined{KV@#1@\CurrentOption}%
    {}{\edef\@tempa{\@tempa,\CurrentOption,}}}%
  \edef\@tempa{%
    \noexpand\setkeys{#1}{\@tempa\@ptionlist{\@currname.\@currext}}}%
  \@tempa
  \AtEndOfPackage{\let\@unprocessedoptions\relax}}
```

The optional arguments to `\usepackage` and `\documentclass` macros are processed here.

```
\ProcessOptionsWithKV{Geom}
```

Actual setting and calculation of layout dimensions are here.

```
\geom@process
```

The `verbose`, `pdftex` and `dvips` options are checked in `\AtBeginDocument`.

```
\AtBeginDocument{%
  \ifx\undefined\pdfpagewidth % latex command is used.
    \Geom@pdftexfalse
  \else                       % pdflatex command is used
    \ifGeom@pdftex\Geom@dvipsfalse\fi
  \fi
  \ifGeom@dvips
    \AtBeginDvi{\special{%
    papersize=\the\paperwidth,\the\paperheight}}%
  \fi
  \ifGeom@pdftex
    \pdfoutput=1\relax
    \pdfpagewidth=\the\paperwidth
    \pdfpageheight=\the\paperheight
  \fi
```

if `verbose`, the page geometry parameters and options are displayed.

```
  \ifGeom@verbose
    \geom@showparams
  \fi}
```

`\geometry` The user-interface macro `\geometry` is defined, which sets unspecified dimensions to be `\undefined` by `\geom@clean`, appends specified options to themselves, and determines layout dimensions by `\geom@process`.

```
\def\geometry#1{%
  \geom@clean
  \setkeys{Geom}{#1}%
  \geom@process}
```

```
⟨/package⟩
⟨*config⟩

%% You can uncomment and edit the line below to set default options.
%%\ExecuteOptions{a4paper,dvips}

⟨/config⟩
```