

# The ‘decimal’ package (*version 1.1*)

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## Abstract

In traditional English typography the decimal point is printed as a raised dot. The *decimal* package provides this functionality by making the full point, or period (.) active in maths mode, and implementing the `\cdot` character instead. In addition, the command `\.` is redefined in such a way that that it produces a full point in math mode, but retains its usual functionality in text mode.

## 1 Introduction

The decimal point (decimal separator) is variously implemented as a comma (European), a full point (North American), or as a raised full point (English). While the comma and full point have always been supported in electronic typesetting, the English raised decimal point has been somewhat overlooked—until now. For a nice history of the decimal fraction see the chapter on *The invention of decimal fractions and of logarithms* in Scott<sup>1</sup> (1960).

## 2 Typography

In Great Britain until about 1970 or so the decimal separator was typically implemented as a raised dot (middle dot). For example, when currency decimalisation was introduced in the UK in 1971, the recommended way of writing currency was with a raised dot, as in £21·34. However, since then there has been a gradual decline in the use of the raised point most probably owing to the fact that this glyph was not generally available on electronic typewriters or computer wordprocessors. While the raised dot does make occasional appearances in British newspapers, it is, unfortunately, seldom seen nowadays even in British scientific journals.

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<sup>1</sup>Scott JF (1960). *A history of mathematics* (Taylor & Francis, London), pp 266.

This decline was highlighted relatively recently when the UK journal *Nature* reprinted some 1953 articles as part of the 50<sup>th</sup> anniversary of the discovery of the double helix. For example, one of the reprinted articles (*Nature* 2003; [421](#), 400–401) states that Franklin and Gosling<sup>2</sup> mentioned the “. . . very strong reflexion at 3.4 Å . . .”. Ironically, if this sentence were published in a journal in Britain today the Ångström symbol would probably be typeset correctly but the decimal point would most likely appear in the American ‘full point’ style as 3.4 Å.

The most pleasing position of the raised decimal point is level with the center of the ‘equals’ sign, as shown by the expression  $x = 0.3456$ , and this is what the *decimal* package implements. However, in old texts the practice was to place the full point rather higher, as in 25.345. While this is a bit too high for visual comfort nowadays, the reason for the original high position lies in the name used by metal type-setters for the decimal point, namely a ‘turned’ full point, as mentioned in the following extract from an 80 year-old *Authors’ & Printers’ Dictionary*.<sup>3</sup>

**decimal fractions**, no decimal can be plural, or take verb in pl., however many figures it contains; (typ.) print in figures. The decimal point in all cases to be a full point turned.

But what is meant by a full point ‘turned’? The clue comes from the ‘turned commas’ entry in the same dictionary, as follows.

**turned commas** (typ.), those used at the commencement of a quotation, as these “, two apostrophes being at the end.

If we use a turned comma to show the location a full point would occupy if ‘turned’ in the same way, we can see that the position is somewhat high, as in the decimal fraction 2‘6. Swapping the turned comma for a similarly turned full point we obtain 2˙6, which shows the decimal point in essentially the position we observe in older texts. All is now clear—by simply turning the metal block of the full point through 180 deg the typesetter had access to a practical decimal point, albeit slightly on the high side.

### 3 Usage

First load the *decimal* package (*after* the `mathpazo` and `hyperref` packages—see Bugs section) using the preamble command

```
\usepackage{decimal}
```

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<sup>2</sup>RWD Nickalls says that he was drawn to this particular series of articles since he spent a year as a student of Ray Gosling in the then Physics Department at Guy’s Hospital Medical School, London, in the 1960s.

<sup>3</sup>Collins H (1921). *Authors’ & Printers’ Dictionary: a guide for authors, editors, printers, correctors of the press, compositors, and typists. With a full list of abbreviations. An attempt to codify the best typographical practices of the present day.* (pub: Humphrey Milford, London).

The *decimal* package will now operate globally to implement the English decimal point wherever one types a fullpoint in math mode. For example the value 123.456 is obtained by typing  $\$123.456\$$ . The correct positioning of the decimal is preserved even when the smaller mathmode fonts are used, as shown in the following two examples.

$$23.562^{1.23^{2.6}} \quad j = \sqrt{\underbrace{ax^2 + bx + c}_{-3.78} + \cos(3\pi/4 + \theta)}$$

On those occasions when a true full point is required in math mode (e.g. at the end of a series of equations) then this is implemented by typing  $\backslash$ . For example

$$y = ax^2 + bx + c.$$

is obtained by typing  $\$y = ax^2 + bx + c\backslash.\$$

**Note:** It is important to appreciate that there are mathmode commands which include a full point as an integral part of the command, and in these cases one must, of course, *not* use the  $\backslash$ . command. A common situation where this arises is in the typesetting of unbalanced vertical braces, in which case a full point is used by one of the commands ( $\backslash\mathit{right}.$ ) to represent the absent brace. For example, the structure

$$\left\{ \begin{array}{l} x = -b/6 \\ y = (4ac - b^2)/7 \end{array} \right.$$

is typeset by the following code

```
\[
\left\{
  \begin{array}{l}
    \displaystyle x = -b/6 \backslash
    \displaystyle y = (4ac - b^2)/7
  \end{array}
\right.
\]
```

which uses the command  $\backslash\mathit{right}.$  to balance the left brace command  $\backslash\mathit{left}\{$  before the array. Since the full point is part of the command there is no need to use the  $\backslash$ . command.

If we now add some punctuation to the above structure, say, a comma terminating the first line and a full point to terminate the second line as follows,

$$\left\{ \begin{array}{l} x = -b/6, \\ y = (4ac - b^2)/3. \end{array} \right.$$

then we add the full point using the command  $\backslash$ . as shown in the following code.

```

\[
\left{
\begin{array}{l}
\displaystyle x = -b/6, \\
\displaystyle y = (4ac - b^2)/7.
\end{array}
\right.
\]

```

Outside mathmode the command `\.` performs its usual function of placing a dot above a character, for example the command `\.a` generates the  $\dot{a}$  character.

## 4 Installing the decimal package

The DECIMAL package is included in the T<sub>E</sub>XLive distribution, and is likely to be already installed if you have a fairly complete recent T<sub>E</sub>XLive installation. The DECIMAL package consists of the following files

```

decimal.ins
decimal.dtx
decimal.pdf   (this file)
decimal.sty

```

### Placing the files

- `decimal.sty` T<sub>E</sub>XLive typically places `decimal.sty` in the following directory  
`/usr/local/texlive/2010/texmf-dist/tex/latex/decimal/decimal.sty`  
 Alternatively, one could place it in the user's `/texmf-local/` directory, for example, something like  
`/usr/local/texlive/texmf-local/tex/latex/local/decimal/decimal.sty`  
 which has the merit of not being overwritten by T<sub>E</sub>XLive.
- `decimal.pdf`  
 T<sub>E</sub>XLive typically places `decimal.pdf` in the `/doc/` directory, for example  
`/usr/local/texlive/2010/texmf-dist/doc/latex/decimal/`  
 Using this directory has the great advantage that the `texdoc` utility will then display the pdf when you type the command `<texdoc decimal>`.

Once the files have been placed, then update the T<sub>E</sub>X file database. On a Linux system this is done by running the `<texhash>` command (as root).

## 5 Known bugs

### Problems with the mathpazo and hyperref packages

We know of only two package-interaction problems as follows. The `mathspazo` package effectively neutralises a previously loaded `decimal` package. If the `decimal`

package is loaded before the `hyperref` package, then  $\LaTeX$  fails, throwing out multiple maths-related error messages

The work-around is simply to install the decimal package *after* these two packages.

## 6 Version history

- May 2, 2005 — version 1.1
- July 12, 2003 — first release (version 1.0)

## 7 The Implementation

The code of the package is quite simple. Initially, we introduce a new command which has the functionality of the `\.` command. Then we redefine the `\.` command so that it produces a dot in math mode, while it retains its original functionality in text mode.

```
1 <*decimal>
2 \let\period\dot
3 \def\dot{\ifmmode\mbox{.}\else\expandafter\period\fi}
```

One thing we need to do is to define a new math command which will yield a `\cdot` without any leading or trailing white space.

```
4 \DeclareMathSymbol{\cdot}{\mathord}{symbols}{"01}
```

Now, we are ready to change the mathcode of the period so that it produces the desired result in math mode. Note that this “trick” is documented in the  $\TeX$ book and in the book “Digital Typography Using  $\LaTeX$ ,” Springer-Verlag New York, ISBN 0-387-95217-9, 2003.

```
5 \mathcode'\dot="8000
6 {\catcode'\dot=\active%
7 \gdef\dot{\cdot} }
8 </decimal>
```