

# Microsoft Word Equation Editor

## Quick Guide

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Updated

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The Microsoft Equation Editor is built in to Microsoft Word and gives a useful way to set out maths working. It can be especially helpful for students who have physical difficulties with pen and pencil, but who are effective computer users.

To insert an Equation into your Word document, click **Insert > Object > Microsoft Equation 3**. If you don't see the Equation object in the list, it is because the Equation Editor was not installed when Word was installed (the Editor is an option). To install the Editor, you will need to use the original Word or Office CD. For more information, open Word Help and do a search for 'Equation Editor'.

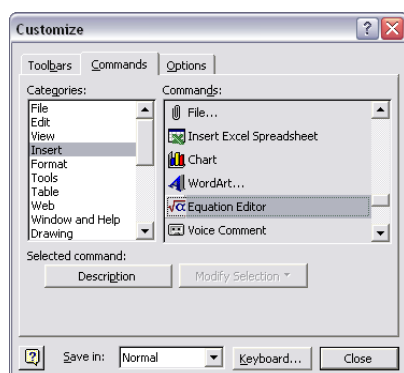
There are some helpful tutorials and documents on the web to get you started with Equation Editor:

<http://www.dessci.com/en/products/ee/> has the official Equation Editor Tips and Tricks from Design Science, who created the Editor.

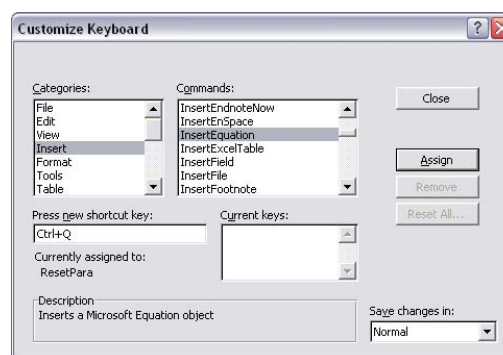
<http://ist.uwaterloo.ca/ec/equations/equation.html> has a good tutorial with videos.

### Quick Access to Equation Editor

To get quick access to the equation Editor, click **Tools > Customise > Insert > Choose Command Tab**, scroll down and select the Equation editor. Click on **Keyboard** then select **Insert** again, and scroll down to choose **InsertEquation**. Click on the **Press New Shortcut key** box, and hold down the keys you want to open the Editor. In the example below, I have used **CTRL-Q**. to create a keystroke shortcut to open the Editor. Click **Assign**, then **Close**. You can also add a button to the Word toolbar: drag the Equation Editor icon from the Customize window up to the toolbar.



Drag the Equation Editor up to the Word Toolbar



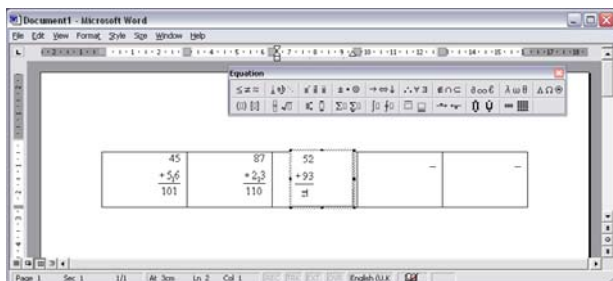
Set up a Shortcut to open the Editor



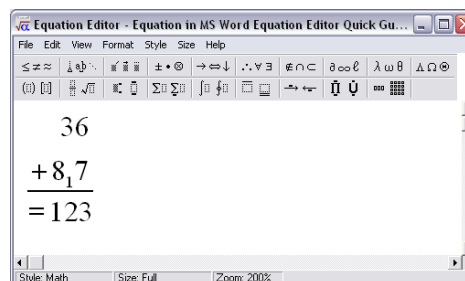
## Editing Equations in a Separate Window rather than 'In-Place'

Usually, when you open the editor it types the expression directly into the Word document, which which can be difficult to see. Both of the tutorials above recommend that it is better to open a separate Equation Editor window in which to edit the equation. I am not sure which method is best: I think that simple exercises may be best done with the Editor 'In-Place', whereas more complicated expressions may be better done in a separate window. It's probably best to try both and see which one you prefer. In this Guide, the first arithmetic examples are screen shots of separate windows, and the later algebraic examples were done 'in-place'.

To set the Editor to use a separate window this, you should download and run the 'force-open.reg' program from the Design Science Tips and Tricks web site at <http://www.dessci.com/en/products/ee/> (Tip # 3). (To download you have to join and give your email address). To set it back to edit 'in-place', download and run the 'in\_place.reg' program from the same source.



Editing the Equation 'in-place'



Editing in a separate window

## Keystroke commands

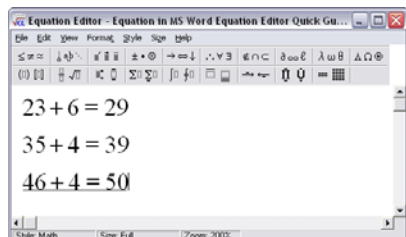
Many, but not all, of the Equation Editor functions have keystroke shortcuts which are very useful for students who have difficulty with the mouse. See the Equation Editor Help for more details. A list of the shortcuts is at the end of this Quick Guide.

To get access to the Equation Editor toolbar using the keyboard, press F2, then use the left and right cursor keys to move to the palette, the down and up keys to get the desired item, and Return to select it.

For most of the keyboard shortcuts you have to hold down several keys at once - e.g. SHIFT+CTRL+R. If you cannot do this, use **Sticky Keys** inside the **Accessibility Control Panel**. With Sticky Keys turned on, a single finger typist can press **SHIFT**, then **CTRL**, then **R**, and the computer will hold them all down at the same time.

## 1. Addition

Typing numbers is easy - just do so, with each line separated by a Return. Click **File** > **Exit** to insert the maths into Word.

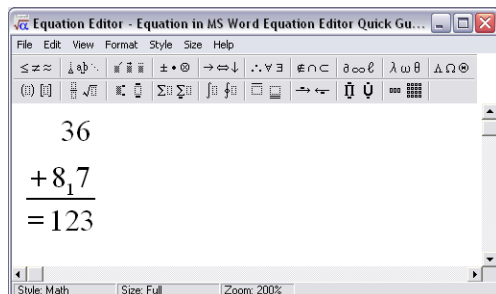


gives this in Word:

$$\begin{array}{r} 23 + 6 = 29 \\ 35 + 4 = 39 \\ 46 + 4 = 50 \end{array}$$

To lay out arithmetic there are several methods - try this first:

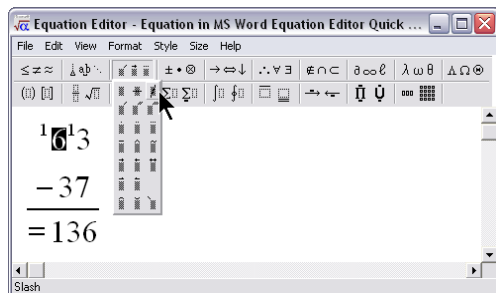
- Open the Equation Editor (CTRL-Q)
- Press CTRL-F to insert a fraction (we will use this to separate the figures from the result)
- Type the top number **36** and press **Return**, then type the bottom number **87**
- Set Align-Right (CTRL+SHIFT+R)
- Use the Down Cursor key to move down to the result, and type the 'units' answer **3**
- To add the carry, use the Up Cursor key to place the cursor between the 8 and 7
- Type CTRL-L to get subscript, and type **1** for the carry
- Press Down Cursor to get to the result and type an equals sign =, and then the 'tens' answer, **12**.
- Press ALT-F-X to exit and insert the exercise into Word.



gives this in Word:

$$\begin{array}{r} 36 \\ + 8_17 \\ \hline = 123 \end{array}$$

## 2. Subtraction

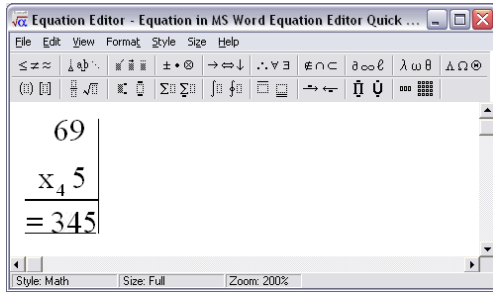


- Use a similar technique for subtraction. To put in the 'borrow', use CTR-H to add a Superscript. To 'strike out' a number, select it (double click, or hold down Shift and press the Cursor key to go over it), and select the strike from the **Embellishments** tools.

Gives this in Word:

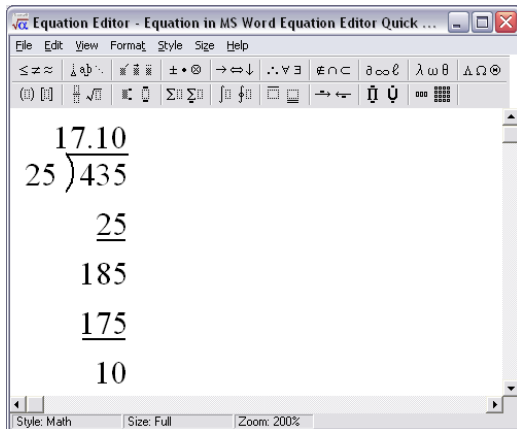
$$\begin{array}{r} 1^63 \\ - 37 \\ \hline = 136 \end{array}$$

### 3. Multiplication



- Type 'x' to get the multiplication symbol.
- To change it from looking like a variable (i.e.  $x$ ) to a 'straight' 'x', select it and click **Style > Function** or press **CTRL+SHIFT+F**. (You can also press and release **CTRL-K** and then press **T**)

### 4. Division



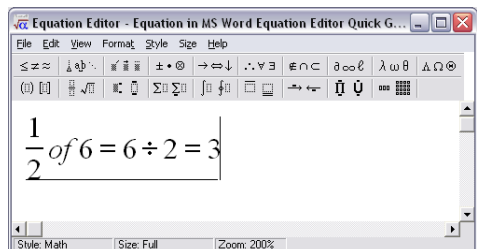
- Type the divisor, 25, then add the long division template. There is no keyboard shortcut for the division template, so if you can't click with the mouse, press **F2** to move to the ToolBar, then the left or right cursor keys to go along to the 'Fraction and Radical' template. Press the down cursor key to open the palette, cursor down, and press **Return** to insert the template.
- Now **TAB** and type in the number to be divided - 435. Cursor up and add the first whole number result -1 - then cursor down, press

**Return** and type in the first product, 25. Type **CTR-SHIFT-R** to right-align.

- Hold down **Shift** and cursor left to highlight the 25, then go to the Underbar and Overbar template and add an underbar, (Keyboard users use **F2**), OR:
- Hold down **Shift** and cursor left to highlight the 25, then hit **CTRL-F** to add a line by inserting a fraction
- Hit **Return** and type in the difference - 18- then add the 5 from the dividend above. Cursor up, add 7 to the result, cursor down to the end and press **Return**, then type in the product of  $7*25$ , = 175. Add an underbar or fraction as above, then the difference, 10. Cursor up to the result, and add a decimal point, and the remainder, 10.

$$\begin{array}{r}
 17.10 \\
 25 \overline{)435} \\
 \underline{25} \\
 185 \\
 \underline{175} \\
 10
 \end{array}$$

## 5. Fractions



- Use CTRL-F to create the fraction
- Press TAB, then type in of, then 6 and =
- The division symbol is in the Operator Symbols palette.

## 6. Powers

In the examples that follow, we are using 'in-place' editing to type the expressions directly into Word. After typing each expression, ESC exits the editor, and TAB adds the spacing. Then CTRL-Q is pressed to open the editor again.

To type a number with a power, type the number, then superscript, **CTR+H** and the index, then hit TAB, the "=", and the result.

$$6^2 = 36 \quad 1^3 = 1 \quad 4^3 = 48 \quad 9^2 = 81 \quad 7^3 = 49$$

$$7^3 = 343$$

## 7. Scientific notation

Open the Equation editor, type the numbers, using CTRL+H for the power, hit RETURN, type '=', then the result:

$$6.02 \times 10^4 = 60200$$

## 8. Algebra

Type 5, then CTRL-9 to add the brackets. Type  $x+2y$ , then TAB to move outside the brackets. Add the rest of the expression in a similar way, with RETURN between each line.

$$\begin{aligned} &5(x + 2y) + 2(x - 4y) \\ &= 5x + 10y + 2x - 8y \\ &= 7x + 2y \end{aligned}$$

## 9. Greek letters and formulae

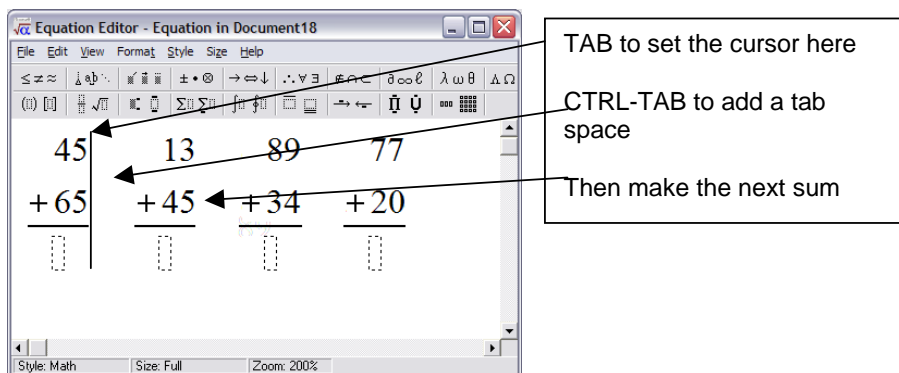
You can type foreign and Greek letters straight into Word - see 'Insert Foreign Characters' in the Word Help - by typing, for example, CTRL+SHIFT+: to get ä, or by using **Insert>Symbol**. Equation Editor has these letters built in, and you can type them by pressing CTRL+G followed by the key: 'p' for  $\pi$ , for example. If you want to type several Greek characters, select **Style>Greek** from the Editor menu.

$$C = \pi D \quad \sin x^\circ = \frac{o}{h} \quad E = \frac{\sigma}{\varepsilon}$$

## 10. Creating Worksheets

There are many ways to create worksheets with ready-made exercises for students to complete.

- 1) The easiest is probably to create an equation object, use CTRL+F to make the first sum, (right-align with CTRL-SHIFT-R) then press TAB until the cursor is flashing just to the right of it. Then press CTRL-TAB to add a tab space, and type CTRL-F for the next sum, add the numbers, TAB, CTRL-TAB to add a tab space, etc. Note that once you have created a complete line you can copy and paste it to make a second row of sums, then edit them.



To complete the exercise, the student double-clicks on it and uses the TAB and cursor keys to move around and insert the answers. Keyboard users first highlight the equation - place the cursor next to it, hold **Shift**, then cursor over it - then press **ALT-SHIFT-F9** and the equation editor will open.

- 2) Or, you could create a Word table and insert a blank equation with a fraction symbol into each cell. Right-align the cells. Add in the numbers, or just the operators, or leave the sum blank for the student to complete. To add the numbers, the student needs to double click on the equation to open it in Equation Editor, then complete the sum:

45	87	+	-	-
+5,6	+2,3	=		
101	110			

3) Or, create a table and insert a set of 3-row, 1 column matrices (see Tips & Tricks 18). The top two rows are the numbers while the third is the result, and the Matrix formatting has been used to add a dividing line between them. Again, to add numbers to the sum, double click on the equation to open it.

$\begin{array}{r} 5^14 \\ -29 \\ \hline = 25 \end{array}$	-	-	-	-
---	---	---	---	---

4) Or here, we have created a blank 3 x 3 Matrix with the Equation Editor, where each element of the matrix has a ready-made fraction. Double click to open in, use TAB and Cursors to move around and insert the numbers.

$$\begin{array}{cccc}
 65 & 77 & 56 & 95 \\
 \hline
 -21 & -32 & -41 & -43 \\
 \hline
 = 44 & & & \\
 \hline
 47 & 69 & 83 & 67 \\
 \hline
 -22 & -32 & -41 & -53 \\
 \hline
 90 & 83 & 73 & 85 \\
 \hline
 -32 & -35 & -28 & -56 \\
 \hline
 54 & 63 & 75 & 85 \\
 \hline
 -29 & -37 & -49 & -56
 \end{array}$$

All of these objects can be copied and pasted and used as templates for worksheets. (If you are reading this electronically, you can copy and paste the examples above as a basis for your activities.)

Some of the activities may look better and be easier to use with 'in-place' editing rather than a separate window.

# Equation Editor Keyboard Guide

## Open an equation for editing or completion

Highlight the equation	Hold Shift and Cursor over it
Open the equation to edit	ALT-SHIFT-F9

## Positioning the insertion point in an equation using keys

Pressing	Moves the insertion point
TAB	To the end of the slot. If the insertion point is at the end of a slot, it moves to the next logical slot.
SHIFT+TAB	To the end of the previous slot.
RIGHT ARROW	Right one unit within the current slot or template.
LEFT ARROW	Left one unit within the current slot or template.
UP ARROW	Up one line.
DOWN ARROW	Down one line.
HOME	To the beginning of the current slot.
END	To the end of the current slot.

Note To insert a tab character in a slot, press CTRL+TAB.

## Changing the display size of an equation using keys

To choose	Press
100%	CTRL+1
200%	CTRL+2
400%	CTRL+4
Redraw	CTRL+D
Show All	CTRL+Y

Note These commands are available only if you start Equation Editor as a separate application, or if you open an equation by selecting the equation in Word, choosing the Equation Object command from the Edit menu, and then choosing the Open command. These commands are also available if you right-click the equation in Word and then click Open on the shortcut menu.

## Aligning an equation using keys

To align	Press
Left	CTRL+SHIFT+L
Center	CTRL+SHIFT+C
Right	CTRL+SHIFT+R



### Applying styles to an equation using keys

To choose	Press	Examples:
Math	CTRL+SHIFT+=	$x, y, z, 1, 2, 3$
Text	CTRL+SHIFT+E	$x, y, z, 1, 2, 3$
Function	CTRL+SHIFT+F	
Variable	CTRL+SHIFT+I	
Greek	CTRL+SHIFT+G	$\xi, \psi, \zeta, 1, 2, 3$
Matrix-Vector	CTRL+SHIFT+B	

You can also use keyboard shortcuts to change the style assigned to the next character that you type. When you type the shortcut, the status bar tells you that a special mode is in effect. After you have inserted one character, Equation Editor reverts to the previous style.

To assign	Press
Symbol	CTRL+G
Matrix-Vector	CTRL+B

### Inserting symbols in an equation using keys

Many symbols can be inserted using a CTRL+K, *character* sequence.

**Note** These key combinations are not available with Windows NT.

To insert	Representing	Press CTRL+K,
$\infty$	Infinity	I
$\rightarrow$	Arrow	A
$\partial$	Derivative (partial)	D
$\leq$	Less than or equal to	<
$\geq$	Greater than or equal to	>
$\times$	Times	T
$\in$	Element of	E
$\notin$	Not an element of	SHIFT+E
$\subset$	Contained in	C
$\not\subset$	Not contained in	SHIFT+C

All of these symbols are characters from the Symbol font, so they can also be inserted by using their ALT key character codes.

You can insert any symbol on a palette by using the keyboard procedure described in Insert symbols and templates in an equation.

### Inserting templates in an equation using keys

















Templates can be inserted using a CTRL+character combination or a CTRL+T, character sequence.

Note Some key combinations are not available with Windows NT.

### Inserting templates in an equation using keys

Templates can be inserted using a CTRL+*character* combination or a CTRL+T, *character* sequence.







Note Some key combinations are not available with Windows NT.

To insert	Template	Press
	Parentheses	CTRL+9 OR CTRL+D
	Brackets	CTRL+[ OR CTRL+]
	Braces	CTRL+{ OR CTRL+}
	Fraction	CTRL+F
	Slash fraction	CTRL+ /
	Superscript (high)	CTRL+H
	Subscript (low)	CTRL+L
	Joint sub/ superscript	CTRL+J
	Integral	CTRL+I
	Absolute value	CTRL+SHIFT+T,
	Root	CTRL+R
	<i>n</i> th root	CTRL+T, N
	Summation	CTRL+T, S
	Product	CTRL+T, P
	Matrix template 3X3	CTRL+T, M
	Underscript (limit)	CTRL+T, U

You can insert any template on a palette by using the keyboard procedure described in Insert symbols and templates in an equation.

### Applying embellishments in an equation using keys

You can attach an embellishment to the character to the left of the insertion point with keyboard shortcuts.

To apply	Description	Press
	Overbar	CTRL+SHIFT+HYPHEN
	Tilde	CTRL+~ (CTRL+SHIFT+" on some keyboards)
	Arrow (vector)	CTRL+ALT+HYPHEN
	Single prime	CTRL+ALT+'
	Double prime	CTRL+" (CTRL+SHIFT+~ on some keyboards)
	Single dot	CTRL+ALT+PERIOD

## Adjusting the spacing between elements in an equation using keys

To nudge	Press
Left by 1 pixel	CTRL+LEFT ARROW
Right by 1 pixel	CTRL+RIGHT ARROW
Down by 1 pixel	CTRL+DOWN ARROW
Up by 1 pixel	CTRL+UP ARROW

















## Accessing the Equation Editor toolbar using keys

To	Press
Move to toolbar	F2
Display a palette	UP OR DOWN ARROW
Select a palette item	UP, DOWN, LEFT, OR RIGHT ARROW
Move to the next or previous palette	LEFT OR RIGHT ARROW
Insert selected palette item	ENTER

## Inserting templates in an equation using keys

Templates can be inserted using a CTRL+*character* combination or a CTRL+T, *character* sequence.

**Note** Some key combinations are not available with Windows NT.

To insert	Template	Press
	Parentheses	CTRL+9 OR CTRL+0
	Brackets	CTRL+[ OR CTRL+]
	Braces	CTRL+{ OR CTRL+}
	Fraction	CTRL+F
	Slash fraction	CTRL+/ CTRL+T, /
	Superscript (high)	CTRL+H
	Subscript (low)	CTRL+L
	Joint sub/ superscript	CTRL+J
	Integral	CTRL+I
	Absolute value	CTRL+SHIFT+T,
	Root	CTRL+R
	<i>n</i> th root	CTRL+T, N
	Summation	CTRL+T, S
	Product	CTRL+T, P
	Matrix template 3X3	CTRL+T, M
	Underscript (limit)	CTRL+T, U