

Making Maths Resources

Mathematical and scientific expressions

You can use formatting tools to create simple maths expressions, for example by using italics (Ctrl-I) for variables, and super (Shift-Ctrl-+) and sub-scripts (Shift-Ctrl--). Here's an example:

$$a^2 + b^2 = c^2$$

You can also insert symbols into a Microsoft Word document by clicking **Insert > Symbol** (e.g ½).

To create more complex algebraic expressions, equations or formulae you should use an equation editor.

To insert an equation into your Word document, click **Insert > Object > Microsoft Equation 3.0**. The Equation Editor is an optional extra that may or may not have been added when Word was installed, so if Word complains that it's not available you may have to use the original Word CD to install it. (See CALL Scotland's Equation Editor Quick Guide¹ for more about how to install and use it.)

There are several other equation editors available:

- we like the [Efofex](http://www.efofex.com)² software (particularly because Efofex can provide free software for pupils with disabilities who have problems writing equations and drawing diagrams by hand and because they have programs for creating equations, graphs and chemical formulae and structures);
- [MathType](http://www.dessci.com/en/products/mathtype/)³ is a popular equation editor with professional authors. The equation editor in Word is a 'cut-down' version of MathType.

¹ Microsoft Word Equation Editor Quick Guide, <http://www.callscotland.org.uk/Resources/Publications/Quick-Guides/>

² Efofex, <http://www.efofex.com>

³ MathType, <http://www.dessci.com/en/products/mathtype/>

Equations created with most of the Equation editors appear in the document as images, so they cannot be read out by a screen or text reader. You should add alt text for screen readers to read the equation.

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

Alt text description:
"cosine of A equals B squared plus C squared minus A squared, divided by 2 times B times C"

Alt text may be OK for simple expressions but it soon gets out of hand for more complex equations like the one on the next page, where you would have to type out long complicated text descriptions.

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2 / n}{n-1}},$$

One option to explore, if you want to generate more accessible mathematics, is MathML⁴. A MathML equation is not just a picture on the page – it is text with structure which web browsers can display, and screen readers can speak out. MathML expressions can also be converted into Braille. Limitations with MathML are that you can't use a screen or text reader to read the maths expression in the Word document itself (as far as we know) – it will only be read out when you convert the document into a web page. The Equation Editor in Word 2003 can't generate MathML so you need the Word 2007 Equation Editor, MathType, Math (the editor provided with OpenOffice) or [MathCast](#), a free program.

Find out more about accessible equations from

- W3C Math Home, <http://www.w3.org/Math/>
- Solutions for the Accessibility Community, <http://www.dessci.com/en/solutions/access/>

⁴ W3C Math Home, <http://www.w3.org/Math/>

Programs for creating interactive maths resources

Program	Ideas
Microsoft Word	Scan a worksheet and draw in text boxes. The pupil can type answers and also use Word drawing tools. Lock the file to prevent changes.
Acrobat Pro	Scan a worksheet or get the PDF from the publisher. Insert 'form fields' and 'reader enable' the document. The pupil can type answers, 'tab' between answer boxes, and use the Adobe drawing tools. See http://www.adapteddigitalexams.org.uk/Making-Prelims/
Textease Studio CT	Scan a worksheet and draw answer boxes. Create stacked numbers and shapes for the pupil to use to complete the exercise. The pupil can also use the Textease typing and drawing tools. Textease Draw has on-screen rulers and measuring tools. Maudie Riley and Alan Stewart at ATSS in Dingwall have made some Textease versions of Heinemann maths workbooks. Staff in Dumfries and Galloway have made maths resources which can be downloaded from http://www.textease.com/scottishresources/index.htm
Mediator	Graeme Bruce at Aspects in Aberdeen has created on-screen versions of Heinemann and TeeJay workbooks. They are available from www.humyo.co.uk , login aspectsdownloads@live.co.uk , password ICTSLS. The files are large – from 30 MB to 150 MB. The Scottish Heinemann Maths books are shared under the CLA VIP copyright licence. TeeJay are happy for their materials to be used by pupils with disabilities provided the school has original paper copies. Graeme notes that you need to print each page as it is finished and you can either do this to a paper printer, or if you want an electronic copy print to PDF with either Acrobat Pro or the free PDFCreator from http://sourceforge.net/projects/pdfcreator/ . http://www.wiredshire.org.uk/professional/support/aspects/Index.html
Clicker 5	Clicker 5 and Clicker Paint can be used to create a wide range of maths and numeracy activities. Free numeracy grids can be downloaded from https://www.learninggrids.com/uk .