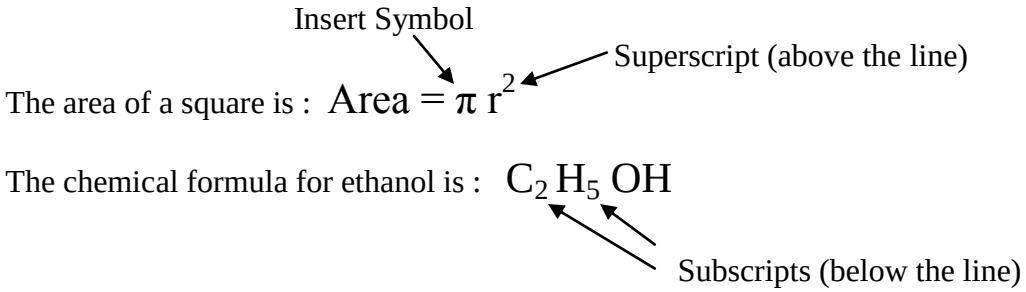
Math and Science Documents

Writing math and science documents is tricky, but not impossible. You probably shouldn't do your daily homework in a word-processor - it really is faster with a pencil and paper. However, IB essays must be word-processed, and this includes math, science, economics and business essays.

What makes it difficult? These essays contain **special symbols and formatting, formulas, and diagrams.**

== Type Formulas with Normal Text ==

You can type math formulas with normal text, using superscripts and subscripts:



Task	***Where to find it***
Greek Letters π. α. β. θ	Insert / Symbol / Basic Greek
Math Symbols ⅔, ≠, ≤, √	Insert / Symbol / Math. Operators
Powers (superscript)	Format / Font / Superscript
Subscript	Format / Font / Subscript

Typing **fractions** in normal text is a problem – you need to type on 3 lines, like this:

$$\frac{x^2 - 4x + 3}{2x - 6} = \frac{(x-1)(x-3)}{2(x-3)} = \frac{x - 1}{2}$$

This becomes time-consuming if you make mistakes – to remove a fraction, you must delete on 3 different lines and make sure everything still lines up correctly. It also doesn't look very good.

Pictures

You can use **Paint Brush,** or the **Drawing Canvas** in MS Word, or use any other drawing tool and **Copy/Paste** the diagram into your document. There are lots of images available on the Web – use Google/Images to find them.

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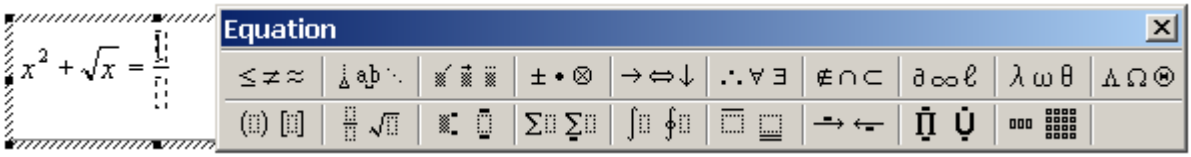
== Microsoft Equation Editor ==

MS Word includes an **equation editor**. Open the **Insert** menu, choose **Object**, and then select Microsoft Equation 3.0. Then you will see something like this:



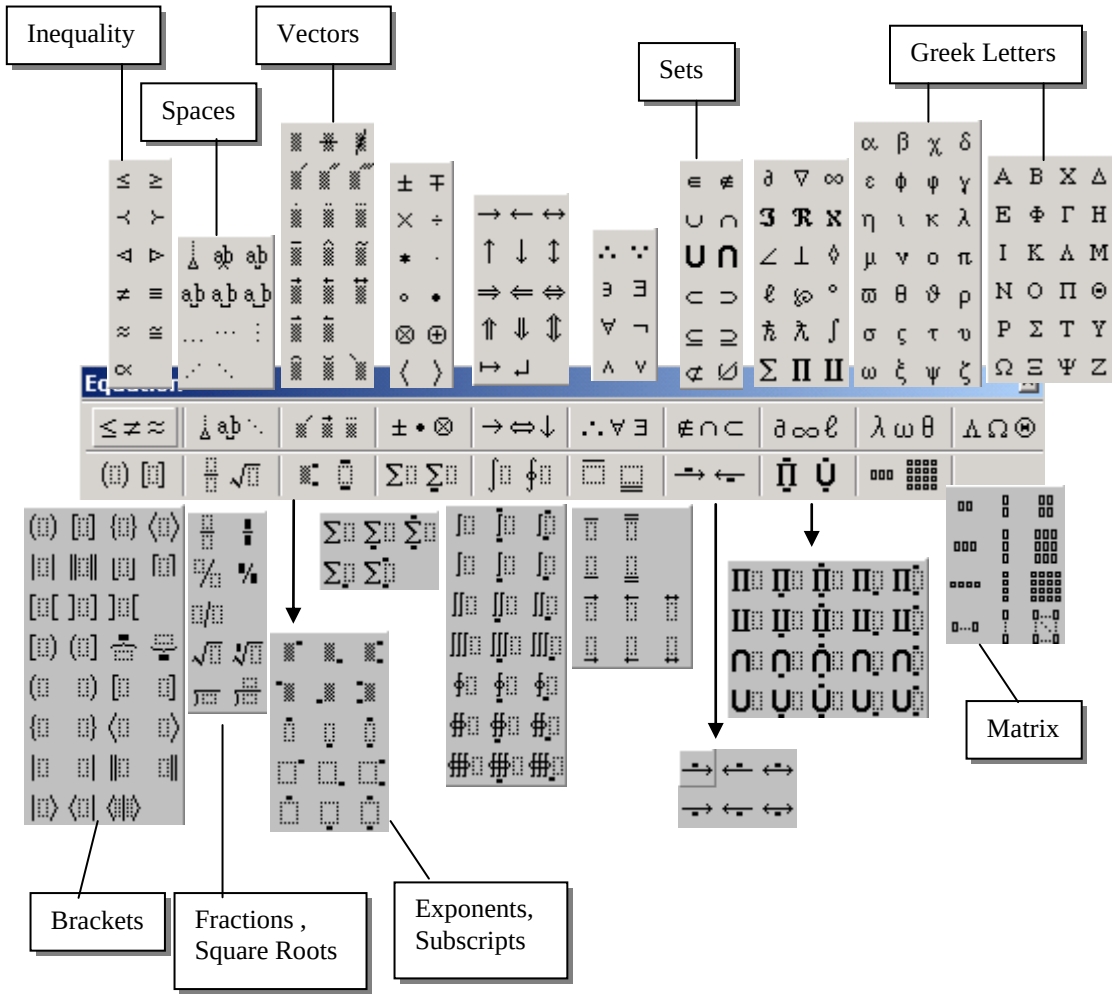
You type your equation in the box. The tool bar includes all the special symbols for various characters and math symbols. For high school mathematics, you can do a lot with the following short-cuts:

Task	***Shortcut***
Fraction	Ctrl-F
Powers	Ctrl-H
Square-root	Ctrl-R
Subscript	Ctrl-L
Blank space(s)	Ctrl-Space Bar
Jump to tool bar	F2

Example

$$\frac{x^2-4x+3}{2x-6}=\frac{(x-3)(x-1)}{2(x-3)}=\frac{x-1}{2}$$

$$y=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$



Math and science documents contain diagrams composed of straight lines and simple shapes such as squares, circles, and arcs. There are also **labels** containing names or numbers.

A test-tube was drawn with two straight **lines**, an **ellipse**, and an **arc**.

One test-tube was drawn, and then the pieces were **grouped** to make a single picture.

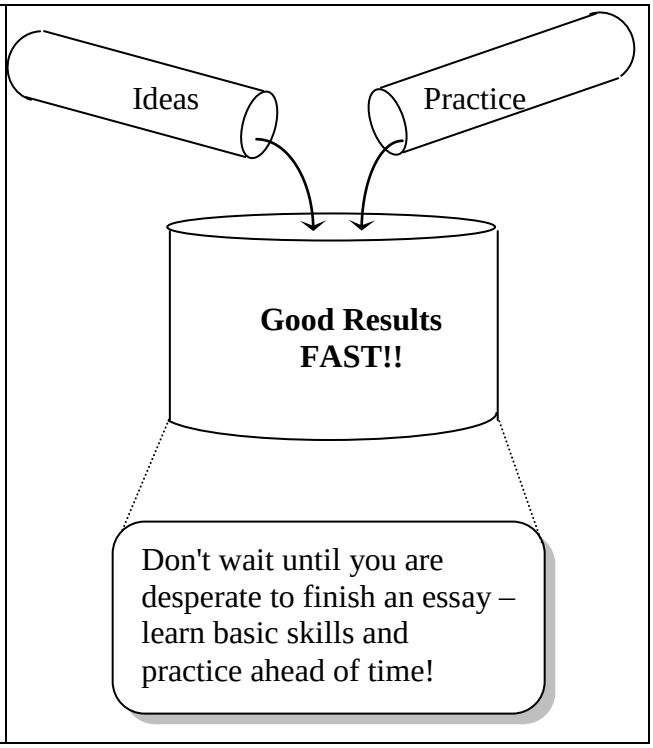
The picture was then **copied** so the test-tubes would be identical.

The test-tubes were **rotated –** the original test-tube was vertical.

There are two **arcs** with **arrow heads**. One arc was drawn, then **flipped.**

The words are in **text-boxes** (frames) on top of the diagrams. The **borders** are set to **invisible**.

The box below has **rounded corners** and a **shadow.**



How to Do It

1. Draw a single vertical line. Hold the **shift** key to force the line to be perfectly vertical.
2. Click on the line. Hold the Control key and drag the line to the right. This will **copy** the line, and the copy will be exactly the same length.
3. Make an **arc** (a semi-circle) for the bottom of the test tube (Autoshapes, Basic Shapes). Stretch to match the lines. Hold the [**alt]** key to make fine adjustments.
4. Draw an **ellipse** (squashed circle) for the top of the tube. It will probably contain a color. Make it **transparent** (no fill color). Generally "no fill" is the best for all diagrams.
5. Mark all 4 pieces, using the **selection arrow. Group** them. Now they are a single picture.
6. Click on the picture, hold the **control** key, and drag the picture to make a second copy.
7. **Rotate** each picture to an appropriate angle. The test-tubes above were at 210 and 150 degrees.
8. The beaker (big container) above is actually a 3rd copy of the same test-tube. It was stretched to make it fatter.
9. The text-box on the right is not actually a text box - it is a **rectangle.** The fill color (area) is **not** transparent - it is white. It has **round corners.** It also has a **shadow**, which makes it appear to be pasted on top of the page.
10. The **arrows** are found under the **line** property of lines and arcs.
11. Use [Arrange Order][Send Behind Text] if you want to type words on top of the diagrams.
12. Use [Format Object][Layout][Behind Text] if you want to slide the picture around.

Formulas

Practice writing **Math Formulae** by writing the two examples from the previous page.

Task	***Where to Find It***
Arc	[Autoshapes] [Basic Shapes][Arc]
Ellipse	[Ellipse] button
Round Corners	[Autoshapes][Basic Shapes][Rounded Rectangle]
Shadow	[Shadow button]
Group	[Right-click][Grouping][Group]
Arrows	[Format Autoshape][Colors and Lines][Arrows]
Rotate	[Free Rotate Button]
Fill Style (background)	[Format Autoshape][Colors and Lines][Fill]
Snap to Grid	[Draw Button][Grid]
Anchor	[Properties][Position][Anchor]
Exact Dragging	[Alt]+ mouse
Copy Shape	[Ctrl] + drag
Turn off Drawing Canvas	[Tools][Options][General][Auto... drawing canvas] - off

Speedy Tricks - Working Faster and Safer

Save - Save often (every 5 minutes or more often). Saving is really easy - click on the little diskette icon, or press Ctrl-S. Every time you think "Ah, good, that worked", it's time to save. Save often - you will rarely lose anything - if you wreck your drawing, reload the saved copy.

Copy - Make one object, then **copy** it lots of times. This includes simple things like lines and arcs. Once you have one line with a nice arrow head on it, copying and stretching is quicker than making a new line and setting the arrow style. Do the same with special symbols. You can make a document with commonly used special symbols, and then copy them into your real document when needed.

Group - If a picture needs several pieces, **group** them so they stay together. Otherwise, any reformatting of the text or other pictures will destroy your nice picture.

Magic Keys - Control + Mouse = Copy a diagram
Shift + Mouse = Perfectly straight lines
Right-Click = Properties

Control + C = Copy
Control + V = Paste
Control + Z = Undo

** Control + S = Save !!! **

Snap to Grid - When this is **on**, diagrams jump by fixed amounts, so it is easy to line things up. This is usually the best idea. Sometimes you need to make very small adjustments - then turn **off** the snap to grid.

Tables instead of Anchors - To stop diagrams from moving around, you can use the **anchor** function – but better is to put diagrams inside a **table**. Once they are in a table, they won't move unless you move the table! This method is used in Web Pages - it is quick, simple, reliable, and makes pretty sensible looking documents. It makes it very easy to put an explanation directly next to a diagram.

Add Toolbar Buttons - The teacher will show you how to do this.