

Standard Form (Mathswatch 83)

$\sim a \times 10^n$

a is between 1 & 10; n is an integer

\sim When mult/div in standard form, work out number part separate from the power of 10 part

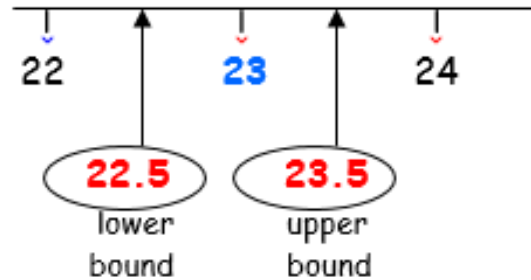
e.g. $3 \times 10^5 \times 4 \times 10^3 = 12 \times 10^8 = 1.2 \times 10^9$

\sim With a calculator use EXP or $\times 10^x$

Bounds of measurement

(Mathswatch 132)

- If 23cm is rounded to nearest whole cm
23 is between the whole numbers 22 and 24



Error Intervals Mathswatch 155

Bounds in disguise, An interval for x is written as

Lower bound $\leq x <$ ***Upper bound***

Upper & lower bounds

Mathswatch 206

- If ' a ' is rounded to nearest ' x '

Upper bound = $a + \frac{1}{2}x$

Lower bound = $a - \frac{1}{2}x$

e.g. if 1.8 is rounded to 1dp

Upper bound = $1.8 + \frac{1}{2}(0.1) = 1.85$

Lower bound = $1.8 - \frac{1}{2}(0.1) = 1.75$

- Calculating using bounds

Adding bounds

Maximum = Upper + upper

Minimum = Lower + lower

Subtracting bounds

Maximum = Upper - lower

Minimum = Lower - upper

Multiplying

Maximum = Upper \times upper

Minimum = Lower \times lower

Dividing

Maximum = Upper \div lower

Minimum = Lower \div upper

Year 9 Term 1: Visualising and Constructing

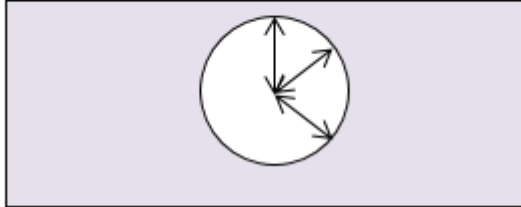


Locus of point (Mathswatch 165)

LOCUS is the path or region a point covers as it moves according to a rule

You will need a pencil, compass and ruler.

- Fixed distance from a point - **circle**



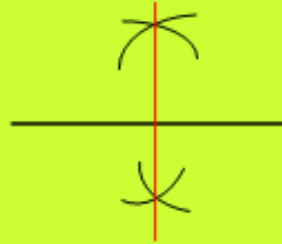
- Equal distance from two intersecting lines - **angle bisector**

Draw a line from where the arcs cross to the vertex of the angle



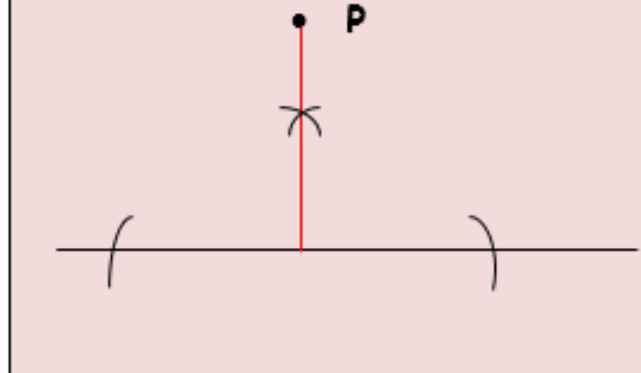
- Equal distance from two points
perpendicular bisector

Draw a straight line through where the arcs cross above and below.



- Perpendicular from a point to a line

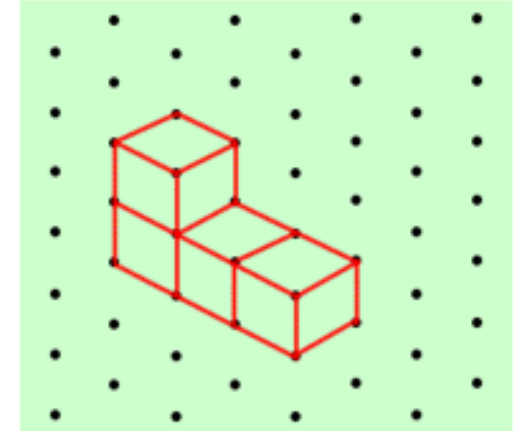
Draw arcs from the point P on the line



2D representations of 3D shapes

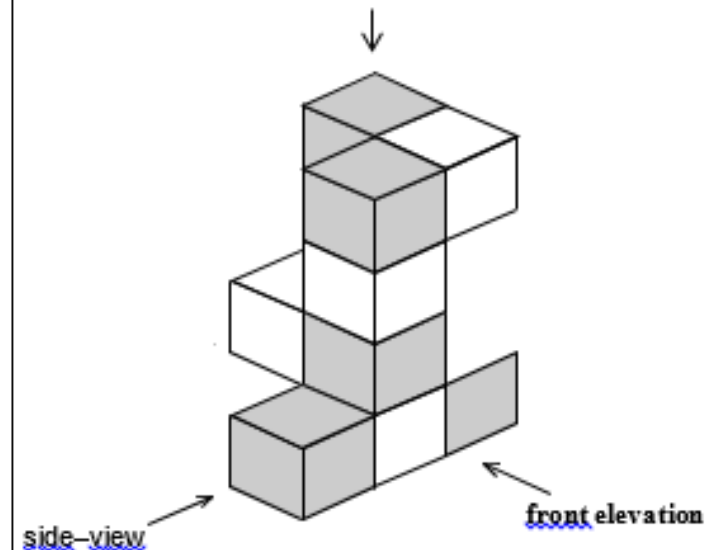
(Mathswatch 51 and 44)

- **3D drawing on isometric paper**
(notice NO horizontal lines)



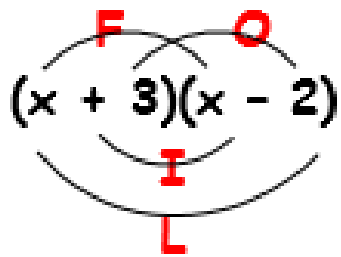
- **3 views of a 3D shape**

Plan view



Expand 2 brackets (Mathswatch 134)

- Use **F O I L**



$$(x + 3)(x - 2)$$

F O I L

$$x^2 - 2x + 3x - 6$$

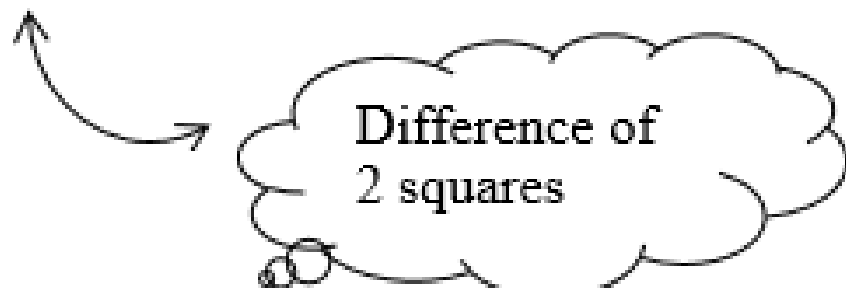
$$= \underline{x^2 + x - 6}$$

Factorise a quadratic expression

(Mathswatch 157)

$$x^2 - 3x - 4 = (x - 4)(x + 1)$$

$$x^2 - 25 = (x - 5)(x + 5)$$

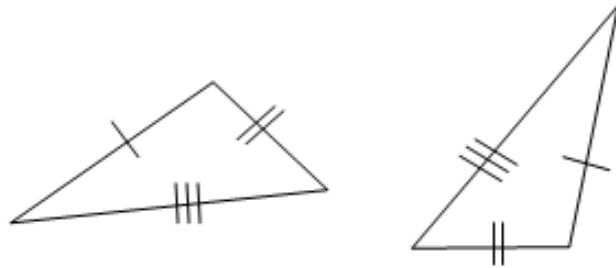


Difference of
2 squares

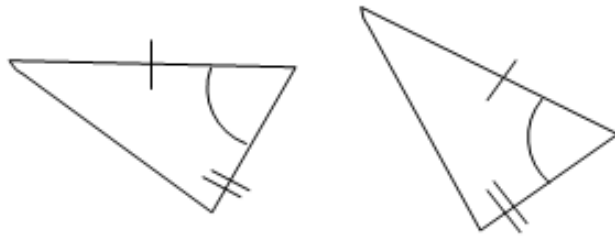
Congruence Mathswatch 166

- Congruent shapes have the same size and shape, one will fit exactly over the other.
- 2 triangles are congruent if any of these 4 conditions are satisfied on each triangle

~The corresponding sides are equal ~ **SSS**



~2 sides & the included angle are equal ~ **SAS**

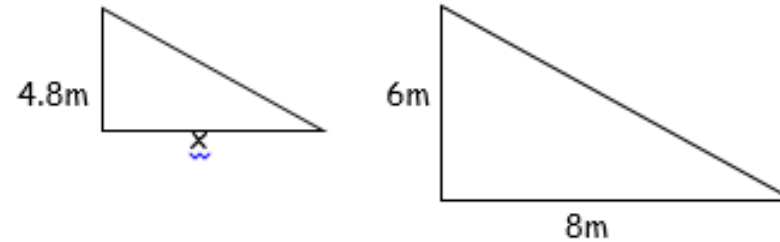


Similarity (Mathswatch 144)

If one shape is an enlargement of the other, we say they are similar.

- Corresponding angles are equal
- Corresponding sides have proportional lengths

Example - these 2 triangles are similar



$$\text{Scale factor} = 6 \div 4.8 = 1.25$$

$$x = 8 \div 1.25 = 6.4\text{cm}$$

Direct and inverse proportion Mathswatch

The symbol \propto means:
'varies as' or 'is proportional to'

- **Direct proportion**

If: $y \propto x$ or $y \propto x^2$ or $y \propto x^3$

Formulae: $y = kx$ or $y = kx^2$ or $y = kx^3$

Example

y is directly proportional to x

When $y = 21$, then $x = 3$

(find value of k first by substituting these values)

$$y \propto x \quad \therefore y = kx$$

$$21 = k \times 3$$

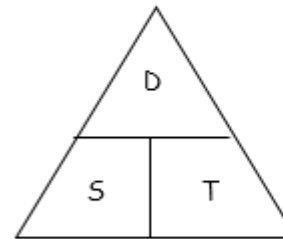
$$\therefore k = 7$$

$$y = 7x$$

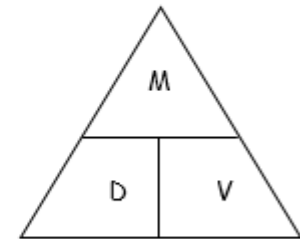
(Now this equation can be used to find y , given x)

Compound Measures (Mathswatch 142)

- These triangles are useful
- Cover the quantity you are trying to find
- What is uncovered is the formula to use



D~Distance
S~Speed
T~Time



M~Mass
D~Density
V~Volume

Fibonacci Sequence Mathswatch 141

This is the most natural sequence -

Add the previous two terms to find the next term!

If $x_1 = 10$ and $x_2 = 13$

then $x_3 = 10 + 13 = 23$

Quadratic Sequences Mathswatch 213

- With quadratic sequences, the second differences are all equal.
- To find the coefficient of n^2 , you need to halve this second difference.
- Compare this sequence to your sequence and find the rest of the nth term rule.

Solve inequalities in one variable

(Mathswatch 138 and 139)

$a < b$ means a is less than b

$a \leq b$ means a is less than or equal to b

$a > b$ means a is greater than b

$a \geq b$ means a is greater than or equal to b

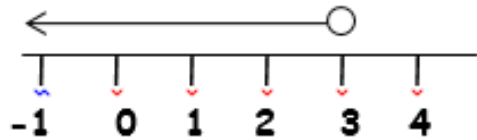
Inequalities can be treated like equations

The solution can be shown on a number line

e.g.1 $2x - 4 < 2$ (+4 to each side)

$$2x < 6 \quad (\div 2 \text{ each side})$$

$$x < 3$$



Solving Inequalities with Unknowns on Both Sides Mathswatch 135

Solve similarly to an equation with unknowns on both sides.

Expand out brackets and Group terms. Multiply out any fractions, use balancing to solve; select the smallest amount of x to eliminate first on two sided equations.

Keep inequality sign exactly the same as the question!