



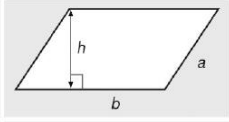
St Anthony's Girls' Catholic Academy

GCSE Maths Higher Formula Sheet

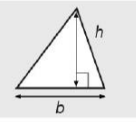
These formulae are not given to you and you need to know them

Areas

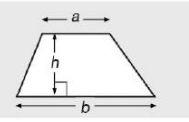
Parallelogram = $b \times h$



Triangle = $\frac{1}{2} b \times h$

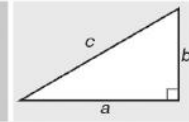


Trapezium = $\frac{1}{2} (a + b)h$

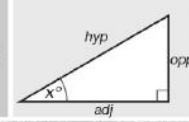


Pythagoras

Pythagoras' Theorem
For a right-angled triangle,
 $a^2 + b^2 = c^2$



Trigonometric ratios (new to F)
 $\sin x^\circ = \frac{\text{opp}}{\text{hyp}}$, $\cos x^\circ = \frac{\text{adj}}{\text{hyp}}$, $\tan x^\circ = \frac{\text{opp}}{\text{adj}}$



Direct & Inverse Proportion

If x is directly proportional to y^n then
 $x \propto y^n$ so $x = ky^n$

If x is inversely proportional to y^n then
 $x \propto \frac{1}{y^n}$ so $x = \frac{k}{y^n}$

Stratified Sampling

The frequency for a group in a stratified sample is
 $\frac{\text{frequency of group}}{\text{total frequency}} \times \text{sample size}$

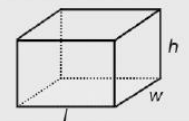
Quadratic Sequences

The n^{th} term of a quadratic sequence is in the form $an^2 + bn + c$, where

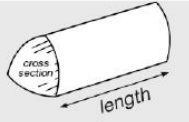
$2a = 2^{\text{nd}}$ difference
 $3a + b = 1^{\text{st}}$ difference (between 1^{st} and 2^{nd} term)
 $a + b + c = 1^{\text{st}}$ term in the sequence

Volumes

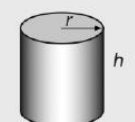
Cuboid = $l \times w \times h$



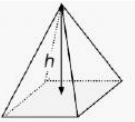
Prism = area of cross section \times length



Cylinder = $\pi r^2 h$




Pyramid = $\frac{1}{3} \times \text{area of base} \times h$

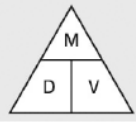


Compound measures

Speed
 $\text{speed} = \frac{\text{distance}}{\text{time}}$



Density
 $\text{density} = \frac{\text{mass}}{\text{volume}}$



Lowest Common Multiple

The LCM of two numbers, a and b , is
 $\text{LCM} = \frac{a \times b}{\text{HCF}}$

Median from a Histogram/Frequency Table

$$L + \frac{m - p}{f} \times w$$

L is the lower limit of the median class
 m is the median point
 p is the total frequency of the previous bars
 f is the frequency of the median class
 w is the class width of the median class

Quadratic equations

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Constructing Pie Charts

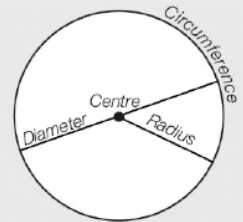
The angle to draw for each sector is
 $\text{Angle} = \frac{\text{frequency}}{\text{total}} \times 360^\circ$

Circles

Circumference = $\pi \times \text{diameter}$, $C = \pi d$

Circumference = $2 \times \pi \times \text{radius}$, $C = 2\pi r$

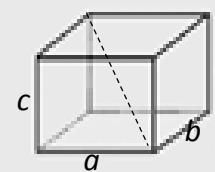
Area of a circle = $\pi \times \text{radius squared}$, $A = \pi r^2$



Area of a Sector
 $A = \frac{\theta}{360^\circ} \times \pi r^2$

Length of an Arc
 $A = \frac{\theta}{360^\circ} \times \pi d$

Length of diagonal across a Cuboid (3D Pythagoras)

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


Compound Growth & Decay

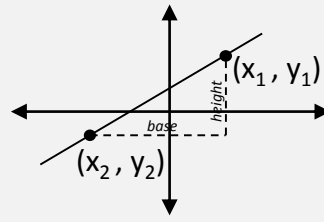
The amount after n years (or days, etc.) is:
 $\text{starting amount} \times (1 \pm \frac{r}{100})^n$

where r is the rate of change.
The \pm means + for growth and - for decay

Gradient of a Line

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

or

$$m = \frac{\text{height}}{\text{base}}$$


Equation of a straight Line

Given a point (x_1, y_1) and the gradient m , the equation of a straight line is
 $y - y_1 = m(x - x_1)$

Substitute the numbers in, expand and simplify

Angles in Polygons

Sum of Interior Angles = $(n - 2) \times 180^\circ$

Where n is the number of sides of the shape

Exterior Angles add up to 360°

One exterior angle in a REGULAR polygon:
 $\frac{360^\circ}{n}$

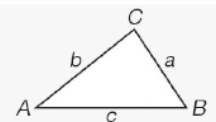
Pairs of Interior and Exterior Angles add up to 180°

Trigonometric formulae

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$



Perpendicular Gradients

Given a gradient of a line m , the gradient of the line perpendicular to it is:
 $-\frac{1}{m}$

Midpoint of two points

between (x_1, y_1) and (x_2, y_2)
 $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$