
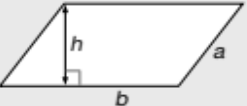
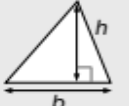
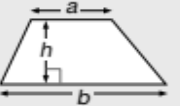
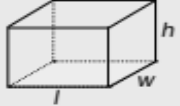
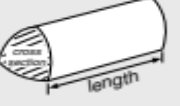

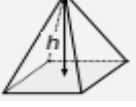


# GCSE Maths Higher Tier - Formulae

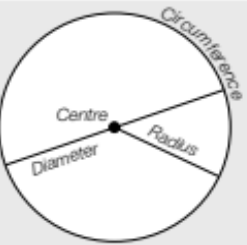
## Areas

Rectangle = $l \times w$	
Parallelogram = $b \times h$	
Triangle = $\frac{1}{2} b \times h$	
Trapezium = $\frac{1}{2}(a + b)h$	

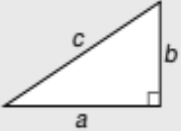

## Volumes

Cuboid = $l \times w \times h$	
Prism = area of cross section $\times$ length	
Cylinder = $\pi r^2 h$	
Volume of pyramid = $\frac{1}{3} \times$ area of base $\times$ h	



## Circles

Circumference = $\pi \times$ diameter, $C = \pi d$	
Circumference = $2 \times \pi \times$ radius, $C = 2\pi r$	
Area of a circle = $\pi \times$ radius squared, $A = \pi r^2$	

## Pythagoras

<b>Pythagoras' Theorem</b> For a right-angled triangle, $a^2 + b^2 = c^2$	
<b>Trigonometric ratios (new to F)</b> $\sin x^\circ = \frac{\text{opp}}{\text{hyp}}$ , $\cos x^\circ = \frac{\text{adj}}{\text{hyp}}$ , $\tan x^\circ = \frac{\text{opp}}{\text{adj}}$	

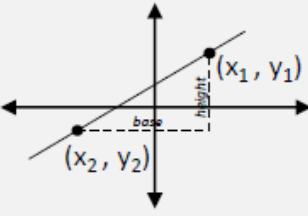
## Compound measures

<b>Speed</b> speed = $\frac{\text{distance}}{\text{time}}$	
<b>Density</b> density = $\frac{\text{mass}}{\text{volume}}$	

## Quadratic equations

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

$m = \frac{y_2 - y_1}{x_2 - x_1}$	
or	
$m = \frac{\text{height}}{\text{base}}$	

## Midpoint of two points

between $(x_1, y_1)$ and $(x_2, y_2)$	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
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## 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 $360^\circ$
One exterior angle in a REGULAR polygon: $\frac{360^\circ}{n}$
Pairs of Interior and Exterior Angles add up to $180^\circ$

## 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
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## Perpendicular Gradients

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

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

The frequency for a group in a stratified sample is $\frac{\text{frequency of group}}{\text{total frequency}} \times \text{sample size}$
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## 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 = $\frac{1}{2} ab \sin C$	

## Compound Growth & Decay

The amount after $n$ years (or days, etc.) is: starting amount $\times (1 \pm \frac{r}{100})^n$ where $r$ is the rate of change. The $\pm$ means + for growth and - for decay
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## Area of a Sector

$A = \frac{\theta}{360^\circ} \times \pi r^2$
Length of an Arc $A = \frac{\theta}{360^\circ} \times \pi d$