



## FORMULA SHEET · YEARS 10 AND 11

# GCSE Maths Formulas to Learn

The formulas and facts GCSE Maths expects you to recall quickly. Even when an exam gives a formula sheet, knowing these by heart saves minutes on every paper.

GCSE

## 01 Area and volume

Trapezium –  $A = \frac{1}{2}(a + b)h$ Circle –  $A = \pi r^2$ ,  $C = 2\pi r = \pi d$ Triangle –  $A = \frac{1}{2}bh = \frac{1}{2}ab \sin C$ Prism – volume = area of cross-section  $\times$  lengthCylinder –  $V = \pi r^2 h$ Pyramid and cone –  $V = \frac{1}{3} \times \text{base area} \times \text{height}$ Sphere –  $V = \frac{4}{3}\pi r^3$ , surface area  $4\pi r^2$ 

## 02 Pythagoras and trigonometry

Pythagoras –  $a^2 + b^2 = c^2$ SOH CAH TOA –  $\sin = \text{opp/hyp}$ ,  $\cos = \text{adj/hyp}$ ,  $\tan = \text{opp/adj}$ Sine rule –  $a/\sin A = b/\sin B = c/\sin C$ Cosine rule –  $a^2 = b^2 + c^2 - 2bc \cos A$ Exact values –  $\sin 30^\circ = \frac{1}{2}$ ,  $\cos 60^\circ = \frac{1}{2}$ ,  $\tan 45^\circ = 1$ ,  
 $\sin 60^\circ = \cos 30^\circ = \frac{\sqrt{3}}{2}$ ,  $\sin 45^\circ = \cos 45^\circ = \frac{\sqrt{2}}{2}$ 

## 03 Algebra

Quadratic formula –  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ Straight line –  $y = mx + c$ ; gradient = change in  $y$ /change in  $x$ Perpendicular lines – gradients multiply to  $-1$  $n$ th term of a linear sequence –  $an + b$ Difference of two squares –  $a^2 - b^2 = (a + b)(a - b)$ 

## 04 Number and measures

Compound interest –  $A = P(1 + r/100)^n$ 

Speed – speed = distance/time

Density – density = mass/volume

Pressure – pressure = force/area

Percentage change – change/original  $\times 100$ Standard form –  $A \times 10^n$ , with  $1 \leq A < 10$ 

## 05 Angles and circle theorems

Polygons – interior angles sum to  $(n - 2) \times 180^\circ$ ; exterior angles sum to  $360^\circ$ 

Centre – the angle at the centre is twice the angle at the circumference

Semicircle – the angle in a semicircle is  $90^\circ$ 

Same segment – angles in the same segment are equal

Cyclic quadrilateral – opposite angles add to  $180^\circ$ Tangent – a tangent meets the radius at  $90^\circ$ ; tangents from a point are equal

Alternate segment theorem – the angle between a tangent and a chord equals the angle in the alternate segment

## 06 Probability and statistics

AND (independent events) – multiply the probabilities

OR (mutually exclusive events) – add the probabilities

Not happening –  $P(\text{not } A) = 1 - P(A)$ 

Averages – mean, median, mode; range = largest – smallest

### How to use this sheet

- 1 Write the formula before substituting in every answer; method marks reward it.
- 2 Learn circle theorems with a sketch each: you must quote the reason in words.
- 3 Always check whether your calculator is in degrees.

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