GCSE Maths Topic Checklist

AQA 8300 · Edexcel 1MA1 · OCR J560 · Foundation and Higher

How to use it: for each line, tick **G** if your child could do it in the exam today, **A** if they could with a reminder, **R** if not. Work on the ambers first, then the reds.

Every GCSE maths topic, area by area

1. Number	R	A	G
Place value; ordering integers, decimals and negative numbers			
The four operations with integers, decimals and negatives, by written methods without a calculator			
Order of operations, including powers and brackets			
Factors, multiples and primes; writing a number as a product of prime factors			
Highest common factor and lowest common multiple, including with Venn diagrams			
Squares, cubes, square roots and cube roots			
Laws of indices with whole-number powers, including zero and negative powers			
Fractional indices, such as $27^{2/3}$ and $16^{-1/2}$ HIGHER			
Standard form: converting, and calculating with and without a calculator			
Fractions: equivalence, simplifying, all four operations, mixed numbers			
Moving between fractions, decimals and percentages; terminating decimals			
Converting recurring decimals to fractions by the algebraic method HIGHER			
Simplifying surds, such as $\sqrt{48} = 4\sqrt{3}$, and exact calculation with them HIGHER			
Rationalising a denominator, such as $6/\sqrt{3}$ or $1/(2 + \sqrt{3})$ HIGHER			
Rounding to decimal places and significant figures; estimating answers			
Error intervals written as inequalities, such as $6.5 \leq x < 7.5$			
Upper and lower bounds in calculations, such as the greatest possible speed HIGHER			
Listing outcomes systematically			
The product rule for counting, such as how many four-digit codes exist HIGHER			
Calculator skills: fractions, powers, roots, standard form and the memory			

2. Algebra	R	A	G
Algebraic notation; simplifying and collecting like terms			
Substituting values into expressions and formulae			
Expanding a single bracket and factorising into one			
Expanding double brackets, such as $(x + 3)(x - 5)$			

2. Algebra	R	A	G
Expanding the product of three binomials HIGHER			
Factorising $x^2 + bx + c$, including the difference of two squares			
Factorising $ax^2 + bx + c$ where a is not 1 HIGHER			
Solving linear equations, including unknowns on both sides and brackets			
Changing the subject of a formula			
Changing the subject when it appears twice or needs factorising HIGHER			
Solving quadratics by factorising			
Solving quadratics with the quadratic formula HIGHER			
Completing the square, and using it to find a turning point HIGHER			
Linear simultaneous equations, by elimination and by substitution			
Simultaneous equations where one is quadratic, including a circle HIGHER			
Linear inequalities, solved and shown on a number line			
Quadratic inequalities, such as $x^2 - x - 12 < 0$ HIGHER			
Inequalities as regions on a graph; set notation HIGHER			
Identities (≡) and "show that" questions			
Algebraic proof, such as the sum of three consecutive integers being a multiple of 3 HIGHER			
Algebraic fractions: simplifying, adding, multiplying, and equations containing them HIGHER			
Function machines and simple functions			
Composite functions fg(x) and inverse functions $f^{-1}(x)$ HIGHER			
Term-to-term and position-to-term rules; the nth term of a linear sequence			
Triangular, square, cube, Fibonacci-type and simple geometric sequences			
The nth term of a quadratic sequence HIGHER			
Straight-line graphs: $y = mx + c$, gradient, intercept, the equation through two points			
Parallel lines; perpendicular gradients that multiply to −1 HIGHER			
Quadratic graphs: plotting, and reading roots, intercepts and turning points			
Recognising and sketching cubic and reciprocal graphs			
Exponential graphs and the graphs of sin x, cos x and tan x HIGHER			
The equation of a circle centred at the origin, and of a tangent to it HIGHER			
Graph transformations: f(x) + a, f(x + a), −f(x), f(−x) HIGHER			
Iteration to find approximate solutions HIGHER			
Real-life graphs: distance–time, conversion graphs, what the gradient means			
Gradients of curves using tangents, and the area under a graph HIGHER			

3. Ratio, proportion and rates of change	R	A	G
Simplifying ratios; ratios as fractions; the form 1 : n			
Sharing in a ratio, including when the difference or one share is given			
Combining two ratios into a three-part ratio			
Percentages of amounts; percentage increase and decrease; one quantity as a percentage of another			
Reverse percentages, finding the original amount			
Simple and compound interest, depreciation, repeated percentage change			
Growth and decay with a multiplier, such as 5000×0.92^n			
Best buys and unit pricing			
Direct and inverse proportion in problems and graphs; recognising $y = kx$ and $y = k/x$			
Proportion equations such as $y \propto x^2$ or $y \propto 1/\sqrt{x}$, finding k HIGHER			
Compound measures: speed, density, pressure, with unit conversions			
Converting units, including area and volume units such as cm^3 to litres			
Scale drawings and map scales			
Similar shapes: length scale factors			
Similar shapes: area and volume scale factors, k^2 and k^3 HIGHER			
The gradient of a curve at a point as a rate of change HIGHER			

4. Geometry and measures	R	A	G
Angles on a line, at a point, vertically opposite, in triangles and quadrilaterals			
Angles in parallel lines — alternate, corresponding, co-interior — with reasons			
Interior and exterior angles of polygons			
Properties and symmetry of triangles and quadrilaterals			
Perimeter and area of rectangles, triangles, parallelograms, trapezia and compound shapes			
Circumference and area of a circle; arc length and sector area			
Volume and surface area of cuboids, prisms and cylinders			
Volume and surface area of spheres, cones and pyramids			
Composite solids, including a frustum			
Plans and elevations; faces, edges and vertices			
Ruler-and-compass constructions: perpendicular bisector, angle bisector, perpendicular from a point			
Loci: regions a set distance from a point or a line			
Bearings			
Reflection, rotation, translation by a column vector, and enlargement with positive or fractional scale factors			

4. Geometry and measures	R	A	G
Enlargement with a negative scale factor; combined transformations; invariant points HIGHER			
Congruent triangles: SSS, SAS, ASA, RHS			
Congruence proofs HIGHER			
Pythagoras' theorem in two dimensions			
Right-angled trigonometry: finding sides and angles			
Exact values of sin, cos and tan for 0°, 30°, 45°, 60° and 90° (tan up to 60°)			
Pythagoras and trigonometry in three dimensions, such as the angle between a line and a plane HIGHER			
The sine rule, the cosine rule and area = ½ab sin C HIGHER			
Circle vocabulary: radius, chord, tangent, arc, sector, segment			
Circle theorems, applied with reasons and proved HIGHER			
Vectors: adding, subtracting, multiplying by a scalar, on diagrams			
Vector proofs that points are collinear or lines parallel HIGHER			

5. Probability	R	A	G
The 0 to 1 scale; probabilities of all outcomes summing to 1			
Listing outcomes; sample space diagrams			
Relative frequency, expected outcomes, fairness and bias			
Two-way tables and frequency trees			
Venn diagrams and set notation: ∪, ∩, A′ and the universal set			
Tree diagrams for independent events and for "without replacement"			
Conditional probability from tables, trees and Venn diagrams HIGHER			

6. Statistics	R	A	G
Types of data; populations and samples; sampling and bias			
Bar charts, pictograms, pie charts, vertical line charts and time series			
Mean, median, mode and range from lists and frequency tables			
Estimated mean and modal class from grouped data			
Scatter graphs: correlation, lines of best fit, interpolation against extrapolation			
Comparing distributions using an average and a measure of spread			
Cumulative frequency graphs, with the median and interquartile range HIGHER			
Box plots, drawn and compared HIGHER			
Histograms with unequal class widths, using frequency density HIGHER			

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