

GCSE Maths topic checklist

Section One: Number

1.	Types of number and BODMAS			
2.	Multiples, factors and prime factors			
3.	LCM and HCF (with and without Venn diagrams)			
4.	Fractions - Simplify / write as fractions / fractions of a number - Add / subtract / multiply and divide fractions - Conversion between mixed and improper fractions			
5.	Convert between fractions, decimals and percentages			
6.	Rounding numbers (decimal places and significant figures)			
7.	Estimating calculations / using one calculation to answer another			
8.	Bounds (error intervals / using upper and lower bounds in formulae)			
9.	Standard form - Convert between standard form and ordinary numbers - Add / subtract / multiply and divide numbers in standard form			

Section two: Algebra

1.	Algebra basics - Collect and simplify like terms - Multiply and divide terms - Substitution - Forming expressions and equations from word problems			
2.	Powers and roots - Estimating square and cube roots - Using index rules			
3.	Taking common factors			
4.	Surds - Add / subtract / multiply and divide expressions with surds - Multiply brackets with surds - Rationalising denominators			
5.	Equations - Forming and solving equations - Cross – multiply - Solve equations with variables (letters) on both sides - Solve equations with fractions			
6.	Rearranging formulae			
7.	Quadratics - Factorise and solve in the form ($a = 1$) and ($a \neq 1$) - Use the quadratic formula to solve - Completing the square to solve and/or find turning points - Form and solve word problems with quadratic equations			

8.	Algebraic fractions - Simplify / write as single fraction in simplest form - Add / subtract / multiply and divide algebraic fractions - Solve equations with algebraic fractions			
9.	Sequences n^{th} term of linear / quadratic / geometric sequences - Using n^{th} term to find other terms / check if a term exists - Fibonacci sequences - Sequence of triangular numbers			
10.	Inequalities - Solve linear inequalities and show on a number line - Solve quadratic inequalities - Solve quadratic with linear inequalities - Show inequalities on a graph (shade regions)			
11.	Iterative methods - Trial and improvement (table method) - Form and use iterative formulae			
12.	Simultaneous equations - Substitution / elimination methods to solve a pair of linear eq's - Solve one linear with a non-linear equation			
13.	Algebraic proof			
14.	Functions - Evaluating functions - Composite and Inverse functions - Solve equations with functions			

Section three: Graphs

1.	Straight lines and gradients			
2.	$y = mx + c$ - Identify gradient and y – intercept - Find equation of a line between 2 points (with y – intercept 'given' and 'not given') - Identify x – intercept			
3.	Plot / sketch straight line graphs			
4.	Coordinates - Find distance between 2 points - Find midpoint of 2 points - Find coordinates of a point given ratio of it's position between two coordinates (using similar triangles)			
5.	Parallel and perpendicular lines			
6.	Finding equation of a tangent to a circle			
7.	Quadratic graphs (plotting / sketching) Show intercepts and turning points			
8.	Harder graphs - Cubic graphs (plotting) - Equation of a circle with centre at origin - Reciprocal graphs (Inverse proportion graphs) - Exponential graphs (k^x) - Trigonometric graphs (sine / cosine and tangent graphs)			

9.	Solving equations using graphs - Solve two linear equations graphically - Solve quadratic equations using graphs - Solve a linear and quadratic equation graphically - Find equation of a line to solve a quadratic equation			
10.	Graph transformations (linear, non-linear and trigonometric graphs)			
11.	Distance – time graphs - Find gradients to calculate speed - Estimate speed at a certain time (curved graphs)			
12.	Velocity – time graphs - Estimate / calculate distance travelled (area under graph) - Find acceleration using graphs - Estimate acceleration at a certain time (curved graphs)			
13.	Real – life graphs - Find gradients to calculate rates (ex. Salary per hour) - Use graphs to convert between units			

Section four: Ratio, proportion and rates of change

1.	Ratios - Writing and simplifying ratios - Dividing in a given ratio - Given difference between parts - Best buys - Solving word problems			
2.	Direct and inverse proportion - Table method - Create and use formulae (finding 'k') - Know graphs of direct and inverse variation - Recipes			
3.	Percentages - Increase / decrease by a percentage (using multipliers) - Percentage change - Repeated percentage change - Reverse percentages			
4.	Compound growth and decay			
5.	Unit conversions - Units of length, currency, temperature (also by using graphs) - Units of area and volume			
6.	Speed, density and pressure			

Section five: Geometry and measures

1.	Geometry basics - Properties of triangle, parallelogram, kite, rhombus and trapezium - Line and rotational symmetry			
2.	Parallel lines Corresponding, alternate, co-interior and vertically-opposite			

3.	Polygons - Sum of interior angles for any polygon - Exterior angle formula for regular polygons - Interior and exterior angles add to 180°			
4.	Circle geometry – Proofs and application			
5.	Congruent shapes Rules for congruent triangles – SSS, AAS, SAS and RHS			
6.	Similar shapes - Prove triangles are similar - Use similarity to find missing lengths - Use similarity to find areas and volumes			
7.	The four transformations - Translations, reflections, rotations and enlargements - Identify invariant points			
8.	Area and perimeter - Triangles and quadrilaterals - Circles – arc length and area of sectors - Composite shapes (adding/subtracting areas)			
9.	3D shapes – Surface area - Prism, cylinder, cone, frustum, pyramid, sphere - Composite shapes			
10.	3D shapes – Volume - Prism, cylinder, cone, frustum, pyramid, sphere - Composite shapes			
11.	Loci and construction - Construct triangles - Construct 90°, 45°, 60°, and 30° angles without protractor - Finding locus which satisfies many rules			
12.	Bearings - Show positions and measure distances of objects using bearings (using scale factors) - Bearings with SOH-CAH-TOA - Bearings with area of any triangle, sine and cosine rules			

Section six: Pythagoras and Trigonometry

1.	Pythagoras theorem - Find missing lengths in right-triangles - Proving triangles are right angled			
2.	Sine, Cosine and Tangent ratios - Find missing lengths and angles in right-triangles - Exact values – 30°, 45° and 60° (non-calculator) - Solve simple trig equations using graphs			
3.	For all triangles, - Area of any triangle - Sine rule to find missing lengths and angles - Cosine rule to find missing lengths and angles			
4.	3D Pythagoras and trigonometry - Find lengths of diagonals in 3D shapes - Find angle between a line and a plane surface			

5.	Vectors - Column vectors (add/subtract/multiples) - Proving vectors are parallel - Proving 3 points lie on a straight line - Finding 'k' (the fraction or multiple of a vector)			
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Section Seven: Probability and Statistics

1.	Probability basics - Probabilities on a number line - Calculating probabilities of simple events - Sample space diagrams - Complementary events			
2.	Counting outcomes - Listing outcomes - Product rule of counting (fundamental counting theorem)			
3.	Probability experiments (Relative frequency)			
4.	The AND/OR rules of probability - Mutually exclusive events (OR rule) - Independent and dependent events (AND rule) - Use tree diagrams to calculate probabilities			
5.	Sets and Venn diagrams - Union, intersection, subset, complement, universal set - Use Venn diagrams to calculate probabilities			
6.	Sampling and data collection			
7.	Mean, median, mode and range Combined and reverse mean			
8.	Averages from frequency tables - Grouped and ungrouped tables - Estimate median and quartiles from grouped tables			
9.	Box plots - Draw box plots from a list of data, table or cumulative frequency graph - Compare box plots using median and IQR			
10.	Cumulative frequency - Draw using tables and find quartiles, median from graph - Calculate probabilities - Estimate proportion (what fraction of the data is above/below a certain value)			
11.	Histograms and frequency density - Draw histograms using table - Calculate proportions and probabilities - Estimate median from histograms			
12.	Scatter graphs			
13.	Other graphs - Bar charts - Frequency polygons - Frequency trees - Pictograms - Stem and leaf diagrams - Pie charts - Two-way tables			