

AQA GCSE Maths 8300**Topic List - FOUNDATION**

NUMBER		
N1	Order numbers	<input type="checkbox"/> Put in order of size, integers (whole numbers), decimals and fractions <input type="checkbox"/> use the symbols =, ≠, <, >, ≤, and ≥ <input type="checkbox"/> Understand and use positive and negative numbers on a number line
N2	Add, subtract, multiply, divide	<input type="checkbox"/> Add, subtract, multiply, and divide integers (whole numbers), decimals, simple fractions (including mixed numbers and improper fractions), both positive and negative <input type="checkbox"/> Understand and use place value <input type="checkbox"/> Understand the terms profit, loss, cost price, selling price, debit, credit, income tax, VAT and interest rate.
N3	Operations	<input type="checkbox"/> Understand inverse (opposite) operations; \times and \div , $+$ and $-$ <input type="checkbox"/> Use correct order of operations (BIDMAS) <input type="checkbox"/> Be able to understand and use brackets, powers, roots and reciprocals
N4	Factors, multiples and primes	Understand the terms; <ul style="list-style-type: none"> <input type="checkbox"/> Prime number <input type="checkbox"/> Factor <input type="checkbox"/> Multiple <input type="checkbox"/> Common factor <input type="checkbox"/> Highest common factor <input type="checkbox"/> Least (lowest) common multiple <input type="checkbox"/> Express a number as a product of prime factors (factor tree) <u>in index form</u> and understand that this is unique for every number
N5	Listing and counting	<input type="checkbox"/> List things in a systematic way
N6	Powers and roots	<input type="checkbox"/> Use positive integer powers and roots of numbers <input type="checkbox"/> Recognise powers of 2, 3, 4 and 5 <input type="checkbox"/> Know square numbers up to 15^2 <input type="checkbox"/> Know that $10^3 = 1000$ and that $10^6 = 1$ million

N7	Powers and roots and fractional indices	<input type="checkbox"/> Calculate with roots and with whole number indices
N8	Exact calculations	<input type="checkbox"/> Calculate exactly with fractions <input type="checkbox"/> Calculate exactly with multiples of π
N9	Standard form	<input type="checkbox"/> Understand numbers written in standard form <input type="checkbox"/> Calculate with numbers in standard form
N10	Fractions and decimals	<input type="checkbox"/> Convert between fractions and decimals <input type="checkbox"/> Be able to put fractions and decimals in order of size
N11	Fractions and ratios	<input type="checkbox"/> Be able to work with fractions in ratio problems
N12	Fractions and percentages	<input type="checkbox"/> Find a fraction of a quantity <input type="checkbox"/> Find a percentage of a quantity <input type="checkbox"/> Use a multiplier to increase or decrease a quantity (eg. use $\times 1.05$ to increase by 5%, or 0.88 to decrease by 12%)
N13	Units of measurement	<input type="checkbox"/> Be able to use units of mass, length, time, money and other measures, including using decimal amounts <input type="checkbox"/> Convert between metric measurements of length <input type="checkbox"/> Convert between metric measurements of area <input type="checkbox"/> Convert between metric measurements of volume and capacity <input type="checkbox"/> NB. Imperial (old) units to metric units do not need to be known, and conversions will be given in the question if required
N14	Estimation	<input type="checkbox"/> Estimate answers (by rounding) <input type="checkbox"/> Check calculations using approximation and estimation
N15	Rounding	<input type="checkbox"/> Round to an appropriate degree of accuracy <input type="checkbox"/> Round to a number of decimal places <input type="checkbox"/> Round to a number of significant figures <input type="checkbox"/> Use inequality signs to show an error interval due to rounding, eg. $8.5 \leq a < 9.5$ <input type="checkbox"/> Know not to round in the middle of a calculation, but just to round the final answer
N16		<input type="checkbox"/> Understand and use limits of accuracy

ALGEBRA		
A1	Basic notation	<p>Understand and use algebraic notation, including</p> <ul style="list-style-type: none"> <input type="checkbox"/> ab, <input type="checkbox"/> $3a$ <input type="checkbox"/> a^2, a^3, a^2b, etc. <input type="checkbox"/> $\frac{a}{b}$ <p><input type="checkbox"/> Use fractions in algebra work instead of decimals</p> <p><input type="checkbox"/> Use brackets</p> <p>NB. Answers are expected to be given <u>in their simplest form</u> even when not asked to do so.</p>
A2	Substitution	<p><input type="checkbox"/> Substitute numbers into formulas, and expressions, including scientific formulas which may not have been seen before</p>
A3	Algebraic terms	<p>Understand and use the terms;</p> <ul style="list-style-type: none"> <input type="checkbox"/> Expression <input type="checkbox"/> Equation <input type="checkbox"/> Formula <input type="checkbox"/> Inequality <input type="checkbox"/> Term <input type="checkbox"/> Factor <input type="checkbox"/> Identity
A4	Manipulate algebra	<ul style="list-style-type: none"> <input type="checkbox"/> Simplify by collecting like terms <input type="checkbox"/> Multiply out a single bracket <input type="checkbox"/> Factorise a single bracket by taking out common factors <input type="checkbox"/> Expand two brackets <input type="checkbox"/> Factorise quadratics (with a single x^2) into two brackets <input type="checkbox"/> Factorise quadratics using the difference of two squares, eg. $a^2 - 9 = (a + 3)(a - 3)$ <input type="checkbox"/> Simplify algebraic expressions by adding, subtracting and multiplying <input type="checkbox"/> Use index laws
A5	Formulae	<ul style="list-style-type: none"> <input type="checkbox"/> Understand and use mathematical formulae <input type="checkbox"/> Rearrange a formula to change the subject

A6	Expressions	<input type="checkbox"/> Know the difference between an equation, like $2x + 3 = 17$, and an identity, like $2x \equiv x + x$ <input type="checkbox"/> Be able to show that two expressions are equal
A7	Functions	<input type="checkbox"/> Understand functions with inputs and outputs
A8	Graphs	<input type="checkbox"/> Work with graphs in all four quadrants (ie. with negative values as well as positive)
A9	Straight line graphs	<input type="checkbox"/> Plot straight line graphs <input type="checkbox"/> Use $y = mx + c$ to find parallel graphs <input type="checkbox"/> Find the equation of a line when given the gradient and one point <input type="checkbox"/> Find the equation of a line when given two points
A10	Gradients and intercepts	<input type="checkbox"/> Find and use gradients and intercepts of graphs
A11	Key features of graphs	Look at a quadratic graph and identify from it <ul style="list-style-type: none"> <input type="checkbox"/> Roots (where a graph crosses the x axis) <input type="checkbox"/> Intercept (where it crosses the y axis) <input type="checkbox"/> Turning points <input type="checkbox"/> Find the roots of a quadratic using algebra <input type="checkbox"/> Understand the symmetry of a quadratic graph
A12	Other graphs	Recognise, sketch or interpret other graphs, including <ul style="list-style-type: none"> <input type="checkbox"/> Cubic functions (x^3, etc.) <input type="checkbox"/> Reciprocal functions ($\frac{1}{x}$, etc.)
A14	Real life graphs	<input type="checkbox"/> Plot and interpret graphs of speed, distance and time <input type="checkbox"/> Use graphs to find solutions with problems of speed, distance and acceleration <input type="checkbox"/> Understand and use reciprocal graphs <input type="checkbox"/> Understand and use exponential graphs <input type="checkbox"/>
A17	Linear equations	<input type="checkbox"/> Solve linear equations <input type="checkbox"/> Solve equations with x on both sides <input type="checkbox"/> Solve equations with brackets <input type="checkbox"/> Find a solution to a linear equation by reading it from a graph

A18	Quadratic equations	<input type="checkbox"/> Solve quadratic equations by factorising into 2 brackets <input type="checkbox"/> Find solutions to a quadratic equation by reading them from a graph
A19	Simultaneous equations	<input type="checkbox"/> Solve simultaneous linear equations <input type="checkbox"/> Find solutions simultaneous equations by reading them from a graph
A21	Creating expressions and equations	<input type="checkbox"/> Create an expression from a word or shape problem <input type="checkbox"/> Create an equation from a word or shape problem and solve it
A22	Inequalities	<input type="checkbox"/> Solve linear inequalities <input type="checkbox"/> Represent solutions to linear inequalities on a number line NB. On a number line, open circles and closed circles must be used correctly, and on a graph, dashed lines and solid lines must be used correctly.
A23	Sequences	<input type="checkbox"/> Generate a sequence from a term-to-term rule or an nth term expression <input type="checkbox"/> Generate a sequence from patterns
A24	Sequences	Recognise and use sequences, including <ul style="list-style-type: none"> <input type="checkbox"/> Square numbers <input type="checkbox"/> Cube numbers <input type="checkbox"/> Triangular numbers <input type="checkbox"/> Arithmetic (linear) sequences <input type="checkbox"/> Fibonacci sequences <input type="checkbox"/> Simple geometric sequences (eg. doubling or multiplying each term by 3)
A25	Nth term of a sequence	<input type="checkbox"/> Find the nth term of a linear sequence

RATIO, PROPORTION AND RATES OF CHANGE		
R1	Units	Change between units for <ul style="list-style-type: none"> <input type="checkbox"/> Time <input type="checkbox"/> Length <input type="checkbox"/> Area <input type="checkbox"/> Volume/capacity <input type="checkbox"/> Mass Change between units for compound measures of <ul style="list-style-type: none"> <input type="checkbox"/> Speed <input type="checkbox"/> Rates of pay <input type="checkbox"/> Density <input type="checkbox"/> Pressure
R2	Scale	<input type="checkbox"/> Use scale factors, scale diagrams and maps
R3	Finding a fraction	<input type="checkbox"/> Express one quantity as a fraction of another NB. The result may also be greater than one or a top-heavy fraction.
R4	Simple ratios	<input type="checkbox"/> Use ratio notation <input type="checkbox"/> Simplify a ratio
R5	Using ratios	<input type="checkbox"/> Dividing a quantity into a given ratio <input type="checkbox"/> Make a division into two parts into a ratio <input type="checkbox"/> Use ratio in problems, including mixing substances, conversions, scale problems, and best value for money, etc.
R6	Writing as a ratio	<input type="checkbox"/> Express two amounts as a ratio or fraction
R7	Proportion	<input type="checkbox"/> Understand and use proportion
R8	Ratio and fractions	<input type="checkbox"/> Understand the relationship between ratio and a fraction or a linear function

R9	Percentages	<input type="checkbox"/> Understand the meaning of percentage <input type="checkbox"/> Change percentages to fractions or decimals and the other way round <input type="checkbox"/> Use percentages, fractions and decimals to multiply <input type="checkbox"/> Express one amount as a percentage of another <input type="checkbox"/> Compare two quantities by using percentages <input type="checkbox"/> Use percentages greater than 100% <input type="checkbox"/> Solve problems using percentage change <input type="checkbox"/> Work with percentage increase and decrease <input type="checkbox"/> Calculate an original value (reverse percentages) <input type="checkbox"/> Find simple interest
R10	Proportion	<input type="checkbox"/> Solve problems involving direct proportion <input type="checkbox"/> Solve problems involving inverse proportion <input type="checkbox"/> Understand graphs of direct and inverse proportion
R11	Compound units	Use units for compound measures of <ul style="list-style-type: none"> <input type="checkbox"/> Speed <input type="checkbox"/> Rates of pay <input type="checkbox"/> Density <input type="checkbox"/> Price per item/amount <input type="checkbox"/> Pressure
R12	Comparisons	<input type="checkbox"/> Compare lengths, areas and volumes using ratio notation <input type="checkbox"/> Apply ratio comparisons in similar shapes or in trigonometry ratios
R13	Direct and inverse proportion	<input type="checkbox"/> Understand that x inversely proportional to y means x is proportional to $\frac{1}{y}$ <input type="checkbox"/> Use equations for direct and inverse proportion
R14	Graphs and proportion	<input type="checkbox"/> Understand and use the gradient of a straight line graph as a rate of change <input type="checkbox"/> Recognise and use graphs that show direct or inverse proportion
R16	Growth and decay	<input type="checkbox"/> Set up and solve problems of growth and decay <input type="checkbox"/> Set up and solve problems of compound interest

GEOMETRY AND MEASURE		
G1	Understanding terms	<input type="checkbox"/> Understand and use the terms points, lines, vertices and planes <input type="checkbox"/> Understand and use the terms parallel, perpendicular and right angle <input type="checkbox"/> Understand and use the terms polygon and regular polygon <input type="checkbox"/> Understand symmetry and rotational symmetry of polygons <input type="checkbox"/> Understand labelling of sides and angles on shapes <input type="checkbox"/> Draw a diagram from a description
G2	Constructions	Use ruler and compasses to construct <ul style="list-style-type: none"> <input type="checkbox"/> Perpendicular bisector of a line <input type="checkbox"/> Perpendicular at a point on a line <input type="checkbox"/> Perpendicular from a separate point to a line <input type="checkbox"/> Angle bisector <input type="checkbox"/> An angle of 60° <input type="checkbox"/> Use constructions in loci problems <input type="checkbox"/> Know that the perpendicular from a point to a line is the shortest distance from the point to the line
G3	Basic angle facts	Know and use <ul style="list-style-type: none"> <input type="checkbox"/> Angles at a point add up to 360° <input type="checkbox"/> Angles at a point on a straight line add up to 180° <input type="checkbox"/> Vertically opposite angles are equal <input type="checkbox"/> In parallel lines, alternate angles are equal <input type="checkbox"/> In parallel lines, corresponding angles are equal <input type="checkbox"/> Angles in a triangle add up to 180° <input type="checkbox"/> Be able to find the sum of angles in any polygon <input type="checkbox"/> Be able to find exterior and interior angles of any regular polygon NB. In parallel lines, “Z angles” and “F angles” are not allowed as reasons

G4	Triangles, quadrilaterals and other polygons	<p>Know and use the special properties of quadrilaterals:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Square <input type="checkbox"/> Rectangle <input type="checkbox"/> Parallelogram <input type="checkbox"/> Trapezium <input type="checkbox"/> Kite <input type="checkbox"/> Rhombus <p>Know and use the special properties of triangles:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Isosceles triangle <input type="checkbox"/> Equilateral triangle <input type="checkbox"/> Scalene triangle <input type="checkbox"/> Right-angled triangle <input type="checkbox"/> Acute angled triangle <input type="checkbox"/> Obtuse angled triangle <p>Know and use the names of polygons:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pentagon <input type="checkbox"/> Hexagon <input type="checkbox"/> Octagon <input type="checkbox"/> Decagon
G5	Congruent triangles	<input type="checkbox"/> Know and use the criteria for congruent triangles: SSS, SAS, ASA and RHS
G6	Applying angle facts and other properties	<ul style="list-style-type: none"> <input type="checkbox"/> Apply angle facts and facts about congruence and similar shapes to find angles and sides <input type="checkbox"/> Use Pythagoras' theorem <input type="checkbox"/> Use base angles in an isosceles triangle are equal <input type="checkbox"/> Use angle facts and other properties for simple proofs
G7	Transformations	<ul style="list-style-type: none"> <input type="checkbox"/> Identify, describe or draw similar shapes <input type="checkbox"/> Identify, describe or draw congruent shapes <p>Describe and use transformations:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Rotation <input type="checkbox"/> Reflection <input type="checkbox"/> Translation (including using vectors) <input type="checkbox"/> Enlargement <input type="checkbox"/> Describe and use enlargements with fractional scale factors

G9	The circle	<p>Know and use definitions and properties of circle parts:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Centre <input type="checkbox"/> Radius <input type="checkbox"/> Chord <input type="checkbox"/> Diameter <input type="checkbox"/> Circumference <input type="checkbox"/> Tangent <input type="checkbox"/> Arc <input type="checkbox"/> Sector <input type="checkbox"/> Segment
G11	Geometry on a grid	<input type="checkbox"/> Solve geometrical problems on a coordinate grid
G12	Solid shapes	<p>Know properties of the faces, surfaces, edges and vertices of</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cubes <input type="checkbox"/> Cuboids <input type="checkbox"/> Prisms <input type="checkbox"/> Cylinders <input type="checkbox"/> Pyramids <input type="checkbox"/> Cones <input type="checkbox"/> Spheres
G13	Plans and elevations	<input type="checkbox"/> Draw and interpret plans and elevations of 3D shapes
G14	Units of measure	<input type="checkbox"/> Use standard units of measure for length, area, volume/capacity, mass, time, money, etc.
G15	Maps and scale drawings	<ul style="list-style-type: none"> <input type="checkbox"/> Measure and use lines and angles in diagrams <input type="checkbox"/> Use maps and scale drawings <input type="checkbox"/> Use bearings, including the 8 compass points and 3-figure angles for bearings
G16	Area and volume	<p>Know and use formulas to calculate</p> <ul style="list-style-type: none"> <input type="checkbox"/> Area of a triangle <input type="checkbox"/> Area of a parallelogram <input type="checkbox"/> Area of a trapezium <input type="checkbox"/> Volume of a cuboid <input type="checkbox"/> Volume of a prism <input type="checkbox"/> Volume of a cylinder

G17	Circles and other shapes	<input type="checkbox"/> Know and use the formula for circumference of a circle <input type="checkbox"/> Know and use the formula for area of a circle <input type="checkbox"/> Calculate perimeters of 2D shapes <input type="checkbox"/> Calculate areas of compound shapes Find the surface area and volume of <ul style="list-style-type: none"> <input type="checkbox"/> Sphere <input type="checkbox"/> Pyramid <input type="checkbox"/> Cone <input type="checkbox"/> Frustum <input type="checkbox"/> Composite solids NB. Answers may be asked for in terms of π
G18	Sectors and arcs	<input type="checkbox"/> Calculate length of an arc <input type="checkbox"/> Calculate area of a sector <input type="checkbox"/> Calculate the angle of a sector
G19	Congruence and similarity	<input type="checkbox"/> Understand congruent shapes <input type="checkbox"/> Understand similar shapes <input type="checkbox"/> Calculate lengths in similar shapes
G20		<input type="checkbox"/> Know and use the formula for Pythagoras' Theorem to find a length <input type="checkbox"/> Know and use the sin, cos and tan ratios to find a length <input type="checkbox"/> Know and use the sin, cos and tan ratios to find an angle
G21	Exact values of sin, cos and tan	<input type="checkbox"/> Know the exact values of sin and cos for angles of 0° , 30° , 45° , 60° and 90° <input type="checkbox"/> Know the exact values of tan for angles of 0° , 30° , 45° , and 60°
G24	Vectors for translations	<input type="checkbox"/> Use a vector to describe a translation
G25	Using vectors	<input type="checkbox"/> Add and subtract vectors <input type="checkbox"/> Multiply a vector by a number <input type="checkbox"/> Use column vectors and vectors on diagrams

PROBABILITY		
P1	Basic probability	<input type="checkbox"/> Use tables and probability trees to show outcomes and probabilities NB. Probabilities should be shown as fractions, decimals or percentages
P2	Random, fair and equally likely events	<input type="checkbox"/> Understand and use ideas of random events, fairness, and equally likely events <input type="checkbox"/> Use these ideas to calculate expected outcomes
P3	Relative frequency	<input type="checkbox"/> Understand the relationship between relative frequency and probability
P4	Exhaustive outcomes	<input type="checkbox"/> Understand and use the fact that the probabilities of exhaustive outcomes (all possible outcomes) add up to 1
P5	Experimental probability	<input type="checkbox"/> Understand that the greater the sample size or number of events in experimental probability, the closer the results will be to the theoretical probability
P6	Diagrams	Use diagrams for showing and calculating sets of data, including <ul style="list-style-type: none"> <input type="checkbox"/> Tables and grids <input type="checkbox"/> Venn diagrams <input type="checkbox"/> Tree diagrams
P7	Sample spaces	<input type="checkbox"/> Use sample spaces for single or combined events with equally likely outcomes <input type="checkbox"/> Use sample spaces to calculate theoretical probabilities
P8	Probability trees	<input type="checkbox"/> Use tree diagrams to represent independent events <input type="checkbox"/> Use tree diagrams to represent dependent events <input type="checkbox"/> Use adding and multiplying correctly for combined probabilities

STATISTICS		
S1	Sample populations	<input type="checkbox"/> Understand how a sample of a population can be used to represent the whole population
S2	Graphs and diagrams	Construct and use <ul style="list-style-type: none"> <input type="checkbox"/> Frequency tables <input type="checkbox"/> Bar charts <input type="checkbox"/> Pie charts <input type="checkbox"/> Pictograms <input type="checkbox"/> Vertical line charts <input type="checkbox"/> Tables and line graphs for time series data
S4	Measures of data	<input type="checkbox"/> Be able to represent data in graphs or diagrams Understand and use <ul style="list-style-type: none"> <input type="checkbox"/> Median <input type="checkbox"/> Mean <input type="checkbox"/> Mode and modal class <input type="checkbox"/> Range Know and understand the terms <ul style="list-style-type: none"> <input type="checkbox"/> Primary data <input type="checkbox"/> Secondary data <input type="checkbox"/> Discrete data <input type="checkbox"/> Continuous data
S5	Describing a population	<input type="checkbox"/> Describe a population, eg. using range, median, etc.
S6	Scatter graphs	<input type="checkbox"/> Use and interpret scatter graphs <input type="checkbox"/> Recognise correlation (positive or negative, and strong or weak, or no correlation) <input type="checkbox"/> Understand that a correlation doesn't mean that one variable is a cause of the other <input type="checkbox"/> Draw a line of best fit <input type="checkbox"/> Use a line of best fit to predict results <input type="checkbox"/> Extrapolate data, but understand why this is not always advisable