GCSE MATHEMATICS COURSE GUIDE

You are following a 2-year GCSE course at Higher tier, with available grades 4-9.
A checklist of many of the GCSE topics is given below, to help guide your revision.

Skill	Approx. grade	
I can convert between ordinary numbers and standard form	4	
I can calculate using standard form, with and without a calculator	5	
I can apply the index laws for multiplying, dividing, power of 0 and brackets	4	
I can understand and use negative and fractional powers	7	
I can work out calculations involving square roots and cube roots	5	
I can simplify surds (e.g. $\sqrt{12}$) and rationalise denominators	7	
I understand rational and irrational numbers	7	
I can put numbers in order: whole numbers, fractions, decimals, and combinations of these	3/4	
I can estimate the answers to calculations	3/4	
I can round numbers to decimal places, or to significant figures	3/4	
I can find the upper/lower bounds for a measurement, including writing these using an inequality	5	
I can find the upper/lower bounds for the result of a calculation	8	
Add, subtract, multiply & divide with fractions/mixed numbers, including to solve problems	4	
I can increase or decrease a quantity using a fraction	3	
Convert between fractions, decimals and percentages, and use this to put numbers in order	3	
I know how to cross-cancel fractions before multiplying, where the numbers are large	5	
I can solve problems involving repeated increase or decrease by a fraction	5	
Where a quantity has been increased/decreased by a fraction, work out the original amount	5	
I can multiply and divide expressions, including dealing with powers	3	
I know what an identity is and how this differs from an equation	5	
I can manipulate algebra to show that two different expressions are equivalent	5	
I can use algebra in various problems, such as area, perimeter and Pythagoras' theorem	5	
I can simplify algebraic expressions involving surds	5	
I can use algebra to write a formal proof	8	
I can complete the square for a quadratic expression (e.g. $x^2 + 6x - 7$)	7	
I can simplify and work with expressions involving algebraic fractions	7	
I can multiply out (expand) a bracket	3	
I can factorise an expression by putting it into a bracket	3	
I can expand a 'double bracket', and I know how to expand $(3x + 2)^2$	5	

Skill	Approx. grade	
I can expand a single or double bracket involving surds	5	
I can expand a combination of more than two brackets e.g. $5(x + 2)(x - 3)(2x - 1)$	7	
Factorise a simple quadratic expression to solve an equation e.g. $x^2 +7x - 8 = 0$	5	
I can factorise a more advanced quadratic expression, such as $4x^2 + 5x - 6$ or $9x^2 - 25$		
I can factorise an expression involving surds into a single bracket	5	
I can use probabilities to work out how many times something is *expected* to happen	3	
Estimate probabilities using results of an experiment, and use the term 'relative frequency'	4	
I can use the fact the probabilities or all the possible outcomes add up to 1	3	
I can list all the possible ways something could happen, and use the list to find probabilities	3	
I can complete a sample space diagram (e.g. for two dice), and use it to find probabilities	3	
I know that repeating an experiment more times gives a better estimate of a probability	4	
I can calculate probabilities in more complex situations, and I know when to add/multiply	5	
I can draw a probability tree diagram for a situation, and use it to calculate probabilities	5	
I can use Venn diagrams, frequency trees and two-way tables to identify probabilities	5	
I can calculate conditional ("given that") probabilities using two-way tables, tree diagrams and Venn diagrams	8	
I know and can use the formulae $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ and $P(A \text{ and } B) = P(A \text{ given } B) \times P(B)$	9	
I can solve equations, including with brackets	3/4	
I can estimate solutions to an equation using a graph	4	
I can solve equations with the letter on both sides of the equation, or with fractions	4	
I can use a curve graph to solve equations, and identify 'roots'	4/5	
I can solve two simultaneous equations by adding or subtracting	5	
I can estimate solutions to simultaneous equations using a graph	5	
I can solve a quadratic equation by factorising, completing the square or using the formula	7	
Solve two simultaneous equations, where one is quadratic, using a substitution method	7	
I can use iteration to find approximate solutions to equations	8	
Solve equations involving algebraic fractions, including with algebra in the denominators	8	
I can find the number of possible choices using the 'product rule for counting'	7	
I understand financial terms such as profit, loss, cost price, selling price, debit, credit	2/3	

Skill	Approx. grade	
I can rearrange a formula to change the subject, including dealing with powers or roots	3/4	
I can write a formula to represent a practical situation	3	
I can find a formula that approximately connects given data	8/9	
I can rearrange a formula where the subject appears twice	5	
I can use algebra and unknowns in a range of contexts, such as volume, area or pressure	8	
I can find the new amount after a *repeated* percentage change, including compound interest	4	
I can write one amount as a percentage of another amount	3	
I can use percentages to compare two different amounts	3/4	
Where a quantity has been increased/decreased by a percentage, find the original amount	5	
Work out how many increases/decreases by a percentage are needed to give a final amount	5	
Identify the percentage of a given repeated percentage increase or decrease, given the original and final values	8	
Plot a line graph from its equation, by working out some co-ordinates that are on the line	3	
I can identify the gradient and y-axis intercept from a line equation such as y = 5x + 2	4	
I can plot a curve graph using a table of values	4	
I can plot a distance-time graph or speed-time graph, and use one to solve problems	3/4	
I know how to identify *parallel* lines from their equations	4	
Find the equation of line using two points on the line, or using one point and the gradient	5	
Identify the roots, vertex (turning point) or line of symmetry from a quadratic (x^2) graph	4/5	
I can find roots of a quadratic (x^2) graph by solving an equation	5	
I can recognise or sketch a graph of y = 1/x and simple graphs involving x^3	5	
Understand a gradient as a 'rate of change' and use gradients to solve practical problems	5	
Find the midpoint of a line segment, or length of a line segment, using the two end points	5	
I can use the form y = mx + c to identify perpendicular lines	7	
I can find the turning point (vertex) of a quadratic function by completing the square	8	
I can recognise, interpret and sketch graphs of exponential functions (e.g. $y = 5^x$)	8/9	
I can plot and interpret exponential graphs in contexts	9	
I can sketch translations and reflections of a given function e.g. $y = (x - 3)^2$	8	
I can calculate/estimate the gradients of graphs and the areas under graphs, including interpreting these for distance-time graphs, velocity-time graphs, and financial graphs	9	
I can recognise and use the equation of a circle centred at the origin	7	

Skill	Approx. grade	
I can find the equation of the tangent to a circle at a given point	9	
I can interpret the gradient at a point on a curve as the instantaneous rate of change	8/9	
I can enlarge a shape using a centre of enlargement and a scale factor (e.g. scale factor 3)	3	
Fully describe a rotation, reflection or translation, using a vector to describe a translation	3	
I can enlarge a shape using a fraction scale factor (and a centre of enlargement)	3/4	
I can enlarge a shape using a negative scale factor (and a centre of enlargement)	7	
I can apply combinations of reflections, rotations and enlargements	7	
I can add, subtract and multiply with column vectors	5	
I can solve vector problems on a grid	5	
Use vectors to construct arguments e.g. collinear points, parallel lines and quadrilaterals	8	
I can prove triangles are congruent using SSS, SAS, AAS and RHS	5	
I can calculate missing lengths in similar shapes	4	
I can calculate lengths, areas and volumes in similar shapes/solids	7	
I can solve a linear inequality (e.g. $5x - 8 < 12$) and show the solution on a number line	3/4	
I can use a graph to represent one or more linear inequalities	7	
I can solve a quadratic inequality (e.g. $x^2 + 2x > 10$), showing the solution using set notation, on a number line or on a graph	8/9	
I understand scatter graphs and different types of correlation	3/4	
I can use graphs to compare two different sets of data	3/4	
I can construct and use a line graph for time series data	4	
I know that correlation does not imply causation	4	
I can draw a line of best fit on a scatter graph, and use it to make predictions I understand why a prediction is unreliable for a value outside the range of the original data	4	
I can find the upper quartile, lower quartile and interquartile range for a simple set of data	5	
I can construct a box plot to represent a list of for a simple set of data (e.g. a list of numbers)	5	
Estimate the mean/range, and find the modal class, from a table of data (including grouped)	2/3	
I can use an average and the range to compare sets of data	3	
I can identify different types of data, such as primary, secondary, discrete, continuous	3	
I can find the median, or the class interval containing the median, from a table of data	4	
Use data from a sample to draw a conclusion, and I understand the limitations of sampling	4	
I can construct a cumulative frequency diagram and interpret it, including finding the median and interquartile range	6	
I can construct a box plot from a cumulative frequency diagram	7	
I can compare two sets of data using box plots, quartiles, and the interquartile range	7	
I can construct and interpret a histogram	8	

Skill	Approx. grade	
Identify mathematical properties for shapes, including triangles and special quadrilaterals	2	
I can identify these parts of a circle: centre, radius, diameter, circumference and chord	2	
I can identify these parts of a circle: tangent, arc, sector, segment	4	
I know the formula for Pythagoras' theorem, and I can use it to solve problems	4	
I can apply Pythagoras' theorem to 3D problems	7	
I can construct a shape, such as a triangle, using a written description or from a diagram	3	
I can perform standard constructions such as an angle bisector, or perpendicular bisector	4	
Use standard constructions to solve practical problems, identify a locus or shade a region	4	
I know that the perpendicular is the shortest distance from a point to a line	5	
I can construct an angle of 60° using compasses	4	
Add, subtract, multiply and divide combinations of whole numbers, decimals and fractions	3/4	
I know the correct way to write recurring decimals	3	
I can change recurring decimals into fractions, and vice versa	7	
I can identify alternate angles and corresponding angles near parallel lines	3	
I can work out the total of the angles in any polygon by dividing it into triangles	3	
I can measure and plot 3-figure bearings, and I understand the bearing of "A from B"	4	
I can calculate missing angles in isosceles triangles	4	
I can use sin, cos & tan to calculate sides and angles in right-angled triangles	5	
I know the exact values of sin & cos for 0°, 30°, 45°, 60° and 90° I know the exact values of tan for 0°, 30°, 45° and 60°	5	
I can recognise, sketch and interpret graphs of y = sin x, y = cos x & y = tan x	8	
I can use sin, cos & tan to solve 3D problems involving right-angled triangles	8	
I can apply the Sine Rule and Cosine Rule to find unknown sides and angles	7	
I can apply the standard circle theorems, using appropriate wording to describe the rules	7	
I can prove standard circle theorems	8	
I can calculate with speed, distance and time	3/4	
I can calculate with density, pressure, rates of change, and population density	5	
I can change between units of density and pressure	5	
I can solve kinematics problems by applying given formulae such as $v^2 = u^2 + 2as$	9	
I can divide a quantity into two parts using a ratio, or use one part to find the other (or the whole)	3/4	
I can write a ratio in the form 1 : n, and use this to compare ratios	4	
I can use algebra to solve a problem involving direct or inverse proportion	4	
I know how direct or inverse proportion appears on a graph	4	

Skill	Approx. grade	
I can construct an equation to describe direct or inverse proportion	7	
I can identify a 3D solid using its plan, front elevation and side elevation	3	
I can construct a plan, front elevation and side elevation from a 3D drawing of a solid	4	
I can calculate the volume of a cuboid, prism or cylinder	2/3	
I can remember and use the formulae for the area and circumference of a circle	3	
I can calculate answers in terms of π	4	
I can calculate the surface area and volume of spheres, pyramids and cones	4	
I can calculate the length of an arc and the area of a sector of a circle	5	
I can calculate the surface area of cubes, cuboids, prisms and cylinders	4	
I can use "1/2 ab sin C" to calculate the area, sides, or angles or any triangle	7	
I understand and can use simple function notation such as f(x), g(4) or f(x + 3)	7	
I can rearrange a formula to find an inverse function $f^{-1}(x)$	7	
I can understand and work with composite functions e.g. fg(x)	8	
I can sketch translations and reflections of a given function e.g. f(x + 3)	8	
I can work out an expression for the nth term of a (linear) sequence	3	
Find an expression for the nth term of a simple quadratic sequence, by comparing with n^2	4	
I can find an expression for the nth term of any quadratic sequence, using differences	8	
I can work with sequences that are more complex than simple adding & subtracting	4/5	
I can recognise and use geometric sequences with nth term r^n, where r is a rational number or a surd	9	
I can work with general iterative processes	8	