# GCSE MATHEMATICS COURSE GUIDE

You are following a 2-year GCSE course at Foundation tier, with available grades 1-5. A checklist of many of the GCSE topics is given below, to help guide your revision.

| **Skill** | **Approx. grade** | |
|---|---|---|
| I can understand and use powers and roots | 2 | |
| I can identify square numbers up to 15 x 15 | 1 | |
| 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 work out calculations involving square roots and cube roots | 5 | |
| I can put numbers in order: whole numbers, fractions, decimals, and combinations of these | 3/4 | |
| I know the value of all of the digits in a whole number | 1 | |
| I can estimate the answers to calculations | 3/4 | |
| I can round numbers to decimal places, or to significant figures | 3/4 | |
| Find the upper/lower bounds for a measurement, including writing these using an inequality | 5 | |
| Add, subtract, multiply & divide with fractions/mixed numbers, including to solve problems | 4 | |
| I can write one amount as a fraction of another amount | 1 | |
| 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 know the difference between an expression, equation and formula | 2 | |
| I can simplify algebra expressions by collecting 'like terms' together | 2 | |
| 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 multiply out (expand) a bracket | 3 | |

| Skill | Approx. grade | |
|---|---|---|
| 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 | |
| I can expand a single or double bracket involving surds | 5 | |
| Factorise a simple quadratic expression, and use this to solve an equation e.g. $x^2 + 7x - 8 = 0$ | 5 | |
| I can factorise an expression involving surds into a single bracket | 5 | |
| I can work out probabilities for a given situation (e.g. when a dice is rolled) | 1/2 | |
| I can solve problems using a probability scale from 0 to 1 | 1/2 | |
| 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 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 add, subtract, multiply and divide with large whole numbers | 1/2 | |
| Understand financial terms such as profit, loss, cost price, selling price, debit, credit | 2/3 | |
| I know the correct order to work out a calculation, including working out any brackets first | 2 | |
| I can substitute numbers into formulae, including negative numbers | 2 | |
| 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 | |

| Skill | Approx. grade | |
|---|---|---|
| I can rearrange a formula where the subject appears twice | 5 | |
| I can calculate percentages with and without a calculator | 2/3 | |
| I can increase or decrease an amount by a percentage, including solving word problems | 3 | |
| 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 | |
| I can read and plot positive and negative co-ordinates | 1/2 | |
| 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 that a gradient is a 'rate of change' and can use gradients to solve problems | 5 | |
| Find the midpoint of a line segment, or the length of a line segment, using two end points | 5 | |
| I can rotate, reflect or translate a shape on a co-ordinate grid | 2/3 | |
| I can enlarge a shape using a centre of enlargement and a scale factor (e.g. scale factor 3) | 3 | |
| I can fully describe a rotation, reflection or translation, using a vector to describe a translation | 3 | |
| I can identify two shapes that are congruent, or similar | 1 | |
| I can enlarge a shape using a fraction scale factor (and a centre of enlargement) | 3/4 | |
| I can add, subtract and multiply with column vectors | 5 | |
| I can solve vector problems on a grid | 5 | |

| Skill | Approx. grade | |
|---|---|---|
| I can prove triangles are congruent using SSS, SAS, AAS and RHS | 5 | |
| I can calculate missing lengths in similar shapes | 4 | |
| I understand the symbols =, ≠, <, >, ≥, ≤ and know when to use them | 1 | |
| I can solve a linear inequality (e.g. 5x – 8 < 12) and show the solution on a number line | 3/4 | |
| I can construct and read tables and diagrams e.g. bar chart, vertical line chart, pictogram | 1/2 | |
| 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<br>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 | |
| I can find the mean, median, mode or range for a simple list of numbers | 1 | |
| I can 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 from a table of data<br>I can find the class interval containing the median from a table of grouped data | 4 | |
| I can use data from a sample to draw a conclusion, and I understand the limitations of sampling | 4 | |
| I understand shape terms such as point, line, vertex, vertices, edge, plane, parallel, perpendicular, right angle, polygon, and regular | 2 | |
| I can identify lines of symmetry for a shape, and the order of rotation symmetry | 1/2 | |
| I can identify mathematical properties for shapes, including triangles and special quadrilaterals | 2 | |
| I understand how capital letters are used to identify shapes, sides, and angles in diagrams | 2 | |
| I know the names for polygons (shapes) with 5, 6, 8 and 10 sides | 1 | |
| 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 | |

| Skill | Approx. grade | |
|---|---|---|
| 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 | |
| I can use standard constructions to solve practical problems, identifying a locus or shading 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 | |
| I understand and can identify factors, multiples, prime numbers, common multiples, common factors, the lowest common multiple (LCM) and the highest common factor (HCF) | 1/2 | |
| I can use a factor tree to write a number as a product of its prime factors, including using indices<br>I can use this to find the highest common factor, or lowest common multiple for large numbers | 2/3 | |
| I can add, subtract, multiply and divide with decimals | 2 | |
| I can 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 calculate missing angles using the rules for angles at a point, and on a straight line | 2 | |
| I can identify situations where 'opposite angles are equal' | 2 | |
| I can identify alternate angles and corresponding angles near parallel lines | 3 | |
| I can calculate missing angles in a triangle | 2 | |
| 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°<br>I know the exact values of tan for 0°, 30°, 45° and 60° | 5 | |
| I can use standard units of mass, length, area, volume/capacity, time and money | 1 | |
| I can convert between metric units of length, area, volume and capacity | 2 | |
| 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 use ratio notation and simplify a ratio | 1/2 | |
| I understand how ratios are linked to fractions | 1/2 | |

| Skill | Approx. grade | |
|---|---|---|
| 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 | |
| I understand and can use the terms: face, surface, edge, and vertex (vertices) for 3D solids | 1/2 | |
| 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 remember and use the formulae for the area of a rectangle, triangle, parallelogram, trapezium and composite shapes | 1/2 | |
| 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 the perimeter of a shape, including a shape made from rectangles | 1/2 | |
| I can calculate answers in terms of $\pi$ | 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 function machines, and complete input-output tables | 1 | |
| I can find the next term in a sequence, and explain how I worked it out | 1 | |
| I can use an expression for the nth term to work out any term in a sequence | 2 | |
| I can recognise a sequence of square, triangle or cube numbers | 2 | |
| 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 work with sequences that are more complex than simple adding & subtracting | 4/5 | |