

# YEAR 11 GCSE MATHS REVISION CHECKLIST

## HIGHER TIER



TOPICS ARE CATEGORISED VIA MATHS STRANDS

### NUMBER TOPICS

<b>1 Number</b>	<b>Grade 3 to 9</b>	☺	☹	☹
1.1 Number problems and reasoning	Work out the total number of ways of performing a series of tasks.			
1.2 Place value and estimating	Estimate an answer. Use place value to answer questions.			
1.3 HCF and LCM	Write a number of the product of its prime factors. Find the HCF and LCM of two numbers.			
1.4 Calculating with powers (indices)	Use powers and roots in calculations. Multiply and divide using index laws. Work out a power raised to a power.			
1.5 Zero, negative and fractional indices	Use negative indices. Use fractional indices.			
1.6 Powers of 10 and standard form	Write a number in standard form. Calculate with numbers in standard form.			
1.7 Surds	Understand the difference between rational and irrational numbers. Simplify a surd. Rationalise a denominator.			

<b>4 Fractions, ratio and percentages</b>	<b>Grade 3 to 7</b>	☺	☹	☹
4.1 Fractions	Add, subtract, multiply and divide fractions and mixed numbers. Find the reciprocal of an integer, decimal or fraction.			
4.2 Ratios	Write ratios in the form 1 : n or n : 1. Compare ratios. Find quantities using ratios. Solve problems involving ratios.			
4.3 Ratio and proportion	Convert between currencies and measures. Recognise and use direct proportion. Solve problems involving ratios and proportion.			
4.4 Percentages	Work out percentage increases and decreases. Solve real-life problems involving percentages.			
4.5 Fractions, decimals and percentages	Work out percentage increases and decreases. Solve real-life problems involving percentages.			

## ALGEBRA TOPICS

<b>2 Algebra</b>	<b>Grade 3 to 7</b>	😊	😐	😞
2.1 Algebraic indices	Use the rules of indices to simplify algebraic expressions.			
2.2 Expanding and factorising	Expand brackets. Factorise algebraic expressions.			
2.3 Equations	Solve equations involving brackets and numerical fractions.  Use equations to solve problems.			
2.4 Formulae	Substitute numbers into formulae.  Rearrange formulae. Distinguish between expressions, equations, formulae and identities.			
2.5 Linear sequences	Find a general formula for the nth term of an arithmetic sequence.  Determine whether a particular number is a term of a given arithmetic sequence.			
2.6 Non-linear sequences	Solve problems using geometric sequences. Work out terms in Fibonacci-like sequences. Find the nth term of a quadratic sequence.			
2.7 More expanding and factorising	Expand the product of two brackets. Use the difference of two squares. Factorise quadratics of the form $x^2 + bx + c$ .			

6 Graphs	Grade 3 to 7	☺	☹	☹
6.1 Linear graphs	Find the gradient and y-intercept from a linear equation. Rearrange an equation into the form $y = mx + c$ . Compare two graphs from their equations. Plot graphs with equations $ax + by = c$ .			
6.2 More linear graphs	Sketch graphs using the gradient and intercepts. Find the equation of a line, given its gradient and one point on the line. Find the gradient of a line through two points.			
6.3 Graphing rates of change	Draw and interpret distance–time graphs. Calculate average speed from a distance–time graph. Understand velocity–time graphs. Find acceleration and distance from velocity–time graphs.			
6.4 Real-life graphs	Draw and interpret real-life linear graphs. Recognise direct proportion. Draw and use a line of best fit.			
6.5 Line segments	Find the coordinates of the midpoint of a line segment. Find the gradient and length of a line segment. Find the equations of lines parallel or perpendicular to a given line.			
6.6 Quadratic graphs	Draw quadratic graphs. Solve quadratic equations using graphs. Identify the line of symmetry of a quadratic graph. Interpret quadratic graphs relating to real-life situations.			
6.7 Cubic and reciprocal graphs	Draw graphs of cubic functions. Solve cubic equations using graphs. Draw graphs of reciprocal functions. Recognise a graph from its shape.			
6.8 More graphs	Interpret linear and non-linear real-life graphs. Draw the graph of a circle.			

<b>9 Equations and inequalities</b>	<b>Grade 3 to 9</b>	☺	☹	☹
9.1 Solving quadratic equations 1	Find the roots of quadratic functions. Rearrange and solve simple quadratic equations.			
9.2 Solving quadratic equations 2	Solve more complex quadratic equations. Use the quadratic formula to solve a quadratic equation.			
9.3 Completing the square	Complete the square for a quadratic expression. Solve quadratic equations by completing the square.			
9.4 Solving simple simultaneous equations	Solve simple simultaneous equations. Solve simultaneous equations for real-life situations.			
9.5 More simultaneous equations	Use simultaneous equations to find the equation of a straight line. Solve linear simultaneous equations where both equations are multiplied. Interpret real-life situations involving two unknowns and solve them.			
9.6 Solving linear and quadratic simultaneous equations	Solve simultaneous equations with one quadratic equation. Use real-life situations to construct quadratic and linear equations and solve them.			
9.7 Solving linear inequalities	Solve inequalities and show the solution on a number line and using set notation.			

<b>15 Equations and graphs</b>	<b>Grade 3 to 9</b>	☺	☹	☹
15.1 Solving simultaneous equations graphically	Solve simultaneous equations graphically.			
15.2 Representing inequalities graphically	Represent inequalities on graphs. Interpret graphs of inequalities.			
15.3 Graphs of quadratic functions	Recognise and draw quadratic functions.			
15.4 Solving quadratic equations graphically	Find approximate solutions to quadratic equations graphically. Solve quadratic equations using an iterative process.			
15.5 Graphs of cubic functions	Find the roots of cubic equations. Sketch graphs of cubic functions. Solve cubic equations using an iterative process.			

<b>17 More algebra</b>	<b>Grade 5 to 9</b>	☺	☹	☹
17.1 Rearranging formulae	Change the subject of a formula where the power of the subject appears. Change the subject of a formula where the subject appears twice.			
17.2 Algebraic fractions	Add and subtract algebraic fractions. Multiply and divide algebraic fractions. Change the subject of a formula involving fractions where all the variables are in the denominators.			
17.3 Simplifying algebraic fractions	Simplify algebraic fractions.			
17.4 More algebraic fractions	Add and subtract more complex algebraic fractions. Multiply and divide more complex algebraic fractions.			
17.5 Surds	Simplify expressions involving surds. Expand expressions involving surds. Rationalise the denominator of a fraction.			
17.6 Solving algebraic fraction	Solve equations that involve algebraic fractions.			
17.7 Functions	Use function notation. Find composite functions. Find inverse functions.			
17.8 Proof	Prove a result using algebra.			

<b>19 Proportion and graphs</b>	<b>Grade 4 to 9</b>	☺	☹	☹
19.1 Direct proportion	Write and use equations to solve problems involving direct proportion.			
19.2 More direct proportion	Write and use equations to solve problems involving direct proportion. Solve problems involving square and cubic proportionality.			
19.3 Inverse proportion	Write and use equations to solve problems involving inverse proportion. Use and recognise graphs showing inverse proportion.			
19.4 Exponential functions	Recognise graphs of exponential functions. Sketch graphs of exponential functions.			
19.5 Non-linear graphs	Calculate the gradient of a tangent at a point. Estimate the area under a non-linear graph.			
19.6 Translating graphs of functions	Understand the relationship between translating a graph and the change in its function notation.			
19.7 Reflecting and stretching graphs of functions	Understand the effect stretching a curve parallel to one of the axes has on its function form. Understand the effect reflecting a curve in one of the axes has on its function form.			

## GEOMETRY TOPICS

5 Angles and trigonometry	Grade 3 to 6	😊	😐	😞
5.1 Angle properties of triangles and quadrilaterals	Derive and use the sum of angles in a triangle and in a quadrilateral. Derive and use the fact that the exterior angle of a triangle is equal to the sum of the two opposite interior angles.			
5.2 Interior angles of a polygon	Calculate the sum of the interior angles of a polygon. Use the interior angles of polygons to solve problems.			
5.3 Exterior angles of a polygon	Know the sum of the exterior angles of a polygon. Use the angles of polygons to solve problems.			
5.4 Pythagoras' theorem 1	Calculate the length of the hypotenuse in a right-angled triangle. Solve problems using Pythagoras' theorem.			
5.4 Pythagoras' theorem 1	Calculate the length of a shorter side in a right-angled triangle. Solve problems using Pythagoras' theorem.			
5.6 Trigonometry 1	Use trigonometric ratios to find lengths in a right-angled triangle. Use trigonometric ratios to solve problems.			
5.7 Trigonometry 2	Use trigonometric ratios to calculate an angle in a right-angled triangle. Find angles of elevation and angles of depression. Use trigonometric ratios to solve problems. Know the exact values of the sine, cosine and tangent of some angles.			

7 Area and volume	Grade 3 to 9	😊	😐	😞
7.1 Perimeter and area	Find the perimeter and area of compound shapes. Recall and use the formula for the area of a trapezium.			
7.2 Units and accuracy	Convert between metric units of area. Calculate the maximum and minimum possible values of a measurement.			
7.3 Prisms	Convert between metric units of volume. Calculate volumes and surface areas of prisms.			
7.4 Circles	Calculate the area and circumference of a circle. Calculate area and circumference in terms of $\pi$ .			
7.5 Sectors of circles	Calculate the perimeter and area of semicircles and quarter circles. Calculate arc lengths, angles and areas of sectors of circles.			
7.6 Cylinders and spheres	Calculate volume and surface area of a cylinder and a sphere. Solve problems involving volumes and surface areas.			
7.7 Pyramids and cones	Calculate volume and surface area of pyramids and cones. Solve problems involving pyramids and cones.			

<b>8 Transformations and constructions</b>	<b>Grade 3 to 7</b>	☺	☹	☹
8.1 3D solids	Draw plans and elevations of 3D solids.			
8.2 Reflection and rotation	Reflect a 2D shape in a mirror line. Rotate a 2D shape about a centre of rotation. Describe reflections and rotations.			
8.3 Enlargement	Enlarge shapes by fractional and negative scale factors about a centre of enlargement.			
8.4 Transformations and combinations of transformations	Translate a shape using a vector. Carry out and describe combinations of transformations.			
8.5 Bearings and scale drawings	Draw and use scales on maps and scale drawings. Solve problems involving bearings.			
8.6 Constructions 1	Construct triangles using a ruler and compasses. Construct the perpendicular bisector of a line. Construct the shortest distance from a point to a line using a ruler and compasses.			
8.7 Constructions 2	Bisect an angle using a ruler and compasses. Construct angles using a ruler and compasses. Construct shapes made from triangles using a ruler and compasses.			
8.8 Loci	Draw a locus. Use loci to solve problems.			

<b>12 Similarity and congruence</b>	<b>Grade 3 to 9</b>	☺	☹	☹
12.1 Congruence	Show that two triangles are congruent. Know the conditions of congruence.			
12.2 Geometric proof and congruency	Prove shapes are congruent. Solve problems involving congruence.			
12.3 Similarity	Use the ratio of corresponding sides to work out scale factors. Find missing lengths on similar shapes.			
12.4 More similarity	Use similar triangles to work out lengths in real life. Use the link between linear scale factor and area scale factor to solve problems.			
12.5 Similarity in 3D solids	Use the link between scale factors for length, area and volume to solve problems.			

<b>13 More trigonometry</b>	<b>Grade 6 to 9</b>	☺	☹	☹
13.1 Accuracy	Understand and use upper and lower bounds in calculations involving trigonometry.			
13.2 Graph of the sine function	Understand how to find the sine of any angle. Know the graph of the sine function and use it to solve equations.			
13.3 Graph of the cosine function	Understand how to find the cosine of any angle. Know the graph of the cosine function and use it to solve equations.			
13.4 The tangent function	Understand how to find the tangent of any angle. Know the graph of the tangent function and use it to solve equations.			
13.5 Calculating areas and the sine	Find the area of a triangle and a segment of a circle. Use the sine rule to solve 2D problems.			
13.6 The cosine rule and 2D	Use the cosine rule to solve 2D problems. Solve bearings problems using trigonometry.			
13.7 Solving problems in 3D	Use Pythagoras' theorem in 3D. Use trigonometry in 3D.			
13.8 Transforming trigonometric graphs 1	Recognise how changes in a function affect trigonometric graphs.			
13.9 Transforming trigonometric graphs 2	Recognise how changes in a function affect trigonometric graphs.			

<b>16 Circle theorems</b>	<b>Grade 4 to 8</b>	☺	☹	☹
16.1 Radii and chords	Solve problems involving angles, triangles and circles.  Understand and use facts about chords and their distance from the centre of a circle. Solve problems involving chords and radii.			
16.2 Tangents	Understand and use facts about tangents at a point and from a point. Give reasons for angle and length calculations involving			
16.3 Angles in circles 1	Understand, prove and use facts about angles subtended at the centre and the circumference of circles.  Understand, prove and use facts about the angle in a semicircle being a right angle. Find missing angles using these theorems and give reasons for answers.			
16.4 Angles in circles 2	Understand, prove and use facts about angles subtended at the circumference of a circle. Understand, prove and use facts about cyclic quadrilaterals.  Prove the alternate segment theorem.			
16.5 Applying circle theorems	Solve angle problems using circle theorems. Give reasons for angle sizes using mathematical language.  Find the equation of the tangent to a circle at a given point.			

<b>18 Vectors and geometric proof</b>	<b>Grade 6 to 9</b>	☺	☹	☹
18.1 Vectors and vector notation	Understand and use vector notation. Work out the magnitude of a vector.			
18.2 Vector arithmetic	Calculate using vectors and represent the solutions graphically. Calculate the resultant of two vectors.			
18.3 More vector arithmetic	Solve problems using vectors. Use the resultant of two vectors to solve vector problems.			
18.4 Parallel vectors and collinear points	Express points as position vectors.  Prove lines are parallel. Prove points are collinear.			
18.5 Solving geometric problems	Solve geometric problems in two dimensions using vector methods. Apply vector methods for simple geometric proofs.			

### RATIO & PROPORTION TOPICS

<b>11 Multiplicative reasoning</b>	<b>Grade 3 to 6</b>	☺	☹	☹
11.1 Growth and decay	Find an amount after repeated percentage changes. Solve growth and decay problems.			
11.2 Compound measures	Calculate rates. Convert between metric speed measures. Use a formula to calculate speed and acceleration.			
11.3 More compound measures	Solve problems involving compound measures.			
11.4 Ratio and proportion	Use relationships involving ratio. Use direct and indirect proportion.			

### STATISTICS & PROBABILITY TOPICS

<b>3 Interpreting and representing</b>	<b>Grade 2 to 5</b>	☺	☹	☹
3.1 Statistical diagrams 1	Construct and use back-to-back stem and leaf diagrams.  Construct and use frequency polygons and pie charts.			
3.2 Time series	Plot and interpret time series graphs. Use trends to predict what might happen in the future.			
3.3 Scatter graphs	Plot and interpret scatter graphs. Determine whether or not there is a linear relationship between two variables.			
3.4 Line of best fit	Draw a line of best fit on a scatter graph. Use the line of best fit to predict values.			
3.5 Averages and range	Decide which average is best for a set of data. Estimate the mean and range from a grouped frequency table. Find the modal class and the group containing the median.			
3.6 Statistical diagrams 2	Construct and use two-way tables. Choose appropriate diagrams to display data. Recognise misleading graphs.			

<b>10 Probability</b>	<b>Grade 3 to 9</b>	☺	☹	☹
10.1 Combined events	Use the product rule for finding the number of outcomes for two or more events. List all the possible outcomes of two events in a sample space diagram.			
10.2 Mutually exclusive events	Identify mutually exclusive outcomes and events. Find the probabilities of mutually exclusive outcomes and events. Find the probability of an event not happening.			
10.3 Experimental probability	Work out the expected results for experimental and theoretical probabilities. Compare real results with theoretical expected values to see if a game is fair.			
10.4 Independent events and tree diagrams	Draw and use frequency trees.  Calculate probabilities of repeated events. Draw and use probability tree diagrams.			
10.5 Conditional probability	Decide if two events are independent. Draw and use tree diagrams to calculate conditional probability.  Draw and use tree diagrams without replacement. Use two-way tables to calculate conditional probability.			
10.6 Venn diagrams and set notation	Use Venn diagrams to calculate conditional probability.  Use set notation.			

<b>14 Further statistics</b>	<b>Grade 3 to 9</b>	☺	☹	☹
14.1 Sampling	Understand how to take a simple random sample.  Understand how to take a stratified sample.			
14.2 Cumulative frequency	Draw and interpret cumulative frequency tables and diagrams. Work out the median, quartiles and interquartile range from			
14.3 Box plots	Find the quartiles and the interquartile range from stem-and-leaf diagrams. Draw and interpret box plots.			
14.4 Drawing histograms	Understand frequency density. Draw histograms.			
14.5 Interpreting histograms	Interpret histograms.			
14.6 Comparing and describing populations	Compare two sets of data.			