GCSE Higher Revision List

Level 8/9 Topics

Number

☐ I can work with exponential growth and decay on the calculator.
☐ I can convert a recurring decimal to a fraction.
☐ I can simplify expressions involving powers or surds including rationalising a denominator.

Algebra

☐ I can manipulate algebraic expressions including fractions and solve related equations.
☐ I can solve quadratic equations by completing the square.
☐ I can solve quadratic equations by using the quadratic formula.
☐ By elimination of an unknown, I can solve two simultaneous equations in two unknowns, one of which is linear, the other equation quadratic in one unknown or of the form \(x^2 + y^2 = r^2\).
☐ I can use functions to give transformations of the graph of \(y = f(x)\) including \(y = f(x) + a\), \(y = f(ax)\), \(y = f(x + a)\), \(y = af(x)\), for linear, quadratic, sine and cosine functions \(f(x)\).
☐ I can draw graphs of exponential functions and of the circle \(x^2 + y^2 = z^2\) and can solve problems involving the intersection of straight lines with a curve (including a circle).
☐ Deduce expressions to calculate the nth term of quadratic sequences
☐ Deduce turning points by completing the square
☐ Calculate or estimate gradients of graphs and areas under graphs, and interpret results in real-life cases

Shape and Space

☐ I can solve problems involving surface areas of pyramids, cylinders, cones and spheres, segments of circles and frustrums of cones.
☐ I understand and use SSS, SAS, AAS and RHS conditions to prove the congruence of triangles.
☐ I can verify standard ruler and compass constructions.
☐ I can use congruence to show that translations, reflections and rotations do not change length and angle.
☐ I can calculate the area of a triangle using \(\frac{1}{2}ab\sin C\).
☐ I can use the sine and cosine rules to solve 2D and 3D problems.
☐ I can draw, sketch and describe the graphs of trigonometric functions for angles of any size, including transformations involving scalings in either or both the \(x\) and \(y\) directions.
☐ I can understand and use vector notation.
☐ I can calculate and represent on a diagram; the sum of two vectors, the difference of two vectors and a scalar multiple of a vector and also calculate the resultant of two vectors.
☐ I understand and use the commutative and associative properties of vector addition.
☐ I can solve simple geometrical problems in 2D using vector methods.

Handling Data

☐ I can compare data sets (including grouped discrete and continuous data) and draw conclusions.
☐ I can identify seasonality and trends in time series, from tables or diagrams and interpret graphs modelling real situations.
☐ I understand the difference between primary and secondary data and can identify possible sources of bias.
☐ I can solve problems involving the addition or multiplication of two probabilities.
☐ Calculate and interpret conditional probabilities through Venn diagrams
Level 7 Topics

Number

- I can use calculators or written methods to calculate the upper and lower bounds of calculations, including use in measurement questions.
- I can check the order of magnitude of a compound calculation using estimation methods, including rounding numbers of any size to one significant figure and simplifying calculations using standard index form, without the use of a calculator.
- I can simplify fractional, negative and zero powers.

Algebra

- I can change the subject of a formula, including making the subject only appear once, or where the subject appears raised to a power.
- I can form and use equations to solve work and other problems involving direct or inverse proportion (for example: \(y \propto x\), \(y \propto x^2\), \(y \propto \frac{1}{x}\), \(y \propto \frac{1}{x^2}\)) and understand what these relationships would look like on a graph.
- I can find gradients of straight lines which are perpendicular to each other and write equations of straight lines in the form \(y = mx + c\).
- I can manipulate algebraic expressions by factorising and cancelling common factors in fractions.
- I can factorise quadratic expressions, including the difference of two squares.
- I can solve quadratic equations such as \(2x^2 + 7x + 6 = 0\) by factorising.

Shape and Space

- I can use and prove angle and tangent properties of circles, including the alternate segment theorem.
- I can use 3D Pythagoras and trigonometry including angles made by a line and a plane.
- I can find the length of a line AB in 2D, given coordinates for points A and B.
- I can solve problems involving the lengths of arcs and areas of sectors of circles.
- I can calculate the volume of pyramids, cones and spheres.
- I can understand and use scale factors, area factors and volume factors and the relationship between them and I understand negative factors.

Handling Data

- I can select a representative sample from a population using random and stratified sampling and criticise sampling methods.
- I can solve problems involving the addition or multiplication of two probabilities and understand what mutually exclusive and independent events are.
- I can draw and interpret histograms for grouped data and I understand frequency density.
Level 5/6 Topics

Number

☐ I can solve problems involving percentage increase and decrease and calculate the original amount when given the transformed amount after a percentage change.
☐ I can solve problems involving repeated proportional or percentage changes, including compound interest and representing repeated proportional changes using a multiplier raised to a power.
☐ I can understand standard index form on the calculator display and convert between ordinary and standard index form representations.
☐ I can calculate with standard index form and check solutions by converting to standard index form.
☐ I can multiply and divide mixed numbers; e.g. \(4 \frac{2}{3} \div 2\frac{1}{4}\).

Algebra

☐ I can change the subject of a formula, including simple cases where the subject appears twice (so I factorise) or where a power of the subject appears (so I take the correct root).
☐ I can use and generate formulae.
☐ I can solve linear equations where there are fractional coefficients e.g. \(\frac{1}{2}x + \frac{1}{4} = 2\).
☐ I can multiply double bracket expressions of the form \((x + 3)(x - 7)\) and simplify the result by collecting like terms.
☐ I can solve quadratic equations of the form \(x^2 + 5x - 6\) by factorisation including the difference of two squares.
☐ I can find the solution of two simultaneous equations by elimination (algebraic method) and solve graphically; i.e. find the point where two lines cross.
☐ I know that \(y = mx + c\) represents a straight line; I can interpret the values of \(m\) and \(c\) so that I know when lines are parallel.
☐ I can plot graphs of simple cubic functions and the reciprocal function \(y = \frac{1}{x}\) with \(x \neq 0\) and recognise the characteristic shapes of these functions.
☐ I can solve linear inequalities in one variable e.g. \(3x + 1 < 7\)
☐ I can solve several linear inequalities in two variables and find the solution set.

Shape and Space

☐ I can identify a formula using its dimensions.
☐ I can transform 2D shapes by combinations of reflection, rotation (of any angle about any point) and translation, including the use of vector notation.
☐ I can construct enlargements using positive fractional scale factors, identify scale factors by looking at diagrams and taking measurements and recognise properties that do not alter with particular transformations.
☐ I can use trigonometry to find lengths, angles and bearings.
☐ I understand the similarity of triangles and other plane figures and use this to solve problems.

Handling Data

☐ I can use tree diagrams to represent outcomes of combined events, recognising when events are independent and find probabilities.
☐ I can draw and interpret cumulative frequency tables and diagrams and box plots for grouped data and then find the median, quartiles, percentiles and interquartile range.
☐ I can compare distributions and make inferences (comments), using the shapes of the distributions and measures of average and spread, including median and quartiles.
☐ I can calculate an appropriate moving average.
Level 4/5 Topics

Number

- I can use and understand terminating and recurring decimals including exact fraction equivalents.
- I can use the terms cube root and negative square root.
- I can solve percentage problems including increase and decrease using a multiplier.
- I can recall the squares to 15² and the corresponding square roots and recall the cubes of 2, 3, 4, 5 and 10.
- I can use index laws with numerical and algebraic expressions involving multiplication and division of positive integer powers, e.g. \( a^3 \times a^{-2} = a \)
- I can check solutions to calculations using various methods including approximating, using inverse operations and recognising the effect of multiplying and dividing by numbers less than one and greater than one.
- I can understand and use ratios including simplifying ratios and dividing a quantity in a given ratio.
- I can calculate an unknown quantity in a direct proportion question.
- I can use and understand the terms reciprocal, highest common factor, least common multiple, prime number and find the prime number decomposition of positive integers.
- I understand the difference between rounding to 2d.p. and rounding to 2s.f.

Algebra

- I can use and make a formula and substitute positive and negative numbers into a formula.
- I can form and solve equations, including those with fractions.
- I can change the subject of a formula.
- I can use a table and equation to find points of quadratic functions (curves) and I can find solutions for when the graph is equal to a value.
- I can form and solve inequalities and represent the solution set on a number line.
- I can use trial and improvement to find approximate solutions of equations.
- I can generate integer sequences, find the \( n \)th term of an arithmetic sequence and find rules for quadratic sequences.
- I can multiply out double bracket expressions e.g. \((x + 3)(x - 7)\).

Shape and Space

- I know that measurements using real numbers depend on the choice of unit and I understand upper and lower bounds of a measurement given to a certain degree of accuracy.
- I can solve problems involving the surface area and volume of prisms, including cylinders and convert between metric units (including \( \text{cm}^3 \) and \( \text{m}^3 \)).
- I can solve angle problems involving intersecting and parallel lines, polygons and circles including tangents.
- I can understand, recall and use Pythagoras' Theorem, including finding the length of a line between two coordinates.
- I can plot and shade loci.
- I can use ruler and compasses to produce constructions, including an equilateral triangle with a given side, the midpoint and perpendicular bisector of a line, the perpendicular from a point to a line and the bisector of an angle.
- I understand and can use 3D coordinates.
- I can find the coordinates of the midpoint of a line segment AB given the coordinates of A and B in 2D.
- I can solve problems involving rates, including speed and density.

Handling Data

- I can solve probability problems involving theoretical probabilities and relative frequencies from data.
- I can calculate an estimate of the mean from grouped data by using midpoints.
- I can interpret scatter graphs for discrete and continuous variables, including using lines of best fit; I understand the vocabulary of correlation, including positive, negative and zero correlation.
Level 4 topics

Number

☐ I can use calculators, understand when entering measures to put them all in the same units and know how to interpret the display.
☐ I can round off a final answer to a reasonable degree of accuracy.
☐ I can use a calculator effectively, including using the memory and bracket keys, the reciprocal function, squares and powers.
☐ I can +, –, x and ÷ fractions.
☐ I can convert a simple fraction to a decimal by dividing.
☐ I can order fractions using a common denominator.
☐ I understand that ‘percent’ means ‘parts per hundred’ and use this to make comparisons.
☐ I can use ratio notation, including reduction to its simplest form and solve word problems.
☐ I can +, –, x and ÷ decimals without the use of a calculator.

Algebra

☐ I can multiply a single term over a bracket and take out single term common factors.
☐ I can solve simple linear equations in which the unknown appears on both sides of the equation or with brackets.
☐ I can use index notation for simple integer powers.
☐ Using a calculator, I could substitute positive and negative numbers into expressions such as \(4x - 2\), \(3x^2 + 4\) and \(2x^4\).
☐ I can plot graphs of linear functions e.g. \(y = 3x - 2\) and \(2x + 3y = 18\).
☐ I can both draw and interpret graphs relating to real life problems.

Shape and Space

☐ I can use parallel lines, alternate and corresponding angles.
☐ I can calculate and use the sums of the interior and exterior angles of polygons.
☐ I understand simple proofs involving triangles and quadrilaterals.
☐ I know the meaning of the terms circle, centre, radius, chord, diameter, circumference, tangent, arc, sector and segment.
☐ I can find circumferences and areas of circles and can recall the formulae.
☐ I can construct triangles and other 2D shapes using a ruler and protractor, given information about their sides and angles.
☐ I can construct triangles with given sides using compasses and a ruler.
☐ I can construct cubes, regular tetrahedra, square based pyramids and other 3D shapes.
☐ I can recall and use the formula for the area of a parallelogram and a triangle.
☐ I can use the formula for the area of a trapezium.
☐ I can find perimeters and areas of simple shapes using areas of triangles and rectangles.
☐ I can find the surface area of simple shapes using areas of triangles and rectangles.
☐ I can calculate volumes of shapes made from cubes and cuboids.
☐ I can enlarge shapes by using positive (including fractional) scale factors.
☐ I can identify the centre and the scale factor of an enlargement.
☐ I can transform triangles and other 2D shapes by translation (using vectors), rotation or reflection.
☐ I understand congruence in the context of transformations.
☐ I can visualise reflections of 3D shapes.

Handling Data

☐ I can identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is one.
☐ I can draw and interpret scatter graphs including using lines of best fit.
☐ I have a basic understanding of correlation.
☐ I can use and interpret diagrams for continuous data, including frequency polygons
☐ I can identify the modal class of a distribution.
☐ I can compare distributions and make inferences, using the shapes of the distributions and measures of average and range.