

Edexcel GCSE Maths HIGHER Topic List

TOPIC	Knowledge, skills and understanding	GRADES
NUMBER		
Ordinality N1	<input type="checkbox"/> Order integers, fractions, decimals and percentages. e.g. $\frac{4}{5}$, $\frac{3}{4}$, 0.72, -0.9	3
Symbols N1	<input type="checkbox"/> Use $<$, $>$, \leq , \geq , $=$, \neq	3
Combinations N5	<input type="checkbox"/> Use the product rule for counting	7
Factors, multiples and primes N4	<input type="checkbox"/> Be able to identify factors, multiples and primes from a list of numbers <input type="checkbox"/> Express a number as a product of prime factors (factor tree); give answer in index form <input type="checkbox"/> Find common multiples or common factors of two numbers <input type="checkbox"/> Find the highest common factor (HCF) or the lowest common multiple (LCM) of two numbers.	0 - 4
Squares, square roots, cubes and cube roots N6	<input type="checkbox"/> Be able to estimate powers and roots of any given integer	6
Index notation N6	<input type="checkbox"/> Understand indices in calculations	4
Index laws N7	<input type="checkbox"/> Multiply and divide by adding or subtracting indices <input type="checkbox"/> Calculate using index laws when indices are fractions or negative, both with and without a calculator <input type="checkbox"/> Understand that for any number n , $n^0 = 1$ <input type="checkbox"/> Understand that $n^{-1} = 1 / n$ <input type="checkbox"/> Understand that $n^{1/2} = \sqrt{n}$ <input type="checkbox"/> Understand that $n^{1/3} = \sqrt[3]{n}$	4 - 7

Standard form N9	<input type="checkbox"/> Understand and use standard form on a calculator <input type="checkbox"/> Convert between large and small numbers in standard form <input type="checkbox"/> Add and subtract in standard form <input type="checkbox"/> Multiply and divide in standard form	4 - 5
Fractions N2 / N3	<input type="checkbox"/> Add and subtract fractions <input type="checkbox"/> Multiply and divide fractions	4 - 5
Decimals, including recurring decimals N10 / N12	<input type="checkbox"/> Understand that all recurring decimals are exact fractions, and that some exact fractions are recurring decimals <input type="checkbox"/> Convert between recurring decimals and fractions <input type="checkbox"/> Know how to convert from recurring decimal to fraction using a proof	7
Using fractions, decimals and percentages N2 / N12	<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%) <input type="checkbox"/> Find one number as a fraction of another number <input type="checkbox"/> Find one number as a percentage of another number <input type="checkbox"/> Multiply using percentages or decimals as operators	2-4
Ratio N11	<input type="checkbox"/> Solve ratio problems using fractions	3
Number operations and the relationships between them, including order of operations and inverse operations N2 / N3 / N6	<input type="checkbox"/> Understand multiplying and dividing, and that one is the inverse of the other <input type="checkbox"/> Use inverse operations <input type="checkbox"/> Understand the use of brackets in calculations <input type="checkbox"/> Understand the hierarchy of operations (BIDMAS) <input type="checkbox"/> Solve word problems <input type="checkbox"/> Understand and find reciprocals <input type="checkbox"/> Understand and use 1 over a number is the inverse of multiplying by that number <input type="checkbox"/> Know the effect on an inequality of multiplying both sides by the same negative number	4

Use surds and π in exact calculations N8	<input type="checkbox"/> Use surds (roots) and π in calculations without a calculator, leaving the surd or π in the answer, eg. give an answer of 25π <input type="checkbox"/> Give an answer to a Pythagoras question as $\sqrt{17}$ <input type="checkbox"/> Manipulate surds in calculations, eg. $(3 - \sqrt{3})^2$ <input type="checkbox"/> Rationalise a denominator, ie. manipulate so that there is no longer a surd on the bottom of the fraction	7 - 8
Rounding and approximation N 14/15	<input type="checkbox"/> Round to the nearest integer (whole number) <input type="checkbox"/> Round numbers to any given power of 10 <input type="checkbox"/> Round to a number of decimal places <input type="checkbox"/> Round to a number of significant figures <input type="checkbox"/> Estimate the answer to a calculation by using rounding <input type="checkbox"/> Use inequality notation to specify error intervals	5
Upper and lower bounds N16	<p>Find the upper and lower bound of a calculation, especially in the calculation of:</p> <input type="checkbox"/> measurements <input type="checkbox"/> perimeter <input type="checkbox"/> area <input type="checkbox"/> volume <input type="checkbox"/> Give a final answer to a calculation to an appropriate degree of accuracy using upper and lower bounds	8
Use a calculator effectively N9	<input type="checkbox"/> Use the following functions <input type="checkbox"/> +, -, \times , \div <input type="checkbox"/> x^2 and \sqrt{x} <input type="checkbox"/> x^3 and $\sqrt[3]{x}$ <input type="checkbox"/> memory functions <input type="checkbox"/> brackets <input type="checkbox"/> Understand that rounding too early can causes inaccuracy <input type="checkbox"/> Know how to enter numbers in standard form	3
Compound Measures N13	<input type="checkbox"/> Use standard units of mass, length, time, money and other measures (including standard compound measures) <input type="checkbox"/> Understand and use compound measures: density; pressure; speed <input type="checkbox"/> Be able to convert between measures, and currencies	4

ALGEBRA		
Algebraic terminology and proofs A3/A6	<input type="checkbox"/> Understand notation and symbols used in algebra <input type="checkbox"/> Understand the difference between expression, formulae, equation, inequality, terms and factors <input type="checkbox"/> Recognise the difference between an equation and an identity, and show algebraic expressions are equivalent. <input type="checkbox"/> Use algebra to construct proofs and arguments	4 - 5
Simplify and manipulate algebraic expressions A4/A5	<input type="checkbox"/> Simplify algebraic products and quotients. <input type="checkbox"/> Simplify algebraic products and quotients using the laws of indices. <input type="checkbox"/> Expand products of two binomials. <input type="checkbox"/> Expand products of more than two binomials. <input type="checkbox"/> Factorise quadratic expressions of the form . <input type="checkbox"/> Factorise quadratic expressions of the form (where $a \neq 0$ or 1) <input type="checkbox"/> Complete the square on a quadratic expression. <input type="checkbox"/> Rearrange formulae to change the subject, where the subject appears once only. <input type="checkbox"/> Rearrange formulae to change the subject, including cases where the subject appears twice, or where a power or reciprocal of the subject appears. <input type="checkbox"/> Simplify and manipulate algebraic fractions.	4 - 7
Functions A7	<input type="checkbox"/> Interpret, where appropriate, simple expressions as functions with inputs and outputs. <input type="checkbox"/> Interpret the reverse process as the 'inverse function'. <input type="checkbox"/> Interpret the succession of two functions as a 'composite function'.	5 - 8
Using formulae A2	<input type="checkbox"/> Derive formulae <input type="checkbox"/> Substitute numbers (positive or negative) into a formula, including formulae with x^2 or x^3 terms <input type="checkbox"/> Change the subject of a simple formula	4 - 5

Solve linear equations A17	<input type="checkbox"/> Set up simple equations for a problem <input type="checkbox"/> Rearrange simple equations <input type="checkbox"/> Solve simple equations <input type="checkbox"/> Solve equations with the unknown on either side <input type="checkbox"/> Solve equations with the unknown on both sides <input type="checkbox"/> Solve equations that include brackets <input type="checkbox"/> Solve equations with negatives, including negative answers <input type="checkbox"/> Solve equations involving fractions	4 - 6
Quadratic equations A18	<input type="checkbox"/> Solve quadratic equations with coefficient of x^2 equal to 1 by factorising. <input type="checkbox"/> Know the quadratic formula. <input type="checkbox"/> Rearrange and solve quadratic equations by factorising, completing the square or using the quadratic formula. <input type="checkbox"/> Find approximate solutions using a graph	5 - 8
Simultaneous equations A19/21	<input type="checkbox"/> Set up and solve two linear simultaneous equations in two variables algebraically. <input type="checkbox"/> Set up and solve two simultaneous equations (one linear and one quadratic) in two variables algebraically. <input type="checkbox"/> Use graphs to find the approximate solution of two linear simultaneous equations. <input type="checkbox"/> Know that the coordinates of the points of intersection of a curve and a straight line are the solutions to the simultaneous equations for the line and curve.	5 - 8
Solve inequalities A22	<input type="checkbox"/> Use inequality signs correctly ($<$, $>$, \leq , \geq) <input type="checkbox"/> Solve a simple linear inequality with one variable <input type="checkbox"/> Show the solution to a linear inequality on a number line <input type="checkbox"/> Solve quadratic inequalities in one variable. <input type="checkbox"/> Express solutions in set notation. <input type="checkbox"/> Solve (several) linear inequalities in two variables, representing the solution set on a graph.	4 - 7
Iteration A20	<input type="checkbox"/> Find approximate solutions to equations using systematic sign-change methods (for example, decimal search or interval bisection) when there is no simple analytical method of solving them.	4 - 8

Edexcel Maths	Topic list	Higher
Nth term of a sequence A23/A25	<input type="checkbox"/> Generate a sequence by spotting a pattern or using a term-to-term rule given algebraically or in words. <input type="checkbox"/> Find a position-to-term rule for simple arithmetic sequences, algebraically or in words. <input type="checkbox"/> Generate a sequence from a formula for the nth term. <input type="checkbox"/> Find a formula for the nth term of an arithmetic sequence. <input type="checkbox"/> Use subscript notation for position-to-term and term-to-term rules. <input type="checkbox"/> Find a formula for the nth term of a quadratic sequence.	4 - 8
Special sequences A24	<input type="checkbox"/> Recognise sequences of triangular, square and cube numbers, and simple arithmetic progressions. <input type="checkbox"/> Recognise Fibonacci and quadratic sequences, and simple geometric progressions (r^n where n is an integer and r is a rational number > 0). <input type="checkbox"/> Generate and find nth terms of other sequences.	5 - 6
Coordinates A8	<input type="checkbox"/> Understand and plot points in four quadrants <input type="checkbox"/> Find the coordinates of the mid-point of a line <input type="checkbox"/> Calculate the length of a line using coordinates	4
Graphs of equations and functions A9	<input type="checkbox"/> Use a table of values to plot graphs of linear and quadratic functions. <input type="checkbox"/> Use a table of values to plot other polynomial graphs and reciprocals. <input type="checkbox"/> Use a table of values to plot exponential graphs	4 - 7
Graphs from quadratic and other functions A11/12	<input type="checkbox"/> Recognise and sketch the graphs of simple linear and quadratic functions. <input type="checkbox"/> Recognise and sketch graphs of: $y=x^3$, $y=1/x$ <input type="checkbox"/> Identify intercepts and, using symmetry, the turning point of graphs of quadratic functions. <input type="checkbox"/> Sketch graphs of quadratic functions, identifying the turning point by completing the square. <input type="checkbox"/> Recognise and sketch graphs of exponential functions in the form $y = k^x$ for positive k . <input type="checkbox"/> Recognise and sketch the graphs of $y=\sin x$, $y=\cos x$ and $y=\tan x$ <input type="checkbox"/> Recognise and use the equation of a circle with centre at the origin.	4 - 8

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Straight line Graphs A9/A10/A16	<input type="checkbox"/> Find and interpret the gradient and intercept of straight lines, graphically and using $y=mx + c$. <input type="checkbox"/> Use the form $y=mx + c$ to find and sketch equations of straight lines. <input type="checkbox"/> Find the equation of a line through two given points, or through one point with a given gradient. <input type="checkbox"/> Identify the solution sets of linear inequalities in two variables, using the convention of dashed and solid lines. <input type="checkbox"/> Identify and find equations of parallel lines. <input type="checkbox"/> Identify and find equations of perpendicular lines. <input type="checkbox"/> Calculate the equation of a tangent to a circle at a given point.	4 - 8
Translations and reflections A13	<input type="checkbox"/> Identify and sketch translations and reflections of a given graph (or the graph of a given equation).	8
Graphs of real world contexts A14	<input type="checkbox"/> Construct and interpret graphs in real-world contexts. e.g. distance-time, money conversion, temperature conversion <input type="checkbox"/> Recognise and interpret graphs that illustrate direct and inverse proportion.	5 - 6
Gradients and Area A15	<input type="checkbox"/> Understand the relationship between gradient and ratio <input type="checkbox"/> Interpret straight line gradients as rates of change. e.g. Gradient of a distance-time graph as a velocity. <input type="checkbox"/> Calculate or estimate gradients of graphs, and interpret in contexts such as distance-time graphs, velocity-time graphs and financial graphs. <input type="checkbox"/> Apply the concepts of average and instantaneous rate of change (gradients of chords or tangents) in numerical, algebraic and graphical contexts. <input type="checkbox"/> Calculate or estimate areas under graphs, and interpret in contexts such as distance-time graphs, velocity-time graphs and financial graphs.	8

RATIO, PROPORTION & RATES OF CHANGE		
Use Measures R1	<input type="checkbox"/> Solve ratio and proportion problems for standard and compound units	4
Scale diagrams R2	<input type="checkbox"/> Use scale factors, scale diagrams and maps	4
Equivalent Ratios R3/R4	<input type="checkbox"/> Find the ratio of quantities and simplify <input type="checkbox"/> Find the ratio of quantities in the form 1:n	4
Division in a given ratio R5	<input type="checkbox"/> Split a quantity into two or more parts <input type="checkbox"/> Express the division of a quantity into two parts as a ratio <input type="checkbox"/> Calculate one quantity from another given the ratio of the two quantities	4
Solve ratio and proportion problems R7/R8/R10	<input type="checkbox"/> Solve simple ratio and proportion problems <input type="checkbox"/> Understand the relationship between ratio and linear functions <input type="checkbox"/> Identify direct proportion from a graph <input type="checkbox"/> Recognise that if $y = kx$, where k is a constant, then y is proportional to x . <input type="checkbox"/> Currency conversion	4 - 5
Solve ratio and percentage problems R9	<input type="checkbox"/> Use the unitary method for an inverse operation <input type="checkbox"/> Solve reverse percentage problems <input type="checkbox"/> Use a multiplier to increase or decrease by a percentage	4 - 5
Inverse proportion R13	<input type="checkbox"/> Solve simple word problems involving quantities in inverse proportion or simple algebraic proportions. e.g. speed–time contexts <input type="checkbox"/> Solve more formal problems involving quantities in inverse proportion (i.e. where $y \propto \frac{1}{x}$). <input type="checkbox"/> Recognise that if $y = \frac{k}{x}$, where k is a constant, then y is inversely proportional to x .	5 - 7

Edexcel Maths	Topic list	Higher
Understand the relationship between gradient and ratio. R14 / R15	<input type="checkbox"/> Interpret straight line gradients as rates of change. <input type="checkbox"/> Calculate or estimate gradients of graphs, and interpret in contexts such as distance-time graphs, velocity-time graphs and financial graphs <input type="checkbox"/> Apply the concepts of average and instantaneous rate of change (gradients of chords or tangents) in numerical, algebraic and graphical contexts.	4 - 8
Growth and Decay R16	<input type="checkbox"/> Calculate simple interest including in financial contexts. <input type="checkbox"/> Solve problems step-by-step involving multipliers over a given interval <input type="checkbox"/> Express exponential growth or decay as a formula.	4 - 5
Compound units R11	<input type="checkbox"/> Use and convert simple compound units (e.g. for speed, rates of pay, unit pricing). <input type="checkbox"/> Use and convert other compound units (e.g. density, pressure). <input type="checkbox"/> Use and convert compound units in algebraic contexts.	4
Similar shapes R12	<input type="checkbox"/> Compare lengths, areas and volumes using ratio notation and scale factors. <input type="checkbox"/> Apply similarity to calculate unknown lengths in similar figures. <input type="checkbox"/> Understand the relationship between lengths, areas and volumes of similar shapes.	4 - 8

GEOMETRY & MEASURES

2D and 3D shape Angles Polygons Polyhedra and other solids G1	<input type="checkbox"/> Use the terms points, lines, line segments, vertices, edges, planes, parallel lines, perpendicular lines. <input type="checkbox"/> Know the terms acute, obtuse, right and reflex angles. <input type="checkbox"/> Use the standard conventions for labelling and referring to the sides and angles of triangles. e.g. AB, $\angle ABC$, angle ABC, a is the side opposite angle A <input type="checkbox"/> Know the terms: regular polygon scalene, isosceles and equilateral triangle quadrilateral, square, rectangle, kite, rhombus, parallelogram, trapezium pentagon, hexagon, octagon. <input type="checkbox"/> Recognise the terms face, surface, edge, and vertex, cube, cuboid, prism, cylinder, pyramid, cone and sphere.	4
Diagrams G1	<input type="checkbox"/> Draw diagrams from written descriptions as required by questions.	4 - 7
Geometrical instruments Perpendicular bisector Angle bisector Perpendicular from a point to a line Loci G2	<input type="checkbox"/> Use a ruler to construct and measure straight lines. <input type="checkbox"/> Use a protractor to construct and measure angles. <input type="checkbox"/> Use compasses to construct circles. <input type="checkbox"/> Construct the perpendicular bisector and midpoint of a line segment. <input type="checkbox"/> Construct the bisector of an angle formed from two lines. <input type="checkbox"/> Construct the perpendicular from a point to a line. <input type="checkbox"/> Construct the perpendicular to a line at a point. <input type="checkbox"/> Know that the perpendicular distance from a point to a line is the shortest distance to the line. <input type="checkbox"/> Apply ruler and compass constructions to construct figures and identify the loci of points, to include real-world problems. <input type="checkbox"/> Understand the term 'equidistant'.	4 - 5

<p>Angles at a point Angles on a line Angles between intersecting and parallel lines Angles in polygons G3</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Know and use the sum of the angles at a point is 360°. <input type="checkbox"/> Know that the sum of the angles at a point on a line is 180°. <input type="checkbox"/> Apply these angle facts to find angles in rectilinear figures, and to justify results in simple proofs. e.g. The sum of the interior angles of a triangle is 180°. <input type="checkbox"/> Apply these angle properties in more formal proofs of geometrical results. <input type="checkbox"/> Know and use: Vertically opposite angles are equal, alternate angles on parallel lines are equal, corresponding angles on parallel lines are equal. <input type="checkbox"/> Derive and use the sum of the interior angles of a triangle is 180°. <input type="checkbox"/> Derive and use the sum of the exterior angles of a polygon is 360°. <input type="checkbox"/> Find the sum of the interior angles of a polygon. <input type="checkbox"/> Find the interior angle of a regular polygon. <input type="checkbox"/> Apply these angle facts to find angles in rectilinear figures, and to justify results in simple proofs. e.g. The sum of the interior angles of a triangle is 180°. <input type="checkbox"/> Apply these angle properties in more formal proofs of geometrical results. 	4
<p>Properties of a triangle Properties of quadrilaterals Symmetry G4</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Know the basic properties of isosceles, equilateral and right-angled triangles. <input type="checkbox"/> Give geometrical reasons to justify these properties. <input type="checkbox"/> Use these facts to find lengths and angles in rectilinear figures and in simple proofs. <input type="checkbox"/> Use these facts in more formal proofs of geometrical results, for example circle theorems. <input type="checkbox"/> Know the basic properties of the square, rectangle, parallelogram, trapezium, kite and rhombus. <input type="checkbox"/> Give geometrical reasons to justify these properties. <input type="checkbox"/> Use these facts to find lengths and angles in rectilinear figures and in simple proofs. <input type="checkbox"/> Use these facts in more formal proofs of geometrical results, for example circle theorems. <input type="checkbox"/> Identify reflection and rotation symmetries of triangles, quadrilaterals and other polygons. 	4 - 5

Circle nomenclature G9	<input type="checkbox"/> Understand and use the terms centre, radius, chord, diameter and circumference. <input type="checkbox"/> Understand and use the terms tangent, arc, sector and segment.	4 - 8
Circle Theorems G10	<input type="checkbox"/> Apply and prove: the angle subtended by an arc at the centre is twice the angle at the circumference. <input type="checkbox"/> Apply and prove: the angle on the circumference subtended by a diameter is a right angle. <input type="checkbox"/> Apply and prove: two angles in the same segment are equal. <input type="checkbox"/> Apply and prove: a radius or diameter bisects a chord if and only if it is perpendicular to the chord. <input type="checkbox"/> Apply and prove: for a point P on the circumference, the radius or diameter through P is perpendicular to the tangent at P. <input type="checkbox"/> Apply and prove: for a point P on the circumference, the angle between the tangent and a chord through P equals the angle subtended by the chord in the opposite segment. <input type="checkbox"/> Apply and prove: the opposite angles of a cyclic quadrilateral are supplementary.	6 - 8
3-dimensional solids G12	<input type="checkbox"/> Recognise and know the properties of the cube, cuboid, prism, cylinder, pyramid, cone and sphere.	4 - 5
Plans and elevations G13	<input type="checkbox"/> Interpret plans and elevations of simple 3D solids. <input type="checkbox"/> Construct plans and elevations of simple 3D solids, and representations (e.g. using isometric paper) of solids from plans and elevations.	4 - 5
Congruent triangles G5	<input type="checkbox"/> Identify congruent triangles. <input type="checkbox"/> Prove that two triangles are congruent using the cases: 3 sides (SSS) 2 angles, 1 side (ASA) 2 sides, included angle (SAS) Right angle, hypotenuse, side (RHS).	4
Applying congruent triangles G5	<input type="checkbox"/> Apply congruent triangles in calculations and simple proofs. e.g. The base angles of an isosceles triangle are equal.	4 - 6

Transformations Reflection Rotation Translation Combinations of transformations G7	<input type="checkbox"/> Reflect a simple shape in a given mirror line, and identify the mirror line from a shape and its image. <input type="checkbox"/> Identify a mirror line $x = a$, $y = b$ or $y = \pm x$ from a simple shape and its image under reflection. <input type="checkbox"/> Rotate a simple shape clockwise or anti-clockwise through a multiple of 90° about a given centre of rotation. <input type="checkbox"/> Identify the centre, angle and sense of a rotation from a simple shape and its image under rotation. <input type="checkbox"/> Use a column vector to describe a translation of a simple shape, and perform a specified translation. <input type="checkbox"/> Perform a sequence of isometric transformations (reflections, rotations or translations), on a simple shape. Describe the resulting transformation and the changes and invariance achieved.	4 - 7
Enlargement G7	<input type="checkbox"/> Enlarge a simple shape from a given centre using a whole number scale factor, and identify the scale factor of an enlargement. <input type="checkbox"/> Identify the centre and scale factor (including fractional scale factors) of an enlargement of a simple shape, and perform such an enlargement on a simple shape. <input type="checkbox"/> Perform and recognise enlargements with negative scale factors.	4 - 5
Similar triangles G7	<input type="checkbox"/> Identify similar triangles. <input type="checkbox"/> Prove that two triangles are similar.	4 - 5
Similar shapes G7/G19	<input type="checkbox"/> Compare lengths, areas and volumes using ratio notation and scale factors. <input type="checkbox"/> Apply similarity to calculate unknown lengths in similar figures. [see also Direct proportion,] <input type="checkbox"/> Understand the relationship between lengths, areas and volumes of similar shapes. [see also Direct proportion,]	5 - 8
Column vectors G24	<input type="checkbox"/> Represent a 2-dimensional vector as a column vector, and draw column vectors on a square or coordinate grid.	5
Vector arithmetic G25	<input type="checkbox"/> Understand addition, subtraction and scalar multiplication of vectors. <input type="checkbox"/> Use vectors in geometric arguments and proofs.	7 - 8

MENSURATION		
Units of measurement G14	<input type="checkbox"/> Use and convert standard units of measurement for length, area, volume/capacity, mass, time and money. <input type="checkbox"/> Use and convert standard units in algebraic contexts.	4
Compound units G14	<input type="checkbox"/> Use and convert simple compound units (e.g. for speed, rates of pay, unit pricing). <input type="checkbox"/> Know and apply in simple cases: $\text{speed} = \text{distance} \div \text{time}$ <input type="checkbox"/> Use and convert other compound units (e.g. density, pressure). <input type="checkbox"/> Know and apply: $\text{density} = \text{mass} \div \text{volume}$ <input type="checkbox"/> Use and convert compound units in algebraic contexts.	4 - 5
Maps and scale drawings G15	<input type="checkbox"/> Use the scale of a map, and work with bearings. <input type="checkbox"/> Construct and interpret scale drawings.	4
Perimeter of rectilinear shapes Circumference of a circle Perimeter of composite shapes G17/G18	<input type="checkbox"/> Calculate the perimeter of rectilinear shapes. <input type="checkbox"/> Know and apply the formula to calculate the circumference of a circle. <input type="checkbox"/> Calculate the arc length of a sector of a circle given its angle and radius. <input type="checkbox"/> Apply perimeter formulae in calculations involving the perimeter of composite 2D shapes.	4 - 8

Area Area of a triangle Area of a parallelogram Area of a trapezium Area of a circle Area of composite shapes G16/G17/G18/G23	<input type="checkbox"/> Know and apply the formula: $\text{area} = \frac{1}{2} \text{base} \times \text{height}$ <input type="checkbox"/> Know and apply the formula: $\text{area} = \frac{1}{2} ab \sin C$ <input type="checkbox"/> Know and apply the formula: $\text{area} = \text{base} \times \text{height}$. [Includes area of a rectangle] <input type="checkbox"/> Calculate the area of a trapezium. <input type="checkbox"/> Know and apply the formula $\text{area} = \pi r^2$ to calculate the area of a circle. <input type="checkbox"/> Calculate the area of a sector of a circle given its angle and radius. <input type="checkbox"/> Apply area formulae in calculations involving the area of composite 2D shapes.	4 - 8
Polyhedra Cones and spheres Pyramids G17	<input type="checkbox"/> Calculate the surface area and volume of cuboids and other right prisms (including cylinders). <input type="checkbox"/> Calculate the surface area and volume of spheres, cones and simple composite solids (formulae will be given). <input type="checkbox"/> Calculate the surface area and volume of a pyramid $\frac{1}{3} \text{area of base} \times \text{height}$ will be given).	4 - 8
Pythagoras' theorem G20	<input type="checkbox"/> Know, derive and apply Pythagoras' theorem $a^2 + b^2 = c^2$ to find lengths in right-angled triangles in 2D figures. <input type="checkbox"/> Apply Pythagoras' theorem in more complex figures, including 3D figures.	5 - 8
Trigonometry in right-angled triangles G20	<input type="checkbox"/> Know and apply the trigonometric ratios, $\sin\theta$, $\cos\theta$ and $\tan\theta$ and apply them to find angles and lengths in right-angled triangles in 2D figures.[see also Similar shapes] <input type="checkbox"/> Apply the trigonometry of right-angled triangles in more complex figures, including 3D figures.	5 - 8

Exact trigonometric ratios G21	<input type="checkbox"/> Know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° . <input type="checkbox"/> Know the exact value of $\tan\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60° .	5
Sine rule G22	<input type="checkbox"/> Know and apply the sine rule, $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$, to find lengths and angles.	7
Cosine rule G22	<input type="checkbox"/> Know and apply the cosine rule, $a^2 = b^2 + c^2 - 2bc\cos A$, to find lengths and angles.	7

PROBABILITY		
Relative frequency P1/P3	<input type="checkbox"/> Record, describe and analyse the relative frequency of outcomes of repeated experiments using tables and frequency trees.	5
Relative frequency and probability P2	<input type="checkbox"/> Use relative frequency as an estimate of probability. <input type="checkbox"/> Understand that relative frequencies approach the theoretical probability as the number of trials increases.	5
Equally likely outcomes and probability P3	<input type="checkbox"/> Calculate probabilities, expressed as fractions or decimals, in simple experiments with equally likely outcomes, for example flipping coins, rolling dice, etc. <input type="checkbox"/> Apply ideas of randomness and fairness in simple experiments. <input type="checkbox"/> Calculate probabilities of simple combined events, for example rolling two dice and looking at the totals. <input type="checkbox"/> Use probabilities to calculate the number of expected outcomes in repeated experiments.	5
Sample spaces P4	<input type="checkbox"/> Use tables and grids to list the outcomes of single events and simple combinations of events, and to calculate theoretical probabilities. e.g. Flipping two coins, Finding the number of orders in which the letters E, F and G can be written <input type="checkbox"/> Use sample spaces for more complex combinations of events e.g. Recording the outcomes for the sum of two dice. Problems with two spinners. <input type="checkbox"/> Recognise when a sample space is the most appropriate form to use when solving a complex probability problem. <input type="checkbox"/> Use the most appropriate diagrams to solve unstructured questions where the route to the solution is less obvious.	4
Enumeration P6	<input type="checkbox"/> Use systematic listing strategies. <input type="checkbox"/> Use the product rule for counting numbers of outcomes of combined events.	4
Venn diagrams and sets P7	<input type="checkbox"/> Use a two-circle Venn diagram to enumerate sets, and use this to calculate related probabilities. <input type="checkbox"/> Use simple set notation to describe simple sets of	5

	<p>numbers or objects. e.g. $A = \{\text{even numbers}\}$ $B = \{\text{mathematics learners}\}$ $C = \{\text{isosceles triangles}\}$</p> <p><input type="checkbox"/> Construct a Venn diagram to classify outcomes and calculate probabilities.</p> <p><input type="checkbox"/> Use set notation to describe a set of numbers or objects. e.g. $D = \{x : 1 < x < 3\}$ $E = \{x : x \text{ is a factor of } 280\}$</p>	
Tree diagrams P7/P8	<p><input type="checkbox"/> Use tree diagrams to enumerate sets and to record the probabilities of successive events (tree frames may be given and in some cases will be partly completed).</p> <p><input type="checkbox"/> Construct tree diagrams, two-way tables or Venn diagrams to solve more complex probability problems (including conditional probabilities; structure for diagrams may not be given).</p>	5
The addition law of probability	<p><input type="checkbox"/> Use the addition law for mutually exclusive events.</p> <p><input type="checkbox"/> Use $p(A) + p(\text{not } A) = 1$</p> <p><input type="checkbox"/> Derive or informally understand and apply the formula</p> $p(A \text{ or } B) = p(A) + p(B) - p(A \text{ and } B)$	5
The multiplication law of probability and conditional probability P9	<p><input type="checkbox"/> Use tree diagrams and other representations to calculate the probability of independent and dependent combined events.</p> <p><input type="checkbox"/> Understand the concept of conditional probability, and calculate it from first principles in known contexts. e.g. In a random cut of a pack of 52 cards, calculate the probability of drawing a diamond, given a red card is drawn.</p> <p><input type="checkbox"/> Derive or informally understand and apply the formula</p> $p(A \text{ and } B) = p(A \text{ given } B)p(B).$ <p><input type="checkbox"/> Know that events A and B are independent if and only if</p> <p><input type="checkbox"/> $p(A \text{ given } B) = p(A).$</p>	7

STATISTICS		
Populations and samples S1/S5	<input type="checkbox"/> Define the population in a study, and understand the difference between population and sample. <input type="checkbox"/> Infer properties of populations or distributions from a sample. <input type="checkbox"/> Understand what is meant by simple random sampling, and bias in sampling.	4 - 7
Categorical and numerical data S2	<input type="checkbox"/> Interpret and construct charts appropriate to the data type; including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data. <input type="checkbox"/> Interpret multiple and composite bar charts. <input type="checkbox"/> Design tables to classify data. <input type="checkbox"/> Interpret and construct line graphs for time series data, and identify trends (e.g. seasonal variations).	4
Grouped data S3	<input type="checkbox"/> Interpret and construct diagrams for grouped data as appropriate, i.e. cumulative frequency graphs and histograms (with either equal or unequal class intervals).	4 - 8
Summary statistics S4	<input type="checkbox"/> Calculate the mean, mode, median and range for ungrouped data. <input type="checkbox"/> Find the modal class, and calculate estimates of the range, mean and median for grouped data, and understand why they are estimates. <input type="checkbox"/> Describe a population using statistics. <input type="checkbox"/> Make simple comparisons. <input type="checkbox"/> Compare data sets using 'like for like' summary values. <input type="checkbox"/> Understand the advantages and disadvantages of summary values. <input type="checkbox"/> Calculate estimates of mean, median, mode, range, quartiles and interquartile range from graphical representation of grouped data. <input type="checkbox"/> Draw and interpret box plots. <input type="checkbox"/> Use the median and interquartile range to compare distributions.	4 - 7

Misrepresenting data	<input type="checkbox"/> Recognise graphical misrepresentation through incorrect scales, labels, etc.	
Bivariate data S6	<input type="checkbox"/> Plot and interpret scatter diagrams for bivariate data. <input type="checkbox"/> Recognise correlation. <input type="checkbox"/> Interpret correlation within the context of the variables, and appreciate the distinction between correlation and causation. <input type="checkbox"/> Draw a line of best fit by eye, and use it to make predictions. <input type="checkbox"/> Interpolate and extrapolate from data, and be aware of the limitations of these techniques.	4 - 7
Outliers S6	<input type="checkbox"/> Identify an outlier in simple cases. <input type="checkbox"/> Appreciate there may be errors in data from values (outliers) that do not 'fit'. <input type="checkbox"/> Recognise outliers on a scatter graph.	4