



Term	Unit	Ref	Topic	GCSE Objective statement	Hegarty	
Autumn Year 10	1 Calculations 1 (Number)	1.1	Place value	Order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥. Apply the four operations +, −, ×, ÷, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals). Apply systematic listing strategies.	46	
		1.2	Rounding	Round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)	56, 130, 131, 132	
		1.3	Adding and subtracting	Apply the operations +, − including formal written methods, to integers, decimals – both positive and negative; understand and use place value (e.g. when calculating with decimals).	47	
		1.4	Multiplying and dividing	Apply the operations ×, ÷, including formal written methods, to integers, decimals – both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals). Use conventional notation for priority of operations, including brackets, powers, roots (BIDMAS)	143, 22	
	2 Expressions (Algebra)	2.1	Terms and expressions	Use and interpret algebraic notation, including: - $ab$ in place of $a \times b$ - $3y$ in place of $y + y + y$ and $3 \times y$ - $a^2$ in place of $a \times a$ , $a^3$ in place of $a \times a \times a$ , $a^2b$ in place of $a \times a \times b$ - $a/b$ in place of $a \div b$ - coefficients written as fractions rather than as decimals - brackets Substitute numerical values into formulae and expressions, Understand and use the concepts and vocabulary of expressions, equations, formulae, terms	780, 781	
		2.2	Simplifying expressions	Simplify and manipulate algebraic expressions by: - collecting like terms - simplifying expressions involving sums, products and powers,	156, 157	
		2.3	Indices	Simplify and manipulate algebraic expressions by: - simplifying expressions involving sums, products and powers, including the laws of indices.	102, 103, 104, 105, 106, 107,	
		2.4	Expanding and factorising 1	Understand and use the concepts and vocabulary of expressions, terms and factors. Simplify and manipulate algebraic expressions by: - multiplying a single term over a bracket - taking out common factors - simplifying expressions involving sums, products and powers,	160, 161 162,163, 164, 165, 166 168, 169,	
			3.1	Angles and lines	Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description. Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons). Measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings.	484, 485, 486, 487, 488, 489, 490, 491,



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	3 Angles and polygons  (Geometry)	3.2	Triangles and quadrilaterals	Derive and apply the properties and definitions of: special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language. Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs. Solve geometrical problems on coordinate axes.	822
		3.3	Congruence and similarity	Use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS).  Apply the concepts of congruence and similarity, including the relationships between lengths in similar figures.	680, 681, 682,
		3.4	Polygon angles	Deduce and use the angle sum in any polygon, and to derive properties of regular polygons including exterior and interior angles	560, 561, 562,
	4 Handling data 1  (Statistics)	4.1	Organising data	Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling. Interpret and construct tables, charts and diagrams, including frequency tables, bar charts, and pictograms for categorical data, and know their appropriate use. Apply statistics to describe a population.	426, 394, 425
		4.2	Representing data 1	Interpret and construct tables, charts and diagrams, including vertical line charts for ungrouped discrete numerical data, and know their appropriate use. Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: - appropriate graphical representation involving discrete data	401, 402
		4.3	Representing data 2	Interpret and construct tables, charts and diagrams, including frequency tables, pie charts and know their appropriate use. Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: - appropriate graphical representation involving discrete data	427, 428
		4.4	Averages and spread 1	Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: - appropriate graphical representation involving discrete data - appropriate measures of central tendency (median, mean, mode ) and spread (range, including consideration of outliers). Apply statistics to describe a population.	405, 406, 407, 408  409, 410, 411, 412,  413



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Spring Year 10	5 Fractions, decimals and percentages (Number)	5.1	Decimals and fractions	Order positive , decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥. Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 or 3/8 ).  Express one quantity as a fraction of another, where the fraction is less than 1	59, 73, 74, 75, 76,  46, 60
		5.2	Fractions and percentages	Recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); Interpret fractions and percentages as operators.	77, 84, 87
		5.3	Calculations with fractions	Apply the four operations +, −, ×, ÷, including formal written methods, to simple fractions (proper and improper), and mixed numbers Recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); and reciprocals.	63, 64  66, 67, 68, 69, 70, 71, 72
		5.4	Fractions, decimals and percentages	Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 or 3/8 ). Define percentage as 'number of parts per hundred'; interpret percentages as a fraction or a decimal, compare two quantities using percentages; work with percentages greater than 100%;	53, 54
	6 Formulae and functions (Algebra)	6.1	Substituting into formulae	Substitute numerical values into formulae and expressions, including scientific formulae. Understand and use standard mathematical formulae	780 to 782
		6.2	Using standard formulae	Understand and use standard mathematical formulae; rearrange formulae to change the subject. Where appropriate, interpret simple expressions as functions with inputs and outputs.	280
		6.3	Equations, identities and functions	Understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms Know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments.	154
		6.4	Expanding and factorising 2	Simplify and manipulate algebraic expression by: - collecting like terms - expanding products of two binomials - factorising quadratic expressions of the form $x^2 + bx + c$ , including the difference of two squares.	161 to 165  223
	7 Working in 2D (Geometry)	7.1	Measuring lengths and angles	Use scale diagrams and maps. Draw diagrams from written description. Use standard units of measure and related concepts (length). Measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings.	864 to 868  492 to 496
		7.2	Area of a 2D shape	Understand and use standard mathematical formulae; rearrange formulae to change the subject if necessary Use standard units of measure and related concepts (length, area). Know and apply formulae to calculate: area of triangles, parallelograms, trapezia;	555, 556, 557, 558, 559
		7.3	Transformations 1	Identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation Describe translations as 2D vectors.	637 to 649
		7.4	Transformations 2	Identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering enlargement (including fractional scale factors).	650 to 654



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Summer year 10	8 Probability (Probability)	8.1	Probability experiments	Record describe and analyse the frequency of outcomes of probability experiments using tables	368, 369 356,
		8.2	Expected outcomes	Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments. Understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size.	355
		8.3	Theoretical probability	Relate relative expected frequencies to theoretical probability, using appropriate language and the 0 - 1 probability scale. Understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size.	351, 352,
		8.4	Mutually exclusive events	Apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one.	353, 354
	9 Measures and accuracy (Number)	9.1	Estimation and approximation	Estimate answers; Round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)	112, 131,
		9.2	Calculator methods	Estimate answers; check calculations using approximation and estimation, including answers obtained using technology. Round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)	129
		9.3	Measures and accuracy	Use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate. Round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures) use inequality notation to specify simple error intervals due to truncation or rounding. ( Upper and lower bounds ) Apply and interpret limits of accuracy. Change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices) in numerical contexts. Use compound units such as speed, density Use standard units of measure and related concepts (length, area, volume/capacity, mass ,time, money, etc).	774 to 777
	10 Equations and inequalities (Algebra)	10.1	Solving linear equations 1	Solve linear equations in one unknown algebraically Translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution.	178 to 188
		10.2	Solving linear equations 2	Solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation); find approximate solutions using a graph.	
		10.3	Quadratic equations	Understand and use the concepts and vocabulary of equations, and factors. deduce roots algebraically. Solve quadratic equations algebraically by factorising; find approximate solutions using a graph.	230
		10.4	Simultaneous equations	Solve two simultaneous equations in two variables (linear/linear) algebraically; find approximate solutions using a graph. Translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution.	190 to 193
		10.5	Inequalities	Understand and use the concepts and vocabulary of inequalities Solve linear inequalities in one variable; represent the solution set on a number line.	265 to 270



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Autumn Year 11	11 Circles and constructions  (Geometry)	11.1	Circles 1	Understand and use standard mathematical formulae; Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment. Know the formulae: circumference of a circle = $2\pi r = \pi d$ , area of a circle = $\pi r^2$ ; calculate perimeters of 2D shapes, including circles; calculate areas of circles and composite shapes.	534 to 543
		11.2	Circles 2	Calculate arc lengths, angles and areas of sectors of circles.	544 to 547
		11.3	Constructions	Use the standard ruler and compass constructions: perpendicular bisector of a line segment, constructing a perpendicular to a given line from /at a given point, bisecting a given angle; use these to construct given figures ; know that the perpendicular distance from a point to a line is the shortest distance to the line. Measure line segments and angles in geometric figures,	659 to 669
		11.4	Loci	Use scale factors, scale diagrams and maps. Use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from /at a given point, bisecting a given angle); use these to construct given figures and solve loci problems; Measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings.	674 to 679
	12 Ratio and proportion  (Ratio and proportion)	12.1	Proportion	Express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1. Define percentage as 'number of parts per hundred'; interpret percentages and as a fraction or a decimal express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%	84 to 87 97, 98
		12.2	Ratio	Identify and work with fractions in ratio problems. Use scale factors, scale diagrams . Use ratio notation, including reduction to simplest form. Divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations). Express a multiplicative relationship between two quantities as a ratio or a fraction. Relate ratios to fractions Compare lengths, areas and volumes using ratio notation;	328 to 338
		12.3	Percentage change	interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics	96, 93
	13 Factors, powers and roots  (Number)	13.1	Factors and multiples	Use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, Apply systematic listing strategies.	27 to 32 33 to 36
		13.2	Prime factor decomposition	Use the concepts and vocabulary of prime factorisation, including using product notation and the unique factorisation theorem.	30, 31
		13.3	Powers and roots	Use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5.	99 to 101
	14 Graphs 1  (Algebra)	14.1	Drawing straight-line graphs	Work with coordinates in all four quadrants. Plot graphs of equations that correspond to straight-line graphs in the coordinate plane; find approximate solutions using a graph.	205, 206
		14.2	Equation of a straight line	use the form $y = mx + c$ to identify parallel lines; find the equation of the line through two given points, or through one point with a given gradient. Identify and interpret gradients and intercepts of linear functions graphically and algebraically. Interpret the gradient of a straight line graph as a rate of change;	201 to 204 207 to 209
		14.3	Kinematic graphs	Plot and interpret graphs and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration.	874 to 876



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	15 Working in 3D (Geometry)	15.1	3D shapes	Use conventional terms and notations: vertices, edges, planes, draw diagrams from written description. Identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres. Construct and interpret plans and elevations of 3D shapes.	829 - 844
		15.2	Volume of a prism	Understand and use standard mathematical formulae; rearrange formulae to change the subject(if required) Compare volumes using ratio notation; make links to scale factors. Use standard units of measure and related concepts (length, area, volume/capacity). Know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders).	570 - 575
		15.3	Volume and surface area	Understand and use standard mathematical formulae; rearrange formulae to change the subject. Know the formulae: circumference of a circle = $2\pi r = \pi d$ , area of a circle = $\pi r^2$ ; calculate perimeters of 2D shapes, including circles; areas of circles and composite shapes. Surface area and volume of spheres, pyramids, cones and composite solids.	576 - 583 584 - 591



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Spring Year 11	16 Handling data 2 (Statistics)	16.1	Frequency diagrams	Interpret, analyse the distributions of data sets from univariate empirical distributions through: - appropriate graphical representation involving grouped discrete and grouped continuous data ( equal group widths)	401, 425
		16.2	Averages and spread 2	Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: - appropriate measures of central tendency (median, mean, and modal class) and spread (range) using grouped data	414 to 418
		16.3	Scatter graphs and correlation	Use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing.	452 to 453
		16.4	Time series	Interpret and construct tables, charts and diagrams, including tables and line graphs for time series data and know their appropriate use.	450
	17 Calculations 2 (Number)	17.1	Calculating with roots and indices	Use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5. Calculate with roots, and with integer indices.	104, 108, 109
		17.2	Exact calculations	Calculate exactly with fractions; calculate exactly with multiples of $\pi$ .	542
		17.3	Standard form	Apply the four operations +, -, $\times$ , $\div$ , to calculations using standard form numbers. Convert numbers into and out of standard form. Calculate with and interpret standard form $A \times 10^n$ , where $1 \leq A < 10$ and $n$ is an integer.	121 to 128
	18 Graphs 2 (Algebra)	18.1	Properties of quadratic functions	Identify and interpret roots, intercepts and turning points of quadratic functions graphically; deduce roots algebraically. sketch and interpret graphs of quadratic functions, find approximate solutions using a graph.	251, 252
		18.2	Sketching functions	Recognise, sketch and interpret graphs of linear functions and quadratic functions, simple cubic functions and the reciprocal function $y = 1/x$ with $x \neq 0$ .	
		18.3	Real-life graphs	Plot and interpret graphs (including reciprocal graphs) and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration.	894 to 902
	19 Pythagoras and trigonometry (Geometry)	19.1	Pythagoras' theorem	Apply Pythagoras' Theorem to obtain simple proofs. Know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$ ; apply them to find lengths in right-angled triangles in two dimensional figures.	497 to 507
		19.2	Trigonometry 1	Compare lengths; make links to similarity (including trigonometric ratios) Apply the concepts of congruence and similarity, including the relationships between lengths in similar figures. Know the formulae for the trigonometric ratios, $\sin \theta = \text{opposite/hypotenuse}$ , $\cos \theta = \text{adjacent/hypotenuse}$ and $\tan \theta = \text{opposite/adjacent}$ ; apply them to find <b>lengths</b> in right-angled triangles in two dimensional figures. Know the exact values of $\sin \theta$ and $\cos \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and $90^\circ$ ; know the exact value of $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and $60^\circ$ .	508 to 515
		19.3	Trigonometry 2	Apply trigonometry to find <b>angles</b> and lengths in right-angled triangles in two dimensional figures.	
		19.4	Vectors	Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors.	650 623 to 629



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Summer Year 11	20 The probability of combined events (Probability)	20.1	Sets	Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams. Construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities.	370 to 380 358 to 359
		20.2	Possibility spaces	Apply systematic listing strategies.	
		20.3	Tree diagrams	Record, describe and analyse the frequency of outcomes of probability experiments using frequency trees. Enumerate sets and combinations of sets systematically, using tree diagrams. Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions.	368, 369
	21 Sequences	21.1	Linear sequences	Generate terms of a sequence from either a term-to-term or a position-to-term rule. Recognise and use simple arithmetic progressions, Deduce expressions to calculate the $n$ th term of linear sequences	196 to 198
		21.3	Special sequences	Recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions ( $r^n$ where $n$ is an integer, and $r$ is a rational number $> 0$ ).	263, 261,
	22 Units and proportionality (Ratio and proportion)	22.1	Compound units	Change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices) in numerical contexts. Use compound units such as speed, rates of pay, unit pricing density and pressure.	715 to 738
		22.2	Direct proportion	Change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices) in algebraic contexts. Express a multiplicative relationship between two quantities as a ratio or a fraction. Understand and use proportion as equality of ratios. Relate ratios to linear functions. Solve problems involving direct proportion, including graphical and algebraic representations. interpret equations that describe direct proportion. Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct proportion.	339 to 341
		22.3	Inverse proportion	Solve problems involving direct and inverse proportion, including graphical and algebraic representations. Understand that $X$ is inversely proportional to $Y$ is equivalent to $X$ is proportional to $1/Y$ ; interpret equations that describe direct and inverse proportion. recognise and interpret graphs that illustrate inverse proportion.	342
		22.4	Growth and decay	recognise and interpret graphs that illustrate direct and inverse proportion. Set up, solve and interpret the answers in growth and decay problems, including compound interest.	94, 95