

Key Stage 4 Maths						
Year 10 GCSE	Congruence, similarity and enlargement Trigonometry	Representing solutions of equations and inequalities Simultaneous equations	Angles & bearings Working with circles Vectors	Ratios & fractions Percentages and Interest Probability	Collecting, representing and interpreting data Noncalculator methods	Types of number and sequences Indices and Roots Manipulating expressions
Pupils should be able to do...	Congruence, similarity and enlargement: - Enlarge a shape by a positive integer scale factor - Enlarge a shape by a fractional scale factor - Enlarge a shape by a negative scale factor (H) - Identify similar shapes - Work out missing sides and angles in a pair given similar shapes	Representing solutions of equations and inequalities: - Understand the meaning of a solution - Form and solve one-step and two-step equations - Form and solve one-step and two-step inequalities - Show solutions to inequalities on a number line - Interpret representations on number lines as	Angles & bearings: - Use cardinal directions and related angles - Draw and interpret scale diagrams - Understand and represent bearings - Measure and read bearings - Make scale drawings using bearings - Calculate bearings using angles rules - Solve bearings	Ratios & fractions: - Compare quantities using a ratio - Link ratios and fractions - Share in a ratio (given total or one part) - Use ratios and fractions to make comparisons - Link ratios and graphs - Solve problems with currency conversion - Link ratios and scales	Collecting, representing and interpreting data: - Understand populations and samples - Construct a stratified sample (H) - Primary and secondary data - Construct and interpret frequency tables and frequency polygons - Construct and interpret two-way tables	Types of number and sequences: - Understand the difference between factors and multiples - Understand primes and express a number as a product of its prime factors - Find the HCF and LCM of a set of numbers - Describe and continue arithmetic and geometric sequences

	• Use parallel line rules to work out missing angles • Establish a pair of triangles are similar • Explore areas of similar shapes (H) • Explore volumes of similar shapes (H) • Solve mixed problems involving similar shapes (H) • Understand the difference between congruence and similarity • Understand and use conditions for congruent triangles • Prove a pair of triangles are congruent (H) Trigonometry: • Explore ratio in similar right-angled triangles	inequalities • Represent solutions to inequalities using set notation (H) • Draw straight line graphs • Find solutions to equations using straight line graphs • Represent solutions to single inequalities on a graph (H) • Represent solutions to multiple inequalities on a graph (H) • Form and solve equations with unknowns on both sides • Form and solve inequalities with unknowns on both sides (H) • Form and solve more complex equations and inequalities • Solve quadratic equations by factorisation* (*Also Foundation tier. Higher cover now,	problems using Pythagoras and trigonometry • Solve bearings problems using the sine and cosine rules (H) Working with circles: • Recognise and label parts of a circle • Calculate fractional parts of a circle • Calculate the length of an arc • Calculate the area of a sector • Circle theorem: Angles at the centre and circumference (H) • Circle theorem: Angles in a semicircle (H) • Circle theorem: Angles in the same segment (H) • Circle theorem: Angles in a cyclic	• Use and interpret ratios of the form $1 : n$ and $n : 1$ • Solve 'best buy' problems • Combine a set of ratios • Link ratio and algebra • Ratio in area problems (H) • Ratio in volume problems (H) • Mixed ratio problems Percentages and Interest: • Convert and compare fractions, decimals and percentages • Work out percentages of amounts (with and without a calculator) • Increase and decrease by a given percentage • Express one	• Construct and interpret line and bar charts (including composite bar charts) • Construct and interpret pie charts • Criticise charts and graphs • Construct histograms (H) • Interpret histograms (H) • Find and interpret averages from a list • Find and interpret averages from a table • Construct and interpret time series graphs • Construct and interpret stem-and-leaf diagrams • Construct and interpret cumulative frequency diagrams (H) • Use cumulative	• Explore other sequences • Describe and continue sequences involving surds (H) • Find the rule for the nth term of a linear sequence • Find the rule for the nth term of a quadratic sequence (H) Indices and Roots: • Square and Cube numbers • Calculate higher powers and roots • Powers of ten and standard form • The addition and subtraction rules for indices • Understand and use the power zero and negative indices • Work with powers of powers • Understand and
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	• Work fluently with the hypotenuse, opposite and adjacent sides • Use the tangent ratio to find missing side lengths • Use the sine and cosine ratio to find missing side lengths • Use sine, cosine and tangent to find missing side lengths • Use sine, cosine and tangent to find missing angles • Calculate sides in right-angled triangles using Pythagoras' Theorem • Select the appropriate method to solve right-angled triangle problems • Work with key angles in right-angled triangles	Core will cover in Year 11) • Solve quadratic inequalities in one variable (H) Simultaneous equations: • Understand that equations can have more than one solution • Determine whether a given (x, y) is a solution to a pair of linear simultaneous equations • Solve a pair of linear simultaneous equations by substituting a known variable • Solve a pair of linear simultaneous equations by substituting an expression • Solve a pair of linear simultaneous equations using graphs • Solve a pair of linear simultaneous	quadrilateral (H) • Understand and use the volume of a cylinder and cone • Understand and use the volume of a sphere • Understand and use the surface area of a sphere • Understand and use the surface area of a cylinder and cone • Solve area and volume problems involving similar shapes (H) Vectors: • Understand and represent vectors • Use and read vector notation • Draw and understand vectors multiplied by a scalar • Draw and understand addition of vectors	number as a percentage of another • Calculate simple and compound interest • Repeated percentage change • Find the original value after a percentage change • Solve problems involving growth and decay • Understand iterative processes (H) • Solve problems involving percentages, ratios and fractions Probability: • Know how to add, subtract and multiply fractions • Find probabilities using equally likely outcomes	frequency diagrams to find measures (H) • Construct and interpret box plots (H) • Compare distributions using charts and measures • Compare distributions using complex charts and measures • Construct and interpret scatter graphs • Draw and use a line of best fit • Understand extrapolation Noncalculator methods: • Mental/written methods of integer/decimal addition and subtraction • Mental/written methods of integer/decimal	use fractional indices (H) • Calculate with numbers in standard form Manipulating expressions: • Simplify algebraic expressions • Use identities • Add and subtract simple algebraic fractions (H) • Add and subtract complex algebraic fractions (H) • Multiply and divide simple algebraic fractions (H) • Multiply and divide complex algebraic fractions (H) • Form and solve equations and inequalities with fractions • Solve equations with algebraic fractions (H)
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		equations by subtracting equations • Solve a pair of linear simultaneous equations by adding equations • Use a given equation to derive related facts • Solve a pair of linear simultaneous equations by adjusting one equation • Solve a pair of linear simultaneous equations by adjusting both equations • Form a pair of linear simultaneous equations from given information • Form and solve pair of linear simultaneous equations from given information • Determine whether a given (x, y) is a solution to both a linear and quadratic equation	• Draw and understand addition and subtraction of vectors • Explore vector journeys in shapes (H) • Explore quadrilaterals using vectors (H) • Understand parallel vectors (H) • Explore collinear points using vectors (H) • Use vectors to construct geometric arguments and proofs (H)	• Use the property that probabilities sum to 1 • Using experimental data to estimate probabilities • Find probabilities from tables, Venn diagrams and frequency trees • Construct and interpret sample spaces for more than one event • Calculate probability with independent events • Use tree diagrams for independent events • Use tree diagrams for dependent events • Construct and interpret conditional probabilities (Tree diagrams) (H) • Construct and interpret	multiplication and division • The four rules of fraction arithmetic • Rational and irrational numbers (convert recurring decimals here) (H) • Understand and use surds (H) • Calculate with surds (H) • Rounding to decimal places and significant figures • Estimating answers to calculations • Understand and use limits of accuracy • Upper and lower bounds (H) • Use number sense • Solve financial maths problems • Break down and solve multi-step problems	• Represent numbers algebraically • Algebraic arguments and proof
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		(H) • Solve a pair of simultaneous equations (one linear, one quadratic) using graphs (H) • Solve a pair of simultaneous equations (one linear, one quadratic) algebraically (H) • Solve a pair of simultaneous equations involving a third unknown (H)		conditional probabilities (Venn diagrams and two-way tables) (H)		
Key Terminology	sine (sin), cosine (cos), tangent (tan), cotangent (cot), secant (sec), and cosecant (csc) integer, scale factor, congruent, similar, enlarge, volume, area	Equation, simultaneous, linear, quadratic, adjust, balance Solution, inequalities, unknown, solve, solution	Bearing, angles, trigonometry, interpret, diagram, scale Fractional, sector, circumference, diameter, radius, radii, tangent, chord, segment, circle theorem, Pi Vector, scalar, proofs	ratio, equal parts, for every, proportion, relationship, order, colon, divide, multiply, part, double number line, promotional, multiplier, placeholder, units,	continuous data log discrete distance–time graph distribution interrogate line graph population pyramid primary source sample scatter graph secondary source stem-and-leaf diagram two-way table	arithmetic sequence difference pattern flow chart general term gradient intercept linear function linear relationship linear sequence notation T(n) slope steepness cube, cube number cube root (e.g. $3\sqrt[3]{8}$) cubed (e.g. 23) prime factor decomposition to the power of n (e.g. 64)

				share, total, label, factors, equivalent, simplify, common factors, scale, compare, denominator, numerator, constant, pi (π) biased event experimental probability sample sample space theoretical probability theory		
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Year 11 GCSE	Gradients & lines Non-linear graphs Using graphs	Expanding & factorising Changing the subject Functions	Multiplicative reasoning Geometric reasoning Algebraic reasoning	Transforming& constructing: Listing & describing (Communication)	Revision	Exams
Pupils should be able to do...	Gradients & lines: Equations of lines parallel to the	Expanding & factorising: Expand and	Multiplicative reasoning: Use scale factors	Transforming& constructing: Perform and		

	axis - Plot straight line graphs - Interpret $y = mx + c$ - Find the equation of a straight line from a graph (1) - Find the equation of a straight line from a graph (2) - Equation of a straight-line graph given one point and gradient - Equation of a straight-line graph given two points - Determine whether a point is on a line - Solve linear simultaneous equations graphically (H) - Recognise when straight lines are perpendicular (H) - Find the equations of perpendicular lines (H)	factorise with a single bracket - Expand binomials - Factorise quadratic expressions - Factorise complex quadratic expressions (H) - Solve equations equal to 0 - Solve quadratic equations by factorisation - Solve complex quadratic expressions by factorisation (H) - Complete the square H (H) - Solve quadratic equations using the quadratic formula (H) Changing the subject: - Solve linear equations - Solve inequalities - Form and solve equations and inequalities in the context of shape - Change the	- Understand direct proportion - Construct complex direct proportion equations (H) - Calculate with pressure and density - Understand inverse proportion - Construct inverse proportion equations (H) - Ratio problems Geometric reasoning: - Angles at points - Angles in parallel lines and shapes - Exterior and interior angles of polygons - Proving geometric facts - Solve problems involving vectors - The first four circle theorems (H) - Angle between a radius and a chord (H)	describe line symmetry and reflection - Perform and describe rotation/rotational symmetry - Perform and describe translations of shapes - Perform and describe enlargements of shapes - Perform and describe negative enlargements of shapes (H) - Identify transformations of shapes - Perform and describe a series of transformations of shapes - Identify invariant points and lines (H) - Perform standard constructions using ruler and protractor or ruler		
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	Non-linear graphs: • Solve linear simultaneous equations graphically • Recognise when straight lines are perpendicular (H) • Find the equations of perpendicular lines (H) Using graphs: • Plot and read from quadratic graphs • Plot and read from cubic graphs • Plot and read from reciprocal graphs • Recognise graph shapes • Identify and interpret roots and intercepts of quadratics • Understand and	subject of a simple formula • Change the subject of a known formula • Change the subject of a complex formula • Change the subject where the subject appears more than once (H) • Solve equations by iteration (H) Functions: • Use function machines • Substitute into expressions and formulae • Use function notation • Work with composite functions • Work with inverse functions • Graphs of quadratic functions • Solve quadratic	• Angle between a radius and a tangent (H) • Two tangents from a point (H) • Alternate segment theorem (H) • Pythagoras' theorem and trigonometric ratios (H) Algebraic reasoning: • Simplify complex expressions • Find the rule for the nth term of a linear sequence • Find the rule for the nth term of a quadratic sequence • Use rules for sequences • Solve linear simultaneous equations • Solve simultaneous equations with one quadratic	and compasses • Solve loci problems • Understand and use trigonometric graphs (H) • Sketch and identify translations of the graph of a given function (H) • Sketch and identify reflections of the graph of a given function (H) Listing & describing (Communication): • Work with organised lists • Sample spaces and probability • Use the product rule for counting (H) • Complete and use Venn diagrams • Construct and interpret plans and elevations • Use data to		
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	use exponential graphs (H) - Find and use the equation of a circle centre (0, 0) (H) - Find the equation of the tangent to any curve H (H)	inequalities (H) Understand and use trigonometric functions	(H) - Formal algebraic proof (H) - Inequalities in two variables (H)	compare distributions Interpreting scatter diagrams		
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Key Terminology	Parallel, horizontal, vertical, straight line, equation, intercept, axis, linear, quadratic, y intercept, x intercept, scale, gradient, reciprocal, parabola, substitute, estimate, cubic, curve, cube, origin, tangent, equidistant	Expand, factorise, coefficient, HCF, binomial, factorise fully, expression, term, trial and improvement, product, roots, significant figure, surd, formula	Enlargement, scale factor, similar, multiplier, direct proportion, constant ratio, origin, linear, varies, proportionality, density, mass, volume, area, force, pressure, curve, inverse Angle, adjacent, point, corresponding, vertically opposite, co-interior, bearing, alternate, polygon, regular, irregular	Symmetry, reflection, diagonal, vertex, rotate, centre, order of rotational symmetry, clockwise, anticlockwise, congruent, scale factor, enlargement, ray, mapping, invariant Systematic, stem and leaf, median, mode, range, mean, exhaustive		
Functional Skills Level 1	L1.1 Read, write, order and compare	L1.11 Add, subtract, multiply and divide	L1.13 Read, write, order and compare	L1.21 Recognise and make use of simple	L1.25 Interpret plans, elevations and nets	Revision

	large numbers (up to one million) L1.2 Recognise and use positive and negative numbers L1.3 Multiply and divide whole numbers and decimals by 10, 100, 1000 L1.4 Use multiplication facts and make connections with division facts L1.5 Use simple formulae expressed in words for one or two-step operations L1.6 Calculate the squares of one-digit and two-digit numbers	decimals up to two decimal places L1.12 Approximate by rounding to a whole number or to one or two decimal places	percentages in whole numbers L1.14 Calculate percentages of quantities, including simple percentage increases and decreases by 5% and multiples thereof L1.15 Estimate answers to calculations using fractions and decimals L1.16 Recognise and calculate equivalences between common fractions, percentages and decimals L1.17 Work with simple ratio and direct proportions L1.18 Calculate simple interest in multiples of 5% on amounts of money	scales on maps and drawings L1.22 Calculate the area and perimeter of simple shapes including those that are made up of a combination of rectangles L1.23 Calculate the volumes of cubes and cuboids L1.24 Draw 2-D shapes and demonstrate an understanding of line symmetry and knowledge of the relative size of angles	of simple 3-D shapes L1.26 Use angles when describing position and direction, and measure angles in degrees L1.27 Represent discrete data in tables, diagrams and charts including pie charts, bar charts and line graphs L1.28 Group discrete data and represent grouped data graphically L1.29 Find the mean and range of a set of quantities L1.30 Understand probability on a scale from 0 (impossible) to 1 (certain) and use probabilities to compare the likelihood of events	
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					L1.31 Use equally likely outcomes to find the probabilities of simple events and express them as fractions	
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Functional Skills Level 2	1. Read, write, order and compare positive and negative numbers of any size 2. Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation 3. Evaluate expressions and make substitutions in given formulae in words and symbols 4. Identify and know	7. Order, add, subtract and compare amounts or quantities using proper and improper fractions and mixed numbers 8. Express one number as a fraction of another 9. Order, approximate and compare decimals 10. Add, subtract, multiply and divide decimals up to three decimal places 11. Understand and calculate using ratios, direct proportion and inverse proportion	13. Calculate amounts of money, compound interest, percentage increases, decreases and discounts including tax and simple budgeting 14. Convert between metric and imperial units of length, weight and capacity using a) a conversion factor and b) a conversion graph 15. Calculate using compound measures including speed, density and rates of pay angles and/or coordinates with 2-D	17. Use formulae to find volumes and surface areas of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders) 18. Calculate actual dimensions from scale drawings and create a scale diagram given actual measurements 19. Use coordinates in 2-D, positive and negative, to specify the positions of points 20. Understand and use common 2-D representations of 3-D	21. Draw 3-D shapes to include plans and elevations 22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes 23. Calculate the median and mode of a set of quantities 24. Estimate the mean of a grouped frequency distribution from discrete data	25. Use the mean, median, mode and range to compare two sets of data 26. Work out the probability of combined events including the use of diagrams and tables, including two-way tables 27. Express probabilities as fractions, decimals and percentages
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	the equivalence between fractions, decimals and percentages 5. Work out percentages of amounts and express one amount as a percentage of another 6. Calculate percentage change (any size increase and decrease), and original value after percentage change	12. Follow the order of precedence of operators, including indices	and 3-D shapes 16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non rectangular shapes (formulae given except for triangles and circles)	objects 21. Draw 3-D shapes to include plans and elevations 22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes		
Entry Level 2	Using numbers and the number system – whole numbers, fractions and decimals Count reliably up to 100 items Read, write, order and compare numbers up to 200 Recognise and	Using numbers and the number system – whole numbers, fractions and decimals Know the number of hours in a day and weeks in a year; be able to name and sequence Divide two-digit whole numbers by single-digit whole numbers and	Using common measures, shape and space Calculate money with pence up to one pound and in whole pounds of multiple items and write with the correct symbols (£ or p)	Using common measures, shape and space Read and compare positive temperatures Read and use simple scales to the nearest labelled division Recognise and name 2-D and 3-D shapes,	Handling information and data Extract information from lists, tables, diagrams and bar charts Make numerical comparisons from bar charts Sort and classify	Revision and Exam Technique Revise all subjects covered. Complete past papers Exam techniques taught.

	sequence odd and even numbers up to 100 Recognise and interpret the symbols +, −, ×, ÷ and = appropriately Add and subtract two-digit numbers Multiply whole numbers in the range 0×0 to 12×12 (times tables)	express remainders Approximate by rounding to the nearest 10, and use this rounded answer to check results Recognise simple fractions (halves, quarters and tenths) of whole numbers and shapes Read, write and use decimals to one decimal place	Read and record time in common date formats, and read time displayed on analogue clocks in hours, half hours and quarter hours, and understand hours from a 24-hour digital clock Use metric measures of length, including millimetres, centimetres, metres and kilometres Use measures of weight, including grams and kilograms Use measures of capacity, including millilitres and litres	including pentagons, hexagons, cylinders, cuboids, pyramids and spheres Describe the properties of common 2-D and 3-D shapes, including numbers of sides, corners, edges, faces, angles and base Use appropriate positional vocabulary to describe position and direction, including between, inside, outside, middle, below, on top, forwards and backwards	objects using two criteria Take information from one format and represent the information in another format, including use of bar charts	
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