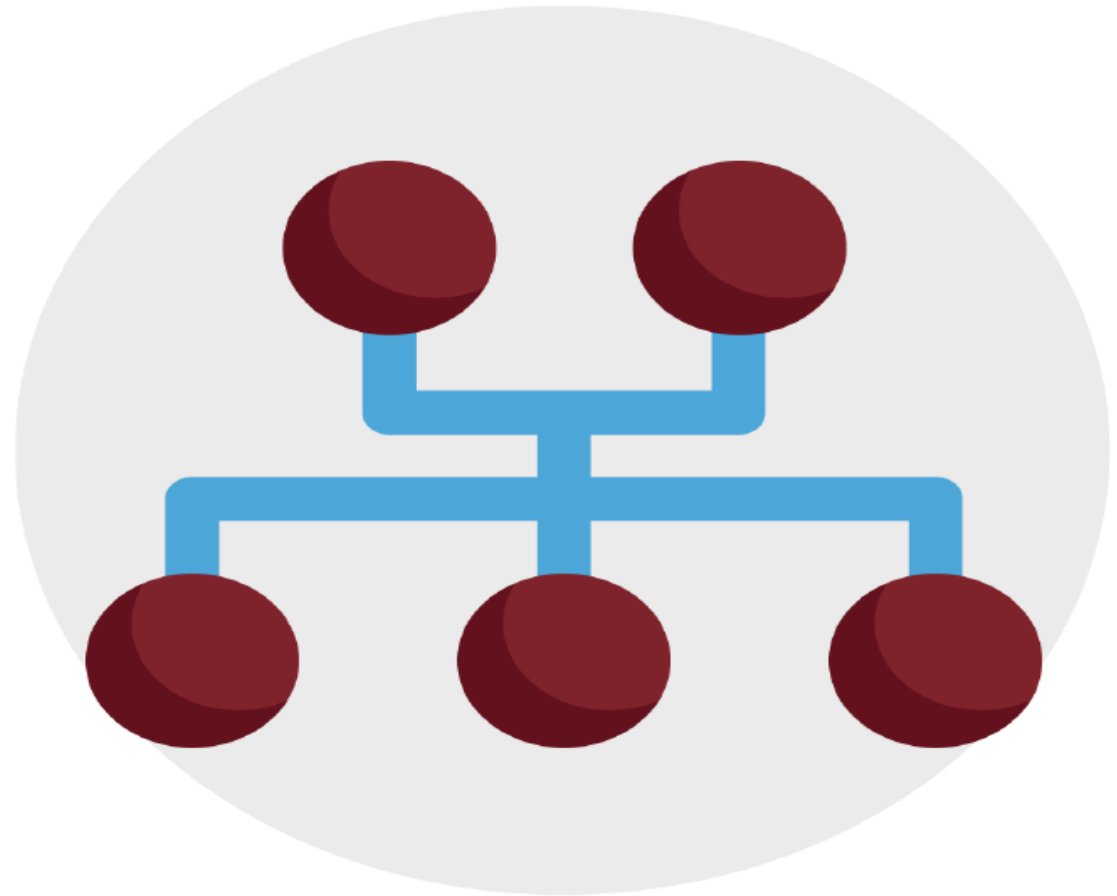


Mathematics

Curriculum Mapping

2021



Concept

1. Number

2. Algebra

3. Statistics and probability

4. Geometry

5. Ratio and proportion

Explanation of concept

Addition and subtraction. Multiplication and division. Four operations with decimals, fractions and surds. Place value and ordering. Equivalence of fractions, decimals and percentages. Ratios and fractions. Fractions and percentages of amounts. Using percentages. Directed number. Factors, multiples, primes, squares, square roots. Indices, standard form. Mathematics and money. Problem solving.

Algebraic notation, brackets, equations and inequalities. Expanding and Factorising. Simultaneous equations. Equality and equivalence. Forming and solving equations. Working with formulas. Testing conjectures, proof. Indices. Sequences. Straight line graphs. Changing the subject. Functions.

Collecting, representing and interpreting data. The data handling cycle. Sets and venn diagrams. Probability

Lines and angles. Transformations, symmetry. Area and volume. Circles. 2d and 3d shapes. Similarity and congruence. Constructions. Pythagoras' theorem, trigonometry. Vectors. Loci

Ratio, scale. Enlargement and similarity. Multiplicative change. Proportion. Rates. Gradients and rates of change. Ratios and fractions. Compound measures: speed, distance, time, density, pressure

Sep 21 - Jul 22	Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Year 7						
Learning	Sequences Understanding and use algebraic notation Equality and Equivalence	Place Value and Ordering integers and Decimals Fraction, Decimal and Percentage Equivalence	Solving Problems with Addition and Subtractions Solving Problems with Multiplication and Division Fractions & Percentage of Amounts	Four Operations with Directed Number Addition and Subtraction of Fractions	Construction, measuring and using Geometric Notation Developing Geometric Reasoning	Develop Number Sense Sets and Probability Prime Number and Proof
Concepts	ALGEBRA	NUMBER	NUMBER GEOMETRY PROBABILITY AND STATISTICS	NUMBER	GEOMETRY	NUMBER ALGEBRA PROBABILITY AND STATISTICS

What is needed to master the Knowledge	Describe and Continue sequences in diagram and number form, both linear and non-linear Use and interpret algebraic notation. Understand and use inverse operations. Form and substitute into expressions Collect like terms. Form and solve one-step equations. Understand equivalence of algebraic expressions.	Understand and use place value. Compare and order numbers. Round to powers of 10 and 15F Interchange between fractions and decimals below 1. Explore fractions above 1	Solve problems in the context of perimeter, money and frequency trees and tables Evaluate areas of triangles, triangles and parallelograms . Order of operations Work out simple fractions and percentages of amounts, with/without a calculator	Order directed numbers, both in contextualised and abstract situations Add and subtract fractions and decimals	Construct triangles given SSS, SAS, ASA Draw and interpret pie charts Calculate and use angles and a point, on a straight line and vertically opposite angles. Calculate missing angles in 2D shapes	PRime Number and Proof Draw and interpret Venn Diagrams Understand and use the language of probability Express a number as a product of prime factors Powers and roots
Common Misconceptions	Students often show lack of understanding for what 'n' represent A sequence such as 1,4,7,10 is often described as $n + 3$ rather than $3n - 2$ Students often forget $ab = ba = a \times b$ and $b + a = a + b$ Students can forget to apply the same operation to both sides of the equation therefore leaving it unbalanced Students often struggle knowing when to add or subtract the equations to eliminate the unknown. Review addition with negatives to address this	Aligning the correct value digits for column addition and subtraction can prove troublesome. Encourage use of the place value table. A shape that is split in two is not necessarily split in half. A half must be two equal proportions of a shape. A fraction with a larger denominator has the greater value. A fraction with a smaller denominator has a lesser value.	When subtracting, students may find knowing when to 'borrow' confusing and instead incorrectly subtracting the smaller digit from the larger one. E.g., $43 - 25 = 22$ When calculating the area of a triangle or parallelogram students tend to use the slanted height rather than the correct perpendicular height. Students often consider percentages to limited to 100%. A key learning point is to understand how percentages can exceed 100%. Students sometimes confuse 70% with a magnitude of 70 rather than 0.7.	Students often incorrectly consider negative numbers with a larger magnitude than positives to have a greater value. For example, $-3 < 2$ Common incorrect answers to $-4 + 6$ are -2 ($4 - 6$) and -10 ($-4 - 6$) When adding and subtracting fractions, students think they can simply add and subtract fractions regardless of the denominator	Students often have difficulty constructing smooth arcs using a pair of compasses. Encourage them to try different techniques such as rotating the paper rather than the compasses. It is important to leave in construction lines as these form the working out. When measuring angles using a 180° degree protractor students often confuse the upper and lower scale. Understanding basic angle properties such as acute and reflex angles helps with this.	Ratios amounts are often confused with fractions involving the same digits. For instance $2 : 3$ is confused with $2/3$ or $1 : 2 = 1/2$. When writing ratios into the form $1 : n$ students incorrectly assume that n has to be an integer or greater than 1. Writing probabilities as a ratio is a common misconception. When creating Venn diagrams students often forget to place the remaining events outside the circles. Students often define a prime number as 'divides by 1 and itself'. This leads to the incorrect assumption of 1 to be prime number.

Sep 21 - Jul 22	Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Year 8						
Learning	<p>Ratio and scale</p> <p>Multiplicative change</p> <p>Multiplying and dividing fractions</p>	<p>Working in the Cartesian Plane</p> <p>Representing data</p> <p>Probability</p>	<p>Brackets, Equations & Inequalities</p> <p>Sequences</p> <p>Indices</p>	<p>Fractions and Percentages</p> <p>Standard Index Form</p> <p>Number Sense</p>	<p>Angles in parallel lines and polygons</p> <p>Area of Trapezia & Circles</p> <p>Line Symmetry & Reflection</p>	<p>The Data Handling Cycle</p> <p>Measures of location</p>
Concepts	<p>Ratio and Proportion</p> <p>Number</p>	<p>Algebra</p> <p>proportion</p> <p>Statistics and Probability</p>	<p>Algebra</p> <p>Number</p>	<p>Number</p> <p>Geometry</p>	<p>Number</p> <p>Geometry</p>	<p>Statistics and probability</p> <p>Geometry</p>
What is needed to master the Knowledge	<p>Understand ratio and its link to multiplication</p> <p>Solve ratio problems</p> <p>Use the form 1:n</p> <p>Link gradient and ratio</p> <p>Use scale factors, linking to ratio, to solve simple direct proportion problems</p> <p>Convert between currencies, including using graphs</p> <p>Multiply and divide fractions by integers</p> <p>Multiply and divide fractions by a fraction</p> <p>Multiply and divide fractions by mixed numbers</p>	<p>Understand and use the equations of a straight line, including lines parallel to the axes</p> <p>Make links between direct proportion and straight lines of the form $y=kx$</p> <p>Construct and interpret frequency tables, grouped and ungrouped, and two way tables</p> <p>Understand grouped and ungrouped, discrete and continuous data</p> <p>Construct sample spaces for more than one event</p> <p>Use sample space, tables and venn diagrams to find probabilities</p>	<p>Expand and factorise into single brackets</p> <p>Form and solve equations and inequalities with and without brackets</p> <p>Substitute into expressions</p> <p>Generate sequences using more complex rules, e.g. with brackets and squared terms, both in words and algebraically</p> <p>Find the rule for the nth term of a linear sequence</p> <p>Form expressions using indices</p> <p>Understand and use the addition and subtraction rules</p> <p>Explore powers of powers</p>	<p>Develop understanding of fractions, decimals and percentages</p> <p>Evaluate percentage increase and decrease</p> <p>Use multipliers to solve percentages problems</p> <p>Convert between numbers in ordinary and standard form</p> <p>Compare numbers given in standard form</p> <p>Calculate with numbers given in standard form, with and without calculators</p> <p>Develop mental strategies</p> <p>Convert between metric measures and units</p> <p>Estimation including rounding to a given number of decimal places</p> <p>Use the order of operation</p> <p>Convert area and volume measures</p>	<p>Work out angles in special quadrilaterals</p> <p>Find and use sum of interior and exterior angles of a polygons</p> <p>Prove simple geometric facts</p> <p>Calculate the area of a trapezium</p> <p>Calculate the area of a circle, and the area of parts of a circle</p> <p>Use significant figures</p> <p>Calculate the area of compound shapes</p> <p>Recognise line symmetry in polygons and other shapes</p> <p>Reflect shapes in horizontal, vertical and diagonal lines</p>	<p>Understand and use primary and secondary sources of data</p> <p>Construct and interpret pie charts</p> <p>Compare distributions using charts</p> <p>Finding the total given the mean</p> <p>Identify outliers</p> <p>Finding the mean from a grouped or ungrouped frequency table</p> <p>Choose the appropriate average</p>

Common Misconceptions

Ratios amounts are often confused with fractions involving the same digits.

For instance 2 : 3 is confused with $\frac{2}{3}$ or $1 : 2 = \frac{1}{2}$.

When writing ratios into the form 1 : n students incorrectly assume that n has to be an integer or greater than 1.

Students sometimes fail to recognise that imperial and metric units are two distinct sets of measurements.

Remembering the metric/imperial conversions often prove difficult for most students.

Dividing fractions is equivalent to multiplying fractions

A linear function does not have to pass through the origin.

The gradient can be calculated from any two points along the graph. Not necessarily from the origin.

Students often have difficulty designing two-way tables.

Students often try to represent continuous data using methods that are only applicable for discrete sets.

Writing probabilities as a ratio is a common misconception.

When creating Venn diagrams students often forget to place the remaining events outside the circles.

Students can forget to apply the same operation to both sides of the equation therefore leaving it unbalanced.

Equations need to be aligned so that unknowns can be easily added or subtracted. If equations are not aligned students may add or subtract with non like variables.

Students often show lack of understanding for what 'n' represent

A sequence such as 1,4,7,10 is often described as $n + 3$ rather than $3n - 2$

One is not a prime number since it only has one factor.

x^2 is often incorrectly taken as $2x$.

A shape that is split in two is not necessarily split in half. A half must be two equal proportions of a shape.

A fraction with a larger denominator has the greater value.

A fraction with a smaller denominator has a lesser value.

Students often have difficulty when dealing with negative powers. For instance, they assume, 1.2×10^{-2} to have a value of -120.

Aligning the correct value digits for column addition and subtraction can prove troublesome. Encourage use of the place value table.

Students often forget the definition of properties associated to angles in parallel lines.

Exterior angles in a polygon have to travel in the same direction for the sum to be 360° .

When calculating the area of a triangle or parallelogram students tend to use the slanted height rather than the correct perpendicular height.

Students often confuse the term translation for transformation.

Students often have more difficulty describing single transformations rather than performing them. Writing vectors in their simplest form by collecting like terms is often a problem in examinations.

Bar charts are often drawn with unequal width bars.

The frequency is often incorrectly taken as the angle when drawing pie charts.

Diagrams are often drawn without the correct labels and missing title.

Students tend to confuse the median, mode and mean averages.

Students often find it difficult to calculate the median average from data presented in a frequency table.

September 2021- July 2022	Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Year 9						
Learning	Straight Line Graphs Forming and Solving Equations Testing Conjectures	Three-dimensional Shapes Constructions and Congruency	Numbers Using Percentages Maths and Money	Deduction Rotation and Translation Pythagoras' Theorem	Enlargement and Similarity Solving Ratio and Proportion Problems Rates	Probability Algebraic Representation Revision
Concepts	ALGEBRA	GEOMETRY	NUMBER	GEOMETRY	RATIO AND PROPORTION	STATISTICS AND PROBABILITY ALGEBRA
What is needed to master the knowledge	<p>Equations of lines parallel to the axis and $y = x$ and $y = -x$ Four operations with directed numbers, substitution into formulas. Compare gradients Compare intercepts Understand and use $y = mx + c$ Write an equation in the form $y = mx + c$ Find the equation of a straight line from a graph Interpret gradient and intercept of real life graphs</p> <p>Inequalities with negative numbers Solve equations with unknowns on both sides Solve inequalities with unknowns on both sides Equations and inequalities in other mathematical contexts Formulae and equations Rearrange formulae (one-step) Rearrange formulae (two-step) Rearrange complex formulae</p> <p>Factors, multiples and primes True or false Always, sometimes, never Show that Conjectures about number Expand a pair of binomials Conjectures with algebra</p>	<p>Know names of 2-D and 3-D shapes Recognise prisms Accurate nets of cuboids and 3-D shapes Sketch and recognise nets of cuboids and other 3-D shapes Plans and elevations Area of plane shapes including circles. Surface area of cubes and cuboids Surface area of triangular prisms Surface area of a cylinder Volume of cubes and cuboids Volume of other 3-D shapes Explore volumes of cones, pyramids and spheres</p> <p>Draw and measure angles Construct and interpret scale drawings Understand the concept of a locus Locus of distance from a point Locus of distance from a straight line / shape Locus equidistant from two points Construct a perpendicular from a point Construct a perpendicular to a point Locus of distance from two lines Construct an angle bisector Construct triangles from given information Identify congruent figures Explore congruent triangles</p>	<p>Integers, real and rational numbers Understand and use surds Four operations with integers, fractions and decimals Solve problems with integers Solve problems with decimals Solve problems with fractions</p> <p>Solve 'reverse' percentage problems Recognise and solve percentage problems (non-calculator) Recognise and solve percentage problems (calculator) Solve problems with repeated percentage change</p> <p>Solve problems with bills and bank statements Calculate simple interest Calculate compound interest Solve problems with VAT Calculate wages and taxes Solve problems with exchange rates Solve unit pricing problems</p>	<p>Angles in parallel lines Solve angle problems (using chains of reasoning) Angle problems with algebra Conjectures with angles Conjectures with shapes Link constructions and geometrical reasoning</p> <p>Identify the order of rotational symmetry of a shape Compare and contrast rotational symmetry with lines of symmetry Rotate a shape about a point on a shape Rotate a shape about a point not on a shape Translate points and shapes by a given vector Compare rotation and reflection of shapes Find the result of a series of transformations</p> <p>Identify the hypotenuse of a right-angled triangle Determine whether a triangle is right-angled Calculate the hypotenuse of a right-angled triangle Calculate missing sides in right-angled triangles Use Pythagoras' theorem on coordinate grids</p>	<p>Recognise enlargement and similarity Enlarge a shape by a positive integer scale factor Enlarge a shape by a positive integer scale factor from a point Enlarge a shape by a positive fractional scale factor Enlarge a shape by a negative scale factor Work out missing sides and angles in a pair of given similar shapes Solve problems with similar triangles Explore ratios in right-angled triangles</p> <p>Solve problems with direct proportion Direct proportion and conversion graphs Solve problems with inverse proportion Graphs of inverse relationships Solve ratio problems given the whole or a part Solve 'best buy' problems Solve problems ratio and algebra</p> <p>Solve speed, distance and time problems without a calculator Solve speed, distance and time problems with a calculator Use distance / time graphs</p>	<p>Single event probability Relative frequency Expected outcomes Independent events Use tree diagrams Use tree diagrams to solve 'without replacement' problems Use diagrams to work out probabilities</p> <p>Draw and interpret quadratic graphs Interpret graphs, including reciprocal and piece-wise Investigate graphs of simultaneous equations Represent inequalities</p>
Common Misconceptions	<p>Not all 45 degree lines have a gradient of 1. Students need to look at the scale on both axis. The gradient isn't always the number immediately after the =</p> <p>Changing an inequality sign to an equals sign when you shouldn't. Divide or multiply both sides of an inequality by a negative number. Misunderstanding of cross multiplying</p> <p>1 is not a prime number. Conjectures are not always true or false</p>	<p>If you have 3 lengths of a triangle you have to use them all to find the area. Misunderstanding of perpendicular height. Confusing formulas of area of a triangle and a parallelogram. Difference between "square centimetres" and "centimetres squared". "cubic centimetres" and "centimetres cubed"</p> <p>Difference between equidistant of two points and two lines.</p> <p>Reflections and rotations of a shape are all congruent.</p>	<p>Recurring decimals are irrational</p> <p>2% is the same 0.2 A percentage can't be greater than 100.</p> <p>Mixing up compound interest and simple interest</p>	<p>All diagonals meet at right angles</p> <p>All rotations have a centre of the origin. Not fully describing a transformation</p> <p>Not understanding the geometrical basis of Pythagoras' Theorem. Not understanding the difference between finding the hypotenuse and an other side</p> <p>Can be used on all triangles</p>	<p>All enlargements get bigger</p> <p>2:3 is equal to 2/3</p> <p>To use addition or subtraction</p>	<p>A probability that is greater than 1. Knowing when to add or multiply probabilities</p> <p>Drawing quadratic graphs with straight lines</p>

September 2021- July 2022	Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Year 10						
Learning	CONGRUENCE AND SIMILARITY COORDINATES AND LINEAR GRAPHS FORMING AND SOLVING EQUATIONS	REPRESENTING SOLUTIONS AREA AND 3D SHAPES	ANGLES AND BEARINGS WORKING WITH CIRCLES VECTORS PERCENTAGES	RATIOS AND FRACTIONS FURTHER PERCENTAGES PROBABILITY	COLLECTING AND REPRESENTING DATA	NON-CALCULATOR METHODS TYPES OF NUMBER AND SEQUENCES INDICES AND ROOTS
Concepts	GEOMETRY ALGEBRA	ALGEBRA GEOMETRY	GEOMETRY NUMBER	NUMBER PROBABILITY AND STATISTICS	PROBABILITY AND STATISTICS	NUMBER ALGEBRA NUMBER
What is needed to master the knowledge	<p>Use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)</p> <p>Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides including the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs</p> <p>Apply and use the concepts of congruence and similarity, including the relationships between lengths in similar figures</p> <p>Compare lengths, areas and volumes using ratio notation</p> <p>Make links to similarity and scale factors</p> <p>Work with co-ordinates in all four quadrants</p> <p>Plot graphs of equations that correspond to straight line graphs in the co-ordinate plane and use the form $y = mx + c$ to identify parallel lines and perpendicular lines</p> <p>Find the equation of the line through two given points, or through one point with a given gradient</p> <p>Identify and interpret gradients and intercepts of linear functions graphically and algebraically</p> <p>Find approximate solutions to linear equations using a graph</p> <p>Solve one and two-step equations and inequalities, with brackets, negative numbers and where the unknowns appear on both sides.</p> <p>Understand the difference between a formula and an equation.</p> <p>Be able to substitute into formulae and rearrange formulae.</p>	<p>Revision of equations and inequalities from last half term.</p> <p>Show solutions to inequalities on a number line</p> <p>Find solutions to equations using straight line graphs</p> <p>Represent solutions to single inequalities on a graph (H)</p> <p>Form and solve inequalities with unknowns on both sides</p> <p>Form and solve more complex equations and inequalities</p> <p>Sketch and interpret linear, quadratic, cubic and reciprocal graphs.</p> <p>(Include using the symmetry of functions)</p> <p>By identifying lines of symmetry in each function students will have a greater understanding of the typical shapes for each function.</p> <p>Use standard units of measure and related concepts (length, area, volume / capacity, mass, time, money etc)</p> <p>Identify properties of the faces, surfaces, edges and vertices of: cube, cuboids, prisms, cylinders, pyramids, cones and spheres</p> <p>Calculate the perimeter of a 2D shape and composite shapes</p> <p>Construct and interpret plans and elevations of 3D shapes</p> <p>Know and apply formulae to calculate area of:</p> <ul style="list-style-type: none"> triangles parallelograms Trapezia 	<p>What an angle is. Understand the meaning of the following: transversal, interior, exterior, interior alternate angles, exterior alternate angles, corresponding, complementary, supplementary</p> <p>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)</p> <p>Identify and apply circle definitions and properties, including centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>Calculate arc lengths, angles and areas of sectors of circles</p> <p>Calculate the volume of spheres, pyramids, cones and composite solids (extension from Half term 2)</p> <p>Understand and represent vectors</p> <p>Use and read vector notation</p> <p>Understand vectors multiplied by a scalar</p> <p>Addition and subtraction of vectors</p> <p>Vector journeys (H)</p> <p>How to convert between fractions, decimals and percentages.</p> <p>Concept of what a fraction and a percentage are. Be able to use bar models to solve ratio and proportion problems.</p> <p>Be able to find a percentage of a quantity. Be able to find a multiplier.</p> <p>Find a percentage change and find repeated percentage changes.</p> <p>Understand reverse percentages.</p> <p>Find compound and simple interest.</p>	<p>Understand division. What a fraction is and how to find a fraction of a quantity.</p> <p>Find one quantity as a fraction of another.</p> <p>Simplify fractions.</p> <p>Convert between ratios and fractions.</p> <p>Link ratios and graphs.</p> <p>Solve problems with currency conversion.</p> <p>Link ratios and scales.</p> <p>Use and interpret ratios of the form 1 : n and n : 1.</p> <p>Solve best buy problems.</p> <p>Combine a set of ratios and use ratio in area problems and ratio in volume problems.</p> <p>Work out percentages of amounts (with and without a calculator), increase and decrease by a given percentage, Express one number as a percentage of another.</p> <p>Revisit simple and compound interest, link to repeated percentage change, and solve problems involving growth and decay.</p> <p>Solve problems involving percentages, ratios and fractions.</p> <p>Know how to add, subtract and multiply fractions.</p> <p>The probability scale. Probabilities can be represented as fractions, decimals and percentages. $P(\text{not happening}) = 1 - P(\text{happening})$</p> <p>Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one</p> <p>Construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities</p>	<p>Interpret and construct tables, charts and diagrams including, for categorical data: frequency tables, bar charts, pie charts, pictograms, vertical line charts for ungrouped discrete numerical data. Also tables and line graphs for time series data and know their appropriate use.</p> <p>Interpret, analyse and compare distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data, including boxplots (know and understand the terms primary data, secondary data, discrete data and continuous data)</p> <p>Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees (probabilities should be written as fractions, decimals or percentages)</p> <p>Pie charts "how many degrees is one thing". Understand the difference between discrete and continuous data. Understand why we can only estimate the mean from a grouped frequency table.</p> <p>Interpret, analyse and compare distributions of data sets from univariate empirical distributions through box plots</p> <p>Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through consideration of outliers.</p> <p>Apply statistics to describe a population</p> <p>Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling.</p>	<p>Understand difference between factor and multiple. Mastery of rounding to decimal places and more importantly significant figures.</p> <p>Concept of "limits of accuracy" understand use of \leq and $<$</p> <p>Know conversions for standard units of measure</p> <p>What a linear sequence is. Difference between quadratic, geometric, Fibonacci. Directed numbers. Substitution. Understand what "term to term" "position to term" and nth term.</p> <p>Understand what the gradient of a straight line graph represents in practical situations</p> <p>Use positive integer powers and associated real roots (square, cube and higher)</p> <p>Recognise powers of 2, 3, 4, 5</p> <p>Calculate with roots and with integer indices</p>
Common Misconceptions	<p>When measuring angles using a 180° degree protractor students often confuse the upper and lower scale.</p> <p>Understanding basic angle properties such as acute and reflex angles helps with this.</p> <p>Students often forget the definition of properties associated to angles in parallel lines.</p> <p>Exterior angles in a polygon have to travel in the same direction for the sum to be 360°.</p> <p>Students often confuse linear graphs to have the same notation as statistical graphs.</p> <p>The gradient can be calculated from any two points along the graph. Not necessarily from the origin.</p> <p>A linear function does not have to pass through the origin.</p> <p>It is beneficial to create a table of results when plotting a linear function. The coordinate pairs arise from the x and y values.</p>	<p>That $y=x^2$ is a straight line</p> <p>Students often have difficulty substituting in negative values to complex equations. Encourage the use of mental arithmetic.</p> <p>Students often confuse area and perimeter.</p> <p>Students can forget to include correct units when stating an area or perimeter.</p> <p>When calculating the area of a triangle or parallelogram students tend to use the slanted height rather than the correct perpendicular height.</p> <p>Students often get confused which elevation to draw and how to include hidden detail.</p> <p>Some students find it very difficult to draw 3D shapes on isometric paper.</p> <p>Students often forget to include units when calculating volumes and areas.</p> <p>It is important to differentiate between those which are prisms and those which are not. Encourage students to identify the cross-section whenever possible.</p>	<p>Difference between co-interior and alternate and corresponding angles. Angles on a straight line add up to 180.</p> <p>Difference between a line and a line segment.</p> <p>Differences: Not understanding the interior angles and exterior angles. Bearings: Not understanding you measure from the North line and go clockwise.</p> <p>constructions: Not understanding the concept of a locus. Not relating perpendicular bisector and locus and angle bisector and locus.</p> <p>When measuring angles using a 180° degree protractor students often confuse the upper and lower scale.</p> <p>Understanding basic angle properties such as acute and reflex angles helps with this.</p> <p>Students often forget the definition of properties associated to angles in parallel lines.</p> <p>Exterior angles in a polygon have to travel in the same direction for the sum to be 360°.</p> <p>You can't have a percentage greater than 100 (or a fraction greater than 1).</p> <p>1:3 means 1/3.</p> <p>2% increase the multiplier is 1.2.</p>	<p>Not understanding why when dividing in the ratio 2:3 you have to divide by 5. 1:3 is the same as 1/3. Understand visual representations - bar modelling.</p> <p>That a probability must be $0 \leq p \leq 1$. When to add and when to multiply probabilities. Mutually exclusive events. Graphs: not starting at zero, different sized gaps between consecutive numbers.</p> <p>Writing probabilities as a ratio is a common misconception. When creating Venn diagrams students often forget to place the remaining events outside the circles.</p> <p>When listing permutations of combined events students often repeat events when they do not use a logical and systematic method.</p>	<p>That a probability must be $0 \leq p \leq 1$. When to add and when to multiply probabilities. Mutually exclusive events. Graphs: not starting at zero, different sized gaps between consecutive numbers.</p> <p>Students often use nonlinear scales for bar and line graphs. The frequency is often incorrectly taken as the angle when drawing pie charts.</p> <p>Diagrams are often drawn without the correct labels and missing titles.</p> <p>Students often have difficulty designing two-way tables. When designing questionnaires common errors include:</p> <ul style="list-style-type: none"> No time period Overlapping responses Lack of 'none' or 'other' option. Check boxes with unequal widths. Double negative questions. <p>Students often try to represent continuous data using methods that are only applicable for discrete sets.</p>	<p>Difference between factor and multiple.</p> <p>If a sequence goes up in 6's the nth term is $n + 6$. Applying the method for finding the nth term of a linear sequence to nth term of a quadratic.</p> <p>Use of inappropriate rote methods such as "two minuses make a plus". Thinking that x^2 squared and x can be simplified.</p> <p>1 is not a prime number since it only has one factor.</p> <p>x^2 is often incorrectly taken as $2x$.</p>

September 2021- July 2022	Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Year 11 foundation						
Learning	algebra 1 fractions, decimals and percentages	ANGLES 4 OPERATIONS ROUNDING	ALGEBRA 2 RATIOS	MENSURATION INDEX RULES SEQUENCES REPRESENTING DATA PROBABILITY ALGEBRA 3	AVERAGES STANDARD FORM SYMMETRY 4 OPERATIONS STANDARD FORM	
Concepts	NUMBER ALGEBRA	GEOMETRY NUMBER	ALGEBRA RATIO AND PROPORTION	ALGEBRA STATISTICS AND PROBABILITY GEOMETRY	NUMBER ALGEBRA GEOMETRY STATISTICS AND PROBABILITY	NUMBER ALGEBRA STATISTICS AND PROBABILITY GEOMETRY RATIO AND PROPORTION
What is needed to master the knowledge	<p>Understand what like terms are. Be able to simplify expressions, expand and simplify single brackets(s). To be able to substitute positive and negative numbers into algebraic expressions. Solve linear equations. Represent inequalities on a number line. Solve linear inequalities.</p> <p>Be able to change between Fractions, decimals and percentages. Calculate percentages using both calculator and non calculator methods.</p>	<p>Understand basic angle facts and properties of shapes including polygons (interior and exterior angles). Understand and use angles on parallel lines.</p> <p>Understand and use the 4 rules with integers and fractions. To be able to round numbers to a given number of decimal places or significant figures. perform the 4 operations with directed number.</p>	<p>EVISE To be able to substitute positive and negative numbers into expressions and hence create a table of values. Find gradients and y intercepts from equations. Recognise parallel lines from their equations JUST $Y=MX+C$. Plot linear, quadratic, cubic and reciprocal graphs JUST X^2, X^3 AND $1/X$. Interpret real life graphs, inc distance time.</p> <p>Simplify ratios including to the forms $n:1$ and $1:n$. Convert between fractions and ratios. Divide in a given ratio. Use compound unit of density.</p>	<p>To find midpoint and gradient of a line. Understand concepts of area and perimeter. Find area of plane shapes and compound shapes. Find area and perimeter of a circle, semi circle and quadrant. Understand what volume is and how to find volume of cylinders and prisms. Know correct units for perimeter, area and volume.</p> <p>To know and apply the laws of indices (to both numerical and algebraic expressions) when the power is an integer. To use and find the n^{th} term of a linear sequence. To recognise arithmetic, geometric and quadratic sequences. To use the n^{th} term of linear and quadratic sequence.</p> <p>To be able to find the probability of a single event. List all possible outcomes including use of possibility spaces Find expected value and relative frequency. use and construct frequency trees and Venn diagrams..</p> <p>Understand column vector notation. Perform vector arithmetic.</p> <p>Be able to write a number as the product of its prime factors. Find the HCF.</p> <p>Forming and solving equations. Read solutions of equations from graphs and find turning points.</p>	<p>To be able to find averages and range including from tables, charts and graphs. Understand outliers.</p> <p>To be able to convert to and from standard form</p> <p>Name standard 2d and 3d shapes.</p> <p>Understand line and rotational symmetry.</p> <p>Perform the 4 operations with directed numbers.</p> <p>rounding to significant figures and standard form. Produce estimations to calculations</p> <p>Use BIDMAS.</p> <p>Understand inequality notation and represent on a number line.</p>	
Common Misconceptions	<p>Difference between $2x$ and x^2. Trying to add/subtract linear with quadratic expressions. Confusion with 4 operations with directed number. Not using BIDMAS when substituting inot formulas. Application of rote methods "you just subtract the two numbers". $3x=7 \therefore x=3/7$</p> <p>Not understanding why, for example, $3/5$ and $6/10$ are equivalent. Understanding why a percentage can be greater than 100. Thinking an increase of 7% is a multiplier of 1.7. Difference between finding a % of a quantity and one quantity as a % of another.</p>	<p>Difference between a line and a line segment. Not understanding angle notation. Difference between co interior and alternate and corresponding angles. Angles on a straight line add up to 180 degrees. Not understanding the difference between alternate interior and alternate exterior angles.</p> <p>Confusion with 4 operations with directed numbers.</p> <p>Thinking that $1/3 + 4/7$ is $5/10$. Not understanding what a fraction is or why adding and subtracting require a common denominator but multiplying and dividing don't.</p> <p>Understanding which is the first significant figure etc. Why you would you choose to use significant figures over decimal places. "two minuses make a plus" (they don't!).</p>	<p>Signs when finding a gradient. Not rearranging into the form $y=mx+c$ before finding gradient and y intercept. When plotting reciprocal graphs connecting the disparate curves.</p> <p>Use of rote methods when dividing in a given ratio and consequent inability to solve problems involving ratio.</p>	<p>Not understanding the difference between "square centimetres" and "centimetres square". Not understanding the derivation of the formula for area of a triangle and consequent confusion with finding area of a triangle and a parallelogram.</p> <p>Confusing the formulas for area and circumference. When finding the perimeter of a quadrant failing to add the radii.</p> <p>Thinking a number to the power zero is zero. 1 is a prime number.</p> <p>The n^{th} term of a sequence which has a common difference of 4 is $n+4$. Using the method for a linear sequence to find the n^{th} term of a quadratic sequence.</p> <p>Not understanding that a probability (p) must have $0 \leq p \leq 1$.</p> <p>107% is equivalent to 1.7.</p> <p>Writing vectors as fractions.</p>	<p>Not placing in order before finding the median. Thinking that "range" is a measure of average. Not understanding when it is appropriate to use mean, median or mode.</p> <p>understanding why numbers <1 will have a negative exponent. Thinking 23.6×10^5 is in standard form. Understanding which is the first significant figure etc. Why you would you choose to use significant figures over decimal places. "two minuses make a plus" (they don't!).</p> <p>Confusion between the signs.</p>	<p>Not understanding that Pythagoras' theorem relates to squares, consequently not squaring before adding or subtracting. Not realising that the initial line must have the Hypotenuse on it's ow</p>

September 2021- July 2022	Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Year 11 higher						
Learning	algebra 1	FRACTIONS, DECIMALS AND PERCENTAGES. INDICES AND SURDS	GRAPHS TRIGONOMETRY	MENSURATION ALGEBRA 4 PROBABILITY COMPOUND UNITS VECTORS ALGEBRA 5	VECTORS SIMILARITY	
Concepts	ALGEBRA1	NUMBER1 ALGEBRA2	ALGEBRA3 GEOMETRY1	NUMBER2 ALGEBRA4 STATISTICS AND PROBABILITY1 GEOMETRY2 RATIO AND PROPORTION1	NUMBER3 ALGEBRA5 STATISTICS AND PROBABILITY2 GEOMETRY3 RATIO AND PROPORTION2	
What is needed to master the knowledge	Solve linear equations. Concept of an inequality. Know the difference between a strict inequality and an included one and how to represent them. Solve quadratics by factorisation. Completing the square.	FDP equivalence. Calculating %. Reverse %. Repeated % change. Compound interest. Changing recurring decimals to fractions. Roots and indices. Understand basic surds and rationalising the denominator. Standard form.	Recognising parallel and perpendicular lines.(revise $y=mx+c$)Find the equation of a line given a point and the gradient or a point and a perpendicular line. Draw quadratic, cubic and reciprocal graphs. Use trigonometry to find sides and angles including in 3 d shapes. To use trigonometry to solve problems involving bearings	Find arc length and the area and perimeter of a sector. Volume and surface area of cones and associated shapes. To understand and use plans. Revise factorisation. Understand linear, quadratic and geometric sequences. Use n'th term to generate term(s) of a quadratic sequence. Find the n'th term of a quadratic sequence and triangular numbers.To be able to change the subject of a complex formula including where the subject appears more than once. To draw and use tree diagrams for independent events. Construct and interpret pie charts and Venn diagrams. Use relative frequency and expected value. Construct and interpret two way tables. Use compound units density and pressure. Column vectors and perform vector arithmetic. Find the radius of a circle given it's equation. Expand triple brackets. Exponential graphs To solve simultaneous equations (both linear and one linear one quadratic).	Volume scale factors. Sine and cosine rule. Find composite and inverse functions. Regions. Histograms. Congruency and proof. Vector geometry. Error intervals/bounds. Circle theorems.	
Common Misconceptions	Difference between solving equations and inequalities. Method for factorising and solving $ax^2 + bx + c = 0$ is the same as $x^2 + bx + c = 0$ (i.e. multiply to get a and add to get c) Not understanding that in completed square form $(x+a)^2 - b$, b must be positive.	An increase of 7% is a multiplier of 1.07 not 1.7. When changing between recurring decimals and fractions not understanding when to multiply by 10,100 etc. If a:b is 1:3 then a/b is 1/3. Not understanding that y is inversely proportional to x is written as $Y \propto 1/x$ which is equivalent to $y=k/x$ Not understanding the equivalence of "rate of change" and the gradient of a curve. Not understanding the derivation of the formulas for arc length and area of a sector.	That the gradient of a perpendicular is the reciprocal rather than the negative reciprocal. Not understanding that bearings measure clockwise.	sector. For a linear sequence which increases by 4 that the nth term is $n+4$. Not understanding the difference between linear and quadratic sequences. Not understanding when to multiply probabilities and when to add. Not understanding how to solve when the unknown is on the denominator. Writing vectors as coordinates, getting the direction wrong. Getting x squared mixed up with 2 to the power of x Not finding the square root when finding the radius	Not realising that if the linear scale factor is K then the area is k^2 and the volume is k^3 . Not understanding that with $f(g(x))$ g(x) is performed first. Mixing up "frequency density" with "frequency". Not understanding the criteria for two triangles to be congruent. Not understanding difference between AAS and ASA. Not understanding that two vectors of the same length and parallel are identical. Confusing "angle at the centre" with "cyclic quadrilateral". Confusing "angle in the alternate segment" with "angles on parallel lines"..	