MATHS CURRICULUM

Year 7

Calculations

All students are taught to confidently work with place value to multiply and divide by powers of ten. They then develop their mental and formal written calculations for multiplication and division with both integers and decimals including introducing students to the grid method that will support them with algebra later in the curriculum.

Number Sense

All students will be taught to convert confidently between fractions decimal and percentages with and without a calculator. They are also taught how to use a number line to place and order fractions, decimals, percentages and negative numbers. They also practice the four operations, addition, subtraction, multiplication and division using negative numbers. Tier 1 students take this one step further and make use of inequality symbols to compare numbers and use a number line. They also convert to recurring decimals as well as terminating decimals.

Algebraic Notation

All students will be taught to write and simplify algebraic expressions and terms in an expression using the four operations, multiplication, division, addition and subtraction. They are introduced to the formal notation and language of algebra. Tier 1 students also learn to expand and factorise single brackets in this topic.

2D Shape, Angles and Symmetry

All students will be taught to use and identify rotational and reflectional symmetry and learn the properties and angle facts of 2D shapes, specifically quadrilaterals and triangles. Tier 1 students also learn the properties and how to calculate the interior and exterior angles of regular and irregular polygons.

Fractions

All students will be taught to perform all four operations with fractions, mixed numbers and integers. They are also required to convert between improper fractions and mixed numbers as well as simplify fractions. Tier 1 students will also perform these operations with numbers between -1 and 1.

Time

All students will be taught to solve basic functional time problems for example using different units of time, clocks and reading bus and train timetables. They will be given an opportunity to plan a journey using what they have learned.

Equations

All students will be taught to solve linear equations, beginning with one step equations up to two step equations and including expanding brackets. They are also taught checking methods to ensure their answers are correct.

Percentages

All students will be taught to calculate confidently simple percentages of an amount with and without a calculator. They are also shown how to calculate percentage changes and Tier 1 students learn to write one quantity as a percentage of another.

Measure

All students will be taught to convert between metric units of measurement as well as accurately use measuring tools such as a ruler for accurate line drawing and a protractor for constructing angles. They are also introduced to scales including map scales and learning to read and draw accurate scale drawings.

Formulae

Students are taught to write expressions from a context and introduced to formulae. They will be taught how to substitute integer and decimal values into expressions and formulae. Tier 1 students will also be shown how to rearrange basic formulae.

Area and Perimeter

All students will be taught to calculate perimeter and area of rectilinear compound shapes, quadrilaterals and triangles. They will be taught how to work with shapes with lengths in different metric units and how to work backwards to find missing dimensions. This links to their work on solving equations earlier in the year.

Coordinates

All students will learn how to plot and read positive coordinates on four quadrants and solve simple geometric problems using coordinates. Tier 1 students are also taught to work with 3D coordinates.

Rounding and Estimating

All students will be taught to round numbers to a nearest power of ten as well as decimals places and significant figures. Tier 1 students will also be asked to express their answers as error intervals using inequality symbols.

Data and Frequency Tables

All students will be taught to sort and classify data into sets as well as use two way tables, tally charts and venn diagrams. Tier 1 students will use inequality symbols for grouped data.

3D Shape

All students will be taught to recognise and name 3D objects and their properties. They will also be taught how to draw and recognise 2D representations of 3D objects. Tier 1 will be introduced to surface area of simple 2D objects.

Financial Awareness

Students will be taught how:

- To calculate the annual cost of subscriptions and services
- To know and understand what constitutes the cost of living
- To be able to plan make financial decisions that take possible future events into account
- To be able to plan within a monthly budget

Year 8

Types of Number

All students will be taught to recognise and use types of numbers e.g. factors, multiples, square, cube and prime numbers. They also recap rounding to significant figures and multiplying and dividing powers of 10 from y7. They are introduced to Highest common factor and lowest common multiples and simple index laws using numerical bases.

Algebraic Expressions

All students will be taught to expand and simplify expressions with single brackets including expressions with more than one single bracket. They will also apply the index laws to algebraic terms and learn how to factorise expressions.

Proportion

All students will be taught to solve direct proportion problems including using the unitary method to find the cost or value of a single item as a strategy to solve best buy and currency conversion problems. This topic applies a variety different real life contexts that involve multiplying and dividing two quantities in proportion. Tier 1 students also look at simple inverse proportion problems.

Transformations

All students will be taught to understand the terms ‘congruent’, ‘congruence’, ‘object’, ‘image’ in order to support drawing and describing three types of transformations, reflection, rotation and translations. Tier 1 students also have to name the equations of the mirror line when reflecting.

Equations

All students will be taught to continue their learning from year 7 on solving equations. They will see equations in which the solution may not be a whole number. In year 8 they will have to solve multi-step equations including with brackets and fractions, tier 1 students will see equations with unknowns on both sides. The students will also be taught how to set up and solve equations in different contexts.

Averages and Range

All students will be taught to calculate median, mode and range from a list, a frequency table and from a bar chart. They will be shown how to interpret averages as a way of comparing two sets of data in context.

Fractions, Percentages and Decimals review

All students will be reviewing their prior learning on Fractions, decimals and percentages. They are taught to carry out all four operations with fractions including with mixed numbers. They also need to fluently convert between fractions decimals and percentages with and without a calculator. They are then taught to calculate with percentages including increasing and decreasing with and without a calculator.

Formulae

All students will be taught set up a formula from a context and substitute values into it, the values may be negative, decimals or fractions. In addition, they are shown how to rearrange formulae to change the subject so they can use formula for solve a problem.

Angles, Polygons and Parallel Lines

All students will be taught to recognise and name regular and irregular polygons. Students are taught to be able to find missing angles within triangles and quadrilaterals as well as interior and exterior angles for polygons. They also apply their knowledge from equations to set up and solve equations involving angles. Tier 1 students are introduced to angle rules between parallel lines.

Probability

All students will be taught to express a probability as a fraction, decimal or percentage and understand the vocabulary of chance including impossible, unlikely, evens, likely, certain. Students are introduced to the concept of theoretical and experimental probabilities and shown how to use diagrams to list and calculate probabilities of two events.

Sequences

All students will be taught to continue numerical and non-numerical sequences. This is an opportunity to revisit key language using sequences that include different types of numbers e.g. square, even, odd, prime, factor and multiple. Students learn to find the term to term and nth term rules of a sequence.

Area and Perimeter

All students will be taught to build on their learning from year 7 and will now need to solve problems involving area of triangles and rectangles. They will also be taught how to work backwards to find missing dimensions. This topic will now include area of other quadrilaterals including parallelograms and trapezia. Tier 1 students will also be taught how to calculate area and perimeter of circles, semi circles and quarter circles.

Constructions and Congruence

All students will be taught to construct both angle, line and point to line bisections and how to apply these to loci problems. They will also develop a further understanding of congruence and how to prove two triangles are congruent. Tier 1 students will also be taught triangle constructions.

Kinematics

All students will be taught to convert between metric and imperial measures when given the conversion as well as covert between different metric units. They will then be taught the connection between speed, distance and time and use the speed = distance / time formula in simple 1-stage problems. Tier 1 students will also be taught to find the average speed over a distance time graph and describe a journey from a given distance/displacement time graph.

Volume and Surface Area

All students will be taught to build on their learning from year 7 on properties of 3D shapes to be able to draw nets, calculate volume of prisms and surface area of cuboids and triangular prisms. Tier 1 students will also be shown how to find the volume and surface area of cylinders using their knowledge from area and perimeter on area and circumference of circles.

Financial Awareness

All students are taught to: • Be able to understand bank statements, what a balance, credit and debit is. • Understand wages and how much of their salary they see after tax and National Insurance. • Understand debt and learn methods to stay in control of their finances • Be aware of how they can be defrauded/scammed out of their money.

Year 9

Foundation

Types of Number (Decimals and Indices)

All students will be taught to:

- **Know how to find LCM and HCF using Venn Diagrams.**
- **Know what HCF and LCM are and how to use them to solve problems.**
- **Know the definitions of multiples, factors, and prime numbers.**
- **Know the cube numbers from 1 - 6 and square numbers from 1 - 15.**
- **Know that square numbers can have both a positive and a negative root.**
- **Be able to multiply and divide by powers of 10 (inc. 10, 100, 1000, 0.1, 0.01, 0.001)**
- **Understand decimal place value.**
- **Be able to convert large and small numbers to standard form and vice versa.**
- **Calculate with numbers in index form i.e. 43 + 52**
- **Be able to use a calculator.**
- **Round a number to the nearest whole number.**
- **Round a number to a given decimal place.**
- **Round a number to a given number of significant places.**
- **Use approximations to 1 significant figure to estimate answers.**

Algebraic Expressions

All students will be taught to:

- **Be able to simplify an expression involving sums, products, and powers**
- **Expand a single and double bracket.**
- **Expand a bracket and simplify.**
- **Factorise a linear expression.**
- **Substitute values into expressions and equations**
- **Rearrange equations to change the subject of a formula**
- **Form an expression**
- **Form an equation to solve a problem.**
- **Recognise and calculate with algebra using index notation.**
- **Know the index laws for multiplication and division of powers with the same base.**

Proportion

All students will be taught to:

• Understand direct proportion

• Solve problems involving direct and inverse proportion, understand a graphical representation of something in direct proportion.

• Use and convert standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate.

• Use a multiplier when solving problems involving direct proportion or proportional increase/decrease.

• Use comparisons to be able to identify best buys for multi-step problems. Including those where different combinations of deals can be used.

Averages

All students will be taught to:

• Find the mean, median and mode from a list of data.

• Know when to use each average and why.

• Find the mode and median from frequency data.

• Find the mean from a frequency table.

• Find the mean, mode, median and range from a bar chart.

• Find the interval that contains the model group from grouped data.

• Find the interval that contains the median from grouped data.

• Find the estimated mean from grouped frequency data.

Ratio

All students will be taught to:

• Understand what a ratio means and its link to fraction notation.

• Understand what a ratio means and its link to proportion

• Simplify ratios and understand equivalence between ratios.

• Write a ratio from a worded problem.

• Simplify a 2 or 3 part ratio

• Write a ratio in the form 1: n and n: 1

• Divide a quantity into a 2 or 3 part ratio

• Use ratio notation to work out the whole amount shared (Part to whole).

• Use ratio to find a quantity when other quantities are known (part to part).

Area and Perimeter

All students will be taught to:

• Use standard formulae to solve problems involving areas of parallelograms, triangles, trapezia, and compound shapes.

• Know and recognise the parts of circle.

• Know and apply the formulae for area of a circle.

• Know and apply the formulae for circumference of a circle.

• Work backwards in a circle problem to find the radius or the diameter.

• Solve a circle problem, leaving answers in terms of pi.

Frequency Diagrams

All students will be taught to:

• Draw and interpret two-way tables

• Complete and interpret frequency trees

• Draw dual and composite bar charts

• Draw and interpret line graphs.

• Draw and interpret Venn Diagrams.

• Compare and contrast the same type of and different types of frequency diagram

• Interpret specific information from a frequency diagram including mode, total frequency, highest and lowest value etc.

Fractions

All students will be taught to:

• Know and find equivalent fractions.

• Simplify a fraction.

• Convert between mixed numbers and improper fractions.

• Multiply fractions.

• Divide fractions.

• Find a fraction of an amount.

• Add and subtract proper, improper fractions and mixed numbers.

• Use a scientific calculator to calculate with fractions, both positive and negative.

Solving Equations

All students will be taught to:

• Know the difference between an expression, an identity, and an equation.

• Write an expression and an equation.

• Expand two brackets and simplify. eg 2(x+4) - 3(x+2).

• Solve one and two step linear equations using 1 variable. • Apply solving linear equations to other aspects of maths

Percentages

All students will be taught to:

• Understand fractions or percentages as operators.

• Calculate a fraction or percentage of an amount.

• Write one amount as a fraction or percentage of another.

• Calculate a percentage change.

• Calculate a percentage increase or decrease.

• Convert between fractions, decimals and percentages and understand their equivalence.

Inequalities

All students will be taught to:

• Know and understand the inequality symbols < ≤ > ≥ = ≡.:

• Find integer solutions to an inequality.:

• Solve a linear inequality.:

• Represent inequalities on a number line.

Pie Charts and Scatter Diagrams

All students will be taught to:

• Understand that pie charts are used to show proportions.

• Use a template to construct a pie chart by scaling frequencies.

• Construct pie charts when the total frequency is not a factor of 360.

• Interpret data shown on in a pie chart.

• Plot a scatter diagram.

• Understand the meaning of ‘correlation’.

• Identify positive, negative and no correlation.

• Interpret a scatter diagram using understanding of correlation.

• Understand that correlation does not indicate causation.

• Construct a line of best fit on a scatter diagram.

• Use a line of best fit to estimate values.

• Know when it is appropriate to use a line of best fit to estimate values.

• Choose appropriate graphs or charts to represent data.

Linear Graphs

All students will be taught to:

• Work with co-ordinates in all four quadrants.

• Draw the lines, y=x, y=-x, y=n and x=n and understand which lines are parallel to the axes.

• Draw a line in the format y=mx + c.

• Find the gradient of a straight line from the equation and graph.

• Deduce the equation of a straight line and write it in the form y=mx+c.

• Use the linear equation to identify parallel lines.

Scale Drawing, Nets and Plans and Elevations

All students will be taught to:

• Understand what a scale factor is.

• Use scale factors to solve problems.

• Convert between miles and kilometres when given the conversion.

• Draw & interpret plans and elevations.

• Draw and identify nets of shapes.

Volume

All students will be taught to:

• Identify 3D shapes from both picture and description.

• Find the Volume of a prism by counting squares and by calculation.

• Find the Volume of a cylinder.

• Solve problems involving Volume.

Probability

All students will be taught to:

•Write probabilities in words, fractions, decimals and percentages and place these on a scale from 0 to 1.

• Compare the probabilities of events by comparing sizes of fractions, decimals, and percentages.

•Systematically list all outcomes for single and combined events.

•Use and draw sample space diagrams.

• Use theoretical models to include outcomes using dice, spinners, and coins.

Financial Awareness

All students will be taught to:

• Understand the importance of their Credit Rating and how this affects their financial options.

• Understand that borrowing money costs interest and be able to calculate monthly interest charges.

• Understand that Buy Now Pay Later schemes and Store Cards are forms of credit which can lead to debt.

• Understand how Payday Loans work.

• Calculate interest charges on Payday Loans.

• Understand the dangers of falling into debt associated with gambling.

• Understand that probabilities when gambling are never favourable.

Year 10

Foundation

Factors Multiples and Primes

All students will be taught to find the prime factor decomposition of a positive integer and write as a product of its prime factors (understand that each number has a unique prime factor decomposition). They also learn to find LCM and HCF of two numbers: by listing, Venn diagrams, and using prime numbers – including using the prime factor decomposition of two numbers.

Equations

All students will be taught to solve one and two step linear equations using 1 variable, solve any linear equation where the unknown appears once - including with brackets or fractions and solve an equation with unknowns on both sides. They also learn to apply solving linear equations to other aspects of maths.

Indices

All students will be taught to understand and use index notation including finding (or estimating) values of calculations involving square roots, cube roots, and positive indices as well as use indices correctly in the hierarchy of operations including with brackets. They will recap and practise using the index laws.

Sequences

All students will be taught to generate terms of a sequence from a term-to-term rule and a position-to-term rule. They will also be taught how to find the term-to-term rule and position-to-term rule for a linear sequence as well as recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences and quadratic sequences.

Ratio

All students will be taught to understand the link between ratio and fractions and be able to use fractions to solve ratio problems. All students will be taught to use ratio notation so they can divide a given quantity into two parts in a given part: part or part: whole ratio; apply ratio to real contexts and problems. This year there is also the addition of writing three part or two-part ratios by combining two other ratios e.g. Find A: C given A: B and B: A and relating ratios to linear functions

Angles and Bearings

All students will be taught to use the standard conventions for labelling and referring to the sides and angles of a triangle and know how to apply the properties of angles at a point, on a straight line, vertically opposite angles, including when represented algebraically. They will learn to understand and use alternate, co-interior and corresponding angles on parallel lines. Students will also be taught to measure, draw and read bearings and understand and use the scale for distance on a map.

Formulae

All students will be taught to substitute numerical values into scientific formulae as well as understand and use standard mathematical formulae. They will learn to rearrange formulae to change the subject when they contain brackets or when the subject appears twice.

Proportion

All students will be taught to understand direct proportion and its link to equivalent ratios. They will learn to use a multiplier when solving problems involving direct proportion or proportional increase/decrease and solve problems involving direct and inverse proportion, including graphical and algebraic representations.

Compound Units

All students will be taught to use compound units such as speed and rates of pay as well as density and pressure. They will learn to change freely between compound units e.g. from km/h to metres/second or from wage per hour to wage per annum. in numerical and algebraic contexts. The students are also taught to draw and interpret a distance-time graph and compound measures graph (e.g. cost per mile for a taxi company).

Similarity and Congruence

All students will be taught to identify congruent shapes, and to show that two shapes are congruent. They will learn to produce a congruent shape by reflecting, rotating, or translating a shape and understand why it is congruent and produce similar shapes by enlargement – including with a fractional scale factor and explain why these shapes are similar. All students will learn to solve problems involving similar shapes where the scale factor is known or can be found.

Factorising Quadratics

All students will be taught to factorise a linear expression by taking out a common factor and expand the product of two linear brackets. They then learn to factorise a quadratic expression of the form $x^2 + bx + c$ and factorise the difference of two squares.

Surface Area and Volume

All students will be taught to use standard formulae to solve problems involving areas of parallelograms, triangles and trapezia as well as calculate area and circumference of circles. They will learn to calculate the volume and surface area of any prism as well as the surface area and volume of composite solids. They also learn to calculate the volume and surface area of spheres, cones, and pyramids.

Linear and Quadratic Functions

All students will be taught to recognise that $y=mx+c$ corresponds to a linear graph and know how the parts of this equation determine the line. They learn to calculate the gradient of a straight-line segment using dy/dx and find the equation of any straight line. They will also be taught to recognise and plot simple quadratic functions.

Pythagoras' Theorem

All students will be taught to recall and use the formula $a^2+b^2=c^2$to find the hypotenuse right angled triangle and to find one of the shorter side lengths of a right-angled triangle. Students will then learn to use Pythagoras' theorem in context or to solve other geometrical problems - for example to find the distance between two coordinates.

Fractions Decimals and Percentages

All students will be recap their prior learning and skills on all four operations with decimals and fractions, converting fluently between fractions, decimals, and percentages. They will also learn to find a percentage of a quantity, increase or decrease a quantity by a given percentage, calculate a repeated percentage change, calculate a change in quantity as a percentage change and calculate reverse percentages.

Probability

All students will be taught to compare experimental data and theoretical probabilities, compare relative frequencies from samples of different sizes. They will also learn to estimate the number of times an event will occur, given the probability and the number of trials and use two way tables and frequency trees to record information and calculate probabilities.

Financial Awareness

All students will be taught to:

- Understand the importance of their credit rating and how this effects their financial options
- Understand what options available post-16 and the associated costs are
- Understand how to improve their credit score
- Understand the costs associated with buying a car
- Understand how job choices and financial status affect mental health

Year 11

Foundation

Fractions Decimals and Percentages

All students will recap their knowledge and skills on all four operations with decimals and fractions, convert between improper fractions and mixed numbers and find a fraction of a quantity. This topic will also revise finding a percentage of a quantity, increase or decrease a quantity by a given percentage, calculate a repeated percentage change and calculate a change in quantity as a percentage change. They will then learn to calculate simple reverse percentage change and compound percentage change.

Probability Trees and Venn Diagrams

All students will be taught to draw and use tree diagrams to calculate the probability of two independent events and two dependent events. They will also learn how to place elements in Venn diagrams with 2 sets, according to their properties use set notation to find probabilities from a Venn diagram.

Powers. Roots and Standard form

All students will be taught to use indices correctly in the hierarchy of operations including with brackets, with and without a calculator as well as recall and use the index laws of multiplication, division and powers of powers. They will learn to interpret and compare numbers in standard form and calculate with numbers in standard form. They are also taught to simplify expressions in the form √y x √y or (√y)2 , x√a + y√a and simplify expressions involving surds and brackets such as a(√x + b).

Sequences

All students will be taught to generate a sequence given an nth term and find an nth term of a given sequence. They will learn to recognise, use and continue non-linear sequences such as Fibonacci chains, cube numbers and triangular numbers and simple geometric progressions such as 2n.

Arcs and Sectors

All students will be taught to know and recognise the parts of circle and know and apply the formulae for area of a circle and circumference of a circle. They will learn to calculate the perimeter and area of composite shapes that include sections of a circle. They are taught to know how to find arc length as well as the area of a sector. They also learn to calculate the volume of a cylinder.

Ratio and Proportion

All students will be taught to use ratio notation, including reduction to simplest form. They learn to divide a given quantity into two parts in a given part: part or part: whole ratio; apply ratio to real contexts and problems. They will also learn to solve problems involving direct and inverse proportion, understand a graphical representation of something in direct proportion. Students are taught to compare lengths, areas and volumes using ratio notation; make links to similarity and scale factors and interpret equations that describe inverse and direct proportion

Simultaneous Equations and Inequalities

All students will be taught to generate and plot coordinates and draw the graph of any linear function and recognise that y=mx+c corresponds to a linear graph and know how the parts of this equation determine the line. They are also taught to solve simultaneous equations, including those where one or both equations need to be multiplied and how to plot a pair of simultaneous equations on a set of axes and know that the point of intersection is the solution for that pair of equations. They are taught to represent inequalities on a number line and solve an inequality.

Averages

All students will be taught to find the mean, median and mode and range from a list of data and make comparisons using averages or the range. They also learn to estimate or find the range, mode, median and mean from a grouped and ungrouped frequency tables and graphs.

Quadratics

All students will be taught to expand single brackets and double brackets and factorise linear expressions. They learn to solve a quadratic equation by factorising and draw a quadratic graph including graphs with a negative coefficient of x^2. They also learn to find approximate solutions to quadratic equations using a graph as well as deduce roots and turning points (minimum and maximum points) of quadratic functions.

Other Graphs

All students will be taught to recognise, sketch and interpret graphs of linear, quadratic functions, cubic functions and the reciprocal function y = 1/x. They also learn to plot and interpret graphs in real contexts to find approximate solutions to problems.

Vectors

All students will be taught to describe vectors as 2D translations, add and subtract column and diagrammatic vectors and multiply column and diagrammatic vectors by a scalar. They also learn to recognise that when one vector is a scalar multiple of another then the lines will be parallel.

Pythagoras Recap and Trigonometry

All students will be taught to recall and use the formula for Pythagoras to find the hypotenuse right angled triangle and one of the shorter side lengths of a right-angled triangle as well as use Pythagoras' theorem in context or to solve other geometrical problems. Students also learn to know the trigonometric ratios to set up and solve a trigonometric equation to find a missing side in a right-angled triangle and a missing angle in a right-angled triangle.

Constructions and Loci

All students will be taught to use the angle facts for points, lines, parallel and intersecting lines, and regular polygons. They both construct and prove congruent triangles using ASA, SAS, SSS & RHS. They learn to construct both angle, line and point to line bisections, construct a locus of a points from a fixed point, line or shape and apply bisections and loci to solve problems.

Year 9

Higher

Types of Number

All students will be taught to find LCM and HCF using Venn Diagrams and how to use them to solve problems. They are also taught to convert large and small numbers into standard form and vice versa as well as use a calculator to work with standard form. They will also recap the index laws for multiplication, division, raising a power to another power and that anything to the power of zero is always one.

Algebraic Expressions

All students will be taught to expand a bracket, factorise a linear expression, expand and simplify double brackets and factorise a quadratic expression when a=1. This topic also included simplifying simple algebraic fractions.

Proportion

All students will be taught to understand direct proportion and solve problems involving direct and inverse proportion, understand a graphical representation of something in direct proportion. They will also be taught to use comparisons to be able to identify best buys for multi-step problems, including those where different combinations of deals can be used.

Averages

All students will be taught to find the mean, median and mode from a list of data as well as from grouped and ungrouped frequency tables and graphs. They will learn to use the mean to find a missing number in a set of data and understand how to use averages to compare more than one set of data.

Ratio

All students will be taught to understand what a ratio means and its link to fraction notation and proportion. They will be taught how to simplify ratios write a ratio from a worded problem, write a ratio in the form 1: n and n: 1 and divide a quantity into a 2 or 3 part ratio

Area and Perimeter

All students will be taught to use standard formulae to solve problems involving areas of parallelograms, triangles, trapezia and compound shapes. They will also be taught how to calculate area and circumference of circles as well as the length of an arc and the area of a sector.

Decimals

All students will be taught to multiply by a number between 0 and 1 without a calculator and round to a given number of decimal places or significant figures. They will also be taught to convert between recurring decimals and fractions.

Equations and Inequalities

All students will be taught to know the symbols $< \leq > \geq = \equiv$. They will also be taught to solve two step linear equations using 1 variable and equations with unknowns on both sides. They will learn how to solve an inequality and represent inequalities on a number line.

Frequency Diagrams

All students will be taught to draw and interpret two way tables, frequency trees, dual and composite bar charts, time series graphs, frequency polygons and Venn diagrams.

Compound and Reverse Percentages

All students will be taught to write one amount as a fraction or percentage of another amount, calculate percentage increase or decrease and solve problems involving percentage change. They are also introduced to reverse percentage problems and solving problems involving repeated percentage change, including compound interest.

Pie Charts and Scatter Diagrams

All students will be taught to construct and interpret pie charts and scatter diagrams. They will learn to understand the meaning of 'correlation' and construct a line of best fit on a scatter diagram and understand its use.

Linear Graphs

All students will be taught to know and use the equations of lines parallel to the axes and recognise that y=mx+c corresponds to a linear graph and know how the parts of this equation determine the line. They will be taught ghow to interpret the gradients of parallel and perpendicular lines and use this knowledge to solve problems.

Types of Data, Sampling and Bias

All students will be taught to describe and identify different types of data: qualitative, quantitative, discrete, continuous, primary and secondary and use the data handling cycle to plan an investigation to test a hypothesis. They will learn different sampling methods including stratified sampling.

Bearings and Scale Drawings

All students will be taught to draw and read bearings and calculate bearings from problems using parallel lines angle facts. They will also be taught to use scale factors as well as how to use and draw scale diagrams.

Solving Simultaneous Equations

All students will be taught to solve any linear equation including those with brackets or where the unknown appears as a denominator. They will be taught how to solve a pair of simultaneous equations, including those where one or both equations need to be multiplied as well as form a pair of simultaneous equations from a worded question, or from a geometric diagram and plot a pair of simultaneous equations on a set of axes and know that the point of intersection is the solution for that pair of equations.

Pythagoras

All students will be taught to identify and label different parts of a triangle including the hypotenuse and use conventional notation for this. They will learn to recall and use the formula a2+ b2=c2 to find any of the side lengths of a right-angled triangles in a variety of contexts.

Graphs

All students will be taught to plot and interpret Distance Time graphs and Velocity Time graphs. They will use distance-time graphs to calculate and estimate Speed and estimate distance and acceleration from a Velocity Time graph.

Financial Awareness

All students will be taught to:

• Understand the importance of their Credit Rating and how this affects their financial options.

• Understand that borrowing money costs interest and be able to calculate monthly interest charges.

• Understand how to calculate tax

• Understand interest charges on Payday Loans

• Understand what a payslip looks like

• Understand the risks and rewards of investing

Year 10

Higher

Indices

All students will be taught to understand and use index notation including finding (or estimating) values of calculations involving square roots, positive, negative, and fractional indices. They will also learn to recall and use laws of fractional and negative indices and use a calculator for all operations including powers, roots, and brackets.

Quadratic Sequences

All students will be taught to generate terms from a linear nth term rule and find the nth term rule for a linear sequence as well as identify a linear, quadratic, geometric or Fibonacci type sequence. Students will learn to generate terms from a quadratic nth term rule and find the nth term rule for a quadratic sequence.

Trigonometric ratios

All students will be taught to identify and label adjacent, opposite, hypotenuse and theta on a right-angled triangle in order to recall and use the correct trigonometric ratio to find a missing side length or angle in a right-angled triangle. They will also learn to use the trigonometric ratios to solve problems in 2D or 3D.

Surds

All students will be taught to understand surd notation, including interpreting calculator display given in surd form. They will learn to simplify a surd such as √12 = √(4 × 3) = √4 × √3 = 2√3, simplify expressions involving surds such as 4√3 + √75 and manipulate expressions involving surds, including expanding double brackets with surds. They will also be taught to rationalise the denominator of an expression. They will also need to learn the exact values of sinθ, cosθ and tanθ when θ=0, 30, 45 and 60. Know that sin90° = 1 and cos90° = 0.

Ratio

All students will be taught to use ratio notation, including reduction to simplest form and divide a given quantity into two parts in a given part: part or part: whole ratio; apply ratio to real contexts and problems. They will also learn to write three part or two-part ratios by combining two other ratios e.g. Find A: C given A: B and B: A and solve problems involving ratios in which one quantity is changed to find an original or new total. Students will be taught to write a ratio as a linear equation.

Standard Form

All students will be taught to interpret and compare numbers in standard form a x 10n, where 1≤a<10 and n is a positive or negative integer. They will learn to calculate with numbers in standard form and interpret a calculator display in standard form and know how to enter numbers in standard form.

Probability

All students will be taught to systematically list all the possible outcomes for single events and combined events and know how to work out the number of possible combinations for combined events. They will also learn to construct and use two-way tables and frequency trees to calculate probabilities.

Cumulative Frequency and Box Plots

All students will be taught to work out the cumulative frequency from a grouped frequency table and draw a cumulative frequency graph/curve. They will learn to use a cumulative frequency graphs/curves to estimate the median and estimate the interquartile range. They are taught to draw and interpret box plots and compare two data sets from cumulative frequency graphs/curves and box plots and make reasoned conclusions.

Similarity and Congruence

All students will be taught to identify congruent shapes, and to show that two shapes are congruent. They will produce a congruent shapes by reflecting, rotating, or translating a shape and understand why it is congruent and produce similar shapes by enlargement – including with a negative or fractional scale factor and explain why these shapes are similar. They will learn to solve problems involving similar shapes where the scale factor is known or can be found and compare lengths, areas and volumes using ratio notation. They will also be taught to apply the concepts of congruence and similarity, including the relationships between lengths, area and volume of similar objects.

Solving Quadratics by Factorising

All students will be taught to factorise a quadratic expression of the form x2 + bx + c and the difference of two squares. They will learn to also factorise a quadratic expression of the form ax2 + bx + c and use that method to solve any quadratic equation set =0 .

Compound Units and Real Life Graphs

All students will be taught to understand and manipulate units and compound units and understand and know the difference between scalar and vector quantities. They will learn to draw and interpret real-life graphs by calculating the gradient of a straight line and know what this represents and calculate the area under a straight line and know what this represents on a real-life graph.

roportion

All students will be taught to solve problems involving direct and inverse proportion, understand a graphical representation of something in direct proportion. They will learn to compare lengths, areas and volumes using ratio notation; make links to similarity and scale factors. Students are taught to use and convert compound units e.g. speed, rates of pay, unit pricing using decimal quantities where appropriate. They also learn to form and interpret equations that describe direct and inverse proportion.

Circle Theorems

All students will be taught to use knowledge of alternate and corresponding angles to calculate missing angles in geometrical diagrams. They will learn to identify when a circle theorem can be used to find missing angles in a geometrical problem and apply and prove the standard circle theorems concerning angles, radii, tangents and chords.

Linear and Quadratic functions

All students will be taught to recognise that y=mx+c corresponds to a linear graph and know how the parts of this equation determine the line. They will learn to find the equation of any straight line, understand the gradients of parallel and perpendicular lines and draw a quadratic graph including graphs with a negative coefficient of x2. They will also be taught to find approximate solutions to quadratic equations using a graph and deduce roots of quadratic functions algebraically as well as how use a quadratic graph to find roots and turning points (minimum and maximum points).

Surface Area and Volume

All students will be taught to calculate the volume of any prism as well as complex shapes such as spheres, pyramids, and cones- including frustums. They will also learn to calculate the surface area of any prism and spheres, pyramids, and cones. They are also taught to solve problems involving area/volume of enlarged shapes.

Conditional Probability

All students will be taught to find the probability of an event happening using relative frequency and use it to estimate the number of times an event will occur, given the probability and the number of trials. They will also learn draw a probability tree diagram for both independent and conditional events and use them to calculate the probability of independent and dependent combined events. They will also be taught to place elements in Venn diagrams with 2 sets, according to their properties and understand and use set notation to find probabilities from a Venn diagram.

Simplifying algebraic Fractions

All students will be taught to simplify algebraic fraction such as 12x3y4/24xy2 by cancelling common factors use factorising in order to find the common factors. They will learn to calculate with algebraic fractions and solve fractional equations, both linear and quadratic.

Financial Awareness

All students will be taught to:

• Be able to understand the real-life cost of renting a property.

• Understand what a mortgage is and what interest rates mean.

• Understand how a student loan works, on be able to work out what sort of support they can get at university.

• Work out the cost of financing a car. Students will understand the different payment options available to them.

Year 11

Higher

Accuracy and Bounds

All students will be taught to combine upper or lower bounds appropriately to achieve an overall maximum or minimum for a situation and use bounds to calculate a value to an appropriate degree of accuracy.

Cumulative Frequency, Box plots and Histograms

All students will be taught to work out the cumulative frequency and draw a cumulative frequency graph from a grouped frequency table. They also learn to use a cumulative frequency graphs/curves to estimate the median and the interquartile range. Students are taught to draw and interpret a box plot and use them to compare two sets of data. Students learn to construct and interpret histograms for grouped data with equal and unequal class intervals and use them to solve problems that draw on other topics in maths.

Quadratic Equations

All students will be taught to expand and simplify double and triple brackets and factorise all forms of quadratic expression including recognising the difference of two squares. Students will learn to solve a quadratic equation of by factorising and identify when a quadratic equation cannot be solved by factorising. They will be taught to use the quadratic formula and use it to solve a quadratic equation that is equal to zero. They will also learn how to complete the square of a quadratic expression and solve a quadratic equation equal to zero by completing the square.

Functions

All students will be taught to understand the meaning of a function and the notation for composite functions. They are taught to find the inverse of a given function and solve problems involving inverse functions and composite functions.

FDP – Reverse and Compound Percentages

All students will be taught to complete the four operations with fractions and with decimals as well as convert and compare fractions, decimals and percentages including those greater than 1. They will recap finding a percentage of an amount and increase and decrease by a given percentage. Students will learn to express a change in quantity as a percentage change and calculate reverse percentage and fraction changes. They will calculate over a range of time periods using compound percentage change with indices and apply the idea of compound interest to solve exponential growth and decay problems in various contexts.

Graphs

All students will be taught to solve quadratics graphically and know how to find the roots of a quadratic by factorising. They will learn to solve simultaneous equations graphically and know how to find the turning point of a quadratic by completing the square. They will be shown how to sketch a quadratic graph by finding its roots and turning point. They are also taught to shade a region given by one or more inequalities, solve a quadratic inequality and draw a cubic graph.

Ratio and Proportion

All students will be taught to express the division of a quantity into two or three parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations). Students learn to form and interpret equations that describe direct and inverse proportion. They are also taught to recognise and interpret graphs that illustrate simple and

complex direct and inverse proportional relationships and solve complex problems using algebra to interpret ratio problems

Sine and Cosine Rule

All students will be taught to use Pythagoras' theorem and Trigonometry to find lengths and angles in three dimensional figures. They are also taught to know the sine rule and the cosine rule and use it to find a missing length or angle in a non - right angled triangle. They will identify when the sine/cosine rule is needed to solve a problem and which of the two is needed. They also learn to find the area of a triangle using 0.5abSinC.

Vectors

All students will be taught to use diagrammatic representation of vectors and add, subtract and multiply a vector by a scalar. They will learn to understand how to create and present a proof involving vectors as well as make deductions about situations involving vectors that are multiples of other vectors, vectors expressed using ratios and involve parallel lines.

Iteration and simultaneous Equations

All students will be taught to understand the process of interval bisection to locate an approximate solution for a complex equation and use interval bisection to locate an approximate solution for a complex equation. They will learn to rearrange an equation to form an iterative formula and use an iterative formula to find approximate solutions to equations. They will be taught to solve two linear simultaneous equations in two variables and understand the concept of solving simultaneous equations by substitution and solve one linear and one quadratic simultaneous equation in two variables by substitution. They will derive and solve two simultaneous equations in complex cases and interpret the solution to a pair of simultaneous equations.

Real Life graphs

All students will be taught to draw and interpret real-life graphs including being shown how to calculate the gradient of a straight line and the area under a straight line and know what this represents on a real-life graph. They will learn to estimate the instantaneous rate of change from a 'real life graph' by drawing a tangent. They are also taught to use the trapezium rule to estimate the area underneath a curve and understand what it means in various contexts. They will recap how to find speed, average speed, acceleration, distance, average acceleration from real life graphs.

Other Graphs

All students will be taught to plot the graph of an exponential function and the trigonometric functions and understand their key features. They will learn to know the effects of transforming the graph and solve problems involving the transformation of graphs. They will also be taught to use the equation of a circle with centre at the origin and find the equation of a tangent to a circle at a given point

Constructions and Loci

All students will be taught to construct congruent triangles using ASA, SAS, SSS & RHS, construct both angle, line and point to line bisections and construct a locus for a given set of conditions.