

# MATHEMATICS -it's a specific, powerful vocabulary for ideas

Maths takes the concrete and helps students to see more abstractly. It provides students with the necessary skills to be more analytical and creative thinkers. These are the skills which prospective employers are looking for, therefore, Maths is helping shape the minds of students and make them more employable.

- Necessary Mathematics – Mathematics for employment and the economy. Functional numeracy; practical and work-related knowledge; and advanced specialist knowledge fall under this reason.
- Social and Personal Mathematics – Mathematics for personal and social relevance. Mathematical problem posing and solving; the development of mathematical confidence, including mathematical persistence; and social empowerment through Mathematics.
- Appreciation of Mathematics as an Element of Culture -- the importance not only of appreciating Mathematics itself, but also its role in history, culture and society in general.

## **Personal Reasons to Learn Maths:**

A person's success in life depends on how well they can solve problems. No matter what their career or life situation, they'll find satisfaction and reward by knowing how to tackle challenges head on. And while students can't possibly practice every problem they'll ever have in life, there is a class in school that can help them learn how to think logically: maths. Doing a maths problem helps practice the problem-solving steps that apply to everyday situations: define the problem, think of ways to solve it, implement a solution, and evaluate the results.

Why do people go to the gym to ride the stationary bike? It's not so that they can compete in the stationary bike Olympics, it's to build up their endurance and strength to make the rest of their lives easier and more enjoyable. Maths is like a gym for your brain. You may never need to use the quadratic equation in your adult life, but the process of learning it boosts your brainpower. By practising how to solve mathematical problems, you optimise your ability to make complex decisions down the road.

## **Why do we teach Numeracy?**

Numeracy is one of the most important skills taught in schools today. A student who has a strong grasp of numeracy has a massive advantage in today's world. Everyone uses numeracy in their day to day lives financially, professionally and socially. Students with poor numeracy skills are more than twice as likely to face unemployment while students with strong numeracy skills are more likely to manage their money better and earn higher wages.

## **Why do we teach Statistics?**

Statistics is one of the most applied areas of Maths taught today. It is used in every scientific study and by most successful businesses to help them get an edge on their competitors. We teach statistics because it gives every student access to analytic skills which are highly sought after in today's job market. Students need to be aware that statistics can often be misleading and manipulative and coerce an audience into believing a desired outcome.

## **Why do we teach Shape?**

We live in a three-dimensional world and it is important that students develop the ability to think in 3D. We teach shape because many occupations, such as carpenters, construct shapes on a daily basis to do their job. Everybody requires a basic understanding of shape to perform simple DIY tasks at home. We also teach shape because it is prevalent in Art and Design, with concepts like symmetry being an important part of why we may find artwork pleasing to look at.

## **Why do we teach Algebra?**

Algebra is a fantastic way to improve student's critical and logical thinking skills, and can be incredibly beautiful and enriching to learn. Computers are in every aspect of our daily lives and algebra is integral to how computers are programmed. Teaching algebra allows students to better understand relationships in our world and to better understand mathematics as a whole.

# Key Stage 3 - Contents

	Year 7	Year 8	Year 9
Autumn Term	Sequences	Ratio & Scale	Straight Line Graphs
	Algebraic Notation	Multiplicative Change	Forming and Solving Equations
	Equality and Equivalence	Multiplying & Dividing Fractions	Testing Conjectures
	Place Value	Cartesian Plane	Three Dimensional Shapes
	Fractions, decimals & percentages	Data	Construction and Congruency
Tables			
Spring Term	Addition & Subtraction	Brackets, Equations, Inequalities	Numbers
	Multiplication & Division	Sequences	Using Percentages
	Four Operations	Indices	Maths and Money
	Fractions	Fractions and Percentages	Deduction
		Standard Form	Rotation and Translation
		Number Sense	Pythagoras' Theorem
Summer Term	Geometric Notation	Angles in Parallel Lines and Polygons	Enlargement and Similarity
	Geometric Reasoning	Area of Trapezia & Circles	Solve Ratio and Proportion problems
	Number Sense	Symmetry & Reflection	Rates
	Statistics & Probability	Data Handling Cycle	Probability
	Prime Numbers & Proof	Measures of Location	Algebraic Representation

Students in KS3 follow a mastery curriculum which is based on the central belief that all learners can understand, enjoy and succeed in all important academic content to a level of excellence. The mastery approach is a Chinese way of teaching Maths that involves breaking down larger, complex learning goals into smaller, more granular steps. Higher content is denoted in blue.

# Key Stage 4 - Contents

## Foundation GCSE - Curriculum Plan

Unit	Topic
1	Number inc LCM, HCF, express a number as product of prime factors
2	Algebraic Expressions inc substitution, expansion & factorisation
3	Angles inc parallel lines & polygons
4	Averages & Range inc grouped data, stem & leaf diagrams
5	Decimals inc estimation, upper & lower bounds
6	2D Shapes
7	Equations inc balancing and trial & improvement method
8	Fractions
9	Transformations inc symmetry
10	Formulae inc substitution, change of subject
11	Percentages
12	Presenting data inc pie chart, scatter diagram, frequency polygon
13	3D Shapes
14	Sequences
15	Ratio & Proportion
16	Algebraic Graphs
17	Measure
18	Inequalities
19	Powers & Roots inc rules for indices & standard form
20	Pythagoras Theorem and Trigonometry
21	Probability
22	Constructions Loci Congruence
23	Simultaneous Equations
24	Vector Geometry

## Higher GCSE - Curriculum Plan

Unit	Topic
1	Number inc indices, standard form, surds
2	Expressions inc substitution, expansion, factorising
3	Angles & Circle Theorems
4	Statistics 1 inc data collection/sampling, averages & range
5	Fractions & Decimals inc upper & lower bound calculations
6	2D Shapes
7	Linear Equations inc algebraic & graphical solutions of simultaneous equations
8	Percentages
9	Transformations
10	Formulae & Sequences
11	Trigonometry 1 inc Pythagoras & 3D shapes
12	Statistics 2 inc cumulative frequency & box plots, histograms
13	3D Shapes
14	Algebraic Graphs inc cubic, reciprocal, exponential
15	Ratio & Proportion inc direct & inverse & graphs
16	Loci, Constructions & Congruence
17	Inequalities inc graphical solutions
18	Probability
19	Further Factorising Quadratics, completing the square, simplify algebraic fractions
20	Trigonometry 2 inc sine/cosine rule, trig graphs, area formula
21	Solve Quadratic Equations inc factorising, completing square, formula
22	Similar Shapes inc area and volume
23	Simultaneous Equations -linear/quadratic equations and circles
24	Vectors
25	Transformation of Functions

# Year 7

## Autumn Term 1a

## Term 1b

- \*All lessons begin with a 'Flashback' starter in order to aid the retention of key mathematical facts and skills.
- \*Weekly homework is used to aid factual fluency and interleave skills taught in lessons.
- \*Knowledge organisers are provided for each unit so that students can see the bigger picture and be aware of all the expected core knowledge, which is regularly assessed through low stakes quizzes.
- \*Formative, low stakes, interweaving tests are taken at the end of each block.
- \*Each block consists of smaller steps which are sequenced to optimise progression.

### Sequences

Describe and continue a sequence given diagrammatically  
Predict and check the next term of a sequence  
Represent sequences in graphical and tabular form  
Recognise the difference between linear and non-linear sequences  
Continue numerical linear sequences  
Continue numerical non-linear sequences  
Explain the term to term rule in words  
[Find missing numbers within sequences](#)

### Algebraic Notation

Given the numerical input, find the output of a function machine  
Use inverse operations to find the input given the output  
Use diagrams and letters with single function machines  
Find the function machine given a single letter  
Substitute values into single operation expressions  
Find numerical inputs and outputs for two function machines  
Use diagrams and letters with a series of two function machines  
Find the function machine given a two-step expression  
Substitute values into two step expressions  
Generate sequences given an algebraic rule  
Represent one and two step expressions graphically

### Equality and Equivalence

Understand the meaning of equality  
Understand and use fact families, both numerically and algebraically  
Solve one step linear equations using inverse operations  
Understand the meaning of like and unlike terms  
Understand the meaning of equivalence  
Simplify algebraic expressions by collecting like terms

### Place Value and Ordering Integers and Decimals

Recognise the place value of any number in an integer up to one billion  
Understand and write integers up to one billion in words and figures  
Work out intervals on a number line  
Position integers on a number line  
Round integers to the nearest power of ten  
Compare two numbers using a variety of symbols  
Order a list of integers  
Find the range of a set of numbers  
Find the median of a set of numbers  
Understand place value for decimals  
Position decimals on a number line  
Compare and order any number up to one billion  
Round a number to 1 significant figure  
[Write 10, 100, 1000 etc. as powers of ten](#)  
[Write positive integers in the form  \$A \times 10^n\$](#)   
[Investigate negative powers of ten](#)  
[Write decimals in the form  \$A \times 10^n\$](#)

### Fraction, Decimal and Percentage Equivalence

Represent tenths and hundredths as diagrams  
Represent tenths and hundredths on number lines  
Interchange between fractional and decimal number lines  
Convert between fractions and decimals – tenths and hundredths  
Convert between fractions and decimals – fifths and quarters  
[Convert between fractions and decimals – eighths and thousandths](#)  
Understand the meaning of percentages using a hundred square  
Convert fluently between simple fractions, decimals and percentages  
Use and interpret pie charts  
Represent any fraction as a diagram  
Represent fractions on number lines  
Identify and use simple equivalent fractions  
Understand fractions as division  
Convert fluently between fractions, decimals and percentages  
[Explore fractions above one, decimals and percentages](#)

Spring Term 2a	Term 2b
<p><b>Solving Problems with Addition and Subtraction</b>            Properties of addition and subtraction            Mental strategies for addition and subtraction            Use formal methods for addition of integers            Use formal methods for addition of decimals            Use formal methods for subtraction of integers            Use formal methods for subtraction of decimals            Choose the most appropriate method; mental strategies, formal written or calculator            Solve problems in the context of perimeter            Solve financial maths problems            Solve problems involving tables and timetables            Solve problems with frequency trees            Solve problems with bar charts and line charts  <a href="#">Add and subtract numbers given in standard form</a></p> <p><b>Multiplication and Division</b>            Properties of multiplication and division            Understand and use factors            Understand and use multiples            Multiply and divide integers and decimals by powers of 10            Multiply by 0.1 and 0.01            Convert metric units            Use formal methods to multiply integers and decimals            Use formal methods to divide integers and decimals            Understand and use order of operations            Solve problems using the area of rectangles and parallelograms            Solves problems using the area of triangles  <a href="#">Solves problems using the area of trapezia</a>            Solve problems using the mean  <a href="#">Explore multiplication and division in algebraic expressions</a></p> <p><b>Fractions and Percentages of Amounts</b>            Find a fraction of a given amount            Use a fraction to find the whole and/or other fractions            Find a percentage of a given amount using mental methods            Find a percentage of a given amount using a calculator  <a href="#">Solve problems with fractions greater than one and percentages greater than 100%</a></p>	<p><b>Directed Number</b>            Understand and use representations of directed numbers            Order directed numbers using lines and appropriate symbols            Perform calculations that cross zero            Add directed numbers            Subtract directed numbers            Multiplication of directed numbers            Multiplication and division of directed numbers            Use a calculator for directed number calculations            Evaluate algebraic expressions with directed numbers            Introduction to two step equations            Solve two step equations            Use order of operations with directed numbers  <a href="#">Roots of positive numbers</a>  <a href="#">Explore higher powers and roots</a></p> <p><b>Fractional Thinking</b>            Understand representation of fractions            Convert between mixed numbers and fractions            Add and subtract unit fractions with the same denominator            Add and subtract fractions with the same denominator            Add and subtract fractions from integers expressing the answer as a single fraction            Understand and use equivalent fractions            Add and subtract fractions where the denominators share a common multiple            Add and subtract fractions with any denominator            Add and subtract improper fractions and mixed numbers            Use fractions in algebraic contexts            Use equivalence to add and subtract decimals and fractions  <a href="#">Add and subtract simple algebraic fractions</a></p>

Summer Term 3a	Term 3b
<p><b>Constructing, Measuring and Using Geometric Notation</b>            Understand and use letter and labelling conventions including those for geometric figures            Draw and measure line segments including geometric figures            Understand angles as a measure of turn            Classify angles            Measure angles up to <math>180^\circ</math>            Draw angles up to <math>180^\circ</math>            Draw and measure angles between <math>180^\circ</math> and <math>360^\circ</math>            Identify parallel and perpendicular lines            Recognise types of triangle            Recognise types of quadrilateral            Identify polygons up to a decagon            Construct triangles using SSS            Construct triangles using SSS, SAS and ASA            Construct more complex polygons            Interpret simple pie charts using proportion            Interpret pie charts using a protractor            Draw pie charts</p> <p><b>Geometric Reasoning</b>            Understand and use the sum of angles at a point            Understand and use the sum of angles on a straight line            Understand and use the equality of vertically opposite angles            Know and apply the sum of angles in a triangle            Know and apply the sum of angles in a quadrilateral            Solve angle problems using properties of triangles and quadrilaterals            Solve complex angle problems  <a href="#">Find and use the angle sum of any polygon</a>  <a href="#">Investigate angles in parallel lines</a>  <a href="#">Understand and use parallel line angle rules</a>  <a href="#">Use known facts to obtain simple proofs</a></p>	<p><b>Developing Number Sense</b>            Know and use mental addition and subtraction strategies for integers            Know and use mental multiplication and division strategies for integers            Know and use mental arithmetic strategies for decimals            Know and use mental arithmetic strategies for fractions            Use factors to simplify calculations            Use estimation as a method for checking mental calculations            Use known number facts to derive other facts            Use known algebraic facts to derive other facts            Know when to use a mental strategy, formal written method or calculator</p> <p><b>Sets and Probability</b>            Identify and represent sets            Interpret and create Venn diagrams            Understand and use the intersection of sets            Understand and use the union of sets  <a href="#">Understand and use the complement of a set</a>            Know and use the vocabulary of probability            Generate sample space diagrams            Calculate the probability of a single event            Understand and use the probability scale            Know that the sum of probabilities for all possible outcomes is one</p> <p><b>Prime Numbers and Proof</b>            Find and use multiples            Identify factors of numbers and expressions            Recognise and identify prime numbers            Recognise square and triangular numbers            Find common factors and HCF            Find common multiples and LCM            Write a number as a product of its prime factors  <a href="#">Use a Venn Diagram to calculate HCF and LCM</a>            Make and test conjectures            Use counterexamples to disprove a conjecture</p>

# Year 8

## Autumn Term 1a

## Term 1b

- \*All lessons begin with a 'Flashback' starter in order to aid the retention of key mathematical facts and skills.
- \*Weekly homework is used to aid factual fluency and interleave skills taught in lessons.
- \*Knowledge organisers are provided for each unit so that students can see the bigger picture and be aware of all the expected core knowledge, which is regularly assessed through low stakes quizzes.
- \*Formative, low stakes, interweaving tests are taken at the end of each block.
- \*Each block consists of smaller steps which are sequenced to optimise progression.

### Ratio and Scale

Understand the meaning and representation of ratio  
Understand and use ratio notation  
Solve problems involving ratio of the form 1:n  
Solve proportional problems involving the ratio m:n  
Divide a value into a given ratio  
Express ratios in their simplest integer form  
Express ratios in the form 1:n  
Compare ratios and related fractions  
Understand  $\pi$  as the ratio between diameter and circumference  
Understand gradient of a line as ratio

### Multiplicative Change

Solve problems involving direct proportion  
Explore conversion graphs  
Convert between currencies  
Explore direct proportion graphs  
Explore relationships between similar shapes  
Understand scale factors as multiplicative representations  
Draw and interpret scale diagrams  
Interpret maps using scale factors and ratios

### Multiplying and Dividing Fractions

Represent multiplication of fractions  
Multiply a fraction by an integer  
Find the product of a pair of unit fractions  
Find the product of a pair of any fractions  
Divide an integer by a fraction  
Divide a fraction by a unit fraction  
Understand and use the reciprocal  
Divide any pair of fractions  
[Multiply and divide mixed number and improper fractions](#)  
[Multiply and divide algebraic fractions](#)

### Working in the Cartesian Plane

Work with coordinates in all four quadrants  
Identify and draw lines that are parallel to the axes  
Recognise and use the line  $y = x$   
Recognise and use lines of the form  $y = kx$   
Link  $y = kx$  to direct proportion problems  
[Explore the gradient of the line  \$y = kx\$](#)   
Recognise and draw lines of the form  $y = x + a$   
Explore graphs with a negative gradient  
Link graphs to linear sequences  
Plot graphs of the form  $y = mx + c$   
[Explore non-linear graphs](#)  
[Find the mid-point of a line segment](#)

### Representing Data

Draw and interpret scatter graphs  
Understand and describe linear correlation  
Draw and use line of best fit  
Identify non-linear relationships  
Identify different types of data  
Read and interpret ungrouped frequency tables  
Read and interpret grouped frequency tables  
Represent grouped discrete data  
Represent continuous data grouped into equal classes  
Represent data in two-way tables

### Tables and Probability

Construct sample space diagrams for one event  
Find probabilities from a sample space diagram  
Find probabilities from two-way tables  
Find probabilities from Venn Diagrams  
[Use the product rule for finding the total number of possible outcomes](#)

Spring Term 2a	Term 2b
<p><b>Brackets, Equations and Inequalities</b>            Form algebraic expressions            Use directed number within Algebra            Multiply out a single bracket            Factorise into a single bracket            Expand multiple single brackets and simplify  <a href="#">Expand a pair of binomials</a>            Solve equations, including with brackets            Form and solve equations with brackets            Understand and solve simple inequalities            Form and solve inequalities  <a href="#">Form and solve equations and inequalities with unknowns on both sides</a>            Identify and use formulae, expressions, identities and equations</p> <p><b>Sequences</b>            Generate sequences given a rule in words            Generate sequences given a simple algebraic rule            Generate sequences given a complex algebraic rule  <a href="#">Find the rule for the <math>n^{\text{th}}</math> term of a linear sequence</a></p> <p><b>Indices</b>            Adding and subtracting expressions with indices            Simplifying algebraic expressions by multiplying indices            Simplifying algebraic expressions by dividing indices            Using the addition law for indices            Using the addition and subtraction laws for indices  <a href="#">Exploring powers of powers</a></p>	<p><b>Fractions and Percentages</b>            Convert fluently between key fractions, decimals and percentages            Calculate key fractions, decimals and percentages of an amount without a calculator            Calculate fractions, decimals and percentages of amounts using calculator methods            Convert between decimals and percentages greater than 100%            Percentage decrease with a multiplier            Calculate percentage increase and decrease using a multiplier            Express one number as a fraction or percentage of another without a calculator            Express one number as a fraction or percentage of another using calculator methods            Work with percentage change            Choose appropriate methods to solve percentage problems  <a href="#">Find the original amount given the percentage less than 100%</a>  <a href="#">Find the original amount given the percentage greater than 100%</a>  <a href="#">Choose appropriate methods to solve complex percentage problems</a></p> <p><b>Standard Index Form</b>            Investigate positive powers of ten            Work with numbers greater than 1 in standard form            Investigate negative powers of ten            Work with numbers between 0 and 1 in standard form            Compare and order numbers in standard form            Mentally calculate with numbers in standard form            Add and subtract numbers in standard form            Multiply and divide numbers in standard form            Use a calculator to work with numbers in standard form  <a href="#">Understand and use negative indices</a>  <a href="#">Understand and use fractional indices</a></p> <p><b>Number Sense</b>            Round numbers to powers of 10 and 1 significant figure            Round numbers to a given amount of decimal places            Estimate the answer to a calculation  <a href="#">Understand and use error interval notation</a>            Calculate using the order of operations            Calculate with money            Convert metric measures of length            Convert metric units of mass and capacity  <a href="#">Convert metric units of area</a>  <a href="#">Convert metric units of volume</a>            Solve problems involving time and calendar</p>



Summer Term 3a	Term 3b
<p><b>Angles in Parallel Lines and Polygons</b>            Understand and Use Basic Angle Rules and Notation            Investigate Angles between parallel lines and the transversal            Identify and Calculate with Co-interior, Alternate and Corresponding Angles.            Solve Complex Problems with parallel line angles.            Construct triangles and special quadrilaterals.            Investigate the properties of special quadrilaterals            Identify and calculate with sides and angles in special quadrilaterals  <a href="#">Understand and use the properties of diagonals of quadrilaterals</a>            Understand and use the sum of the exterior angles in any polygon            Understand and use the sum of the interior angles in any polygon  <a href="#">Prove simple geometric facts</a>  <a href="#">Construct an angle bisector and a perpendicular bisector.</a></p> <p><b>Area of Trapezia and Circles</b>            Calculate the area of triangles, rectangles, parallelograms and trapezia            Calculate the perimeter and area of compound shapes            Investigate the area of a circle and parts of a circle with and without a calculator            Calculate the perimeter and area of compound shapes involving circles</p> <p><b>Line Symmetry and Reflection</b>            Recognise lines of symmetry            Reflect a shape in a horizontal or vertical line            Reflect a shape in a diagonal line</p>	<p><b>The Data Handling Cycle</b>            Set up a statistical enquiry            Design and criticise questionnaires            Draw and interpret pictograms, bar charts and vertical line charts            Draw and interpret multiple bar charts            Draw and interpret pie charts            Draw and interpret line graphs            Choose the most appropriate diagram for a given set of data            Represent and interpret grouped quantitative data            Find and interpret the range            Compare distributions using charts            Identify misleading graphs</p> <p><b>Measures of Location</b>            Understand the mean, median and mode            Choose the most appropriate average  <a href="#">Find the mean from a frequency table</a>  <a href="#">Find the mean from a grouped frequency table</a>            Identify outliers            Compare distributions using averages.</p>

# Year 9

## Autumn Term 1a

## Term 1b

- \*All lessons begin with a 'Flashback' starter in order to aid the retention of key mathematical facts and skills.
- \*Weekly homework is used to aid factual fluency and interleave skills taught in lessons.
- \*Knowledge organisers are provided for each unit so that students can see the bigger picture and be aware of all the expected core knowledge, which is regularly assessed through low stakes quizzes.
- \*Formative, low stakes, interweaving tests are taken at the end of each block.
- \*Each block consists of smaller steps which are sequenced to optimise progression.

### Straight Line Graphs

Lines parallel to the axes,  $y=x$  and  $y=-x$

Using tables of values

Compare gradients

Compare intercepts

[Understand and use  \$y=mx+c\$](#)

Find the equation of a line from a graph

Interpret gradient and intercepts of real-life graphs

[Model real-life graphs involving inverse proportion](#)

[Explore perpendicular lines](#)

### Forming and Solving Equations

Solve one and two step equations and inequalities

Solve one and two step equations and inequalities with brackets

Inequalities with negative numbers

Solve equations with unknowns on both sides

Solve equations and inequalities in context

Substituting into formulae and equations

Rearranging formulae (one-step)

Rearranging formulae (two-step)

[Rearrange complex formulae including brackets and squares](#)

### Testing Conjectures

Factors, multiples and primes

True or False?

Always, Sometimes, Never true

Show that..

Conjectures about number

Expand a pair of binomials

Conjectures with algebra

Explore the 100 grid

### Three Dimensional Shapes

Know names of 2D and 3D shapes

Recognise prisms (including language of edges/vertices)

Accurate nets of cuboids and other 3D shapes

Plans and Elevations

Find area of 2D shapes

Surface area of cubes and cuboids

Surface area of triangular prisms

Surface area of a cylinder

Volume of cubes and cuboids

Volume of other 3D shapes – prisms and cylinders

Explore volumes of cones, pyramids and spheres

### Constructions and Congruency

Locus of distance from two lines

Construct an angle bisector

Construct triangles from given information

Identify congruent figures

Explore congruent triangles

Identify congruent triangles

Spring Term 2a	Term 2b
<p><b>Numbers</b>  Integers, real and rational numbers  <a href="#">Understand and use surds</a>  Work with directed number  Solve problems with integers  Solve problems with decimals  HCF and LCM  Adding and subtracting fractions  Multiplying and dividing fractions  Solve problems with fractions  Numbers in standard form</p> <p><b>Using Percentages</b>  Use the equivalence of fractions, decimals and percentages  Calculate percentage increase and decrease  Express a change as a percentage  Solve 'reverse' percentage problems  Recognise and solve percentage problems (with and without a calculator)  <a href="#">Solve problems with repeated percentage change</a></p> <p><b>Maths and Money</b>  Solve problems with bills and bank statements  Calculate simple interest  Calculate compound interest  Solve problems with Value Added Tax  Calculate wages and taxes  Solve problems with exchange rates  Solve unit pricing problems</p>	<p><b>Deductions</b>  Angles in parallel lines  Solving angle problems (using chains of reasoning)  Angle problems with algebra  Conjectures with angles  Conjectures with shapes  <a href="#">Link constructions and geometrical reasoning</a></p> <p><b>Rotations and Translation</b>  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  <a href="#">Find the result of a series of transformations</a></p> <p><b>Pythagoras' Theorem</b>  Squares and square roots  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 axes  Explore proofs of Pythagoras' Theorem  <a href="#">Use Pythagoras' Theorem in 3D shapes</a></p>

Summer Term 3a	Term 3b
<p><b>Enlargement and Similarity</b>            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  <a href="#">Enlarge a shape by a negative scale factor</a>            Work out missing sides and angles in a pair of similar shapes  <a href="#">Solve problems with similar triangles</a>  <a href="#">Explore ratios in right-angled triangles</a></p> <p><b>Solve Ratio and Proportion Problems</b>            Solve problems with direct proportion            Direct proportion and conversion graphs            Solve problems with inverse proportion  <a href="#">Graphs of inverse relationships</a>            Solve ratio problems given the whole or part            Solve 'best buy' problems  <a href="#">Solve problems with ratio and algebra</a></p> <p><b>Rates</b>            Solve speed, distance and time problems without a calculator            Solve speed, distance and time problems with a calculator            Use distance-time graphs            Solve problems with density, mass and volume            Solve flow problems and their graphs            Rates of change and their units  <a href="#">Convert compound units</a></p>	<p><b>Probability</b>            Single event probability            Relative frequency            Expected outcomes            Independent events  <a href="#">Use tree diagrams</a>  <a href="#">Use tree diagrams to solve 'without replacement' problems</a>            Use diagrams to work out probabilities</p> <p><b>Algebraic Representation</b>            Draw and interpret quadratic graphs            Interpret other graphs, including reciprocal and piece-wise  <a href="#">Investigate graphs of simultaneous equations</a>            Represent inequalities</p>

# Year 10

## Autumn Term 1a

## Term 1b

\*Each topic has test and a resit test in the style of the final exam. Results are recorded with a question analysis to inform students of their areas of strength and weakness. These results contribute to the overall datapoint. These low stakes tests are given after a delay so that students are required to revise content (using Hegarty homework) and draw from their long term memory reserves rather than short term.

\*Starters feature interleaving topics in order to keep skills fresh and maintain a sense of perpetual revision. These have been designed to work alongside the curriculum covering the four strands of number, algebra, shape and data.

### FOUNDATION

1	Number inc LCM, HCF, express a number as product of prime factors
2	Algebraic Expressions inc substitution, expansion & factorisation

#### **Number**

BIDMAS

Powers, roots and brackets

Product of prime factors

LCM and HCF

#### **Expressions**

Simplify algebraic expressions

Use the index laws

Expand single brackets and simplify

Expand double brackets

Factorise quadratic expressions

### FOUNDATION

3	Angles inc parallel lines & polygons
4	Averages & Range inc grouped data, stem & leaf diagrams
5	Decimals inc estimation, upper & lower bounds

#### **Angles**

Apply angle rules associated with polygons

Apply angle rules associated with parallel lines

Draw and measure bearings

#### **Averages and Range**

Work out averages and range from a list

Compare data

Find averages for grouped and ungrouped data

#### **Decimals**

Rounding

Estimation

Four rules with decimals

Solve problems

Find upper and lower bounds

## HIGHER

1	Number inc indices, standard form, surds
2	Expressions inc substitution, expansion, factorising

### **Number**

Find HCF and LCM of larger numbers  
Write a number as a product of its prime factors  
Apply the laws of indices  
Write numbers in standard form  
Calculate with numbers in standard form  
Simplify surds

### **Expressions**

State relationships between different quantities  
Simplify algebraic expressions – four rules  
Index rules to simplify  
Expand and factorise algebraic expressions

## HIGHER

3	Angles & Circle Theorems
4	Statistics 1 inc data collection/sampling, averages & range
5	Fractions & Decimals inc upper & lower bound calculations

### **Angles and Circle Theorems**

Calculate using the sum of interior angles of polygons  
Calculate using the sum of exterior angles of polygons  
Prove and use the angle properties of a circle  
Prove and use the tangent/chord properties of a circle  
Prove and use the alternate segment theorem

### **Handling Data**

Use appropriate sampling techniques  
Calculate the mean in a frequency distribution  
Find the mean of grouped data  
Use the sigma notation  
Represent data as a time series

### **Fractions and decimals**

Add and subtract mixed numbers  
Convert a fraction to a decimal and vice versa  
Find reciprocals  
Multiply and divide fractions  
Convert a fraction to a recurring decimal and vice versa  
Solve problems involving fractions  
Work out upper and lower bounds of measures and calculate the effect.

**Spring Term 2a****Term 2b**

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**FOUNDATION**

6	2D Shapes
7	Equations inc balancing and trial & improvement method
8	Fractions

**2D shapes**

Areas and perimeters of shapes  
Convert units of area

**Solving Equations**

Formulate and solve an equation  
Equation, expression meanings  
Model real life situations

**Fractions**

Convert between fractions and mixed numbers  
Equivalence to order fractions  
Four rules with fractions  
Reciprocal of a number

**FOUNDATION**

9	Transformations inc symmetry
10	Formulae inc substitution, change of subject

**Transformations**

Symmetry  
Describe transformations  
Distinguish preserved properties  
Apply similarity rules

**Formulae**

Form a relationship between quantities  
Substitution  
Change the subject

## HIGHER

6	2D Shapes
7	Linear Equations inc algebraic & graphical solutions of simultaneous equations
8	Percentages

### **2D shapes**

Use formulae to calculate areas and perimeters of circles and parts of circles  
Convert units of area

### **Linear Equations and Graphs**

Solve linear equations (including fractional coefficients)  
Algebraically solve two simultaneous equations  
Draw graphs of linear equations  
Implement  $y=mx+c$   
Find the gradient of perpendicular lines  
Find solutions to simultaneous equations from the point of intersection.

### **Percentages**

Find a percentage increase and decrease of an amount  
Find a reverse percentage  
Use a multiplier  
Calculate simple and compound interest

## HIGHER

9	Transformations
10	Formulae & Sequences

### **Transformations**

Translate using vector notation  
Rotate a shape about a Centre of Rotation  
Reflect shapes in horizontal, vertical,  $y=x$  and  $y=-x$  lines  
Enlarge shapes (+ve, -ve, fractional sf)  
Recognise congruent shapes  
Combine transformations

### **Formulae and Sequences**

Use formula triangles for speed, density etc  
Substitute +ve and -ve numbers into simple formulae and those involving powers  
Generate a formula from given information  
Change the subject of a formula  
Determine if an expression represents Length, Area or Volume



**Summer Term 3a****Term 3b**

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**FOUNDATION**

11	Percentages
12	Presenting data inc pie chart, scatter diagram, frequency polygon
13	3D Shapes

**Percentages**

Find percentages of quantities  
 One amount as a percentage of another  
 Increase and decrease using multipliers  
 Solve real life problems

**Presenting Data**

Design questionnaires and surveys  
 Primary and Secondary data  
 Discrete and continuous data  
 Sampling methods and bias  
 Draw and interpret graphs

**3D shapes**

Calculate the volume of 3D shapes  
 Calculate the surface area of 3D shapes  
 Convert between units of volume

**FOUNDATION**

14	Sequences
15	Ratio & Proportion

**Sequences**

Generate terms using term-to-term and position-to-term  
 Generate terms derived from diagrams  
 Find the nth term of an arithmetic sequence  
 Generate a sequence using an nth term formula

**Ratio and Proportion**

Reduce a ratio to its simplest form  
 Solve problems involving ratio  
 Proportion set in a variety of contexts

## HIGHER

11	Trigonometry 1 inc Pythagoras & 3D shapes
12	Statistics 2 inc cumulative frequency & box plots, histograms
13	3D Shapes

### **Pythagoras and Trigonometry**

Use Pythagoras in 3D situations

Use Trig ratios to calculate unknown lengths and angles

Use Trig in 3D situations

### **Handling Data 2**

Represent data in frequency polygons

Recognise the differences between a bar chart and a histogram

Compare distributions in charts and graphs

Find the median and quartiles of large sets of ungrouped data

Draw a cumulative frequency table for grouped data

Find medians and quartiles from cumulative frequency curves

Use cumulative frequency curve to solve problems

Draw box plot from cumulative frequency curve

Compare cumulative frequency curves and box plots

Complete a histogram from a frequency table

Complete a frequency table from a histogram

Use a histogram to work out the frequency in part of a class interval

### **3D Shapes**

Use formulae to calculate and solve problems with volumes and surface areas

convert between units of volume

Find the number of vertices, edges and faces of 3D shapes

Draw and recognise solids from their net

Draw and interpret plans and elevations

Draw planes of symmetry in 3D shapes

Recognise and name solids in the real world, including prisms

## HIGHER

14	Algebraic Graphs inc cubic, reciprocal, exponential
15	Ratio & Proportion inc direct & inverse & graphs

### **Algebraic Graphs**

Plot the graphs of quadratic functions for positive and negative values of x

Find graphically the solution to quadratic equations

Plot the graphs of cubic functions for +ve & -ve values of x

Find graphically the solution to cubic equations

Find graphically the solution to quadratic and linear simultaneous equations

Draw graphs of reciprocal and exponential functions

### **Ratio and Proportion**

Work out map distance given ratio and real distance  
Interpret direct and indirect proportions as algebraic functions

Find the constant of proportionality

Use algebraic functions to find unknown values

Recognise and sketch graphs for

$$y \propto x,$$

$$y \propto x^2,$$

$$y \propto x^3,$$

$$y \propto 1/x,$$

$$y \propto 1/x^2$$

# Year 11

## Autumn Term 1a

## Term 1b

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### FOUNDATION

16	Algebraic Graphs
17	Measure
18	Inequalities
19	Powers & Roots inc rules for indices & standard form

#### **Algebraic Graphs**

Straight line graphs of the form  $y=mx+c$   
Plot graphs of functions in which  $y$  is given in terms of  $x$ .

#### **Measure**

Select and suitable strategies and techniques to solve problems and word problems involving a range of measures including compound measures.

#### **Inequalities**

Write numbers given an inequality  
Represent inequalities on a number line  
Solve inequalities

#### **Powers and Roots**

Square/Square root/Cube/Cube root  
Index notation  
Index laws including negative powers  
Standard Form notation

### FOUNDATION

20	Pythagoras Theorem and Trigonometry
21	Probability
22	Constructions Loci Congruence
23	Simultaneous Equations

#### **Pythagoras and Trigonometry**

How to apply Pythagoras' Theorem  
How to apply Trigonometry to right-angled triangles.

#### **Probability**

How to use the language of probability to describe the likelihood of an event  
How to represent and compare probabilities on a number scale  
How to list outcomes for mutually exclusive events  
How to use probability tree diagrams and Venn diagrams to find probability.

#### **Construct/Loci/Congruence**

Construct triangles and other 2D shapes using ruler and protractor/compasses  
Use the rules for congruence SSS, SAS, ASA, RHS  
Use Loci

#### **Simultaneous Equations**

Algebraically solve two simultaneous equations  
Find solutions to simultaneous equations from the point of intersection.

## HIGHER

16	Loci, Constructions & Congruence
17	Inequalities inc graphical solutions
18	Probability
19	Further Factorising Quadratics, completing the square, simplify algebraic fractions

### **Loci Constructions and Congruence**

How to construct equilateral triangles  
How to construct the midpoint and perpendicular bisectors of a line  
How to construct the perpendicular from a point on a line  
How to construct the bisector of an angle  
How to construct 60, 30 and 45 degrees  
How to construct a regular hexagon inside a circle  
How to construct a region bounded by a circle and line  
How to find a path equidistant from two points or two line segments

### **Inequalities**

How to solve linear inequalities and show results on line or write integer solutions  
How to draw the graphs of inequalities and identify regions or point solutions

### **Probability**

How to use  $p(a \text{ or } b) = p(a) + p(b)$   
How to use  $p(a \text{ and } b) = p(a) \times p(b)$   
How to draw and use tree diagrams to solve probability questions  
How to find estimates of probability by considering relative frequencies  
To recognise that the more an experiment is repeated the better the accuracy

### **Further factorising**

How to factorise more complex quadratic expressions  
How to simplify rational quadratic expressions  
How to add & subtract rational quadratic expressions  
How to complete the square

## HIGHER

20	Trigonometry 2 inc sine/cosine rule, trig graphs, area formula
21	Solve Quadratic Equations inc factorising, completing square, formula
22	Similar Shapes inc area and volume
23	Simultaneous Equations - linear/quadratic equations and circles

### **Trigonometry 2**

How to sketch and use graphs:  $y = \sin x$ ,  $\cos x$ ,  $\tan x$   
How to use sine and Cosine rules in non-right angled triangles  
How to identify and use the Sine and Cosine rules  
How to find the area of triangles given 2 lengths & an angle

### **Quadratic Equations**

How to use the quadratic formula to solve quadratic equations  
How to use quadratic formula to solve equations leaving answer in surd form  
How to complete the square of a quadratic to find max/min point

### **Similar Shapes**

How to use integer and non-integer scale factors to find missing lengths  
How to find the relationship of linear, area and volume scale factors  
How to prove formally geometric properties of triangles

### **Simultaneous Equations**

How to solve quadratic and linear functions graphically  
How to find the exact solution of linear and quadratic equations  
How to draw a circle of radius  $r$  centred on the origin  
How to find approximate solutions for linear and circular simultaneous equations  
How to find the exact solution of linear and circular simultaneous equations

**Spring Term 2a****Term 2b**

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**FOUNDATION**

24

Vector Geometry

**Vector Geometry**

Recognise magnitude and direction of a vector

Recognise the 3 forms of vector notation

Identify equal vectors

Calculate the magnitude of a vector

Identify parallel vectors

Multiply a vector

Revision Plan – 10 week rota

Interleaving starters and Banker topics in order to secure content.

Finish the rota to secure the content

Past Paper questions to secure exam technique.

## HIGHER

24	Vectors
25	Transformation of Functions

### **Vectors**

How to recognise magnitude and direction of a vector

How to recognise the three forms of vector notation

How to identify equal vectors

How to calculate the magnitude of a vector

How to identify parallel vectors

How to multiply a vector

How to simplify vector expressions

How to recognise that  $-AB = BA$

How to solve simple geometrical problems in 2D

How to show two lines are parallel

How to recognise when 3 points lie on the same line

### **Transformation of functions**

How to use function notation

How to identify, describe and carry out vertical translations

How to identify, describe and carry out horizontal translations

How to identify, describe and carry out reflections in the x and y axes

How to identify, describe and carry out a stretch parallel to the axes

How to apply all the above to the graphs of  $\sin x$  and  $\cos x$

Revision Plan – 10 week rota

Interleaving starters and Banker topics in order to secure content.

Summer Term 3a	Term 3b
<p data-bbox="108 188 225 219"><b>Revision</b></p> <p data-bbox="108 228 384 259">Past paper questions</p> <p data-bbox="108 306 301 342"><b>Final Exam</b></p>	

# Year 12

## Autumn Term 1a

## Term 1b

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### Algebra 1

Argument and proof  
Index Laws  
Surds  
Quadratic functions  
Lines and circles  
Simultaneous Equations  
Inequalities

### Trigonometry

Sine, cosine and tangent  
The sine and cosine rules

### Differentiation and Integration

Differentiation from first principles  
Differentiating  $ax^n$  and Leibniz notation  
Rates of change  
Tangents and Normals  
Turning points  
Integration  
Area under a curve

### Polynomials and the Binomial Theorem

Expanding and factorising  
The binomial Theorem  
Algebraic division  
Curve sketching

### Exponentials and Logarithms

The law of logarithms  
Exponential functions  
Exponential processes  
Curve fitting

### Vectors

Definitions and properties  
Components of a vector

## Spring Term 2a

## Term 2b

### Units and Kinematics

Standard units and basic dimensions  
Motion in a straight line  
Equations of motion for constant acceleration  
Motion with variable acceleration

### Collecting, representing and interpreting data

Sampling  
Central tendency and spread  
Single-variable data  
Bivariate data

### Forces and Newton's Laws

Forces 1  
Dynamics 1  
Motion under gravity  
Systems of forces

### Probability and DRVs

Probability  
Binomial distribution

### Hypothesis testing 1

Formulating a test  
The critical region

## Summer Term 3a

## Term 3b

Revision

### Motion in two dimensions

2D motion with constant acceleration  
2D motion with variable acceleration  
Motion under gravity 2



# Year 13

Autumn Term 1a	Term 1b
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<p><b>Algebra 2</b>            Mathematical Proof            Functions            Parametric Equations            Algebraic fractions            Partial fractions            Vectors in 3D</p> <p><b>Trigonometric Identities</b>            Radians            Reciprocal and inverse trigonometric functions            Compound angles            Equivalent forms for <math>a\cos\theta + b\sin\theta</math></p> <p><b>Differentiation 2</b>            The shapes of functions            Trigonometric functions            Exponential and logarithmic functions            The product and quotient rules            The Chain Rule            Inverse functions            Implicit differentiation            Parametric functions</p>	<p><b>Sequences</b>            The Binomial Series            Arithmetic Sequences            Geometric Sequences</p> <p><b>Integration and differential equations</b>            Standard integrals            Integration by substitution            Integration by parts            Integrating rational functions            Integrating parametric functions            Differential equations</p> <p><b>Numerical Methods</b>            Simple root finding            Iterative root finding            Newton-Raphson root finding            Numerical integration</p>
Spring Term 2a	Term 2b
<p><b>Motion in two dimensions</b>            2D motion with constant acceleration            2D motion with variable acceleration            Motion under gravity 2            Motion under forces</p> <p><b>Probability and CRVs</b>            Conditional probability            The Normal distribution            Using the Normal as an approximation of the Binomial</p>	<p><b>Forces 2</b>            Statics            Dynamics 2            Moments</p> <p><b>Hypothesis Testing 2</b>            Testing correlation            Testing a Normal distribution</p>
Summer Term 3a	Term 3b
<p><b>Revision</b>            Past Paper Questions</p>	<p><b>Final Exam</b></p>