

Curriculum Intent

Mathematic teachers are striving for all students to be successful and enjoy the subject, irrespective of their prior experience. Students will be encouraged to see the link between topics across the curriculum, as well as their application to problems, which can include a real-life emphasis.

Students are being prepared for studying the subject at GCSE, in the Sixth Form and beyond. They will appreciate its relevance to the world of work, in particular, where problem-solving strategies are needed to tackle tasks where the correct approach is not immediately clear.

As well as being knowledgeable with their application, students will need to adopt a risk-taking approach in order to make an initial attempt. They will need to be reflective of the solution, or progress made towards one, and ensure their final answer is communicated in a mathematically coherent manner.

Autumn Term | Number | Algebra | Ratio

Number

Round decimals to the nearest decimal place
 Recognise significant figures
 Round a number to one significant figure
 Estimate calculations by rounding to one significant figure and multiplying and dividing mentally
 Solving problems involving multiplying and dividing any three-digit by any two-digit number
 Product of prime factors and HCF, LCM
 Writing repetitive multiplication using indices including 21 and 20
 Use index rules, multiplication, division and raising to the power
 Express numbers in standard form
 Use inequality notation to specify simple error intervals due to rounding

Ratio

Simplify ratios and use ratio notation
 Divide a quantity into two or more parts in a given ratio
 Apply ratio to real contexts and problems
 Use map scales to find distances
 Interpret the gradient of a straight line graph as a rate of change
 Use and understand the notation for direct and inverse proportion
 Recognise and interpret graphs that illustrate direct and inverse proportion
 Set up, solve and interpret answers in growth and decay problems including compound interest

Algebra

Construct and use simple formulae involving one or two operations
 Write an expression from a problem
 Substitute negative numbers into a simple formula
 Multiply a single term over a bracket
 Expand the product of two linear expressions
 Square a linear expression, expand the product of two linear expressions of the form $x \pm n$ and simplify the corresponding quadratic expression
 Solve simple linear equations
 Solve linear equations with integer coefficients (with and without brackets, negative signs anywhere in the equation, positive or negative solution)
 Derive a formula and, in simple cases, change its subject
 Solve linear inequalities in one variable, and represent the solution set on a number line
 Find a particular term in a sequence involving negative or fractional numbers
 Write the term-to-term rule in a sequence involving negative or fractional numbers
 Generate terms of a linear sequence
 Deduce expressions to calculate the n th term of a linear sequence
 Find the next term of quadratic sequences and functions
 Recognise and use Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n , n integer, r rational)

How is homework used to enhance learning?

- Homework book
- Mathswatch
- Review exercise
- Exam Style questions

What does Excellence look like?

- Use fractions, decimals and negative in the data to find averages.
- Use algebra to find a number given the mean.
- Angles in a full circle – part of a circle, arcs and sectors.
- Order fractions.
- Find areas of circles and round the answer.
- Square and square root.
- Substitution.
- Rearranging equations.
- Substitution into formula.
- Ratio – enlargement/similar triangles.
- Area and perimeter of shapes.
- Name shapes to transform.
- Lines of reflection.
- Negative numbers
- Sequences
- Ratio
- Converting units.
- Types and properties of shapes.



Area and Volume

Use and change between units of length and mass
 Use formulae for the area of a triangle, parallelogram and trapezium
 Find the area and perimeter of compound shapes
 Identify and name parts of a circle, to include centre, radius, chord, diameter and circumference
 Solve problems involving the area of a circle and know the formula
 Solve problems involving the circumference of a circle and know the formula

Pythagoras

Use Pythagoras' theorem to find the length of the hypotenuse
 Use Pythagoras' theorem to find the length of a shorter side
 Understand and apply Pythagoras' theorem when solving problems in 2-D

Graphs

Use coordinates in all four quadrants to locate and specify points
 Name and draw lines parallel to the x and y axis
 Plot straight line graphs, given a table
 Interpret and analyse straight line graphs $y=mx+c$ (gradient, intercept)
 Use the form $y=mx+c$ to identify parallel lines
 Plot graphs of simple quadratic and cubic functions
 Plot cubic and reciprocal graphs, recognise the shapes of quadratic and cubic graphs
 Plot and interpret graphs of non-standard functions to find approximate solutions to problems such as simple kinematics – distance, speed and acceleration

Fractions, Decimals and Percentages

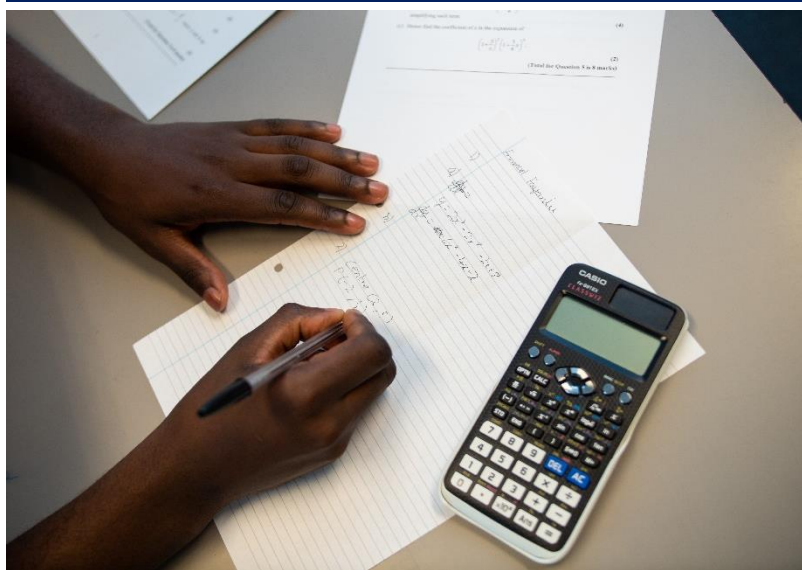
Order decimal numbers
 Do calculations with simple fractions involving addition
 Add and subtract fractions by writing them with a common denominator
 Understand and use efficient methods to add, subtract, multiply and divide fractions, interpreting division as a multiplicative inverse
 Convert between mixed and improper fractions
 Compare percentages, fractions and decimals
 Use the equivalence of fractions, decimals and percentages
 Calculate fractional or percentage parts of quantities and measurements, using a calculator where necessary
 Calculate a percentage of an amount
 Find the outcome of a given percentage increase or decrease
 Calculate a percentage change
 Simple interest
 Use reverse percentages to solve problems (original value problems)

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What does excellence look like?

- Scatter graphs
- Graphs – gradient Solving equations Bar modelling.
- Enlargement
- Types of shapes and properties of shapes.
- Converting units.
- Translation.
- Graphs.
- Negative, fraction and decimal numbers
- Solving equations.
- Trigonometry
- Speed, distance, time. Etc.
- Sequences – substitution.



Statistics and Probability

Find the mode and range of a set of data
 Find the median and mean of a set of data
 Understand and use the mean of discrete data and compare two simple distributions, using the range and one type of average
 Group data, where appropriate, in equal class intervals
 Calculate mean, median, mode and range from an ungrouped frequency table
 Estimate the mean, median and range of a set of grouped data and find the modal class
 Draw and interpret pie charts
 Use and interpret scatter graphs and recognise correlation
 Understand and use the probability scale from 0 to 1
 Calculate theoretical probability of a single event happening or not happening
 Calculate relative frequency

Angles and Polygons

Know and use the angle sum of a triangle, quadrilateral, angles at a point and angles on a straight line
 Use angle properties of isosceles, equilateral and right-angled triangles
 Use of vertically opposite, alternate and corresponding angles to solve problems.
 Exterior and Interior angles of polygons
 Use straight edge and compasses to do standard constructions
 Understand and use bearings

Transformations

Find the order of rotational symmetry and line symmetry
 Reflect shapes in a vertical/horizontal line
 Reflect shapes in lines $y=c, x=c, y=\pm x$
 Rotate shapes around a given centre of rotation
 Translate shapes (with/without vectors)
 Know translations, rotations and reflections preserve length and angle
 Enlarge 2-D shapes, given a centre of enlargement and a whole-number scale factor
 Enlarge 2-D shapes, given a fractional scale factor
 Describe transformations involving more complex shapes and solids

Simultaneous Equations

Solve a pair of simultaneous equations algebraically
 Solve a pair of simultaneous equations graphically
 Use a pair of simultaneous equations to solve a worded problem

International Opportunities

Within the curriculum

History of fractions <https://nrich.maths.org/2515>

Tasks for fractions https://nrich.maths.org/public/topic.php?group_id=2&code=19

Al-Khwarizmi Born 830AD Developed Algebra

Muslim mathematician and astronomer whose major works introduced Hindu-Arabic numerals and the concepts of algebra into European mathematics.

Fibonacci sequence – The magic of Fibonacci numbers Arthur Benjamin – TED talk

Sequence within voting systems – resource within the international folder.

Leonhard Euler 1707 – 1783 A Swiss mathematician who developed notation including the use of π .

Srinivasa Ramanujan 1887-1920 An Indian mathematician who discovered the formula for π

Using circles to estimate areas of fields.

<http://www.agritechtalk.org/Uno%20How%20Visit%201%20part%201.html>

Use temperatures of the states of America in international folder.

The number of Significant figures used for different data changes depending on how accurate you need to be.

John Napier 1550-1617 standardised the use of the decimal point.

Thales c.636 – c.546BC A Greek philosopher found that angles at the base of an isosceles triangle are equal.

Euclid born 300BC A Greek mathematician who was the 'founder of geometry' proved the exterior angles theory.

Euclid born 300BC A Greek mathematician who was the 'founder of geometry' found an algorithm for finding HCF and LCM.

Use different units of measurements eg. km, miles as well as different SI units.

Where and why did metric come about?

The golden ratio <https://www.livescience.com/37704-phi-goldenratio.html>

Use literacy rates as percentages or any other international data.

Use international data.

Baye's theorem <https://www.mathsisfun.com/data/bayes-theorem.html>

Thomas Bayes 1702 – 1761 English Statistician.

Abraham de Moivre French mathematician 1667 – 1754 developed game theory and actuarial mathematics.