Maths Year 7

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 knowledge 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 — Time | Axioms & Arrays | Factors & Multiples | Order of Operations — Positive & Negative Numbers | Expressions, equations and inequalities

Time
Understand a range of notation for quantities of time and time of day
Solve problems involving time of day and quantities of time

Axioms and Arrays
Identify the commutative, associative and distributive properties using arrays to develop understanding
Use commutativity, associativity and distributivity to solve calculations efficiently
Compare and contrast scaling, area, repeated addition and grouping/ sharing models for multiplication and division
Identify when multiplication and division are required in problems

Factors and Multiples
Understand the terms factor and multiple
Recognise and define prime, square and cube numbers
Use the definitions of factors and multiples to find common factors and common multiples
Express an integer as a product of its factors
Interpret and create representations of integers that reveal their structure
Conjecture and make generalised statements (e.g. square numbers cannot be prime, square numbers have an odd number of factors etc.)

Order of Operations
Understand the equal priority of addition with subtraction and multiplication with division in written calculations
Understand that operations of equal priority can be evaluated in any order
Understand the higher priority of multiplication with division over addition with subtraction in written calculations
Understand that written calculations follow rules of 'syntax' determining the order of operations
Interpret the order of operations from written calculations, function machines and worded descriptions
Form written calculations, function machines and worded descriptions correctly embedding the order of operations
Form and identify equivalent calculations based on distributivity, commutativity and the order of operations
Form and interpret expressions involving variables correctly embedding the order of operations

Positive and Negative Numbers
Interpret negative numbers in a variety of contexts
Compare and order positive and negative numbers
Use positive and negative numbers to express change and difference
Understand the meaning of absolute value
Calculate using all four operations with positive and negative values
Use number lines to model calculations with negative numbers
Use fact families for multiplication and division with positive and negative numbers
truncated number

Expressions, equations and inequalities
Develop understanding of algebraic notation including: $a \times b = ab$, $y + y + y = 3y$, $a \times a = a^2$
Collect like terms to simplify expressions and understand that this is a result of the distributive property e.g. $3a + 2a = (3 + 2)a = 5a$
Substitute numerical values into expressions and evaluate
Use the distributive property to identify equivalent expressions involving a single bracket and the expanded form e.g. $3(a + b) = 3a + 3b$
Develop understanding of the equality and inequality signs
Use two equations to form another related equation or inequality e.g. if $a = b$ and $b = c$ then $a = c$, $a + 1 > b$, $2a + b = 3c$
Use different contexts, including sequences, to construct expressions, equations and

What does Excellence look like?
- Highest common factor, lowest common multiple.
- Simplify expression with fractions.
- Area and perimeter of shapes with unknown lengths.
- Substitution.
- Collecting like terms with negatives.
- Substitution with negatives.
- Simplifying expression.
- Expanding brackets.
- Add and subtract fractions.
- Rearranging equations.
- Bar modelling. Simplifying expressions.
- Negative numbers.

How is homework used to enhance learning?
- Homework book
- Eedi
- Review exercise
- Exam Style questions

Classifying 2D shapes

Classify polygons by symmetry, regularity, intersection of diagonals, number of parallel sides
Classify triangles and quadrilaterals according to properties (angles, regularity, symmetry)
Know and use the angle sum of triangles and quadrilaterals
Generalise results for properties of special types of triangles and quadrilaterals
Form and solve equations from contexts arising from properties of triangles and quadrilaterals

Angles

Draw and measure acute and obtuse angles reliable to the nearest degree
Know and use angle facts: angles at a point, angles at a point on a straight line, vertically opposite angles
Define parallel and perpendicular lines
Use angle facts around corresponding, alternate and co-interior angles to find missing angles
Find unknown angles by forming algebraic expressions and equations
Solve an equation for unknowns on one side in the context of finding an unknown angle

Constructing triangles and quadrilaterals

Construct triangles and quadrilaterals for given conditions using ruler, protractor and compasses
Explore and define the minimum conditions for constructing triangles
Recognise when two triangles are congruent using the criteria of minimum conditions

Coordinates

Read and write coordinates of points in all four quadrants, including non-integer coordinates
Solve geometric problems involving missing co-ordinates
Find the mid-point of a line segment or two points
Use the midpoint and a point on the line to find the coordinates of another point on the line
Recognise and plot horizontal and vertical lines on a coordinate axis

Area of 2D shapes

Understand and use units of measure to describe the perimeter of a polygon
Understand and use units of measure for area
Calculate the perimeter of a polygon and develop strategies for estimating curved lengths
Make links between counting strategies used in arrays and methods for calculating the area of a rectangle
Find the area of rectilinear shapes
Finding the area of other 2-D shapes including triangles and special quadrilaterals
Generalise formulae for finding the area of 2-D shapes using the language of height, base, width, length etc.
Rearrange formulae to make a different subject in the context of area formulae
Reason about generalised statements of the relationship between area and perimeter

Transforming 2D figures

Reflect an object in a mirror line (both horizontal, vertical and diagonal)
Identify horizontal and vertical mirror lines on a coordinate grid and write their equations
Rotate an object with and without a centre of rotation
Translate shapes by a given number of units (positive or negative) in the x and y directions
Describe and complete translations using column vectors
Combine transformations and identify when combinations can be expressed as a single transformation
Enlarge a shape with a positive scale factor, including a fractional scale factor (no centre of enlargement)
Explore the ratios of both side lengths and area within and between similar shapes when an object is enlarged by a given scale factor
Recognise which transformations produce congruent shapes

How is homework used to enhance learning?
- Homework book
- Eedi
- Review exercise
- Exam Style questions

What does excellence look like?

Area and perimeter of shapes using fractions as lengths of sides.
Use fractions and unknowns with area and perimeter
Rearrange equations to find lengths of sides
Use decimals with equations.
Area and perimeter of shapes.
Use angle rules
Use algebra in problems.

Prime factor decomposition

Know factors and multiples, square numbers, cube numbers, prime numbers, triangular numbers
Write a number as a product of its prime factors
Use indices to record repeated multiplication
Identify the factors of a number by inspecting the product of its prime factors
Find squares, square roots, cubes and cube roots using prime factorisation
Find the highest common factor and lowest common multiple by listing factors/multiples
Find the highest common factor and lowest common multiple by using the prime factorisation

Fractions

Explore multiple representations of fractions
Convert between mixed numbers and improper fractions
Compare and order numbers (including like and unlike fractions)
Recognise and find equivalent fractions
Convert fractions to decimals
Convert terminating decimals to fractions in their simplest form
Express one quantity as a fraction of another
Find a fraction of a set of objects or a quantity
Find the whole given a fractional part
Multiply a fraction by an integer or fraction
Divide a fraction by an integer or fraction
Solve word problems involving multiplication of a fraction by a whole number or fraction using models and equations to represent the problem
Add and subtract fractions with like and unlike denominators
Add and subtract fractions with mixed numbers and improper fractions
Calculate with decimals by linking to equivalent fractions
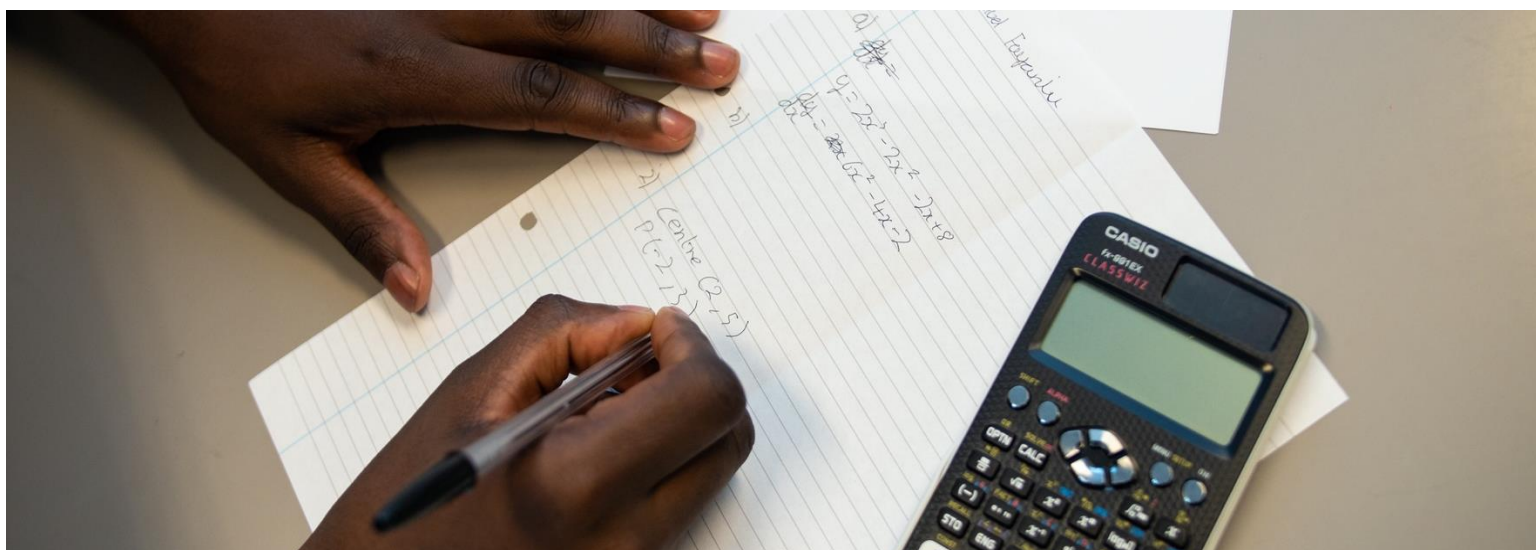
Percentage

Understand percentages as a ratio of two quantities where one quantity is standardised to 100
Understand percentages as a fractional operator with a denominator of 100
Understand and interpret percentages over 100%
Interpret a percentage as a fraction and decimal
Express a quantity as a percentage of another
Compare two quantities using percentages
Find a percentage of an amount with and without a calculator
Increase and decrease a quantity by a given percentage

Ratio

Understand the concept of ratio and use ratio language and notation
Connect ratio with understanding of fractions
Compare two or more quantities in a ratio
Recognise and construct equivalent ratios
Simplify a ratio
Construct tables of values and use graphs as a representation for a given ratio
Compare ratios by finding a common total value
Solve ratio and proportion problems in a variety of contexts

What does Excellence look like?

- Ordering fractions, whole numbers.
- Fraction of amounts.
- Add, subtract, multiply and divide fractions.
- Fractions, decimals, percentages.
- Recurring decimals.
- Applying proportion to unfamiliar contexts
- Understanding prime factorisation as means to identify facts about a number

How is homework used to enhance learning?

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

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

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

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 and an algorithm for finding HCF and LCM.

Use different units of measurements e.g. 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.