



GCSE Mathematics Year 10 Higher Tier

Mathematics teachers are striving for all students to develop an interest in studying the subject at a higher level. Students will be encouraged to explore the links between mathematics and other fields of study. Students will develop an awareness of the relevance of mathematics to the world of work and to situations in society in general.

Mathematics knows no races or geographic boundaries; for mathematics, the cultural world is one country. - David Hilbert

Students will Learn:-

Term 1

Fractions and Percentages Ordering fractions and the four rules with fractions Recurring decimals Percentage increase and decrease Compound percentages

Expressions and powers Expanding brackets Factorising – common factors Factorising quadratics Algebraic fractions Index laws, negative and fractional Standard form Surds

Probability May be done before or after work package Calculating probabilities Listing outcomes Probability from experiments AND/ OR rules Tree diagrams Conditional probability

3D shapes Plans and elevations Volume Nets and surface area Spheres, cones and Pyramids Symmetry of 3D shapes

Transformations Reflections Rotations Translations Enlargements Combinations of transformations

Term 2

Formulas, Equations and Sequences Work Package 2 Writing formulas Substituting into formulas Rearranging formulas Solving equations Forming equations Identities Proof Iterative method Term to term rules Using the nth term Finding the nth term

Collecting Data and Averages Different types of data Data collection Sampling and bias Averages and ranges Averages for grouped data

Area and Congruence Triangles and quadrilaterals Circles and sectors Congruence and similarity Area and volumes of similar shapes

Pythagoras and Trigonometry Pythagoras' theorem 3D Pythagoras Trigonometry – sin, cos, tan The sine and cosine rules Trigonometry in 3D

Term 3

Quadratics and Simultaneous Equations Solving by factorising, diff of two squares Completing the square The quadratic formula Simultaneous equations Quadratic simultaneous equations

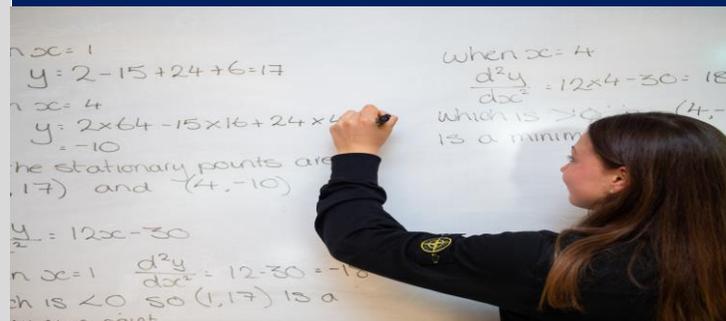
Ratio and Proportion Using ratios Dividing in a given ratio Proportion Inverse proportion

Constructions Scale drawings Bearings Constructions Loci

Sets and Venn diagrams Unions and intersections Complement of a set

Some Knowledge and Skills gained:-

- Be able to find an equivalent fraction
- To convert between mixed and improper fractions
- Simplify algebraic expressions by collecting like terms Use the index laws when multiplying and dividing variables. Expand a single term with a bracket
- Find a probability from a given event Know that probabilities must be between 0 and 1
- Find the relative frequency from an event
- Draw plans and elevations of 3D shapes. Draw 3D shapes on isometric paper
- Find the surface area and volume of a sphere. Find the surface area and volume of cones and frustums
- Translate, reflect and enlarge a shape on a coordinate grid
- Be able to set up an algebraic equation for a given situation. Interpret the solution of an algebraic equation in context
- Find the nth term of a quadratic sequence
- Find the mode, median, mean and range from a frequency table
- Find the area and perimeter of rectangles, triangles and composite shapes
- Use Pythagoras theorem to find missing lengths in right angled triangles
- Use the quadratic formula to solve quadratic equations

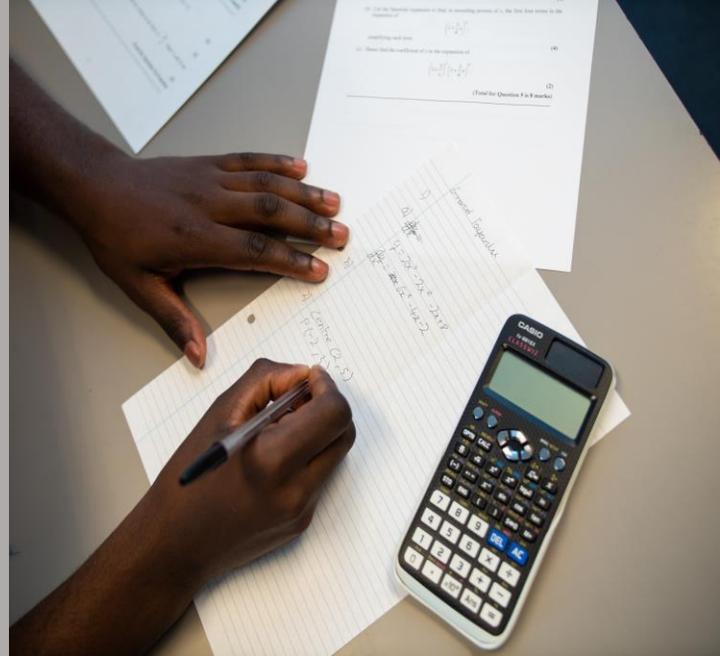


How will we assess learning?

- Homework book exercises
- Mathswatch
- Exam style questions
- Problem solving book
- Understanding of key vocabulary, definitions
- Past Papers

Key Vocabulary?

- Common denominator, reciprocal
- Index, index notation Variable, expression, term, product, expanding, binomial
- Event, outcome, equally likely, random, mutually exclusive, independent events, dependent events, relative frequency, conditional
- Plan, elevation, net, isometric grid
- Line of symmetry, scale factor, rotation, enlargement, translation
- Consecutive, term, term-to-term rule, arithmetic sequence, geometric sequence, position-to-term rule
- Primary, secondary, qualitative, quantitative, discrete, continuous, population sample, representative
- Circumference, sector, arc, congruence, similar, scale factor
- Pythagorean triple, hypotenuse, sine, cosine, tangent
- Roots, solution, simultaneous equation
- Exchange rates, proportion
- Perpendicular, locus (loci), bisect
- Gradient, y-intercept, x-intercept, parallel, perpendicular, number line, inequality
- Circumference, arc, sector, segment, tangent, chord



“Pure Mathematics is, in its way, the poetry of logical ideas.” Albert Einstein

International Opportunities

Within the curriculum

- Use literacy rates as percentages or any other international data. History of fractions <https://nrich.maths.org/2515> Tasks for fractions https://nrich.maths.org/public/topic.php?group_id=2&code=19
- International 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. Standard form – km between planets.
- Use international data. Baye’s theorem <https://www.mathsisfun.com/data/bayestheorem.html> Thomas Bayes 1702 – 1761 English Statistician. Abraham de Moivre French mathematician 1667 – 1754 developed game theory and actuarial mathematics.
- Famous buildings – Pantheon.
- The school emblem. Flags of the world. Symmetry of buildings.
- Singaporean bar modelling method Al-ge-bra is Arabic Use science equations Use scientific formulas, cooking formulas, mobile phones etc. Fibonacci sequence – The magic of Fibonacci numbers Arthur Benjamin – TED talk Sequence within voting systems – resource within the international folder. Pascal’s triangle Sierpinsky’s triangle.
- π a Greek letter 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>
- Pythagoras was a Greek mathematician c.560 – c.480BC <https://nrich.maths.org/2721>
- Bhaskara was an Indian mathematician who dealt with complicated formula with zero-digits. He was acknowledged by mathematicians in Europe in the 12th century, and thus considered by many as the man who invented the quadratic equation. Simultaneous equations in real life – in international folder.
- ‘M’ comes from the Latin word ‘modus’ meaning measure (some say from the French word ‘monter’ - to climb). ‘C’ is for Cartesian plane. Cartesian plane was named by Rene Descartes.
- Thales c.636 – c.546 BC Angles at the base of an isosceles triangle are equal. Vertically opposite angles are equal. Euclid born 300BC A Greek mathematician who was the ‘founder of geometry’ proved the exterior angles theory.
- Use of International data.