

Mathematics Year 9 Curriculum:

There are 5 main areas of Mathematics that will be covered in Year 9: **Number:** –indices, roots, standard form, limits of accuracy, **Handling Data:** – representation and analysis of data, **Algebra:** equations, identities, simultaneous equations, direct and inverse proportion. **Shape and space** – Pythagoras, trigonometry, congruent shapes and **Problem solving/using and applying Mathematics.**

Autumn Term:

1. Calculating
2. Visualising and constructing
3. Algebraic Proficiency: tinkering
4. Proportional reasoning
5. Pattern sniffing

Key Objectives Autumn Term - To be able to:

- calculate with roots, and with integer indices, calculate with standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer, use inequality notation to specify simple error intervals due to truncation or rounding, apply and interpret limits of accuracy
- use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle), use these to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line, construct plans and elevations of 3D shapes
- understand and use the concepts and vocabulary of identities, know the difference between an equation and an identity, simplify and manipulate algebraic expressions by expanding products of two binomials and factorising quadratic expressions of the form $x^2 + bx + c$, argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments, translate simple situations or procedures into algebraic expressions or formulae
- solve problems involving direct and inverse proportion including graphical and algebraic representations, apply the concepts of congruence and similarity, including the relationships between lengths in similar figures, change freely between compound units (e.g. density, pressure) in numerical and algebraic contexts, use compound units such as density and pressure
- recognise and use Fibonacci type sequences, quadratic sequences

Spring Term:

1. Solving equations and inequalities 1
2. Calculating space
3. Conjecturing
4. Algebraic proficiency: visualising

Key Objectives Spring Term - To be able to:

- understand and use the concepts and vocabulary of inequalities, solve linear inequalities in one variable, represent the solution set to an inequality on a number line
- identify and apply circle definitions and properties, including: tangent, arc, sector and segment, calculate arc lengths, angles and areas of sectors of circles, calculate surface area of right prisms (including cylinders), calculate exactly with multiples of π , know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$, and apply it to find lengths in right-angled triangles in two dimensional figures
- use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS), apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' Theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs
- identify and interpret gradients and intercepts of linear functions algebraically, use the form $y = mx + c$ to identify parallel lines, find the equation of the line through two given points, or through one point with a given gradient, interpret the gradient of a straight line graph as a rate of change, recognise, sketch and interpret graphs of quadratic functions, recognise, sketch and interpret graphs of simple cubic functions and the reciprocal function $y = 1/x$ with $x \neq 0$, plot and interpret graphs (including reciprocal graphs) and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration

Summer Term:

1. Solving equations and inequalities 2
2. Understanding risk
3. Presentation of data
4. Trigonometry

Key Objectives Summer Term - To be able to:

- solve, in simple cases, two linear simultaneous equations in two variables algebraically, derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution, find approximate solutions to simultaneous equations using a graph
- calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions, enumerate sets and combinations of sets systematically, using tree diagrams, understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size
- interpret and construct tables, charts and diagrams, including tables and line graphs for time series data and know their appropriate use, draw estimated lines of best fit; make predictions, know correlation does not indicate causation; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing
- make links to similarity (including trigonometric ratios) and scale factors, know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° ; know the exact value of $\tan\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60° , know the trigonometric ratios, $\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$, $\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$, $\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$, apply it to find angles and lengths in right-angled triangles in two dimensional figures

Key Performance Standards:

- Calculate with roots and integer indices
- Manipulate algebraic expressions by expanding the product of two binomials
- Manipulate algebraic expressions by factorising a quadratic expression of the form $x^2 + bx + c$
- Understand and use the gradient of a straight line to solve problems
- Solve two linear simultaneous equations algebraically and graphically
- Plot and interpret graphs of quadratic functions
- Change freely between compound units
- Use ruler and compass methods to construct the perpendicular bisector of a line segment and to bisect an angle
- Solve problems involving similar shapes
- Calculate exactly with multiples of π
- Apply Pythagoras' Theorem in two dimensions
- Use geometrical reasoning to construct simple proofs
- Use tree diagrams to list outcomes
- Calculate angles and lengths in right angled triangles