

MATHEMATICS

Teacher in charge - Mr S. Edwards

Aims

- To build on the skills, concepts and knowledge developed during Year 8
- To continue to involve pupils in activities which will nurture confidence and enthusiasm for Mathematics
- To give all pupils the opportunity to develop their potential to the full

Course Description

The Year 9 course is focused on pedagogic progression designed to build upon learning in Year 8. The faculty have developed differentiated schemes of work to cater for all abilities. Pupils follow an appropriate scheme of work based on their previous attainment. Lessons are taught using a wide variety of teaching techniques to encompass many different learning strategies.

Learning Objectives Foundation Path	Learning Objectives Higher Path
<p>Number</p> <ul style="list-style-type: none"> • round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures) • estimate answers; check calculations using approximation and estimation, including answers obtained using technology • recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions) • work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $7/2$ or 0.375 and $3/8$) • interpret fractions and percentages as operators • work with percentages greater than 100% • solve problems involving percentage change, including original value problems, and simple interest including in financial mathematics • calculate exactly with fractions 	<p>Number</p> <ul style="list-style-type: none"> • 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
<p>Ratio, Proportion and Rates of Change</p> <ul style="list-style-type: none"> • express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations) • identify and work with fractions in ratio problems • understand and use proportion as equality of ratios • express a multiplicative relationship between two quantities as a ratio or a fraction • use compound units (such as speed, rates of pay, unit pricing) • change freely between compound units (e.g. speed, rates of pay, prices) in numerical contexts • relate ratios to fractions and to linear functions 	<p>Ratio, Proportion and Rates of Change</p> <ul style="list-style-type: none"> • 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

Learning Objectives Foundation Path	Learning Objectives Higher Path
<p>Geometry and Measures</p> <ul style="list-style-type: none"> • measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings • identify, describe and construct similar shapes, including on coordinate axes, by considering enlargement • interpret plans and elevations of 3D shapes • use scale factors, scale diagrams and maps • understand and use alternate and corresponding angles on parallel lines • derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons) • compare lengths, areas and volumes using ratio notation • calculate perimeters of 2D shapes, including circles • identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference • know the formulae: circumference of a circle = $2\pi r = \pi d$, area of a circle = πr^2 • calculate areas of circles and composite shapes • know and apply formulae to calculate volume of right prisms (including cylinders) 	<p>Geometry and Measures</p> <ul style="list-style-type: none"> • 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 • 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 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
<p>Algebra</p> <ul style="list-style-type: none"> • use and interpret algebraic notation, including: a^2b in place of $a \times a \times b$, coefficients written as fractions rather than as decimals • understand and use the concepts and vocabulary of factors • simplify and manipulate algebraic expressions by taking out common factors and simplifying expressions involving sums, products and powers, including the laws of indices • substitute numerical values into scientific formulae • rearrange formulae to change the subject • generate terms of a sequence from either a term-to-term or a position-to-term rule • deduce expressions to calculate the nth term of linear sequences • solve linear equations with the unknown on both sides of the equation • find approximate solutions to linear equations using a graph • plot graphs of equations that correspond to straight-line graphs in the coordinate plane • identify and interpret gradients and intercepts of linear functions graphically • recognise, sketch and interpret graphs of linear functions and simple quadratic functions • plot and interpret graphs and graphs of non-standard (piece-wise linear) functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance and speed 	<p>Algebra</p> <ul style="list-style-type: none"> • 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 • recognise and use Fibonacci type sequences, quadratic sequences • 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 • 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 • 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

Learning Objectives Foundation Path	Learning Objectives Higher Path
<p>Statistics</p> <ul style="list-style-type: none"> • interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data • use and interpret scatter graphs of bivariate data • recognise correlation • interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers) • apply statistics to describe a population 	<p>Statistics</p> <ul style="list-style-type: none"> • 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
<p>Probability</p> <ul style="list-style-type: none"> • relate relative expected frequencies to theoretical probability, using appropriate language and the 0 - 1 probability scale • record describe and analyse the frequency of outcomes of probability experiments using tables • construct theoretical possibility spaces for single experiments with equally likely outcomes and use these to calculate theoretical probabilities • apply the property that the probabilities of an exhaustive set of outcomes sum to one • apply systematic listing strategies • record describe and analyse the frequency of outcomes of probability experiments using frequency trees • enumerate sets and combinations of sets systematically, using tables, grids and Venn diagrams • construct theoretical possibility spaces for combined experiments with equally likely outcomes and use these to calculate theoretical probabilities • apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments 	<p>Probability</p> <ul style="list-style-type: none"> • 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

Grouping

Pupils in Year 9 stay in their groups from Year 8 and will be continually monitored over the year to ensure they remain in the correct group. Classes cover work that is appropriate for the ability of the group. The progress of each pupil is carefully monitored to ensure that they are in the correct group. Our aim is to teach every pupil according to their ability and to ensure that they are extended as much as possible.

Homework

40 minutes of homework is set weekly and recorded on Show My Homework. Most homework is set on Sparxmaths. At the start of the year, pupils are given a training lesson on how to use Sparxmaths and a letter is sent to parents explaining how it works. If none has been set, the expectation is that pupils review their work. Where necessary, longer pieces of homework are set and pupils are given an appropriate length of time to complete the work.

Assessment

Work is regularly marked and collated in individual evidence folders to assist pupils' progress. These are recorded for each pupil as part of each individual's 'Progression Passport'. A formal End of Year assessment will take place.