RIPLEY ST THOMAS
A CHURCH OF ENGLAND ACADEMY

Key Stage 4: Year 9

Subject: Mathematics

Aims of the subject:

The mathematics department aim to develop the full potential of every student in the subject. It is our aim to ensure that every pupil experiences success and enjoyment in the subject, whether it be equipping them with sufficient mathematical skills for everyday life or developing problem solving and reasoning skills to take them beyond GCSE.

The Mathematics scheme of learning is divided into units of study consisting of interlinking skills and topics. For each unit of study, pupils will complete a weekly homework and unit quizzes. Students are assessed formally by way of assessments in the Autumn, Spring and Summer terms, plus end of year exam. The interactive resource, MathsWatch, is used throughout KS4 in classroom teaching and homework setting.

Year 9 – Phase 3 (Set 5)

		What will I learn?
Term 1	Unit 1	• Calculate and recognise powers and associated roots beyond cubes • write a number as a product of prime factors • find the highest common factor of 2 or more numbers from a list AND Venn diagram • find the lowest common multiple of 2 or more numbers from a list AND Venn diagram • apply BIDMAS to evaluate a calculation • apply the four operations to decimals • round numbers correct to a given number of decimal places • round numbers correct to a given number of significant figures • estimate calculations by rounding numbers to 1 significant figure • truncate numbers to a given number of decimal places/significant figures • use inequality notation to specify simple error intervals

	Unit 2	• interpret and write more complex algebraic expressions and formulae • substitute positive and negative values into formulae and expressions • simplify expressions by collecting like terms • plot coordinates in 4 quadrants • plot a linear graph by generating a table of values • draw and interpret (single) line graphs from real life situations • expand a single bracket • factorise linear expressions • form and solve equations with an unknown on one side (including brackets) • generate a sequence using the nth term • find the nth term of an arithmetic sequence
Term 2	Unit 3	• calculate and use the sum of interior and exterior angles of polygons • recognise and name regular polygons • solve angle problems relating to regular polygons • derive and use the formula for area of a trapezium • find the area of composite shapes made up of triangles and rectangles • recognise and draw nets of cubes/cuboids/triangular prisms • work out the volume and surface area of cubes/cuboids and triangular prisms
	Unit 4	• apply the four operations to proper fractions, improper fractions and mixed numbers • work interchangeably with terminating decimals, corresponding fractions and their percentages • calculate fractions of an amount • calculate percentages of an amount with a calculator using decimal multipliers • calculate percentage increase/decrease • calculate the percentage change between two quantities • apply the property that the probabilities of all outcomes sum to 1 • generate lists and sample space diagrams for single and combined events and use to calculate probabilities • expected frequency

Term 3	Unit 5	• interpret and construct frequency polygons • interpret and construct a stem and leaf diagram • calculate the mean, median, mode and range • make comparisons between two distributions in relation to the mean, median, mode and range • recognise and name positive, negative, no, strong, weak correlation • understand that if correlation exists, it does not necessarily mean that causality is present • draw a scatter graph • draw a line of best fit where appropriate and use to estimate values • interpret and draw pie charts
	Unit 6	• write a ratio in the form 1:n • divide an amount into a given ratio • solve problems involving ratio including real life contexts • recognise examples of direct and inverse proportion • solve best buy/better value problems • use and interpret scales on maps • use and interpret scales on scale diagrams to draw a scale diagram

Phase 4 (Sets 3 and 4)

		What will I learn?
Term 1	Unit 1	• convert numbers between ordinary numbers and standard form and vice versa • order and compare numbers which have been written in standard form • calculate problems with numbers in standard form without a calculator • solve problems involving standard form with a calculator • solve simple equations where the numbers are written in standard form • calculate with positive and negative integer indices • use compound units such as speed, density and pressure to solve problems • solve problems with compound units where a change of units is required, including finding average speed • change freely between related standard units (for example speed, density and pressure)

	Unit 2	• form and solve linear equations with integer coefficients where the unknown appears on both sides and where the equation involves brackets • understand and use the concepts and vocabulary of expressions, terms, equations, factors and formulae • represent the ratio of two quantities which are in direct proportion as a linear relationship and represent graphically • solve problems involving direct and inverse proportion by graphical and algebraic approaches • model situations or procedures by translating them into algebraic formulae and by using graphs
	Unit 3	• rearrange formulae where the subject appears once or can be collected as a like term (include examples involving square, square roots, cube and cube roots) • identify and apply circle definitions and properties including radius, diameter, circumference, sector, segment, tangent and arc • recall and use the formula for circumference of a circle including being able to find the radius/diameter when given the area (including being able to give answers in terms of pi) • recall and use the formula for volume and surface area of a cylinder • understand, recall and use Pythagoras' Theorem in 2D problems
Term 2	Unit 4	• identify and interpret gradients and intercepts of linear functions graphically and algebraically; recognise that equations of the form y=mx+c correspond to straight line graphs • draw graphs of functions in which y is given explicitly or implicitly in terms of x • find the midpoint of a line segment or the coordinates of a point for a given ratio along a line • work out the gradient and find the equation of a straight line given 2 points or given one point and the gradient • manipulate equations so that it is possible to tell whether lines are parallel or not; show that 2 lines are parallel • plot a graph representing a real-life problem from information given in words, in a table or as a formula • draw and interpret linear graphs and piece-wise linear graphs representing real-life situations • plot and interpret distance-time graphs

	Unit 5	• complete a frequency table for the outcomes of an experiment • understand and use the term relative frequency and use relative frequency to estimate probabilities • consider differences between theoretical probability and relative frequency in a practical situation • understand and use a Venn diagram consisting of a universal set and at most two sets, which may or may not intersect including shading areas and solving problems • construct and use Venn diagrams to solve problems involving probability including set notation, i.e. P(A) P(A') P(A∪B) P(A∩B) • design, use and complete two way tables • complete a frequency tree and use a frequency tree to compare frequencies of outcomes • calculate the mean, median, mode and range of an ungrouped frequency table • analyse and compare the distributions of data using graphical distributions and suitable measures of spread and average, including commenting on outliers • plot, interpret and use a time-series graph • understand that if data points are joined with a line then the line will not represent actual values but will show a trend
Term 3	Unit 6	• describe and transform 2D shapes using single rotations • describe and transform 2D shapes using single reflections including finding the equation of the line of reflection • describe and transform 2D shapes using translation by vector notation • column vector calculations • describe and transform 2D shapes using enlargements by a positive scale factor (including fractional scale factors) • identify the scale factor of an enlargement as the ratio of the lengths of two corresponding sides • using a straight edge and compasses to complete standard constructions including; equilateral triangle, perpendicular bisector, perpendicular at AND from a given point on a given line and an angle bisector • draw circles or part circles when given the radius or diameter • use the standard constructions to construct loci (e.g. A fixed distance from a point and a fixed distance from a given line, given equal distances from two points, given equal distances from 2 line segments, less than a given distance or greater than a given distance from a point or line segment) • describe regions satisfying several conditions • work out missing angles using properties of alternate, corresponding and co-interior angles including examples involving parallelograms including giving reasons for answers • recall and use the eight points of the compass and their equivalent three figure bearings • use, measure and draw bearings including on scale drawings

Phase 5 (Sets 1 and 2)

		What will I learn?
Term 1	Unit 1	• know the difference between an equation and an identity • argue mathematically to show algebraic expressions are equivalent and use algebra to support and construct • simplify and manipulate algebraic expressions by expanding products of two binomials • factorise quadratic expressions of the form x^2+bx+c including the difference of two squares • solve quadratic equations by factorising • solve quadratic equations graphically • identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically
	Unit 2	• calculate arc lengths, angles and areas of sectors of circles (including giving answers in terms of π) • working backwards to find the radius/diameter given the area or arc length • calculate the volume of spheres, pyramids, cones and composite solids (include working backwards to find the radius/diameter) • calculate the surface area of spheres, pyramids, cones and composite solids (include working backwards to find the radius/diameter)
	Unit 3	• understand and use the concepts and vocabulary of expressions, terms, equations, factors, identity, inequality and formulae • solve linear inequalities in one variable and represent the solution on a number line • solve two linear simultaneous equations in two variables algebraically and graphically • combine 2 two-part ratios to one three-part ratio (i.e. A:B=5:6, B:C=8:11, work out A:C in its simplest form)
Term 2	Unit 4	• calculate the probability of independent and dependent combined events, including using tree diagrams and other representations and know the underlying assumptions • know different types of sampling including random, systematic and stratified sampling (please note, questions may not explicitly use the phrase 'stratified sample') • know the advantages and disadvantages of different sampling methods including bias • calculate the estimate of the mean, the interval containing the median and modal class for a grouped frequency table • construct and interpret frequency tables and bar charts for grouped continuous data • apply statistics to describe a population, using measures of central tendency and measures of dispersion

	Unit 5	• understand congruence and identify shapes that are congruent • understand and use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS) • understand similarity of triangles and of other plane figures and identify shapes that are similar including all squares, all circles or all regular polygons with equal number of sides • apply the concepts of similarity including the relationships between lengths to find missing lengths in similar figures • understand, recall and use trigonometric relationships in right-angled triangles, including problems involving bearings • know the exact values of sinx and cosx for x=0, 30, 45, 60 and 90 and know the exact value of tanx for x=0, 30, 45 and 60
Term 3	Unit 6	• draw, sketch, recognise and interpret quadratic graphs, simple cubic graphs and the reciprocal function • plot and interpret graphs (including reciprocal and non-standard function) in real contexts to find approximate solutions to contextual problems such as simple kinematic problems involving distance, speed and acceleration • interpret the gradient of a straight line graph as a rate of change • set up, solve and interpret answers in growth and decay problems • calculate problems which involve simple/compound interest • solve percentage problems involving the original value • understand that an equation of the form y=kx represents direct proportion and the k is the constant of proportionality • understand that an equation of the form y=k/x represents inverse proportion and that k is the constant of proportionality

Extra-curricular opportunities

- UKMT Intermediate Maths Challenge (Set 1)
- Enter the Half-Termly Maths Competition

How you can support your child's progress

- Practise mental maths skills i.e. addition, subtraction, multiplication and division
- Seek real life opportunities to challenge your child's mathematical knowledge for example calculating best buys, calculating how many pots of paint required to decorate a room etc.
- Encourage your child to use NRich.co.uk to access 'rich tasks'
- Attend lunchtime support sessions for help with homework and revision