Year 9 Mathematics

In Year 9 students follow either stage 8 or 9 of the "Kangaroo maths" scheme of work which builds on and enriches the prior knowledge of topics that were first visited in Year 7 and Year 8, as well as introducing new concepts. Lessons develop students' mathematical knowledge across the five strands - number, algebra, ratio and proportion, geometry and statistics as well as building their confidence in problem-solving. Students are assessed throughout the year via the use of "BAM" tests (BAM stands for "becoming a mathematician").

Methods of deepening and securing knowledge:	
Interleaving	Low stakes starters are used to develop and consolidate learning from Year 7 and 8.
Challenge and differentiation	In all lessons, teachers use a 'Going for Gold' strategy to differentiate the work. Planning considers students' starting points and looks at possible misconceptions.
Questioning	Teachers give students thinking time when posing questions. Questioning is used to develop thinking/reasoning skills as well as identify misconceptions. Variety of retrieval techniques are used including cold calling.

	Autumn term 1	Autumn term 2	Spring term 1
Topic(s)	**Calculating** ● Calculate with positive indices. ● Calculate with roots. ● Calculate with negative indices in the context of standard form. ● Use a calculator to evaluate numerical expressions involving powers. ● Use a calculator to evaluate numerical expressions involving roots. ● Add numbers written in standard form. ● Subtract numbers written in standard form. ● Multiply numbers written in standard form. ● Divide numbers written in standard form. ● Use standard form on a scientific calculator, including interpreting the standard form display of a scientific calculator. ● Understand the difference between truncating and rounding. ● Identify the minimum and maximum values of an amount that has been rounded (to nearest x, x d.p., x s.f.). ● Use inequalities to describe the range of values for a rounded value. ● Solve problems involving the maximum and minimum values of an amount that has been rounded. **Visualising and constructing** ● Use ruler and compasses to construct the perpendicular bisector of a line segment. ● Use ruler and compasses to bisect an angle. ● Use a ruler and compasses to	**Algebra** ● Understand the meaning of an identity. ● Multiply two linear expressions of the form $(x + a)(x + b)$. ● Multiply two linear expressions of the form $(ax + b)(cx + d)$. ● Expand the expression $(x + a)^2$ ● Factorise a quadratic expression of the form $x^2 + bx$. ● Factorise a quadratic expression of the form $x^2 + bx + c$. ● Work out why two algebraic expressions are equivalent. ● Create a mathematical argument to show that two algebraic expressions are equivalent. ● Distinguish between situations that can be modelled by an expression or a formula. ● Create an expression or a formula to describe a situation. **Proportional Reasoning** ● Know the difference between direct and inverse proportion. ● Know the features of graphs that represent a direct or inverse proportion situation. ● Know the features of expressions, or formulae, that represent a direct or inverse proportion situation. ● Distinguish between situations involving direct and inverse proportion. ● Solve simple problems involving inverse proportion. ● Solve simple problems involving rates of pay. ● Solve more complex ratio problems involving mixing or concentrations. ● Solve more complex problems involving	**Pattern Sniffing** ● Recognise and use the Fibonacci sequence. ● Generate Fibonacci type sequences. ● Solve problems involving Fibonacci type sequences. ● Explore growing patterns and other problems involving quadratic sequences. ● Generate terms of a quadratic sequence from a written rule. ● Find the next terms of a quadratic sequence using first and second differences. ● Generate terms of a quadratic sequence from its nth term. **Solving Equations and Inequalities** ● Find the set of integers that are solutions to an inequality, including the use of set notation. ● Know how to show a range of values that solve an inequality on a number line. ● Solve a simple linear inequality in one variable with unknowns on one side. ● Solve a complex linear inequality in one variable with unknowns on one side. ● Solve a linear inequality in one variable with unknowns on both sides. ● Solve a linear inequality in one variable involving brackets. ● Solve a linear inequality in one variable involving negative terms. ● Solve problems by constructing and solving linear inequalities in one variable.

	construct a perpendicular to a line from a point and at a point. ● Know how to construct the locus of points a fixed distance from a point and from a line. ● Solve simple problems involving loci. ● Combine techniques to solve more complex loci problems. ● Choose techniques to construct 2D shapes; e.g. rhombus. ● Construct a shape from its plans and elevations. ● Construct the plan and elevations of a given shape.	unit pricing. ● Finding missing lengths in similar shapes when information is given as a ratio. ● Solve problems combining understanding of fractions and ratio. ● Convert between compound units of density and pressure. ● Solve simple problems involving density. ● Solve simple problems involving pressure. ● Solve problems involving speed.	
Assessment	BAM1, BAM8.	BAM2, BAM3, BAM7.	
CEIAG *(Careers that are linked to that topic)*	**Calculating** ● Scientific jobs using very large or very small numbers in calculations. ● Quality control in products. **Constructing** ● Technical drawing - architecture. ● Planning for buildings/infrastructure.	**Algebra** ● Air traffic controllers. ● Architects. ● Computer engineers and analysts. ● Economists. ● Market research analysts. ● Dietitians and nutritionists. ● Engineers. **Proportion** ● Photocopying. ● Cooking/baking. ● Stock markets. ● Accident investigation.	**Sequences** ● Computer and information systems managers. ● Farming. ● Medical and health services. ● Statisticians.. ● Nuclear engineers **Solving equations** ● Air traffic controllers. ● Architects. ● Computer engineers and analysts. ● Economists. ● Market research analysts. ● Dietitians and nutritionists. ● Engineers.

	Spring term 2	Summer term 1	Summer term 2
Topic(s)	**Calculating space** ● Know circle definitions and properties, including: tangent, arc, sector and segment. ● Calculate the arc length of a sector, including calculating exactly with multiples of π ● Calculate the area of a sector, including calculating exactly with multiples of π ● Calculate the angle of a sector when the arc length and radius are known. ● Calculate the surface area of a right prism. ● Calculate the surface area of a cylinder, including calculating exactly with multiples of π. ● Know and use Pythagoras' theorem. ● Calculate the hypotenuse of a right-angled triangle using Pythagoras' theorem in two dimensional figures. ● Calculate one of the shorter sides in a right-angled triangle using Pythagoras' theorem in two dimensional figures. ● Solve problems using Pythagoras' theorem in two dimensional figures. **Conjecturing** ● Apply angle facts to derive results about angles and sides. ● Create a geometrical proof. ● Know the conditions for triangles to be congruent. ● Use the conditions for congruent triangles. ● Use congruence in geometrical proofs.	**Algebraic graphs** ● Identify and interpret gradients of linear functions algebraically. ● Identify and interpret intercepts of linear functions algebraically. ● Use the form y = mx + c to identify parallel lines. ● Find the equation of a line through one point with a given gradient. ● Find the equation of a line through two given points. ● Interpret the gradient of a straight line graph as a rate of change. ● Plot graphs of quadratic functions. ● Plot graphs of cubic functions. ● Plot graphs of reciprocal functions. ● Recognise and sketch the graphs of quadratic functions. ● Interpret the graphs of quadratic functions. ● Recognise and sketch the graphs of cubic functions. ● Interpret the graphs of cubic functions. ● Recognise and sketch the graphs of reciprocal functions. ● Interpret the graphs of reciprocal functions. ● Plot and interpret graphs of non-standard functions in real contexts. ● Find approximate solutions to kinematic problems involving distance, speed and acceleration.	**Solving Equations** ● Understand that there are an infinite number of solutions to the equation ax + by = c (a ¹ 0, b ¹ 0). ● Find approximate solutions to simultaneous equations using a graph. ● Solve two linear simultaneous equations in two variables in very simple cases (addition but no multiplication required). ● Solve two linear simultaneous equations in two variables in very simple cases (subtraction but no multiplication required). ● Solve two linear simultaneous equations in two variables in very simple cases (addition or subtraction but no multiplication required). ● Solve two linear simultaneous equations in two variables in simple cases (multiplication of one equation only required with addition). ● Solve two linear simultaneous equations in two variables in simple cases (multiplication of one equation only required with subtraction). ● Solve two linear simultaneous equations in two variables in simple cases (multiplication of one equation only required with addition or subtraction). ● Derive and solve two simultaneous equations. ● Solve problems involving two simultaneous equations and interpret

● Solve geometrical problems involving similarity. ● Know the meaning of a Pythagorean triple.	the solution. **Understanding risk** ● List outcomes of combined events using a tree diagram. ● Know and use the multiplication law of probability. ● Now and use the addition law of probability. ● Use a tree diagram to solve simple problems involving independent combined events. ● Use a tree diagram to solve complex problems involving independent combined events. ● Use a tree diagram to solve simple problems involving dependent combined events. ● Use a tree diagram to solve complex problems involving dependent combined events. ● Understand that relative frequency trends towards theoretical probability as sample size increases. **Presenting data** ● Construct graphs of time series. ● Interpret graphs of time series. ● Construct and interpret compound bar charts. ● Construct and interpret frequency polygons. ● Construct and interpret stem and leaf diagrams. ● Interpret a scatter diagram using understanding of correlation. ● Construct a line of best fit on a scatter diagram and use the line of best fit to estimate values. ● Understand that correlation does not

			indicate causation.
Assessment	BAM10, BAM11, BAM9, BAM12.	BAM4, BAM6.	BAM5, BAM13.
CEIAG *(Careers that are linked to that topic)*	**Calculating space** ● Construction/design. ● Decorating. ● Carpentry. ● Gardening.	**Algebraic graphs** ● Computer game design. ● Medical professional.	**Solving equations** ● Air traffic controllers. ● Architects. ● Computer engineers and analysts. ● Economists. ● Market research analysts. ● Dietitians and nutritionists. ● Engineers. **Understanding risk** ● Investment. ● Insurance. ● Gambling. ● Retail. **Presenting data** ● Weather forecasting. ● Market analysis. ● Medical professional. ● Retail.

Independent Study

Students are given independent study tasks on a weekly basis which is either:

The use of "Hegarty Maths" - an online platform where students watch an instructional video whilst taking notes and then complete an assessment where they can make comments and teachers can respond in order to remotely assist students. All students' work online is reviewed by teachers in order to provide feedback or assistance where appropriate.

A selection of tasks which cover a variety of topics, many of which will have been covered previously in the school year, or in previous years. This will boost students' recall of topics that have not been covered in recent times and will keep them "ticking over".