

Priory's Mathematics Curriculum - Implementation

Key Stage 3 (years 7,8 & 9) – In Key Stage 2 students work to gain a basic understanding of number, algebra, shape and statistics as outlined in the Key Stage 2 national curriculum. In Key Stage 3 they need to broaden their knowledge within these strands as well as explore aspects of each strand in a greater depth in order to gain a better understanding of the most underpinning topics of mathematics. Throughout the course of Key Stage 3 Mathematics at Penwortham Priory students acquire knowledge, develop fluency and learn to problem solve and reason mathematically in various different topics.

<u>Year 7 Long Term Plan</u>	<u>Year 8 Long Term Plan</u>	<u>Year 9 Long Term Plan</u>
Place Value	Indices and estimations	Fractions & Decimals
Calculations & properties of number	Multiplying and dividing with fractions	Area and Perimeter
Working with decimals	Ratio, proportion and rates of change	Algebraic expressions
Negative Numbers	Percentages of an amount	Ratio and Proportion
Fractions	Functions, graphs and equations	Linear graphs
Fractions, decimals and percentages	Equations and formulae	Representing data
Writing with algebra	Polygons and parallel lines	Angles
Setting up and solving equations	Area of shapes	Scatter Graphs
Number and picture sequences	Circles	Probability
Properties of shape	Pythagoras' theorem	Transformations
Angle properties	Averages	Equations
Perimeter, area and volume	Collecting data	Pythagoras & Trigonometry
		Constructions

In Year 7, students build upon prior mathematical knowledge in numbers and the number system, algebra, ratio and proportion and geometry. Students develop their reasoning skills through challenging problems written in unfamiliar contexts. Lessons will synthesize core learning with rich mathematical tasks that extend where appropriate.

During Year 8, students build upon knowledge learned at KS2 and Year 7, in numbers and the number system, algebra, ratio and proportion and geometry. Students develop their reasoning skills through challenging problems written in unfamiliar contexts. Lessons will synthesize core learning with rich mathematical tasks that extend where appropriate.

During Year 9, students build upon knowledge learned in previous years, in numbers and the number system, algebra, ratio and proportion, geometry, statistics and probability. Students develop their reasoning skills through challenging problems written in unfamiliar contexts. Students are expected to work increasingly independently demonstrating application on concepts learned.

When	What will I learn and what skills will I develop?	Why do I need to know this?	How will I learn this?
Year 7	<ul style="list-style-type: none"> • Students learn how to use place value to write numbers in words and digits and how to compare the size of decimals using inequality symbols. As learning progresses they use the this to multiply and divide by a given power of ten. • Students learn how to find common multiples and factors pairs of numbers and algebraic terms. By exploring the factor properties of different types of numbers students are introduced to prime and square numbers. • Students learn how to use place value to add, subtract, multiply and divide with decimal numbers using the column method. As learning progresses they learn how to round to a given accuracy and use multiplication to solve a range of real life problems. • Students learn how to compare and order negative numbers using a number line and the place value table. As learning progresses they move from using the number line to add and subtract with negatives to using written methods to perform multiplication and division. • In working with fractions students learn how to compare fractions and mixed numbers with different denominators using equivalences. They progress on from this by adding and subtracting fractions using visual and written methods. 	<ul style="list-style-type: none"> • The ability to arrange digits in a place value table is crucial to accessing future topics such as fractions, percentages and many more. • Extend their understanding of the number system; make connections between number relationships, and their algebraic representations • Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics • Begin to model situations mathematically and express the results using a range of 	<ul style="list-style-type: none"> • You will learn through various different strategies inside and outside of the classroom where appropriate. • Teacher exposition and modelling, mini-whiteboards, targeted questioning, yellow box notes, treasure hunts, tarsia puzzles, 3-act maths, goal-free problems, retrieval practice

	<ul style="list-style-type: none"> • Students learn how to use place value and equivalent fractions to convert between fractions, decimals and percentage using calculator and non-calculator methods. • Students learn how to form and simplify algebraic expressions involving multiplication, addition, division and subtraction. They use this knowledge to begin solving equations using the balance method. • Students learn how to use the balance to form and solve linear equations. Learning progresses from solving one step equations to setting up equations where the unknown appears on both side. • Students learn how to recognise and describe a number and picture sequence using a term-to-term and position-to-term rule. As learning progresses they find the nth term of a sequence and begin to plot sequences on a grid. • Properties of shapes teaches students how to describe 2D and 3D shape using key vocabulary. Learning progresses from visualising the different types of triangles and quadrilaterals to understanding how prisms are different from other 3D shapes. • In this unit of work students are introduced to a range of angle properties including angles on a straight line, in a triangle and vertically opposite. Students are guided to discover each of the angle properties for themselves so they can link them together later on. • Students learn how to find the perimeter and area of rectangles, triangles and other compound shapes. They later apply this knowledge to find the volume of cuboids and prisms. 	<p>formal mathematical representations</p> <ul style="list-style-type: none"> • Just as $2 + 2 + 2$ can be written as 3×2, $a + a + a$ can be written as $3 \times a$. However, with algebraic notation \times and \div symbols are not included. $3 \times a$ is written as $3a$ and $3 \div a$ is written as a fraction $3/a$. • By solving the equation you find the value of the unknown number. • Understanding how each quadrilateral has unique properties helps students in future topics on angles and geometrical reasoning topics. 	<p>and low stakes quizzes.</p> <ul style="list-style-type: none"> • Outside the classroom you will be expected to complete homework once per week. You will have the opportunity to take part in whole school maths challenges during Pi Day and My Money Week. You will also have the opportunity to go on Mathematical trips throughout the year.
Year 8	<ul style="list-style-type: none"> • Students use place value to multiply and divide by decimal numbers and round a number to a given significant figure. As learning progresses they apply this knowledge to evaluate numbers written using standard index form. • Students learn about multiplying and dividing with fractions and mixed numbers using both visual and written methods. Learning progresses from finding the product of two fractions to using reciprocal value to divide one mixed number by another. 	<ul style="list-style-type: none"> • Use a calculator and other technologies to calculate results accurately and then interpret them appropriately • Being able to visualise division with fractions and mixed numbers helps students understand the written methods. 	<ul style="list-style-type: none"> • You will learn through various different strategies inside and outside of the classroom where appropriate. • Teacher exposition and

	<ul style="list-style-type: none"> • Students learn how to use ratio notation to solve problems ranging from interpreting the scale of a map to calculating a speed, distance or time. • Students learn how to find a percentage of an amount using calculator and non-calculator methods. As learning progresses they use decimal multipliers to find a percentage change and calculate a simple interest in financial mathematics. • Students learn how to plot linear graphs and use them to estimate the solutions to equations. As learning progresses students begin to plot and identify the properties of quadratic graphs. • Students continue to develop their algebraic reasoning skills by expanding a pair or brackets, factorising expressions, solving equations and formulae and changing the subject of a formula. • Students discover the properties of interior, corresponding and alternate angles in parallel lines. As learning progresses they are challenged to prove each property using algebraic and geometrical notation. Later, students use interior and exterior angles of polygons to solve complex problems. • Students learn how to calculate the area of triangles, parallelograms and trapeziums. They use this knowledge to later find the total surface of cuboids and prisms. • In this unit students learn how to calculate the circumference and area of circles both as decimals and in terms of π. Learning progresses from 2D circles to finding the total surface area and volume of cylinders. • Students are guided through the discovery of Pythagoras' Theorem and learn how to apply it to calculate an unknown side in a right-angled triangle. As learning progresses they are challenged to solve a range of problems using Pythagoras' Theorem. 	<ul style="list-style-type: none"> • Finding a percentage of an amount without the use of a calculator can be done by equivalent fractions or by finding 10% first. Another method could be to change the percentage to a decimal and multiply the decimal by the quantity • Graphs are used to show a relationship between x and y values. This relationship can be written as an equation. • A Pythagorean triple is a set of three integers that exactly fits the Pythagoras relationship. • If the lengths of the three sides of a triangle obey Pythagoras' Theorem the triangle is right-angled. 	<p>modelling, mini-whiteboards, targeted questioning, yellow box notes, treasure hunts, tarsia puzzles, 3-act maths, goal-free problems, retrieval practice and low stakes quizzes.</p> <ul style="list-style-type: none"> • Outside the classroom you will be expected to complete homework once per week. You will have the opportunity to take part in whole school maths challenges during Pi Day and My Money Week. You will also have the opportunity to go on Mathematical trips throughout the year.
Year 9	<ul style="list-style-type: none"> • Students learn how to solve problems with long multiplication and division using written methods. They use this knowledge to add, 	<ul style="list-style-type: none"> • calculate exactly with fractions. 	<ul style="list-style-type: none"> • You will learn through various

	<p>subtract, multiply and divide with fractions and mixed numbers. Finally, students learn the difference between terminating and recurring decimals and how to convert a recurring decimal to a simplified fraction.</p> <ul style="list-style-type: none"> • Students learn how to calculate averages with discrete and continuous data from stem and leaf diagrams and frequency tables.. They use these to compare distributions and analyse sets of data. • Students learn how to find the area of various 2D shapes parallelograms, trapezia, compound shapes and circles. Throughout the topic links are made to algebraic reasoning and estimation • Students learn how to expand and factorise algebraic linear and quadratic expressions. Learning progresses to expanding cubic and factorising quadratics in the form $ax^2 + bx + c$. • Students learn how to simplify and use equivalent ratios to calculate proportionate amounts. They use this knowledge to share an amount using a ratio. • Students learn how to plot and derive the equation of straight line graphs in the form $y = mx + c$. Learning progresses on from this to find the equation of parallel and perpendicular lines in the form $ax + by + c = 0$. • Students learn how to plot and interpret various statistical diagrams ranging from pie charts to histograms with unequal class widths. Throughout the unit emphasis is place on interpreting the diagrams as much as it is plotting them. • Students learn how to discover various angle properties such as angles on a straight line, about a point, in a triangle and on parallel lines. As learning progress they are challenged to construct polygons and solve problems involving their interior and exterior angles. • Students learn how to design a questionnaire without bias to collect primary qualitative and quantitative data sets. As learning progresses they use stratified sampling to determine sample size and how to design two-way tables and frequency trees to organise these data 	<ul style="list-style-type: none"> • Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation. • Calculate arc lengths, angles and areas of sectors of circles • Developing mental methods to factorise quadratics is key to gaining confidence with quadratics equations later on. • apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations) • Find the equation of the line through two given points, or through one point with a given gradient • Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling • Geometric problems can often be solved using various angle properties. Encourage students to look for and apply alternative properties. 	<p>different strategies inside and outside of the classroom where appropriate.</p> <ul style="list-style-type: none"> • Teacher exposition and modelling, mini-whiteboards, targeted questioning, yellow box notes, treasure hunts, tarsia puzzles, 3-act maths, goal-free problems, retrieval practice and low stakes quizzes. • Outside the classroom you will be expected to complete homework once per week. You will have the opportunity to take part in whole school maths challenges during Pi Day and My Money
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	<ul style="list-style-type: none"> • At the start of this unit students learn how to perform and describe reflections, rotations, translations and enlargements on a grid. As learning progresses they are challenged to describe a combination of transformations using the correct terminology. • Students learn how to solve an equation using the balance method and trial and improvement. As learning progresses they are taught how to form and solve a pair of simultaneous equations from known geometrical facts and real life problems. • Students learn how to plot and interpret a scatter graph. Learning progresses from using the line of best fit to find missing values to understanding whether correlation means causation. • Students are guided through the discovery of Pythagoras' Theorem using Pythagorean Triples. They use Pythagoras' Theorem to find the hypotenuse and shorter side of any right-angled triangle. As learning progresses they begin to find lengths in 3D shapes • Students learn how to construct angle and line bisectors using a pair of compasses. Later, students apply this knowledge to solve problems involving loci about a point and line. 	<ul style="list-style-type: none"> • apply statistics to describe a population • Identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional and negative scale factors) • Translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution. • draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing • Pythagoras' Theorem can be applied to a wide variety of geometrical and real world problems. Students need to practise identifying when the theorem can be applied by recognising triangular components. • Use these to construct given figures and solve loci problems; 	<p>Week. You will also have the opportunity to go on Mathematical trips throughout the year.</p>
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Key Stage 4

Students at Priory study the OCR GCSE in Mathematics J560 at Higher or Foundation tier.

OCR's GCSE (9–1) in Mathematics provides a broad, coherent, satisfying and worthwhile course of study. It encourages learners to develop confidence in, and a positive attitude towards mathematics and to recognise the importance of mathematics in their own lives and to society. It also provides a strong mathematical foundation for learners who go on to study mathematics at a higher level, post-16.

It emphasises and encourages:

- Sound understanding of concepts
- Fluency in procedural skill
- Competency to apply mathematical skills in a range of contexts
- Confidence in mathematical problem solving.

Assessment overview

Students are entered for either foundation tier (paper 01, paper 02 and paper 03) or higher tier (paper 04, paper 05 and paper 06).

Foundation tier (grades 5 to 1)

Paper	Marks	Duration	Weighting
Paper 01 - J560/01 (Calculator permitted)	100	1 hour 30 mins	33⅓%
Paper 02 - J560/02 (Calculator not permitted)	100	1 hour 30 mins	33⅓%
Paper 03 - J560/03 (Calculator permitted)	100	1 hour 30 mins	33⅓%

Higher tier (grades 9 to 4)

Paper	Marks	Duration	Weighting
Paper 04 - J560/04 (Calculator permitted)	100	1 hour 30 mins	33⅓%
Paper 05 - J560/05 (Calculator not permitted)	100	1 hour 30 mins	33⅓%
Paper 06 - J560/06 (Calculator permitted)	100	1 hour 30 mins	33⅓%

Content overview

Content is arranged by topic area and applies to both tiers as detailed in the specification. Topics may be assessed on any paper.

<ul style="list-style-type: none">• Number operations and integers• Calculations with integers• Whole number theory• Combining arithmetic operations• Inverse operations• Fractions, decimals and percentages• Fractions• Decimal fractions• Percentages• Ordering fractions, decimals and percentages• Indices and surds• Powers and roots• Standard form• Plane vector geometry• Similarity• Mensuration• Units and measurement• Perimeter calculations• Area calculations• Volume and surface area calculations• Triangle mensuration	<ul style="list-style-type: none">• Exact calculations• Approximation and estimation• Ratio, proportion and rates of change• Calculations with ratio• Direct and inverse proportion• Discrete growth and decay• Algebra• Algebraic expressions• Algebraic formulae• Algebraic equations• Algebraic inequalities• Language of functions• Sequences• Graphs of equations and functions• Probability• Basic probability and experiments• Combined events and probability diagrams• Statistics• Sampling• Interpreting and representing data• Analysing data	<ul style="list-style-type: none">• Straight line graphs• Transformations of curves and their equations• Interpreting graphs• Basic geometry• Conventions, notation and terms• Ruler and compass constructions• Angles• Properties of polygons• Circles• Three-dimensional shapes• Congruence and similarity• Plane isometric transformations• Congruence
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