

Subject Curriculum Information Pack



Pedmore
High School

Aspire, Persevere, Succeed

Curriculum Intent



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Pedmore High School Mathematics Curriculum Rationale

The mathematics curriculum aims to develop:

- **Fluency** of basic mathematical skills including through varied and frequent practise with increasingly complex problems over time so that pupils develop understanding and the ability to recall and apply knowledge rapidly and accurately.
- The ability to **reason mathematically** by conjecturing relationship and generalisations, developing arguments and proving statements using correct mathematical language .
- The ability to **solve problems** by applying their mathematics to a variety of routine and nonroutine problems by breaking down problems into a series of simpler steps and persevering in seeking solutions in order to promote independence and resilience.
- To build on the mathematics that has been taught previously to enable students to master key skills and to make rapid progress.

Intent

At Pedmore High School our Maths curriculum is designed to develop a passion for mathematics which students will take with them throughout their school life and beyond, whilst building curiosity about the mathematics around them and ask about `why` and `how` concepts arise. A curriculum that enables students to become successful learners who are ready to learn, make progress and achieve in mathematics and to ensure students have the confidence and aptitude to apply their mathematical skills. We believe that a learning environment that supports all learners to be able to access the curriculum and achieve, providing challenge opportunities through “pitching it high”, will ensure they have access to study Maths and related courses beyond GCSE and A Level, at University and through their career ambitions.

Implementation:

Pupils follow the Kangaroo Invictus Scheme of Work through KS3 and 4. The SOW in both key stages has an emphasis on building pupils' problem solving and reasoning skills and develops recall and application of knowledge through a sequence of lessons that build, by constantly revisiting and extending topics throughout the years. This compliments the National Curriculum which makes reference to each key stage which consolidates the learning that has already taken place. It will also have reference to "end points" which are regularly shared to enable students understand the main learning and skills that are the foundations to progress.

Formal Assessment points take place towards the end of each full term. Formative "low stakes" assessments are used regularly to check progress in the form of "exit tickets", "do it now tasks", "bread and butter" tasks and "blast from the past" activities all designed to engage students with their ability to recall key skills and understanding. At Key stage 4 each assessment is GCSE levelled. Homework is set via the use of Hegarty and written homework linked to **knowledge Organisers** which are evident in all books and linked to key topics on the SOW.

Students track progress through an in-depth analysis of assessment outcomes and respond immediately with "next steps" which are set by teachers to address misconceptions.

Our 5-year plan outlines the units covered throughout the years and the constant recap and extension helps to build pupils knowledge. It also aligns with the year 5 to 8 curriculum mapping through our collaborative planning with primary colleagues.

Impact:

By the end of KS4 all pupils should be confident, resilient and competent mathematicians equipped with the skills needed for their future mathematical journey.

As individuals and as a department, we are passionate about mathematics and in doing so, we wish to help pupils see the importance of mathematics during lessons and within our enrichment programme and its application in life as well as the enjoyment mathematics can bring.

We encourage all pupils to be able to see the mathematical links to a range of subjects studied at school by giving those opportunities to develop a high level of numeracy required for success in the wider curriculum and in adult life.

Key Stage 3 - Working mathematically

Through the mathematics content, pupils are taught to:

Develop fluency

- consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots
- select and use appropriate calculation strategies to solve increasingly complex problems
- use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships
- substitute values in expressions, rearrange and simplify expressions, and solve equations
- move freely between different numerical, algebraic, graphical and diagrammatic representations [for example, equivalent fractions, fractions and decimals, and equations and graphs]
- develop algebraic and graphical fluency, including understanding linear and simple quadratic functions
- use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics.

Reason mathematically

- extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations
- extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically

- identify variables and express relations between variables algebraically and graphically
- make and test conjectures about patterns and relationships; look for proofs or counter-examples
- begin to reason deductively in geometry, number and algebra, including using geometrical constructions
- interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning
- explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally.

Solve problems

- develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
- 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 formal mathematical representations
- select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.

Key Stage 4 - Working mathematically

Through the mathematics content pupils should be taught to:

Develop fluency

- consolidate their numerical and mathematical capability from key stage 3 and extend their understanding of the number system to include powers, roots and fractional indices
- select and use appropriate calculation strategies to solve increasingly complex problems, including exact calculations involving multiples of π and surds, use of standard form and application and interpretation of limits of accuracy
- consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions, and expressions involving surds and algebraic fractions

- extend fluency with expressions and equations from key stage 3, to include quadratic equations, simultaneous equations and inequalities
- move freely between different numerical, algebraic, graphical and diagrammatic representations, including of linear, quadratic, reciprocal, exponential and trigonometric functions
- use mathematical language and properties precisely.

Reason mathematically

- extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically
- extend their ability to identify variables and express relations between variables algebraically and graphically
- make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments and proofs
- reason deductively in geometry, number and algebra, including using geometrical constructions
- interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning
- explore what can and cannot be inferred in statistical and probabilistic settings, and express their arguments formally
- assess the validity of an argument and the accuracy of a given way of presenting information.

Solve problems

- develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
- develop their use of formal mathematical knowledge to interpret and solve problems, including in financial contexts
- make and use connections between different parts of mathematics to solve problems
- model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions

- select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem.

Year 10 Curriculum Assessment Map



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Curriculum Assessment Map: Year 10 Foundation Mathematics

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	<p>Calculating Space</p> <p>Calculating</p> <p>Solving Equations and Inequalities 1</p>	<p>Mathematical Movement 1</p> <p>Algebra Simplifying</p> <p>Proportional reasoning</p>	<p>Sequences</p> <p>Solving Equations and Inequalities 2</p> <p>Calculating Space 2</p>	<p>Conjecturing</p> <p>Algebra Graphs</p>	<p>Fractions, Decimals and Percentages</p> <p>Solving Equations and Inequalities 3</p> <p>Probability</p>	<p>Presentation of data</p> <p>Mathematical Movement 2</p> <p>Visualising and Constructing</p>
Key Learning & Skills	<ul style="list-style-type: none"> Compare lengths, areas and volumes using ratio notation. Calculate perimeters of 2D shapes – including circles. Identify and apply circle definitions. Know and use the formulae for area and circumference of a circle. Calculate areas of composite shapes. Know and calculate volume of prisms - including cylinders/ Calculate with roots and integer indices. Calculate with standard form. Use inequality notation to specify error intervals. Apply limits of accuracy. Solve linear equations with unknowns on both sides. Find solutions to linear equations using a graph. 	<ul style="list-style-type: none"> Work with coordinates in all four quadrants Understand $y=x$ and $y=-x$. Identify, describe and construct congruent shapes involving rotation, reflection and translation. Describe translations as vectors. Understand identities, equations and expressions. Expand two binomials. Factorise simple quadratic expressions. Create formulae to describe situations. Solve direct/inverse proportion problems graphically and algebraically. Apply congruence and similarity – including lengths in similar figures. Use compound units (density/pressure/area). 	<ul style="list-style-type: none"> Recognise and use Fibonacci type sequences. Generate and find next terms of quadratic sequences. Use the concepts and vocabulary of inequalities. Solve linear inequalities with one variable and represent on a number line. Apply circle definitions including: tangent, arc, sector and segment. Calculate arc lengths, angles and areas of sectors. Calculate exactly with π. Apply Pythagoras's theorem. 	<ul style="list-style-type: none"> Use basic congruence facts for triangles (SSS, SAS, ASA, RHS). Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture. Use known facts to obtain simple proof. Identify gradients and y-intercepts. Use $y=mx+c$ to identify parallel lines. Find the equation of a line given two points, or one point and the gradient. Interpret gradient as rate of change. Identify, sketch and interpret quadratic, cubic and reciprocal graphs. Plot and interpret graphs – including non-standard functions in real life context. 	<ul style="list-style-type: none"> Interpret and percentages as operators. Work with percentages greater than 100%. Solve problems involving percentage change, reverse percentages and simple interest. Calculate exactly with fractions. Derive, solve and interpret simultaneous equations algebraically. Find solutions to simultaneous equations using a graph. Calculate probability of independent and dependent events – including tree diagrams. Enumerate combinations of sets using a tree diagram. Use Venn diagrams to find probabilities. 	<ul style="list-style-type: none"> Interpret and construct tables, charts and diagrams including: time series, bar charts, frequency polygons and stem and leaf diagrams. Draw lines of best fit and make predictions. Understand correlations doesn't indicate causation. Apply addition, subtractions and multiplication of column vectors. Construct; perpendicular bisector of a line, perpendicular to a given line/at a given point and bisecting an angle. Use the above constructions to solve loci problems. Construct plans and elevations of 3D shapes.

Curriculum Assessment Map: Year 10 Foundation Mathematics

<p>End points</p>	<p>Know how to interpret the display on a scientific calculator when working with standard form</p> <p>Know the difference between direct and inverse proportion</p> <p>Know how to represent an inequality on a number line</p> <p>Know that the point of intersection of two lines represents the solution to the corresponding simultaneous equations</p> <p>Know the meaning of a quadratic sequence</p> <p>Know the characteristic shape of the graph of a cubic function</p> <p>Know the characteristic shape of the graph of a reciprocal function</p> <p>Know the definition of speed</p> <p>Know the definition of density</p> <p>Know the definition of pressure</p> <p>Know Pythagoras' theorem</p> <p>Know the definitions of arc, sector, tangent and segment</p> <p>Know the conditions for congruent triangles</p>					
<p>Informal (formative) Assessment</p>	<ul style="list-style-type: none"> • Hegarty homework tasks <ul style="list-style-type: none"> • Exit tickets • GRIT 					
<p>Formal (summative) Assessment</p>	<p>Year 10 Test 1</p>	<p>Year 10 Test 2</p>	<p>Year 10 Test 3</p>	<p>Year 10 Test 4</p>	<p>Year10 Test 5</p>	<p>Year 10 Test 6</p>

Curriculum Assessment Map: Year 10 Higher Mathematics

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	Investigating Properties of Shape Calculating Solving Equations and Inequalities 1	Mathematical Movement 1 Algebraic Proficiency: Manipulation Proportional reasoning	Sequences Solving Equations and Inequalities 2 Calculating Space	Conjecturing Algebra graphs	Fractions, Decimals and Percentages Solving Equations and Inequalities 3 Probability	Analysing Statistics Algebraic Proficiency: Visualising 2 Mathematical Movement 2
Key Learning & Skills	<ul style="list-style-type: none"> Estimate and calculate with powers and roots. Calculate with surds. Limits of accuracy (upper and lower bounds). Find approximate solutions using iteration. Solve simultaneous equations 	<ul style="list-style-type: none"> Identify, describe and construct similar shapes – including scale factor. Describe combinations of rotations, reflections and translations. Simplify algebraic expressions involving algebraic fractions. Expand and simplify products of more than two binomials – including surds. Factorise quadratic expressions including difference of two squares. Interpret direct and inverse proportion equations. Recognise graphs that illustrate direct and inverse proportion. Understand X is inversely proportional to Y is equivalent to X is proportional to $1/Y$. 	<ul style="list-style-type: none"> Find the nth term of quadratic sequences. Recognise and use simple geometric progression. Solve linear inequalities with two variables. Represent the solution set to an inequality using set notation and on a graph. Calculate surface area and volume of spheres, pyramids, cones and composite solids. Apply concepts of congruence and similarity to length, area and volumes of similar figures. 	<ul style="list-style-type: none"> Learn, apply and prove the standard circle theorems. Plot and interpret graphs involving distance, speed and acceleration. Calculate and estimate gradients and areas under graphs (including non-linear graphs). Interpret results from distance-time graphs, velocity-time graphs and financial context graphs. Interpret the gradient at a point on a curve as instantaneous rate of change. Identify roots, intercepts and turning points of quadratic graphs. 	<ul style="list-style-type: none"> Change recurring decimals to fractions and vice versa. Set up, solve and interpret growth and decay problems – including compound interest. Solve quadratic equations by factorising – including those that require rearrangement. Find approximate solutions to quadratics by using a graph. Deduce roots of quadratic functions algebraically. Apply systematic listing strategies – including the product rule. Calculate and interpret conditional probabilities using two-way tables, tree diagrams and Venn diagrams. 	<ul style="list-style-type: none"> Construct and interpret diagrams for grouped discrete data. Interpret, analyse and compare distributions of data sets through: graphical representations and appropriate central tendency. Use $y=mx+c$ to identify perpendicular lines. Recognise and use the equation of a circle Find the equation of the tangent to a circle at a given point. Add, subtract and multiply vectors. Apply diagrammatic and column representations of vectors.

Curriculum Assessment Map: Year 10 Higher Mathematics

<p>End points</p>	<ul style="list-style-type: none"> • Know the convention for labelling the sides in a right-angle triangle. • Know the trigonometric ratios, $\sin\theta = \text{opposite/hypotenuse}$, $\cos\theta = \text{adjacent/hypotenuse}$, $\tan\theta = \text{opposite/adjacent}$. • Know 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 that $a^{1/n} = \sqrt[n]{a}$. • Know that $a^{-n} = 1/a^n$. • Know the information required to describe a transformation. • Know the special case of the difference of two squares. • Know how to set up an equation involving direct or inverse proportion. • Know set notation. • Know the conventions for representing inequalities graphically. • Know the formulae for the volume of a sphere, a cone and a pyramid. • Know the formulae for the surface area of a sphere, and the curved surface area of a cone. • Know the circle theorems. • Know the characteristic shape of the graph of an exponential function. • Know the meaning of roots, intercepts and turning points. • Know the definition of acceleration. • Know how to construct a box plot. • Know the conditions for perpendicular lines. 					
<p>Informal (formative) Assessment</p>	<ul style="list-style-type: none"> • Hegarty homework tasks <ul style="list-style-type: none"> • Exit tickets • GRIT 					
<p>Formal (summative) Assessment</p>	<p>Year 10 Test 1</p>	<p>Year 10 Test 2</p>	<p>Year 10 Test 3</p>	<p>Year 10 Test 4</p>	<p>Year10 Test 5</p>	<p>Year 10 Test 6</p>



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