HPRS

CURRICULUM MAP

SUBJECT AREA:	Mathematics	YEAR / GROUP:	11 – aimed at grade 9 - 6

BRIEF SUMMARY OF CURRICULUM INTENT

Our main aim in mathematics in HPRS is to give students the best possible chance to enjoy and succeed in mathematics in such a way that will positively impact on their lives post 16. We believe that maths is not only about numbers, equations etc but is about real understanding and we work with students to help them see that by studying mathematics/numeracy they can make a real difference to their future prospects. Maths has a structure that can be learnt through practical applications and we plan lessons to be as "hands-on" and problem solving as possible to increase student participation and self esteem. As enthusiastic teachers we hope to convey our enjoyment of the subject and the fun in the topic in a way that brings the teaching moment into focus.

It is the intent that the mathematics curriculum at HPRS is:-

- A curriculum that is ambitious for all students
- A curriculum that is coherently planned and sequences
- A curriculum that is successfully adapted, designed and developed for students with special educational needs, and/or disabilities
- A curriculum that is broad and balanced for all students

The curriculum delivery in mathematics relies on:-

- Embedding quality teaching a learning opportunities in lessons with increased thinking time planned for students before the need to respond
- Marking in such a way that it is personalised to identify and correct misconceptions in student friendly language
- Assessing progress regularly and reporting this to parents/carers each term
- Comparing student progress with their individual learning profiles
- Supporting student who are struggling to work in the mathematics room by offering 1 : 1 support with a TA
- Monitoring students who are being taught separately from the main cohort by supplying resources to support the staff working towards the Functional Skills qualification with students
- Purposeful questioning provoking discussion within the lessons.

How SMSC and British Values are delivered in this subject

Spiritual – encourage interest in the power of mathematics in everyday life and use spiritual examples to exemplify this – Rangoli patterns in symmetry and tessellation, Fibonacci sequence and the golden ratio etc.

Moral – teachers provide good role models on how to interact with each other and students are encouraged to value the contributions of other students without judgement. Handouts and worked examples avoid stereotypes regarding gender, race, sexual orientation etc.

Social – students in seating plan to facilitate good working practise, collaboration and the opportunity to work with students from a variety of different backgrounds. Work within the British values of rule of law, individual liberty and mutual respect of each other.

Cultural – students are taught methods for mathematics from around the world such as the Singapore Bar Method, the Chinese lattice method of multiplication etc. Students learn about the traditional methods of mathematics which their parents/grandparents/carers may have been taught as part of the "teaching for mastery" initiative.

KEY DATES / NOTES

Assessment will be a mixture of on-going formative assessments and summative assessments at the end of specific topics.

Questioning throughout lessons will take place and marking will be timely and detailed.

A combination of these, along with teacher judgement, will form a RAG rated entry half termly on the assessment tracker and this will be reported back to parents/carers at the end of each term

Assessments will be a combination of Corbett maths past papers, BKSB assessments and AQA past papers

Timing	**Key Skills** *What pupils are learning to do*	**Teaching & Learning Themes & Styles** *Topics, Activities, Learning Styles*	**Assessment Focus** *including dates and suggested assessments and methods of assessment*	**Additional Features** • Literacy Elements • Curriculum Links • Visits / Events
AUTUMN Half term 1	Understand and use standard mathematical formulae, rearrange formulae to change the subject Work with co-ordinates in all four quadrants Plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form y = mx + c to identify parallel lines, use	Graphs in algebra – equation of a straight line	Corbett maths higher paper set A Paper 1 – non-calculator Mymaths – GCSE 9 – 1 (England)	

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	the form y = mx + c to identify perpendicular lines, find the equation of the line through 2 given points, or through one point with a given gradient Identify and interpret gradients and intercepts of linear functions graphically and algebraically Express a multiplicative relationship between 2 quantities as a ratio or a fraction Relate ratios to fractions and to linear functions Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion. Plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form y = mx + c to identify parallel lines, use the form y = mx + c to identify perpendicular lines, find the equation of the line through 2 given points, or through one point with a given gradient Recognise, sketch and interpret graphs of linear functions and quadratic functions, simple cubic	Linear and quadratic functions	Revision and assessment booster packs for 6 & 7 -	

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	functions and the reciprocal function $y = \frac{1}{x}$ with $x \neq 0$, exponential functions $y = x^k$ for positive values of k, and the trigonometric functions (with arguments in degrees) y = sin x, y = cos x and y = tan x for angles of any size Solve quadratic equations (including those that require rearrangement) algebraically by factorising; by completing the square and by using the quadratic formula; find approximate solutions using a graph Identify and interpret roots, intercepts and turning points of quadratic functions graphically, deduce root algebraically, deduce turning points by completing the square Recognise, sketch and interpret graphs of linear functions and quadratic functions, simple cubic functions and the reciprocal function $y = \frac{1}{x}$ with $x \neq 0$, exponential functions $y = x^k$ for positive values of k, and the trigonometric functions (with arguments in degrees) y = sin	Properties of quadratic functions		

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	x, y = cos x and y = tan x for angles of any size Solve quadratic equations (including those that require rearrangement) algebraically by factorising; by completing the square and by using the quadratic formula; find approximate solutions using a graph Plot and interpret graphs(including reciprocal graphs and exponential graphs) and graphs or non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written descriptions	Kinematic graphs 3D shapes		

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	Identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres Construct and interpret plans and elevations of 3D shapes Understand and use standard mathematical formulae, rearrange formulae to change the subject Use compound units such as speed, rates of pay, unit pricing, density and pressure. Compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors. Use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc) Know and apply formulae to calculate; area of triangles, parallelograms, trapezia, volume of cuboids and other right prisms (including cylinders) Know the formulae; circumference of a circle = $2\prod r = \prod D$, area of a circle = $\prod r^2$	Volume of a prism		

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	Calculate perimeters of 2D shapes, including circles; areas of circles and composite shapes. Surface area and volume of spheres, pyramids, cones and composite solids Understand and use standard mathematical formulae, rearrange formulae to change the subject Identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prism, cylinders, pyramids, cones and spheres Know the formulae; circumference of a circle = $2\prod r = \prod D$, area of a circle = $\prod r^2$ Calculate perimeters of 2D shapes, including circles; areas of circles and composite shapes. Surface area and volume of spheres, pyramids, cones and composite solids Apply the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures	Volume and surface area		

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AUTUMN Half term 2	Calculate exactly with fractions and multiples of ∏, simplify surd expressions involving squares (eg $\sqrt{12} = \sqrt{4} \times 3 = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$) and rationalise denominators Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angle 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: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment Solve geometrical problems on coordinate axes Know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ and the trigonometric ratios, sin a = opposite/hypotenuse, cos A = adjacent/hypotenuse and tan A = opposite/adjacent; apply them to find angles and lengths in right-angled triangles and, where possible	Pythagoras, trigonometry and vectors – Pythagoras theorem	Corbett maths higher paper set A Paper 2 – calculator Paper 3 - calculator Mymaths – GCSE 9 – 1 (England) Revision and assessment booster packs for 6 & 7	

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	general triangles in two and three dimensional figures. Compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors. Apply the concept of congruence and similarity including the relationships between lengths, areas and columns in similar figures Know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ and the trigonometric ratios, sin a = opposite/hypotenuse, cos A = adjacent/hypotenuse and tan A = opposite/adjacent; apply them to find angles and lengths in right-angled triangles and, where possible general triangles in two and three dimensional figures. Know the exact values of sin A and cos A for A = 0° , 30°, 45°, 60° and 90° Know the exact value of tan A for A = 0°, 30°, 45° and 60° Use conventional terms and notations; points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons,	Trigonometry		

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	regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description Derive and apply the properties and definitions of; special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus, and triangles and other plan figures using appropriate language Apply addition and subtraction of vectors, multiplications of vectors by a scalar and diagrammatic and column representation of vectors. Use vector to construct geometric arguments and proofs Use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5; e4stimate powers and roots of any given positive number Calculate with roots and with integer indices; calculate with fractions indices	Vectors Calculating with roots and indices		

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	Simplify and manipulate algebraic expressions (including those involving surds and algebraic fractions) by; - Collecting like terms - Multiplying a single term over a bracket - Taking out common factors - Simplifying expressions involving sums, products and powers, including the laws of indices - Expanding products of 2 or more binomials - Factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares, factorising quadratic expressions of the form $ax^2 + bx + c$ Calculate exactly with fractions and multiples of ∏, simplify surd expressions involving squares (eg $\sqrt{12} = \sqrt{4} \times 3 = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$) and rationalise denominators Simplify and manipulate algebraic expressions (including those involving surds and algebraic fractions) by; - Collecting like terms	Exact calculations		

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	- Multiplying a single term over a bracket - Taking out common factors - Simplifying expressions involving sums, products and powers, including the laws of indices - Expanding products of 2 or more binomials - Factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares, factorising quadratic expressions of the form $ax^2 + bx + c$ - Solve 2 simultaneous equations in 2 variables (linear/linear or linear/quadratic) algebraically; find approximate solutions using a graph Apply the four operations + - x ÷ including formal written methods, to integers, decimals and simple fractions (proper and improper) and mixed numbers – all both positive and negative; understand and use place value (eg when working with very large or very small	Standard form		

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	numbers, and when calculating with decimals) Recognise, sketch and interpret graphs of linear functions and quadratic functions, simple cubic functions and the reciprocal function $y = \frac{1}{x}$ with $x \neq 0$, exponential functions $y = k^x$ for positive values of k, and the trigonometric functions (with arguments in degrees) y = sin x, y = cos x and y = tan x for angles of any size Recognise, sketch and interpret graphs of linear functions and quadratic functions, simple cubic functions and the reciprocal function $y = \frac{1}{x}$ with $x \neq 0$, exponential functions $y = k^x$ for positive values of k, and the trigonometric functions (with arguments in degrees) y = sin x, y = cos x and y = tan x for angles of any size Sketch translations and reflections of a given function Plot and interpret graphs (including reciprocal graphs and exponential graphs) in	Graphs – algebra – cubic and reciprocal functions Expotential and trigonmetric functions Real life graphs		

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	real contexts and graphs of non-standard functions in rea contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration. Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion Calculate or estimate gradients of graphs (including quadratic and other on-linear graphs) and areas under graphs (including quadratic and other non-linear graphs), and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts. Recognise and use the equation of a circle with centre at the origin; find the equation of a tangent to a circle at a given point Identify and apply circle definitions and properties, including; centre, radius, chord, diameter, circumference, tangent, arc, sector and segment	Gradients and areas under graphs Equations of a circle		

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SPRING Half term 3	Interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line chart for ungrouped discrete numerical data, tables and line graphs for time series data and know their appropriate use Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: - Appropriate graphical representation involving discrete, continuous and grouped data, including box plots - Appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers, quartiles and inter-quartile range) Apply statistics to describe a population	Handling data – averages and speed	Corbett maths higher paper set B Paper 1 – non-calculator Paper 2 – calculator Paper 3 - calculator Mymaths – GCSE 9 – 1 (England) Revision and assessment booster packs for 6 & 7 -	

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	Construct and interpret diagrams for grouped descrete data and continuous data, ie histograms with equal and unequal class intervals and cumulative frequency graphs and know their appropriate use Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: - Appropriate graphical representation involving discrete, continuous and grouped data, including box plots - Appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers, quartiles and inter-quartile range) Solve linear equations in one unknown algebraically including those with the unknown on both sides of the equation; find approximate solutions using a graph Apply statistics to describe a population	Box plots and cumulative frequency graphs Scatter graphs and correlation		

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	Use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimates lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of doing so Interpret and construct tables, charts and diagrams, including frequency table, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graph for time series data and know their appropriate use Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees. Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes or multiple future experiments Relate relative expected frequencies to theoretical probability, using appropriate	Time series Probability – experiments		

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	language and the 0 – 1 probability scale Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling			
	Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments. Relate relative expected frequencies to theoretical probability, using appropriate language and the 0 – 1 probability scale Understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size	Theoretical probability		
	Apply the property that the probabilities of an exhaustive set of outcome sum to one, apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one.	Mutually exclusive events		
	Apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the	The probability of combined events – sets		

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	probabilities of an exhaustive set of mutually exclusive events sum to one. Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions Apply systematic listing strategies including use of the product rule for counting Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams Construct theoretical possibility spaces for single experiments with equally likely outcomes and use these to calculate theoretical probabilities Construct theoretical possibility spaces for combined experiments with equally likely outcomes and use these to calculate theoretical probabilities	Possibility spaces		

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	Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees. Apply ideas of randomness, fairness and equally likely events to calculated expected outcomes of multiple future experiments Apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one. Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions	Tree diagrams		
	Calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams, and Venn diagrams	Conditional probability		

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SPRING Half term 4	Generate terms of a sequence from either a term-to-term or a position-to-term rule Recognise and use sequences of triangular, square and cube numbers; simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions and other sequences. Deduce expressions to calculate the nth term of linear sequences and quadratic sequences. Generate terms of a sequence from either a term-to-term or a position-to-term rule Recognise and use sequences of triangular, square and cube numbers; simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions and other sequences. Deduce expressions to calculate the nth term of linear sequences and quadratic sequences	Sequences – linear sequences Quadratic sequences		

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	Generate terms of a sequence from either a term-to-term or a position-to-term rule Recognise and use sequences of triangular, square and cube numbers; simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions and other sequences.	Special sequences		
	Change freely between related standard units (eg time, length, area, volume/capacity, mass) and compound units (eg speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts. Use compound units such as speed, rates of pay, unit pricing, density and pressure	Units and proportionality - compound units		
	Change freely between related standard units (eg time, length, area, volume/capacity, mass) and compound units (eg speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts Compare lengths, areas and volumes using ratio notation;	Converting between units		

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	make links to similarity (including trigonometric ratios) and scale factors. Apply the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures Express a multiplicative relationship between 2 quantities as a ratio or a fraction Understand and use proportion as quality of ratios Relate ratios to fractions and to linear functions Solve problems involving direct and inverse proportion, including graphical and algebraic representations Understand that X is inversely proportional to Y is equivalent to X is proportional to $\frac{1}{Y}$; construct and interpret equations that describe direct and inverse proportion Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion	Direct and inverse proportion		

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	Interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion Set up, solve and interpret the answers in growth and decay problems, including compound interest and work with general iterative processes.	Rates of change Growth and decay		
SUMMER Half term 5			Corbett maths higher paper set C Paper 1 – non-calculator Paper 2 – calculator Paper 3 - calculator	
SUMMER Half term 6	GCSE papers			