Department
Mathematics

Programme of Study: Key Stage 3 to Key Stage 5

Intent:

It is our duty to inspire young people to see the true beauty of mathematics in the wider world by bringing mathematics alive, thereby making it exciting, relevant and easy

This vision is underpinned by our **core principles** of Aspire, Believe, Achieve, which builds on the aims of the National Curriculum to deliver opportunity and development for all. At Kings Academy Prospect School we believe:

1. Everyone can be a mathematician; students are able to experience a personal and inclusive pathway
2. We have a commitment to developing inquisitive minds, continually questioning, strengthening and extending students conceptual knowledge
3. Students should relish and enjoy the challenge and exploration of the mathematical world
4. Mathematics is everywhere – it is a universal language
5. Students celebrate and explore different approaches,
6. Mathematics is a creative discipline; the answer is only the start!

A Prospect student will, therefore, develop the following **characteristics:**

1. Be inquisitive
2. Be a resilient problem solver - have the confidence to try and try again
3. Make connections and find patterns, within mathematics and across the entire curriculum
4. Be open to different approaches, recognise the strengths and weaknesses of these and how these change in different situations
5. Have a sense of accomplishment and pride - find satisfaction in solutions
6. Be fluent and aim for complete mastery
7. Be confident mathematical communicators; explain, justify and reason
8. Appreciate both the relevance of maths and its abstract beauty

Overview:

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Key Concepts

Pattern	Dimension	Quantity	Uncertainty	Shape	Change
Pattern is seen as a wide-ranging concept that covers patterns encountered all around us, such as those in musical forms, nature, traffic patterns, etc. It is argued that our ability to recognize, interpret, and create patterns is the key to dealing with the world around us.	Dimension includes "big ideas" related to one, two, and three dimensions of "things" (using spatial and numerical descriptions), projections, lengths, perimeters, planes, surfaces, location, etc. Facility with each dimension requires a sense of "benchmarks" and estimation, direct measurement and derived measurement skills.	Quantity is described as an outgrowth of people's need to quantify the world around us, using attributes such as: length, area, and volume of rivers or land masses; temperature, humidity, and pressure of our atmosphere; populations and growth rates of species; motions of tides; revenues or profits of companies, etc.	Uncertainty covers "big ideas" related to probability, subjective probability, and relevant statistical methods. Few things in the world are 100% certain; therefore the ability to attach a number that represents the likelihood of an instance is a valuable tool whether it has to do with the weather, the stock-market, or the decision to board a plane. It also covers "big ideas" such as variability, sampling, error, or prediction, and related statistical topics such as data collection, data displays, and graphs.	Shape is a category describing real images and entities that can be visualized (e.g., houses and buildings, designs in art and craft, safety signs, packaging, snowflakes, knots, crystals, shadows and plants), as well as highly abstract "things" greater than three dimensions.	Change describes the mathematics of how the individual organisms grow, populations vary, prices fluctuate, objects travelling speed up and slow down. Change and rates of change help provide a narration of the world as time marches on. Additive, multiplicative, exponential patterns of change can characterize steady trends; periodic changes suggest cycles and irregular change patterns connect with chaos theory

Key Themes

Number	Algebra	Ratio, proportion and rates of change	Geometry and measures	Probability	Statistics
Pupils will be taught: ● Place value ● Positive and negative integers ● Number facts e.g. Primes ● Four operations ● Inverse operations ● Powers and roots ● Standard form ● Fractions, decimals and percentages ● use standard units of mass, length, time, money and other measures ● round numbers ● use approximation ● use a calculator and other technologies ● appreciate the infinite nature of the sets of integers	Pupils will be taught: ● Algebraic notation ● Algebraic language ● brackets ● substitute ● simplify and manipulate algebraic expressions ● Rearrange formulae ● Form algebraic expressions ● solve linear equations ● solve quadratic equations ● work with coordinates in all four quadrants ● Graphs e.g. linear, quadratic ● Interpret graphs ● Parallel and perpendicular lines ● Sequences ● Index laws ● Simultaneous equations	Pupils will be taught: ● Conversions of units ● Scale factors ● express one quantity as a fraction of another ● use ratio notation ● divide into a ratio ● proportion ● percentage change ● direct and inverse proportion ● speed, unit pricing and density ● Compound (and simple) interest ● Growth and decay	Pupils will be taught: ● 2D shapes ● Perimeter ● Area ● 3D shapes ● Surface Area ● Volume ● Construction ● Transformations ● Congruency and similarity ● Angle geometry ● Pythagoras' Theorem ● Trigonometric ratios ● Trigonometry with non-right-angled triangles ● Vectors ● Circle theorems	Pupils will be taught: ● Probability language ● Sample space ● Theoretical probability ● Experimental probability ● Relative Frequency ● Venn diagrams and sets ● Methods of presenting probability events e.g. tree diagrams Conditional probability	Pupils will be taught: ● Types of data ● Data collection methods ● Data analysis e.g. mean ● Data presentation e.g. tables and graphs ● Analyse results and interpret data in relation to real work contexts

Key Stage 3

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/239058/SECONDARY_national_curriculum_-_Mathematics.pdf

YEAR: 7

1 2 3 4 5 6 7	8 9 10 11 12 13 14 15	16 17 18 19 20 21	22 23 24 25 26 27	28 29 30 31 32	33 34 35 36 37 38
Key Content: Algebraic Thinking **Focus:** Sequences Understand and use algebraic notation Equality and Equivalence	**Key Content:** Place Value and Proportion **Focus:** Place value and ordering integers and decimals Fraction, decimal and percentage equivalence	**Key Content:** Application of Number **Focus:** Solving problems with addition & subtraction Solving problems with multiplication and division Fractions of an amount	**Key Content:** Directed Numbers and Fractional Thinking **Focus:** Operations and equations with directed numbers Addition and subtraction of fractions	**Key Content:** Lines and Angles **Focus:** Constructing, measuring and using geometric notation Developing geometric reasoning	**Key Content:** Reasoning with Number **Focus:** Developing number sense Sets and probability Prime numbers and proof
Key Concepts	Key Concepts	Key Concepts	Key Concepts	Key Concepts	Key Concepts
Key Themes					
Assessment Method: Baseline assessment Unit assessments Sparx	Assessment Method: Unit assessment End of term assessment Sparx	Assessment Method: Unit assessment Sparx	Assessment Method: Unit assessment End of term assessment Sparx	Assessment Method: Unit assessment Sparx	Assessment Method: Sparx Exam

YEAR: 8

1 2 3 4 5 6 7	8 9 10 11 12 13 14 15	16 17 18 19 20 21	22 23 24 25 26 27	28 29 30 31 32	33 34 35 36 37 38 3
Key Content: Proportional Reasoning **Focus:** Ratio and scale Multiplicative change Multiplying and dividing fractions	**Key Content:** Representations **Focus:** Working in the cartesian plane Representing data Tables and probability	**Key Content:** Algebraic Techniques **Focus:** Brackets, equations and inequalities Sequences Indices	**Key Content:** Developing Number **Focus:** Fractions & percentages Standard index form Number sense	**Key Content:** Developing Geometry **Focus:** Angles in parallel lines and polygons Area of trapezia and circles Line symmetry and reflection	**Key Content:** Reasoning with Data **Focus:** The data handling cycle Measures of location
Key Concepts	Key Concepts	Key Concepts	Key Concepts	Key Concepts	Key Concepts
Key Themes	Key Themes	Key Themes	Key Themes	Key Themes	Key Themes
Assessment Method: Baseline assessment Unit assessments	Assessment Method: Unit assessment End of term assessment	Assessment Method: Unit assessment Sparx	Assessment Method: Unit assessment End of term assessment	Assessment Method: Unit assessment Sparx	Assessment Method: Sparx Exam

Sparx	Sparx		Sparx		

YEAR: 9

1 2 3 4 5 6 7	8 9 10 11 12 13 14 15	16 17 18 19 20 21	22 23 24 25	26 27 28 29 30 31 32	33 34 35 36 37 38 39
Key Content: Reasoning with Algebra **Focus:** Straight line graphs Forming and solving equations Testing conjecture	**Key Content:** Constructing in 2 and 3 Dimensions **Focus:** Three dimensional shapes Constructions and congruence	**Key Content:** Reasoning with Number **Focus:** Numbers Using percentages Maths and money	**Key Content:** Reasoning with Geometry **Focus:** Deduction Rotation and translation Pythagoras' theorem	**Key Content:** Reasoning with Proportion **Focus:** Enlargement and similarity Solving ratio & proportion problems Rates	**Key Content:** Representations and Revision **Focus:** Probability Algebraic representation Revision
Key Concepts	Key Concepts	Key Concepts	Key Concepts	Key Concepts	Key Concepts
Key Themes	Key Themes	Key Themes	Key Themes	Key Themes	Key Themes
Assessment Method: Baseline assessment Sparx	Assessment Method: Exam Sparx	Assessment Method: Unit assessment Sparx	Assessment Method: Unit assessment Sparx	Assessment Method: Unit assessment Sparx	Assessment Method: Sparx Exam

Key Stage 4

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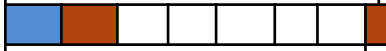
YEAR: 10

Foundation

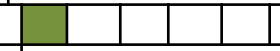
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 3
Number, factors and Multiples Decimals and rounding Fractions Basic Algebra	Sequences Co-ordinates and linear graphs Ratio and Proportion Percentages Perimeter and Area	Circumference and Area Volume Collecting and representing data	Statistical measures Probability Indices Standard form Measures	Angles Properties of polygons 2D representation of 3D shapes Sketching graphs	Real life graphs Direct and inverse proporti Pythagoras' theorem Trigonometry
Key Concepts	Key Concepts	Key Concepts	Key Concepts	Key Concepts	Key Concepts
Key Themes	Key Themes	Key Themes	Key Themes	Key Themes	Key Themes

Assessment Method: Topic Tests Sparx	Assessment Method: Topic Tests Sparx	Assessment Method: Topic Tests Sparx	Assessment Method: Topic Tests Sparx	Assessment Method: Topic Tests Sparx Mock exam	Assessment Method: Topic Tests Sparx

Higher

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
Number, factors and Multiples Decimals and rounding Fractions Basic Algebra Indices Equations Sequences Co-ordinates and linear graphs	Co-ordinates and linear graphs Ratio and Proportion Percentages Perimeter and Area
Key Concepts	Key Concepts
	
Key Themes	Key Themes
	
Assessment Method: Topic Tests Sparx	Assessment Method: Topic Tests Sparx

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
Circumference and Area Volume Collecting and representing data Statistical measures
Key Concepts

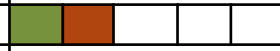
Key Themes

Assessment Method: Topic Tests Sparx

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
Probability Surds Standard form Measures
Key Concepts

Key Themes

Assessment Method: Topic Tests Sparx

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
Angles, scale diagrams and bearings Properties of polygons 2D representation of 3D shapes Sketching graphs
Key Concepts

Key Themes

Assessment Method: Topic Tests Sparx Mock Exam

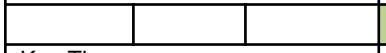
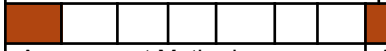
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
Real life graphs Direct and inverse propo Pythagoras' theorem Trigonometry
Key Concepts

Key Themes

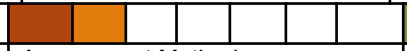
Assessment Method: Topic Tests Sparx

YEAR: 11

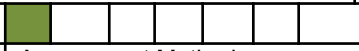
Foundation

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Quadratics, rearranging formulae and identities Inequalities Simultaneous equations
Key Concepts

Key Themes

Assessment Method: Topic Tests Mock exam

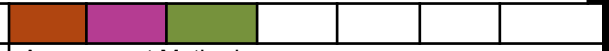
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Scattergraphs Algebra and graphs Quadratic graphs
Key Concepts

Key Themes

Assessment Method: Topic Tests

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Scale diagrams and bearings Construction and loci Transformations
Key Concepts

Key Themes

Assessment Method: Topic Tests Mock Exam

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Solving quadratic equations Vectors Growth and decay Problem solving
Key Concepts

Key Themes

Assessment Method: Topic Tests

Higher

1 2 3 4 5 6 7 8	9 10 11 12 13 14 15	16 17 18 19 20 21	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Transformations Congruence and similarity Construction and loci Quadratics, rearranging formulae and identities Inequalities	Equation of a circle Further equations and graphs Simultaneous equations Vectors Numerical methods Scattergraphs	Circle Theorems	Growth and decay Gradient and rate of change Algebraic fractions Transforming functions Pre-calculus and area under a curve
Key Concepts	Key Concepts	Key Concepts	Key Concepts
Key Themes	Key Themes	Key Themes	Key Themes
Assessment Method: Topic Tests Mock Exam	Assessment Method: Topic Tests	Assessment Method: Topic Tests Mock Exam	Assessment Method: Topic Tests

Key Stage 5

YEAR: 12

CORE MATHS

1 2 3 4 5 6 7 8	9 10 11 12 13 14 15	16 17 18 19 20 21 22	23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
Topic 1 – Social Media Topic 2 – Society	Topic 2 – Society Topic 3 - Sport	Topic 4 – Clothing Industry	Topic 5 - Financs	Topic 6 – Creative arts	Topic 7 - Health
Key Themes	Key Themes	Key Themes	Key Themes	Key Themes	Key Themes
Assessment Method: Unit assessment	Assessment Method: Unit assessment	Assessment Method: Unit assessment	Assessment Method: Unit assessment	Assessment Method: Unit assessment Mock exam	Assessment Method: Unit assessment

A LEVEL MATHS

Teacher 1

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39					
Algebra and functions	Vectors in 2D Co-ordinate geometry	Co-ordinate geometry Trigonometry	Trigonometry Modelling in mechanics Equations of motion	Forces and motion	Algebraic methods Trigonometry
Key Themes	Key Themes	Key Themes	Key Themes	Key Themes	Key Themes
					
Assessment Method: Topic tests	Assessment Method: Topic tests	Assessment Method: Topic tests	Assessment Method: Topic tests	Assessment Method: Topic tests Mock exam	Assessment Method: Topic tests

Teacher 2

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39					
Further algebra Differentiation	Differentiation Integration Data collection	Data collection Statistical representation and interpretation	Statistical representation and interpretation Probability Statistical distributions Hypothesis testing	Hypothesis testing	Functions and graphs Sequences and series
Key Themes	Key Themes	Key Themes	Key Themes	Key Themes	Key Themes
					
Assessment Method: Topic tests	Assessment Method: Topic tests	Assessment Method: Topic tests	Assessment Method: Topic tests	Assessment Method: Topic tests Mock exam	Assessment Method: Topic tests

FURTHER MATHS A LEVEL

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39					
Decision maths:	Core Pure 1:	Core Pure 1:	Core Pure 1:	Core Pure 1:	Mechanics:

Algorithms Graphs and Networks Algorithms on Graphs	Complex numbers Argand diagrams Series	Roots of polynomials Volumes of revolution Matrices	Linear transformations Proof by induction Vectors	Vectors Mechanics: Momentum and Impulse Work, power and energy	Momentum and Impulse Work, power and energy
Key Themes	Key Themes	Key Themes	Key Themes	Key Themes	Key Themes
Assessment Method: Topic tests	Assessment Method: Topic tests	Assessment Method: Topic tests	Assessment Method: Topic tests	Assessment Method: Topic tests Mock exam	Assessment Method: Topic tests

YEAR: 13

CORE MATHS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Topic 8 - Economy	Topic 9 – Travel Topic 10 - Environment
Key Themes	Key Themes
Assessment Method: Unit assessment Mock exam	Assessment Method: Unit assessment

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Topic 11 - Disasters	Topic 12 - Engineering
Key Themes	Key Themes
Assessment Method: Unit assessment Mock exam	Assessment Method: Unit assessment

A LEVEL MATHS

Teacher 1

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Proof by contradiction Trigonometry	Trigonometry Parametric equations Vectors
Key Themes	Key Themes
Assessment Method: Topic tests Mock exam	Assessment Method: Topic tests

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Moments Forces and friction Projectiles	Application of forces Further kinematics
Key Themes	Key Themes
Assessment Method: Topic tests Mock exam	Assessment Method: Topic tests

Teacher 2

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Functions and graphs Sequences and series	Differentiation Numerical methods

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Regression, correlation and hypothesis testing	Conditional probability Normal distribution

Binomial expansion Differentiation	Integration	Conditional probability	
Key Themes	Key Themes	Key Themes	Key Themes
Assessment Method: Topic tests Mock exam	Assessment Method: Topic tests	Assessment Method: Topic tests Mock exam	Assessment Method: Topic tests

FURTHER MATHS A LEVEL

1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30 31	32 33 34 35 36
Decision Maths: Route inspection Linear programming Simplex algorithm Core Pure 2: Complex numbers	Decision Maths: Critical path analysis Mechanics: Elastic strings and springs Elastic collisions in one dimension Elastic collisions in two dimensions	Core Pure 2: Series Methods in calculus Volumes of revolution Polar co-ordinates	Core Pure 2: Hyperbolic functions Methods in differential equations Modelling with differential equations
Key Themes	Key Themes	Key Themes	Key Themes
Assessment Method: Topic tests Mock exam	Assessment Method: Topic tests	Assessment Method: Topic tests Mock exam	Assessment Method: Topic tests