

MATHS

Department Aims

Our goal within the Maths Department has been to provide students with learning opportunities which inspire and challenge. We strive to capture students' enjoyment of Mathematics inside and outside the classroom

- To set challenging targets with high expectations for all students.
- To offer a variety of approaches to teaching and learning to engage and motivate students and demand their active participation.
- To smooth the transition for students between Key Stages and ensure progression in teaching and learning throughout their time at Shirley.
- To explore enrichment opportunities outside the curriculum to enhance students' enjoyment of mathematics.

Department Ethos

"If you able to solve the problems in MATHS, then you also able to solve the problems in your LIFE"
(Maths is a great Challenger) - Vignesh

Department Staff

Mrs A Gordon - Head of Department
Mrs A Brown - Leading Mathematics Practitioner
Ms L Douto - 3rd in charge
Mr M Tarawally – Teacher of Maths
Mr Akuffo-Kisiedu– Teacher of Maths
Mrs J Juster - Higher Learning Teaching Assistant
Mr P Saunders – Teacher of Maths
Mr G King – Teacher of Maths
Mr A Mubeezi – Teacher of Maths

Key Stage 3 Information

In Shirley High School we put students in set based on their Mathematical ability. We have three sets in Maths for Years 7 and 8.

- **Delta –High ability**
- **Theta – Middle ability**
- **Pi – Low ability**

Students in Year 7 are tested in their first Maths lesson at SHS and then they are put in sets based on their ability and their baseline test result.

Students are tested regularly, during Autumn, Spring and Summer term, and movement between sets are possible based on student progress and test results.

Students in Years 7 – 13 take part in UK Maths challenge every year.

Years 7 and 8 take part in few Maths trips during the year. Year 8 students take part in free enrichment sessions run by Further Maths organization, and Year 7 students take part in London Eye and Science Museum trip to understand use of Maths in everyday life.

Please look at the table below for our scheme of work for Years 7 and 8.

	Scheme of Work for Year 8
<p>Delta</p> <p>Autumn term : Unit 1-4</p> <p>Spring term : Unit 5-7</p> <p>Summer term : Unit 8-10</p>	<ul style="list-style-type: none"> Unit 1 – Factors and powers Unit 2 – Working with powers <p>Autumn half term assessment</p> <ul style="list-style-type: none"> Unit 3 – 2D shapes and 3D solids Unit 4 – Real line graphs <p>End of Autumn term assessment</p> <ul style="list-style-type: none"> Unit 5 – Transformations Unit 6 – Fractions, decimals and percentage <p>Spring half term assessment</p> <ul style="list-style-type: none"> Unit 7 – Constructions and loci <p>End of Spring term assessment</p> <ul style="list-style-type: none"> Unit 8 – Probability Unit 9 – Scale drawings and measures <p>Summer half term assessment</p> <ul style="list-style-type: none"> Unit 10 – Graphs <p><u>End of year assessment, two papers one calculator and one non-calculate.</u></p>
<p>Theta</p> <p>Autumn term : Unit 1-4</p> <p>Spring term : Unit 5-7</p> <p>Summer term : Unit 8-10</p>	<ul style="list-style-type: none"> Unit 1 – Number Unit 2 – Area and volume <p>Autumn half term assessment</p> <ul style="list-style-type: none"> Unit 3 – Statistics, graphs and charts Unit 4 – Expressions and equations <p>End of Autumn term assessment</p> <ul style="list-style-type: none"> Unit 5 – Real- life graphs Unit 6 – Decimals and ratio <p>Spring half term assessment</p> <ul style="list-style-type: none"> Unit 7 – Lines and angles

	<p style="text-align: center;">End of Spring term assessment</p> <ul style="list-style-type: none"> • Unit 8 – Calculating with fractions • Unit 9 – Straight line graphs <p style="text-align: center;">Summer half term assessment</p> <ul style="list-style-type: none"> • Unit 10 – Percentages, decimals and fractions <p style="text-align: center;"><u>End of year assessment, two papers one calculator and one non-calculate.</u></p>
<p style="text-align: center;">Pi</p> <p>Autumn term : Unit 1-4</p> <p>Spring term : Unit 5-7</p> <p>Summer term : Unit 8-10</p>	<ul style="list-style-type: none"> • Unit 1 – Number properties and calculations • Unit 2 – Shapes and measures in 3D <p style="text-align: center;">Autumn half term assessment</p> <ul style="list-style-type: none"> • Unit 3 – Statistics • Unit 4 – Expressions and equations <p style="text-align: center;">End of Autumn term assessment</p> <ul style="list-style-type: none"> • Unit 5 – Decimal calculations • Unit 6 – Angles <p style="text-align: center;">Spring half term assessment</p> <ul style="list-style-type: none"> • Unit 7 – Number properties <p style="text-align: center;">End of Spring term assessment</p> <ul style="list-style-type: none"> • Unit 8 – Sequences • Unit 9 – Fractions and percentages <p style="text-align: center;">Summer half term assessment</p> <ul style="list-style-type: none"> • Unit 10 – Probability <p style="text-align: center;"><u>End of year assessment, two papers one calculator and one non-calculate.</u></p>
<p>Scheme of Work for Year 7</p>	
<p style="text-align: center;">Delta</p> <p>Autumn term : Unit 1-4</p> <p>Spring term : Unit 5-7</p> <p>Summer term : Unit 8-10</p>	<ul style="list-style-type: none"> • Unit 1 – Analysing and displaying data • Unit 2 – Number skills <p style="text-align: center;">Autumn half term assessment</p> <ul style="list-style-type: none"> • Unit 3 – Equations, functions and formula • Unit 4 – Fractions <p style="text-align: center;">End of Autumn term assessment</p> <ul style="list-style-type: none"> • Unit 5 – Angles and shapes

	<ul style="list-style-type: none"> • Unit 6 – Decimals <p style="text-align: center; color: red;">Spring half term assessment</p> <ul style="list-style-type: none"> • Unit 7 – Equations <p style="text-align: center; color: red;">End of Spring term assessment</p> <ul style="list-style-type: none"> • Unit 8 – Multiplicative reasoning • Unit 9 – Perimeter, area and volume <p style="text-align: center; color: red;">Summer half term assessment</p> <ul style="list-style-type: none"> • Unit 10 – Sequences and graphs <p style="text-align: center; color: red;"><u>End of year assessment, two papers one calculator and one non-calculate.</u></p>
<p style="text-align: center;">Theta</p> <p>Autumn term : Unit 1-3</p> <p>Spring term : Unit 4-7</p> <p>Summer term : Unit 8-10</p>	<ul style="list-style-type: none"> • Unit 1 – Analysing and displaying data • Unit 2 – Number skills <p style="text-align: center; color: red;">Autumn half term assessment</p> <ul style="list-style-type: none"> • Unit 3 – Equations, functions and formula • Unit 4 – Decimals and measures <p style="text-align: center; color: red;">End of Autumn term assessment</p> <ul style="list-style-type: none"> • Unit 5 – Fractions • Unit 6 – Probability <p style="text-align: center; color: red;">Spring half term assessment</p> <ul style="list-style-type: none"> • Unit 7 – Ratio and proportions <p style="text-align: center; color: red;">End of Spring term assessment</p> <ul style="list-style-type: none"> • Unit 8 – Lines and graphs • Unit 9 – Sequences and graphs <p style="text-align: center; color: red;">Summer half term assessment</p> <ul style="list-style-type: none"> • Unit 10 – Transformation <p style="text-align: center; color: red;"><u>End of year assessment, two papers one calculator and one non-calculate.</u></p>
<p style="text-align: center;">Pi</p> <p>Autumn term : Unit 1-4</p>	<ul style="list-style-type: none"> • Unit 1 – Analysing and displaying data • Unit 2 – Calculating <p style="text-align: center; color: red;">Autumn half term assessment</p>

Spring term : Unit 5-7
Summer term : Unit 8-10

- Unit 3 – Equations, functions and formula
- Unit 4 – Graphs

End of Autumn term assessment

- Unit 5 – Factors and multiples
- Unit 6 – Decimals and measures

Spring half term assessment

- Unit 7 – Angles and lines

End of Spring term assessment

- Unit 8 – Measuring and shapes
- Unit 9 – Fractions, decimals and percentages

Summer half term assessment

- Unit 10 – Transformation

End of year assessment, two papers one calculator and one non-calculate.

Key Stage 4 Information

Students who study for GCSE Mathematics will be expected to:

- develop confidence and competence with the defined mathematical content
- develop fluent knowledge, skills and understanding of mathematical methods
- acquire, select and apply mathematical techniques to solve problems
- reason mathematically, make deductions and inferences, and draw conclusions
- comprehend, interpret and communicate mathematical information in a variety of forms appropriate to the information and context
- recall, select and apply mathematical formulae.

Exam board: Edexcel GCSE (9-1)

Maths syllabus: 1MA1

You will be sitting 3 papers

Paper 1: 1 hour 30minutes Non-calculator

Paper 2: 1 hour 30 minutes Calculator
 Paper 3: 1 hour 30 minutes Calculator

Foundation: New Grades 1 – 5
Higher: New Grades 4 - 9

Key Stage 5 Information

There are two KS5 Mathematics options offered at Shirley High School:

A-level Mathematics

Students have the opportunity to study A-level Mathematics following the new specification Pearson-EDEXCEL syllabus. The course consists of Pure Mathematics (algebra, calculus and geometry) and Mechanics and Statistics modules. There are no longer option modules in A-level Mathematics and assessment is 100% exam based, with no assessed coursework.

A-level Mathematics is a popular choice both with those wishing to pursue a STEM (Science, Technology, Engineering and Mathematics) career, and those wishing to combine it with complementary subject choices such as Business Studies and Psychology.

GCSE Mathematics Resit

Students can retake the new specification GCSE Mathematics exam following the Pearson-EDEXCEL syllabus.

Scheme of Work

Year 1/AS Level		Year 2/Alevel	
Unit	Title	Unit	Title
1	Algebra and functions	1	Proof: Examples including proof by deduction* and proof by contradiction
	<u>a</u> Algebraic expressions – basic algebraic manipulation, indices and surds	2	Algebraic and partial fractions
	<u>b</u> Quadratic functions – factorising, solving, graphs and the discriminants		<u>a</u> Simplifying algebraic fractions
	<u>c</u> Equations – quadratic/linear simultaneous	<u>b</u>	Partial fractions
	<u>d</u> Inequalities – linear and quadratic (including graphical solutions)	3	Functions and modelling
	<u>e</u> Graphs – cubic, quartic and reciprocal		<u>a</u> Modulus function
	<u>f</u> Transformations – transforming graphs – $f(x)$ notation		<u>b</u> Composite and inverse functions
-	Coordinate geometry in the (x, y) plane	<u>c</u>	Transformations
2	<u>a</u> Straight-line graphs, parallel/perpendicular, length and area problems	<u>d</u>	Modelling with functions*

<u>b</u>	Circles – equation of a circle, geometric problems on a grid		*examples may be Trigonometric, exponential, reciprocal etc.
<u>3</u>	Further algebra	<u>4</u>	<u>Series and sequences</u>
	<u>Algebraic division, factor theorem and proof</u>		<u>Arithmetic and geometric progressions (proofs of ‘sum formulae’)</u>
<u>b</u>	<u>The binomial expansion</u>	<u>b</u>	Sigma notation
<u>4</u>	Trigonometry	<u>5</u>	<u>Recurrence and iterations</u>
	<u>Trigonometric ratios and graphs</u>		<u>The binomial theorem</u>
<u>b</u>	<u>Trigonometric identities and equations</u>	<u>a</u>	<u>Expanding $(a + bx)^n$ for rational n; knowledge of range of validity</u>
<u>5</u>	Vectors (2D)	<u>6</u>	<u>Expansion of functions by first using partial fractions</u>
	<u>Definitions, magnitude/direction, addition and scalar multiplication</u>		<u>Trigonometry</u>
<u>b</u>	<u>Position vectors, distance between two points, geometric problems</u>	<u>a</u>	<u>Radians (exact values), arcs and sectors</u>
<u>6</u>	Differentiation	<u>b</u>	<u>Small angles</u>
	<u>Definition, differentiating polynomials, second derivatives</u>		Secant, cosecant and cotangent (definitions, identities and graphs);
<u>b</u>	<u>Gradients, tangents, normals, maxima and minima</u>	<u>c</u>	Inverse trigonometrical functions; Inverse trigonometrical functions
<u>7</u>	Integration	<u>d</u>	Compound* and double (and half) angle formulae *geometric proofs expected
	<u>Definition as opposite of differentiation, indefinite integrals of x^n</u>		<u>e</u>
<u>b</u>	<u>Definite integrals and areas under curves</u>	<u>f</u>	Proving trigonometric identities
<u>8</u>	Exponentials and logarithms: Exponential functions and natural logarithms	<u>g</u>	Solving problems in context (e.g. mechanics)
Unit	Title	<u>7</u>	Parametric equations
Section A – Statistics		<u>a</u>	<u>Definition and converting between parametric and Cartesian forms</u>
		<u>b</u>	Curve sketching and modelling
<u>1</u>	Statistical sampling	Unit	Title
<u>a</u>	Introduction to sampling terminology; Advantages and disadvantages of sampling	Section A – Statistics	
<u>b</u>	Understand and use sampling techniques; Compare sampling techniques in context		
<u>2</u>	Data presentation and interpretation	<u>1</u>	<u>Regression and correlation</u>

<u>a</u>	Calculation and interpretation of measures of location; Calculation and interpretation of measures of variation; Understand and use coding	<u>a</u>	Change of variable	
	Interpret diagrams for single-variable data; Interpret scatter diagrams and regression lines; Recognise and interpret outliers; Draw simple conclusions from statistical problems		<u>b</u>	Correlation coefficients
3	Probability: Mutually exclusive events; Independent events		Statistical hypothesis testing for zero correlation	
4	Statistical distributions: Use discrete distributions to model real-world situations; Identify the discrete uniform distribution; Calculate probabilities using the binomial distribution (calculator use expected)		Probability	
<u>5</u>	Statistical hypothesis testing	<u>2</u>	Using set notation for probability	
	Language of hypothesis testing; Significance levels		<u>a</u>	Conditional probability
<u>b</u>	Carry out hypothesis tests involving the binomial distribution	<u>b</u>	Questioning assumptions in probability	
Section B – Mechanics			The Normal distribution	
<u>6</u>	Quantities and units in mechanics	<u>3</u>	<u>a</u>	Understand and use the Normal distribution
	Introduction to mathematical modelling and standard S.I. units of length, time and mass		<u>b</u>	Use the Normal distribution as an approximation to the binomial distribution
	Definitions of force, velocity, speed, acceleration and weight and displacement; Vector and scalar quantities	<u>c</u>	Statistical hypothesis testing for the mean of the Normal distribution	
<u>7</u>	Kinematics 1 (constant acceleration)			
	Graphical representation of velocity, acceleration and displacement	Section B – Mechanics		
<u>b</u>	Motion in a straight line under constant acceleration; suvat formulae for constant acceleration; Vertical motion under gravity	4	Moments: Forces' turning effect	
<u>8</u>	Forces & Newton's laws	<u>5</u>	Forces at any angle	
	Newton's first law, force diagrams, equilibrium, introduction to i, j system		<u>a</u>	Resolving forces

b	Newton's second law, 'F = ma', connected particles (no resolving forces or use of F = μR); Newton's third law: equilibrium, problems involving smooth pulleys	b	Friction forces (including coefficient of friction μ)
	Kinematics 2 (variable acceleration)	6	Applications of kinematics: Projectiles
a	Variable force; Calculus to determine rates of change for kinematics		Applications of forces
9 b	Use of integration for kinematics problems i.e. $r = \int v dt, v = \int a dt$	7 a	Equilibrium and statics of a particle (including ladder problems)
		b	Dynamics of a particle
		-	Further kinematics
		8 a	Constant acceleration (equations of motion in 2D; the i, j system)
		b	Variable acceleration (use of calculus and finding vectors r and v at a given time)