Subject Curriculum Overview for Academic Year 2022/2023

Subject: Mathematics	Subject Leader: Mr S Card	Stage B	AUTUMN TERM
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
Block 1 – Rational and irrational numbers	• Understand the definition of rational and irrational numbers • Write recurring decimals as fraction and vice versa • Simplify surds • Add and subtract surds • Multiply and divide surds • Rationalise surds	Rational number Irrational number Surd	Blocks 1-2 will be assessed before the Autumn half term holiday
Block 2 – Quadratics and completing the square	• Understand the meaning of 'completing the square' • Express quadratics in the form $x^2 + bx + c$ in completed square form • Solve quadratics equations $x^2 + bx + c = 0$ by completing the square • Solve quadratic functions requiring rearranging by completing the square • Find roots of quadratic functions by completing the square • Find the vertex of a quadratic graph by writing it in completed square form	Complete the square Quadratic equation Root Vertex	
Block 3 – Circle theorems	• Know and use the fact that the angle subtended by the diameter is 90^o • Know and use the fact that the angle at the centre is twice the angle at the circumference • Know and use the fact that angles subtended from the same chord are equal • Understand the term cyclic quadrilateral and how its angles are related • Know and use the fact that the angle between a radius and tangent is a 90^o • Know and use the alternate segment theorem to solve geometry problems	Subtended Chord Cyclic quadrilateral Tangent Segment	Blocks 3-5 will be assessed before the Christmas holiday
Block 4 – Graphs of motion and kinematics	• Understand the difference between distance and displacement • Draw displacement/time graphs and calculate speeds from them • Understand the difference between speed and velocity • Draw speed/time and velocity/time graphs • Calculate distances and displacement from velocity/time graphs • Use the constant acceleration formulae to solve problems	Displacement Kinematic Velocity Acceleration	
Block 5 – Probability diagrams and conditional probability	• Understand the notation associated with conditional probability • Solve conditional probability problems using two-way tables • Solve conditional probability questions using Venn diagrams • Solve conditional probability problems using tree diagrams • Know the formula for conditional probability • Apply the conditional probability formula to solve problems	Notation Conditional Exhaustive Independent Dependent	

Subject Curriculum Overview for Academic Year 2022/2023

Subject: Mathematics	Subject Leader: Mr S Card	Stage B	SPRING TERM
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
Block 6 – Algebraic fractions	• Simplify algebraic fractions by cancelling common terms • Simplify algebraic fractions by factorising • Multiply algebraic fractions • Divide algebraic fractions • Add and subtract algebraic fractions by getting a common denominator • Solve equations containing algebraic fractions	Algebraic fraction Factorise Common denominator	Blocks 6-8 will be assessed before the Spring half term holiday
Block 7 – Functions, graphs and transformations	• Understand function notation and how to substitute values into functions • Calculate composite functions • Find the inverse of a function • Draw and recognise the graphs of basic cubic and exponential functions • Translate graphs linking to function notation • Reflect graphs linking to function notation	Function Composite function Inverse function Reciprocal function Transformation Translation	
Block 8 – Quadratics and identities	• Factorise quadratic expressions of the form $ax^2 + bx + c$ where a is prime • Factorise quadratic expressions where a is a composite number • Solve quadratic equations of the form $ax^2 + bx + c = 0$ by factorising • Solve quadratic equations requiring rearranging by factorising • Expand triple brackets • Solve identity problems involving quadratics	Coefficient Identity Factorise Composite	
Block 9 – 3D coordinates, Pythagoras and trigonometry	• Use Pythagoras' theorem to find missing lengths in cuboids • Use Pythagoras' theorem to find missing lengths in prisms and pyramids • Use trigonometry to find angles between sides and diagonals in cuboids • Use trigonometry to find angles between sides and diagonals other 3D solids • Read 3-dimensional Cartesian coordinates • Solve geometry problems in a 3-dimensional cartesian axis	Pythagoras Trigonometry Hypotenuse Adjacent Opposite Cartesian	Blocks 9-10 will be assessed before the Easter holiday
Block 10 – Graphs of inequalities and linear programming	• Solve quadratic inequalities using an algebraic method • Know how linear inequalities can be represented graphically • Solve linear inequalities graphically • Solve quadratic inequalities graphically • Write inequalities to represent given information • Solve problems using linear programming	Linear inequality Quadratic inequality Linear programming Inclusive	

Subject Curriculum Overview for Academic Year 2022/2023

Subject: Mathematics	Subject Leader: Mr S Card	Stage B	SUMMER TERM
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
Block 11 – Sine rule, cosine rule and the area of a triangle	• Know and use the area of triangle formula • Find missing sides and angles when given an area • Use the sine rule to find missing sides in non-right-angled triangles • Use the sine rule to find missing angles in non-right-angled triangles • Use the cosine rule to find missing sides in non-right-angled triangles • Use the cosine rule to find missing angles in non-right-angled triangles	Area Ambiguous Diagonal	Blocks 11-12 will be assessed before the Summer half term holiday
Block 12 – Circle compounds	• Find the area of composite shapes involving sectors • Calculate the angle of a sector or its radii from its area • Find the perimeter of composite shapes involving sectors • Calculate the angle of a sector or its radii from its arc length or perimeter • Find the perimeter of segments • Find the area of segments	Arc Segment Sector Chord Composite Minor/major	
Block 13 – Further data analysis	• Understand how random, systematic, opportunity and stratified samples are collected • Identify trends in data over time using trend lines • Calculate and plot graphs of moving averages • Understand the difference between a frequency diagram and a histogram • Draw histograms with unequal class widths • Find frequencies and the median from histograms	Sample Trend Moving average Frequency density Class width Histogram	Assessment based on previous knowledge and new learning from current curriculum year
Block 14 – Fractional indices, estimating powers and bounds	• Understand the meaning of exponents which are unit fractions • Evaluate expressions with exponents of the form a/b • Solve equations containing indices • Apply knowledge of powers to estimate the roots of numbers • Calculate the upper and lower bounds when a number has been rounded • Find the upper and lower bounds of numerical calculations	Bound Index/indices Exponent Base Evaluate	

Subject Curriculum Overview for Academic Year 2022/2023

How parents can support learning in the subject this academic year

At the beginning of each new block of work, students will stick a **Knowledge Checklist** into their orange book. This contains a list of the learning objectives for the block (given above), key vocabulary which has been carefully defined and important facts that the students need to know. Helping students to learn the vocabulary and key knowledge will be hugely beneficial to their progress. The objectives are referenced to a Mathswatch video clip which will explain the work, give examples and practise questions. These can be used for pre-learning to gain an insight into what is coming up, consolidation of understanding or catching up on work missed.

Practice is important so please encourage students to complete homework on a weekly basis, suggest they attend Maths Club (Monday after school) which allows them to work on any aspect of their maths with support from several teachers or develop their interest in other areas of maths. Talking and using maths at home is a great way to link maths to everyday situations, for instance scaling up or down ingredients for a recipe, discussing time or money, estimating costs, looking at best value products in the supermarket, converting between units of measure etc.

Due to the hierarchical structure of Mathematics, it is vital that students catch up on any work missed through absences. If a student is absent they are expected to use their Knowledge Checklist to locate a video clip which will explain the work. Students should copy down the examples and work through the questions given. When they return they will need to copy up the missed notes from another student. If they need support with the work then please encourage them to attend Maths Club where staff will be there to help and support.

Recommended Reading

Humble Pi – A comedy of maths errors – Matt Parker
The man who knew infinity – Robert Kanigel
Flatterland – Ian Stewart
Can you solve my problems – Allex Bellos
The number Mysteries – Marcus du Sautoy
Math with bad drawings: Illuminating the ideas that shape our reality – Ben Orlin

Points to note

Students are expected to bring a scientific calculator to every maths lesson. The model we currently recommend is the Casio Classwiz FX-83GTX-S. This calculator can be purchased through the school via parentpay.