Subject Curriculum Overview for Academic Year 2024/2025

Subject: Mathematics	Subject Leader: Mr S Card	Year 9	
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
Unit 1 – Indices and standard form	**Key Knowledge** The Laws of Indices are $cy^a \times dy^b = cd\ y^{a+b}$ $cy^a \div dy^b = c/d\ y^{a-b}$ $(cy^a)^b = c^b y^{ab}$ $y^0 = 1$ $y^1 = y$ $y^{a/b} = \sqrt[b]{y^a}$ $y^{-a} = 1/y^a$ (Where y is the same number, referred to as the base number) • Nested brackets are brackets within a set of brackets. These nested brackets are the first priority in order of operations. • When estimating calculations, round each number to 1 significant figure • A number written in standard form is written as where a is a number between 1 and 10 and a is an integer **Applying Knowledge/Methods** • Use powers and roots in calculations which also contain brackets • Multiply and divide using index laws • Work out a power raise to a power • Use negative indices • Use fractional indices • Estimate answer to calculations • Write a number in standard form • Convert a number in standard form to an ordinary number • Calculate in standard form • Order numbers in standard form	Indices Base number Standard form	Unit Tests are completed at the end of each unit. End of Term tests are completed at the end of each Term. The End of Summer Term test includes content from the whole year.

Unit 2 – Expressions, equations and formulae	**Key Knowledge** • An expression is a collection of numbers, operators and/or symbols which represent a value. They do not contain an equals sign • An equation is a statement of equality between two algebraic expressions • A formula is a particular type of equation which allows us to calculate particular quantities (i.e. the formula for area of a rectangle is A = b x h) **Applying Knowledge/Methods** • Write and solve equations containing fractions • Write and solve equations with unknowns on both sides • Substitute numerical values into expressions • Use order of operations with substituting numerical values into expressions • Substitute numerical values into expressions with contain powers and roots • Write and use formulae • Substitute into formulae to find the value of the subject • Substitute into formulae and then rearranging to find the value of other variables • Rearrange algebraic formulae • Simplify expressions containing brackets • Factorise linear expressions • Expand double brackets	Terms Variables Operators Squaring Coefficient Expression Equations Formulae Expand Substitute Linear Like terms	
Unit 3 – Dealing with data	**Key Knowledge** • Primary data is data gathered first hand by the researcher • Secondary data is data that has been collected by someone else • A sample is a small group collected from the population • A questionnaire is a set of questions with a choice of answers used to gain information	Primary Secondary Data Sample Questionnaire Mean Median Line of best fit	

	• A line of best fit is a straight line drawn on a scattergraph which best fits the data. Roughly half the points are below the line, half are above • An outlier is a data point which does not fit the trend of the data **Applying Knowledge/Methods** • Identify primary and secondary data • Choose an appropriate sample size and explain what factors would impact data and collection and make a sample bias • Design and use data collection sheets and tables • Design and use a questionnaire • Estimate the mean from a frequency table • Find the median from a frequency table • Plot data on a scattergraph • Construct and use a line of best fit to estimate missing values • Identify and suggest reasons for outliers in data • Draw line graphs for grouped data • Draw back-to-back stem and leaf diagrams • Write a report to show survey results	Outlier Estimate Trend	
Unit 4 – Multiplicative reasoning	**Key Knowledge** • Enlargement is a type of transformation which changes the size and position of the shape. All sides are in the same proportion to the original shape and the angles do not change • Compound measures combine measure of two quantities. For example speed is measured using units for distance and time • $Speed = \frac{Dis\tan ce}{Time}$ • $Density = \frac{Mass}{Volume}$ • $\Pr e\,ssure = \frac{Force}{Area}$ • If two quantities are in inverse proportion, as one quantity increases, the other decreases and vice versa **Applying Knowledge/Methods** • Enlarge 2D shapes using a positive scale factor and a centre of enlargement	Enlargement Scale Factor Centre of Enlargement Compound measures Speed Distance Time Density Mass Volume Pressure Force Area Inverse proportion	

	• Find the centre of enlargement using lines • Enlarge 2D shapes using a negative scale factor • Enlarge 2D shapes using a fractional scale factor • Increase and decrease quantities using a percentage • Find the original amount before a percentage increase/decrease using inverse operations • Calculate percentage change • Solve problems using compound measures • Solve best buy problems • Solve problems using inverse proportion		
Unit 5 - Constructions	**Key Knowledge** • The scale of a map is the ratio of a distance on the map to the corresponding distance on the ground (i.e. 1 : 50 000 being 1cm on the map representing 50 000cm in reallife) **Applying Knowledge/Method** • Use scales on maps and diagrams • Draw diagrams to scale • Make accurate constructions using drawing equipment • Construct accurate triangles • Construct accurate nets of solids involving triangles • Construct and draw accurate scale diagrams • Use scale diagrams to solve problems	Scale Construct Perpendicular Bisector Nets	
Unit 6 – Sequences, inequalities, equations and proportion	**Key Knowledge** • The nth term rule of a sequence is a rule which connects a numbers position in the sequence to the sequence itself • Two variables are said to be directly proportion if as one of them increases, the other increases as well at the same rate (and vice versa) • Two variables are said to be inversely proportional if as one of them increases, the other decreases (and vice versa) **Applying Knowledge/Method** • Use the nth term rule to generate an arithmetic sequence • Find the nth term rule of a sequence • Recognise and continue quadratic sequences	Sequence Arithmetic Inequality Integer Equations Formulae Variables Direct proportion Inverse proportion	

	• Recognise and continue geometric sequences • Represent inequalities on a number line • Find integer values that satisfy an inequality • Construct and solve equations containing fractions • Construct and solve equations containing powers • Write formulae connecting variables in direct or inverse proportion • Use algebra to solve problems in indirect and inverse proportion		
Unit 7 - Graphs	**Key Knowledge** • The general equation of a linear graph is y = mx + c where m represents the gradient of the line and c is where the line crosses the y axis • Simultaneous equations are equations involving two or more unknowns that have the same value in each equation (I.e. if x is equal to 3 in the first equation, it is also equal to 3 in the second equation) • The equation $y = x^2$ represents a quadratic graph. This is a symmetrical curved graph which goes through the origin **Applying Knowledge/Method** • Draw a linear graph from its equation using gradient and y-intercept • Write an equation which is parallel to another • Compare graph lines using their equations • Draw graphs of the form ax + by = c by rearranging the equation first to the form y = mx + c • Solve simultaneous equations graphically • Solve problems using simultaneous equations • Draw graphs with quadratic equations in the form $y = x^2$ • Interpret graphs of quadratic functions • Drawing and interpret graphs showing inverse proportion • Draw and interpret non-linear graphs	Linear Gradient Y-intercept Parallel Rearrange Simultaneous Graphically Quadratic Parabola Inverse proportion Non-linear	

Unit 8 – Circles, Pythagoras and prisms	**Key Knowledge** • To calculate the circumference of a circle, we use the formula $c = \pi d$ where c is the circumference and d is the diameter • To calculate the area of a circle, we use the formula $A = \pi r^2$, where A is the area and r is the radius • π Is an irrational number that can be approximated to 3.14 • Pythagoras' Theorem is $a^2 + b^2 = c^2$ where c is the longest side and a and b are the two shorter sides • The surface area of a 3D shape is the area of all its surfaces added together • The volume of a 3D shape is the amount of space inside the 3D object **Applying Knowledge/Method** • Calculate the circumference of a circle • Estimate calculations involving pi (π) • Solve problems involving the circumference of a circle • Calculate the area of a circle • Solve problems involving the area of a circle • Find the length of an unknown side in a right-angle triangle • Solve problems involving right-angled triangles • Calculate the surface area of a prism • Calculate the volume of a prism • Calculate the surface area of a cylinder • Calculate the volume of a cylinder • Convert between metric cubic measurements • Find the lower and upper bound for a measurement • Calculate percentage error intervals	Circumference Diameter Irrational Right-angled Hypotenuse Pythagoras' Theorem Surface Area Volume Prism Cylinder	

Unit 9 – Trigonometry	**Key Knowledge** • Two shapes are similar if they are the same shape, but one is an enlargement of the other • Two shapes are congruent if they are identical in shape and size • The tangent of an angle θ is written as tanθ . Tanθ = $\frac{Opposite}{Adjacent}$. • The sine of an angle θ is written as sinθ . Sinθ = $\frac{Opposite}{Hypotenuse}$. • The cosine of an angle θ is written cosθ . Cos θ = $\frac{Adjacent}{Hypotenuse}$. **Applying Knowledge/Method** • Use congruent shapes to solve problems about triangles and other polygons • Work out whether shapes are similar, congruent or neither • Solve problems involving similar triangles • Use conventions for naming the sides of a right-angles triangle (I.e. hypotenuse, adjacent and opposite) • Use the tangent ratio to find a missing side in a right-angled triangle • Find the tan ratio of any angle • Use the sine ratio to find a missing side of a right-angled triangle • Find the sine ratio of any angle • Use the cosine ratio to find a missing side of a ratio-angled triangle • Find the cosine ratio of any angle	Similarity Congruency Enlargement Hypotenuse Adjacent Opposite	

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Unit 10 - Probability	**Key Knowledge** • Mutually exclusive events are events that cannot happen at the same time (I.e. rolling an odd number on a dice and rolling a 6) • Mutually exclusive probabilities sum to 1. **Applying Knowledge/Method** • Identify mutually exclusive outcomes and events • Work out the probabilities of mutually exclusive outcomes and events • Calculate estimates of probabilities from experiments • Decide whether a dice or spinner is bias • List all possible outcomes of one or two events in a sample space diagram • Decide if a game is fair • Use two-way tables • Calculate probabilities from two-way tables • Draw Venn Diagrams • Calculate probabilities from Venn Diagrams	Outcomes Events Mutually exclusive Estimate Experiment Bias	

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.

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

Murderous Maths Series – Poskitt Kjartan
Look into my eyes (Ruby Redfort) – Lauren Child
The number devil: A Mathematical adventure – Hans Magnus Enzensberger
Alex's adventures in Numberland – Alex Bellos
Can you solve my problems? – Allex Bellos
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.