

Maths

Mathematics: working hard together, achieving together, making every lesson count

The Mathematics Department will provide students with exciting, relevant and challenging Mathematics, delivered by dedicated staff.

Students will understand the underlying principles of the mathematics they learn, making links and developing reasoning skills and logical thinking.

They will progress towards being independent mathematicians who can identify correct and incorrect work for themselves.

Students will have their confidence encouraged and their complacency challenged in order to maximise potential.

Autumn		Spring		Summer	
4 Operations Expressions & Formulae Factorising T&I FDP	Index Laws Compound Interest Angles Nets, Plans & Elevations	Ratio Types of numbers Probability	P,A,V Circle Parts	Analysing data: Cumulative Frequency, Box Plot, Histograms	Transposition of Formulae Linear Graphs Real Life Graphs

Students will receive one piece of homework per week that will be marked and returned to the student at the next available opportunity. The piece of work will be designed to last between 1 hour and 1 and a half hours. Unless otherwise stated by the teacher, students should complete homework in their book and show all working out. Homework could take a variety of formats including:

- Worksheet
- Research Project
- Mymaths
- Revision
- Exam Practice

Unit	Duration (lessons)	Learning Objectives/Outcomes
Data Handling	20	<ul style="list-style-type: none"> • To interpret and discuss the data in a variety of ways • To design and criticise a questionnaire • To interpret and design a variety of charts and graphs • To calculate and understand averages and measures of spread
Number	4	<ul style="list-style-type: none"> • To recall and apply multiplication facts to 10 x 10 • To understand and use four operations with positive

		<p>and negative integers</p> <ul style="list-style-type: none"> To be able to recall integer squares and cubes
Algebra	16	<ul style="list-style-type: none"> To write and manipulate algebraic expressions To expand and factorise algebraic expressions To substitute positive and negative numbers into algebraic formula To use systematic trial and improvement to find approximate solutions of equations
Number	8	<ul style="list-style-type: none"> To convert equivalent fractions and write in simplest form To convert between fractions, decimals and percentages To find fractions and percentages of amounts To use a variety of methods to calculate percentage increases and decreases
Number	4	<ul style="list-style-type: none"> To use percentages to solve problems including; compound interest, depreciation, VAT and income tax calculations To calculate an original amount when given the transformed amount after a percentage change To use compound interest
Inverse operations	4	<ul style="list-style-type: none"> Multiply and divide numbers using the commutative, associative, and distributive laws and factorisation where possible, or place value adjustments Understand 'reciprocal' as multiplicative inverse, knowing that any non-zero number multiplied by its reciprocal is 1 (and that zero has no reciprocal, because division by zero is not defined) Find reciprocals Use one calculation to find the answer to another Solve word problems Use inverse operations Understand that the inverse operation of raising a positive number to a power n is raising the result of this operation to the power $1/n$ Understand and use unit fractions as multiplicative inverses Solve word problems Use reverse percentage calculations Use calculators for reverse percentage calculations by doing an appropriate division

Accuracy	4	<ul style="list-style-type: none"> • Round numbers to a given power of 10 • Round to the nearest integer and to a given number of significant figures • Round to a given number of decimal places • Estimate answers to calculations, including using rounding
Angles and triangles	8	<ul style="list-style-type: none"> • Recall and use properties of angles <ul style="list-style-type: none"> ○ angles at a point ○ angles at a point on a straight line, including right angles ○ perpendicular lines ○ vertically opposite angles • Distinguish between scalene, isosceles, equilateral, and right-angled triangles • Understand and use the angle properties of triangles • Use the angle sum of a triangle is 180° • Understand and use the angle properties of intersecting lines • Understand and use the angle properties of parallel lines • Mark parallel lines on a diagram • Use the properties of corresponding and alternate angles • Understand and use the angle properties of quadrilaterals • Give reasons for angle calculations • Explain why the angle sum of a quadrilateral is 360° • Understand the proof that the angle sum of a triangle is 180° • Understand a proof that the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices • Recall and use these basic properties of angles in more complex problems
Polygons	4	<ul style="list-style-type: none"> • Calculate and use the sums of the interior angles of polygons • Use geometrical language appropriately and recognise and name pentagons, hexagons, heptagons, octagons and decagons • Use the angle sum of irregular polygons • Calculate and use the angles of regular polygons • Use the sum of the interior angles of an n-sided polygon • Use the sum of the exterior angles of any polygon is 360° • Use the sum of the interior angle and the exterior angle is 180° • Find the size of each interior angle or the size of each exterior angle or the number of sides of a regular polygon

		<ul style="list-style-type: none"> • Understand tessellations of regular and irregular polygons • Tessellate combinations of polygons • Explain why some shapes tessellate and why other shapes do not
Nets, Plans & Elevations	4	<ul style="list-style-type: none"> • Use 2-D representations of 3-D shapes • Use isometric grids • Draw nets and show how they fold to make a 3-D solid • Understand and draw front and side elevations and plans of shapes made from simple solids • Given the front and side elevations and the plan of a solid, draw a sketch of the 3-D solid
Use of Calculators	4	<ul style="list-style-type: none"> • Enter a range of calculations, including those involving time and money • Know how to enter complex calculations • Understand and interpret the calculator display • Understand that premature rounding can cause problems when undertaking calculations with more than one step • Use calculator functions including +, −, ×, ÷, x^2, \sqrt{x}, memory, x^y, $x^{1/y}$ and brackets
Ratio	4	<ul style="list-style-type: none"> • Divide a quantity in a given ratio • Solve a ratio problem in a context • Use ratios • Write ratios in their simplest form
Factors and multiples	4	<ul style="list-style-type: none"> • Identify factors, multiples and prime numbers from a list of numbers • Find the prime factor decomposition of positive integers • Find the common factors and common multiples of two numbers • Find the Highest Common Factor (HCF) and the Lowest Common Multiple (LCM) of two numbers
Probability Measures	2	<ul style="list-style-type: none"> • Distinguish between events which are; impossible, unlikely, even chance, likely, and certain to occur • Mark events and/or probabilities on a probability scale of 0 to 1 • Write probabilities in words or fractions, decimals and percentages

Relative Probability	2	<ul style="list-style-type: none"> • Understand and use estimates or measures of probability, including relative frequency • Use theoretical models to include outcomes using dice, spinners, coins • Find the probability of successive events, such as several throws of a single dice • Estimate the number of times an event will occur, given the probability and the number of trials • Compare experimental data and theoretical probabilities • Compare relative frequencies from samples of different sizes
Mutually exclusive outcomes	4	<ul style="list-style-type: none"> • List all outcomes for single events, and for two successive events, systematically • Use and draw sample space diagrams
Mutually exclusive and independent events	4	<ul style="list-style-type: none"> • Add simple probabilities • Identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is 1 • Use $1 - p$ as the probability of an event not occurring where p is the probability of the event occurring • Find a missing probability from a list or table • Draw a probability tree diagram based on given information • Use a tree diagram to calculate conditional probability • Use conditional probabilities • Understand selection with or without replacement
Perimeter area and volume (i)	4	<ul style="list-style-type: none"> • Measure shapes to find perimeter or area • Find the perimeter of rectangles and triangles • Calculate perimeter and area of compound shapes made from triangles, rectangles and other shapes • Recall and use the formulae for the area of a triangle and a rectangle • Calculate areas of compound shapes • Find the area of a trapezium • Find the area of a parallelogram • Find the surface area of simple shapes (prisms) using the formulae for triangles and rectangles, and other shapes • Calculate volumes of right prisms, including triangular prisms, and shapes made from cubes and cuboids • Recall and use the formula for the volume of a cuboid
Parts of a circle	4	<ul style="list-style-type: none"> • Recall the definition of a circle and identify (name) and draw the parts of a circle • Understand related terms of a circle • Draw a circle given the radius or diameter

Perimeter area and volume (ii) Including Circles $C = \pi d$ & $A = \pi r^2$	8	<ul style="list-style-type: none"> • Find circumferences of circles and areas enclosed by circles • Recall and use the formulae for the circumference of a circle and the area enclosed by a circle • Use $\pi \approx 3.142$ or use the π button on a calculator • Find the perimeters and areas of semicircles and quarter circles • Calculate the lengths of arcs and the areas of sectors of circles • Answers in terms of π may be required • Find the surface area of a cylinder • Find the volume of a cylinder • Use volume to solve problems
Interpreting Data	8	<ul style="list-style-type: none"> • Interpret: <ul style="list-style-type: none"> ○ composite bar charts ○ comparative and dual bar charts ○ pie charts ○ stem and leaf diagrams ○ scatter graphs ○ frequency polygons ○ box plots ○ cumulative frequency diagrams ○ histograms • Recognise simple patterns, characteristics and relationships in line graphs and frequency polygons • Calculate the mean of a small data set, using the appropriate key on a scientific calculator • Σx and Σfx or the calculation of the line of best fit
Histograms	4	<ul style="list-style-type: none"> • Find the median from a histogram or any other information from a histogram, such as the number of people in a given interval • From histograms: <ul style="list-style-type: none"> ○ complete a grouped frequency table ○ define the frequency density