

Key Stage 3 Curriculum Overview – Maths

Curriculum Intent

The Mathematics department strives to give students the confidence to acquire and use mathematical skills that will stand them in good stead throughout their lifetime. The department seeks to achieve excellence in the teaching and learning of Mathematics, in order for the students to make significant progress, irrespective of their prior attachment in this interesting and varied subject. As a core subject studied by all students throughout their time at school, we believe Maths is one of the most important and interesting in the curriculum. Wherever you look in the world there is Maths and we aim to equip students with the knowledge, and more importantly, the skills to fully participate in our information driven society.

Approach / Philosophy / Implementation:

The curriculum in Maths aims to ensure that students:

Develop a culture of deep understanding, confidence and competence in Maths producing strong, secure learning and progress.

Develop fluency in the fundamental skills of Maths through practice in different contexts and in problem solving.

Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.

Solve problems by applying mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Term	Year 7	Year 8
Autumn term 1	<p><u>Sequences</u> Describe and continue sequences Predict and check next term(s) Sequences in a table and graphically Linear and non-linear sequences Explain the term-to-term rule Find missing terms (H)</p> <p><u>Understanding and using algebraic notation</u> Given a numerical input, find the output of a single function machine Use inverse operations to find the input given the output Use diagrams and letters to generalise number operations Use diagrams and letters with single function machines Find the function machine given a simple expression Substitute values into single operation expressions Find a numerical inputs and outputs for a series of two function machines</p>	<p><u>Ratio and Scale</u> Understand the meaning and representation of ratio Understand and use ratio notation Solve problems involving ratio of the form 1:N (or N:1) Solve the problem involving ratios of the form M:N Divide in a given ratio Expressed ratios in their simplest integer form Express ratios in the form 1:N (H) Compared ratios and fractions Understand PI as a ratio Understand gradient as a ratio</p> <p><u>Multiplicative Change</u> Solve problems involving direct proportion Explore conversion graphs Convert between currencies</p>

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	<p>Use diagrams and letters with a series of two function machines Find the function machine given a two-step expression Substitute values into two step expressions Generate sequences given an algebraic rule Represent one and two-step functions graphically</p> <p><u>Equality and Equivalence</u> Understand the meaning of equality Understand and used fact families numerically and algebraically Solve one step linear equations involving +/- using inverse operations Solve one step linear equations involving \times/\div Using inverse operations Understand the meaning of like and unlike terms Understand the meaning of equivalency Simplify algebraic expressions by collecting like terms</p>	<p>Explore direct proportion graphs (H) Explore relationships between similar shapes Understand scale factors as multiplicative representations Draw and interpret scale diagrams Interpret Maps using scale factors and ratios</p> <p><u>Multiplying and dividing fractions</u> Represent multiplication of fractions Multiply a fraction by an integer Find the product of the pair of unit fractions Find the product of a pair of any fractions Divide an integer by a fraction Divide a fraction by a unit fraction Understand and use the reciprocal Divide any pair of fractions Multiply and divide improper and mixed fractions Multiply and divide algebraic fractions</p>
<p>Autumn term 2</p>	<p>Place Value and ordering integers and decimals</p> <p>Recognise the place value of any number in an integer up to 1 billion Understand and write integers up to 1 billion in words and figures Work out intervals on a number line Position integers on a number line Round integers to the nearest power of 10 Compared to numbers using inequality symbols Order a list of integers Find the range and median of a set of numbers Understand place value for decimals Position decimals on a number line Compare and order any number up to 1 billion Round a number to one significant figure Write 10, 100, 1,000 etc as powers of 10 (H) Right positive integers in the form $A \times 10^n$ (H)</p>	<p>Working in the Cartesian plane</p> <p>Work with coordinates in all four quadrants Identify and draw lines that are parallel to the axis Recognize and use the line $y=x$ Recognize and use lines of the form $y=kx$ Link $y=kx$ to direct proportional problems Explore the gradient of the line $y=kx$ (H) Recognise and use the lines of the form $y=x+a$ Explore graphs with negative gradient ($y=kx$, $y=a-x$, $x+y=a$) Link graphs to Linear sequences Plot graphs of the form $y=mx+c$ Explore non-linear graphs (H)</p> <p>Find the midpoint of a line segment (H) Collecting and representing data Draw and interpret scatter graphs Understand and describe linear correlation Draw and use line of best fit</p>

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	<p>Investigate negative powers of 10 (H) Right decimals in the form of $A \times 10^n$ (H)</p> <p>Fraction, decimal and percentage equivalence</p> <p>Represent tenths and hundredths as diagrams and on number line Interchange between fractions and decimal number lines Convert between fractions and decimals <i>10ths & 100ths 5ths & quarters 8ths & 1000ths (H)</i> Understand the meaning of percentage using a hundred Square Convert fluently between simple fractions, decimals and percentages Use and interpret pie charts Represent any fraction as a diagram Represent fractions on number lines Identify and use simple equivalent fractions Understand fractions as division Convert fluently between fractions, decimals and percentages Explore fractions above one, decimals and percentages (H)</p>	<p>Identify non-linear relationships Identify different types of data Read and interpret ungrouped and grouped frequency tables Represent grouped discrete data Represent continuous data grouped into equal classes Construct and interpret two-way tables</p> <p>Tables and probability</p> <p>Construct sample spaces for one or more events Find probabilities from a sample space, Two-Way table and Venn diagrams Use the product rule for finding the total number of possible outcomes</p>
Spring term 1	<p><u>Solving problems with addition and subtraction</u></p> <p>Properties of addition and subtraction Mental strategies for addition and subtraction Use formal methods for addition and subtraction of integers Use formal methods for addition and subtraction of decimals Choose the appropriate method: Mental strategies or formal written Solve problems in the context of perimeter Solve financial maths problems Solve problems involving tables and timetables Solve problems with frequency trees Solve problems with bar charts and line charts Add and subtract numbers given in standard form (H)</p> <p><u>Solving problems with multiplication and division</u></p> <p>Properties of multiplication and division Understand and use factors Understand and use multiples</p>	<p><u>Brackets, equations and inequalities</u></p> <p>Form algebraic expressions Use directed number with algebra Multiply out and factorise a single bracket Expand multiple single brackets and simplify Expand a pair of binomials (H) Solve equations, including with brackets Form and solve equations with brackets Understand and solve simple inequalities Form and solve inequalities Solve equations and inequalities with unknowns on both sides (H) Form and solve equations and inequalities with unknowns on both sides (H) Identify and use formulae, expressions, identities and equations</p> <p>Sequences</p> <p>Generate sequences given a role in words Generate sequences given a simple algebraic rule</p>

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	<p>Multiply and divide integers and decimals by power of 10 Multiplied by 0.1 and 0.01 (H) Convert metric units Use formal methods to multiply and divide integers Use formal methods to multiply and divide decimals Understand and use order of operations Solve problems using the area of rectangles and parallelograms Solve problems using the area of triangles Solve problems using the area of trapezia (H) Solve problems using the mean Explore multiplication and division in algebraic expressions (H)</p> <p><u>Fractions and percentages</u> Find a fraction of a given amount Use a given fraction to find the whole and/or other fractions Find a percentage of a given amount using mental methods Find a percentage of a given amount using a calculator Solve problems with fractions greater than 1 and percentages</p>	<p>Generate sequences given a complex algebraic rule Find the rule for the nth term of a linear sequence (H)</p> <p><u>Indices</u> Adding and subtracting expressions with indices Simplifying algebraic expressions by multiplying and dividing indices Using the addition law for indices Using the addition and subtraction law for indices Exploring powers of powers (H)</p>
Spring term 2	<p><u>Four operations with directed numbers</u> Understand and use representations of directed numbers Order directed numbers using lines and appropriate symbols Perform calculations that cross zero Add, subtract, multiply and divide directed numbers Use a calculator for directed number calculations Evaluate algebraic expressions with directed number Introduction to tow-step equations Solve two-step equations Use order of operations with directed numbers Roots of positive numbers (H) Explore higher powers and roots (H)</p> <p><u>Addition and subtraction of fractions</u> Understand representations of fractions Convert between mixed number and fractions Add and subtract unit fractions with the same denominator Add and subtract fractions with the same denominator</p>	<p><u>Fractions and Percentages</u> Convert fluently between key fractions, decimals and percentages Calculate key fractions, decimals and percentages of an amount without a calculator Calculate fractions, decimals and percentages of an amount using a calculator Convert between decimals and percentages greater than 100% Percentage decrease with the multiplier Calculators percentage increase and decrease using a multiplier Express one number as a fraction or a percentage of another without a calculator and using calculator methods Work with percentage change Choose appropriate methods to solve percentage problems Find the original amount given the percentage less than/greater than 100% (H) Choose appropriate methods to solve complex percentage problems (H)</p> <p><u>Standard index form</u> Investigate positive powers of 10 Work with numbers greater than 1 in standard form Investigate negative powers of 10</p>

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	<p>Add and subtract fractions from integers expressing the answer as a single fraction</p> <p>Understand and use equivalent fractions</p> <p>Add and subtract fractions where denominators share a simple common multiple and those with any denominator</p> <p>Add and subtract improper fractions and mixed numbers</p> <p>Use fractions in algebraic contexts</p> <p>Use equivalence to add and subtract decimals and fractions</p> <p>Add and subtract simple algebraic fractions (H)</p>	<p>Work with the numbers between 0 and 1 in standard form</p> <p>Compare and order numbers in standard form</p> <p>Meant to be calculate with numbers in standard form</p> <p>Add and subtraction numbers in standard form</p> <p>Multiplying divide numbers in standard form</p> <p>Use a calculator to work with numbers in standard form</p> <p>Understand in use negative indices (H)</p> <p>Understand and use fractional indices</p> <p><u>Number Sense (application of number skills to problems)</u></p> <p>Round numbers to powers of 10 and one significant figure</p> <p>Round numbers to a given number of decimal places</p> <p>Estimate the answer to a calculation</p> <p>Understand and use error interval notation (H)</p> <p>Calculate using the order of operations</p> <p>Calculate with money</p> <p>Convert metric measures of lengths</p> <p>Convert metric units of weight and capacity</p> <p>Convert metric units of area and volume (H)</p> <p>Solve problems using time and the calendar</p>
<p>Summer term 1</p>	<p><u>Constructing, measuring and using geometric notation</u></p> <p>Understand and use letter and labelling conventions including those for geometric figures</p> <p>Draw and measure line segments including geometric figures</p> <p>Understand angles as a measure of turn</p> <p>Classify angles</p> <p>Measure and draw angles up to 180 degrees</p> <p>Draw and measure angles between 180 and 360 degrees</p> <p>Identify perpendicular and parallel lines</p> <p>Recognized types of triangle</p> <p>Recognized types of quadrilaterals</p> <p>Identify polygons up to a decagon</p> <p>Constructs triangles using SSS, SAS and ASA</p> <p>Construct more complex polygons</p> <p>Interpret simple pie charts using proportion</p> <p>Interpret pie charts using a protractor</p>	<p><u>Angles in parallel lines and polygons</u></p> <p>Understand and use basic angle rules and notation</p> <p>Investigate angles between parallel lines and the transversal</p> <p>Identify and calculate with alternate and corresponding angles</p> <p>Identify and calculate with co-interior, alternate and corresponding angles</p> <p>Solve complex problems with parallel line angles</p> <p>Constructions angles and special quadrilaterals</p> <p>Investigate the properties of special quadrilaterals</p> <p>Identify and calculate with sides and angles in special quadrilaterals</p> <p>Understand and use the properties of diagonals of quadrilaterals</p> <p>Understand and use the sum of exterior angles of any polygon</p> <p>Understand and use the sum of the interior angles in any polygon</p> <p>Calculate missing interior angles in regular polygons</p> <p>Prove simple geometric facts (H)</p> <p>Construct an angle bisector (H)</p> <p>Construct a perpendicular bisector of a line segment (H)</p>

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	<p>Draw pie charts</p> <p><u>Developing geometric reasoning</u> Understand and use the sum of angles at a point Understand and use the sum of angles on a straight line Understand and use the equality of vertical opposite angles Know and apply the sum of angles in a triangle Know and apply the sum of angles in a quadrilateral Solve angle problems using properties of triangles and quadrilaterals Solve complex angle problems Find and use the angle sum of any polygon (H) Investigate angles in parallel lines (H) Understand and use parallel line angles rules (H) Use known facts to obtain simple proofs (H)</p>	<p><u>Area of trapezia and circles</u> Calculate the area of triangles, rectangles and parallelograms Calculate the area of a trapezium Calculate the perimeter and area of compound shapes Investigate the area of a circle Calculate the area of a circle and part of a circle with and without a calculator</p> <p><u>Line symmetry and reflection</u> Recognise line symmetry Reflect a shape in a horizontal or vertical line (shapes touching and not touching the line) Reflect a shape in a diagonal line (shapes touching and not touching the line)</p>
<p>Summer term 2</p>	<p><u>Developing number sense (application of number skills to problems)</u> Know and use mental additions and subtraction strategies for integers Know and use mental multiplication and division strategies for integers Know and use mental arithmetic strategies for decimals Know and use mental arithmetic strategies for fractions Use factors to simplify calculations Use estimation as a method for checking mental calculations Use known number facts to derive other facts Use known algebraic facts to derive other facts Know when to use a mental strategy, formal written method or a calculator</p> <p><u>Sets and probability</u> Identify and represent sets Interpret and create Venn diagrams Understand and use the intersection of sets Understand and use the union of sets Understand and use the complement of a set (H) Know and use the vocabulary of probability Generate sample spaces for single events Calculate the probability of a single event Understand and use the probability scale Know that the sum of probabilities for all possible outcomes is 1</p>	<p><u>The data handling cycle</u> Set up statistical inquiry Design and criticise questionnaires Draw and interpret pictograms, bar charts and vertical line charts Draw and interpret multiple bar charts, pie charts and line graphs Choose the most appropriate diagram for given set of data Represent and interpret grouped quantitative data Find and interpret the range Compare distributions using charts Identify misleading graphs</p> <p><u>Measures of location</u> Understand and use the mean, median and mode Choose the most appropriate average Find the mean from an ungrouped/grouped frequency table Identify outliers Compare distributions using averages and the range</p>

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	<p><u>Prime numbers and proof</u> Identify factors of numbers and expressions Recognise and identify prime numbers Recognise square and triangular numbers Find common factors of a set of numbers including the HCF and LCM Write a number as a product of its prime factors Use a Venn diagram to calculate the HCF and LCM (H) Make and test conjectures Use counter examples to disprove a conjecture</p>	
Evidence of learning	<p>Pupils complete 20-minute end of block assessments that cover each of the small steps after each unit of work. These are recorded and compared as a cohort to ensure good progress is being made. Assessment will be ongoing through lessons the use of mini-whiteboards and 'live' marking. Pupils will also have end of term tests to showcase retention of knowledge – this will help inform their grades and targets.</p>	<p>Pupils complete 20-minute end of block assessments that cover each of the small steps after each unit of work. These are recorded and compared as a cohort to ensure good progress is being made. Assessment will be ongoing through lessons the use of mini-whiteboards and 'live' marking. Pupils will also have end of term tests to showcase retention of knowledge – this will help inform their grades and targets towards their official SATS assessments in May.</p>
Links to prior learning	<p>All of our units of work build upon prior knowledge gained throughout KS2. This all builds upon Scheme of work used by lower school and Holywell. Throughout the year skills learnt at Holywell will be revisited in different contexts (operations with shape etc.) Our scheme builds over time and allows for small steps to be taught by teachers so pupils can be the best they can be. If there are gaps we will endeavour to close these and adjust lessons accordingly.</p>	<p>Links back directly to Y7 work completed at Holywell and all of our units of work build upon prior knowledge gained throughout KS2. Throughout the year skills learnt at Holywell will be revisited in different contexts (algebra with BIDMAS) Our scheme builds over time and allows for small steps to be taught by teachers so pupils can be the best they can be. If there are gaps we will endeavour to close these and adjust lessons accordingly.</p>
Links to future learning	<p>Start of GCSE curriculum – base works for this, especially algebra units.</p>	<p>These skills are built upon in KS3 and are used regularly to solve problems. Start of GCSE curriculum – base works for this, especially algebra units.</p>
<p>Reading in the curriculum (Literacy & Vocabulary) Key vocabulary is identified in each unit and taught explicitly during lessons. We encourage pupils to talk like a Mathematician using the key words in Mathematics. Verbal discussion and Oracy in Maths are encouraged throughout learning. Pupils are encouraged to use full sentences in their explanations and reading strategies are reinforced when teaching.</p>		
<p>Careers in Maths</p>		

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Computer analyst Criminology expert Civil engineering – structure using shapes Programming Financial analyst Product designing/industry Software engineering Data analyst Computer Software developer System analyst Mathematical modeller Space scientist Accountant Growth analyst Pilot Construction Midwifery/Nursing Architecture Design/Industry Banking Teacher

EVERY JOB!!

Protected Characteristics in the curriculum

By maintaining high standards of behaviour, including mutual respect and tolerance for different faiths and beliefs and encouraging learners to respect the protected characteristics, class teachers will be promoting British values.

Safeguarding including safety in the curriculum

Ensuring students are seated in a way that takes account of safeguarding notes and which promotes positive learning and social outcomes. Reporting any concerns within department and school policies.

Values across the curriculum

Respect – Respecting different abilities in the classroom, different styles and approaches
Perseverance & Resilience – Keeping on going is key to solving problems and improving within Maths
Trust – Trusting the process – keep going and you will improve
Community/Co-operation – working together to solve problems, fins mistakes and improve
Joy/Happiness - To enjoy the subject of Maths
Determination - To keep going

How we track your progress

Linking to the progress descriptors all students' progress is tracked through the work they produce and contribute to in class, homework, end of unit assessments and in class assessments/quizzes.

Pupils access end of block tests when a unit of work is complete – this allows everyone to see where progress has been made. These are out of 20 each time and the papers go home so parents can see them. All learners also have end of term tests – these cover all skills in Maths and help to decide progress points – this is shared with learners. Homework on Sparx Maths also shows pupils their progress and rewards consistency/effort.

Parents/Carers can support their child by:

Being positive with pupils. Checking test papers that come home and discussing Maths with pupils. Ensuring times tables facts are known for rapid recall. Making sure homework is completed and to a good standard.

Sustainability within the subject

Links to real-world scenarios – farming, transporting goods etc.
Discussions on how we can use Maths to improve the world.