



Marshalls Park Academy - Curriculum Overview



Subject: Mathematics

Year Group: 9 Foundation

In Year 9, Students start the three year KS4 mathematics curriculum.

The aim of the curriculum is to become fluent in the fundamentals of mathematics, reason mathematically and solve problems.

TERM 1	TERM 2	TERM 3
<p style="text-align: center;">CONTENT/SKILLS</p> <p>Number</p> <ul style="list-style-type: none"> • Use and order positive and negative numbers (integers) and decimals; use the symbols $<$, $>$ and understand the \neq symbol; • Add, subtract, multiply and divide positive and negative numbers (integers); • Recall all multiplication facts to 10×10, and use them to derive quickly the corresponding division facts; • Multiply or divide any number by powers of 10; • Use brackets and the hierarchy of operations (not including powers); • Round numbers to a given power of 10; • Check answers by rounding and using inverse operations. • Use decimal notation and place value; • Identify the value of digits in a decimal or whole number; • Compare and order decimal numbers using the symbols $<$, $>$; • Understand the \neq symbol (not equal); • Write decimal numbers of millions, e.g. $2\ 300\ 000 = 2.3$ million; • Add, subtract, multiply and divide decimals, including calculations involving money; 	<p style="text-align: center;">CONTENT/SKILLS</p> <p>Fractions and percentages.</p> <ul style="list-style-type: none"> • Use diagrams to find equivalent fractions or compare fractions; • Write fractions to describe shaded parts of diagrams; • Express a given number as a fraction of another, using very simple numbers, some cancelling, and where the fraction is both < 1 and > 1; • Write a fraction in its simplest form and find equivalent fractions; • Order fractions, by using a common denominator; • Compare fractions, use inequality signs, compare unit fractions; • Convert between mixed numbers and improper fractions; • Add and subtract fractions; • Add fractions and write the answer as a mixed number; • Multiply and divide an integer by a fraction; • Multiply and divide a fraction by an integer, including finding fractions of quantities or measurements, and apply this by finding the size of each category from a pie chart using fractions; • Understand and use unit fractions as multiplicative inverses; • Multiply fractions: simplify calculations by cancelling first; 	<p style="text-align: center;">CONTENT/SKILLS</p> <p>Angles</p> <ul style="list-style-type: none"> • Estimate sizes of angles; • Measure angles using a protractor; • Use geometric language appropriately; • Use letters to identify points, lines and angles; • Use two-letter notation for a line and three-letter notation for an angle; • Describe angles as turns and in degrees and understand clockwise and anticlockwise; • Know that there are 360° in a full turn, 180° in a half turn and 90° in a quarter turn; • Identify a line perpendicular to a given line on a diagram and use their properties; • Identify parallel lines on a diagram and use their properties; • Find missing angles using properties of corresponding and alternate angles; • Understand and use the angle properties of parallel lines. • Recall the properties and definitions of special types of quadrilaterals, including symmetry properties; • List the properties of each special type of quadrilateral, or identify (name) a given shape; • Draw sketches of shapes; • Classify quadrilaterals by their geometric properties and name all quadrilaterals that have a specific property;



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<ul style="list-style-type: none"> • Multiply or divide by any number between 0 and 1; • Round to the nearest integer; • Round to a given number of decimal places and significant figures; • Estimate answers to calculations by rounding numbers to 1 significant figure; • Use one calculation to find the answer to another. • Find squares and cubes: <ul style="list-style-type: none"> – recall integer squares up to 10 x 10 and the corresponding square roots; – understand the difference between positive and negative square roots; – recall the cubes of 1, 2, 3, 4, 5 and 10; • Use index notation for squares and cubes; • Recognise powers of 2, 3, 4, 5; • Evaluate expressions involving squares, cubes and roots: <ul style="list-style-type: none"> – add, subtract, multiply and divide numbers in index form; – cancel to simplify a calculation; • Use index notation for powers of 10, including negative powers; • Use the laws of indices to multiply and divide numbers written in index notation; • Use brackets and the hierarchy of operations with powers inside the brackets, or raising brackets to powers; • Use calculators for all calculations: positive and negative numbers, brackets, square, cube, powers and roots, and all four operations. • List all three-digit numbers that can be made from three given integers; • Recognise odd, even and prime (two digit) numbers; 	<ul style="list-style-type: none"> • Divide a fraction by a whole number; • Divide fractions by fractions. • Recall the fraction-to-decimal conversion and convert fractions to decimals; • Convert a fraction to a decimal to make a calculation easier, e.g. $0.25 \times 8 = \frac{1}{4} \times 8$, or $\frac{3}{8} \times 10 = 0.375 \times 10$; • Recognise recurring decimals and convert fractions such as $\frac{3}{7}$, $\frac{1}{3}$ and $\frac{2}{3}$ into recurring decimals; • Compare and order fractions, decimals and integers, using inequality signs; • Understand that a percentage is a fraction in hundredths; • Express a given number as a percentage of another number; • Convert between fractions, decimals and percentages; • Order fractions, decimals and percentages, including use of inequality signs. • Express a given number as a percentage of another number; • Find a percentage of a quantity without a calculator: 50%, 25% and multiples of 10% and 5%; • Find a percentage of a quantity or measurement (use measurements they should know from Key Stage 3 only); • Calculate amount of increase/decrease; • Use percentages to solve problems, including comparisons of two quantities using percentages; • Percentages over 100%; • Use percentages in real-life situations, including percentages greater than 100%: <ul style="list-style-type: none"> – Price after VAT (not price before VAT); – Value of profit or loss; 	<ul style="list-style-type: none"> • Identify quadrilaterals from everyday usage; • Given some information about a shape on coordinate axes, complete the shape; Understand and use the angle properties of quadrilaterals; • Use the fact that angle sum of a quadrilateral is 360°; • Recall and use properties of angles at a point, angles at a point on a straight line, right angles, and vertically opposite angles; • Distinguish between scalene, equilateral, isosceles and right-angled triangles; • Derive and use the sum of angles in a triangle; • Find a missing angle in a triangle, using the angle sum of a triangle is 180°; • Understand and use the angle properties of triangles, use the symmetry property of isosceles triangle to show that base angles are equal; • Use the side/angle properties of isosceles and equilateral triangles; • Understand and use the angle properties of intersecting lines; • Understand a proof that the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices; Use geometrical language appropriately, give reasons for angle calculations and show step-by-step deduction when solving problems. • Recognise and name pentagons, hexagons, heptagons, octagons and decagons; • Understand 'regular' and 'irregular' as applied to polygons; • Use the sum of angles of irregular polygons; • Calculate and use the sums of the interior angles of 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°;
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- Identify factors and multiples and list all factors and multiples of a number systematically;
- Find the prime factor decomposition of positive integers and write as a product using index notation;
- Find common factors and common multiples of two numbers;
- Find the LCM and HCF of two numbers, by listing, Venn diagrams and using prime factors: include finding LCM and HCF given the prime factorisation of two numbers;
- Understand that the prime factor decomposition of a positive integer is unique – whichever factor pair you start with – and that every number can be written as a product of two factors;
- Solve simple problems using HCF, LCM and prime numbers.

Algebra

- Use notation and symbols correctly;
- Write an expression;
- Select an expression/equation/formula/identity from a list;
- Manipulate and simplify algebraic expressions by collecting 'like' terms;
- Multiply together two simple algebraic expressions, e.g. $2a \times 3b$;
- Simplify expressions by cancelling, e.g. $\frac{4x}{2} = 2x$;
- Use index notation and the index laws when multiplying or dividing algebraic terms;
- Understand the \neq symbol and introduce the identity \equiv sign;
- Multiply a single number term over a bracket;
- Write and simplify expressions using squares and cubes;

- Simple interest;
- Income tax calculations;
- Use decimals to find quantities;
- Find a percentage of a quantity, including using a multiplier;
- Use a multiplier to increase or decrease by a percentage in any scenario where percentages are used;
- Understand the multiplicative nature of percentages as operators.

Equations, inequalities and sequences

- Select an expression/equation/formula/identity from a list;
- Write expressions and set up simple equations including forming an equation from a word problem;
- Use function machines;
- Solve simple equations including those:
 - with integer coefficients, in which the unknown appears on either side or on both sides of the equation;
 - which contain brackets, including those that have negative signs occurring anywhere in the equation, and those with a negative solution;
 - with one unknown, with integer or fractional coefficients;
- Rearrange simple equations;
- Substitute into a formula, and solve the resulting equation;
- Find an approximate solution to a linear equation using a graph;
- Solve angle or perimeter problems using algebra.
- Write an equation to solve a word problem.
- Show inequalities on number lines;

- Use the sum of the interior angle and the exterior angle is 180° ;
- Identify shapes which are congruent (by eye);
- Explain why some polygons fit together and others do not;

Averages and range

- Specify the problem and:
 - plan an investigation;
 - decide what data to collect and what statistical analysis is needed;
 - consider fairness;
- Recognise types of data: primary secondary, quantitative and qualitative;
- Identify which primary data they need to collect and in what format, including grouped data;
- Collect data from a variety of suitable primary and secondary sources;
- Understand how sources of data may be biased and explain why a sample may not be representative of a whole population;
- Understand sample and population.
- Calculate the mean, mode, median and range for discrete data;
- Interpret and find a range of averages as follows:
 - median, mean and range from a (discrete) frequency table;
 - range, modal class, interval containing the median, and estimate of the mean from a grouped data frequency table;
 - mode and range from a bar chart;
 - median, mode and range from stem and leaf diagrams;
 - mean from a bar chart;



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- Simplify expressions involving brackets, i.e. expand the brackets, then add/subtract;
- Argue mathematically to show algebraic expressions are equivalent;
- Recognise factors of algebraic terms involving single brackets;
- Factorise algebraic expressions by taking out common factors.
- Write expressions to solve problems representing a situation;
- Substitute numbers in simple algebraic expressions;
- Substitute numbers into expressions involving brackets and powers;
- Substitute positive and negative numbers into expressions;
- Derive a simple formula, including those with squares, cubes and roots;
- Substitute numbers into a word formula;
- Substitute numbers into a formula.

Graphs, tables and charts

- Use suitable data collection techniques (data to be integer and decimal values);
- Design and use data-collection sheets for grouped, discrete and continuous data, use inequalities for grouped data, and introduce \leq and \geq signs; Sort, classify and tabulate data, both discrete and continuous quantitative data, and qualitative data; Extract data from lists and tables;
- Use correct notation for time, 12- and 24-hour clock and work out time taken for a journey from a timetable;
- Construct tables for time-series data;

- Write down whole number values that satisfy an inequality;
- Solve an inequality such as $-3 < 2x + 1 < 7$ and show the solution set on a number line;
- Solve two inequalities in x , find the solution sets and compare them to see which value of x satisfies both;
- Use the correct notation to show inclusive and exclusive inequalities;
- Construct inequalities to represent a set shown on a number line;
- Solve simple linear inequalities in one variable, and represent the solution set on a number line;
- Round answers to a given degree of accuracy;
- Use inequality notation to specify simple error intervals due to truncation or rounding.
- Recognise sequences of odd and even numbers, and other sequences including Fibonacci sequences;
- Use function machines to find terms of a sequence;
- Write the term-to-term definition of a sequence in words;
- Find a specific term in the sequence using position-to-term or term-to-term rules;
- Generate arithmetic sequences of numbers, triangular number, square and cube integers and sequences derived from diagrams;
- Recognise such sequences from diagrams and draw the next term in a pattern sequence;
- Find the next term in a sequence, including negative values;
- Find the n th term
 - for a pattern sequence;
 - a linear sequence;
 - of an arithmetic sequence;

- Understand that the expression 'estimate' will be used where appropriate, when finding the mean of grouped data using mid-interval values;
- Compare the mean, median, mode and range (as appropriate) of two distributions using bar charts, dual bar charts, pictograms and back-to-back stem and leaf



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<ul style="list-style-type: none">• Design, complete and use two-way tables for discrete and grouped data;• Calculate the total frequency from a frequency table;• Read off frequency values from a table;• Read off frequency values from a frequency table;• Find greatest and least values from a frequency table;• Identify the mode from a frequency table;• Identify the modal class from a grouped frequency table;• Plotting coordinates in first quadrant and read graph scales in multiples;• Produce and interpret:<ul style="list-style-type: none">– pictograms;– composite bar charts;– dual/comparative bar charts for categorical and ungrouped discrete data;– bar-line charts;– vertical line charts;– line graphs;– line graphs for time-series data;– histograms with equal class intervals;– stem and leaf (including back-to-back);• Calculate total population from a bar chart or table;• Find greatest and least values from a bar chart or table;• Find the mode from a stem and leaf diagram;• Identify the mode from a bar chart;• Recognise simple patterns, characteristic and relationships in bar charts and line graphs;• Interpret and discuss any data.• Interpret tables; represent data in tables and charts;	<ul style="list-style-type: none">• Use the nth term of an arithmetic sequence to<ul style="list-style-type: none">– generate terms;– decide if a given number is a term in the sequence, or find the first term over a certain number;– find the first term greater/less than a certain number;• Continue a geometric progression and find the term-to-term rule, including negatives, fraction and decimal terms;• Continue a quadratic sequence and use the nth term to generate terms;• Distinguish between arithmetic and geometric sequences.	
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- Know which charts to use for different types of data sets;
- Draw circles and arcs to a given radius;
- Know there are 360 degrees in a full turn, 180 degrees in a half turn, and 90 degrees in a quarter turn;
- Measure and draw angles, to the nearest degree; Construct pie charts for categorical data and discrete/continuous numerical data;
- Interpret simple pie charts using simple fractions and percentages; $\frac{1}{2}$, $\frac{1}{4}$ and multiples of 10% sections;
- From a pie chart:
 - find the mode;
 - find the total frequency;
- Understand that the frequency represented by corresponding sectors in two pie charts is dependent upon the total populations represented by each of the pie charts.
- Draw scatter graphs;
- Interpret points on a scatter graph;
- Identify outliers and ignore them on scatter graphs;
- Draw the line of best fit on a scatter diagram by eye, and understand what it represents;
- Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing;
- Distinguish between positive, negative and no correlation using lines of best fit;
- Use a line of best fit to predict values of a variable given values of the other variable;
- Interpret scatter graphs in terms of the relationship between two variables;
- Interpret correlation in terms of the problem;



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- Understand that correlation does not imply causality;
- State how reliable their predictions are, i.e. not reliable if extrapolated.

KEY ASSESSMENTS

HALF TERM 1
Unit assessment

HALF TERM 2
End of Term 1 assessment

KEY ASSESSMENTS

HALF TERM 3
Unit assessment

HALF TERM 4
End of Term 2 assessment

KEY ASSESSMENTS

HALF TERM 5
Unit assessment

HALF TERM 6
End of Year assessment

Students have access to Mathswatch revision resources and supporting video clips. <https://vle.mathswatch.co.uk/vle/>

Edexcel Maths GCSE Foundation revision guides are available to support learning.

Students can obtain further revision resources from www.mathsgenie.co.uk and www.corbettmaths.com