



# Dallam School

Curriculum overview

Department: Mathematics - Foundation  
Year Group: 10

## AUTUMN Half Term 1

### Theme/ topic:

**Number, decimals and rounding**

### Theme/ topic:

**Indices, powers and roots**

### Theme/ topic:

**Factors, multiples and primes**

### Theme/ topic:

**Algebra: the basics, setting up, rearranging and solving equations**

### Theme/ topic:

**Expressions and substitution into formulae**

By the end of this half term pupils will know (key knowledge, including tier 3 vocabulary):

- 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  $10 \times 10$ , and use them to derive quickly the corresponding division facts;
- Multiply or divide any number by powers of 10;

### Key Words

*Integer, number, digit, negative, decimal, addition, subtraction, multiplication, division,*

- Find squares and cubes:
- Recall integer squares up to  $10 \times 10$  and the corresponding square roots;
- Recall the cubes of 1, 2, 3, 4, 5 and 10;
- Use index notation for squares and cubes; powers of 10, including negative powers;

### Key Words

*Power, roots*

- List all three-digit numbers that can be made from three given integers;
- Recognise odd, even and prime (two digit) numbers;
- Identify factors and multiples and list all factors and multiples of a number systematically;

### Key Words

*factor, multiple, primes, square, cube, even, odd*

- Use notation and symbols correctly;
- Write an expression;
- Select an expression/equation/formula/identity from a list;

### Key Words

*Expression, identity, equation, formula, term, 'like' terms, index, power, collect, simplify*

**The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.**

### Key Words

*substitute, expand, bracket, factor, factorise, linear, simplify*

<i>remainder, operation, estimate</i>				
They will understand (key concepts):				
<ul style="list-style-type: none"> <li>➤ Understand the <math>\neq</math> symbol (not equal);</li> </ul>	<ul style="list-style-type: none"> <li>➤ Understand the difference between positive and negative square roots;</li> </ul>	<ul style="list-style-type: none"> <li>➤ 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;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Understand the <math>\neq</math> symbol and introduce the identity <math>\equiv</math> sign;</li> </ul>	<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p>
They will know how to (key skills including speaking, reading and writing in this subject):				
<ul style="list-style-type: none"> <li>➤ Use brackets and the hierarchy of operations (not including powers);</li> <li>➤ Round numbers to a given power of 10;</li> <li>➤ Use decimal notation and place value;</li> <li>➤ Identify the value of digits in a decimal or whole number;</li> <li>➤ Compare and order decimal numbers using the symbols <math>&lt;</math>, <math>&gt;</math>;</li> <li>➤ Write decimal numbers of millions, e.g. 2 300 000 = 2.3 million;</li> <li>➤ Add, subtract, multiply and divide decimals, including calculations involving money;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Evaluate expressions involving squares, cubes and roots:</li> <li>➤ add, subtract, multiply and divide numbers in index form;</li> <li>➤ Use the laws of indices to multiply and divide numbers written in index notation;</li> <li>➤ Use brackets and the hierarchy of operations with powers inside the brackets, or</li> </ul>	<ul style="list-style-type: none"> <li>➤ Find the prime factor decomposition of positive integers and write as a product using index notation;</li> <li>➤ Find common factors and common multiples of two numbers;</li> <li>➤ 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;</li> <li>➤ Solve simple problems using</li> </ul>	<ul style="list-style-type: none"> <li>➤ Manipulate and simplify algebraic expressions by collecting 'like' terms;</li> <li>➤ Multiply together two simple algebraic expressions, e.g. <math>2a \times 3b</math>;</li> <li>➤ Simplify expressions by cancelling, e.g. <math>= 2x</math>;</li> <li>➤ Use index notation and the index laws when multiplying or dividing algebraic terms;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Multiply a single number term over a bracket;</li> <li>➤ Write and simplify expressions using squares and cubes;</li> <li>➤ Simplify expressions involving brackets, i.e. expand the brackets, then add/subtract;</li> <li>➤ Argue mathematically to show algebraic expressions are equivalent;</li> <li>➤ Recognise factors of algebraic terms involving single brackets;</li> <li>➤ Factorise algebraic expressions by taking out common factors;</li> <li>➤ Write expressions to solve problems representing a situation;</li> <li>➤ Substitute positive and negative numbers into expressions involving brackets and powers;</li> <li>➤ Derive a simple formula, including those with squares, cubes and roots;</li> </ul>

<ul style="list-style-type: none"> <li>➤ Multiply or divide by any number between 0 and 1;</li> <li>➤ Round to the nearest integer and given number of decimal places and significant figures</li> <li>➤ Estimate answers to calculations by rounding numbers to 1 significant figure;</li> </ul>	<p>raising brackets to powers;</p> <ul style="list-style-type: none"> <li>➤ Use calculators for all calculations: positive and negative numbers, brackets, square, cube, powers and roots, and all four operations.</li> </ul>	<p>HCF, LCM and prime numbers.</p>		<ul style="list-style-type: none"> <li>➤ Substitute numbers into a (word) formula;</li> </ul>
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**AUTUMN Half Term 2**

<p><b>Theme/ topic:</b> <b>Tables, charts and graphs</b></p>	<p><b>Theme/ topic:</b> <b>Pie charts</b></p>	<p><b>Theme/ topic:</b> <b>Scatter graphs</b></p>	<p><b>Theme/ topic:</b> <b>Fractions, decimals and percentages</b></p>
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By the end of this half term pupils will know (key knowledge, including tier 3 vocabulary):

<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p> <p><b>Key Words</b></p> <p><i>Mean, median, mode, range, average, discrete, continuous, qualitative, quantitative, data, sample, population, stem and leaf, frequency, table, sort, pie chart, estimate</i></p>	<ul style="list-style-type: none"> <li>➤ Know which charts to use for different types of data sets;</li> <li>➤ Draw circles and arcs to a given radius;</li> <li>➤ Know there are 360 degrees in a full turn, 180 degrees in a half turn, and 90 degrees in a quarter turn;</li> <li>➤ Measure and draw angles, to the nearest degree; Construct pie charts for categorical data and discrete/continuous numerical data;</li> </ul> <p><b>Key Words</b></p>	<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p> <p><b>Key Words</b></p> <p><i>Scatter graph, line of best fit, correlation, positive, negative</i></p>	<ul style="list-style-type: none"> <li>➤ Use diagrams to find equivalent fractions or compare fractions;</li> <li>➤ Write fractions to describe shaded parts of diagrams;</li> <li>➤ Express a given number as a fraction of another, using very simple numbers, some cancelling, and where the fraction is both <math>&lt; 1</math> and <math>&gt; 1</math>;</li> <li>➤ Write a fraction in its simplest form and find equivalent fractions</li> </ul> <p><b>Key Words</b></p>
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	<i>Table, sort, pie chart, estimate</i>		<i>Decimal, percentage, inverse, addition, subtraction, multiplication, division, fractions, mixed, improper, recurring, integer, decimal, terminating, percentage</i>
They will understand (key concepts):			
<b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b>	<ul style="list-style-type: none"> <li>➤ 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.</li> </ul>	<b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b>	<ul style="list-style-type: none"> <li>➤ Understand and use unit fractions as multiplicative inverses;</li> <li>➤ Understand that a percentage is a fraction in hundredths;</li> </ul>
They will know how to (key skills including speaking, reading and writing in this subject):			
<ul style="list-style-type: none"> <li>➤ Use suitable data collection techniques (data to be integer and decimal values);</li> <li>➤ Design and use data-collection sheets for grouped, discrete and continuous data, use inequalities for grouped data, and introduce <math>\leq</math> and <math>\geq</math> signs; Sort, classify and tabulate data, both discrete and continuous quantitative data, and qualitative data; Extract data from lists and tables;</li> <li>➤ Use correct notation for time, 12- and 24-hour clock and work out time taken for a journey from a timetable;</li> <li>➤ Construct tables for time-series data;</li> <li>➤ Design, complete and use two-way tables for discrete and grouped data;</li> <li>➤ Calculate the total frequency from a frequency table;</li> <li>➤ Read off frequency values from a table;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Interpret simple pie charts using simple fractions and percentages; , and multiples of 10% sections;</li> <li>➤ From a pie chart:</li> <li>➤ find the mode;</li> <li>➤ find the total frequency;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Draw scatter graphs;</li> <li>➤ Interpret points on a scatter graph;</li> <li>➤ Identify outliers and ignore them on scatter graphs;</li> <li>➤ Draw the line of best fit on a scatter diagram by eye, and understand what it represents;</li> <li>➤ Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing;</li> <li>➤ Distinguish between positive, negative and no correlation using lines of best fit;</li> <li>➤ Use a line of best fit to predict values of a variable given values of the other variable;</li> <li>➤ Interpret scatter graphs in terms of the relationship between two variables;</li> <li>➤ Interpret correlation in terms of the problem;</li> <li>➤ State how reliable their predictions are, i.e. not reliable if extrapolated.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Order fractions, by using a common denominator;</li> <li>➤ Compare fractions, use inequality signs, compare unit fractions;</li> <li>➤ Convert between mixed numbers and improper fractions;</li> <li>➤ Add and subtract fractions;</li> <li>➤ Add fractions and write the answer as a mixed number;</li> <li>➤ Multiply and divide fractions and integers, including finding fractions of quantities or measurements, and apply this by finding the size of each category from a pie chart using fractions;</li> <li>➤ Convert a fraction to a decimal</li> <li>➤ Recognise recurring decimals and convert fractions into recurring decimals;</li> <li>➤ Compare and order fractions, decimals and integers, using inequality signs;</li> <li>➤ Express a given number as a percentage of another number;</li> <li>➤ Convert between fractions, decimals and percentages;</li> </ul>

<ul style="list-style-type: none"> <li>➤ Read off frequency values from a frequency table;</li> <li>➤ Find greatest and least values from a frequency table;</li> <li>➤ Identify the mode from a frequency table;</li> <li>➤ Identify the modal class from a grouped frequency table;</li> <li>➤ Produce and interpret: pictograms, composite/dual/comparative bar charts for categorical and ungrouped discrete data, bar-line charts, vertical line charts, line graphs for time-series data, histograms with equal class intervals, stem and leaf (including back-to-back);</li> <li>➤ Calculate total population from a bar chart or table;</li> <li>➤ Find greatest and least values from a bar chart or table;</li> <li>➤ Find the mode from a stem and leaf diagram;</li> <li>➤ Identify the mode from a bar chart;</li> <li>➤ Recognise simple patterns, characteristic and relationships in bar charts and line graphs;</li> <li>➤ Interpret and discuss any data.</li> </ul>			<ul style="list-style-type: none"> <li>➤ Order fractions, decimals and percentages, including use of inequality signs.</li> </ul>
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<b>SPRING Half Term 1</b>		
<b>Theme/ topic:</b> <b>Percentages</b>	<b>Theme/ topic:</b> <b>Equations and inequalities</b>	<b>Theme/ topic:</b> <b>Sequences</b>
By the end of this half term pupils will know (key knowledge, including tier 3 vocabulary):		
<b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b>  <b>Key Words</b>	<ul style="list-style-type: none"> <li>➤ Select an expression/equation/formula/identity from a list;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Recognise sequences of odd and even numbers, and other sequences including Fibonacci sequences;</li> <li>➤ Recognise such sequences from diagrams and draw the next term in a pattern sequence;</li> </ul>

<p><i>Percentage, VAT, increase, decrease, multiplier, profit, loss</i></p>	<ul style="list-style-type: none"> <li>➤ Write expressions and set up simple equations including forming an equation from a word problem;</li> <li>➤ Use inequality notation to specify simple error intervals due to truncation or rounding</li> </ul> <p><b>Key Words</b></p> <p><i>Solve, change, subject, inequality, represent, substitute, bracket, expand, linear, equation, balance, accuracy</i></p>	<p><b>Key Words</b></p> <p><i>Arithmetic, geometric, function, sequence, nth term, derive, quadratic, triangular, cube, square, odd, even</i></p>
<p>They will understand (key concepts):</p>		
<ul style="list-style-type: none"> <li>➤ Understand the multiplicative nature of percentages as operators.</li> </ul>	<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p>	<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p>
<p>They will know how to (key skills including speaking, reading and writing in this subject):</p>		
<ul style="list-style-type: none"> <li>➤ Express a given number as a percentage of another number;</li> <li>➤ Find a percentage of a quantity without a calculator: 50%, 25% and multiples of 10% and 5%;</li> <li>➤ Find a percentage of a quantity or measurement</li> <li>➤ Calculate amount of increase/decrease;</li> <li>➤ Use percentages to solve problems, including comparisons of two quantities using percentages;</li> <li>➤ Use percentages in real-life situations, including percentages greater than 100%:</li> <li>➤ Price after VAT (not price before VAT);</li> <li>➤ Value of profit or loss;</li> <li>➤ Simple interest;</li> <li>➤ Income tax calculations;</li> <li>➤ Use decimals to find quantities;</li> <li>➤ Find a percentage of a quantity, including using a multiplier;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Use function machines;</li> <li>➤ Solve simple equations including those:</li> <li>➤ with integer coefficients, in which the unknown appears on either side or on both sides of the equation;</li> <li>➤ which contain brackets, including those that have negative signs occurring anywhere in the equation, and those with a negative solution;</li> <li>➤ with one unknown, with integer or fractional coefficients;</li> <li>➤ Rearrange simple equations;</li> <li>➤ Substitute into a formula, and solve the resulting equation;</li> <li>➤ Find an approximate solution to a linear equation using a graph;</li> <li>➤ Solve angle or perimeter problems using algebra.</li> <li>➤ Show inequalities on number lines;</li> <li>➤ Write down whole number values that satisfy an inequality;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Use function machines to find terms of a sequence;</li> <li>➤ Write the term-to-term definition of a sequence in words;</li> <li>➤ Find a specific term in the sequence using position-to-term or term-to-term rules;</li> <li>➤ Generate arithmetic sequences of numbers, triangular number, square and cube integers and sequences derived from diagrams;</li> <li>➤ Find the next term in a sequence, including negative values;</li> <li>➤ Find the nth term</li> <li>➤ for a pattern sequence;</li> <li>➤ a linear sequence;</li> <li>➤ of an arithmetic sequence;</li> <li>➤ Use the nth term of an arithmetic sequence to</li> <li>➤ generate terms;</li> <li>➤ decide if a given number is a term in the sequence, or find the first term over a certain number;</li> <li>➤ find the first term greater/less than a certain number;</li> <li>➤ Continue a geometric progression and find the term-to-term rule, including negatives, fraction and decimal terms;</li> </ul>

<ul style="list-style-type: none"> <li>➤ Use a multiplier to increase or decrease by a percentage in any scenario where percentages are used;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Solve an inequality such as <math>-3 &lt; 2x + 1 &lt; 7</math> and show the solution set on a number line;</li> <li>➤ Solve two inequalities in <math>x</math>, find the solution sets and compare them to see which value of <math>x</math> satisfies both;</li> <li>➤ Use the correct notation to show inclusive and exclusive inequalities;</li> <li>➤ Construct inequalities to represent a set shown on a number line;</li> <li>➤ Solve simple linear inequalities in one variable, and represent the solution set on a number line;</li> <li>➤ Round answers to a given degree of accuracy;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Continue a quadratic sequence and use the <math>n</math>th term to generate terms;</li> <li>➤ Distinguish between arithmetic and geometric sequences.</li> </ul>
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<b>SPRING Half Term 2</b>	
<b>Theme/ topic:</b> <b>Angles, polygons and parallel lines</b>	<b>Theme/ topic:</b> <b>Interior and exterior angles</b>
By the end of this half term pupils will know (key knowledge, including tier 3 vocabulary):	
<ul style="list-style-type: none"> <li>➤ Estimate sizes of angles;</li> <li>➤ Measure angles using a protractor;</li> <li>➤ Use geometric language appropriately;</li> <li>➤ Use letters to identify points, lines and angles;</li> <li>➤ Use two-letter notation for a line and three-letter notation for an angle;</li> <li>➤ Describe angles as turns and in degrees and understand clockwise and anticlockwise;</li> <li>➤ Know that there are <math>360^\circ</math> in a full turn, <math>180^\circ</math> in a half turn and <math>90^\circ</math> in a quarter turn;</li> <li>➤ Identify a line perpendicular to a given line on a diagram and use their properties;</li> <li>➤ Identify parallel lines on a diagram and use their properties;</li> <li>➤ Recall the properties and definitions of special types of quadrilaterals, including symmetry properties;</li> <li>➤ List the properties of each special type of quadrilateral, or identify (name) a given shape;</li> <li>➤ Use the fact that angle sum of a quadrilateral is <math>360^\circ</math>;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Recognise and name pentagons, hexagons, heptagons, octagons and decagons;</li> </ul> <p><b>Key Words</b></p> <p><i>Polygon, interior, exterior, proof, tessellation, hexagons, heptagons, octagons, decagons, quadrilateral, triangle, regular, irregular</i></p>

<p>➤ Distinguish between scalene, equilateral, isosceles and right-angled triangles;</p> <p><b>Key Words</b></p> <p><i>Quadrilateral, angle, polygon, rotational symmetry, parallel, corresponding, alternate, co-interior, vertices, edge, face, sides, triangle, perpendicular, isosceles, scalene, clockwise, anticlockwise, , two-dimensional, three-dimensional, measure, line, angle, order, intersecting, obtuse, acute, reflex</i></p>	
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They will understand (key concepts):

<ul style="list-style-type: none"> <li>➤ Understand and use the angle properties of parallel lines.</li> <li>➤ Understand and use the angle properties of intersecting lines;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Understand 'regular' and 'irregular' as applied to polygons;</li> </ul>
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They will know how to (key skills including speaking, reading and writing in this subject):

<ul style="list-style-type: none"> <li>➤ Find missing angles using properties of corresponding and alternate angles;</li> <li>➤ Draw sketches of shapes;</li> <li>➤ Classify quadrilaterals by their geometric properties and name all quadrilaterals that have a specific property;</li> <li>➤ Identify quadrilaterals from everyday usage;</li> <li>➤ Given some information about a shape on coordinate axes, complete the shape; Understand and use the angle properties of quadrilaterals;</li> <li>➤ Recall and use properties of angles at a point, angles at a point on a straight line, right angles, and vertically opposite angles;</li> <li>➤ Derive and use the sum of angles in a triangle;</li> <li>➤ Find a missing angle in a triangle, using the angle sum of a triangle is <math>180^\circ</math>;</li> <li>➤ Understand and use the angle properties of triangles, use the symmetry property of isosceles triangle to show that base angles are equal;</li> <li>➤ Use the side/angle properties of isosceles and equilateral triangles;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Calculate and use the sums of the interior angles of polygons;</li> <li>➤ Calculate and use the angles of regular polygons;</li> <li>➤ Use the sum of the interior angles of an n-sided polygon;</li> <li>➤ Use the sum of the exterior angles of any polygon is <math>360^\circ</math>;</li> <li>➤ Use the sum of the interior angle and the exterior angle is <math>180^\circ</math>;</li> <li>➤ Identify shapes which are congruent (by eye);</li> </ul>
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## SUMMER Half Term 1

**Theme/ topic:**

**Statistics, sampling and the averages**

**Theme/ topic:**

**Perimeter, area and volume**

By the end of this half term pupils will know (key knowledge, including tier 3 vocabulary):

- Recognise types of data: primary secondary, quantitative and qualitative;
- Calculate the mean, mode, median and range for discrete data;
- Recognise the advantages and disadvantages between measures of average.

### Key Words

*Mean, median, mode, range, average, discrete, continuous, qualitative, quantitative, data, sample, population, stem and leaf, frequency, table, sort, pie chart, estimate, primary, secondary, interval, midpoint, survey*

- Indicate given values on a scale, including decimal value;
- Know that measurements using real numbers depend upon the choice of unit;
- Recall and use the formulae for the area of a triangle and rectangle;
- Find the area of a trapezium and recall the formula;
- Identify and name common solids: cube, cuboid, cylinder, prism, pyramid, sphere and cone;
- Sketch nets of cuboids and prisms;
- Recall and use the formula for the volume of a cuboid;

### Key Words

*Triangle, rectangle, parallelogram, trapezium, area, perimeter, formula, length, width, prism, compound, measurement, polygon, cuboid, volume, symmetry, vertices, edge, face, units, conversion*

They will understand (key concepts):

- 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.
- Understand that the expression 'estimate' will be used where appropriate, when finding the mean of grouped data using mid-interval values;

**The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.**

They will know how to (key skills including speaking, reading and writing in this subject):

- Specify the problem and plan an investigation, decide what data to collect and what statistical analysis is needed and consider fairness.
- 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;
- 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;

- Convert between units of measure within one system, including time and metric units to metric units of length, area and volume and capacity e.g. 1ml = 1cm<sup>3</sup>;
- Make sensible estimates of a range of measures in everyday settings;
- Measure shapes to find perimeters and areas using a range of scales;
- Find the perimeter of rectangles and triangles; parallelograms and trapezia; compound shapes;
- Find the area of a parallelogram;
- Calculate areas and perimeters of compound shapes made from triangles and rectangles;
- Find the surface area of a prism using rectangles and triangles;
- Find the volume of a prism, including a triangular prism, cube and cuboid;

<ul style="list-style-type: none"> <li>➤ mode and range from a bar chart;</li> <li>➤ median, mode and range from stem and leaf diagrams;</li> <li>➤ mean from a bar chart;</li> <li>➤ 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;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Calculate volumes of right prisms and shapes made from cubes and cuboids;</li> </ul>
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**SUMMER Half Term 2**

<b>Theme/ topic:</b> <b>Real-life graphs</b>	<b>Theme/ topic:</b> <b>Straight-line graphs</b>	<b>Theme/ topic:</b> <b>Transformations</b>
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By the end of this half term pupils will know (key knowledge, including tier 3 vocabulary):

<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p> <p><b>Key Words</b></p> <p><i>Linear, graph, distance, time, coordinate, quadrant, real-life graph, gradient, intercept, function, solution, parallel</i></p>	<ul style="list-style-type: none"> <li>➤ Plot and draw graphs of <math>y = a</math>, <math>x = a</math>, <math>y = x</math> and <math>y = -x</math>;</li> <li>➤ Recognise straight-line graphs parallel to the axes;</li> <li>➤ Recognise that equations of the form <math>y = mx + c</math> correspond to straight-line graphs in the coordinate plane;</li> </ul> <p><b>Key Words</b></p> <p><i>Linear, graph, coordinate, quadrant, gradient, intercept, function, solution, parallel</i></p>	<ul style="list-style-type: none"> <li>➤ Identify congruent shapes by eye;</li> <li>➤ Identify correct rotations from a choice of diagrams;</li> <li>➤ Identify correct reflections from a choice of diagrams;</li> <li>➤ Identify the equation of a line of symmetry;</li> <li>➤ Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides, simple integer scale factors, or simple fractions;</li> </ul> <p><b>Key Words</b></p> <p><i>Transformation, rotation, reflection, enlargement, translation, single, combination, scale factor, mirror line, centre of rotation, centre of enlargement, column vector, vector, similarity, congruent, angle, direction, coordinate, describe</i></p>
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They will understand (key concepts):

<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p>	<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p>	<ul style="list-style-type: none"> <li>➤ Understand that rotations are specified by a centre, an angle and a direction of rotation;</li> <li>➤ Understand that translations are specified by a distance and direction using a vector;</li> <li>➤ Understand that distances and angles are preserved under reflections, rotations and translations, so that any figure is congruent under either of these transformations;</li> <li>➤ Understand that reflections are specified by a mirror line;</li> </ul>
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		<ul style="list-style-type: none"> <li>➤ Understand that an enlargement is specified by a centre and a scale factor;</li> <li>➤ Understand that similar shapes are enlargements of each other and angles are preserved – define similar in this unit.</li> </ul>
They will know how to (key skills including speaking, reading and writing in this subject):		
<ul style="list-style-type: none"> <li>➤ Use input/output diagrams;</li> <li>➤ Draw, label and scale axes;</li> <li>➤ Use axes and coordinates to specify points in all four quadrants in 2D;</li> <li>➤ Identify points with given coordinates and coordinates of a given point in all four quadrants;</li> <li>➤ Find the coordinates of points identified by geometrical information in 2D (all four quadrants);</li> <li>➤ Find the coordinates of the midpoint of a line segment; Read values from straight-line graphs for real-life situations;</li> <li>➤ Draw straight line graphs for real-life situations, including ready reckoner graphs, conversion graphs, fuel bills graphs, fixed charge and cost per unit;</li> <li>➤ Draw distance–time graphs and velocity–time graphs;</li> <li>➤ Interpret distance–time graphs, and calculate: the speed of individual sections, total distance and total time;</li> <li>➤ Interpret information presented in a range of linear and non-linear graphs;</li> <li>➤ Find and interpret gradient as the rate of change in distance–time and speed–time graphs, graphs of containers filling and emptying, and unit price graphs.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Use function machines to find coordinates (i.e. given the input <math>x</math>, find the output <math>y</math>);</li> <li>➤ Sketch a graph of a linear function, using the gradient and <math>y</math>-intercept;</li> <li>➤ Plot and draw graphs of straight lines of the form <math>y = mx + c</math> using a table of values;</li> <li>➤ Identify and interpret gradient from an equation <math>y = mx + c</math>;</li> <li>➤ Identify parallel lines from their equations;</li> <li>➤ Plot and draw graphs of straight lines in the form <math>ax + by = c</math>;</li> <li>➤ Find the equation of a straight line from a graph;</li> <li>➤ Find the equation of the line through one point with a given gradient;</li> <li>➤ Find approximate solutions to a linear equation from a graph.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Find the centre of rotation, angle and direction of rotation and describe rotations fully using the angle, direction of turn, and centre;</li> <li>➤ Rotate and draw the position of a shape after rotation about the origin or any other point including rotations on a coordinate grid;</li> <li>➤ Translate a given shape by a vector;</li> <li>➤ Transform 2D shapes using single reflections (including those not on coordinate grids) with vertical, horizontal and diagonal mirror lines;</li> <li>➤ Use column vectors to describe and transform 2D shapes using single translations on a coordinate grid;</li> <li>➤ Describe reflections on a coordinate grid;</li> <li>➤ Scale a shape on a grid (without a centre specified);</li> <li>➤ Enlarge a given shape using <math>(0, 0)</math> as the centre of enlargement, and enlarge shapes with a centre other than <math>(0, 0)</math>;</li> <li>➤ Find the centre of enlargement by drawing;</li> <li>➤ Describe and transform 2D shapes using enlargements by: <ul style="list-style-type: none"> <li>➤ a positive integer scale factor;</li> <li>➤ a fractional scale factor;</li> </ul> </li> </ul>



# Dallam School

Curriculum overview

Department: Mathematics - Foundation  
Year Group: 11

## AUTUMN Half Term 1

Theme/ topic:

Theme/ topic:

Theme/ topic:

Theme/ topic:

**Ratio**

**Proportion**

**Pythagoras and Trigonometry**

**Probability**

By the end of this half term pupils will know (key knowledge, including tier 3 vocabulary):

- Write ratios in their simplest form;
- Write/interpret a ratio to describe a situation;
- Write ratios in form 1 : m or m : 1;
- Write a ratio as a fraction;
- Write a ratio as a linear function;

**Key Words**

*Ratio, proportion, share, parts, fraction*

- Recognise when values are in direct proportion by reference to the graph form;

**Key Words**

*Function, direct proportion, inverse proportion, graphical, linear, compare*

- Understand, recall and use Pythagoras' Theorem in 2D, including leaving answers in surd form and being able to justify if a triangle is right-angled or not;
- Understand, use and recall the trigonometric ratios sine, cosine and tan, and apply them to find angles and lengths in general triangles in 2D figures;
- Know the exact values of  $\sin \theta$  and  $\cos \theta$  for  $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$  and  $90^\circ$ ; know the exact value of  $\tan \theta$  for  $\theta = 0^\circ, 30^\circ, 45^\circ$  and  $60^\circ$ .

**Key Words**

*Triangle, right angle, angle, Pythagoras' Theorem, sine, cosine, tan, trigonometry, opposite, hypotenuse, adjacent, ratio, elevation, depression, length, accuracy*

- 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;
- List all outcomes for single events systematically;
- Identify different mutually exclusive outcomes and know that the sum of the probabilities of all outcomes is 1;
- Record outcomes of probability experiments in tables;
- Use union and intersection notation;

**Key Words**

*Probability, dependent, independent, conditional, tree diagrams, sample space, outcomes, theoretical, relative frequency, fairness, experimental*

They will understand (key concepts):

<ul style="list-style-type: none"> <li>➤ Understand and express the division of a quantity into a of number parts as a ratio;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Understand and use proportion as equality of ratios;</li> <li>➤ Understand inverse proportion: as x increases, y decreases (inverse graphs done in later unit);</li> <li>➤ Understand direct proportion ---&gt; relationship <math>y = kx</math>.</li> </ul>	<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p>	<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p>
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They will know how to (key skills including speaking, reading and writing in this subject):

<ul style="list-style-type: none"> <li>➤ Share a quantity in a given ratio including three-part ratios;</li> <li>➤ Solve a ratio problem in context:</li> <li>➤ use a ratio to find one quantity when the other is known;</li> <li>➤ use a ratio to compare a scale model to a real-life object;</li> <li>➤ use a ratio to convert between measures and currencies;</li> <li>➤ problems involving mixing, e.g. paint colours, cement and drawn conclusions;</li> <li>➤ Compare ratios;</li> <li>➤ Write lengths, areas and volumes of two shapes as ratios in simplest form;</li> <li>➤ Express a multiplicative relationship between two quantities as a ratio or a fraction.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Solve word problems involving direct and inverse proportion;</li> <li>➤ Work out which product is the better buy;</li> <li>➤ Scale up recipes;</li> <li>➤ Convert between currencies;</li> <li>➤ Find amounts for 3 people when amount for 1 given;</li> <li>➤ Solve proportion problems using the unitary method;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Calculate the length of the hypotenuse and of a shorter side in a right-angled triangle, including decimal lengths and a range of units;</li> <li>➤ Apply Pythagoras' Theorem with a triangle drawn on a coordinate grid;</li> <li>➤ Calculate the length of a line segment AB given pairs of points;</li> <li>➤ Use the trigonometric ratios to solve 2D problems including angles of elevation and depression;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Find the probability of an event happening using theoretical probability;</li> <li>➤ Use theoretical models to include outcomes using dice, spinners, coins;</li> <li>➤ Work out probabilities from frequency tables, frequency trees, and two way tables;</li> <li>➤ Add simple probabilities;</li> <li>➤ Using <math>1 - p</math> as the probability of an event not occurring where <math>p</math> is the probability of the event occurring;</li> <li>➤ Find a missing probability from a list or table including algebraic terms;</li> <li>➤ Find the probability of an event happening using relative frequency;</li> <li>➤ Estimate the number of times an event will occur, given the probability and the number of trials – for both experimental and theoretical probabilities;</li> <li>➤ List all outcomes for combined events systematically;</li> <li>➤ Use and draw sample space diagrams;</li> <li>➤ Work out probabilities from Venn diagrams to represent real-life situations</li> <li>➤ Compare experimental data and theoretical probabilities;</li> <li>➤ Compare relative frequencies from samples of different sizes;</li> <li>➤ Find the probability of successive events, such as several throws of a single dice;</li> </ul>
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			➤ Use tree diagrams to calculate the probability of two independent or dependent events;
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**AUTUMN Half Term 2**

<b>Theme/ topic:</b> <b>Multiplicative reasoning</b>	<b>Theme/ topic:</b> <b>Plans and elevations</b>	<b>Theme/ topic:</b> <b>Constructions, loci and bearings</b>	<b>Theme/ topic:</b> <b>Quadratic equations: expanding and factorising</b>
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By the end of this half term pupils will know (key knowledge, including tier 3 vocabulary):

<p>➤ Understand and use compound measures: density, pressure and speed:</p> <p><b>Key Words</b></p> <p><i>Ratio, proportion, best value, proportional change, compound measure, density, mass, volume, speed, distance, time, density, mass, volume, pressure, acceleration, velocity, inverse, direct</i></p>	<p>➤ Understand clockwise and anticlockwise;</p> <p>➤ Draw circles and arcs to a given radius or given the diameter;</p> <p>➤ Measure and draw lines, to the nearest mm;</p> <p>➤ Measure and draw angles, to the nearest degree;</p> <p>➤ Know and use compass directions;</p> <p>➤ Draw sketches of 3D solids;</p> <p>➤ Know the terms face, edge and vertex;</p> <p>➤ Identify and sketch planes of symmetry of 3D solids;</p> <p><b>Key Words</b></p> <p><i>Construct, circle, arc, sector, face, edge, vertex, two-dimensional, three-dimensional, solid, elevations,</i></p>	<p>➤ Visually identify shapes which are congruent;</p> <p><b>Key Words</b></p> <p><i>Congruent, angles, regular, irregular, bearing, degree, bisect, perpendicular, loci, map, scale, plan, region</i></p>	<p>➤ Define a 'quadratic' expression;</p> <p><b>Key Words</b></p> <p><i>Quadratic, function, solve, expand, factorise, simplify, expression, graph, curve, factor, coefficient, bracket</i></p>
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They will understand (key concepts):

<b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b>	<b>The majority of new mathematical content in this unit is procedural so falls in to</b>	➤ Understand congruence, as two shapes that are the same size and shape;	<b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b>
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	<p>the "they will they know how to" section.</p>	<ul style="list-style-type: none"> <li>➤ Understand that triangles satisfying SSS, SAS, ASA and RHS are unique, but SSA triangles are not;</li> </ul>	
<p>They will know how to (key skills including speaking, reading and writing in this subject):</p>			
<ul style="list-style-type: none"> <li>➤ Convert between metric speed measures;</li> <li>➤ Read values in km/h and mph from a speedometer;</li> <li>➤ Calculate average speed, distance, time – in miles per hour as well as metric measures;</li> <li>➤ Use kinematics formulae to calculate speed, acceleration</li> <li>➤ Change d/t in m/s to a formula in km/h</li> <li>➤ Express a given number as a percentage of another number in more complex situations;</li> <li>➤ Calculate percentage profit or loss;</li> <li>➤ Make calculations involving repeated percentage change, not using the formula;</li> <li>➤ Find the original amount given the final amount after a percentage increase or decrease;</li> <li>➤ Use compound interest;</li> <li>➤ Use a variety of measures in ratio and proportion problems: currency conversion, rates of pay, best value</li> <li>➤ Set up, solve and interpret the answers in growth and decay problems;</li> <li>➤ Understand that X is inversely proportional to Y is equivalent to X is proportional to <math>\frac{1}{Y}</math></li> <li>➤ Interpret equations that describe direct and inverse proportion.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Make accurate drawings of triangles and other 2D shapes using a ruler and a protractor;</li> <li>➤ Construct diagrams of everyday 2D situations involving rectangles, triangles, perpendicular and parallel lines;</li> <li>➤ Understand and draw front and side elevations and plans of shapes made from simple solids;</li> <li>➤ Given the front and side elevations and the plan of a solid, draw a sketch of the 3D solid.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Use straight edge and a pair of compasses to do standard constructions:</li> <li>➤ construct the perpendicular bisector of a given line;</li> <li>➤ construct the perpendicular from a point to a line;</li> <li>➤ construct the bisector of a given angle;</li> <li>➤ construct angles of 90°, 45°;</li> <li>➤ Draw and construct diagrams from given instructions, including the following:</li> <li>➤ a region bounded by a circle and an intersecting line;</li> <li>➤ a given distance from a point and a given distance from a line;</li> <li>➤ equal distances from two points or two line segments;</li> <li>➤ regions may be defined by 'nearer to' or 'greater than';</li> <li>➤ Find and describe regions satisfying a combination of loci;</li> <li>➤ Use constructions to solve loci problems (2D only);</li> <li>➤ Use and interpret maps and scale drawings;</li> <li>➤ Estimate lengths using a scale diagram;</li> <li>➤ Make an accurate scale drawing from a diagram;</li> <li>➤ Use three-figure bearings to specify direction;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Multiply together two algebraic expressions with brackets;</li> <li>➤ Square a linear expression, e.g. <math>(x + 1)^2</math>;</li> <li>➤ Factorise quadratic expressions of the form <math>x^2 + bx + c</math>;</li> <li>➤ Factorise a quadratic expression <math>x^2 - a^2</math> using the difference of two squares;</li> <li>➤ Solve quadratic equations by factorising;</li> <li>➤ Find the roots of a quadratic function algebraically</li> </ul>



		<ul style="list-style-type: none"> <li>➤ Mark on a diagram the position of point B given its bearing from point A;</li> <li>➤ Give a bearing between the points on a map or scaled plan;</li> <li>➤ Given the bearing of a point A from point B, work out the bearing of B from A;</li> <li>➤ Use accurate drawing to solve bearings problems;</li> <li>➤ Solve locus problems including bearings.</li> </ul>	
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SPRING Half Term 1			
Theme/ topic:	Theme/ topic:	Theme/ topic:	Theme/ topic:
<b>Quadratics: graphs</b>	<b>Circles, cylinders, cones and spheres</b>	<b>Fractions and reciprocals</b>	<b>Indices and standard form</b>
By the end of this half term pupils will know (key knowledge, including tier 3 vocabulary):			
<ul style="list-style-type: none"> <li>➤ Generate points and plot graphs of simple quadratic functions, then more general quadratic functions;</li> <li>➤ Identify the line of symmetry of a quadratic graph;</li> </ul> <p><b>Key Words</b></p> <p><i>Quadratic, function, solve, expand, factorise, simplify, expression, graph, curve, factor, coefficient, bracket</i></p>	<ul style="list-style-type: none"> <li>➤ Recall the definition of a circle and identify, name and draw parts of a circle including tangent, chord and segment;</li> <li>➤ Recall and use formulae for the circumference of a circle and the area enclosed by a circle circumference of a circle = <math>2\pi r = \pi d</math>, area of a circle = <math>\pi r^2</math>;</li> <li>➤ Use <math>\pi \approx 3.142</math> or use the <math>\pi</math> button on a calculator;</li> </ul> <p><b>Key Words</b></p> <p><i>Area, perimeter, formula, length, width, measurement, volume, circle, segment, arc, sector, cylinder, circumference, radius,</i></p>	<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p> <p><b>Key Words</b></p> <p><i>Add, subtract, multiply, divide, mixed, improper, fraction, decimal</i></p>	<p><b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b></p> <p><b>Key Words</b></p> <p><i>Indices, standard form, power, reciprocal, index</i></p>



	<i>diameter, pi, sphere, cone, hemisphere, segment, accuracy, surface area</i>		
They will understand (key concepts):			
<b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b>	<b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b>	➤ Understand 'reciprocal' as multiplicative inverse, knowing that any non-zero number multiplied by its reciprocal is 1	<b>The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.</b>
They will know how to (key skills including speaking, reading and writing in this subject):			
<ul style="list-style-type: none"> <li>➤ Find approximate solutions to quadratic equations using a graph;</li> <li>➤ Interpret graphs of quadratic functions from real-life problems;</li> <li>➤ Identify and interpret roots, intercepts and turning points of quadratic graphs.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Give an answer to a question involving the circumference or area of a circle in terms of <math>\pi</math>;</li> <li>➤ Find radius or diameter, given area or perimeter of a circles;</li> <li>➤ Find the perimeters and areas of semicircles and quarter-circles;</li> <li>➤ Calculate perimeters and areas of composite shapes made from circles and parts of circles;</li> <li>➤ Calculate arc lengths, angles and areas of sectors of circles;</li> <li>➤ Find the surface area and volume of a cylinder;</li> <li>➤ Find the surface area and volume of spheres, pyramids, cones and composite solids;</li> <li>➤ Round answers to a given degree of accuracy.</li> <li>➤</li> </ul>	<ul style="list-style-type: none"> <li>➤ Add, subtract, multiply and divide mixed numbers and fractions;</li> <li>➤ Find the reciprocal of an integer, decimal or fraction;</li> </ul>	<ul style="list-style-type: none"> <li>➤ Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers, fractions and powers of a power;</li> <li>➤ Use numbers raised to the power zero, including the zero power of 10;</li> <li>➤ Convert large and small numbers into standard form and vice versa;</li> <li>➤ Add, subtract, multiply and divide numbers in standard form;</li> <li>➤ Interpret a calculator display using standard form and know how to enter numbers in standard form.</li> </ul>

**SPRING Half Term 2**

**Theme/ topic:**

**Similarity and congruence in 2D**

**Theme/ topic:**

**Vectors**

**Theme/ topic:**

**Rearranging equations, graphs of cubic and reciprocal functions and simultaneous equations**

By the end of this half term pupils will know (key knowledge, including tier 3 vocabulary):

- Use the basic congruence criteria for triangles (SSS, SAS, ASA and RHS);
- Identify shapes which are similar; including all circles or all regular polygons with equal number of sides;
- Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides;
- Know that scale diagrams, including bearings and maps are 'similar' to the real-life examples.

**Key Words**

*Vector, direction, magnitude, scalar, multiple, parallel, collinear, ratio, column vector, congruence, side, angle, compass, construction, shape, volume, length, area, volume, scale factor, enlargement, similar, perimeter,*

- Be able to represent information graphically given column vectors;
- Identify two column vectors which are parallel;

**Key Words**

*Vector, direction, magnitude, scalar, multiple, parallel, collinear, ratio, column vector, congruence, side, angle, compass, construction, shape, volume, length, area, volume, scale factor, enlargement, similar, perimeter,*

- Know the difference between an equation and an identity and use and understand the  $\neq$  symbol;
- Recognise, sketch and interpret graphs of simple cubic functions;
- Recognise, sketch and interpret graphs of the reciprocal function  $\frac{a}{x}$  with  $x \neq 0$ ;

**Key Words**

*Reciprocal, linear, gradient, functions, direct, indirect, estimate, cubic, subject, rearrange, simultaneous, substitution, elimination, proof*

They will understand (key concepts):

- Understand similarity of triangles and of other plane shapes, use this to make geometric inferences, and solve angle problems using similarity;
- Understand the effect of enlargement on perimeter of shapes;

- Understand and use column notation in relation to vectors;

**The majority of new mathematical content in this unit is procedural so falls in to the "they will they know how to" section.**

They will know how to (key skills including speaking, reading and writing in this subject):

- Solve angle problems involving congruence;
- Solve problems to find missing lengths in similar shapes;

- Calculate using column vectors, and represent graphically, the sum of two vectors, the difference of two vectors and a scalar multiple of a vector.

- Change the subject of a formula involving the use of square roots and squares;
- Answer 'show that' questions using consecutive integers ( $n, n + 1$ ), squares  $a^2, b^2$ , even numbers  $2n$ , and odd numbers  $2n + 1$ ;

		<ul style="list-style-type: none"><li>➤ Solve problems involving inverse proportion using graphs, and read values from graphs;</li><li>➤ Find the equation of the line through two given points;</li><li>➤ Use graphical representations of inverse proportion to solve problems in context;</li><li>➤ Solve simultaneous equations (linear/linear) algebraically and graphically;</li><li>➤ Solve simultaneous equations representing a real-life situation, graphically and algebraically, and interpret the solution in the context of the problem;</li></ul>
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