

### **Subject Vision**

The Mathematical curriculum provides students with a deep knowledge of mathematical concepts. This will enable students to carry out calculations fluently throughout all domains. This should develop students to be inquisitive problem solvers who can apply Maths to the real world.

### **End Points**

- **EP1 Have a deep understanding of maths and how it relates to the real world**
- **EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge**
- **EP3 Reason, interpret and communicate mathematically**
- **EP4 Can apply mathematical knowledge fluently across and between domains**

<u>Subject Domains of Knowledge</u>	<u>Subject Key Concepts</u>
<ul style="list-style-type: none"> <li>• D1 Number</li> <li>• D2 Algebra</li> <li>• D3 Statistics</li> <li>• D4 Ratio proportion and rates of change</li> <li>• D5 Geometry and Measure</li> <li>• D6 Probability</li> </ul>	<ul style="list-style-type: none"> <li>• C1 Mathematical operations</li> <li>• C2 Directed number</li> <li>• C3 FDPR</li> <li>• C4 place value</li> <li>• C5 types of numbers</li> <li>• C6 Algebraic manipulation (simplify /expanding/ changing the subject etc)</li> <li>• C7 Equations</li> <li>• C8 Graphs and sequences</li> <li>• C9 constructions and loci</li> <li>• C10 Measures (perimeter, area, volume etc)</li> <li>• C12 Angles (inc parallel lines and using angles)</li> <li>• C13 Transformations (including vectors)</li> <li>• C14 properties of shapes</li> <li>• C15 Data Handling (including averages, charts and graphs)</li> </ul>

**Medium Term Plan**

**Year 8**

<b>Units / Term</b>	<b>Unit 1: 2D shapes with isometric drawing</b>	<b>Unit 2: multiply and dividing including decimals</b>	<b>Unit 3: collecting terms and substitution</b>
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<b>Overview</b>	This unit builds upon the year 7 unit on shapes. It recalls knowledge of the properties of shapes and develops it using isometric drawing and 3D shapes.	This unit builds upon the understanding of what a decimal is and develops on that using multiplying and dividing skills.	This unit builds upon simplifying terms – adding, subtracting, dividing and multiplying them. It develops the skills of substitution in more complex expressions.
<b>Lesson Sequence</b>	<ol style="list-style-type: none"> <li>1. Identify 2D shapes and their properties</li> <li>2. Know properties of triangles</li> <li>3. Understand regular polygons</li> <li>4. Draw shapes on isometric paper</li> </ol>	<ol style="list-style-type: none"> <li>1. To be able to add and subtract decimals</li> <li>2. Multiply and divide by 10</li> <li>3. Multiply and divide by integers</li> <li>4. Multiply and divide using decimals</li> <li>5. Multiply and divide fractions</li> </ol>	<ol style="list-style-type: none"> <li>1. Collecting terms with all operations</li> <li>2. Expanding brackets and simplifying</li> <li>3. Substitute problems</li> </ol>
<b>Key Domains and Concepts taught in this Unit / Term</b>	D5 Geometry and Measure C9 constructions and loci C12 Angles (inc parallel lines and using angles) C14 properties of shapes	D1 Number C1 Mathematical operations C4 place value	D2 Algebra C6 Algebraic manipulation (simplify /expanding/ changing the subject etc)
<b>KS4 End Points taught in this Unit / Term</b>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p><b>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</b></p> <p><b>EP3 Reason, interpret and communicate mathematically</b></p> <p><b>EP4 Can apply mathematical knowledge fluently across and between domains</b></p>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p><b>EP4 Can apply mathematical knowledge fluently across and between domains</b></p>	<p><b>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</b></p> <p><b>EP3 Reason, interpret and communicate mathematically</b></p>

<b>Declarative Knowledge (Students should know)</b>	2D shapes names and properties Know angles in triangles and properties of triangles	Multiply and divide integers Understand place value	Know what the concept of algebra is and how to simplify it Know how to multiply/divide/add/subtract algebraic terms
<b>Procedural Knowledge (Students should be able to do)</b>	Draw 3D shapes with isometric paper	Multiply decimals together Divide decimals together	Substitute numbers into algebraic expressions Be confident at simplifying terms together
<b>Developing T3 Literacy and Numeracy</b>	<b>Isometric:</b> Edge on 3D view <b>Plan:</b> A view of a shape or object from above, looking down on to it <b>Angle:</b> A measure of term <b>Equilateral:</b> All sides equal <b>Isosceles:</b> Two sides equal <b>Scalene:</b> No sides equal <b>Parallel:</b> Lines that are always the same distance apart and never meet	<b>Integer:</b> Whole number including positives, negatives and zero <b>Decimal:</b> A number where tenths, hundredths and thousandths etc are written after a decimal point <b>Place value:</b> The value of a digit based on where the digit occurs in the number	<b>Term:</b> A number or an individual piece of algebra with no mathematical operation <b>Expression:</b> A group of terms with mathematical operations (e.g. add/subtract etc) between them. <b>Substitute:</b> Replace a letter variable with a number <b>Like:</b> Terms containing exactly the same variable
<b>Assessment (Summative and Formative)</b>	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment
<b>Links to Prior Learning</b>	Year 7 – 2d shape properties and names Year 7 – angles in shapes	Year 7 and KS2 – multiplying and dividing 2/3 digits KS2 – place value and remainders	Year 7 – collecting terms and understanding of a term and an expression. Index laws
<b>Next steps in learning</b>	Area and volume of shapes Properties of 3D shapes and names	Complicated calculations including decimals	Solving equations

<p><b>Common Barriers to learning in this unit</b></p>	<p>Correct orientation of isometric paper            Drawing horizontal lines on isometric paper (drawing “face on” rather than “edge on”)            Mix up a rhombus/trapezium/parallelogram</p>	<p>Place value misconceptions            Do not line the columns up correctly            Forgetting the place holder 0 when multiplying by a two (or more) digit number            Placing the decimal point in the solution to a decimal multiplication            Using equivalent fractions to divide decimals, and remembering that we do not have to adjust the answer</p>	<p>Identifying like terms (especially with different powers)            Index laws            Confused with the difference between add/subtract and multiply terms            Forget when a letter and number are together it is multiplied</p>
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Units / Term	Unit 4: data	Unit 5: Speed / distance / time	Unit 6: types of numbers
<b>Overview</b>	This unit builds on bar charts looking into comparative ones. It teaches students to draw pie charts, read cumulative frequency graphs and plot scatter graphs.	This unit introduces to concept of speed, distance and time. Students will use the formula to find all of them. Students will understand time and converting between minutes and hours.	This unit will introduce multiples and factors and students will use factor trees of support them finding the highest common factor and lowest common multiple.
<b>Lesson sequence</b>	<ol style="list-style-type: none"> <li>1. Look at and use comparative bar charts</li> <li>2. Read and plot Scatter graphs</li> <li>3. Draw pie charts</li> <li>4. Draw cumulative frequency graphs</li> </ol>	<ol style="list-style-type: none"> <li>1. Use the formula to find speed</li> <li>2. Use the formula to find distance</li> <li>3. Find the time of journeys</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify types of numbers</li> <li>2. Find the product of prime factors</li> <li>3. Find the HCF by listing</li> <li>4. Find the LCM using product of prime factors</li> <li>5. Use laws of indices</li> <li>6. Use brackets and laws of indices</li> </ol>
<b>Key Domains and Concepts taught in this Unit / Term</b>	D3 Statistics C15 Data Handling (including averages, charts and graphs)	D4 Ratio proportion and rates of change D5 Geometry and Measure C8 Graphs and sequences C10 Measures (perimeter, area, volume etc)	D1 Number C2 Directed number C4 place value C5 types of numbers C15 Data Handling (including averages, charts and graphs)
<b>KS4 End Points taught in this Unit / Term</b>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p>EP3 Reason, interpret and communicate mathematically</p>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</p>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p>EP3 Reason, interpret and communicate mathematically</p> <p>EP4 Can apply mathematical knowledge fluently across and between domains</p>
<b>Declarative Knowledge</b>	Know how to draw and interpret bar charts, pictograms and read pie charts	Know how to use their calculators	Index laws

<p><b>(Students should know)</b></p>	<p>Understand the x and y axis on a chart</p> <p>Know that all charts need labelling and titles</p>	<p>Know how to use the inverse in a formula</p>	<p>Know factors / prime numbers / multiples</p>
<p><b>Procedural Knowledge (Students should be able to do)</b></p>	<p>Be able to draw and interpret comparative bar charts.</p> <p>Be able to draw a pie chart using a protractor</p> <p>Draw a cumulative frequency graph</p> <p>Draw and interpret a scatter graph</p>	<p>Use the speed distance time formula to find speed, distance and time from a question</p> <p>Know that speed = distance / time</p> <p>Solve complex questions related to speed.</p>	<p>Use knowledge of factors and prime numbers to find the product of prime factors</p> <p>Find the HCF / LCM of two numbers</p> <p>Recap on index law and calculations with indices</p>
<p><b>Developing T3 Literacy and Numeracy</b></p>	<p><b>Frequency:</b> Number of times something happens</p> <p><b>Cumulative:</b> A running total up to that point</p> <p><b>Dual:</b> A diagram containing information about two different groups, side by side for comparison</p> <p><b>Scatter graph:</b> Points are plotted to show the relationship between two variables</p> <p><b>Line of best fit:</b> A straight line drawn to represent the trend of the values</p> <p><b>Correlation:</b> Relationship between two variables</p>	<p><b>Speed:</b> How fast something is going (the rate at which an object moves with relation to time)</p> <p><b>Compound Measures:</b> Measures made up of two or more other measures</p> <p><b>Metric:</b> A decimal system of measurements based on 10, so units are multiples of 10, 100, 1000</p> <p><b>Imperial:</b> An old measurement system based on everyday activities (not base 10, so conversions are much trickier)</p>	<p><b>Multiple:</b> A number in a certain times table</p> <p><b>Factor:</b> A whole number that divides exactly in to another number</p> <p><b>Prime:</b> A number with precisely 2 factors (namely 1 and itself)</p> <p><b>Product:</b> The result when two numbers are multiplied</p> <p><b>Common:</b> A factor or multiple that is shared by two or more numbers</p> <p><b>Index/indices:</b> A small number placed in the upper-right of a base number which shows how many copies of the base number are multiplied together</p>

<b>Assessment (Summative and Formative)</b>	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment
<b>Links to Prior Learning</b>	Year 7 – draw and interpret a bar chart and a pictogram and read pie charts	Year 7 – solving problems. Inverse functions Year 8 term 1 -Substituting into a formula	Year 7 – prime/ factors / multiples Index law
<b>Next steps in learning</b>	Box plots Frequency polygons Vertical line graphs / time series graphs	Density Two-way speed/distance/time problems	3-way HCF /LCM questions Wordy questions including HCF/LCM
<b>Common Barriers to learning in this unit</b>	Issues with drawing accurate axes Forget the spaces needed between bars in a bar chart. Line of best fit is different in science Plot frequency rather than cumulative frequency, so do not make a curve. Use a ruler to join the dots in a cf graph Do not calculate the angles on a pie chart correctly. Issues drawing angles with protractors (e.g. not turning the protractor)	Do not remember the formula Use a formula triangle and get the letters in the wrong position Do not identify the speed from the question Trouble writing/identifying the correct unit for their answer	Forgetting 1 is not a prime number Getting factors and multiples mixed up Writing their primes in a list, rather than a product Using a Venn diagram to find the HCF



Units / Term	Unit 7: solving and forming equations	Unit 8: Area of 2D shapes including circles	Unit 9: rearranging formula
<b>Overview</b>	This unit builds upon the knowledge of being able to solve an equation. It stretches students further by teaching them how to form the equation first.	The unit continues to develop the skills of properties of 2D shapes and finding out the area of shapes including circles.	This unit continues to develop algebraic fluency by teaching students how to rearrange formulas.
<b>Lesson Sequence</b>	<ol style="list-style-type: none"> <li>1. Solving equations using function machines</li> <li>2. 1 step equations</li> <li>3. 2 step equations</li> <li>4. Use brackets in equations</li> </ol>	<ol style="list-style-type: none"> <li>1. Area of rectangles and rectilinear shapes</li> <li>2. Area of parallelograms and triangles</li> <li>3. Area of trapeziums</li> <li>4. Area of circles</li> </ol>	<ol style="list-style-type: none"> <li>1. Solving equation recap</li> <li>2. Changing the subject of a formula</li> <li>3. Change the subject of a more complex question</li> </ol>
<b>Key Domains and Concepts taught in this Unit / Term</b>	D2 Algebra C7 Equations C6 Algebraic manipulation (simplify /expanding/ changing the subject etc)	D5 Geometry and Measure C10 Measures (perimeter, area, volume etc) C14 properties of shapes	D2 Algebra C6 Algebraic manipulation (simplify /expanding/ changing the subject etc) C7 Equations
<b>KS4 End Points taught in this Unit / Term</b>	<b>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</b>	<b>EP3 Reason, interpret and communicate mathematically</b> <b>EP4 Can apply mathematical knowledge fluently across and between domains</b>	<b>EP1 Have a deep understanding of maths and how it relates to the real world</b> <b>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</b> <b>EP3 Reason, interpret and communicate mathematically</b> <b>EP4 Can apply mathematical knowledge fluently across and between domains</b>
<b>Declarative Knowledge</b>	Simplify expressions in algebra Use brackets and substitute algebra	S2 Shapes and properties Perimeter of shapes	Solving an equation Understand the inverse operation

(Students should know)	Basic solving using function machines		
Procedural Knowledge (Students should be able to do)	Solve one step / two step equations Solve equations including brackets Form equations from wordy questions and shapes and then solve	Find the area of rectangles/parallelograms/trapeziums Find the area of compound shapes  Find the area of circles	Rearrange an equation Change the subject of an equation
Developing T3 Literacy and Numeracy	<b>Equation:</b> A mathematical statement containing an equals sign <b>Solve:</b> Finding the numerical value(s) that make the equation true <b>Inverse:</b> The opposite/reverse mathematical operation that undoes the effect of the operation	<b>Dimensions:</b> The measurable size of something (often refers to length, width and height) <b>Area:</b> The amount of space inside a shape, measured in square units <b>Diameter:</b> A straight line passing through the centre of a circle to touch both sides of the circle <b>Radius:</b> A straight line from the centre of a circle to its edge. <b>Pi:</b> The ratio of the circumference of a circle to its diameter, which is approximately 3.14159	<b>Formula:</b> An equation used to find quantities when given certain values  <b>Subject:</b> When a formula is arranged so that a letter is equal to the rest of the formula, that letter is the subject of the formula  <b>Rearrange:</b> The process of changing the subject of a formula
Assessment (Summative and Formative)	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment
Links to Prior Learning	Year 7 – collecting terms and introduction to algebra. Basic solving Year 8 – term 1 substitution, simplifying expressions and expanding brackets	Year 7 – 2d shapes properties and perimeter	Year 7 – simplify algebra, understand $3a$ means $3 \times a$ . basic solving Year 8 – term 2 solving equations

<b>Next steps in learning</b>	Solve more complex questions Rearrange formulas and making the subject	Volume of shapes	More complex changing the subject questions Algebraic fractions
<b>Common Barriers to learning in this unit</b>	Do not write an equation with an equals Do not use inverse functions Forget that 2a means 2 x a Write equations including x and ÷ rather than proper mathematical notation	Mix up perimeter and area of shapes Do not use the radius to find the area of a circle	Do not use inverse operations Want the answer to be numerical, rather than algebraic Can't see the order they need to do operations to fully rearrange the formula

Units / Term	Unit 10: ratio	Unit 11: probability venn diagrams	Unit 12: measures
<b>Overview</b>	This unit continues to develop the fluency of ratio. It builds on the skills learnt so far and develops it further looking into sharing in to a ratio in more complex scenarios.	This unit continues looking at probability in venn diagrams. Students will understand the notation used and read and draw a venn diagram.	This unit helps to secure skills of converting units. This skill crosses throughout the year in different units.
<b>Lesson Sequence</b>	<ol style="list-style-type: none"> <li>Using basic ratio</li> <li>Sharing in equivalent ratios</li> <li>Sharing in a ratio from the total</li> <li>Sharing from a total then sharing from the difference</li> <li>Practicing mixed questions</li> </ol>	<ol style="list-style-type: none"> <li>Using venn diagrams and the notation</li> <li>Using venn diagrams linked with probability</li> </ol>	<ol style="list-style-type: none"> <li>Use the basic metric units and estimating</li> <li>Converting metric units</li> <li>Reading scales</li> <li>Use scale drawing</li> </ol>
<b>Key Domains and Concepts taught in this Unit / Term</b>	D2 Algebra C3 FDPR D4 Ratio proportion and rates of change	C4 place value C3 FDPR D6 Probability	C3 FDPR C4 place value C10 Measures (perimeter, area, volume etc) D1 Number D4 Ratio proportion and rates of change
<b>KS4 End Points taught in this Unit / Term</b>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p><b>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</b></p> <p><b>EP4 Can apply mathematical knowledge fluently across and between domains</b></p>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p><b>EP3 Reason, interpret and communicate mathematically</b></p> <p><b>EP4 Can apply mathematical knowledge fluently across and between domain</b></p>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p><b>EP4 Can apply mathematical knowledge fluently across and between domain</b></p>

<b>Declarative Knowledge (Students should know)</b>	<p>Understand what ratio looks like and how to add parts into a ratio Use ratio in real life problems Simplify ratio</p>	<p>Understand that probability is less than 1 Add and subtract fractions with different denominators Know types of numbers</p>	<p>Estimating lengths/ heights/ weights Know different measurements and convert them</p>
<b>Procedural Knowledge (Students should be able to do)</b>	<p>Share into a ratio Solve complex questions with ratio involved</p>	<p>Use knowledge of types of numbers to fill in a venn diagram Learn venn diagram notation Use a venn diagram to find a probability</p>	<p>Know all metric units and be able to convert them  Be able to read scales</p>
<b>Developing T3 Literacy and Numeracy</b>	<p><b>Ratio:</b> A part-to-part comparison, written <math>a : b</math> <b>Proportional:</b> Quantities that vary by a set multiple <b>Equivalent:</b> Two ratios that are of equal value <b>Sharing:</b> Dividing an amount in to a given ratio</p>	<p><b>Universal set:</b> The set of numbers being considered in the venn diagram <b>Intersection:</b> The overlap between two or more circles in a venn diagram, showing the elements that belong to more than one set <b>Union:</b> The elements of given sets all combined together <b>Complement:</b> Elements not in a given set</p>	<p><b>Metric:</b> A decimal system of measurements based on 10, so units are multiples of 10, 100, 1000 <b>Imperial:</b> An old measurement system based on everyday activities (not base 10, so conversions are much trickier) <b>Metre:</b> The metric unit for length <b>Litre:</b> The metric unit for capacity <b>Gram:</b> The metric unit for mass/weight <b>Centi-:</b> Prefix meaning “one-hundredth of . . .” <b>Kilo-:</b> Prefix meaning “a thousand of . . .” <b>Milli- :</b> Prefix meaning “one-thousandth of . . .”</p>
<b>Assessment (Summative and Formative)</b>	<p>Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment</p>	<p>Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment</p>	<p>Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment</p>

<b>Links to Prior Learning</b>	Year 7 – simplify and equivalent ratios	Year 7 /KS2 - add/subtract fractions Year 7 – probability scale and basics	KS2 - reading scales and measurements
<b>Next steps in learning</b>	Ratio connected with FDP	Combination and frequency trees Two way tables Probability trees	SDT
<b>Common Barriers to learning in this unit</b>	<p>Do not understand what the parts represent in the ratio</p> <p>Write ratios as fractions</p> <p>Compare one part of a ratio to the whole amount, rather than the other part</p> <p>Can not link which part of a ratio goes with which name/amount in the question</p> <p>Can not differentiate between questions sharing an amount, or given one amount and finding the whole, or given the difference</p>	<p>Can not identify the correct part from the notation</p> <p>Get intersection and union confused</p> <p>Forget probability must add up to 1 in total</p>	<p>Remembering conversions (e.g. is it 100 or 1000?)</p> <p>Deciding whether to multiply or divide</p> <p>Read a scale incorrectly</p> <p>Misunderstand a scale written in very large numbers</p>

Units / Term	Unit 13: Proportion	Unit 14: Volume	Unit 15: probability diagrams
<b>Overview</b>	In this unit students develop on their ratio understanding and use it in real life scenarios using proportion. Looking at best buys and direct and inverse proportion.	Students have grasped an understanding or perimeter and area of shapes. This topic now develops that by focusing on volume of shapes.	This unit continues to develop skills in probability. In this unit students are introduced to probability trees, frequency trees and two way tables.
<b>Lesson Sequence</b>	<ol style="list-style-type: none"> <li>1. Proportion</li> <li>2. Unitary method</li> <li>3. Using best buys</li> <li>4. Recipes</li> </ol>	<ol style="list-style-type: none"> <li>1. Area of shapes</li> <li>2. Volume of cuboids</li> <li>3. Volume of compound rectilinear prisms</li> <li>4. Volume of triangular prisms</li> <li>5. Volume of cylinders</li> </ol>	<ol style="list-style-type: none"> <li>1. Two way tables</li> <li>2. Frequency trees</li> <li>3. Using FDP</li> <li>4. Using tree diagrams</li> <li>5. Tree diagrams with different events</li> </ol>
<b>Key Domains and Concepts taught in this Unit / Term</b>	C3 FDPR C7 Equations C15 Data Handling (including averages, charts and graphs) D1 Number D2 Algebra D4 Ratio proportion and rates of change	C10 Measures (perimeter, area, volume etc) C14 properties of shapes D1 Number D2 Algebra D5 Geometry and Measure	C3 FDPR D1 Number D2 Algebra D4 Ratio proportion and rates of change D6 Probability
<b>KS4 End Points taught in this Unit / Term</b>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p><b>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</b></p> <p><b>EP4 Can apply mathematical knowledge fluently across and between domains</b></p>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p><b>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</b></p>	<p><b>EP3 Reason, interpret and communicate mathematically</b></p> <p><b>EP4 Can apply mathematical knowledge fluently across and between domains</b></p>

<b>Declarative Knowledge (Students should know)</b>	Know ratio proportions	Know how to find the area of a shape Know properties of 2D shapes	Know the probability scale and that probability is out of 1
<b>Procedural Knowledge (Students should be able to do)</b>	Understand proportion Use the unitary method Direct and Inverse proportion Use proportion to find the best buy Recipe questions	Find the volume of cuboids and prisms Know properties of 3D shapes and use these to find the volume Problem solve with 3D shapes and volume	Use a two way table and find the probability of an event happening Draw a frequency tree and use it to find probability Draw a probability tree and use it to find outcomes of events
<b>Developing T3 Literacy and Numeracy</b>	<b>Proportional:</b> Quantities that vary by a set multiple <b>Unitary:</b> Reducing a proportion to 1 unit or item, to then multiply up	<b>Volume:</b> The amount of space in a 3D object, measured in cubic units <b>Cuboid:</b> A 3D solid that has 6 rectangular faces <b>Rectilinear:</b> A 3D solid made up of straight, parallel and perpendicular edges <b>Cross section:</b> The face that results from slicing through a solid shape <b>Prism:</b> A 3D solid with a uniform cross-section <b>Cylinder:</b> A 3D solid with circular cross-section	<b>Probability:</b> The chance of something happening <b>Event:</b> A situation with given, or experimental, probability outcomes <b>Outcome:</b> One result of a probability event <b>Frequency:</b> Number of times something happens
<b>Assessment (Summative and Formative)</b>	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment
<b>Links to Prior Learning</b>	Year 7 and year 8 ratio proportions	Year 7 – perimeter and properties of 2D shapes	Year 7 – probability introduction Year 8 – earlier in the year venn diagrams



		Year 8 – earlier in year did area of 2D shapes	
<b>Next steps in learning</b>	Ratio and proportion linked with FDP	Surface area	Probability trees – non replacement and different events happening
<b>Common Barriers to learning in this unit</b>	Try to compare prices by comparing non-equal amounts Best buys: Divide the wrong way round, so they don't know if they want the largest or smallest amount Inverse proportion: Multiply both sides	Do not divide by 2 when finding the area of a triangle. Do not remember area of a parallelogram is the same as a rectangle. Do not add the parallel sides to find the area of a trapezium	Probability is out of 1 in total Multiply along the branches Each set of branches add up to 1 How to multiply and add fractions Conditional Probability: remembering that the denominator is <b>not</b> the total frequency
<b>Units / Term</b>	<b>Unit 16: standard form – linked with indices</b>	<b>Unit 17: plotting linear graphs</b>	<b>Unit 18: Transformations</b>
<b>Overview</b>	In this unit indices are developed further by connecting it to standard form. Students will be able to convert large and small numbers into standard form and convert into original numbers.	Students will build on the skills of plotting coordinates to draw linear graphs. Students will use substituting skills to find coordinates to plot.	In this unit continue to develop skills of transforming shapes on a grid using reflection, rotation and translation.
<b>Lesson Sequence</b>	<ol style="list-style-type: none"> <li>1. Powers of 10</li> <li>2. Using indices</li> <li>3. Standard form for big numbers</li> <li>4. Standard form for small numbers</li> </ol>	<ol style="list-style-type: none"> <li>1. Horizontal and vertical lines</li> <li>2. Plotting straight lines</li> <li>3. Using the gradient</li> <li>4. Using the intercept</li> </ol>	<ol style="list-style-type: none"> <li>1. Reflection</li> <li>2. Rotation</li> <li>3. Translation</li> </ol>
<b>Key Domains and Concepts taught in this Unit / Term</b>	C1 Mathematical operations C3 FDP C4 place value D1 Number D2 Algebra	C8 Graphs and sequences D1 Number D2 Algebra	C1 Mathematical operations C8 Graphs and sequences C13 Transformations (including vectors) D1 Number D3 Statistics D5 Geometry and Measure

<p><b>KS4 End Points taught in this Unit / Term</b></p>	<p><b>EP3 Reason, interpret and communicate mathematically</b> <b>EP4 Can apply mathematical knowledge fluently across and between domains</b></p>	<p><b>EP3 Reason, interpret and communicate mathematically</b> <b>EP4 Can apply mathematical knowledge fluently across and between domains</b></p>	<p><b>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</b> <b>EP3 Reason, interpret and communicate mathematically</b></p>
<p><b>Declarative Knowledge (Students should know)</b></p>	<p>Index law and how to use indices Place value</p>	<p>know the y and x axis of a grid Substitute values into an equation</p>	<p>Use coordinates Know the y-axis and the x-axis, and equations of straight lines Understand basic reflection over a given mirror line Understand basic rotation, about a given centre of rotation Understand translations, including use of vectors</p>
<p><b>Procedural Knowledge (Students should be able to do)</b></p>	<p>Use Standard form for represent large numbers and small numbers Be able to put numbers into standard form and take them out</p>	<p>Understand the equation of a straight line is <math>y=mx+c</math> Substitute values into an equation Plot and draw a liner graph Understand the gradient</p>	<p>Be able to reflect shapes in different lines on a coordinate axes and describe the mirror line Be able to rotate shapes on a coordinate axes and describe 180° rotations correctly Be able to translate shapes from any vector</p>
<p><b>Developing T3 Literacy and Numeracy</b></p>	<p><b>Powers of 10:</b> Calculations in base 10, eg using 10, 100, 1000 etc <b>Index/indices:</b> A small number placed in the upper-right of a base number which shows how many copies of the base number are multiplied together</p>	<p><b>Linear graph:</b> A straight line <b>Substitute:</b> The method used to find missing coordinates from an equation <b>Equation of a straight line:</b> The agreed form that straight lines are written in, <math>y=mx+c</math></p>	<p><b>Transformation:</b> Changing a shape's position or size <b>Object:</b> The original shape, before a transformation <b>Image:</b> The new shape, after a transformation</p>

	<p><b>Standard form:</b> An agreed scientific notation, used for very large and very small numbers</p>	<p><b>Gradient:</b> How steep a graph is <b>y-Intercept:</b> Where the graph crosses the y-axis</p>	<p><b>Reflection:</b> An image or shape as it would be seen in a mirror line <b>Mirror line:</b> The line of symmetry between an object and its reflected image <b>Rotation:</b> To turn a shape, by a given angle <b>Centre of rotation:</b> The point around which an object is rotated <b>Translation:</b> To move an object, without rotation or reflection <b>Vector:</b> A way of writing a translation, without words</p>
<b>Assessment (Summative and Formative)</b>	<p>Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment</p>	<p>Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment</p>	<p>Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment</p>
<b>Links to Prior Learning</b>	<p>Year 7 – index laws / place value</p>	<p>Year 7 – coordinates</p>	<p>Year 7: Basic reflection across a given mirror line Year 7: Basic rotation around a given centre Year 7: Positive translation, including vectors</p>
<b>Next steps in learning</b>	<p>Calculations in standard form</p>	<p>Parallel and perpendicular lines Equations of a line Quadratic graphs</p>	<p>Describing transformations More combined transformations Enlargement</p>
<b>Common Barriers to learning in this unit</b>	<p>Forgetting what 10 to the power of something means Understanding negative indices in standard form make the number</p>	<p>Substitution, particularly Negative numbers Incorrect axes on graphs Forgetting to join the coordinates up to give a graph</p>	<p>Get confused with the x-axis and the y-axis. Also, with lines <math>x=</math> and <math>y=</math>. Do not describe correctly Rotation – finding the centre point</p>

	smaller, but we still write the standard form with a multiplication sign Not understanding place value	Plotting coordinates the wrong way around	
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Units / Term	Unit 19: Bearings	Unit 20: percentages	Unit 21: averages – estimated mean
<b>Overview</b>	In this unit students will be introduced to using bearings. Students skills of using a protractor will be used. Students will understand what a bearing is and how to use it.	This unit builds on the prior learning of percentages. Students will develop the skill by looking at increase and decrease, percentage change and reverse percentages.	This unit builds on the four averages and data handling lessons previously taught. It progresses by using data from a frequency table and predicting an estimated mean.
<b>Lesson Sequence</b>	<ol style="list-style-type: none"> <li>1. Use a compass and measure angles</li> <li>2. Find a bearing</li> <li>3. Find a bearing using reflex angles</li> <li>4. Find a bearing on a map</li> </ol>	<ol style="list-style-type: none"> <li>1. Percentage building blocks with/without a calculator</li> <li>2. Using multipliers</li> <li>3. Percentage increase and decrease</li> <li>4. Percentage change</li> <li>5. Profit and loss</li> <li>6. Reverse percentage</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the mode, median, mean and range</li> <li>2. Find averages from a frequency chart</li> <li>3. Find the estimate mean</li> <li>4. Compare data</li> <li>7. Reverse mean</li> </ol>
<b>Key Domains and Concepts taught in this Unit / Term</b>	C12 Angles (inc parallel lines and using angles) D1 Number D4 Ratio proportion and rates of change D5 Geometry and Measure	C1 Mathematical operations C3 FDPR C4 place value D1 Number	C15 Data Handling (including averages, charts and graphs) D1 Number D3 Statistics
<b>KS4 End Points taught in this Unit / Term</b>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p><b>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</b></p> <p><b>EP4 Can apply mathematical knowledge fluently across and between domains</b></p>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p><b>EP3 Reason, interpret and communicate mathematically</b></p> <p><b>EP4 Can apply mathematical knowledge fluently across and between domains</b></p>	<p><b>EP1 Have a deep understanding of maths and how it relates to the real world</b></p> <p><b>EP3 Reason, interpret and communicate mathematically</b></p> <p><b>EP4 Can apply mathematical knowledge fluently across and between domains</b></p>

<b>Declarative Knowledge (Students should know)</b>	<p>Know how to use a protractor and draw angles</p> <p>Know what different angles are called</p>	<p>Know what a percentage is and convert it from and to a decimal and fraction</p>	<p>Find the mean, median, mode and range of data calculate the average of data</p>
<b>Procedural Knowledge (Students should be able to do)</b>	<p>Understand a bearing has 3 digits, is clockwise and always from a north line.</p> <p>Use bearings on maps</p>	<p>Percentage of an amount</p> <p>Percentage increase and decrease</p> <p>Solve problems with percentages</p>	<p>Find an estimated mean from a frequency chart.</p> <p>Find an estimated mean using a mid point from a grouped frequency chart</p>
<b>Developing T3 Literacy and Numeracy</b>	<p><b>Bearing:</b> An angle of turn, measured clockwise from a North line, given as a three-figure number</p> <p><b>Acute:</b> An angle/bearing less than <math>90^\circ</math></p> <p><b>Obtuse:</b> An angle/bearing between <math>90^\circ</math> and <math>180^\circ</math></p> <p><b>Reflex:</b> An angle/bearing greater than <math>180^\circ</math></p>	<p><b>Percentage:</b> An amount per hundred</p> <p><b>Multiplier:</b> A decimal used to calculate a percentage of amount or a percentage change, in one calculation</p> <p><b>Reverse Percentage:</b> Working backwards to find an original amount</p>	<p><b>Mean:</b> An average found by taking the total of all the amounts divided by how many amounts there were</p> <p><b>Median:</b> An average found by ordering the numbers and locating the central value</p> <p><b>Mode:</b> A type of average, the value or quality that occurs the most often</p> <p><b>Range:</b> A measure of spread, the difference between the highest and lowest value</p> <p><b>Frequency:</b> Number of times something happens</p> <p><b>Grouped data:</b> Data presented in groups in a table, shown with inequalities, instead of individual amounts</p> <p><b>Estimated mean:</b> An estimate for the mean, from grouped data</p>

<b>Assessment (Summative and Formative)</b>	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment	Formative – exit ticket in topic and feedforward with a tick time task Summative – end of term assessment
<b>Links to Prior Learning</b>	Year 7 – using a protractor and drawing angles	Year 7 - understanding a percentage and converting it to fractions and ratio	Year 7 – mode, median, mean, range
<b>Next steps in learning</b>	Complicated bearing questions Construction	Compound percentage using multipliers / simple interest Reverse percentage / Percentage of another	Averages from a frequency chart
<b>Common Barriers to learning in this unit</b>	Not lining up the protractor with the north line Reading the protractor incorrectly Not writing 3 digits Measuring <b>from</b> the wrong point Drawing/measuring reflex bearings with a 180° protractor	Cannot convert a percentage to a decimal Get confused with percentage increase and decrease and just find the percentage of an amount Reverse percentages: Finding the actual percentage needed, not just the percentage of amount in the question	Forgetting which average is which, and how to calculate them Forgetting to use the mid-point of a group Dividing by the number of rows rather than total frequency.

Units / Term	Unit 22: Basic enlargement
<b>Overview</b>	Enlargement is introduced as the final transformation. Students learn how to enlarge shapes on a grid.
<b>Lesson Sequence</b>	<ol style="list-style-type: none"> <li>1. Identify all the different transformations</li> <li>2. Understand scale factors</li> <li>3. Enlarge a shape with a positive scale factor</li> <li>4. Enlarge a shape with a fraction scale factor</li> </ol>
<b>Key Domains and Concepts taught in this Unit / Term</b>	C13 Transformations (including vectors) D1 Number
<b>KS4 End Points taught in this Unit / Term</b>	<p><b>EP3</b> Reason, interpret and communicate mathematically</p> <p><b>EP4</b> Can apply mathematical knowledge fluently across and between domains</p>
<b>Declarative Knowledge (Students should know)</b>	Know how to reflect, translate, rotate shapes on a grid and how to describe transformations
<b>Procedural Knowledge (Students</b>	Enlarge a shape with a scale factor on a grid



<b>should be able to do)</b>	<p>Enlarge a shape from a centre point with a scale factor</p> <p>Understand enlargement doesn't always mean a shape getting bigger</p>
<b>Developing T3 Literacy and Numeracy</b>	<p><b>Object:</b> The original shape</p> <p><b>Image:</b> The final shape after a transformation</p> <p><b>Scale factor:</b> A number that each dimension of a shape is multiplied by, during enlargement</p> <p><b>Enlarge:</b> Changing all dimensions of an object by a given scale factor (<u>not</u> just making it bigger!)</p> <p><b>Centre of enlargement:</b> The point from which a centre is enlarged</p>
<b>Assessment (Summative and Formative)</b>	<p>Formative – exit ticket in topic and feedforward with a tick time task</p> <p>Summative – end of term assessment</p>
<b>Links to Prior Learning</b>	Year 7 – basic transformations
<b>Next steps in learning</b>	<p>Combined transformations</p> <p>Negative/ fractional scale factor</p>
<b>Common Barriers to learning in this unit</b>	<p>Not multiplying all dimensions by the same scale factor</p> <p>Drawing enlargements <u>at</u> the centre, rather than the enlarged distance away from the centre</p>



## Maths Year 8

	Remembering that enlargement can make a shape smaller (with a fractional scale factor)
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Units / Term	Unit 16: Density
Overview	In this unit density is introduced. Students have already looked at speed, distance and time but now focus on mass, volume and density within a formula.
Lesson Sequence	
Key Domains and Concepts taught in this Unit / Term	C1 Mathematical operations C7 Equations C10 Measures (perimeter, area, volume etc) C14 properties of shapes D1 Number D2 Algebra D4 Ratio proportion and rates of change
KS4 End Points taught in this Unit / Term	<b>EP1 Have a deep understanding of maths and how it relates to the real world</b> <b>EP2 Solve Problems and form reasonable and logical conclusions based on rigorous mathematical knowledge</b>
Declarative Knowledge (Students should know)	Know how to rearrange formula Use a triangle for SDT Find the volume of a 3D shape

<b>Procedural Knowledge (Students should be able to do)</b>	<p>Understand what density is and how it relates to mass and volume</p> <p>Use the formula to find density</p> <p>Find mass of an object</p> <p>Find the volume from the density of something</p>
<b>Developing T3 Literacy and Numeracy</b>	<p><b>Density:</b> How tightly matter is packed together</p> <p><b>Volume:</b> The amount of space in a 3D object, measured in cubic units</p> <p><b>Mass:</b> The quantity of matter in an object (in everyday life, often called “weight”)</p>
<b>Assessment (Summative and Formative)</b>	<p>Formative – exit ticket in topic and feedforward with a tick time task</p> <p>Summative – end of term assessment</p>
<b>Links to Prior Learning</b>	<p>Year 8 – rearranging formula</p> <p>Year 8 – earlier in the year SDT</p>
<b>Next steps in learning</b>	<p>Two way complex SDT and density questions</p> <p>Pressure questions</p>
<b>Common Barriers to learning in this unit</b>	<p>Not understanding what density actually is</p> <p>Not using the formulae correctly (should they multiply or divide?)</p> <p>Not being able to find the volume</p> <p>Finding the correct unit for their answer from the question</p>