

Area of study

Your child will ... (Knowledge)

Your child will be able to... (Skills)

### Autumn Term

Properties of number

- Revisit how to find the lowest common multiple and highest common multiple of two or more numbers using the product of prime factors
- Investigate problems involving highest common factor and lowest common multiple included worded scenarios and those where working in reverse to find the original values is required
- Revisit laws of indices involving multiplying and dividing and then build to look at laws involving brackets and where the base number needs manipulation to apply the laws
- Learn to write large and small numbers in standard form
- Revisit roots and learn how these can be written exactly using surds or as a decimal approximation

- Apply the laws of indices to be able to calculate values and to simplify expressions
- Complete calculations in standard form for both large and small numbers and with both multiplying and dividing
- Start to apply knowledge of reciprocals and roots to negative and fractional indices

Perimeter, area and volume

- Revisit how to find the perimeter of shapes and that this is a measurement of length
- calculate the circumference of circles and learn the relationship between circle and pi
- Revisit calculating the area of 2D shape and extend to learn the formula to calculate the area of a trapezium and that this can also be calculated by partitioning the shape into rectangles and triangles.
- Learn how to calculate the area of a circle
- Discover that volume measures the capacity of a 3 dimensional shape and that prisms will have a cross sectional area that can be calculated using previously acquired skills
- Use nets of 3 dimensional shapes to visualise the faces to assist in the calculation of surface area
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- Apply mathematical formulae to calculate the area of more complex shapes including a trapezium and circles.
- Start to problem solve by finding missing lengths when given area and some of the lengths of shapes including a trapezium
- Use required formula to calculate the surface area of prisms including cylinders
- Calculate the volume of prisms
- Start to problem solve questions involving surface area and volume
- Substitute values into given formulae to calculate volume and surface area of complex shapes such as cones and spheres

Area of study

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## Autumn Term

Fractions, decimals and percentages

- Revisit converting between improper fractions and mixed numbers
- Carry out calculations with fractions including adding and subtracting.
- Revisit multiplying and dividing fractions by both integers and fractions
- Convert between percentages, decimals and fractions
- Calculate percentage increase and decrease including reverse percentages
- Apply terminology to the language of percentages including interest, profit and depreciation
- Carry out calculations involving repeated percentage change and understand the difference between simple and compound interest
- Convert between percentages and decimals to create multipliers
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- Be able to add, subtract, multiply and divide fractions involving both proper fractions and with mixed numbers
- Make comparisons between fractions, decimals and percentages
- Convert between fractions, decimals and percentages
- Calculate percentages of amounts using multipliers including questions in a financial context
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Properties of shape

- Extend use of angles in parallel lines with multi step problems including those involving straight lines and triangles including corresponding and alternate angles
- Recognise the properties of regular polygons
- Find the sum of interior angles in triangles, quadrilaterals and extend to an N sided polygon
- Learn the relationship between side lengths in a right angled triangle by applying Pythagoras's theorem to calculate the length of the hypotenuse and then other sides
- Apply terminology of triangles including hypotenuse, adjacent and opposite and how to label a triangle based upon the information sought in order to use trigonometry to calculate both sides and angles
- Revisit the concept of enlargement with similar shapes and understand how to calculate length using a common scale factor
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- Calculate interior and exterior angles of both regular and irregular polygons
- Understand and apply mathematical similarity to enlargements including fractional examples.
- Investigate the connections between area and volume scale factor enlargements
- Apply Pythagoras' theorem to right angled triangles
- Use trigonometry to find missing lengths in right angled triangles
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Area of study

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## Spring Term

<p>Algebra</p>	<ul style="list-style-type: none"> <li>Recognise that when an expression is equal to a value it is an equation and can be solved</li> <li>Consider and apply inverse operations to solve equations to find unknown values in questions of increasing difficulty, starting with one step including add, subtract, multiply and divide and moving on to multi step</li> <li>Revisit the procedures of expanding and factoring with one or more brackets</li> <li>Take worded problems and write them algebraically to form an equation that can be solved</li> <li>Identify other subjects where solving equations may be used eg science</li> <li>Introduce the use of inequalities, how they can be solved and represented on a number line or graphically</li> <li>.</li> </ul>	<ul style="list-style-type: none"> <li>Form and solve linear equations</li> <li>Solve equations with unknown values on both sides including brackets</li> <li>Factorise quadratic expressions</li> <li>Change the subject of a formula by rearranging</li> <li>.</li> <li>.</li> </ul>
<p>Place value and calculations</p>	<ul style="list-style-type: none"> <li>Revisit the process of rounding numbers to a suitable degree of accuracy</li> <li>Use calculators to find exact answers to solutions and see that by using approximate values we can achieve sensible estimates to solve problems</li> <li>Continue to apply the hierarchy of operations to more complex calculations</li> <li>Revisit the use of place value to multiplying and dividing by 10,100, 1000 to calculations involving decimals</li> <li>Revisit how to write numbers using standard form and how this can assist when calculating with large and small values</li> <li>Recognise the concept of bounds and how numbers rounded to a degree of accuracy have a lower and higher limit</li> <li>.</li> <li>.</li> </ul>	<ul style="list-style-type: none"> <li>Estimate calculations by rounding numbers to one significant figure</li> <li>Apply approximations to solve problems</li> <li>Multiply decimal numbers</li> <li>Carry out calculations in standard form using all 4 operations</li> <li>Express bounds of a number in the form of an error interval using inequalities</li> <li>.</li> <li>.</li> </ul>
<p>Collecting Data</p>	<ul style="list-style-type: none"> <li>know when to use appropriate graphs and justify choice of representations</li> <li>recognise sources of bias and know how to minimise them</li> <li>design a question to solve a problem and plan how to answer it</li> <li>group data into equal class intervals (grouped frequency tables)</li> <li>Revisit how to calculate all averages and the range of a data set whether in a list or tabulated</li> <li>Use statistical language to include discrete, continuous, qualitative, quantitative</li> <li>Understand that a population includes all items within your data set</li> </ul>	<ul style="list-style-type: none"> <li>Extract and interpret information from a variety of lists, tables and other sources of data</li> <li>Design and use appropriate data collection sheets for both discrete and continuous data</li> <li>.</li> <li>.</li> </ul>

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### Spring Term

Representing data

- revisit drawing and interpreting the graphs and charts covered in year 8
- construct time series graphs
- use Venn diagrams to sort/classify their data
- interpret graphs, diagrams and pie charts
- recognise and read data from a scatter graph
- Start to learn how to construct a frequency polygon
- Understand why different graphs are plotted using different calculations from the same data and what each of these graphs represents
- Revisit drawing a cumulative frequency graph
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- Construct scatter graphs
- Draw and interpret lines of best fit on a scatter graph
- Calculate the gradient of a line of best fit and start to interpret what this represents
- construct pie charts
- Learn how to calculate values including the range and inter quartile range from a cumulative frequency graph

### Summer Term

Ratio and proportion

- Revisit writing ratios in the form 1:n and n:1
- Solve multi stage ratio problems which involve more than 2 parts using lowest common multiple
- Recognise that equivalent ratios can be written as fractions
- Solve problems involving ratio and algebra
- Use different strategies to calculate values that are in direct proportion
- Recognise relationships that are inversely proportional
- Solve direct and inverse proportion questions using algebra and learn how to calculate the unknown constant (K)
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- Use relevant direct proportion methods to solve "Best Buy" problems
- Solve multi stage ratio problems which involve more than 2 parts using lowest common multiple
- Start to recognise and write direct and inversely proportional relationships using algebra
- Recognise graphs representing proportional relationships
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Probability

- understand and use the term mutually exclusive
- use and understand relative frequency
- find probabilities from two-way tables
- Represent probabilities using tree diagrams and venn diagrams
- Understand the difference between independent events and how conditional probability will mean that the probability is affected by what has happened previously
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- know when to add and multiply probabilities
- use tree diagrams to find probabilities – independent events and moving on to conditional events
- start to calculate probabilities from Venn Diagrams
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SummerTerm

Angles and constructions

- Measure and draw angles including acute, obtuse and reflex angles to the nearest degree using a protractor
- Use eight compass point directions
- Recognise angles as a measure of a turn
- Construct a SAS, SSS and ASA triangles accurate to 1mm and 2 degrees
- Understand the language of construction including terms such as bisect, perpendicular, loci
- Use a pair of compasses to construct a perpendicular bisector and to bisect an angle
- Use the construction skills to accurately reflect regions on a scale drawing
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- Apply previous knowledge of angles in parallel lines to multi stage problems
- Construct the perpendicular from a point on a line
- Find the sum of interior angles using  $180(n-2)$
- Understand and use congruence and mathematical similarity
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Compound measures

- Identify relationships with compound units including speed and density
- Revist converting between units for time, length, area, volume
- Look at rearranging the appropriate formula to be able to calculate any missing value
- Make connections with work in science
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- Solve problems involving speed
- Solve problems involving density
- Apply knowledge to multi stage problems where students need to calculate overall values to find the average speed or density
- Converting between units for the compound measures including speed and density eg KM/H to M/S
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