Topic	Rationale	Knowledge Acquisition	Key Vocabulary	Skills and Enrichment
Unit 1	Number work to be completed initially to build the foundations for the remainder of the academic year	Find the prime factor decomposition of a number less than 100	Prime, factors, multiples, indices, giga, mega, kilo, BIDMAS, square, square root, significant figure	Can you make every number just by multiplying prime numbers? How many photographs can you store on a 1 terabyte server? When is it a good idea to round numbers? When is it not?
		Find the prime factor decomposition of a number		
		Use prime factor decomposition to find the HCF or LCM of 2 numbers		
		Know and use the general forms of the index laws for multiplication and division of positive integer powers. (e.g. $p^a \times p^b$, $p^a \div p^b$, $(pa)^b$)		
		Extend the patterns by using the index law for division established for positive power answers, to show that any number to the power of zero is 1		
		Apply the index laws for multiplication and division of small positive integer powers		
		Know the prefixes associated with 10^9, 10^6, 10^3 (giga, mega and kilo)		
		Understand the order in which to calculate expressions that contain powers and brackets in both the numerator and denominator of a fraction		
		Understand the difference between squaring a negative number and subtracting a squared number within a more complex calculation		
		Be able to simplify expressions containing powers to complete the calculation		
		Round numbers to 1 significant figure		
		Round numbers to a given number of significant figures		
		Use numbers of any size rounded to 1 significant figure to make standardized estimates for calculations with 1 step		

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Unit 2	Powers work follows logically from previous unit work on powers	Simplify simple expressions involving powers but not brackets, by collecting like terms	Expand, collect like terms, bracket, identity, expression, powers, indices	What does the expression x^3*x^2 mean in a spreadsheet program? How many expressions can be simplified to $24x^2 + 12x$? How long does it take a car to slow down to enter a speed restriction area?
		Multiply a single term over a bracket e.g. $x(x + 4)$, $3x(2x - x^3)$		
		Know and understand the meaning of an identity and use the identity sign		
		Simplify simple expressions involving index notation, e.g. $x^2 + 2x^2$, $p \times p^2$, $r^5 \div r^2$		
		Simplify expressions involving brackets and powers e.g. $x(x^2 + x + 4)$, $3(a + \ ) - 2(a + b)$		
		Use the distributive law to take out single term algebraic factors, e.g. $x^3 + x^2 + x = x(x^2 + x + 1)$		
		Substitute positive and negative integers into linear expressions and expressions involving powers		
		Apply the index laws for multiplication and division of small integer powers, e.g. $a^3 \times a^2$, $x^3 \div x^2$		
		Construct and solve equations that involve multiplying out brackets by a negative number and collecting like terms (e.g. $4(\ -1) = 32 - 3(\ -2)$)		
		Know and use the general forms of the index laws for multiplication and division of positive integer powers. (e.g. $p^a \times p^b$, $p^a \div p^b$, $(p^a)^b$)		

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Unit 3	Mensuration which can be used in application problems in units 5 and 9	Begin to use plans and elevations	Plan, elevation, formula, area, circumference, circle, radius, diameter, Pythagoras, hypotenuse, surface area, cylinder, coordinate, volume	What would famous landmarks look like photographed from above? Why do African elephants have larger ears than Asian elephants? What volume of water do you need to fill a swimming pool? How long would it take to fly around the world?
		Use the formula for the circumference of a circle		
		Analyse 3-D shapes through cross-sections, plans and elevations		
		Use the formulae for area of a circle, given the radius or diameter		
		Calculate the volume of right prisms		
		Use the formulae for the circumference and area of a circle, given the circumference or area, to calculate the radius or diameter		
		Know the formula for Pythagoras' theorem and how to substitute in values from a diagram		
		Use and apply Pythagoras' theorem to solve problems		
		Calculate the surface area of right prisms		
		Calculate the lengths and areas given the volumes in right prisms		
		Given the coordinates of points A and B, calculate the length of AB		
		Calculate the lengths, areas and volumes in cylinders		

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Unit 4	Algebra to separate two shape units	Draw and use graphs to solve distance–time problems	Graph, distance-time, function, linear, interpret, proportion, misleading, constant, rates of change	How will different exchange rates affect the amount of money you can spend on holiday? How do stock-market traders use graphs to help make investment decisions? What will the population of the world be in 2050? In 2100?
		Plot the graphs of a function derived from a real-life problem		
		Discuss and interpret linear and non-linear graphs from a range of sources		
		Recognise graphs that show direct proportion		
		Discuss and interpret real-life graphs, e.g. conversion graphs, water filling baths/containers, graphs comparing e.g. mobile phone tariffs - how you can see which tariff is better for different numbers of calls		
		Use graphs to solve distance–time problems		
		Identify misleading graphs and statistics, choosing the appropriate reasons from a wide choice of options, or writing their own reasons		
		Recognise graphs showing constant rates of change, average rates of change and variable rates of change		

Topic	Rationale	Knowledge Acquisition	Key Vocabulary	Skills and Enrichment
Unit 5	Relevant pre-requisite knowledge to prepare for unit 9	Recognise and visualise the transformation of 2D shape translation	Transformation, translation, reflection, rotation, enlargement, scale factor, similar, perimeter, area, volume	How could you describe the movement of images on a screen? What is the centre of rotation of the centre of the Solar System? What does the zoom function do on a camera? How does 25% enlargement change the size of a photo?
		Rotation on a coordinate grid		
		Describe a rotation on a coordinate grid		
		Describe a reflection, giving the equation of the line of reflection		
		Transform 2D shapes by simple combinations of rotations, reflections and translations, e.g. repeated reflection, rotation or translation, reflections in the x and y axes, rotations about (0,0)		
		Identify reflection symmetry in 3D shapes		
		Transform 2D shapes by more complex combinations of rotations, reflections and translations, e.g. a reflection, followed by a rotation, reflection in $y = x$, $x = -3$ and rotations about points other than the origin		
		Know that translations, rotations and reflections preserve length and angle		
		Reflection on a coordinate grid in $y = x$, $y = -x$		
		Enlarge 2D shapes, given a centre of enlargement and a positive whole number scale factor		
		Recognise that enlargements preserve angle but not length		
		Enlarge 2D shapes, given a centre of enlargement outside the shape and a negative whole-number scale factor		
		Know that enlargements of 2D shapes produce similar shapes		
		Understand the implications of enlargement for perimeter		
		Enlarge 2D shapes, given a fractional scale factor		
		Know that translations, rotations and reflections map objects on to congruent images		
		Use fractional scale factors with a centre of enlargement		
		Identify the scale factor of an enlargement as the ratio of the lengths of any two corresponding line segments		
		Calculate the new area of a shape after enlargement		
		Calculate the new volume of a shape after enlargement		

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Unit 6	Builds on core fraction, decimals, percentage work from Year 7	Learn fractional equivalents to key recurring decimals e.g. 0.333333..., 0.66666666..., 0.11111...and by extension 0.222222....	Recurring, equivalent, numerator, denominator, fraction, terminating, reverse percentage,	Can you prove that 0.9999999…. = 1? Employment has risen by 2% to 6.8 million people. How many people were employed before the increase? How can you work out who has made the biggest improvements in maths tests over the year? How much will your savings be worth in 3 years time if the interest rate stays the same?
		Know the denominators of simple fractions that produce recurring decimals, and those that do not		
		Convert a recurring decimal to a fraction		
		Use an inverse operation, e.g. if I know there was a 20% discount in a sale then the original price was multiplied by 0.8 to get the discount price. I can find the original price by dividing the discounted price by 0.8		
		Use the unitary method for an inverse operation e.g. if I know an item was 80% of the original cost in a sale find the original price		
		Work out problems with reverse percentages		
		Use multipliers		
		Calculate percentage change, using the formula actual change / original amount × 100 – where formula is recalled		
		Calculate percentage change, using the formula actual change / original amount × 100 – where formula is given		
		calculate compound interest and repeated percentage change		

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Unit 7	There is flexibility to where this topic can be placed in the scheme due to its standalone nature. Howvere, it must be placed before unit 9.	Draw an accurate triangle given two sides and included angle(SAS)	Triangle, quadrilateral, parallel, construct, perpendicular, compass, segment, locus, loci	How is triangulation used to make maps? What area of cardboard is needed to make a box for a rolled-up poster? What is the shortest distance from a point in a field to the edge? What regular polygons can you draw using only a ruler and a pair of compasses? How much of a car's windscreen can you wipe with two wipers?
		Draw an accurate triangle given two angles and the included side (ASA)		
		Draw accurate quadrilaterals		
		Construct a line parallel to a given line		
		Use straight edge and compass to construct the mid-point and perpendicular bisector of a line segment		
		Use straight edge and compass to construct the bisector of an angle		
		Use straight edge and compass to construct the perpendicular from a point on a line segment		
		Use straight edge and compass to construct the perpendicular from a point to a line segment		
		Recognise and use the perpendicular distance from a point to a line as the shortest distance to the line		
		Use ruler and compasses to construct simple nets of 3D shapes, using squares, rectangles and triangles e.g. regular tetrahedron, square-based pyramid, triangular prism		
		Draw the locus equidistant between 2 points or from a point		
		Draw the locus equidistant between 2 lines		
		Produce shapes and paths by using descriptions of loci, e.g. an equilateral triangle		
		Produce shapes and paths by using descriptions of loci		
		Use construction to find the locus of a point that moves according to a rule		

Topic	Rationale	Knowledge Acquisition	Key Vocabulary	Skills and Enrichment
Unit 8	Fraction and decimal calculations has been covered before this, a key pre-requisite to completing tree diagrams	Use the vocabulary of probability	Probability, experiment, frequency, fractions, denominators, relative frequency, estimate, outcome, mutually exclusive, independent	What percentage chance of rain would make you decide to take an umbrella? What is the probability of a car breaking down due to a flat battery or a flat tyre? What is the probability that a drug will stop a headache? How many times do you have to flip a coin to be confident that it is a fair coin? How likely are you to be to roll a double with two dice? What is the probability that a baby will be born left-handed or colour blind?
		Collect data from a simple experiment and record in a simple frequency table		
		Understand and use the probability scale from 0 to 1		
		Begin to add and subtract simple fractions and those with simple common denominators		
		Know how to calculate relative frequency		
		Use relative frequency to make estimates		
		Identify all possible mutually exclusive outcomes of a single event		
		Find and justify probabilities based on equally likely outcomes in simple contexts		
		Estimate probabilities based on these data		
		Use experimentation to complete a data collection sheet, e.g. throwing a die or data-logging		
		When interpreting results of experiment use vocabulary of probability		
		Know that if probability of event is p probability of not occurring is 1 – p		
		Understand that relative frequency can be used to estimate the probability of an outcome		
		Apply probabilities from experimental data to a different experiment in simple situations (only looking at one outcome). How many successes would you expect?		
		Identify all mutually exclusive outcomes for two successive events with two outcomes in each event		
		Apply probabilities from experimental data to a different experiment (a combination of two outcomes). How many successes would you expect?		
		Identify conditions for a fair game – from a small set of simple options		
		Calculate the probability of the final event of a set of mutually exclusive events		
		Calculate the probability of a combination of events or single missing event of a set of mutually exclusive events using sum of outcomes is one		

		Use the vocabulary of probability to assign a probability to a complex event		
		Draw and use tree diagrams to represent outcomes of two independent events and calculate probabilities		
		Recognise when/how to use probabilities connected with independent		

Topic	Rationale	Knowledge Acquisition	Key Vocabulary	Skills and Enrichment
Unit 9	This unit needs to follow unit 7	Use bearings to specify direction	Bearings, scale, plan, plan, view, elevation, congruent, similar	What scale would you use to fit a map of your town on a piece of paper? How are bearings the same as angles? How are they different? Why is it difficult to draw an accurate world map? How do artists making special effects for film use similar shapes? Can you use triangles to find the height of a tree?
		Make simple drawings, demonstrating accurate measurement of length and angle (draw accurately from a plan)		
		Use scales in maps and plans		
		Draw diagrams to scale		
		Use and interpret maps, using proper map scales (1 : 25 000)		
		Use and interpret scale drawings, where scales use mixed units, and drawings aren't done on squared paper, but have measurements marked on them		
		Solve geometric problems using side and angle properties of equilateral, isosceles and right-angled triangles and special quadrilaterals		
		Begin to use congruency to solve simple problems in triangles and quadrilaterals		
		Know and use the criteria for congruence of triangles		
		Solve simple geometrical problems showing reasoning		
		Solve simple problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons - by looking at each shape separately		
		Distinguish between conventions, definitions and derived properties by labelling given examples of each		
		Solve harder problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons – by looking at several shapes together		
		Identify 2D shapes that are congruent or similar by reference to sides and angles		
		Use the information given about the length of sides and size of angles to determine whether triangles are congruent, or similar		
		Find points that divide a line in a given ratio, using the properties of similar triangles		
		Use similarity to solve problems in 2D shapes		
		Know that triangles given SSS, SAS, ASA or RHS are unique, but that triangles given SSA or AAA are not		
		generate fuller solutions by presenting a concise and reasoned argument		

Topic	Rationale	Knowledge Acquisition	Key Vocabulary	Skills and Enrichment
Unit 10	The unit of work students find the most challenging. Leave this toward the end of the year when all skills have been fully developed.	Plot the graphs of linear functions in the form $y = mx + c$ and recognise and compare their features	Linear, gradient, intercept, inverse, parallel, perpendicular, axis	Can you predict where a line will cross the axis? What does a 'Gradient 12%' road sign mean? Can graphs help you solve algebraic problems? How can you tell if two lines are at right angles? Can you find a function whose inverse is
		Find the inverse of a linear function such a $x \rightarrow 2x + 5$, $x \rightarrow 2(x - 3)$, $x \rightarrow \frac{x+2}{4}$, $x \rightarrow 5x - 4$		
		Recognise the graph of the inverse of simple linear functions		
		Know that the gradient of a line is the change in y over change in x		
		Without drawing the graphs, compare and contrast features of graphs such as $y = 4x$, $y = 4x + 6$, $y = x + 6$, $y = -4x$, $y = x - 6$		
		Recognise that when the linear and inverse of a linear function such as $y = 2x$, $y = 3x$ are plotted, they are a reflection in the line $y = x$		
		Know and use $y = mx + c$ for any straight line		
		Be able to work out when a point is on a line		
		Know for a straight line $y = mx + c$, m is the gradient and $m =$ (change in y) ÷ (change in x)		
		Recognise that any line parallel to a given line will have the same gradient		
		Know that a line perpendicular to the line $y = mx + c$, will have a gradient of $-\frac{1}{m}$		
		Recognise when lines are parallel or perpendicular from their equations		
		Recognise when lines are parallel and where a line crosses the y-axis from the equation of the line		

				the same as the function? How many megapixels will a phone camera have in 2030?