



Curriculum Map Year 8 2021

	Tiers 1-2	Tier 3	Tier 4	Tier 5 - Majority	Tier 6
Autumn 1					
Problem solving task Assessment					
Place value	Count on and back in steps of constant size				
1. Rounding recap	Recognise odd and even numbers	Order positive and negative integers			Convert between ordinary and standard index form representations.
2. Rounding to significant figures	Order positive integers and decimals to 1 decimal place	Order positive decimals to 2 decimal places	Order positive and negative decimals (including numbers with a differing number of decimal places)	Order any set of numbers (including those written in standard form)	Recognise that measurements given to the nearest whole unit may be inaccurate by up to one half of the unit in either direction
3. Standard form representations (links with science)	Round whole numbers to the nearest whole, 10, 100, 1000	Round decimals to the nearest whole number or 1 decimal place	Round decimals to 2 decimal places	Round decimals to an appropriate degree of accuracy (including significant figures)	Make and justify estimates and approximations of calculations by rounding numbers to one significant figure Explore the language of proof using algebraic expressions for odd and even numbers; Express an algebraic number of the form 'abc' as '100a+10b+c'
Addition and subtraction	Use mental methods to add or subtract multiples of 10 or 100				
4. Adding and subtracting standard form	Know and use addition and subtraction facts to 20				
5. Upper and lower bounds (addition/subtraction) (include inequality notation)	Use written methods to add and subtract integers and decimals to 2 dp	Add and subtract integers and decimals of any size (with the same number of decimal places)	Add and subtract integers and decimals of any size (including negatives and numbers with a differing number of decimal places)	Use positive and negative numbers of any size, the laws of arithmetic and inverse operations	Work on proofs involving addition and subtraction (e.g. 'show that $abc - bca = 99k$ ') Communicate the solution to a problem involving measurement, explaining the limitations of accuracy using upper and lower bounds
6. Upper and lower bounds (multiplication)		Add and subtract negative numbers		Add and subtract numbers written in standard form	
7. Upper and lower bounds (in context of problem)	Find the perimeter of rectangles	Calculate perimeters of shapes made of rectangles	Calculate and use the perimeter of any shape	Solve problems involving perimeter (considering upper and lower bounds)	Solve problems involving perimeter of compound shapes (including circles) Use inequality notation to specify simple error intervals due to truncation or rounding (in context) Explore degrees of accuracy with multiplication and division problems
Angle sums	Draw and measure angles (acute, obtuse)	Draw and measure any angle (including reflex)			
8. Angles in parallel lines (recap)	Distinguish between and estimate the size of acute, obtuse and reflex angles				
9. Interior angles	Begin to find the angles in a triangle	Know the angles at a point, on a straight line and in a triangle	Know and use angles in a quadrilateral	Know and use properties of angles, parallel and intersecting lines, triangles and other polygons	
10. Exterior angles		Recognise vertically opposite angles	Identify alternate and corresponding angles	Know and use interior and exterior angle sums	Prove rules for interior and exterior angle sums
11. Geometrical problems with angles			Solve geometrical problems using alternate and corresponding angles justifying answers	Solve geometric problems using step-by-step reasoning	Solve multi-step problems using properties of angles, of parallel lines, and of triangles and other polygons, justifying inferences and explaining reasoning with diagrams and text.
12. Poster lesson (angle properties)					
Autumn 2					
Problem solving task Assessment					

Multiplication and division	Know multiplication facts for 2 - 10 times tables				
1. Index laws (Explore)	Multiply and divide integers and decimals by 10, 100, 1000	Multiply and divide decimals with one or two decimal places by an integer	Understand the effect of multiplying and dividing numbers by values between 0 and 1		Explore proofs involving multiplication and division
2. Index laws (use)	Use written methods to multiply 2 or 3 digit numbers by a single digit number	Multiply and divide negative numbers			
3. Simple fractional and negative indices (prove from index laws)	Use multiplication facts to recognise simple divisions	Know and apply BIDMAS (excluding indices)	Know and apply BIDMAS (including indices)	Use positive and negative numbers of any size, the laws of arithmetic and inverse operations (including multiplying and dividing decimals by decimals)	Use positive and negative numbers of any size, the laws of arithmetic and inverse operations for all numbers (including algebraic expressions)
4. Estimate square and cube roots		Recognise square numbers and corresponding square roots	Use squares, positive and negative square roots, cubes and cube roots, and index notation for small positive integer powers	Use index notation for integer powers; know and use the index laws for multiplication and division of positive integer powers	Examine and extend the index laws to establish the meaning of negative, fractional and zero powers, including use of surd notation; Simplify surds; Arithmetic with surds
5. Simplify surds				Estimate square roots	Estimate cube roots
Multiples and factors	Recognise and use multiples, factors, primes (under 100)				
6. Prime factorisation - use to find HCF and LCM		Recognise and use HCF and LCM (in simple cases) Use Venn diagrams to depict common multiples and factors	Find the prime factorisation of a number	Use the prime factorisation of a number	
Applications	Know and use the formula for the area of a rectangle	Calculate areas of shapes made from rectangles	Derive and use formula for the area of a triangle, parallelogram and trapezium Calculate areas of compound shapes	Convert between length and area measures	Find the (circumference and) area of a circle (to dp and in terms of pi) Find the lengths of arcs and areas of sectors
7. Algebra recap: Collect like terms (including Expand terms over a single bracket)				Solve problems involving area of compound shapes	
8. Algebra recap: Factorise linear expressions			Find the volume and surface area of cuboids	Find the circumference and area of circles (simple)	Solve problems involving area of compound shapes (including circles)
9. Algebra recap: Substitute into algebraic expressions				Find the volume and surface area of prisms	Find the volume and surface area of prisms
10. Explore Pi					Present a concise reasoned argument to derive formulae for lengths of arcs, and areas of sectors
11. Circumference of a circle					Present a concise reasoned argument to derive formulae for surface area and volume of a cylinder
12. Area of a circle					
13. Arcs of circles					
14. Sectors of circles					
15. Poster lesson					
	Calculate the mode, range, mean and median (single digit integers)	Calculate the mode, range, mean and median (decimals)			
	Convert between metric units using decimals to 2dp	Convert one metric unit to another	Know rough metric equivalents of imperial measures	Explore conversions between units of length, area and volume	Convert between units of length, area and volume

Spring 1

Problem solving task Assessment

Fractions	Identify fractions of shapes	Express a smaller number as a percentage or fraction of a larger one			Distinguish between fractions with denominators that have only prime factors 2 or 5 (terminating decimals), and other fractions (recurring decimals)
1. Recap on four operations with fractions	Find equivalent fractions	Use percentages to compare simple proportions	Order fractions by writing as equivalents or converting into decimals	Simplify or transform algebraic fractions by taking out common factors	Simplify algebraic fractions
2. Cancel simple algebraic fractions (non-quadratic)	Find unit fractions of simple quantities	Multiply fractions by an integer	Multiply and divide fractions	Multiply and divide simple algebraic fractions	

3. Add and subtract algebraic fractions	Add and subtract simple fractions with the same denominator Find simple equivalent FDP	Add and subtract simple fractions	Add and subtract fractions	Add and subtract simple algebraic fractions
4. Multiply and divide algebraic fractions		Convert between fractions, decimals and percentages	Use division to convert a fraction to a decimal	Convert recurring decimals into fractions
5. Convert recurring decimals into fractions	Calculate simple fractions and percentages of amounts	Calculate fractions and percentages of quantities	Increase and decrease and amount by a given percentage	Increase and decrease an amount by a given percentage or fraction Use multipliers for percentage change
6. Compound interest and decay				
Applications	Use vocabulary and ideas of probability, drawing on experience	Use the vocabulary and ideas of probability, drawing on experience	Interpret results of an experiment using the language of probability and appreciate that random processes are unpredictable	Know that the sum of probabilities of all mutually exclusive outcomes is 1 and use this when solving problems
7. Language of probability. Probability scale.	Understand and use the probability scale from 0 to 1; Find and justify probabilities based on equally likely outcomes in simple contexts	Understand and use the probability scale from 0 to 1 Find and justify probabilities based on equally likely outcomes in simple contexts	Know that, if the probability of an event occurring is p , then the probability of it not occurring is $1 - p$	Know that, if the probability of an event occurring is p , then the probability of it not occurring is $1 - p$
8. Find and justify probabilities of events. $P(\text{event}) = p$, $P(\text{not event}) = 1 - p$	Identify all the possible mutually exclusive outcomes of a single event	Identify all the possible mutually exclusive outcomes of a single event.	Use diagrams and tables to record all possible mutually exclusive outcomes for single events and for two successive events	Use lists and tables to record all possible mutually exclusive outcomes for single events and for two successive events
9. Use lists and tables to record all outcomes for single events and two successive events				Know when to add or multiply two probabilities: if A and B are mutually exclusive, then the probability of A or B occurring is $P(A) + P(B)$, whereas if A and B are independent events, the probability of A and B occurring is $P(A) \times P(B)$
10. Use a numerical scale to express and compare experimental and theoretical probabilities		Compare experimental and theoretical probabilities in simple contexts.	Compare estimated experimental probabilities with theoretical probabilities	Understand relative frequency as an estimate of probability and use this to compare outcomes of experiments. Use tree diagrams to represent outcomes of two or more events and to calculate probabilities of combinations of independent events
11. Understand relative frequency as an estimate of probability and use this to compare outcomes				
12. Use tree diagrams to represent outcomes of two or more events				
13. Know when to add or multiply two probabilities (use tree diagrams)				

Spring 2

Problem solving task Assessment

Ratio and proportion	Understand and use £.p notation	Use direct proportion in simple contexts	Use the unitary method to solve problems involving ratio and direct proportion	Use proportional reasoning to solve problems, choosing the correct numbers to take as 100%, or as a whole Compare two ratios	Understand and apply Pythagoras' theorem when solving problems in 2D and simple problems in 3D Know the exact values for $\sin x$, $\cos x$ and $\tan x$ for 0, 30, 45, 60 and 90 degrees
1. Compare two ratios. Simplify ratios recognising links with fraction notation (recap)	Convert £ to p and vice versa	Use ratio notation			
2. Calculate ratios in a range of contexts (recap)	Carry out mental and written calculations involving money	Simplify ratios (including money and time)	Simplify ratios, including those in different units	Simplify ratios, recognising links with fraction notation	
3. Use proportional reasoning to solve problems (recap)	Read the time to the minute on analogue and digital clocks	Divide a quantity into two parts in a simple ratio	Divide a quantity into two or more parts given a ratio	Calculate ratios in a range of contexts	Understand and use trigonometric relationships in right-angled triangles, and use these to solve problems, including those involving bearings
4. Explore properties of sides of right angled triangles (Pythagoras)	Use 12 hour and 24 hour clock notation	Understand the link between ratio and proportion	Apply understanding of link between ratio and proportion	Recognise when fractions or percentages are needing to compare proportions	Understand and use proportionality and calculate the result of any proportional change using multiplicative methods
5. Apply Pythagoras' theorem in 2D	Convert between minutes and hours	Increase and decrease and amount by a given percentage		Extend mental methods of calculation with fractions, percentages and ratios	Understand and use measures of compound measures speed, density and <u>pressure</u> and solve problems involving constant or average rates of change.
6. Explore ratios in right angled triangles (experiment)					
7. Explore exact values for $\sin x$, $\cos x$ and $\tan x$ (second of experimental lesson)					
8. Find a side given an angle					
9. Find an angle given a side					
10. Solve problems with right angled triangles					
11. Poster lesson					

Data analysis	Construct, on paper and using ICT, graphs and diagrams to represent data including, bar graphs and simple pie charts	Construct and interpret graphs and diagrams to represent data, including bar line graphs and frequency diagrams for grouped discrete data	Use appropriate graphical representation involving discrete, continuous and grouped data	Interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, line charts for ungrouped discrete numerical data, tables and line graphs time series data and know their appropriate use	Use a range of statistical methods to explore and summarise data, including estimating and finding the mean and median for large data sets
12. Interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pictograms and pie charts	Calculate statistics for discrete sets of data finding the mode, range and median	Construct frequency tables for gathering discrete data, grouped where appropriate in equal class intervals and use these to find the mean	Use appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)	Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through use of appropriate graphical representation involving discrete, continuous and grouped data	Interpret and draw frequency polygons
13. Mode, median, mean and range		Find the mode, mean, median and range for a set of discrete data, and the modal class for grouped discrete data	Apply statistics to describe a population	Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through use of appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)	Interpret and draw scatter diagrams and lines of best fit
14. Use of averages					Use appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)
15. Interpret and draw frequency polygons					
16. Interpret and draw scatter diagrams and lines of best fit					

Summer 1

Problem solving task Assessment

Sequences	Recognise and extend sequences of consecutive numbers, odd numbers and even numbers	Generate terms of a simple sequence, given a rule	Generate terms of a linear sequence using term-to-term and position-to-term rules	Generate terms of a linear sequence using term-to-term and position-to-term rules	
1. Nth term (recap)	Describe integer sequences	Generate sequences from patterns or practical contexts	Explore iterative sequences		
2. Explore quadratic sequences	Generate terms of a simple sequence given a rule	Use iterative processes	Use linear expressions to describe the n th term of a simple arithmetic sequence	Use linear expressions to describe the n th term of a simple arithmetic sequence	Develop, compare and evaluate algebraic and spatial representations of situations that generate sequences
3. Interpret, deduce and justify generalisations for the n th term of linear and quadratic sequences			Relate linear sequences to linear functions	Explore quadratic sequences	Interpret, deduce and justify generalisations for the n th term of linear and quadratic sequences, including the properties of square and triangle numbers.
Algebraic expressions	Use letter symbols to represent unknown numbers or variables	Use letter symbols to represent unknown numbers or variables	Use index notation for small positive integer powers		Find the inverse of a linear function
4. Factorise linear expressions (recap)	Simplify linear algebraic expressions by collecting like terms	Simplify linear algebraic expressions by collecting like terms (numbers and letters)	Simplify or transform linear expressions by collecting like terms	Simplify or transform algebraic expressions by taking out single-term common factors	
5. Expand two brackets to form a quadratic expression	Understand and use inverse operations	Understand that algebraic operations follow the rules of arithmetic	Understand that algebraic operations, including the use of brackets, follow the rules of arithmetic	Add simple algebraic fractions	
6. Factorise a quadratic expression into brackets		Multiply a single term over a bracket (positive integer coefficients)	Multiply a single term over a bracket (positive and negative integers)	Expand two brackets to form a quadratic expression	Construct linear equations and simple linear inequalities (one variable) to represent real-life situations or mathematical problems;
7. Simplify algebraic fractions by factorising				Work with general iterative processes e.g. use systematic trial and improvement methods to find approximate solutions of equations such as $x^3 + x = 20$.	Solve linear equations and inequalities representing the solution in the context of the problem
8. Work with general iterative processes					

Algebraic manipulation	Use simple formulae expressed in words, then symbols	Use simple formulae from mathematics and other subjects substitute positive integers into simple linear expressions and formulae	Derive simple formulae and in simple cases change subject. Construct and solve linear equations with integer coefficients (unknown on one side).	Construct and solve linear equations with integer coefficients (unknown on one or both sides, without and with brackets)	Construct and solve linear equations with integer coefficients (with and without brackets, negative signs anywhere in the equation, positive or negative solution)
9. Construct and solve linear equations with integer coefficients (recap)	Substitute positive integers into simple linear expressions and formulae	Construct and solve simple linear equations, e.g. $4a=12$	Substitute positive integers into expressions involving small powers	Substitute numbers into expressions and formulae	Simplify algebraic fractions
10. Construct and solve linear equations with variables on both sides			Use formulae from mathematics and other subjects	Change the subject of simple formulae	Use formulae from mathematics and other subjects ; substitute numbers into expressions and formulae; derive a formula and in simple cases, change its subject
11. Construct and solve simple linear inequalities					Solve quadratic equations of the form $x^2 + bx + c = 0$ by factorisation, graphically or by iterative, e.g. trial and improvement, methods
12. Use formulae from mathematics and other subjects; include rearranging (recap) *13. Solve quadratic equations by factorising, graphically or trial and improvement					Expand the product of two linear expressions of the form $ax \pm b$, simplify the corresponding quadratic expression, and factorise simply quadratic expressions Use identities such as $a^2 - b^2 = (a + b)(a - b)$; compare and evaluate different representations of the same context; identify equivalent expressions and confirm by transformation
Linear graphs	Use coordinates in the first quadrant	Represent simple functions using words, symbols and mappings	Generate points in all four quadrants and plot graphs of linear functions (y given explicitly in terms of x), on paper and using ICT	Generate points and plot graphs of linear functions given explicitly (y given in terms of x) and implicitly (y given implicitly in terms of x , e.g. $ay + bx = 0$, $y + bx + c = 0$)	Generate points in all four quadrants and plot the graphs of the linear functions, where y is given explicitly in terms of x, recognise that equations of the form $y=mx+c$ correspond to straight-line graphs
14. Generate points and plot graphs of linear functions (recap)	Plot a simple graph (e.g. for a multiplication table).	Use coordinates in all four quadrants and identify coordinates of points determined by geometric information Generate coordinate pairs that satisfy a simple rule Plot graphs of simple linear functions (y given explicitly in terms of x) .	Recognise that equations of the form $y = mx + c$ correspond to straight-line graphs	Find the gradient of lines given by equations of the form $y = mx + c$	Investigate the gradients of parallel lines and lines perpendicular to these lines
15. Find the gradient of lines given by $y=mx+c$			Discuss and interpret graphs arising from real situations.		
16. Investigate gradients of parallel and perpendicular lines			Understand and use measures of compound measures speed, density and <u>pressure</u> and solve problems involving constant or average rates of change.	Represent and solve problems involving constant or average rates of change graphically	Construct a pair of simultaneous linear equations to represent real-life situations or mathematical problems; examine and compare algebraic methods of solution; use graphical representation to explain why the intersection of two lines gives the common solution and why some cases have no common solution and others have an infinite number
17. Find the midpoint of a line segment AB given A and B. *18. Construct a pair of simultaneous equations. Explain graphically why they may have solutions or not. *19. Plot quadratic graphs				Find the midpoint of the line segment AB, given the coordinates of points A and B	
Summer 2 Problem solving task Assessment					
Transformations	Identify lines of symmetry in 2D shapes			Identify reflection symmetry in 3D shapes	
1. Identify reflection symmetry in 2D shapes	Visualise and draw where a shape will be after reflection in a mirror line	Recognise and visualise the symmetries of a 2D shape	Identify all the symmetries of 2D shapes	Use a coordinate grid to solve problems involving translations, rotations, reflections and enlargements	Transform 2D shapes by combinations of translations, rotations and reflections
2. Solve problems involving translations	Explore symmetry and simple transformations using ICT.	Understand and use the language and notation associated with reflections, translations and rotations	Transform 2D shapes by rotation, reflection and translation and try out mathematical representations of simple combinations of these transformations	Recognise that translations, rotations and reflections preserve length and angle, and map objects onto congruent images	Use congruence to show that translations, rotations and reflections preserve length and angle

3. Solve problems involving rotations	Draw lines of symmetry and complete symmetrical shapes	Reflect 2D shapes in given mirror lines		Explore and compare combinations of translations, reflections and rotations of 2D shapes	Measure the angle of rotation, using fractions of a turn or degrees
4. Solve problems involving reflections	Draw the reflection of a shape in a mirror line along one side	Rotate a 2D shape about a given point			Use any point as the centre of rotation
5. Solve problems involving enlargements (positive integer)	Use the vocabulary of position, direction and movement, to describe movement about a grid	Translate a 2D shape around a grid			
6. Solve problems involving enlargements (negative, fractional)		Explore these transformations and symmetries using ICT.	Enlarge 2D shapes, given a centre of enlargement and a positive integer scale factor, and explore enlargement using ICT.	Enlarge 2D shapes, given a centre of enlargement and a positive integer scale factor, identifying the scale factor as the ratio of the lengths of any two corresponding line segments	Enlarge 2D shapes using positive, fractional and negative scale factors recognising the similarity of the resulting shapes
7. Understand and use the effects of enlargement on perimeter				Recognise that enlargements preserve angle but not length	Calculate the length of AB, given coordinates of points A and B
8. Explore combinations of transformations					Find the point that divides a line in a given ratio, using properties of similar triangles
9. Know that if two shapes are similar, corresponding angles are equal and corresponding sides are in the same ratio					Know that if two 2D shapes are similar, corresponding angles are equal and corresponding sides are in the same ratio
*10. Find the point that divides a line in a given ratio, using properties of similar triangles					Understand and use the effects of enlargement on perimeter
Construction	Draw and classify polygons by identifying their properties, including their line symmetry				
11. Identify and draw nets of shapes	Identify and draw nets of simple 3D shapes	Draw parallel and perpendicular lines	Construct the midpoint and perpendicular bisector of a line segment	Construct the perpendicular from a point to a line	
12. Volume of prisms		Construct squares and rectangles	Construct the bisector of an angle	Construct the perpendicular to a line from a point on the line	Construct bisectors of angles and perpendicular bisectors of line segments.
13. Surface area of prisms		Construct a triangle given two sides and the included angle (SAS) or two angles and the included side (ASA)	Construct the perpendicular from a point to a line	Construct triangles, given right angle, hypotenuse and side (RHS)	
14. Conversions between units of length, area and volume		Draw simple nets of 3D shapes	Use ruler and compasses to construct a triangle, given the lengths of the three sides (SSS)	Construct triangles and other 2D shapes	Understand from experience of constructing them that triangles given SSS, SAS, ASA or RHS are unique, but that triangles given SSA or AAA are not
13. Construct the midpoint and perpendicular bisector of a line segment			Find simple loci to produce shapes and paths.	Find a simple locus	Find the locus of a point that moves according to a more complex rule
14. Construct the bisector of an angle			Make scale drawings		
15. Construct the perpendicular from a point to a line			Use bearings to specify direction	Use and interpret maps and scale drawings.	Problem solve using loci, maps and scale drawings.
16. Use a ruler and compasses to construct a triangle					
17. Find a simple locus					
*18. Find the locus of a point that moves according to a more complex rule					
19. Use and interpret maps and scale drawings					
20. Problem solve using loci, maps and scale drawings					