Curriculum Map – Mathematics

Year Group – 9

Autumn 1

Straight line graphs

Length: 7 sessions, 2 weeks
10 sessions, 2.5 weeks – HT

Knowledge
Algebraic equations and substitution of values.
Four quadrant graphs
Rules for coordinates.
What a gradient of a line is and where gradients intersect.
Place value and ordering numbers.
Parallel, line of best fit, perpendicular vocabulary.

Skills
Find y when x is given in an algebraic equation.
Turn x and y values into coordinates.
Plot coordinates on graph with four quadrants.
Identify gradients of lines
Identify where two lines intersect.
Find the equation for a straight-line graph.
Identify similarities and differences between straight line graphs.

Key Activities:
Using tables to generate coordinate by using substitution for equations, y=mx+c
Give x a value from -2 to 2 when substituting to generate coordinates.
Solve worded problems using straight line graphs.
Find equations and write equations using y=mx+c

Key Vocabulary:
Straight line graph
Gradient
Intersect
Co-ordinates
Quadrants

Forming and solving equations

Length: 9 sessions, 2 weeks
10 sessions, 2.5 weeks - HT

Knowledge
Negative numbers and place value.
The rules for >, <, =, ≤ and ≥
The inverse of all four operations.
Algebraic conventions for written calculations.
Rules for substitution.

Skills
Use 0 or ● to represent inequalities on a number line.
Rearrange equations to find missing letter values.
Rearrange equations to solve the equation with unknown on both sides.
Identify the difference between a formulae and equation.
Substitute given values into formulae and equations.

Key Activities:
How to rearrange formulae with one and two steps.
Solve equations with unknown on both sides.
Use substitution to solve equations or find values of formulae.
Use common formulae in worded problems – trapezium, v = u + at, area of a parallelogram and temperature conversion.
Use and understand pictorial representation for solving equations with unknown on both sides.

Key Vocabulary:
Inequality
Equation
Formulae
Substitute
Inverse

Testing conjectures

Length: 8 sessions, 2 weeks

Knowledge
Multiplication and division facts for all times tables.
Language associated with probability.
Place value knowledge.
Calculation strategies for all four operations.
Algebraic conventions.
BODMAS
Rules for multiplication and division in algebra

Skills
Apply multiplication and division facts to multiples, factors and prime numbers.
Use the language of probability to identify the chance of an event happening.
Test and prove statements about numbers.
Use ≡

Key Activities:
Modelling of algebraic brackets with algebra tiles.
Expand and simplify algebraic brackets.
Reason about numerical statements and prove / justify answers with examples.
Identify factors and multiples of numbers.
Know the prime numbers upto 20.
Solve worded problems using known number facts.

Key Vocabulary:
Factor
Prime
Multiple
Expand
Simplify

***Assessment** (including hot and cold task):*
Assessment A cold task – 1st lesson
Assessment A hot task – last lesson
Assessment B to be used for any higher tier pupils or those working at the exceeding stage for their age.
GL assessment baseline test

Autumn 2

3 dimensional shapes

Length: 12 sessions, 3 weeks

Knowledge
Names and properties of 2D and 3D shapes
Conventions of formulae to work out area and volume.
Multiplication and division facts.
Inverse operations.
Circumference of a circle and the relationship between this and the radius.
Value of Pi and the meaning of the symbol π
The difference between a plan and an elevation.

Skills
Identify 2D and 3D, match shapes to their names.
Match 3D shapes to their nets
Draw nets of regular 3D shapes.
Calculate surface area of 3D shapes using multiplication facts and given formulae.
Calculate the volume of 3D shapes including cubes and cuboids.
Calculate the volume of compound 3D shapes.
Use length x width x depth to calculate volume of cubes and cuboids.

Key Activities:
Practical shape activities to reinforce shape language and support with visualization of 3D shapes.
Matching activities for understanding of 2D and 3D shapes.
Using formulae to calculate area of 2D and 3D shapes.
Use area knowledge to calculate surface area of 3D shapes.
Calculate volume of cubes, cuboids, prisms, and cylinders.
Use πr^2 when calculating with cylinders and circles.
Use isometric paper for 3D drawings.

Key Vocabulary:
Edge
Vertices
Prism
Circumference
PI
Diameter

Construction and Congruency

Length: 14 sessions, 3.5 weeks

Knowledge
Angles, their properties and how to use a protractor to measure angles.
Powers of 10
Scale factor in relation to maps and diagrams.
Circumference of a circle and the relationship between this and the radius.
Value of Pi and the meaning of the symbol π
How to read measurements from a ruler.
Meaning of the word congruence.
How to set up and use a compass for drawing / construction of shapes.

Skills
Use a protractor to accurately measure and draw angles.
Use a compass to accurately draw circles.
Use formulae for the area of a circle when problem solving.
Construct perpendicular bisectors.
Construct a perpendicular from and to a point.
Use a ruler accurately for measuring specific lengths.
Use a compass to construct a triangle with given measurements.
Identify congruence in shapes.

Key Activities:
Identify congruent 2D shapes – both regular and irregular.
Explore gradients of lines and calculate these from different given lines.
Construct triangles and line bisects using compass – practical guidance needs to be given on using a compass and ensure that this knowledge is secure first.
Measuring and drawing of angles using a protractor.

Key Vocabulary:
Construct
Congruence
Bisector
Perpendicular
Compass
Protractor
Ruler
Pi
Radius
Circumference
Diameter

***Assessment** (including hot and cold task):*
Assessment A cold task – 1st lesson
Assessment A hot task – last lesson
Assessment B to be used for any higher tier pupils or those working at the exceeding stage for their age.

Term	Spring 1						Spring 2					
Unit title	**Numbers** **Reasoning with Numbers**		**Using percentages**		**Mathematics and money**		**Deduction**		**Rotation and Reflection**		**Pythagoras' theorem**	
Length	9 sessions, 2 weeks 10 sessions, 2.5 weeks – HT		6 sessions, 1.5 weeks 7 sessions, 1.5 weeks - HT		7 sessions, 2 weeks		6 sessions, 1.5 weeks 7 sessions, 1.5 weeks – HT		6 sessions, 1.5 weeks 7 sessions, 1.5 weeks – HT		7 sessions, 1.5 weeks 8 sessions, 2 weeks – HT	
Outcomes	**Knowledge** Integers are whole numbers. Rational numbers are made by dividing two integers Irrational numbers cannot be written as a fraction or ration of two integers. Real numbers include integers, real numbers and irrational numbers.	**Skills** Identify and sort integers, rational, irrational and real numbers. Identify and use surds (HT) Solve problems with integers and decimals. Adding and subtracting fractions. Multiplying and dividing fractions. Identify and reason with Highest common factors and lowest common multiples	**Knowledge** The equivalence between common fractions, decimals and percentages. Percentage is out of 100. Calculator usage for solving questions involving percentages. Percentage increase as a decimal e.g. 130% = multiplying by 1.3	**Skills** Use percentage increase and decrease to solve problems. Reason with 10% and 1% to find different percentage amounts of numbers. Calculate percentage change using change ÷ original x 100. Explain the steps needed to solve worded problems with percentages. Calculate percentage increase and decrease and repeated changes (HT)	**Knowledge** When receipts are given and what they show. Understand the value of coins and calculate change. Identify the different coins and notes used in the United Kingdom. Calculate change when using a debit / credit card.	**Skills** Calculate interest and compound interest. Calculate Value Added Tax. Calculate currency conversions and solve problems with exchange rates. Solve problems involving money and currency conversion. .	**Knowledge** Angle rules for triangles, quadrilaterals, Full turn, half turn and straight line. Convention for naming straight lines and angles with letters. Sum of angles in regular 2D shapes – up to and including an octagon. The exterior angle of a triangle is equal to the sum of the two opposite interior angles	**Skills** Identify and reason about corresponding angles, alternate angles, vertically opposite angles and co-interior angles. Identify parallel lines. Solve problems involving parallel lines and angles. Construct triangles using compass (HT) Construct bisectors using compass	**Knowledge** Degrees in a full turn and half turn. Names and properties of regular 2D shapes. 90 degree turn is the same as a quarter turn. Read coordinates in all four quadrants. Plot coordinates in all four quadrants.	**Skills** Identify the point of rotation and use this to rotate regular 2D shapes through 360° Compare lines of symmetry to order of symmetry. Rotate a 2D shape about a point that is not on the original shape. Translate shapes using given vectors along the horizontal and vertical planes. Compare rotation and reflections of shapes.	**Knowledge** Angles in triangles total 180° Right angles and how to represent these on regular 2D shapes. Rules for calculating the area of a triangle. Names and properties of 3D shapes.	**Skills** Apply the rules of squares and square roots to negative numbers. Draw and identify the hypotenuse on a right-angled triangle. Calculate the hypotenuse using $a^2 + b^2 = c^2$ Apply Pythagoras theorem to 'real-life' context worded problems.
Activities and Assessment	**Key Activities:** Identify and sort integers, rational, irrational, real and imaginary numbers. Add and subtract fraction with same and different denominators. Multiply and divide fractions with same and different denominators. Solve problems with and write numbers in standard form (recap) Problem solving with fractions. **Key Vocabulary:** Real Numbers Rational Numbers Irrational Numbers Integers Venn Diagram Surds Highest Common Multiple Lowest Common Factor Numerator Denominator		**Key Activities:** Calculate percentage increase and percentage decreases making the link between percentages and decimals for multiplication. Reasoning with percentages to find the whole number' in worded problems. Solve percentage problems without the use of a calculator. Solve percentage problems with the use of a calculator. Calculate repeated percentage changes using decimals (HT). Problem solve and reason with percentages in worded problems. **Key Vocabulary:** Percentage Change Increase Decrease Repeated change Equivalence Fraction Decimal		**Key Activities:** Solve problems with bank statement and bills. Understand the advantages and disadvantages with interest. Calculate interest rates and compounding interest. Solve problems with hourly wage, overtime and annual salaries. Identify where products are cheaper using currency conversion and exchange rates. **Key Vocabulary:** Tax Value Added Tax Wages Hourly Rate Overtime Interest Bills Bank Statement Credit Debit Balance		**Key Activities:** Identify the angles rules for regular 2D shapes. Identify and reason about corresponding angles, alternate angles, vertically opposite angles and co-interior angles. Solve problems involving angles – interior and exterior of 2D shapes. Complete constructions of bisectors – perpendicular and angle. Complete constructions of triangles using compasses (HT) **Key Vocabulary:** Conjecture Shape Angles Co-interior angles Corresponding angles Alternate angle Vertically opposite angle Quadrilateral Triangle Parallel		**Key Activities:** Rotate 2D shapes about a given point – both on the shape and outside the shape. Make comparisons and draw conclusions about lines of symmetry and order of symmetry. Translate shapes using vectors to describe the movement of the shape. Understand and write vectors to describe the movement of a shape. Solve problems involving rotation, reflection and translation of regular 2D shapes. **Key Vocabulary:** Order of rotational symmetry Line of symmetry Rotation Centre of rotation Clockwise Anticlockwise Vectors Horizontal Vertical		**Key Activities:** Solve worded problems in 'real-life' contexts that use Pythagoras theorem and the rule $a^2 + b^2 = c^2$ Solve problems involving square numbers and square roots. Identify the square root and use a calculator to find the square root of a number. Understand and prove that not all square roots are integers. **Key Vocabulary:** Integer Square Square root Pythagoras theorem Hypotenuse	
	***Assessment** (including hot and cold task):* Assessment A cold task – 1st lesson Assessment A hot task – last lesson Assessment B to be used for any higher tier pupils or those working at the exceeding stage for their age.						***Assessment** (including hot and cold task):* Assessment A cold task – 1st lesson Assessment A hot task – last lesson Assessment B to be used for any higher tier pupils or those working at the exceeding stage for their age.					

Term	Summer 1						Summer 2					
Unit title	**Enlargement and similarity**		**Solving ratio and proportion problems**		**Rates**		**Probability**		**Algebraic representation**		**Revision**	
Length	8 sessions, 2 weeks		8 sessions, 2 weeks		7 sessions, 2 weeks		8 sessions, 2 weeks		4 sessions, 1 weeks		8 sessions, 2 weeks	
Outcomes	**Knowledge** That multiplication and division are inverse operations Multiplication and corresponding division facts up to 12 x 12. Properties of regular 2D shapes. Rules for reading and writing coordinates.	**Skills** Recognize similarity and enlargement in shapes. Enlarge a regular shape by a positive integer. Calculate the missing length of enlargement when given comparative lengths. Enlarge a regular shape from a given point Enlarge a shape by a positive fractional scale factor. Calculate missing angles and sides in a pair of given shapes.	**Knowledge** Calculate with all four operations including decimal numbers. Recall and apply knowledge of place value to number lines. Conventions for writing money and measures.	**Skills** Apply knowledge of direct proportion to solve worded problems involving measures. Understand how conversion graphs are use for imperial to metric and metric to imperial measures. Understand and use ≈ when giving an answer. Solve worded problems with inverse proportion Solve 'best buy' worded problems	**Knowledge** Prior learning from science – speed, distance time. That multiplication and division are inverse operations Multiplication and corresponding division facts up to 12 x 12. Graphing and reading speed, distance, time graphs. Properties of 2D and 3D regular shapes – length, width, height, volume	**Skills** Calculate speed, distance, time problems without the use of a calculator. Solve speed, distance, time problems with a calculator. Draw speed, distance, time graphs for given information. Solve problems with density, mass and volume.	**Knowledge** Calculation with fraction rules. Conversion between common fraction, decimals and percentages Calculate with all four operations Addition and subtraction facts. Reading and interpreting Venn diagrams and two way tables.	**Skills** Identify the probability of a single event from worded information. Represent probability as a fraction, decimal or percentage. Understand and use the notation for ratio Calculate relative frequency – including convergence. Use the formula for relative frequency Identify and calculate expected outcomes. Use diagrams to work our probabilities.	**Knowledge** Coordinates – how to read, write and plot them accurately. The rules for >, <, =, ≤ and ≥ Use 0 or ● to represent inequalities on a number line.	**Skills** Draw and interpret quadratic graphs. Interpret graphs including reciprocal and piece wise. Represent inequalities on number lines and graphs. Write the expression for inequalities shown for number lines and graphs.	**Knowledge** **This will be structured and adapted according to needs of individual students.**	**Skills** **This will be structured and adapted according to needs of individual students.**
Activities and Assessment	**Key Activities:** Calculate the corresponding length on a shape when given the scale of enlargement. Enlarge regular 2D shapes on squared paper. Apply knowledge of shapes to worded problems and find missing angles and sides. Recognize that enlarging by a fraction makes the shape smaller. **Key Vocabulary:** Enlarge Centre of enlargement 2D shape names Right angle Coordinates Scale factor		**Key Activities:** Recall the formula of a circle Understand that when two quantities are in direct proportion, if you multiply/divide one of the quantities by a number, you multiply/divide the other quantity by the same number. Use conversion graphs to solve problems involving measures and currency. Find missing values when given numbers and an inversely proportional relationship. **Key Vocabulary:** Direct proportion Inches Centimeters Inversely proportional Conversion graph Approximately ≈ Best value for money		**Key Activities:** Use the formula speed = distance ÷ time Calculate and find missing values in speed, distance, time worded problems. Use the formula density = mass ÷ volume Calculate and find missing values in mass, density, volume worded problems. **Key Vocabulary:** Constant speed Average speed Proportional Speed Distance Time Density Mass Volume		**Key Activities:** Understand and use relative frequency = number of successful outcomes ÷ total number of trials. Calculate the probability of independent events and the probability that both events occur. Complete frequency trees where some values are given. Complete two-way tables to show missing values. **Key Vocabulary:** Probability Fraction Decimal Percentage Ratio Relative frequency Convergence Expected outcomes		**Key Activities:** Identify the positive aspects of a quadratic graph. Criticize a quadratic graph and identify ways that it can be improved – checking that the points are joined with a curve. Identify different types of graph – including straight line, quadratic and reciprocal. Investigate graphs for simultaneous equations and notice that the solution is given by the coordinates of where the lines intersect. HT **Key Vocabulary:** Straight line Quadratic Reciprocal Inequalities Expression Number line		**Key Activities:** Revise key topics from across Key Stage 3 that are not secure; personalize according to the needs of the class. Key topics to consider: Algebra Algebraic equations Using algebra tiles Worded problems involving ration and proportion Enlargement and properties of 2D shapes Shape knowledge and naming of 2D and 3D shapes. If year group is confident – cover some of the higher tier content that has not yet been covered as part of the revision. Worded problems involving more than one step and BODMAS. **Key Vocabulary:**	
	***Assessment* (including hot and cold task):** Assessment A cold task – 1st lesson Assessment A hot task – last lesson Assessment B to be used for any higher tier pupils or those working at the exceeding stage for their age. GL Assessment progress tests.						***Assessment* (including hot and cold task):** Assessment A cold task – 1st lesson Assessment A hot task – last lesson Assessment B to be used for any higher tier pupils or those working at the exceeding stage for their age. GL assessment baseline test					