Year 9 foundation

Topic: Integers and place value
Use and order positive and negative numbers (integers);
Order integers, decimals, use the symbols <, > and understand the ≠ symbol;
Add and subtract positive and negative numbers (integers);
Recall all multiplication facts to 10 × 10, and use them to derive quickly the corresponding division facts;
Multiply or divide any number by powers of 10;
Multiply and divide positive and negative numbers (integers);
Use brackets and the hierarchy of operations (not including powers);
Round numbers to a given power of 10;
Check answers by rounding and using inverse operations.

Topic: Decimals
Use decimal notation and place value;
Identify the value of digits in a decimal or whole number;
Compare and order decimal numbers using the symbols <, >;
Understand the ≠ symbol (not equal);
Write decimal numbers of millions, e.g. 2 300 000 = 2.3 million;
Add, subtract, multiply and divide decimals;
Multiply or divide by any number between 0 and 1;
Round to the nearest integer;
Round to a given number of decimal places;
Round to any given number of significant figures;
Estimate answers to calculations by rounding numbers to 1 significant figure;
Use one calculation to find the answer to another.

Topic: Indices, powers and roots
Find squares and cubes:
recall integer squares up to 10 x 10 and the corresponding square roots;
understand the difference between positive and negative square roots;
recall the cubes of 1, 2, 3, 4, 5 and 10;
Use index notation for squares and cubes;
Recognise powers of 2, 3, 4, 5;
Evaluate expressions involving squares, cubes and roots:

add, subtract, multiply and divide numbers in index form;
cancel to simplify a calculation;
Use index notation for powers of 10, including negative powers;
Use the laws of indices to multiply and divide numbers written in index notation;
Use the square, cube and power keys on a calculator;
Use brackets and the hierarchy of operations with powers inside the brackets, or raising brackets to
Use calculators for all calculations: positive and negative numbers, brackets, powers and roots, four operatio

Topic: Factors, multiples and primes
List all three-digit numbers that can be made from three given integers;
Recognise odd and even numbers;
Identify factors, multiples and prime numbers;
Recognise two-digit prime numbers;
List all factors of a number and list multiples systematically;
Find the prime factor decomposition of positive integers and write as a product using index notation;
Solve simple problems using HCF, LCM and prime numbers.
Find common factors and common multiples of two numbers;
Find the LCM and HCF of two numbers, by listing, Venn diagrams and using prime factors: include finding LCM and HCF given the prime factorisation of two numbers;
Understand that the prime factor decomposition of a positive integer is unique – whichever factor pair you start with – and that every number can be written as a product of two factors;

Topic: Fractions
Use diagrams to find equivalent fractions or compare fractions; Write fractions to describe shaded parts of
Express a given number as a fraction of another, using very simple numbers, some cancelling, and where the fraction is both < 1 and > 1;
Write a fraction in its simplest form and find equivalent fractions;
Order fractions, by using a common denominator;
Compare fractions, use inequality signs, compare unit fractions;
Convert between mixed numbers and improper fractions;
Add and subtract fractions;
Add and subtract mixed number fractions and write the answer as a mixed number;
Multiply and divide an integer by a fraction;

Multiply and divide a fraction by an integer, including finding fractions of quantities or measurements, and apply this by finding the size of each category from a pie chart using fractions;

Understand and use unit fractions as multiplicative inverses;

Multiply fractions: simplify calculations by cancelling first; Multiply mixed number fractions;

Divide a fraction by a whole number; Divide fractions by fractions. Divide mixed numbers by whole numbers and vice versa;

Find the reciprocal of an integer, decimal or fraction;Understand 'reciprocal' as multiplicative inverse, knowing that any non-zero number multiplied by its reciprocal is 1 (and that zero has no reciprocal because division by zero is not defined).

Topic: Fractions, decimals and percentages

Recall the fraction-to-decimal conversion;

Convert between fractions and decimals;

Convert a fraction to a decimal to make a calculation easier

Recognise recurring decimals and convert fractions into recurring decimals

Compare and order fractions, decimals and integers, using inequality signs;

Understand that a percentage is a fraction in hundredths;

Express a given number as a percentage of another number;

Convert between fractions, decimals and percentages;

Order fractions, decimals and percentages, including use of inequality signs.

Topic: Percentages

Express a given number as a percentage of another number;

Find a percentage of a quantity without a calculator: 50%, 25% and multiples of 10% and 5%;

Find a percentage of a quantity or measurement (use measurements they should know from Key Stage 3

Calculate amount of increase/decrease;

Use percentages to solve problems, including comparisons of two quantities using percentages;

Calculate percentage change

Percentages over 100%;

Use percentages in real-life situations, including percentages greater than 100%:

Price after VAT (not price before VAT);

Value of profit or loss; Calculate percentage profit or loss;

Simple interest;

Income tax calculations;

Bank statements debit, credit, balance

cost price, selling price, ,

Find a percentage of a quantity, including using a multiplier;

Use a multiplier to increase or decrease by a percentage in any scenario where percentages are used;

Understand the multiplicative nature of percentages as operators.

Make calculations involving repeated percentage change, not using the formula;

Find the original amount given the final amount after a percentage increase or decrease;
Use compound interest;

Topic: Algebra: The basics
Use notation and symbols correctly;
Write an expression;
Select an expression/equation/formula/identity from a list;
Manipulate and simplify algebraic expressions by collecting 'like' terms;
Multiply together two simple algebraic expressions, e.g. $2a \times 3b$;
Simplify expressions (fractions) by cancelling
Use index notation when multiplying or dividing algebraic terms; Use index laws in algebra;
Understand the $\neq$ symbol and introduce the identity $\equiv$ sign;

Topic: Expanding and factorising single brackets
Multiply a single number term over a bracket;
Write and simplify expressions using squares and cubes;
Simplify expressions involving brackets, i.e. expand the brackets, then add/subtract;
Argue mathematically to show algebraic expressions are equivalent;
Recognise factors of algebraic terms involving single brackets;
Factorise algebraic expressions by taking out common factors.

Topic: Expressions and substitution into formula
Write expressions to solve problems representing a situation;
Substitute numbers in simple algebraic expressions;
Substitute numbers into expressions involving brackets and powers;
Substitute positive and negative numbers into expressions;
Derive a simple formula, including those with squares, cubes and roots;
Substitute numbers into a word formula;
Substitute numbers into a formula.

Topic: Equations
Select an expression/equation/formula/identity from a list;
Write expressions and set up simple equations;
Use function machines;
Solve simple equations;
Solve linear equations, with integer coefficients, in which the unknown appears on either side or on both sides of the equation;
Solve linear equations which contain brackets, including those that have negative signs occurring anywhere in the equation, and those with a negative solution;
Solve linear equations in one unknown, with integer or fractional coefficients;
Rearrange simple equations;
Change the subject of a formula involving the use of square roots and squares;
Substitute into a formula, and solve the resulting equation;
Find an approximate solution to a linear equation using a graph;
Write an equation to solve a word problem.
Compare coefficients and solve to find unknowns

Topic: Inequalities
Show inequalities on number lines;
Write down whole number values that satisfy an inequality;

Solve an inequality such as $-3 < 2x + 1 < 7$ and show the solution set on a number line;
Solve two inequalities in x, find the solution sets and compare them to see which value of x satisfies both;
Use the correct notation to show inclusive and exclusive inequalities;
Construct inequalities to represent a set shown on a number line;
Solve simple linear inequalities in one variable, and represent the solution set on a number line;
Round answers to a given degree of accuracy.

Topic: Ratio
Understand and express the division of a quantity into a of number parts as a ratio;
Write ratios in their simplest form;
Write/interpret a ratio to describe a situation;
Share a quantity in a given ratio including three-part ratios;
Solve a ratio problem in context:
use a ratio to find one quantity when the other is known;
Use a ratio to compare a scale model to a real-life object;
use a ratio to convert between measures and currencies;
problems involving mixing, e.g. paint colours, cement and drawn conclusions;
Compare ratios including when you are given a relationship between two ratios e.g red:white is 3:4 but white:green is 5:7. What is the ratio of red:green
Write ratios in form 1 : m or m : 1;
Write a ratio as a fraction including one part as a fraction of the other;Express a multiplicative relationship between two quantities as a ratio or a fraction
Write lengths, areas and volumes of two shapes as ratios in simplest form;

Topic: Proportion
Solve word problems involving direct and indirect proportion;
Work out which product is the better buy (best value);
Scale up recipes;
Convert between currencies;
Find amounts for 3 people when amount for 1 given;
Solve proportion problems using the unitary method;
Use a variety of measures in ratio and proportion problems:
rates of pay;
Use $y = kx$ to solve direct proportion problems, including questions where students find k, and then use k to find another value;
Solve problems involving inverse proportion using graphs by plotting and reading values from graphs;
Solve problems involving inverse proportionality;
Set up and use equations to solve word and other problems involving direct proportion or inverse
Recognise when values are in direct proportion by reference to the graph form;
Understand inverse proportion: as x increases, y decreases (inverse graphs done in later unit);
Recognise when values are in direct proportion by reference to the graph form;
Understand direct proportion ---> relationship $y = kx$.
Understand that X is inversely proportional to Y is equivalent to X is proportional to 1/y
Interpret equations that describe direct and inverse proportion.

Topic: Standard form
Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers, fractions and powers of a power;
Use numbers raised to the power zero, including the zero power of 10;
Convert large and small numbers into standard form and vice versa;

Add and subtract numbers in standard form;
Multiply and divide numbers in standard form;
Interpret a calculator display using standard form and know how to enter

Topic: Straight line graphs
Use axes and coordinates to specify points in all four quadrants in 2D;
Identify points with given coordinates and coordinates of a given point in all four quadrants;
Draw, label and scale axes;
Find the coordinates of points identified by geometrical information in 2D (all four quadrants);
Use function machines to find coordinates (i.e. given the input x, find the output y);
Plot and draw graphs of $y = a$, $x = a$, $y = x$ and $y = -x$;
Recognise straight-line graphs parallel to the axes;
Find the coordinates of the midpoint of a line segment;
Recognise that equations of the form $y = mx + c$ correspond to straight-line graphs in the coordinate
Plot and draw graphs of straight lines of the form $y = mx + c$ using a table of values;
Sketch a graph of a linear function, using the gradient and y-intercept;
Identify and interpret gradient from an equation $y = mx + c$;
Identify parallel lines from their equations;
Plot and draw graphs of straight lines in the form $ax + by = c$;
Find the equation of a straight line from a graph;
Find the equation of the line through one point with a given gradient;
Find approximate solutions to a linear equation from a graph;
Find the gradient of a straight line from real-life graphs too.

Topic: Real life graphs
Read values from straight-line graphs for real-life situations;
Draw straight line graphs for real-life situations, including ready reckoner graphs, conversion graphs, fuel bills graphs, fixed charge and cost per unit;
Draw distance–time graphs and velocity–time graphs;
Work out time intervals for graph scales;
Interpret distance–time graphs, and calculate: the speed of individual sections, total distance and total
Interpret information presented in a range of linear and non-linear graphs;
Interpret graphs with negative values on axes;
Interpret gradient as the rate of change in distance–time and speed–time graphs, graphs of containers filling

Topic: Sequences
Recognise sequences of odd and even numbers, and other sequences including Fibonacci sequences;
Use function machines to find terms of a sequence;
Write the term-to-term definition of a sequence in words;
Find a specific term in the sequence using position-to-term or term-to-term rules;
Generate arithmetic sequences of numbers, triangular number, square and cube integers and sequences derived from diagrams;
Recognise such sequences from diagrams and draw the next term in a pattern sequence;
Find the next term in a sequence, including negative values;
Find the nth term for a pattern sequence;
Find the nth term of a linear sequence;
Find the nth term of an arithmetic sequence;
Use the nth term of an arithmetic sequence to generate terms;
Use the nth term of an arithmetic sequence to decide if a given number is a term in the sequence, or find the first term over a certain number;

Use the nth term of an arithmetic sequence to find the first term greater/less than a certain number;
Continue a geometric progression and find the term-to-term rule, including negatives, fraction and decimal
Continue a quadratic sequence and use the nth term to generate terms;
Distinguish between arithmetic and geometric sequences.

Topic: Transformations
Identify congruent shapes by eye;
Rotation
Understand clockwise and anticlockwise;
Understand that rotations are specified by a centre, an angle and a direction of rotation;
Find the centre of rotation, angle and direction of rotation and describe rotations;
Describe a rotation fully using the angle, direction of turn, and centre;
Rotate a shape about the origin or any other point on a coordinate grid;
Draw the position of a shape after rotation about a centre (not on a coordinate grid);
Identify correct rotations from a choice of diagrams;
Translation
Understand that translations are specified by a distance and direction using a vector;
Translate a given shape by a vector;
Describe and transform 2D shapes using single translations on a coordinate grid;
Use column vectors to describe translations;
Understand that distances and angles are preserved under rotations and translations, so that any figure is congruent under either of these transformations.
Reflection
Understand that reflections are specified by a mirror line;
Identify correct reflections from a choice of diagrams;
Understand that reflections are specified by a mirror line;
Identify the equation of a line of symmetry;
Transform 2D shapes using single reflections (including those not on coordinate grids) with vertical, horizontal and diagonal mirror lines;
Describe reflections on a coordinate grid;
Enlargement

Scale a shape on a grid (without a centre specified);
Understand that an enlargement is specified by a centre and a scale factor;
Enlarge a given shape using (0, 0) as the centre of enlargement, and enlarge shapes with a centre other
Find the centre of enlargement by drawing;
Describe and transform 2D shapes using enlargements by:
-    a positive integer scale factor;
-    a fractional scale factor;
Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides, simple integer scale factors, or simple fractions;
Understand that distances and angles are preserved under reflections, so that any figure is congruent under this transformation;
Understand that similar shapes are enlargements of each other and angles are preserved – define similar
Describe and transform 2D shapes using combined rotations, reflections, translations, or enlargements.

Topic: Plans and Elevations
Understand clockwise and anticlockwise;
Draw circles and arcs to a given radius or given the diameter;
Measure and draw lines, to the nearest mm;
Measure and draw angles, to the nearest degree;
Know and use compass directions;
Draw sketches of 3D solids;
Know the terms face, edge and vertex;
Identify and sketch planes of symmetry of 3D solids;
Use isometric grids to draw 2D representations of 3D solids;
Make accurate drawings of triangles and other 2D shapes using a ruler and a protractor;
Construct diagrams of everyday 2D situations involving rectangles, triangles, perpendicular and parallel
Understand and draw front and side elevations and plans of shapes made from simple solids;
Given the front and side elevations and the plan of a solid, draw a sketch of the 3D solid.

Year 10

Topic: Tables
Use suitable data collection techniques (data to be integer and decimal values);
Design and use data-collection sheets for grouped, discrete and continuous data, use inequalities fo
Interpret and discuss the data;
Sort, classify and tabulate data, both discrete and continuous quantitative data, and qualitative data;
Construct tables for time–series data;
Extract data from lists and tables;
Use correct notation for time, 12- and 24-hour clock;
Work out time taken for a journey from a timetable;
Design and use two-way tables for discrete and grouped data;
Use information provided to complete a two-way table;
Calculate the total frequency from a frequency table;
Read off frequency values from a table;
Read off frequency values from a frequency table;
Find greatest and least values from a frequency table;
Identify the mode from a frequency table;
Identify the modal class from a grouped frequency table.

Topic: Statistics and sampling
Specify the problem and:
plan an investigation;
decide what data to collect and what statistical analysis is needed;
consider fairness;
Recognise types of data: primary secondary, quantitative and qualitative;
Identify which primary data they need to collect and in what format, including grouped data;
Collect data from a variety of suitable primary and secondary sources;
Understand how sources of data may be biased;
Explain why a sample may not be representative of a whole population;
Understand sample and population.
Questionnaires/surveys

Topic: The averages
Calculate the mean, mode, median and range for discrete data;
Can interpret and find a range of averages as follows:
-   median, mean and range from a (discrete) frequency table;
- range, modal class, interval containing the median, and estimate of the mean from a grouped data
-   mode and range from a bar chart;
-   mean from a bar chart;
Understand that the expression 'estimate' will be used where appropriate, when finding the mean of grouped data using mid-interval values;
Compare the mean, median, mode and range (as appropriate) of two distributions using bar charts, dual bar charts, pictograms
Recognise the advantages and disadvantages between measures of average

Topic: Charts and graphs
Plotting coordinates in first quadrant and read graph scales in multiples;
Produce:
pictograms;
composite bar charts;
dual/comparatie bar charts for categorical and ungrouped discrete data;
bar-line charts;
vertical line charts;
line graphs;
line graphs for time–series data;
histograms with equal class interals;
Interpret data shown in
pictograms;
composite bar charts;
dual/comparatie bar charts;
line graphs;
line graphs for time–series data;
histograms with equal class interals;
Calculate total population from a bar chart or table;
Find greatest and least alues from a bar chart or table;
Identify the mode from a bar chart;
Recognise simple patterns, characteristics, relationships in bar charts and line graphs.

Topic: Pie charts

Draw circles and arcs to a given radius;

Know there are 360 degrees in a full turn, 180 degrees in a half turn, and 90 degrees in a quarter turn;

Measure and draw angles, to the nearest degree;

Interpret tables; represent data in tables and charts;

Know which charts to use for different types of data sets;

Construct pie charts for categorical data and discrete/continuous numerical data;

Interpret simple pie charts using simple fractions and percentages; and multiples of 10% sections;

From a pie chart: Find the mode, find the total frequency

Understand that the frequency represented by corresponding sectors in two pie charts is dependent upon th

Topic: Scatter graphs

Draw scatter graphs;

Interpret points on a scatter graph;

Identify outliers and ignore them on scatter graphs;

Draw the line of best fit on a scatter diagram by eye, and understand what it represents;

Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing;

Distinguish between positive, negative and no correlation using lines of best fit;

Use a line of best fit to predict values of a variable given values of the other variable;

Interpret scatter graphs in terms of the relationship between two variables;

Interpret correlation in terms of the problem;

Understand that correlation does not imply causality;

State how reliable their predictions are, i.e. not reliable if extrapolated.

Topic: Properties of shapes, parallel lines and angle facts

Estimate sizes of angles;

Measure angles using a protractor;

Use geometric language appropriately;

Use letters to identify points, lines and angles;

Use two-letter notation for a line and three-letter notation for an angle;

Describe angles as turns and in degrees;

Understand clockwise and anticlockwise;

Know that there are 360° in a full turn, 180° in a half turn and 90° in a quarter turn;

Identify a line perpendicular to a given line;

Mark perpendicular lines on a diagram and use their properties;

Identify parallel lines;

Mark parallel lines on a diagram and use their properties;

Recall the properties and definitions of special types of quadrilaterals, including symmetry properties;

List the properties of each special type of quadrilateral, or identify (name) a given shape;

Draw sketches of shapes;

Name all quadrilaterals that have a specific property;

Identify quadrilaterals from everyday usage;

Given some information about a shape on coordinate axes, complete the shape;

Classify quadrilaterals by their geometric properties;

Understand and use the angle properties of quadrilaterals;

Use the fact that angle sum of a quadrilateral is 360°;

Use geometrical language appropriately and give reasons for angle calculations;

Recall and use properties of angles at a point, angles at a point on a straight line, right angles, and vertically opposite angles;
Distinguish between scalene, equilateral, isosceles and right-angled triangles;
Derive and use the sum of angles in a triangle;
Find a missing angle in a triangle, using the angle sum of a triangle is 180°;
Understand and use the angle properties of triangles, use the symmetry property of isosceles triangle to show that base angles are equal;
Use the side/angle properties of isosceles and equilateral triangles;
Show step-by-step deduction when solving problems;
Understand and use the angle properties of intersecting lines;
Understand a proof that the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices;
Find missing angles using properties of corresponding and alternate angles;
Understand and use the angle properties of parallel lines.
Solve angle problems using algebra.

symmetry and rotational symmetry of polygons

Topic: Interior and exterior angles of polygons
Recognise and name pentagons, hexagons, heptagons, octagons and decagons;
Understand 'regular' and 'irregular' as applied to polygons;
Use the sum of angles of irregular polygons;
Calculate and use the sums of the interior angles of polygons;
Calculate and use the angles of regular polygons;
Use the sum of the interior angles of an n-sided polygon;
Use the sum of the exterior angles of any polygon is 360°;
Use the sum of the interior angle and the exterior angle is 180°;
Identify shapes which are congruent (by eye);
Explain why some polygons fit together and others do not;
Solve angle problems using algebra.
Topic: Quadratic equations: Expanding and factorising
Define a 'quadratic' expression;
Multiply together two algebraic expressions with brackets;
Square a linear expression, e.g. $(x + 1)^2$;
Factorise quadratic expressions of the form $x^2 + bx + c$;
Factorise a quadratic expression $x^2 - a^2$ using the difference of two squares;
Solve quadratic equations by factorising;
Find the roots of a quadratic function algebraically.

Topic: Quadratic equations: Graphs
Generate points and plot graphs of simple quadratic functions, then more general quadratic functions;
Identify the line of symmetry of a quadratic graph;
Find approximate solutions to quadratic equations using a graph;
Interpret graphs of quadratic functions from real-life problems;
Identify and interpret roots, intercepts and turning points of quadratic graphs

Topic: Right angled triangles: Pythagoras' Theorem
Understand, recall and use Pythagoras' Theorem in 2D, including leaving answers in surd form;
Given 3 sides of a triangle, justify if it is right-angled or not;
Calculate the length of the hypotenuse in a right-angled triangle, including decimal lengths and a ran
Find the length of a shorter side in a right-angled triangle;
Apply Pythagoras' Theorem with a triangle drawn on a coordinate grid;
Calculate the length of a line segment AB given pairs of points;

Topic: Perimeter and area
Indicate given alues on a scale, including decimal alue;
Know that measurements using real numbers depend upon the choice of unit;
Convert between units of measure within one system, including time;
Convert metric units to metric units;
Make sensible estimates of a range of measures in everyday settings;
Measure shapes to find perimeters and areas using a range of scales;
Perimeter
Find the perimeter of rectangles and triangles;
Find the perimeter of parallelograms and trapezia;
Find the perimeter of compound shapes;
Solve angle or perimeter problems using algebra.
Area
Recall and use the formulae for the area of a triangle and rectangle;
Find the area of a rectangle and triangle;
Find the area of a trapezium and recall the formula;
Find the area of a parallelogram;
Calculate areas and perimeters of compound shapes made from triangles and rectangles;
Surface Area
Estimate surface areas by rounding measurements to 1 significant figure;
Find the surface area of a prism;
Find surface area using rectangles and triangles;
Convert between metric area measures.

Topic: 3D forms and volume
Identify and name common solids: cube, cuboid, cylinder, prism, pyramid, sphere and cone;
Sketch nets of cuboids and prisms;
Recall and use the formula for the volume of a cuboid;
Find the volume and surface area of a prism, including a triangular prism, cube and cuboid;
Calculate volumes and surface areas of right prisms and shapes made from cubes and cuboids;
Estimate volumes etc by rounding measurements to 1 significant figure;
Convert between metric volume measures;
Convert between metric measures of volume and capacity e.g. 1ml = 1cm3.

Topic: Probability

Distinguish between events which are impossible, unlikely, even chance, likely, and certain to occur;
Mark events and/or probabilities on a probability scale of 0 to 1;
Write probabilities in words or fractions, decimals and percentages;
Find the probability of an event happening using theoretical probability;
Use theoretical models to include outcomes using dice, spinners, coins;
List all outcomes for single events systematically;
Work out probabilities from frequency tables;
Work out probabilities from two-way tables;
Record outcomes of probability experiments in tables;
Add simple probabilities;
Identify different mutually exclusive outcomes and know that the sum of the probabilities of all outcomes
Using 1 – p as the probability of an event not occurring where p is the probability of the event occurring;
Find a missing probability from a list or table including algebraic terms.
Find the probability of an event happening using relative frequency;
Estimate the number of times an event will occur, given the probability and the number of trials – for both experimental and theoretical probabilities;
List all outcomes for combined events systematically;
Use and draw sample space diagrams;
Work out probabilities from Venn diagrams to represent real-life situations and also 'abstract' sets of
Use union and intersection notation;
Compare experimental data and theoretical probabilities;
Compare relative frequencies from samples of different sizes;
Find the probability of successive events, such as several throws of a single dice;
Draw and use frequency trees
Use tree diagrams to calculate the probability of two independent events;
Use tree diagrams to calculate the probability of two dependent events.

Topic: Compound measures
Metric conversions for length, weight, capacity etc
Understand and use compound measures and:
convert between metric speed measures;
read values in km/h and mph from a speedometer;
calculate average speed, distance, time – in miles per hour as well as metric measures;
convert between density measures;
Convert between pressure measures;
Use kinematics formulae from the formulae sheet to calculate speed, acceleration, etc (with variables defined in the question);
change d/t in m/s to a formula in km/h, i.e. d/t × (60 × 60)/1000 – with support;
Topic: Constructions, loci and bearings
Understand congruence, as two shapes that are the same size and shape;
Visually identify shapes which are congruent;
Use straight edge and a pair of compasses to do standard constructions:
understand, from the experience of constructing them, that triangles satisfying SSS, SAS, ASA and RHS are unique, but SSA triangles are not;
construct the perpendicular bisector of a given line;
construct the perpendicular from a point to a line;
construct the bisector of a given angle;

construct angles of 90°, 45°;
Draw and construct diagrams from given instructions, including the following:
- a region bounded by a circle and an intersecting line;
- a given distance from a point and a given distance from a line;
- equal distances from two points or two line segments;
- regions may be defined by 'nearer to' or 'greater than';
Find and describe regions satisfying a combination of loci;
Use constructions to sole loci problems (2D only);
Use and interpret maps and scale drawings;
Estimate lengths using a scale diagram;
Make an accurate scale drawing from a diagram;
Use three-figure bearings to specify direction;
Mark on a diagram the position of point B given its bearing from point A;
give a bearing between the points on a map or scaled plan;
given the bearing of a point A from point B, work out the bearing of B from A;
Use accurate drawing to sole bearings problems;
Sole locus problems including bearings.
Topic: Perimeter, area and volume 2: Circles, cylinders, cones, pyramids and spheres
Recall the definition of a circle;
Identify, name and draw parts of a circle including tangent, chord and segment;
Recall and use formulae for the circumference of a circle and the area enclosed by a circle circumference of a circle = 2πr = πd, area of a circle = πr2;
Find circumferences and areas enclosed by circles;
Use π ≈ 3.142 or use the π button on a calculator;
give an answer to a question involving the circumference or area of a circle in terms of π;
Find radius or diameter, given area or perimeter of a circles;
Find the perimeters and areas of semicircles and quarter-circles;
Calculate perimeters and areas of composite shapes made from circles and parts of circles;
Calculate arc lengths, angles and areas of sectors of circles;
Find the surface area of a cylinder;
Find the volume of a cylinder;
Find the surface area and volume of spheres, pyramids, cones and composite solids;
Round answers to a given degree of accuracy.

Topic: Similarity and congruence in 2D
Use the basic congruence criteria for triangles (SSS, SAS, ASA and RHS);
Sole angle problems involving congruence;
Identify shapes which are similar; including all circles or all regular polygons with equal number of sides;
Understand similarity of triangles and of other plane shapes, use this to make geometric inferences, and sole angle problems using similarity;
Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding
Understand the effect of enlargement on perimeter of shapes;
Sole problems to find missing lengths in similar shapes;
Know that scale diagrams, including bearings and maps are 'similar' to the real-life examples