Supporting your child with Mathematics and Numeracy

Be **POSITIVE**!
Encourage your child to 'try' and 'have a go' and work together with them.

Use your child's **MISTAKES** to help them learn. Encourage them to identify where they went wrong – was it a calculation error or a wrong method?

Encourage your child to look in their exercise book and read any teacher **NOTES** or examples to recall any prior knowledge required.

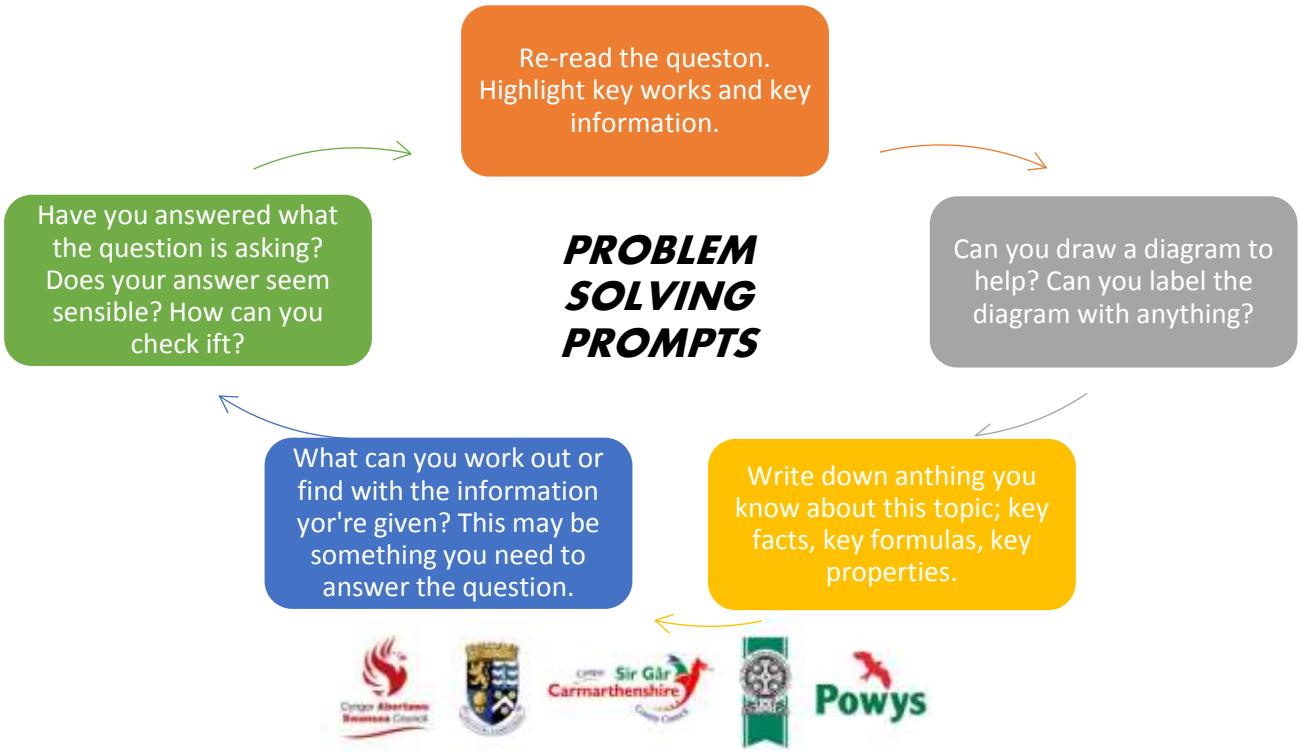
TOP TIPS

Don't give up!
There are many **ONLINE** videos and demonstrations which can remind you and your child of mathematical methods.

Encourage your child to **CHECK** their work. Does their answer seem sensible? Can they approach the question a different way and obtain the same solution?

Encourage your child to make **LINKS** with other aspects of mathematics as well as other subjects.

- While schools are closed, make sure your child is able to access work to support their progress in Mathematics and Numeracy from their teacher through whichever online platform their school is using.
- When supporting your child with their learning, identify what they can do confidently and aim to move them on from here in small progressive steps. This document may help you to identify the next steps in your child's learning.
- Use everyday activities and real life contexts to demonstrate and practice mathematical and numeracy skills.
- If you find any of your child's work too unfamiliar or difficult to support with, this document will indicate a number of helpful online videos and websites which may support with this. Also encourage your child to ask their teacher for further help and instruction.
- **ENGAGE** with your child and **ENCOURAGE** them to **ENDURE**!



Key Questions

Key Questions to ask your child to help and support them through mathematics questions;

Question you could ask your child	Purpose
1. What is the question asking you to do?	*Can they explain that they understand the question being asked?*
2. What method do you know for finding this out?	*Can they recall a suitable method? Do they need to look back in their books? Or at notes sent home by their teacher? Or at an online video?*
3. Would a visual picture or model help?	*Can a visual representation help understand what mathematics is required? A number line? A bar model? A tree diagram? A table to write a list? A diagram showing angles? Identified shapes? Can any angles or properties be labelled on the diagram?*
4. Do you need any special mathematical equipment such as a compass or protractor?	*Are they are using the correct equipment when drawing accurate scale drawings or bearings or loci?*
5. Can you explain why you are choosing this method?	*Do they understand what they are doing, rather than guessing and hoping for the best?*
6. Is there another way you can answer the question?	*Is there an opportunity to explore different ways of thinking and approaching a question?*
7. Do you NEED to use a calculator or can you do it without?	*Does the question expect them to use a calculator? Are they gaining enough exposure and practice of both calculator and non-calculator methods?*
8. Can you estimate roughly what your answer will be?	*Have they engaged appropriately with the question and understood in what range a sensible answer would be?*
9. Does your answer seem to be a sensible size?	*Are they checking their answers and more conscientious about accuracy rather than speed of finishing?*
10. Is there a way you can check your answer?	*Are they aware of an appropriate way of checking their answer without doing exactly the same thing they did the first time? Can they work backwards? Can they attempt the question in a different way and still get the same answer? Can they substitute their answer into an equations to see if it's correct?*

Years 7 - 9

The Mathematical concepts indicate the steps needed to be undertaken by your child as their understanding deepens and they develop mastery, moving from the green to amber to red.

Mathematical concept	Application	Links
NUMBER		
Read and write numbers of any size and use the four operations and the connections between them. Use known facts to derive others when multiplying, e.g. use 7 x 6 to derive 0.7 x 6. Use known facts to derive others when dividing, e.g. use 7 x 6 to derive 42 ÷ 0.0006.		Reading and writing a number Apply division as the inverse of multiplication Use of known facts to derive others Strategies to check calculations
Identify and use prime numbers, square numbers, square roots, the lowest common multiple (LCM) and the highest common factor (HCF). Use the terms cube, cube root and reciprocal. Write a number as a product of its prime factors in index form.		Prime Numbers HCF and LCM Square and square root Cube and cube root
Express square numbers using powers. Express cube numbers and repeated multiplication ($7x7x7x7x7x7=7^6$) as powers. Understand the importance of powers of 10, and its application in standard form, to include multiplying and dividing numbers in standard form, and representing standard form on a calculator.	Your child could investigate the distances between planets and the sun, these will be very large numbers. Ask your child to write these distances in standard form.	Use powers and understand the importance of powers of 10 Standard form
Use equivalence of fractions, decimals, percentages and ratio to compare proportions. Use equivalence of fractions, decimals, percentages and ratio to select the most appropriate for a calculation.	Your child could adjust appropriate recipes to work out the quantities of ingredients required for a different number of people.	Recurring decimals Use equivalence of fraction, decimal or percentage to select the most appropriate for calculations. Top heavy and mixed fractions
Calculate percentages of quantities using non-calculator methods where appropriate. Calculate a percentage, fraction, decimal of any quantity with a calculator where appropriate, calculate the outcome of a given percentage increase or decrease and express one quantity as a percentage of another. Calculate a percentage increase or decrease and express one quantity as a percentage of another, including those given in different units.	Your child could research some offers online and work out the sale price of items after the percentage discount.	Calculate percentages of a value without a calculator Calculate a percentage increase and decrease
Use ratio and proportion including map scales and express two or more quantities as a ratio.		Use ratio to calculate quantities Proportion

Simplify ratios including those given in different units and use ratio and proportion to calculate quantities, including cases where the 'total' is not given.		
Add and subtract fractions. Multiply and divide fractions.		Adding and subtracting fractions Multiplying and dividing fractions
Add and subtract numbers with up to 2 decimal places, multiply and divide 3-digit by 2-digit numbers, multiply and divide decimals with 1 or 2 places by single-digit whole numbers, and multiply and divide whole numbers by 0.5, 0.2, 0.1. Multiply and divide whole numbers and decimals. Add and subtract numbers and decimals of any size.		Adding and subtracting decimals Multiply by 10,100,1000
Use the order of operations, including brackets, and powers.	Your child could use a basic calculator and a scientific calculator to investigate different calculations with various operations and work out why the answers are different on each calculator.	Order of operations
Add and subtract with negative numbers. Multiply and divide with negative numbers.		Positive and negative numbers
Present answers to a given number of decimal places. Use rounding to estimate answers to a given number of significant figures and present answers to a given number of significant figures.		Estimating Rounding to decimal places Rounding to significant figures Presenting answers to an appropriate degree of accuracy
Make informed decisions relating to discounts and special offers. Carry out calculations relating to VAT, saving and borrowing. Calculate foreign money and exchange rates.	Discuss best buy offers online and encourage your child to compare them to work out which is the best value.	Calculations relating to VAT Use profit and loss when buying and selling Discounts and special offers Currency
Understand the advantages and disadvantages of using bank accounts, including bank cards. Appreciate the basic principles of budgeting, saving (including understanding compound interest) and borrowing. Understand the risks involved in different ways of saving and investing and describe why insurance is important and the impact of not being insured.	Your child could look online at the different bank accounts available and discuss them with you.	Budgeting, saving, borrowing and an introduction to compound interest The importance of insurance Understand the advantages and disadvantages of using bank accounts and bank cards

MEASURE		
Find perimeters of shapes, including compound shapes, with straight sides. Find circumferences of circles. Find perimeters of semicircles and quadrants and use Pythagoras' Theorem.		Pythagoras' Theorem Finding the circumference of a circle
Make estimates of length, weight/mass and capacity based on familiar and less familiar objects, and read and interpret scales on a range of measuring instruments.		Read and interpret scales on a range of measuring instruments
Convert between units of the metric system. Use and convert rough metric equivalents of imperial units in daily use. Understand and use a variety of compound measures, including speed and density, and define upper and lower bounds of discrete measurements.		Calculating with speed, distance and time Converting between lengths in the metric system Using rough metric equivalents of imperial units in everyday life
Convert between times expressed as a decimal or fraction and hours, minutes and seconds, e.g. 1.5, 1.25, 1.75 hours and use time zones to compare times in different countries. Interpret time expressed as decimals and fractions and enter them appropriately on a calculator, and use timetables and time zones to calculate travel time for a multi-stage journey.		Measure and record times in an hundredth of a second Using different time zones Use time tables to calculate travel times
Calculate the area of rectangles, triangles, parallelograms, compound shapes, kites, trapezia, circles, semicircles, quadrants and the surface area of cubes and cuboids.		Area of a rectangle Area of a triangle Areas of compound shapes Finding the area of a circle Surface area of a cuboid
Calculate the volume of cubes, cuboids, prisms constructed from cuboids, prisms and cylinders.		Volume of a cuboid Volume of a prism Volume of a cylinder
Measure, draw and label angles to the nearest degree and calculate angles on a straight line, around a point, vertically opposite and in triangles. Explore angles on parallel lines, the exterior angles of triangles, the angle properties of quadrilaterals, and measure bearings. Calculate interior and exterior angles of polygons, explore properties of shapes that tessellate, and draw bearings.	Your child could investigate patterns which tessellate, ask them to explain why they tessellate in each case.	Measure and draw angles Angles on parallel lines Bearings Applying an understanding of bearing and scale Investigating the interior and exterior angles of polygons Tessellations

GEOMETRY		
Define solid shapes by their properties using the terms edges, faces, vertices and prism. Classify quadrilaterals.		Edges, faces and vertices Properties of quadrilaterals
Explain the properties of congruent shapes. Recognise similar shapes and calculate the size of missing sides with whole number scale factor.		Similar Shapes
Recognise and draw to scale on square paper nets of cubes and cuboids. Recognise and draw accurate nets of prisms, represent 3D shapes on isometric paper, and draw plans and elevations of 3D shapes made out of cubes.	You could challenge your child to draw accurate nets for various prisms and they can test the accuracy of their nets by observing if they form the intended prism.	3D shapes and their nets
Construct circles using compasses and draw triangles accurately when given lengths and angles, using ruler and protractor. Construct triangles when given three lengths using a ruler and compass, and identify sets of lengths that cannot form a triangle		Constructing a triangle using a protractor Constructing triangles given 3 side lengths
Know the symmetrical properties of regular and irregular shapes, rotate a shape on a grid, translate a shape using a description and describe a translation. Identify planes of symmetry, enlarge shapes on square paper where the scale factor is a positive whole number. Rotate shapes and describe rotations about the origin, enlarge a shape around a centre where the scale factor is positive, and explore locus where the path is a given distance from a point, line or shape.		Symmetry Transformations and enlargements

ALBEGRA		
Explore number sequences and express nth term rules involving one and two steps in words and symbols. Use algebra to express the nth term rule of a linear sequence and use the nth term rule to find particular terms. Distinguish between a linear and non-linear sequence.		How to find the next term in an arithmetic sequence Linear sequences
Understand algebraic notation for algebraic expressions, simplify expressions and substitute positive whole numbers into expressions. Substitute negative numbers into expressions, expand single brackets and rearrange formulae involving two variables. Use rules of indices, expand double brackets, factorise into a single bracket and rearrange formulae involving two or more variables.		Algebraic Notation Expand Single Brackets Rearranging formulae
Express the output generated from function machines, and read, plot and write coordinates in all four quadrants. Generate and plot points for linear functions. Understand linear functions in the form of y=mx+c.		Drawing straight line graphs Straight line graphs and Y=mx +c
Solve two step equations and give solutions for inequalities < > ≤ ≥. Solve equations including those where the solution is a negative, a fraction or a decimal and those that include brackets ( ). Construct and solve equations that include brackets ( ) and a( ) + b( ) and where the variable appears on both sides, solve equations by trial and improvement, express situations as inequalities and solve inequalities showing the solutions on a number line.		Solving Equations (two step, brackets, fractions) Solving Equations (unknown on both sides) Solving inequalities

DATA		
Collect own data for a survey, e.g. through designing a questionnaire, construct frequency tables for sets of data, and construct a wide range of graphs and diagrams to represent the data. Construct scatter diagrams to investigate correlation and interpret diagrams and graphs to compare sets of data. Construct and interpret graphs and diagrams (including pie charts) to represent discrete or continuous data.	Your child could design a survey to give to friends and family online. They can collate the data and observe whether any questions could have been asked differently to improve the quality of answers. Ask them to display the information on a graph.	Constructing frequency tables Collecting data through designing questionnaires Scatter diagrams Pie chart- angle calculation Pie chart - drawing How to represent data
Use mean, median, mode and range to compare two distributions (discrete data). Find the mean, median, mode and range from ungrouped frequency tables and use them to compare two distributions (continuous data). Find the mean, median, mode and range from grouped frequency tables and explain why it is an estimate.		Averages (list, frequency table) Averages (grouped frequency table)
Recognise that impossible = 0 and certain = 1 and that the probability of an event will lie on a scale between 0 and 1. Express the probability of an event as a fraction or decimal percentage. Show that the sum of all probabilities = 1. Use the sum of all probabilities is 1 – simple cases, e.g. rolling a dice P (not 6).		Probability
Determine events with two outcomes that are/aren't equally likely and give examples of events that have a probability of ½. Record all the outcomes of two events as an exhaustive list. Complete a sample space diagram and a two way table. Recognise that practice is different from theory and that repeated experiments may give different results.	Your child could play the horse race game (attach) at various times to observe the fastest horses each time and investigate why this may be.	Completing a sample space diagram
Estimate the number of successes of an event, e.g. flipping a coin ten times, how many heads would be expected? e.g. rolling a fair dice 300 times, how many 3s would be expected? Understand that reliability/stability increases with a greater number of trials.		Estimating probability and relative frequency

Years 10 - 11

Mathematical concept	Application	Links
NUMBER		
Use and interpret numbers in standard form within calculations.		Writing numbers in standard form Adding numbers in standard form Multiplying numbers in standard form Dividing numbers in standard form
Find the lowest common multiple (LCM) and highest common factor (HCF) using prime factors. Distinguish between rational and irrational numbers and manipulate surds.		HCF and LCM using prime factors Surds Adding and subtracting surds Expanding brackets with surds Rationalising the denominator Rational and irrational numbers
Use multipliers when working with percentages and calculate repeated proportional change, using powers. Use and understand the idea of reverse percentage to find the original quantity. Change between recurring decimals and fractions.		Using multipliers Reverse percentages Converting recurring decimals to fractions
Calculate with direct and inverse proportion. Use direct and inverse proportion, in 2 and 3 dimensions.		
Understand and demonstrate the real-life process of foreign exchange and consider the best value of an item priced in two or more different currencies.	Your child could investigate the current foreign exchange rates and work out the cost of various items in different currencies. How many pounds would they need to become a millionaire in another country?	Currency
Calculate compound interest using and understanding efficient methods.		Compound interest
Calculate with money, including household bills and income tax.		Best Buys
Make comparisons between financial products that involve short-term borrowing and investments, and long-term borrowing and investments.	Your child could investigate the cost of buying various items on finance.	

MEASURE		
Find the perimeter of semicircles and quadrants, including compound shapes, cases that require a solution in terms of pi and finding the radius or diameter given a circumference. Find the arc length and the perimeter of a sector. Find the perimeter of a segment.		Perimeter of a semicircle Length of arc
Use trigonometry and Pythagoras' theorem to calculate the length of a side in a right angled triangle. Use trigonometry in non-right angled triangles, use Pythagoras' theorem and trigonometry in 3 dimensions and use the sine and cosine rule.		Pythagoras' Theorem Trigonometry introduction Using trigonometry to find a side Trigonometry to find the area of a triangle 3D Pythagoras Using the sine rule to find a side Using the cosine rule to find a side
Understand and use a variety of compound measures, including speed, density and population density including those that involve converting between units.	Your child could work out the speed at which they can run, or at which they can push a toy car etc, by measuring the distance travelled and recording the time it has taken to travel this distance.	Speed, distance and time Density
Define upper and lower bounds. Recognise and define limitations on accuracy of measurements in calculations involving addition and subtraction, multiplication and division.		Lower and upper bounds Using upper and lower bounds in calculations
Construct and interpolate from conversion graphs. Construct and extrapolate from conversion graphs.		Draw conversion graphs Interpret conversion graphs
Use timetables and time zones to plan a multi-stage journey and to plan the optimum route.		
Find areas of semicircles and quadrants, including cases that require a solution expressed in terms of pi, and finding the radius or diameter given an area. Calculate sector area and find the surface area of prisms, cylinders and spheres. Calculate segment area and the surface area of cones.		Area of a semicircle Surface area of a cuboid Surface area of prisms Surface area of a cylinder Surface area of a sphere Area of a sector Area of a segment Surface area of a cone

Convert between metric units of area and volume. Distinguish between formulae for length, area and volume, and calculate volumes of spheres, hemispheres, cones and pyramids. Calculate volumes of compound solids.	Your child could find various 3D items around the house, estimate which has the largest volume and then measure and calculate the volumes to find out.	Metric units of area Metric units of volume Distinguishing between formulae for length, area and volume Volume of a cone Volume of a pyramid Volume of a sphere Volume of a frustum
Calculate an angle in a right angled triangle using trigonometry. Use trigonometry in situations including those involving bearings, and angles of elevation and depression. Use trigonometry in non-right angled triangles, use the sine and cosine rule, use trigonometry to find an angle in 3 dimensions, and sketch and use trigonometric graphs.		Trigonometry introduction Using trigonometry to find an angle Trigonometry to find the area of a triangle Using the sine rule to find an angle Using the cosine rule to find an angle 3D Trigonometry Sine graph Cosine graph Tangent graph
Find the distance between two points from their coordinates, find the midpoint of a line, and use bearings. Use coordinates in 3 dimensions.	Your child could work out the bearing which various items in a room are on, from a fixed point in the room.	Find the midpoint of a line Find the distance between two points Bearings 3D Coordinates
Use circle theorems to calculate angles in circles. Use the alternate segment theorem and understand and construct geometrical proofs using circle theorems.		Circle Theorems Circle Theorem Examples

GEOMETRY		
Recognise similar shapes and calculate the size of missing sides. Find the area and volume of similar shapes. Prove that two triangles are congruent and use the conditions for congruent triangles in formal proofs.	Your child could sketch various shapes and draw enlargements of these shapes to investigate what happens to the area of the shape when the side lengths are enlarged by various scale factors.	Length of similar shapes Area of similar shapes Volume of similar shapes Congruent Triangles
Draw plans and elevations of any 3D solid, accurately to an appropriate scale.		Plans and elevations
Construct perpendicular bisectors, the perpendicular from a point to a line, the bisector of an angle, angles of 60^{o} and 90^{o}, and shade a region defined by up to two conditions. Select and apply loci to solve problems given more than two conditions.		Construct a perpendicular bisector Construct a perpendicular from a point to a line Construct an angle bisector Construct a 90 degree angle Construct a 60 degree angle Loci Loci Examples
Reflect shapes and describe reflection in horizontal and vertical lines, rotate shapes about a point and describe rotations, translate a shape and describe a translation using vectors, and enlarge a shape where the scale factor is 0.5. Reflect shapes in the lines y=x and y=-x, enlarge a shape where the scale factor is a fraction, and find the centre of enlargement. Enlarge a shape where the scale factor is negative, and recognise and describe combinations of transformations.		Describing reflections Translations using vectors Enlargement by a fractional scale factor Enlargement by a negative scale factor Finding the centre of enlargement

ALBEGRA		
Generate non-linear sequences given the nth term rule, express the nth term rules algebraically, and generate non-linear sequences given the nth term and express non-linear nth term rules algebraically.		nth term for linear sequences nth term for quadratic sequences
Use rules of indices where the power is 0 or a fraction with numerator 1, where the power is a negative whole number or a proper fraction, and where the power is a negative fraction.		Basic rules of indices Fractional indices Negative indices
Substitute into expressions, including those involving powers and brackets, multiply out double brackets, and use substitution to draw graphs.		Expanding double brackets Substitution
Factorise into a single bracket. Factorise quadratic expressions where the coefficient of x^2 is 1, including the difference of two squares. Factorise quadratic expressions and simplify algebraic fractions.		Factorise into a single bracket Factorise quadratics - easier Factorise quadratics - harder Factorise the difference of two squares Simplify Algebraic Fractions
Rearrange formulae including whole number powers and brackets, brackets and powers, and cases that require factorisation.		Rearranging formulae Rearranging formulae-advanced
Distinguish between equations, formulae, expressions, and identities.		
Generate and plot points for simple quadratic and cubic functions, quadratic and cubic functions, simple reciprocal graphs, exponential graphs of the function $y=k^x$. State the equation of parallel lines, perpendicular lines, and find the equation of a line from a graph. Transform graphs of functions.		Quadratic graphs Cubic graphs Reciprocal graphs Exponential graphs Transformation of graphs
Solve linear simultaneous equations with matching coefficients, and simple linear simultaneous equations graphically. Solve linear simultaneous equations, including graphically. Construct and solve equations involving direct and inverse proportion.		Solving simultaneous equations Solving simultaneous equations graphically Direct proportion Inverse proportion
Construct graphs and define regions to show one inequality, 2 or more, and 3 or more inequalities.		Graphing inequalities
Solve equations by trial and improvement. Solve a quadratic equation where the coefficient of x^2 is 1, by factorising. Solve quadratic equations using all methods.		Trial and Improvement Solving quadratics by factorising Using the quadratic formula
Draw inferences from distance-time graphs. Examine rates of change. Find the distance travelled from speed-time graphs, construct tangents to curves and find the area under a graph.		Distance-time graphs Area under a graph Tangent to a curve
Add and subtract algebraic fractions.		Algebraic Fractions

DATA		
Identify bias in the design of collection sheets and questionnaires and write suitable questions, including response boxes. Consider the effect of sample size and other factors that affect the reliability of conclusions drawn, and sample systematically. Define a random sample and work with stratified sampling techniques.	Your child could design a survey to give to friends and family online. They can collate the data and observe whether any questions could have been asked differently to improve the quality of answers.	Questionnaires Stratified sampling Random sampling
Construct and interpret graphs and diagrams (including pie charts) to represent discrete and continuous data, including frequency polygons, cumulative frequency curves and boxplots, and histograms.	Your child could look online at various graphs representing current information. Ask them to interpret these graphs.	Draw frequency polygons Interpret frequency polygons Draw cumulative frequency diagrams Boxplots Draw histograms Interpret histograms Interpreting histograms - harder
Calculate the upper quartile, lower quartile and interquartile range of a set of discrete data, and use a cumulative frequency curve to estimate the median, quartiles and interquartile range.		Comparing boxplots Interpret cumulative frequency diagrams
Use a scatter diagram to make predictions about the data from a line of best fit drawn by eye, and from a line of best fit that passes through the mean.		Scatter diagrams
Use the mean, median, mode and range from grouped frequency tables to compare distributions. Compare sets of data and their distributions, including those that involve describing central tendency, dispersion and correlation.		Estimating the mean from grouped frequency tables
Find probabilities in fraction and decimal form and estimate the number of successes. Use sample space diagrams and two way tables to calculate probabilities and solve problems. Understand dependent and independent outcomes, and use tree diagrams for two or more dependent events to calculate the probability of combined events. Construct and use tree diagrams for two or more dependent events.		Basic probability and two way tables Sample space diagrams OR rule Independent events Conditional probability Tree diagrams
Compare an estimated probability from experimental results with a theoretical probability. Use relative frequency to test a given probability.		Relative frequency