Maths – Number

	CORE KNOWLEDGE and SKILLS	
9A	EXCELLING	**9A**
9B	• Use index laws with positive and negative integers and fractional indices. Estimate powers and roots.	**9B**
8A	• Solve more complex problems involving surds or standard form. .	**8A**
8B	• Convert recurring decimals into fractions and vice versa, using algebraic proof when appropriate.	**8B**
7A	• Solve more complex repeated and inverse percentage problems.	**7A**
7B	• Combine upper or lower bounds appropriately to achieve an overall solution for a practical problem.	**7B**
6A	SECURING	**6A**
6B	• Use the product rule to calculate the number of ways of listing events. • Simplify surds. Rationalise simple denominators. Solve simple equations written in surd form.	**6B**
5A	• Use index laws to calculate with roots and positive integer indices. • Round numbers to a given number of decimal places or significant figures.	**5A**
5B	• Use correct inequality notation on number lines and to show intervals. Write down the maximum or minimum figure for a value rounded to a given whole number. • Use compound measures to solve problems.	**5B**
4A	• Write numbers as the product of their prime factors and hence solve problems using HCF/LCM. • Calculate using numbers in standard form, both with and without a calculator.	**4A**
4B	• Use fractions, decimals and percentages as multipliers to solve problems in a variety of contexts. • Calculate efficiently and accurately with numbers given as integers, fractions, decimals, percentages or standard form, using written and mental methods. Check results using inverses or approximations. • Add/subtract/multiply/divide with mixed numbers, and recognise x 1/n as the inverse of x n. • Give answers in terms of π and use values given in terms of π in calculations.	**4B**
3A	DEVELOPING	**3A**
3B	• Identify all possible permutations or combinations of events, using lists, tables and diagrams. • Recall squares of numbers up to 15 x 15 and cubes of 1, 2, 3, 4, 5 and 10. Know the corresponding roots, giving positive and negative roots as applicable. Recognise powers of 2, 3, 4, 5, and 10. • Convert between ordinary numbers and numbers in standard form.	**3B**
2A	• Make sensible metric/imperial estimates for everyday measurements and use them in a variety of calculations. Know how to convert between metric units. Use a range of measuring scales. • Recognise what fraction, decimal or percentage of a shape is shaded. Convert between fractions, decimals and percentages, and use this to compare and order fractions/decimals/percentages.	**2A**
2B	Simplify fractions and identify equivalent fractions. Convert between mixed numbers and improper fractions. Add and subtract fractions. Calculate fractions/decimals/percentages of amounts. Convert between ratios and fractions.	**2B**
1A	• Solve problems using factors/multiples/primes/HCF/LCM. • Check answers using approximations/estimations and evaluate results. • Understand and use place value. Round numbers to the nearest whole number, 10, 100 or 1000.	**1A**
1B	• Add/subtract/multiply and divide integers (both positive and negative) and decimals, using mental and written methods. Use inverse operations to check answers. Use BIDMAS, reciprocals and the symbols =, $\neq$, $<$, $>$, $\leq$, $\geq$.	**1B**
P8	PREPARING for GCSE	**P8**
P7	• Write numbers up to 3 digits in words and figures.	**P7**
P6	• Recognise odd/even numbers.	**P6**
P5	• Recognise integers as positive, negative or zero and order them.	**P5**
P4	• Be able to add and subtract whole numbers up to 3 digits.	**P4**
P3	• Know multiplication tables up to 12 x 12 and use these to carry out simple division.	**P3**
P2	• Use column headings to identify the value of a digit in a whole number. • Be able to carry out simple money calculations and tell the time using an analogue clock. • Be able to multiply a whole number by 10, 100, 1000,	**P2**
P1	• Be able to multiply a 2 digit number by a 2 digit number, and divide a number by a single digit.	**P1**

Maths – Algebra

	CORE KNOWLEDGE and SKILLS	
9A	EXCELLING	**9A**
9B	• Draw, recognise and interpret reciprocal and trig graphs. Identify turning points of quadratics by completing the square. Use transformations (translations and reflections) of functions.	**9B**
8A	• Estimate and interpret areas under curves and gradients of a tangent to a curve.	**8A**
8B	• Recognise and write down equations of circles, centre (0, 0), radius *r*. Work out coordinates of points of intersection of a circle and a straight line. Find the equation of a tangent to a circle.	**8B**
7A	• Solve harder quadratic equations by factorising, completing the square and the quadratic formula. Use algebraic fractions. Solve simultaneous equations when one is linear and the other quadratic. Solve quadratic inequalities/linear inequalities with 2 variables. Show the feasible region on a graph.	**7A**
7B	• Use set and function notation confidently. Understand and use composite functions, inverse functions and recursive (iterative) relations. Construct rigorous proofs to validate a given result.	**7B**
6A	SECURING	**6A**
6B	• Use y = mx + c to identify parallel and perpendicular lines. Calculate the area under a linear graph. • Draw/interpret exponential graphs. Multiply out more than two binomials. • Factorise/simplify harder expressions and solve more difficult equations. Work out a formula for the *n*th term of a quadratic sequence, and use sequences with surds in them. Use trial and improvement to estimate solutions of equations.	**6B**
5A	• Work out/use gradients and points to identify the equation of a straight line. Use the form y=mx+c to identify parallel lines – including rearranging an equation to identify the gradient.	**5A**
5B	• Draw quadratic and simple non-linear graphs and graphs of real-life situations. Recognise and sketch linear, quadratic, simple cubic and 1/x graphs. Find roots, intercepts and turning points of quadratic graphs. Solve simple quadratics by factorising (including the difference between two squares).	**5B**
4A	• Simplify algebraic expressions, including those involving powers and surds. Multiply out two binomials. Use more complicated formulae expressed in words/letters. Change the subject of a formula. Set up, solve and interpret linear equations, including simultaneous linear equations.	**4A**
4B	• Set up and solve linear inequalities and represent them on a number line. • Understand the difference between an equation and an identity and use algebraic reasoning (including comparing coefficients) to verify a statement. • Continue the terms of a quadratic, Fibonacci-type or geometric sequence. Work out a formula for the *n*th term of linear sequences.	**4B**
3A	DEVELOPING	**3A**
3B	• Plot coordinates and identify coordinates of midpoints and missing vertices. Use tables of values to draw straight-line graphs. Recognise and work out the gradients, y-intercepts and equations. Draw simple quadratic graphs. Read, draw and interpret graphs of real-life situations.	**3B**
2A	• Form linear sequences given the *n*th term, term to term rule or diagrams. Describe how a sequence continues. Work out the value of any term. Work out a formula for the *n*th term of a linear sequence. Recognise sequences of triangular, square and cube numbers.	**2A**
2B	• Use algebraic notation correctly. Understand and use number machines. Form simple expressions. Simplify expressions by collecting like terms, expanding brackets, simplifying powers and factorising. Substitute numbers into simple formulae given in words and algebra. Solve simple linear equations.. Understand the terms expression, equation, formula, identity, inequality, term and factor. Know/use the signs <, ⩽, ⩾, >, = and ≠. Solve simple linear inequalities and show inequalities on a number line.	**2B**
1A		**1A**
1B		**1B**
P8	PREPARING for GCSE	**P8**
P7	• Continue simple sequences of numbers or diagrams.	**P7**
P6	• Plot and write down coordinates in the first quadrant.	**P6**
P5	• Know repeated addition can be done by multiplication and repeated subtraction can be done by division.	**P5**
P4	• Know and use simple inverses.	**P4**
P3	• Understand smaller than and greater than and be able to put numbers in size order.	**P3**
P2	• Know that symbols can be used to represent a number. Work out the value of a symbol in a problem.	**P2**
P1		**P1**

Maths – Ratio, Proportion and Rates of Change

	CORE KNOWLEDGE and SKILLS	
9A	EXCELLING	**9A**
9B	• Solve growth and decay problems using multipliers or iterative processes. Understand that some iterations may have a limiting value.	**9B**
8A	• Draw a tangent at a point on a curve and measure the gradient. Interpret the meaning of the gradient at a point (the gradient of the tangent) as the instantaneous rate of change. Understand that on a speed/velocity-time graph then the gradient will represent acceleration, and on a distance-time graph the gradient will represent speed/velocity. Understand the difference between positive and negative gradients as rates of change, and the link to direct/inverse proportion in a variety of numerical, algebraic and graphical contexts.	**8A**
8B		**8B**
7A		**7A**
7B		**7B**
6A	SECURING	**6A**
6B	• Construct and interpret equations representing direct and inverse proportion.	**6B**
5A	• Understand and use the equations representing direct and inverse proportion: y=kx and y=k/x. Set up and use equations to solve a variety of problems involving direct or inverse proportion.	**5A**
5B	• Relate algebraic solutions to graphical representation of the equations. Recognise direct and inverse proportion graphs. Understand the difference between positive and negative gradients and interpret the gradient as the rate of change. Sketch/identify a graph that represents a real life situation.	**5B**
4A	• Use a fraction of a quantity to compare proportions.	**4A**
4B	• Work out a percentage increase or decrease. Solve percentage increase/decrease problems using a multiplier. Solve problems involving repeated proportional change and compound interest problems. Use percentages, decimals or fractions to calculate proportions. Calculate reverse percentages.	**4B**
	• Use calculators to explore exponential growth and decay. Model growth and decay problems.	
	• Use and interpret ratios in a wide variety of problems, including best-buy problems.	
	• Use the links between ratio, direct proportion, equations and graphs to solve a variety of problems.	
	• Use/convert between units in algebraic contexts. Solve more complicated problems using compound measures. Understand the effect of enlargement on areas and volumes of shapes and solids and make comparisons. Work out a scale from a scale drawing.	
	• Understand, recall and use trigonometry ratios in right-angled triangles.	
3A	DEVELOPING	**3A**
3B	• Work out one quantity as a fraction or decimal of another quantity. Convert between ratios, fractions, decimals and percentages and use them to solve simple problems.	**3B**
2A	• Interpret percentage as the operator 'so many hundredths of'. Work out the percentage of a shape that is shaded and shade a percentage of a shape. Increase or decrease an amount by a percentage. Work out one quantity as a percentage of another quantity. Solve simple interest problems.	**2A**
2B	• Use ratio notation. Simplify a ratio and write in the form 1:n. Divide an amount in a given ratio. Compare two quantities and represent them as a ratio. Compare the cost of items using ratios and fractions. Use equality of ratios to solve problems.	**2B**
1A	• Recall and use conversions for metric measures for length, area, volume/capacity, mass and time. Convert between common imperial units and use given conversion factors to convert between metric and imperial. Use simple compound units, including speed, rates of pay, pressure and density.	**1A**
1B	• Use and interpret scales for maps and scale drawings. Construct scale drawings. Use scales to estimate lengths. Understand the effect of enlargement on perimeter.	**1B**
P8	PREPARING for GCSE	**P8**
P7	• Be able to continue repeating patterns in diagrams and describe the repeating pattern.	**P7**
P6	• Given two different things e.g. 12 yellow beads and 20 red beads, create different repeating patterns	**P6**
P5	• Understand what the numerator and denominator in a fraction represent.	**P5**
P4	• Identify simple fractions of shapes that are shaded.	**P4**
P3	• Know equivalent simple fractions, decimals and percentages.	**P3**
P2	• Measure lengths accurately using a ruler.	**P2**
P1	• Know the different metric and imperial units used for measuring length, area, volume, weight and capacity.	**P1**

Maths – Geometry and Measures

	CORE KNOWLEDGE and SKILLS	
9A	EXCELLING	**9A**
9B	• Use Pythagoras Theorem and Trigonometry to solve problems in 3-D. Know and use the sine and cosine rules to find lengths and angles. Know and use the area of a triangle = ½ absinC.	**9B**
8A	• Use vectors to construct arguments and proofs. Recognise when lines are parallel using vectors. Identify and prove that points are co-linear.	**8A**
8B	• Prove the circle theorems.	**8B**
7A	• Use ratio to compare areas/volumes of similar shapes.	**7A**
7B		**7B**
6A	SECURING	**6A**
6B	• Identify, draw and describe fully combinations of transformations, and use negative scale factors for enlargements. Understand 'invariance' for points, lines and shapes.	**6B**
	• Know and use the circle theorems to solve a variety of problems.	
5A	• Use a ruler and compasses to do standard constructions, draw 2D shapes, simple loci and regions.	**5A**
5B	• Identify, draw and describe fully transformations of shapes (reflections, rotations, translations and enlargements – including fractional scale factors, and representing enlargements as ratios). Know which properties are preserved under transformations, and which are not. Solve problems using combinations of transformations. Use vectors to describe translations, and be able to draw them. Understand vector notation and add, subtract and multiply vectors by a scalar.	**5B**
4A	• Know and use angle facts for angles on parallel lines. Solve problems using symmetry/angle properties of triangles and quadrilaterals. Calculate the size of exterior/interior angles in a regular polygon and solve problems using angles in polygons. Solve problems using congruent/similar shapes and use the conditions for congruent triangles. Use clear mathematical reasoning.	**4A**
4B	• Interpret accuracy of measuring to the nearest integer. Solve problems using three figure bearings.	**4B**
	• Solve problems using the perimeter/area of compound or more complicated shapes. Work out the surface area/volume of cuboids, cylinders, pyramids, spheres, hemispheres, cones and prisms. Solve problems using arc lengths and areas of sectors.	
	• Know the formula for Pythagoras' Theorem and trigonometry in right angled triangles, and use them to solve problems. Know the exact trig values for 0^o, 30^o, 45^o, 60^o and 90^o.	
3A	DEVELOPING	**3A**
3B	• Use the correct notation and names for angles. Identify and draw parallel and perpendicular lines. Measure/draw lines to the nearest mm and angles to the nearest degree. Solve problems using angles on a straight line, at a point, vertically opposite angles and angles in triangles and quadrilaterals. Give reasoned explanations.	**3B**
2A	• Identify/draw lines of symmetry and the order of rotational symmetry for shapes/diagrams. Complete diagrams with given line symmetry or rotational symmetry.	**2A**
2B	• Recognise and name polygons. Draw and name parts of a circle. Draw circles given the radius or diameter. Know and name 3-D solids. Identify edges, faces and vertices. Understand that prisms have uniform cross section. Solve geometrical problems on a set of axes.	**2B**
1A	• Find areas by counting squares and know the formulae for finding areas of triangles, parallelograms, trapezia and circles. Find the perimeter of shapes, including the circumference of a circle.	**1A**
	• Draw and use plans and elevations. Draw nets. Understand and use isometric drawings.	
1B	• Choose appropriate units and make sensible estimates of a range of real-life measures. Read and interpret scales. Use, interpret and draw maps and scale drawings. Know the 8 main compass points.	**1B**
P8	PREPARING for GCSE	**P8**
P7	• Know the names of basic 2-D shapes and be able to identify and sketch them.	**P7**
P6	• Know that an angle represents the amount of turn and that angles are measured in degrees	**P6**
P5	• Know the different metric and imperial units used for measuring length	**P5**
P4	• Know the four points of a compass.	**P4**
P3	• Know multiplication tables up to 12 x 12 and use these to carry out simple division.	**P3**
P2	• Be able to draw lines of a given length accurately	**P2**
P1	• Be able to identify some lines of symmetry of shapes	**P1**

Maths – Probability

	CORE KNOWLEDGE and SKILLS	
9A	EXCELLING • Understand the implications of with or without replacement problems when calculating conditional probabilities. • Draw and Use tree diagrams and Venn diagrams for calculating conditional probabilities.	**9A**
9B		**9B**
8A		**8A**
8B		**8B**
7A		**7A**
7B		**7B**
6A	SECURING • Use lists/two way tables to calculate conditional probabilities.	**6A**
6B		**6B**
5A	• Understand and use relative frequency to estimate probabilities. Use a relative frequency diagram to estimate a probability by using the largest number of trials available. Use relative frequencies to estimate the number of times an event happens. Consider differences between the theoretical probability of an outcome and its relative frequency in a practical situation. • Complete a tree diagram to show outcomes and probabilities. Use a tree diagram (which may or may not be given) as a method for calculating probabilities for independent events. Understand the implications of with or without replacement for probabilities. • Understand a Venn diagram consisting of a universal set and at most two sets, which may or may not intersect. Shade areas on a Venn diagram to represent probabilities. Solve problems using a Venn diagram (which may or may not be given in the question). • Understand and use the probability notation correctly, including complements, unions and intersections. • Determine when it is appropriate to add or multiply probabilities. Understand the meaning of independence for events. Understand the implications of with or without replacement problems for probabilities obtained. Calculate probabilities when events are dependent or independent.	**5A**
5B		**5B**
4A		**4A**
4B		**4B**
3A	DEVELOPING • List all the outcomes for a single event or two events in a systematic way. Use a list/table to calculate probabilities. Complete tables and/or grids to show outcomes and probabilities. • Design, complete and use two-way tables. • Complete a frequency table to record the outcomes of an experiment. Understand and use the term relative frequency. Understand that experiments rarely give the same results. Understand that the greater the number of trials in an experiment, the more reliable the results are likely to be. Appreciate, for example, a fair coin is still equally likely to give heads or tails even after five heads in a row. Recall that an ordinary fair dice is unbiased with equally likely outcomes. • Design, complete and use a frequency tree from given information. Use a frequency tree to compare frequencies of outcomes. • Understand when outcomes can or cannot happen at the same time. Use this understanding to calculate probabilities. Know that the sum of the probabilities of all possible mutually exclusive outcomes has to be 1. Find the probability of a single outcome from knowing the probability of all other outcomes. • Understand the 0-1 probability scale	**3A**
3B		**3B**
2A		**2A**
2B		**2B**
1A		**1A**
1B		**1B**
P8	PREPARING for GCSE • Be familiar with the words certain, likely, even chance, unlikely and impossible when related to talking about the chance of something happening. • Know that the probability scale goes between 0 and 1 and that they can be measured in fractions, decimals or percentages • Put events on a probability scale reasonably accurately • Conduct simple experiments and collect the data • Record data in tally charts and use tallies to work out the frequencies	**P8**
P7		**P7**
P6		**P6**
P5		**P5**
P4		**P4**
P3		**P3**
P2		**P2**
P1		**P1**

Maths – Statistics

	CORE KNOWLEDGE and SKILLS	
9A	EXCELLING	**9A**
9B	• Construct and interpret histograms for grouped discrete and continuous data.	**9B**
8A	• Find an estimate of the median or other information from a histogram.	**8A**
8B	• Choose an appropriate measure according to the nature of the data to be the 'average'. Compare two diagrams in order to make decisions about a hypothesis (usually using the mean/median and interquartile range/range).	**8B**
7A		**7A**
7B		**7B**
6A	SECURING	**6A**
	• Understand which diagrams are appropriate for different types of data.	
6B	• Construct and interpret cumulative frequency graphs and box plots for grouped discrete and continuous data. Calculate quartiles and inter-quartile range from a small data set. Read off lower quartile, median and upper quartile from a cumulative frequency diagram or a box plot and calculate the inter-quartile range.	**6B**
	• Compare two distributions in order to make decisions about a hypothesis by comparing the range or the inter-quartile range and a suitable measure of average, such as the mean or median.	
5A	• Plot and interpret time series graphs. Use a time-series graph to predict a subsequent value. Understand that if data points are joined with a line then the line will not represent actual values but will show a trend.	**5A**
5B	• Calculate an estimate of the mean for a grouped frequency distribution, understanding why it is an estimate. Find the interval containing the median and identify the modal class. Choose an appropriate measure to be the 'average', according to the nature of the data.	**5B**
4A	• Understand that samples may or may not be representative of the population, and that the size and construction of the sample will affect how representative it is. Find patterns in data that may lead to a conclusion and look for unusual data values that do not fit an otherwise good correlation.	**4A**
4B	• Understand that just because a correlation exists, it does not necessarily mean that causality is present. Draw a line of best fit by eye on a scatter graph for data with strong enough correlation, or know that a line of best fit is not justified due to the lack of correlation. Find patterns in data that may lead to a conclusion being drawn. Understand and identify outliers and make decisions whether or not to include them when drawing a line of best fit. Use a line of best fit to estimate unknown values using interpolation and extrapolation, whilst knowing the dangers of doing so.	**4B**
3A	DEVELOPING	**3A**
3B	• Draw and interpret bar charts, composite bar charts, dual bar charts, pictograms, pie charts for categorical data. Draw and interpret a vertical line chart for discrete numerical data	**3B**
2A	• Design, complete and use two-way tables	**2A**
2B	• Decide whether data is qualitative, discrete or continuous and use this decision to choose suitable diagrams for the data. Understand the difference between grouped and ungrouped data, and the advantages and disadvantages of grouping data. Distinguish between primary and secondary data.	**2B**
1A	• Find the mean, median and mode for a discrete frequency distribution. Calculate the range for a set of data. Compare sets of data using these values.	**1A**
1B	• Draw and interpret a scatter graph. Recognise positive, negative or no correlation. Recognise strong, moderate or weak correlation. Look for unusual data values such as a value that does not fit an otherwise good correlation	**1B**
P8	PREPARING for GCSE	**P8**
P7	• Be able to draw and interpret simple bar charts and pictograms.	**P7**
P6	• Collect and record data in tally charts.	**P6**
P5	• Use tallies to work out frequencies.	**P5**
P4	• Read information from two way tables.	**P4**
P3	• Add, subtract, multiply, divide and order numbers.	**P3**
P2		**P2**
P1		**P1**