Revision 'Must Know' Checklist: Y9 Maths Higher Tier (Upper)

Below is a checklist of everything you must know to be successful by the end of this year.

Number	Algebra	Geometry and Measures	Ratio and Proportion	Statistics and Probability
• Use product rule for counting and finding potential combinations • Use BIDMAS to complete complex calculations • Solve estimation problems to one and two-step calculations • Evaluate positive numerical indices (not algebraic) • Solve numerical indices equations with different base numbers and missing powers. EG 8^3 = 2^? • Evaluate algebraic positive numerical indices. • Evaluate more complex problems such as 25^1.5 • Find the HCF of 2 numbers using either lists of common factors or a Venn diagram • Solve worded HCF and LCM problems using product of Primes • Convert large numbers into and out of standard form • Convert small numbers into and out of standard form • Add and subtract numbers in standard form • Multiply and divide numbers in standard form	• Substitute positive and negative numbers into expressions without a calculator • Expand single brackets (Recap) and double brackets and simplify expressions • Solve linear equations, with integer coefficients, in which the unknown appears on either side or on both sides of the equation • Change the subject of a formula (one and two-step) • Change the subject of a formula involving powers and roots • Factorise quadratic expressions in the form ax2 +bx +c where a=2 • Solve quadratic equations by factorising in the form ax2 +bx +c=0 where a=1 • Factorise quadratic expressions in the form ax2 +bx +c where a>1 • Draw linear graphs such as x=4, y=-1 • Draw linear graphs in the form y=mx+c from a table of values • Draw linear graphs such as y = mx • Identify the gradient of a straight line from a graph	• Understand and use the angle properties of parallel lines and find missing angles using the properties of corresponding and alternate angles giving reasons, include geometric shapes and their properties • Understand, recall and use Pythagoras' Theorem in 2D. Given three sides of a triangle, justify if it is right-angled or not • Give an answer to the use of Pythagoras' Theorem in surd form • Understand, recall and use Pythagoras' Theorem in 2D. Given three sides of a triangle, justify if it is right-angled or not • Find the interior angle of a polygon • Calculate the angles of regular polygons and use these to solve geometric problems • Find the exterior angle of a polygon • Find the number of sides of a polygon give the interior or exterior angle • Solve exam style questions on angle problems • Calculate the length of the hypotenuse and a shorter side in	• Solve problems involving Pressure, Area, Force, include changes of units • Solve problems involving Density, Mass, Volume, include changes of units • Solve problems involving Speed, Distance, Time. miles per hour as well as metric measures, include changes of units. • Convert between units of compound measures. • Metric speed measures, density measures and pressure measures • Calculate an unknown quantity from quantities that vary in direct or inverse proportion • Recognise when values are in direct proportion by reference to the graph form, and use a graph to find the value of k in y = kx. • Identify direct proportion from a table of values, by comparing ratios of values, for x squared and x cubed relationships. • Relate algebraic solutions to graphical representation of the equations • Solve problems involving direct proportion or inverse proportion with squares, cubes or other	• Sort, classify and tabulate data and discrete or continuous quantitative data • Find averages and measures of spread from lists of numbers • Recognise advantages and disadvantages of between measures of average • Compare the mean and range of two distributions, or median or mode as appropriate • Produce and interpret composite and duel bar charts. • Produce and interpret pie charts. • Find the mode and the frequency represented by each sector. • Describe the advantages and limitations of pie charts • Calculate the mean, mode, median and range from a frequency table (discrete data). • Compare data sets using averages and range • Find the mean from a grouped frequency table • Construct and interpret an ordered stem and leaf diagram

• Identify Surds and simplify • Rationalize Surds - Single Surd denominator • Use Surds in complex operations • Rationalize Surds including complex double brackets, i.e. 3 + √2 • Solve problems using the order of operations (BIDMAS) • Order Fractions, Decimals and Percentages • Add and subtract proper, improper fractions and mixed numbers • Multiply and divide proper, improper fractions and mixed numbers • Convert a recurring decimal into a fraction • Find a percentage of an amount • Find percentage increases & decreases using both non-calculator and calculator methods • Solve worded percentage increase and decrease problems • Solve percentage change problems • Solve reverse/backward percentage problems	• Identify the gradient and y-intercept from a graph • Find the equation of a positive straight line given two points • Find the equation of a positive straight line and given the gradient and a point • Plot a straight line graph given the gradient and y-intercept • Calculate the length of a line segment given the coordinates of the end points – Pythagoras • Use straight line graphs to solve currency conversion graphs • Solve currency conversion problems by extrapolating • Draw and interpret straight-line graphs for real-life situations, including ready reckoner graphs, conversion graphs, fuel bills, fixed charge and cost per item (gradient) • Draw a distance–time graph and Use to calculate various measures (of individual sections), including average speed, distance, time • Generate points and plot graphs of simple quadratic functions, then more general quadratic functions. Find approximate solutions. Why is it an approximate? • Solve linear equations with unknowns on one (Recap) and	a right-angled triangle problems (including decimal lengths and a range of units). • Find the area and perimeter of composite shapes made up of rectangles, triangles, parallelograms and trapeziums • Discover the pi as a ratio and describe its significance • Use pi to find the circumference of a circle (with and without calculator) • Find the area circumference of a circle • Find the area of semi circles / quarter of circles • Find the area and perimeter of a sector of a circle including arcs • Find the surface area of prisms including cubes, cuboids, and triangular prisms • Find the volume of prisms including cubes, cuboids, and triangular prisms • Find the surface area and volume of a cylinder • Convert between metric measures of volume and capacity, e.g. 1 ml = 1 cm3 • Calculate the upper and lowers bounds of numbers given to varying degrees of accuracy,	powers/roots of another quantity, include using k to find another value. • Understand and use SSS, SAS, ASA and RHS conditions to prove the congruence of triangles using formal arguments, and to verify standard ruler and pair of compasses constructions. • Share within a given 2 part ratio • Solve recipe problems • Solve worded ratio problems by upscaling and downscaling • Solve challenging problems using ratio (i.e. combining ratio with factor problems from past papers)	• Construct a back-to-back stem and leaf diagram and interpret it • Find the mode, median, range, as well as the greatest and least values from stem and leaf diagrams, and compare two distributions from stem and leaf diagrams • Construct a frequency polygon • Draw and interpret Scattergraphs • Describe a Scattergraphs correlation • Draw a line of best fit • Differentiate between experimental versus theoretical probability • Create a sample space diagram for experiments • Find probability from two-way tables • Find probabilities using Frequency Trees • Solve independent probability problems using probability trees • Solve conditional probability problems using probability trees • Shade areas of a Venn diagram and use correct notation TBAT fill in a Venn diagram correctly given two sets of data

• Solve simple interest problems • Solve compound interest problems inc. Depreciation • Write ratios in their simplest form, including three part ratios. • Divide into a given ratio with two or more parts • Write a ratio as a linear function	both sides with positive, negative and fractional answers • Solve double inequalities and represent on a number line. • Change the subject of a formula (multi-step) • Solve linear simultaneous equations using elimination where co-efficients are the same and answers positive • Solve simultaneous equations graphically • Solve double inequalities and represent on a number line. • Find the solution sets and compare them to see which value of x satisfies both solve linear inequalities in two variables algebraically • Factorise quadratic expressions in the form ax2 + bx + c. • Solve quadratic equations by factorising, including ones that need rearranging • Solve quadratic equations by using the quadratic formula • Write a quadratic in completing the square form. • Use to solve quadratic equations • Expand the product of more than two linear expressions, triple brackets.	include whole numbers, decimal places and significant figures. • Find the upper and lower bounds of calculations involving perimeters, areas and volumes of 2D and 3D shapes • Use inequality notation to specify an error interval due to truncation or rounding • Reflect a 2D shape in a line such as x=4 or y=-1 and be able to describe the transformation • Reflect a 2D shape in the line y=x and/ or y=-x and be able to describe the transformation • Translate a 2D shape using a vector • Describe a translation of a 2D shape using a vector • Rotate a 2D shape on a set of axis • Describe a rotation of a 2D shape on a set of axis • Enlarge a 2D shape on a set of axis using a positive, negative and fractional scale factor using vectors • Describe a transformation is a rotation, translation , enlargement or reflection as exam style questions • Understand and draw front and side elevations and plans of shapes made from simple solids		• Find probability from Venn diagram with two sets of data • Work out probabilities from Venn diagrams to represent real-life situations and also 'abstract' sets of numbers/values, such as sets of prime and even number • Compare experimental data and theoretical probabilities., include samples of different sizes. • Estimate the number of times an event will occur, given the probability and the number of trials • Plot a scatter graph and draw accurately a line of best fit • Use a line of best fit to solve scatter graph problems • Draw a pie chart • Compare and interpret pie chart questions • Draw a cumulative frequency diagram • Find averages and measures of spread from a cumulative frequency graph i.e Median and IQR • Compare distributions using cumulative frequency diagrams • Draw a boxplot/ Box and Whisker diagram from a discrete set of numbers

	• Solve simultaneous equations graphically, formed from two linear functions, include real-life situation and represent the solution in context of the problem • Solve linear inequalities in two variables graphically. • Show the solution set of several inequalities in two variables on a graph • Recap solve quadratic equations by factorising in the form ax2 +bx +c=0 where a=1 • Solve quadratic equations by factorising in the form ax2 +bx +c=0 where a>1 • Sketch a graph of a quadratic function, by factorising or by using the formula, identifying roots, y-intercept and turning point by completing the square • Simplify algebraic fractions • Use function notation, finding f(2) or x when you know the solution. Find f(x) + g(x) and f(x) – g(x), 2f(x), f(3x) etc... algebraically • For two functions f(x) and g(x), find composite functions such as gf(x)	• Read and construct scale drawings, drawing lines and shapes to scale • Find and describe regions satisfying a combination of loci, including 3D. Region bounded by a circle and an intersecting line, given distance from a point and a given distance from a line, equal distances from two points or two line segments, regions which may be defined by 'nearer to' or 'greater than' • Understand, draw and measure bearings • Find the length of the longest side (hypotenuse) of a right angled triangle • Find any length side of a right angled triangle • Solve worded Pythagoras problems • Understand what Sine, Cosine and Tangent Ratios are • Find a missing angle in a right angled triangle • Find a missing side on a right angled triangle • Know and apply Area = ab sin C to calculate the area, sides or angles of any triangle		• Draw a boxplot from a cumulative frequency diagram • Compare boxplots and make written conclusions about data sets

		• Know the sine rule, and use to solve 2D problems, including bearings • Know the cosine rule, and use to solve 2D problems, including bearings • Recognise, sketch and interpret graphs of the trigonometric functions (in degrees) y = sin x, y = cos x and y = tan x for angles of any size • Know the exact values of sin θ and cos θ for θ = 0°, 30°, 45° , 60° and 90° and exact value of tan θ for θ = 0°, 30°, 45° and 60° and find them from graphs • Find missing angles using the angle in a semicircle is a right angle • Find missing angles using the perpendicular from the centre of a circle to a chord bisects the chord • Find missing angles using angles in the same segment are equal • Find missing angles using alternate segment theorem • Find missing angles using opposite angles of a cyclic quadrilateral sum to 180° • Find missing angles using the angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the circumference		

		• Find and give reasons for missing angles on diagrams using one or multiple circle theorems • Find and give reasons for missing angles on diagrams using isosceles triangles (radius properties) in circles • Understand and use vector notation, including column notation, and understand and interpret vectors as displacement in the plane with an associated direction, link to unit 8 translations • Understand that 2a is parallel to a and twice its length, and that a is parallel to –a in the opposite direction • Represent vectors, combinations of vectors and scalar multiples in the plane pictorially. • Calculate the sum of two vectors, the difference of two vectors and a scalar multiple of a vector using column vectors) • Calculate the resultant of two vectors, including algebraic terms		