Revision ‘Must Know’ Checklist: Y11 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
○ Calculate the upper and lowers bounds of numbers given to varying degrees of accuracy, include whole numbers, decimal places, and significant figures. ○ Use inequality notation to specify an error interval due to truncation or rounding ○ find where the upper and lower bound of a given calculation agree. ○ Understand sets of numbers ○ Simplify surds and expand single brackets with surds. ○ Rationalise the denominator using the conjugate ○ Understand the difference between combinations and permutations ○ Know and use the product rule for counting ○ Link understanding of combinations to calculating probability ○ Multiply and divide fractions, including mixed numbers. ○ Add and subtract fractions, including mixed numbers. ○ Find a percentage of a quantity. ○ Calculate the value of profit or loss.	○ Understand and use the laws of indices. ○ Evaluate & simplify expressions with negative indices with numerical bases. ○ solve equations by changing base. ○ Expand the product of more than two linear expressions, triple brackets. ○ Factorise quadratic expressions of the form ax^2+bx+c, ○ Factorise the special case of the difference of two squares. ○ Change the subject of a formula, including cases where the subject is on both sides of the original formula, or involving fractions and small powers of the subject ○ Solve linear equations that involve fractions ○ Recognise common factors in algebraic fractions and simplify algebraic fractions. ○ Apply skills in factorising quadratics to simplify algebraic fractions. ○ Multiply and divide algebraic fractions.	○ Perform speed, distance, time, and calculations ○ Complete compound measures calculations (Density, Mass & Volume, Pressure, Force & Area). ○ For a non-linear distance–time graph, estimate the speed at one point in time, from the tangent, and the average speed over several seconds by finding the gradient of the chord. ○ Draw a linear velocity–time graph (of individual sections) and find speed, time, acceleration, distance using enclosed areas by counting squares or using areas of trapezia, rectangles, and triangles. ○ 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) ○ To understand the requirements for parallel vectors ○ Solve geometric problems in 2D where vectors are divided in a given ratio	○ 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. ○ Recognise when values are in inverse proportion by reference to the graph form ○ Solve problems involving direct proportion or inverse proportion with squares, cubes, or other powers/roots of another quantity, include using k to find another value. ○ Relate algebraic solutions to graphical representation of the equations ○ Perform calculations with ratio & fractions	○ Construct and interpret grouped frequency tables. ○ To construct frequency polygons. ○ Estimate the mean with grouped data. Understand why it is an estimate. ○ Find the interval which contains the median and the modal class. ○ To create scatter graphs, describe correlation draw lines of best fit, and estimate. ○ To explain why some predictions may be unreliable ○ Produce line graphs. ○ Construct and interpret time–series graphs, comment on trends ○ Understand what is meant by a sample, a population, and a census. ○ Understand how different sample sizes may affect the reliability of conclusions drawn. ○ Construct and interpret cumulative frequency tables. Construct and interpret the graphs/diagrams from tables ○ Produce box plots from raw data and when given

○ Calculate Percentage change and percentage profit or loss. ○ Compound and simple interest. ○ Find the number of compounds given the investment and the final amount. ○ Calculate original cost after a percentage increase or decrease (reverse percentage calculations). ○ Linear sequences. ○ Quadratic sequences. ○ Find the common ratio r in geometric sequences. ○ Convert between standard form and ordinary form ○ Perform reverse mean calculations. ○	○ Add and subtract algebraic fractions with different denominators. ○ Plot graphs of simple cubic functions using tables of values, including finding solutions to cubic equations ○ Plot graphs of the reciprocal function 1/x with x ≠ 0 using tables of values. ○ find the equation of a line in the form y =mx+ c ○ Find the equation of a parallel and perpendicular line that goes through a given point in the form y = mx+c ○ Find the equation of a line from two points & the equation of a perpendicular line given a third point ○ Form and solve linear and quadratic equations and inequalities, interpreting the solution in the context of the problem where appropriate. ○ Write a quadratic in completing the square form and use this skill to solve quadratic equations. ○ Understand how to define a function. ○ Use function notation and find outputs given inputs.	○ Prove that or more vectors lie on a straight line ○ Recognise the difference between vector problems in which one ratio is unknown and two ratios are unknown ○ Solve vector questions with two ratios missing, using simultaneous equations, and equating coefficients ○ To identify and use alternate angles, corresponding angles, and co-interior angles ○ To understand how to calculate the interior and exterior angle in a polygon ○ Use Pythagoras' Theorem to solve problems in 3D configurations. ○ Calculate the length of a diagonal of a cuboid. ○ Use the trigonometric ratios to solve missing lengths and angle problems with right-angled triangles. ○ Find angles of elevation and depression ○ Use trigonometry in 3D, find the angle between a line and a plane. ○ Understand similarity of triangles and of other shapes. ○ Prove that two shapes are similar by showing that all		○ quartiles, median and identify any outliers. ○ Compare data sets using the median and interquartile range. ○ Construct a histogram by calculating frequency density. ○ Interpret histograms by estimating the number of people in a given interval. ○ Complete a table knowing the sum of the probabilities of all outcomes is 1. Use 1 – p as the probability of an event not occurring. ○ Estimate the number of times an event will occur, given the probability and the number of trials ○ Find the probability of successive events, such as several throws of a single dice. ○ Draw and find probabilities from a probability tree diagram based on given information with replacement. ○ Draw and use a tree diagram to calculate conditional probabilities - without replacement. ○ Construct probability trees using algebraic expressions

	○ For two functions f(x) and g(x), find composite functions such as gf(x) ○ Solve equations with composite functions ○ Know that f –1(x) refers to the inverse function. ○ Find the inverse of a linear function. ○ Use completing the square to sketch quadratic functions and to identify the coordinates of a turning point. ○ Investigate the effect of applying the transformations of y = f(x)+a & y = f(x+a) for linear, quadratic, cubic functions ○ Apply to the graph of y = f(x) the transformations y = af(x), y = f(ax) y = –f(x), y = f(–x), for linear, quadratic, cubic functions ○ Apply single transformations to curves including trig functions to find the new coordinates of given points. ○ Solve two linear simultaneous equations by elimination. ○ Set up and solve a pair of linear simultaneous equations in two variables,	corresponding angles are equal in size and/or lengths of sides are in the same ratio/one is an enlargement of the other, giving the scale factor. ○ Know the relationships between linear, area and volume scale factors of mathematically similar shapes and solids. ○ Find missing lengths, areas and volumes in similar 3D solids using scale factors ○ Use conditions of congruency to prove congruent triangles. ○ Recognise when and understand how to apply the sine and cosine rules ○ Solve problems with **bearings** by using the sine and cosine rule. ○ Recognise, sketch, and transform graphs of the trigonometric functions (in degrees) ○ Know the exact values of sin θ and cos θ and tan θ for θ = 0°, 30°, 45° , 60° and 90° and exact value and find them from graphs y = sin x, y = cos x and y = tan x for angles of any size ○ Use the formulae for volume and surface area of		to represent conditional probability ○ Draw and find probabilities from Venn diagrams using union, intersection, compliment and given that notation and combined set notation. ○ Work out probabilities from Venn diagrams to represent real-life situations and 'abstract' sets of numbers/values, such as sets of prime and even number.

	including to represent a situation. ○ Interpret the solution in the context of the problem. ○ Draw circles, centre the origin, equation x2+ y2 = r2. ○ Solve simultaneous equations graphically, giving the intersection points of a given straight line with a circle ○ Find the equation of a tangent to a circle at a given point, by finding the gradient of the radius perpendicular to it. ○ By writing the denominator in terms of its prime factors, decide whether fractions can be converted to recurring or terminating decimals. Convert a fraction to a recurring decimal. ○ Solve 'Show that' and proof questions using consecutive integers (n, n + 1), squares a2, b2, even numbers 2n, odd numbers 2n +1 ○ Understand iteration is a process used to approximation the solutions to equations, and to show that a root exists between two given values.	spheres and cones, use to solve problems, include in terms of π ○ Solve problems involving more complex shapes and solids, including segments of circles and frustums of cones, include in terms of π ○ Solve algebraic problems involving the surface area of spheres, cones, and frustums ○ Know and use the angle at the centre is twice the angle at the circumference subtended from the same arc ○ Know and use "The angle subtended by the diameter is 90°" ○ Know and use "The angles in a cyclic quadrilateral sum to 180°" ○ Know and use "Angles in the same segment are equal" ○ Know and use that "The tangent meets a radius at 90" and "Lengths of the tangents from a point to the circle are equal." ○ Know and use "The alternate segment theorem" ○ Select and apply the appropriate circle theorems to find missing angles.		

	○ Use a recurrence relation given in the question to approximate a root. ○ Solve linear inequalities in two variables graphically. Show the solution set of several inequalities in two variables on a graph ○ Solve quadratic inequalities in one variable, by factorising and sketching the graph to find critical values. ○ To construct and solve quadratic inequalities in context ○ Investigate the coefficients of binomial expansions using (a+b)^n ○ Find possible values for variables in expansions given the coefficient and knowledge of Pascal's triangle ○ Begin to estimate gradients of curves by drawing tangents ○ Select two points on a curve and calculate the gradient of a the resulting chord, reducing the distance between them to estimate the gradient. ○ Develop a general rule for differentiating polynomial functions.	○ Make use of circle theorems when proving congruency ○ Perform transformations of shapes, including translation, rotation, and reflection. ○ Enlarge a shape using a negative or fractional scale factor. ○ Describe a transformation using a single transformation. ○ Create loci and constructions.		

	○ Utilise understanding of the laws of indices to differentiate functions with roots and fractions ○ Find the equation of a tangent to a curve. ○ Apply understanding of gradient to determine when a function is defined as increasing or decreasing ○ Find the second derivative of a polynomial ○ Use the derivative to find the coordinates of a stationary point ○ To find the nth term arithmetic sequence using Un, a and d notation. ○ Investigate the sum of n terms in an arithmetic sequence ○ find the nth term of a quadratic sequence ○ Investigate the limiting value of a sequence			

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