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

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

Glenthorne
High School
Achievement for all

Number	Algebra	Geometry and Measures	Ratio and Proportion	Statistics and Probability
• Use and order positive and negative integers and decimals. Understand < > ≠ . • Identify the value of digits in numbers including decimals. • Round numbers to a given number of decimal places. • Round numbers to 1 significant figure. To estimate values by rounding to one significant figure. • Recall integer squares, cubes and roots and use index notation up to 10x10. • Evaluate expressions involving squares, cubes and roots - Including using calculators • Recognise multiples, factors, and prime numbers (up to two-digit) from a list. • Find the LCM and HCF of two numbers via numerous methods and include solving simple problems. • Find the prime factor decomposition of positive integers and write as a product using index notation. • Multiply and divide numbers by powers of 10. Use one calculation to find	• Use algebraic notation and symbols correctly, write an expression. • Identify expression/equation/formula/identity from a list. Introduce the identity ≡ sign. • Multiply together two simple algebraic expressions, e.g. 2a×3b, using negative algebraic terms. Use index notation and laws when multiplying or dividing algebraic terms- involving negatives. • Manipulate and simplify algebraic expressions by collecting 'like' terms - Including terms with powers. • Expand a single and double bracket. • Simplify expressions involving brackets. • Multiply/expand two sets of single brackets, e.g. 3x(x+4)+2x(x-2) • Factorise algebraic expressions by taking out common factors of a single bracket -involving powers. • Substitute numbers into expressions including those involving brackets and powers - Positive and negative. • Substitute numbers into an algebraic formula and worded formula - Including scientific Kinematic Formula. • Solve one/two-step linear equations with the unknown on one side - Including fractional coefficients which involve multiplying at the end. Solve	• Estimate the size of angles Measure and draw angles using a protractor. • Use letters to identify points, lines and angles (Two-letter notation for a line and three-letter notation for an angle). Identify a perpendicular to a given line and mark perpendicular lines on a diagram. • Identify parallel lines and mark parallel lines on a diagram. To know that there are 360° in a full turn, 180° in a half turn and 90° in a quarter turn. Identify a perpendicular to a given line and mark perpendicular lines on a diagram. Identify parallel lines and mark parallel lines on a diagram • Find missing angles at a point, on a straight line, right angles, and vertically opposite angles. • Sketch, name and list the properties of each special type of quadrilateral and classify quadrilaterals by their geometric properties. • Find missing angles in quadrilaterals - Including the use of special types of shapes. Show step-by-step deduction when solving multi-step angle problems with	• Express the splitting of a quantity into a ratio. Write a ratio as a fraction, write ratio in its simplest form. • Write ratios in form 1:m or m:1. • Share a quantity in a given two-part or three-part ratio - Include problems involving mixing, e.g. paint colours, cement and drawn conclusions. • Use a ratio to find one quantity when the other is known - Upscaling. Compare ratios by upscaling to a common multiple of parts, e.g. Cats:Dogs and Dogs:Fish • Use a ratio to compare a scale model to a real-life object. • Understand and use proportion as equality of ratios, e.g. Recognise that two paints mixed red to yellow 5 : 4 and 20 : 16 are the same colour. • Solve proportion problems using the unitary method. • Scale up recipes and decide if there is enough of each ingredient.	• Use correct notation for time, 12 and 24-hour clock. To interpret timetables and work out time taken for a journey, involving problem solving scenarios. • Produce and interpret a pictogram - Find the total population and mode. • To produce and interpret a stem and leaf diagram. Produce a back-to-back stem and leaf diagram and use it to compare an average and spread - Median and range • Produce and interpret dual/comparative bar chart - Find the total population, least/greatest values, mode and recognise patterns. • Produce and interpret a composite bar chart - Find the total population, least/greatest values, mode and recognise patterns. • Understand that pie charts represent proportions rather than frequencies and use this to interpret simple pie charts using simple fractions and percentages, 1/2, 1/4 and multiples of 10% sections. • Construct pie charts for categorical data and discrete/continuous

an answer for another. Use laws of indices to multiply and divide numbers written in index notation - Including negatives.

- Convert large numbers into standard form and back.

- Convert small numbers into standard form and back.

- Add, subtract, multiply and divide decimals - Including worded money problems.

- Use the order of operations with and without calculators for all calculations: positive and negative numbers, brackets, powers and roots, four operations. (Understand the term Surd/exact form).

- Add and subtract positive and negative integers

- Multiply and divide positive and negative integers.

- Use diagrams to find equivalent fractions or compare/order fractions. Use inequality signs."

- Order fractions, decimals and percentages (using inequality signs)

- Convert between mixed numbers and improper fractions

equations that involve negative numbers.

- Solve equations with unknowns on both sides (with negative and fractional solutions).

- Write down integer values that satisfy an inequality using a range also.

- Show inequalities on number lines and write an inequality using a number line - Use the correct notation to show inclusive and exclusive inequalities.

- Solve simple linear inequalities as well as those with unknowns on both sides, and represent the solution set on a number line.

- Recognise sequences of odd and even numbers, and other sequences including Fibonacci sequences.

- Distinguish between arithmetic and geometric sequences.

- Write the term-to-term definition of a sequence in words. Find the nth term of an arithmetic sequence, including increasing and decreasing sequences.

- Find the next term in a sequence - including negative values.

- Plot or identify points needed to complete geometrical shapes in all four quadrants.

- Recognise straight-line graphs parallel to the axes.

triangles/quadrilaterals. Use geometrical language appropriately and give reasons for angle calculations

- Find missing angles in triangles - Including the use of isosceles and equilateral triangles. Distinguish between scalene, equilateral, isosceles and right-angled triangles.

- Recognise and name pentagons, hexagons, heptagons, octagons and decagons. Understand 'regular' and 'irregular' as applied to polygons.

- Calculate and use the sums of the interior angles to find missing angles of regular polygons. To calculate the exterior angles of a polygon.

- Understand the angle properties and find missing angles in parallel and intersecting lines - Including reasons for answers.

- Convert metric units to other metric units

- Find the perimeter and area of compound shapes made from rectangles and triangles.

- Find the perimeter and area of parallelograms and trapeziums, given the area.

- Work out which product is the better buy.

- Solve problems involving Speed, Distance, Time. miles per hour as well as metric measures, include changes of units.

- Solve problems involving Density, Mass, Volume, include changes of units.

numerical data (Must be accurate to 2 degrees).

- Produce and interpret a line graph and recognise patterns.

- Draw a scatter graph and understand/draw a line of best fit. Comment on the correlation and the relationship of the variables. Understand correlation does not imply causation

- Recognise types of data, e.g. Primary, secondary, discrete, continuous, qualitative, quantitative.

- Understand how sources of data may be biased.

- Calculate the mean, mode, median and range for discrete data.

- Find the mean, median, mode and range from a discrete frequency table (non-grouped data).

- Organise raw data into a grouped frequency table. Identify the modal and median class from a grouped frequency table.

- Complete a two-way table from a worded problem.

- Distinguish between events which are

- Add and subtract fractions (including those with mixed numbers) Express a given number as a fraction of another.

- Multiply and divide fractions by fractions.

- Attempt to simplify calculations before, when multiplying.

- Convert between fractions and decimals.

- Convert to make a calculation easier, e.g. 0.25 × 8 = 1/4 × 8, or 3/8 × 10 = 0.375 × 10.

- Convert between simple fractions, decimals and percentages (convert fractions into recurring decimals).

- Understand that a percentage is a fraction in hundredths. Find a percentage of a quantity/measurement without a calculator: 50%, 25% and multiples of 10% and 5% - Include real-life VAT, simple interest, tax… Express a given number as a percentage of another number. The use of multipliers for calculating the percentage of a quantity.

- Plot and draw graphs of y = a, x = a, y = x and y = –x. Consider what the gradient means and plot y = mx + c

- Recognise that equations of the form y = mx + c correspond to straight-line graphs in the coordinate plane.

- Plot and draw graphs of straight lines of the form y = mx + c using a table of values.

- Plot graphs of y = mx + c without a table of values- based on interpretation of the gradient and y-intercept from the equation of the graph. Sketch a graph of a linear function, using the gradient and y-intercept.

- Find the coordinates of the midpoint of a line segment (using the formula).

- Draw, label and scale axes. Draw straight line graphs for real-life situations, including ready reckoner graphs, conversion graphs, fuel bills graphs, fixed charge and cost per unit.

- Read values from straight-line graphs for real-life situations.

- Draw/Interpret distance–time graphs, and calculate: the speed of individual sections, total distance and total time. Using a speed to calculate the distance/time to plot onto the graph.

- Understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors.

- Identify and name common solids: cube, cuboid, cylinder, prism, pyramids, sphere and cone. Sketch nets of cuboids and prisms. Know the terms face, edge and vertex. Draw sketches of 3D solids. Identify and sketch planes of symmetry of 3D solids.

- Find the surface area of a cube and a cuboid, finding missing side lengths when the surface area is given.

- Find the volume of cubes and cuboids, using volume to find missing side lengths.

- Find the volume of triangular prisms Including triangles, trapeziums, parallelograms, compound shapes made from rectangles.

- Understand congruency and similarity referring to lengths and angles.

- Identify simple congruent and similar shapes by eye/counting squares.

- Understand and use the basic congruence criteria for triangles (SSS, SAS, ASA and RHS).

- Solve angle problems involving congruence.

impossible, unlikely, even chance, likely, and certain to occur. Understand probabilities can be written in words or fractions, decimals and percentages. Mark events and/or probabilities on a probability scale of 0 to 1.

- Find the probability of an event happening using theoretical probability, e.g. 3 or 4 on a dice, or coloured counters in a bag. Estimate the number of times an event will occur, given the probability and the number of trials, how does this compare to the experimental probability? Compare relative frequencies from samples of different sizes.

- Record outcomes of probability experiments in tables. Work out probabilities from frequency tables, include deciding if a coin, spinner or game is fair. Work out probabilities from Venn diagrams to represent real-life situations, include 'abstract' sets of numbers/values with union and intersection notation.

- Identify different mutually exclusive outcomes and know that the sum of the probabilities of all outcomes is 1. Use 1 – p to

• Calculate a percentage increase/decrease of a quantity/measurement using multipliers - Include real-life VAT, simple interest, tax… Percentage change/profit and loss. • Add and subtract fractions with different denominators. Add and subtract mixed number fractions. Multiply simple fractions and mixed number fractions. Divide simple fractions and mixed number fractions. • Add and subtract numbers in standard form, with and without a calculator.	• Define a 'quadratic' expression. Multiply double brackets/Quadratics. Square a linear expression, e.g. (x + 1) squared. • Factorise quadratic expressions of the form $x^2 + bx + c$. • Recognise a quadratic graph from its shape. Generate points and plot graphs of quadratic functions. • Identify and interpret the gradient from an equation $ax + by = c$. • Solve simultaneous equations (linear/linear) graphically. • Solve simultaneous equations (linear/linear) algebraically, recognising whether to add/subtract the equations when solving by elimination (no multiplying). • Solving worded simultaneous equations.	• Understand similarity of shapes using scale factors and use to solve angle problems. • Understand that translations are specified by a distance and direction using a column vector. Translate a given shape by a vector. • Understand that reflections are specified by a mirror line. Describe reflections on a coordinate grid using the equation of the line of symmetry. • Reflect shapes on coordinate grids with vertical, horizontal and diagonal mirror lines (named with equations), including not on coordinate grids to start. • Understand that rotations are specified by a centre, an angle and a direction of rotation. Draw a shape after rotation about the origin or any other point on a coordinate grid. Find the centre of rotation, angle and direction of rotation to describe rotations. • Enlarge a shape on a grid without a centre specified - Include fractional scale factors. Enlarge a given shape using the origin and not as the centre of		• find the probability of an event not occurring. • Find a missing probability from a list or table using mutually exclusive outcomes. • List all outcomes for combined events systematically, e.g. dice, spinners, coins, choices on a menu. Use to find simple probabilities. Use and draw sample space diagrams Link to listing outcomes of combined events. • Calculate probabilities from two-way tables, considering questions when the denominator is changing. • Complete and use a frequency tree, with probabilities.

		enlargement - Include fractional scale factors.		
		• Understand and recall Pythagoras' Theorem in 2D. Give a brief history of Pythagoras and show simple ways to prove his theorem, calculate the length of the hypotenuse of a right-angled triangle.		
		• Calculate the length of a shorter side in a right-angled triangle, including leaving answers in surd form. Given 3 sides of a triangle, use Pythagoras' Theorem to justify if it is right-angled or not.		
		• Answer worded and problem-solving based Pythagoras questions.		
		• Identify, name and draw parts of a circle including tangent, chord and segment. Investigate where π comes from.		
		• Recall and use the formulae to find the circumference of an enclosed circle $2\pi r = \pi d$.		
		• Recall and use the formulae to find the area of an enclosed circle = $\Pi r2$, including leaving your answer in terms of π.		
		• Find radius or diameter, given the circumference and area of a circles.		

- Understand and recall the trigonometric ratios sine, cosine and tan by labelling right-angled triangles. Use the trigonometric ratios to find missing sides of right-angles triangles as well as angles, including real-life 2D problem solving scenarios.

- Estimate lengths using a scale diagram. Use and interpret maps and scale drawings.

- Understand and draw front and side elevations and plans of shapes made from more complex solids with diagonal lengths. Given the front and side elevations and the plan of a solid, draw a sketch of the 3D solid.

- Use a straight edge, protractor and a pair of compasses to construct SSS, SAS, ASA and RHS triangles. Understand they are unique, but SSA triangles are not.

- Construct the perpendicular bisector of a given line. Construct a bisector from a point to a line.

- Construct the bisector of a given angle. Construct angles of 90°, 45°.

- Use three-figure bearings to specify direction. Mark on a

		diagram the position of point B given its bearing from point A. • Identify the scale factor of an enlargement of a shape as the ratio or multiple of the lengths of two corresponding sides. • Understand the effect of enlargement on perimeter of shapes. • Solve simple problems to find missing lengths in similar shapes where the shapes are drawn separately. • Understand and use column notation in relation to vectors. Represent information graphically given column vectors.		