MARK RUTHERFORD SCHOOL

Curriculum Plan: Maths

All of our SOW is split into Higher content and Foundation Content

	Autumn Term		Spring Term		Summer Term	
	Autumn 1 7 weeks	**Autumn 2 7 weeks**	**Spring 1 5.5 weeks**	**Spring 2 6 weeks**	**Summer 1 6 weeks**	**Summer 2 7 weeks**
Year 7	**Sequences** – Sequences in a table and graphically – Linear and non-linear sequences – Explain the term-to-term rule – Find missing terms (H) **Understand and use algebraic notation** – Single-function machines – Substitute values into single operation expressions – Substitute values into two-step expressions – Generate sequences given an algebraic rule – Represent one- and two-step functions graphically **Equality and Equivalence** – Solve one-step linear equations involving +/- using inverse operations – Solve one-step linear equations involving x/÷ using inverse operations – Understand the meaning of like and unlike terms – Understand the meaning	**Place value & ordering integers & decimals** – Compare two numbers using =, ≠, <, >, ≤, ≥ – Order a list of integers – Find the range and median of a set of numbers – Understand place value for decimals – Position decimals on a number line – Round a number to 1 significant figure – Write 10, 100, 1000 etc. as powers of 10 (H) – Write positive integers and decimals in the form $Ax10^n$ (H) **Fraction, decimal & percentage equivalence** -Interchange between fractional and decimal number lines -Convert between fractions and	**Solving problems with addition and subtraction** – Properties of addition and subtraction – Mental strategies for addition and subtraction – Choose the most appropriate method: mental strategies, formal written or calculator. – Solve problems in the context of perimeter – Solve financial maths problems. – Solve problems with bar charts and line charts – Add and subtract numbers given in standard form (H) **Solving problems with multiplication and division** – Properties of multiplication & division – Understand and use factors. – Multiply by 0.1 and 0.01 (H)	**Fractions and percentages of amounts** – Find a fraction of a given amount – Find a percentage of a given amount – Solve problems with fractions greater than 1 and percentages greater than 100% (H) **Operations & equations with directed number** – Order directed numbers using lines and appropriate symbols. – Add and subtract directed numbers – Multiplication and division of directed numbers – Evaluate algebraic expressions with directed numbers. – Solve two-step equations – Use order of operations with directed numbers – Roots of positive numbers (H)	**Constructing, Measuring & Using Geometric Notation** – Classify angles – Draw and measure angles – Identify perpendicular and parallel lines – Recognise types of triangles and quadrilaterals – Identify polygons up to a decagon – Construct triangles using SSS – Construct triangles using SSS SAS and ASA – Interpret simple pie charts using proportion – Interpret pie charts using a protractor – Draw pie charts **Developing Geometric Reasoning** – Understand and use the sum of angles at a point – Understand and use the sum of angles on a straight line	**Developing Number Sense** – Use factors to simplify calculations – Use estimation as a method for checking mental calculations – Know when to use a mental strategy formal written method or a calculator **Sets & Probability** – Identify and represent sets – Interpret and create Venn diagrams – Understand and use the intersection and the union of sets. – Understand and use the complement of a set (H) – Calculate the probability of a single event – Understand and use the probability scale – Know that the sum of probabilities of all possible outcomes is 1

	of equivalence – Simplify algebraic expressions by collecting like terms, using the ≡ symbol	decimals tenths and hundredths, fifths and quarters. -Convert fluently between simple fractions, decimals and percentages. -Use and interpret pie charts. -Understand fractions as division -Convert fluently between fractions, decimals and percentages. -Explore fractions above one, decimals and percentages (H)	– Convert metric units – Understand and use order of operations. – Solve problems using the area of rectangles, parallelograms and triangles. – Solve problems using the area of trapezia (H) – Solve problems using the mean. – Explore multiplication and division in algebraic expressions (H)	**Addition & subtraction of fractions** - Convert between mixed numbers and fractions. – Add and subtract fractions – Add and subtract improper fractions and mixed numbers – Use fractions in algebraic contexts – Add and subtract simple algebraic fractions (H)	– Understand and use the equality of vertically opposite angles – Know and apply the sum of angles in a triangle – Know and apply the sum of angles in a quadrilateral – Find and use the angle sum of any polygon – (H) – Understand and use parallel line angle rules (H)	**Prime Numbers & Proof** – Recognise and identify prime numbers – Find common factors of a set of numbers including the HCF – Find common multiples of a set of numbers including the LCM – Write a number as a product of its prime factors – Use a Venn diagram to calculate the HCF and LCM (H)
Year 8	**Ratio & scale** – Solve problems involving ratios of the form 1: n (or n: 1) – Divide in a given ratio. – Express ratios in the form 1: n (H) – Compare ratios and fractions. **Multiplicative change** – Solve problems involving direct proportion – Explore conversion graphs – Convert between currencies – Explore direct proportion graphs (H) – Explore relationships between similar shapes. – Interpret maps using	**Working in the Cartesian plane** – Recognise and use the line $y = x$, $y = kx$ and $y = x + a$ and negative gradients ($y = -kx$, $y = a - x$, $x + y = a$) – Plot graphs of the form y=mx+c – Explore non-linear graphs (H) – Find the midpoint of a line segment (H) **Representing data** – Draw and interpret scatter graphs. – Read and interpret ungrouped and	**Brackets, Equations and Inequalities** – Form algebraic expressions – Multiply and factorise single brackets. – Expand a pair of binomials (H) – Form and solve equations with brackets – Form and solve inequalities – Solve equations and inequalities with unknowns on both sides (H) – Identify and use formulae, expressions, identities and equations **Sequences**	**Fractions and Percentages** – Convert fluently between key fractions, decimals, and percentages. – Calculate key fractions, decimals and percentages of an amount without a calculator and with calculator methods. – Calculate percentage increase and decrease using a multiplier. – Work with percentage change. – Find the original amount given the percentage less than 100% (H)	**Angles in Parallel Lines & Polygons** – Identify and calculate alternate, corresponding and co interior angles – Constructions triangles and special quadrilaterals – Understand and use the sum of exterior and interior angles of any polygon – Prove simple geometric facts H – Construct an angle bisector and a perpendicular bisector of a line segment H **Area of Trapezia & Circles**	**The Data Handling Cycle** – Draw and interpret pictograms bar charts, vertical line charts, multiple bar charts, pie charts and line graphs – Represent and interpret grouped quantitative data – Find and interpret the range **Measures of Location** – Understand and use the mean median and mode – Find the mean from an ungrouped and grouped frequency table H – Identify outliers

	scale factors and ratios **Multiplying and dividing fractions** – Find the product of a pair of any fractions. – Understand and use the reciprocal. – Divide any pair of fractions. – Multiply and divide improper and mixed fractions and algebraic fractions.	grouped frequency tables. – Construct and interpret two-way tables. **Tables & Probability** – Find probabilities from a sample space and two-way tables. – Find probabilities from Venn diagrams – Use the product rule for finding the total number of possible outcomes.	– Generate sequences given a rule in words or algebra. – Find the rule for the nth term of a linear sequence (H) **Indices** – Adding and subtracting expressions with indices – Multiplying indices – Dividing indices – Using the addition and subtraction law for indices – Exploring powers of powers (H)	**Standard Index Form** – Work with numbers greater and less than 1 in standard form – Compare and order numbers in standard form – Calculate with numbers in standard form – Understand and use negative indices (H) – Understand and use fractional indices (H) **Number sense** – Round numbers to powers of 10, 1 significant figure and to a given number of decimal places – Estimate the answer to a calculation. – Understand and use error interval notation (H) – Calculate using the order of operations. – Calculate with money – Convert metric measures. – Convert metric units of area and volume (H) – Solve problems involving time and the calendar.	– Calculate the area of triangles rectangles, parallelograms and trapezia. – Calculate the perimeter and area of compound shapes – Calculate the area of a circle and parts of a circle **Line Symmetry & Reflection** – Recognise line symmetry – Reflect a shape in a horizontal, vertical or a diagonal line	– Compare distributions using averages and the range

MARK RUTHERFORD SCHOOL

Year 9	**Straight line graphs** – Compare gradients and intercepts – Understand and use $y = mx + c$ – Write an equation in the form $y = mx + c$ (H) – Find the equation of a line from a graph – Model real-life graphs involving inverse proportion (H) – Explore perpendicular lines (H) **Forming & solving equations** – Inequalities with negative numbers – Solve equations and inequalities with unknowns on both sides – Equations and inequalities in other mathematical contexts – Rearrange complex formulae (H) **Testing conjectures** – Conjectures about number – Expand a pair of binomials. – Conjectures with algebra – Expand three binomials (H)	**Three dimensional shapes** – Know names of 2D and 3D shapes. – Accurate nets of cuboids and other 3D shapes – Plans and elevations – Surface area of prisms and cylinders – Volume of prisms and cylinders – Explore volumes of cones, pyramids and spheres (H) **Constructions & congruency** – Locus of distance from a point, a straight line, 2 points and 2 lines. – Multiple constructions. – Explore congruent triangles	**Numbers** – Integers, real and rational numbers – Understand and use surds (H) – Adding and subtracting, multiplying and dividing fractions. – Solve problems with fractions. – Numbers in standard form. **Using Percentages** – Solve reverse percentage problems. – Recognise and solve percentage problems – Solve problems with repeated percentage change (H) **Maths and Money** – Solve problems with bills and bank statements. – Calculate simple and compound interest – Calculate wages and taxes – Solve problems with exchange rates – Solve unit pricing problems.	**Deduction** – Solve angle problems using chains of reasoning – Angle problems with algebra – Link constructions and geometrical reasoning (H) **Rotation and Translation** – Identify the order of rotational symmetry of a shape – Rotate a shape about a point. – Translate points and shapes by a given vector – Compare rotation and reflection of shapes – Find the result of a series of transformations (H) **Pythagoras Theorem** – Calculate the hypotenuse of a right-angled triangle. – Calculate missing sides in right-angled triangles. – Use Pythagoras' theorem on coordinate axes. – Use Pythagoras' theorem in 3D shapes (H)	**Enlargement and Similarity** – Recognise enlargement and similarity. – Enlarge a shape by a positive integer scale factor from a point. – Enlarge a shape by a negative scale factor (H) – Work out missing sides and angles in a pair of given similar shapes. – Solve problems with similar triangles (H) **Solving ratio and proportion problems** – Solve problems with inverse proportion – Graphs of inverse relationships (H) – Solve best buy problems – Solve problems involving ratio and algebra (H) **Rates** – Solve speed, distance and time problems – Use distance-time graphs – Solve problems with density, mass and volume – Solve flow problems and their graphs – Convert compound units	**Probability** – Relative frequency - including convergence – Expected outcomes – Independent events – Use tree diagrams (H) – Use diagrams to work out probabilities. **Algebraic representation** – Draw and interpret quadratic graphs – Interpret graphs, including reciprocal and piece-wise – Investigate graphs of simultaneous equations (H) – Represent inequalities **Revision for end of year assessment** -We use this to set accurately for GCSE tiers.

MARK RUTHERFORD SCHOOL

Year 10	**Congruence, similarity & enlargement** – Enlarge a shape by a positive integer or fractional scale factor – Enlarge a shape by a negative scale factor (H) – Establish a pair of triangles are similar – Explore areas and volumes of similar shapes (H) – Solve mixed problems involving similar shapes (H) – Understand and use conditions for congruent triangles – Prove a pair of triangles are congruent (H) **Trigonometry** – Use the sine, cosine and tangent to find missing sides and angles – Select the appropriate method to solve right-angled triangle problems – Use trigonometry in 3-D shapes (H) – Use the formula $1/2absinC$ to find the area of non-right-angled triangles (H) – Understand and use the sine rule to find missing lengths and angles (H) – Understand and use the cosine rule to find	**Representing solutions of equations & inequalities** – Show solutions to inequalities on a number line – Represent solutions to inequalities using set notation (H) – Find solutions to equations using straight line graphs – Represent solutions to single inequalities on a graph (H) – Represent solutions to multiple inequalities on a graph (H) – Solve quadratic equations by factorisation (H) – Solve quadratic inequalities in one variable (H) **Simultaneous equations** – Solve a pair of linear simultaneous equations – Form and solve pair of linear simultaneous equations from given information – Solve a pair of simultaneous equations (one linear, one quadratic)(H)	**Angles and Bearings** – Calculate bearings using angle rules – Solve bearings problems using Pythagoras and trigonometry. – Solve bearings problems using the sine and cosine rules (H) **Working with circles** – Calculate fractional parts of a circle. – Calculate the length of an arc and the area of a sector. – Circle theorem: Angles at the centre and circumference (H) – Circle theorem: Angles in a semi-circle (H) – Circle theorem: Angles in the same segment (H) – Circle theorem: Angles in a cyclic quadrilateral (H) – Understand and use the volume of a cylinder, sphere and cone – Understand and use the surface area of a sphere, cylinder and cone. – Solve area and volume problems involving similar shapes (R) (H) **Vectors** – Understand and represent vectors. – Draw and understand	**Ratios & fractions** – Use ratios and fractions to make comparisons. – Solve problems with currency conversion. – Use and interpret ratios of the form 1 : n and n : 1 – Combine a set of ratios – Ratio in area problems (H) – Ratio in volume problems (H) **Percentages & Interest** – Calculate simple and compound interest. – Repeated percentage change – Solve problems involving growth and decay. – Understand iterative processes (H) **Probability** – Using experimental data to estimate probabilities – Find probabilities from tables, Venn diagrams and frequency trees. – Calculate probability with independent events. – Use tree diagrams for independent and dependent events. – Construct and	**Collecting, representing & interpreting data** – Understand populations and samples – Construct a stratified sample (H) – Primary and secondary data – Construct and interpret frequency tables and frequency polygons. – Construct and interpret histograms (H) – Construct and interpret stem-and-leaf diagrams. – Construct and interpret cumulative frequency diagrams (H) – Construct and interpret box plots (H) – Compare distributions using complex charts and measures (H) – Construct and interpret scatter graphs (R) – Understand extrapolation **Non - Calculator Methods** – Exact answers – Rational and irrational numbers	**Types of Number and Sequences** – Find the HCF and LCM of a set of numbers – Explore sequences – Calculate the nth term – Describe and continue sequences involving surds (H) – Find the rule for the nth term of a quadratic sequence (H) **Indices and Roots** – Understand and use the power zero and negative indices. – Work with powers of powers. – Understand and use fractional indices (H) **Manipulating expressions** – Use identities – Add and subtract algebraic fractions (H) – Multiply and divide algebraic fractions (H) – Form and solve equations and inequalities with fractions – Solve equations with algebraic fractions (H) – Represent numbers algebraically – Algebraic arguments and proof

	missing lengths and angles (H)	– Solve a pair of simultaneous equations involving a third unknown (H)	vectors multiplied by a scalar – Draw and understand addition and subtraction of vectors – Explore vector journeys in shapes (H) – Understand Parallel in vector (H) – Explore co-linear points using vectors (H)	interpret conditional probabilities (tree diagrams, Venn diagrams and two-way tables) (H)	(H) – Calculate with surds (H) – Upper and lower bounds (H) – Solve financial maths problems.	
Year 11	**Gradients & lines** – Interpret $y = mx + c$ – Find the equation of a straight line from a graph – Equation of a straight-line graph given one point and gradient – Equation of a straight-line graph given two points – Determine whether a point is on a line – Solve linear simultaneous equations graphically – Explore perpendicular lines (H) – Find the equations of perpendicular lines (H) **Non-linear graphs** – Plot and read from quadratic graphs – Identify and interpret roots and intercepts of quadratics – Plot and read from cubic graphs – Plot and read from reciprocal graphs	**Expanding & factorising** – Expand and factorise with a single bracket – Expand binomials – Solve quadratic equations by factorisation – Solve complex quadratic equations by factorisation (H) – Complete the square (H) – Solve quadratic equations using the quadratic formula (H) **Changing the subject** – Form and solve equations and inequalities in the context of shape – Change the subject of a formula – Change the subject where the subject appears more than once (H) – Solve equations by iteration (H)	**Multiplicative reasoning** – Understand direct proportion – Construct complex direct proportion equations (H) – Calculate with pressure and density. – Understand inverse proportion – Construct inverse proportion equations (H) **Geometric reasoning** – Exterior and interior angles of polygons – Proving geometric facts. – Solve problems involving vectors – Circle theorem - angle between radius and chord (H) – Circle theorem - two tangents from a point (H) – Circle theorem - alternate segment theorem (H)	**Transforming & Constructing** – Identify transformations of shapes (R) – Perform and describe a series of transformations of shapes – Identify invariant points and lines (H) – Solve loci problems – Understand and use trigonometrical graphs (H) – Sketch and identify transformations graph of a given function (H) **Listing & describing** – Work with organised lists – Use the product rule for counting (H) – Complete and use Venn diagrams – Construct and interpret plans and elevations	**Revision for GCSE Exams**	

	– Recognise graph shapes – Understand and use exponential graphs (H) – Find and use the equation of a circle centre $(0,0)$(H) – Find the equation of the tangent to any curve (H) **Using graphs** – Construct and interpret other real-life straight line graphs – Interpret and construct distance/time graphs and speed/time graphs – Construct and interpret piece-wise graphs – Recognise and interpret graphs that illustrate direct and inverse proportion – Find approximate solutions to equations using graphs – Estimate the area under a curve (H)	**Functions** – Use function notation – Work with composite functions (H) – Work with inverse functions (H) – Graphs of quadratic functions – Solve quadratic inequalities (H) – Understand and use trigonometric functions	– Review Pythagoras' theorem and using trigonometric ratios **Algebraic reasoning** – Simplify complex expressions – Find the rule for the nth term of a linear sequence – Find the rule for the nth term of a quadratic sequence (H) – Use rules for sequences. – Solve simultaneous equations with one quadratic (H) – Formal algebraic proof (H) – Inequalities in two variables (H)	**Show That** – Recurring decimals (H) – Capture Recapture (H) – Show that with algebra, shape and angles – Show that with vectors (H) – Form proof with congruent triangles (H)		