Maths Curriculum Overview 2021-22

Head of Department	S. King

What will students learn in each year?

Year 7	
Term 1 Algebraic Thinking	**Sequences** Describe and continue sequences in diagram and number forms, both linear and non-linear Predict and check next term(s) of a sequence Compare numerical and graphical forms Represent sequences in tabular and graphical form Recognise the difference between linear and non-linear sequences Continue numerical linear sequences Continue numerical non linear sequences Explain the term to term rule for numerical sequences in words Find missing numbers within sequences **Understand and Use algebraic notation** Given a numerical input, find the output of a single function machine Use inverse operations to find an input given the output Use diagrams and letters to generalise number operations Use diagrams and letters with single function machines Find the function machine given a simple expression Substitute values into single operation expressions Find numerical inputs and outputs for a series of two function machines Use letters and diagrams for a series of two function machines Find the function machines given two step expression Substitute values into a twostep expressions Generate sequences from an algebraic rule Represent one and two step functions graphically **Equality and equivalence** Understand equality Use fact families Form and solve one step equations Understand equivalence of algebraic expressions Collet like terms
Term 2 Place Value and Proportion	**Place value and ordering integers and decimals** Recognise and use integer place value up to one billion Recognise and use decimal place value to at least hundredths Work out intervals and use number lines Compare and order numbers Use ordered lists to find the range and median of a set of numbers

	Round numbers to positive powers of ten Round numbers to one significant figure **Fraction, decimal and percentage equivalence** Represent tenths and hundredths on diagrams and number lines Interchange between fractions, decimals and percentages for multiples of one tenth and one quarter Interpret pie charts Equivalent fractions Convert between other fractions, decimals and percentages
Term 3 Applications of Number	**Solving problems with addition and subtraction** Use mental and formal written methods of addition with integers and decimals, including choosing the most appropriate method Solve problems in context of perimeter, money and frequency trees and tables Solve problems in the context of bar charts and line charts **Solving problems with multiplication and division** Multiply by 1, 100 and 1000, 0.1 and 0.01 and convert metric units Use formal and written methods of multiplication and division Find the mean of a set of number Find simple fractions and percentages of amounts Begin to use the order of operations **Fractions and percentages of amounts** Work out simple fractions and percentages of amounts with and without a calculator
Term 4 Directed Numbers Fractional thinking	**Operations and equations with directed numbers** Order directed numbers, both in contextualised and abstract situations Revisit four operations to include directed number Use a calculator with directed numbers Use the order of operations **Addition and subtraction of fractions** Represent tenths and hundredths on diagrams and number lines Convert mixed numbers and improper fractions Add and subtract fractions Add and subtract fractions and decimals
Term 5 Lines and Angles	**Constructing, measuring and using geometric notation** Understand and use lettering labelling notations for lines and angles Draw and measure line and angles accurately Classify angles Identify and draw parallel and perpendicular lines Recognise types of triangles, quadrilateral and other polygons Construct triangles given SSS, SAS, ASA Draw and interpret pie charts

	Developing geometric reasoning Calculate and use angles at a point, angles on a straight line and vertically opposite angles Calculate missing angles in triangles and quadrilaterals
Term 6 Reason with Number	**Developing number sense** Mental arithmetic strategies Use known facts to derive other facts Evaluate an algebraic expression given a related fact Use estimation **Sets and probability** Understand and use set notation Draw and interpret the language of probability Calculate the probability of a single event Use the sum of probabilities of an event is 1 **Prime numbers and proof** Recognise prime, square and triangle numbers Express a number as a product of prime factors Powers and roots Make and test conjectures Understand and use counterexamples

Year 8	
Term 1 Proportional Reasoning	**Ratio and scale** Understand ratio and its link to multiplication Use ratio notation Reduce ratios to simplest form Solve ratio problems Divide a value in a given ratio Express ratios in the form Compare ratios and related fractions Understand the gradient of a line as a ratio. Calculate the circumference of a circle ***Multiplicative change*** Use scale factors, linking to ratio, to solve simple direct proportion problems Convert between currencies, including using graphs Draw and interpret scale diagrams and maps ***Multiplying and dividing fractions*** Multiple and divide a fraction by an integer

	Multiple and divide a fractions by a fraction Understand and use the reciprocal
Term 2 Representations	**Working in the Cartesian plane** Plot and interpret straight line graphs Understand and use the equations of a straight line, including lines parallel to the axes Make links between direct proportion and straight lines Model situations by translating them into expressions, formulae and graphs **Representing data** Draw and interpret scatter graphs Understand correlation Draw and use the line of best fit Understand grouped and ungrouped, discrete and continuous data Design and use one and two way tables **Tables and Probability** List outcomes using sample space diagrams Find probabilities using tables and venn diagrams
Term 3 Algebraic techniques	**Brackets, equations and inequalities** Expand, and factorise into single brackets Form and use expressions, formulae and identities Form and solve equations and inequalities with and without brackets Distinguish between equations, expressions, formulae and identities **Sequences** Generate sequences using more complex rules, with brackets and squared terms both in words and algebraically **Indices** Form expressions using indices Understand and use the additions and subtraction rules
Term 4 Developing Number	**Fractions and percentages** Develop understanding of fractions, decimal and percentages Evaluate percentage increases and decreases Use multipliers to solve percentage problems Express one number as a percentage of another **Standard index form** Convert between numbers in ordinary and standard form Compare numbers given in standard form Calculate with numbers given in standard form with and without a calculator **Number sense**

	Develop mental strategies Convert between metric measures and units Estimation, including rounding to a given number of decimal places Use the order of operations
Term 5 Developing Geometry	**Angles in parallel lines and polygon** Review Y7 angles rules Understand and use parallel lines and angles Revisit geometric notation Work out angles in special quadrilaterals Find and use the sum of interior and exterior angles of a polygon Prove simple geometric facts **Area of trapezia and circles** Review area of shapes covered in Year 7 Calculate the area of a trapezium Calculate the area of a circles an area of parts of a circles Use significant figures Calculate the area of compound shapes **Line symmetry and reflection** Recognise line symmetry in polygons and other shapes Reflect shapes in horizontal, vertical and diagonal lines
Term 6 Reasoning with Data	**The data handling cycle** Understand and use primary and secondary sources of data Collect data, including questionnaires Interpret and construct statistical diagrams, including multiple bar charts Construct and interpret pie charts Compare distributions using charts Identify misleading graphs **Measures of location** Revisit the median and mean, including finding the total given the mean Find the mean of grouped data work out the mode and modal class Choose the appropriate average Comparing distributions using measures

Year 9	
Term 1 Reasoning with Algebra	**Straight line graphs** Lines parallel to the axis y = x and y = -x Using tables of values Compare gradients Compare intercepts Understand and use y = mx + c

	Write an equation in the form of y = mx + c Interpret gradient and intercepts from real life graphs Find the gradient of a line from a graph Model real life graphs involving inverse proportion Explore perpendicular lines **Forming and solving equations** Solve one and two step equations and inequalities Solve one and two step equations and inequalities with brackets Inequalities with negative numbers Solve equations with unknowns both sides Solve inequalities with unknowns both sides Solve equations and inequalities in context Substituting into formulae and equations Rearranging formulae (one step) Rearranging formulae (two step) Rearranging complex formulae including brackets and squares ***Testing conjectures*** Factors , multiples and primes True or false? Always, sometimes, never true Show that Conjectures about number Expand a pair of Bionimals Conjectures with algebra Explore the 100 grid
Term 2 Constructing in 2 and 3 Dimensions	**Three dimensional shapes** Know names of 2D and 3D shapes Recognise prisms (including language of vertices/ edges) Accurate nets of cuboids and other 3D shapes Sketch and recognise nets of cuboids and other 3D shapes Plan and elevations Find area of 2D shapes Surface area of cubes and cuboids

	Surface area of triangular prims Surface area of a cylinder Volume of cubes and cuboids Volume of other 3D shapes - prisms and cylinders Explore volume of cones, pyramids and spheres **Constructions and Congruency** Draw and measure angles Construct and interpret scale drawings Locus of distance from a point Locus of distance from a straight line/shape Locus equidistant from two points Construct a perpendicular bisector Construct a perpendicular from a point Construct a perpendicular to a point Locus of distance from two lines Construct an angle bisector Construct triangles from given information Identify congruent figures Explore congruent triangles
Term 3 Reasoning with Numbers	**Numbers** Integers, real and rational numbers Understand and use surds Work with directed number Solve problems with integers Solve problems with decimals HCF and LCM Adding and subtracting fractions Multiplying and dividing fractions Solve problems with fractions Numbers in standard form **Using Percentages** Using the equivalence of fractions, decimals and percentages Calculate percentage increase and decrease Express a change as a percentage Solve reverse percentages problems Recognise and solve percentage problems(non calculator) Recognise and solve percentage problems (calculator) Solve problems with repeated percentage problems

	Maths and Money Solve bills with bills and bank statements Calculate simple interest Calculate compound interest Solve problems with value added tax Calculate wages and taxes Solve problems with exchange rates Solve unit pricing problems
Term 4 Reasoning with Geometry	**Deductions** Angles in parallel lines Solve angle problems using chains of reasoning Angle problems with algebra Conjectures with angles Conjectures with shapes Link constructions and geometrical reasoning **Rotation and Translation** Identity the order of rotational symmetry of a shape Compare and contrast rotational symmetry with line symmetry Rotate a shape about a point on a shape Rotate a shape about a point not on a shape Translate points and shapes by a given vector Compare rotation and reflection of shapes Find the result of a result of transformations **Pythagoras Theorem** Squares and square roots Identify the hypotenuse of a right angle triangle Determine whether a triangle is a right angle Calculate the Hypotenuse of a right angle triangle Calculate missing sides of a right angle triangle Use Pythagoras theorem on an coordinate axes Explore proofs of the Pythagoras theorem Use Pythagoras theorem in 3d Shapes **Enlargement and similarity** Recognise enlargement and Similarity Enlarge a shape by a positive integer scale factor Enlarge a shape by a positive scale factor from a point Enlarge a shape by a positive fractional scale factor Enlarge a shape by a negative scale factor Work out missing sides and angles in a pair of given similar shapes

	Solve problems with similar triangles Explore ratio in right angled triangles
Term 5 Reasoning with Proportion	**Ratio and Proportions** Solve problems with direct proportion Direct proportion and conversion graphs Solve problems with inverse proportion Graphs of inverse relationships Solve ratio problems given the whole or a part Solve best but problems Solve problems ratio and algebra **Rates** Solve speed, distance and time problems without a calculator Solve speed, distance and time problems with a calculator Use distance /time graphs Solve problems with density, mass and volume Solve flow problems and their graphs Rates of change and their units Convert compound shapes
Term 6 Representations and Revision	**Probability** Single event probability Relative frequency – include convergence Expected outcomes Independent event Use tree diagrams Use tree diagrams to solve 'without replacement' problems Use diagrams to work out probabilities **Algebraic Representations** Draw and interpret quadratic graphs Interpret graphs including reciprocal and piece – wise Investigate graphs of simultaneous equations Represent inequalities **Revision** Representing Number Representing data Algebraic Representations *Representing problems*

Year 10 **Exam Board: Edexcel**	
Term 1 Similarity	**Congruence, Similarity and enlargement** Enlarge a shape by a positive integer scale factor

	Enlarge a shape le factor Enlarge a shape by a negative scale factor Identify similar shapes Work out missing sides and angles in a pair of similar shapes Use parallel lines to work out missing angles Establish a pair of triangles are similar Explore areas of similar shapes Explore volumes of similar shapes Solve mixed problems involving similar shapes Understand the difference between congruence and similarity Understand and use conditions for congruent triangles Prove a pair of triangles are congruent ***Trigonometry*** Explore ratio in similar right-angled triangles Work fluently with the hypotenuse, opposite and adjacent sides Use the tangent ratio to find missing side lengths Use the sine and cosine ratio to find missing side lengths Use the sine, cosine and tangent to find missing side lengths Use the sine, cosine and tangent to find missing angles Calculate sides in right-angled triangles using Pythagoras' Theorem Work with the key angles in right-angled triangles Use trigonometry in 3d shapes Use the formula 1/2absin C to find the area of a triangle Understand and use the sine rule to find missing lengths Understand and use the sine rule to find missing angles Understand and use the cosine rule to find missing lengths Understand and use the cosine rule to find missing angles Choosing and using the sine and cosine rules
Term 2 Developing Algebra	**Equations and Inequalities** Understand the meaning of a solution Form and solve one-step and two-step equations Form and solve one and two step inequalities Show solutions to inequalities on a number line Interpret representations on a number line as inequalities Represent solutions to inequality using set notation Draw straight line graphs Find solutions to equations using line graphs Represent solutions to single inequalities on a graph Represent solutions to multiple inequalities on a graph Form and solve equations with unknowns on both sides Form and solve inequalities with unknowns on both sides Form and solve more complex equations and inequalities Solve quadratic equations by factorisation Solve quadratic inequalities in one variable

	Simultaneous Equations Understand that equations can have more than one solution Determine whether a given (x,y) is a solution to a pair of linear simultaneous equations Solve a pair of linear simultaneous equations by substituting a known variable Solve a pair of linear simultaneous equations by substituting an expression Solve a pair of linear simultaneous equations using graphs Solve a pair of linear simultaneous equations by subtracting equations Solve a pair of simultaneous equations by adding equations Use a given equation to derive related facts Solve a pair of linear simultaneous equations by adjusting one equation Solve a pair of linear simultaneous equations by adjusting both equations Form a pair of linear simultaneous equations from given information Determine whether a given (x,y) is a solution to a pair of linear simultaneous equations Solve a pair of simultaneous equations (one linear, one quadratic) using graphs Solve a pair of simultaneous equations (one linear, one quadratic) algebraically Solve a pair of simultaneous equations involving a third unknown
Term 3 Geometry	**Angles and Bearings** Use cardinal directions and related angles Draw and interpret scale diagrams Understand and represent bearings Measure and read bearings Make scale drawing use bearings Calculate bearings using angles rules Solve bearings problems using Pythagoras and trigonometry Solve bearings problems using the sine and cosine rules **Working with circles** Recognise and label parts of a circle Calculate fractional parts of a circle Calculate the length of an arc Calculate the area of a sector Circle theorem: Angles at the centre and circumference Circle theorem: Angles in a semicircle Circle theorem : Angles in the same tangent Circle theorem: Angles in a cyclic quadrilateral Understand and use the volume of a cylinder and cone Understand and use the volume of a sphere Understand and use the surface area of a sphere Understand and use the surface area of a cylinder and cone Solve area and Volume problems involving similar shapes **Vectors** Understand and represent vectors Use and read vector notation Draw and understand vectors multiplied by a scalar

	Draw and understand addition of vectors Draw and understand addition and subtraction of vectors Explore vector journeys in shapes Explore quadrilaterals using vectors Understand parallel vectors Explore collinear points using vectors Use vectors to construct geometric arguments and proofs
Term 4 Proportions and Proportional Change	**Ratios and fractions** Compare quantities using a ratio Link ratio and fractions Share and ratio (given total or one part) Use ratio and fractions to make comparisons Link ratio and graphs Solve problems with currency conversion Link ratios and scales Use and interpret ratios of the form 1:n and n:1 Solve gest buy problems Compare a set of ratios Link ratio and algebra Ratio in area problems Ratio in volume problems Mixed ratio problems **Percentages and Interest** Convert and compare fractions, decimals and percentages Work out percentages of an amount (with and without a calculator) Increase and decrease by a given percentage Express one number as a percentage of another Calculate simple and compound interest Repeated interest change Find the original amount after a percentage change Solve problems involving growth and decay Understand iterative processes Solve problems involving percentages, ratios and fractions **Probability** Know how to add, subtract and multiply fractions Find probably using equally likely outcomes Use the property that probabilities add to 1 Using experimental data to estimate probabilities Find probably from tables, Venn diagrams and frequency tables Construct and interpret sample spaces for more than one event Calculate probability for independent events Use tree diagrams for independent evens Use tree diagrams for dependant events Construct and interpret conditional probability (Tree diagrams) Construct and interpret conditional probability (Venn diagrams and two way tables)

Term 5 Delving into data	**Delving into Data** Understand populations and samples Construct a stratified sample Primary and secondary date Construct and interpret frequency tables and frequency polygons Construct and interpret two way tables Construct and interpret line and bar charts (including composite) Construct and interpret pie charts Criticise charts and graphs Construct histograms Interpret histograms Find and interpret averages from a list Find and interpret averages from a table Construct and interpret time series graphs Construct and interpret stem and leaf diagrams Construct and interpret cumulative frequency diagrams Use cumulative frequency diagrams to find measure Construct and interpret box plots Compare distributions using charts and measures Compare distributions using complex charts and measures Construct and interpret scatter graphs Draw and use a line of best fit Understand extrapolation
Term 6 Using Number	**Non – calculator Methods** Mental/written methods of integer/decimal addition and subtraction Mental/written methods of integer/decimal multiplication and division The four rules of fractions arithmetic Exact values Rational and irrational numbers (converting recurring decimals here) Understand and use surds Calculate with surds Rounding to decimal places and significant figures Estimating answers to calculations Understand and use limits of accuracy Upper and lower bounds Use number sense Solve financial maths problems Break down and solve multi step problems Types of numbers and sequences Understand the difference between factors and multiples Understand primes and express a number as a product of its prime factors Find the HCF and LCM of a set of numbers Describe and continue arithmetic and geometric sequences Explore other sequences Describe and continue sequences involving surds

	Find the rule for the nth term of a linear sequence Find the rule for the nth term of a quadratic sequence **Indices and roots** Square and cube numbers Calculate highest powers and roots Powers of ten and standard form The addition and subtractions rules for indices Understand and use the power zero and negative indices Work with powers of powers Understand and use fractional indices Calculate with numbers in standard form

Year 11 **Exam Board: Edexcel**	
Term 1 Graphs	**Gradients and lines** Equations of line parallel to the axis Plot straight line graphs 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 Recognise when straight lines are perpendicular Find the equations of perpendicular lines **Non-linear graphs** Plot and read from quadratic graphs Plot and read from cubic graphs Plot and read from reciprocal graphs Recognise graph shapes Identify and interpret roots and intercepts of quadratics Understand and use exponential graphs Find and use the equations of a circle centre (0,0) Find the equation of the tangent to any curve **Using graphs** Reflect shapes in given lines Construct and interpret conversion graphs Construct and interpret other real life graphs Interpret distance time graphs Construct distance time graphs Construct and interpret speed time graphs Construct and interpret piece-wise graphs Recognise and interpret graphs that illustrate direct and inverse proportion Find the approximate solution to equations using graphs

	Estimate the area under a curve
Term 2 Algebra	**Expanding and factorising** Expand and factorise with a single bracket Expand binomials Factorise quadratic expressions Factorise complex quadratic expressions Solve equations equal to 0 Solve quadratic equations by factorising Solve complex quadratic expressions by factorisation Complete the square Solve quadratic equations using the quadratic formula **Changing the subject** Solve linear equations Solve inequalities Form and solve equations and inequalities in the context of shape Change the subject of a simple formula Change the subject of a known formula Change the subject of a complex formula Change the subject where the subject appear more than once Solve equation by iteration **Functions** Use function machines Substitute into expressions and formulae Use function notation Work with composite functions Work with inverse functions Graphs of quadratic functions Solve quadratic inequalities Understand and use trigonometric functions
Term 3 Reasoning	**Multiplicative reasoning** Use scale factors Understand direct proportion Construct complex direct proportion equations Calculate with pressure and density Understand inverse proportion Construct inverse proportion equations Ratio problems **Geometric reasoning** Angles at points Angles in parallel lines and shapes Exterior and interior angles of polygons Proving geometric facts Solve problems involving vectors The first four circle theorems

	Angle between a radius and a chord Angle between a radius and a tangent Two tangents from points Alternate segment theorem Pythagoras theorem and 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 Use rules for sequences Solve linear simultaneous equations Solve simultaneous equations with one quadratic Formal algebraic proof Inequalities in two variables.
Term 4 Revision and Communication	**Multiplicative reasoning** Use scale factors Understand direct proportion Construct complex direct proportion equations Calculate with pressure and density Understand inverse proportion Construct inverse proportion equations Ratio problems **Geometric reasoning** Angles at points Angles in parallel lines and shapes Exterior and interior angles of polygons Proving geometric facts Solve problems involving vectors The first four circle theorems Angle between a radius and a chord Angle between a radius and a tangent Two tangents from points Alternate segment theorem Pythagoras theorem and 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 Use rules for sequences Solve linear simultaneous equations Solve simultaneous equations with one quadratic Formal algebraic proof Inequalities in two variables
Term 5	**Skills – fluency, reason mathematically and solve** **Knowledge - refer to top 40**

Revision past papers, AO2 and 3 questions	
Term 6	Examinations