YEAR 9 HALF TERM 1 MATHEMATICS SETS 3 - 4 LEARNING PROGRAMME

Love God
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Value all

Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Calculating	Be able to calculate with roots, and with integer indices Be able to calculate with standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer Be able to use inequality notation to specify simple error intervals due to truncation or rounding Be able to apply and interpret limits of accuracy	Power Root Index, Indices Standard form Inequality Truncate Round Minimum, Maximum Interval Decimal place Significant figure	Calculate with positive/negative indices/roots Use a calculator to evaluate numerical expressions involving powers and roots Add/Subtract /Multiply/Divide numbers written in standard form Use standard form on a scientific calculator Understand the difference between truncating and rounding Identify the minimum and maximum values of an amount that has been rounded (to nearest x, x d.p., x s.f.) Use inequalities to describe the range of values for a rounded value	Know the meaning of powers Know the meaning of roots Know the multiplication and division laws of indices Understand and use standard form to write numbers Interpret a number written in standard form Round to a given number of decimal places or significant figures Know the meaning of the symbols <, >, ≤, ≥	There will be a written piece of homework each week to reinforce key concepts

YEAR 9	HALF TERM 1	MATHEMATICS SETS 3 - 4	LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Visualising and Constructing	Be able to use the standard ruler and compass constructions Be able to use these to construct given figures and solve loci problems; Be able to construct plans and elevations of 3D shapes	Compasses Arc Line segment Perpendicular Bisect Perpendicular bisector Locus, Loci Plan Elevation	Use ruler and compasses to construct the perpendicular bisector of a line segment, bisect an angle, perpendicular to a line from a point and at a point Use a ruler and compasses to construct a Know how to construct the locus of points a fixed distance from a point and from a line Solve simple and complex problems involving loci Choose techniques to construct 2D shapes; e.g. rhombus Construct a shape from its plans and elevations Construct the plan and elevations of a given shape	Measure distances to the nearest millimetre Create and interpret scale diagrams Use compasses to draw circles Interpret plan and elevations	There will be a written piece of homework each week to reinforce key concepts

YEAR 9 HALF TERM 2 MATHEMATICS SETS 3 - 4 LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Proportional reasoning	Be able to solve problems involving direct and inverse proportion including graphical and algebraic representations Be able to apply the concepts of congruence and similarity, including the relationships between lengths in similar figures Be able to change freely between compound units (e.g. density, pressure) in numerical and algebraic contexts Be able to use compound units such as density and pressure	Direct proportion Inverse proportion Multiplier Linear Congruent Congruence Similar Similarity Compound unit Density Population density Pressure Notation Kilograms per metre cubed is written as kg/ m3	Know the difference between direct and inverse proportion Recognise direct proportion Know the features of a graph that represents a direct proportion situation Recognise inverse proportion Know the features of a graph that represents an inverse proportion situation Know the features of an expression, or formula, that represents a direct or inverse proportion situation Understand the connection between the multiplier, the expression and the graph Solve problems involving direct and inverse proportions Identify congruence & similarity of shapes in a range of situations Finding missing lengths in similar shapes Solve problems involving compound units, such as density, pressure, population density, speed Convert between compound units of density and speed	Find a relevant multiplier in a situation involving proportion Plot the graph of a linear function Understand the meaning of a compound unit Convert between units of length, capacity, mass and time	There will be a written piece of homework each week to reinforce key concepts.

YEAR 9	HALF TERM 2	MATHEMATICS SETS 3 - 4	LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Algebraic proficiency: tinkering	Be able to understand and use the concepts and vocabulary of identities Be able to know the difference between an equation and an identity Be able to simplify and manipulate algebraic expressions by expanding products of two binomials and factorising quadratic expressions of the form $x^2 + bx + c$ Be able to argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments Be able to translate simple situations or procedures into algebraic expressions or formulae	Inequality Identity Equivalent Equation Formula, Formulae Expression Expand Linear Quadratic Notation The equals symbol '=' and the equivalency symbol '≡'	Understand the meaning of an identity Multiply two linear expressions of the form $(x + a)(x + b)$ Multiply two linear expressions of the form $(ax \pm b)(cx \pm d)$ Expand the expression $(x \pm a)2$ Factorise a quadratic expression of the form $x^2 + bx$ Factorise a quadratic expression of the form $x^2 + bx + c$ Work out why two algebraic expressions are equivalent Create a mathematical argument to show that two algebraic expressions are equivalent Distinguish between situations that can be modelled by an expression or a formula Create an expression or a formula to describe a situation	Manipulate expressions by collecting like terms Know that $x \times x = x2$ Calculate with negative numbers Know the grid method for multiplying two two-digit numbers Know the difference between an expression, an equation and a formula	There will be a written piece of homework each week to reinforce key concepts.

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Pattern Sniffing	recognise and use Fibonacci type sequences, quadratic sequences	Term Term-to-term rule Position-to-term rule nth term Generate Linear Quadratic First (second) difference Fibonacci number Fibonacci sequence	Recognise and use the Fibonacci sequence Generate Fibonacci type sequences and find the next terms of a Fibonacci sequence Explore growing patterns and other problems involving quadratic sequences Generate terms of a quadratic sequence from a written rule Find the next terms of a quadratic sequence using first and second differences Generate terms of a quadratic sequence from its nth term	Generate a linear sequence from its nth term Substitute positive numbers into quadratic expressions Find the nth term for an increasing linear sequence Find the nth term for a decreasing linear sequence	There will be a written piece of homework each week to reinforce key concepts.
Solving equations and inequalities I	understand and use the concepts and vocabulary of inequalities solve linear inequalities in one variable represent the solution set to an inequality on a number line	(Linear) inequality Unknown Manipulate Solve Solution set Integer	Find the set of integers that are solutions to an inequality, including the use of set notation Know how to show a range of values that solve an inequality on a number line Solve simple and complex linear inequalities in one variable with unknowns on one and both sides Solve a linear inequality in one variable involving brackets and negative terms and by constructing and solving linear inequalities in one variable	Understand the meaning of the four inequality symbols Solve linear equations including those with unknowns on both sides	There will be a written piece of homework each week to reinforce key concepts.

YEAR 9	HALF TERM 3	MATHEMATICS SETS 3 - 4	LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Calculating space	identify and apply circle definitions and properties calculate arc lengths, angles and areas of sectors of circles *calculate surface area of right prisms (including cylinders)* calculate exactly with multiples of π know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$, and apply it to find lengths in right-angled triangles in two dimensional figures	Circle, Pi Radius, diameter, chord, circumference, arc, tangent, sector, segment (Right) prism, cylinder Cross-section Hypotenuse Pythagoras' theorem	Know circle definitions and properties, including: tangent, arc, sector and segment Calculate the arc length of a sector, including calculating exactly with multiples of π Calculate the area of a sector, including calculating exactly with multiples of π Calculate the angle of a sector when the arc length and radius are known Calculate the surface area of a right prism	Know and use the number π Know and use the formula for area and circumference of a circle Know how to use formulae to find the area of rectangles, parallelograms, triangles and trapezia Know how to find the area of compound shapes	There will be a written piece of homework each week to reinforce key concepts.

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Calculating space	identify and apply circle definitions and properties, including: tangent, arc, sector and segment calculate arc lengths, angles and areas of sectors of circles calculate surface area of right prisms (including cylinders) calculate exactly with multiples of π know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$, and apply it to find lengths in right-angled triangles in two dimensional figures	Circle, Pi Radius, diameter, chord, circumference, arc, tangent, sector, segment (Right) prism, cylinder Cross-section Hypotenuse Pythagoras' theorem	Calculate the surface area of a cylinder, including calculating exactly with multiples of π Know and use Pythagoras' theorem Calculate the hypotenuse of a right-angled triangle using Pythagoras' theorem in two dimensional figures Calculate one of the shorter sides in a right-angled triangle using Pythagoras' theorem in two dimensional figures Solve problems using Pythagoras' theorem in two dimensional figures	Know and use the number π Know and use the formula for area and circumference of a circle Know how to use formulae to find the area of rectangles, parallelograms, triangles and trapezia Know how to find the area of compound shapes	There will be a written piece of homework each week to reinforce key concepts.
Conjecturing	use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS) apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' Theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs	Congruent, congruence Similar (shapes), similarity Hypotenuse Conjecture Derive Prove, proof Counterexample	Identify congruent triangles and know and use the criteria for triangles to be congruent (SSS, SAS, ASA, RHS) Solve problems, including geometrical proof, involving congruence and similarity Test conjectures using known facts in geometrical situations, including why the base angles in an isosceles triangle must be equal Explain the connections between Pythagorean triples	Know angle facts including angles at a point, on a line and in a triangle Know angle facts involving parallel lines and vertically opposite angles Know the properties of special quadrilaterals Know Pythagoras' theorem	There will be a written piece of homework each week to reinforce key concepts.

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Algebraic proficiency: visualising	identify and interpret gradients and intercepts of linear functions algebraically use the form $y = mx + c$ to identify parallel lines find the equation of the line through two given points, or through one point with a given gradient interpret the gradient of a straight line graph as a rate of change recognise, sketch and interpret graphs of quadratic , simple cubic and reciprocal functions ($y = 1/x$ with $x \neq 0$) plot and interpret graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems	Function, Equation Quadratic Cubic Reciprocal Gradient y-intercept x-intercept Root Sketch, Plot Kinematic Speed Distance Time Acceleration Deceleration Linear, Non-linear Parabola Asymptote Rate of change	Identify and interpret gradients of linear functions algebraically Identify and interpret intercepts of linear functions algebraically Use the form y = mx + c to identify parallel lines Find the equation of a line through one point with a given gradient Find the equation of a line through two given points Interpret the gradient of a straight line graph as a rate of change Plot graphs of quadratic, cubic and reciprocal functions	Plot straight-line graphs Interpret gradients and intercepts of linear functions graphically and algebraically Recognise, sketch and interpret graphs of linear functions Recognise graphs of simple quadratic functions Plot and interpret graphs of kinematic problems involving distance and speed	There will be a written piece of homework each week to reinforce key concepts.

YEAR 9	HALF TERM 5	MATHEMATICS SETS 3 - 4	LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Algebraic proficiency: visualising	identify and interpret gradients and intercepts of linear functions algebraically use the form $y = mx + c$ to identify parallel lines find the equation of the line through two given points, or through one point with a given gradient interpret the gradient of a straight line graph as a rate of change recognise, sketch and interpret graphs of quadratic functions recognise, sketch and interpret graphs of simple cubic functions and the reciprocal function $y = 1/x$ with $x \neq 0$ plot and interpret graphs (including reciprocal graphs) and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration	Function, equation Quadratic, cubic, reciprocal Gradient, y-intercept, x -intercept, root Sketch, plot Kinematic Speed, distance, time Acceleration, deceleration Linear, non-linear Parabola, Asymptote Rate of change	Recognise and sketch the graphs of quadratic functions Interpret the graphs of quadratic functions Recognise and sketch the graphs of cubic functions Interpret the graphs of cubic functions Recognise and sketch the graphs of reciprocal functions Interpret the graphs of reciprocal functions Plot and interpret graphs of non-standard functions in real contexts Find approximate solutions to kinematic problems involving distance, speed and acceleration	Plot straight-line graphs Interpret gradients and intercepts of linear functions graphically and algebraically Recognise, sketch and interpret graphs of linear functions Recognise graphs of simple quadratic functions Plot and interpret graphs of kinematic problems involving distance and speed	There will be a written piece of homework each week to reinforce key concepts.

YEAR 9 HALF TERM 5 MATHEMATICS SETS 3 - 4 LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Solving equations and inequalities II	solve, in simple cases, two linear simultaneous equations in two variables algebraically derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution find approximate solutions to simultaneous equations using a graph	Equation Simultaneous equation Variable Manipulate Eliminate Solve Derive Interpret	Understand that there are an infinite number of solutions to the equation $ax + by = c$ ($a \neq 0$, $b \neq 0$) Find approximate solutions to simultaneous equations using a graph Solve two linear simultaneous equations in two variables in very simple cases (addition and subtraction but no multiplication required) Solve two linear simultaneous equations in two variables in simple cases (multiplication of one equation only required with addition and subtraction) Derive and solve two simultaneous equations Solve problems involving two simultaneous equations and interpret the solution	Solve linear equations Substitute numbers into formulae Plot graphs of functions of the form $y = mx + c$, $x \pm y = c$ and $ax \pm by = c$) Manipulate expressions by multiplying by a single term	There will be a written piece of homework each week to reinforce key concepts.

YEAR 9 HALF TERM 6 MATHEMATICS SETS 3 - 4 LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Understanding risk	calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions enumerate sets and combinations of sets systematically, using tree diagrams understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size	Outcome, Equally likely outcomes Event, Independent event, Dependent event Tree diagrams Theoretical probability Experimental probability Random Bias, Unbiased, Fair Relative frequency Enumerate Set	Calculate the probabilities of independent combined events Calculate the probabilities of dependent combined events Construct and list outcomes of combined events using a tree diagram Use a tree diagram to solve simple problems involving independent combined events Use a tree diagram to solve complex problems involving independent combined events Use a tree diagram to solve simple problems involving dependent combined events Use a tree diagram to solve complex problems involving dependent combined events Understand that relative frequency tends towards theoretical probability as sample size increases	Add fractions (decimals) Multiply fractions (decimals) Convert between fractions, decimals and percentages Use frequency trees to record outcomes of probability experiments Use experimental and theoretical probability to calculate expected outcomes	There will be a written piece of homework each week to reinforce key concepts.

YEAR 9	HALF TERM 6	MATHEMATICS SETS 3 - 4	LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Presentation of data	interpret and construct tables, charts and diagrams, including tables and line graphs for time series data and know their appropriate use draw estimated lines of best fit; make predictions know correlation does not indicate causation; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing	Categorical data, Discrete data Continuous data, Grouped data Time series Compound bar chart Scatter graph Bivariate data (Linear) Correlation Positive correlation, Negative correlation Line of best fit Interpolate Extrapolate Trend	Construct graphs of time series Interpret graphs of time series Construct and interpret compound bar charts Interpret a wider range of non-standard graphs and charts Interpret a scatter diagram using understanding of correlation Construct a line of best fit on a scatter diagram and use the line of best fit to estimate values Know when it is appropriate to use a line of best fit to estimate values Understand that correlation does not indicate causation	Know the meaning of discrete and continuous data Interpret and construct frequency tables Construct and interpret pictograms, bar charts, pie charts, tables, vertical line charts, histograms (equal class widths) and scatter diagrams	There will be a written piece of homework each week to reinforce key concepts.