



Year 10 Mathematics Curriculum Overview

Please note that the placements of each unit are approximate.

	Units and Objectives
Autumn	Unit 1 – 3D Solids • draw sketches of 3D solids • identify planes of symmetry of 3D solids and sketch them • convert between metric measures of volume and capacity • recall and use the formula for the volume of a cuboid • find the volume and surface area of prisms • find the volume and surface area of a cylinder • find the volume and surface area of a pyramid • find the volume and surface area of a cone • find the volume and surface area of a sphere • find the surface area and volumes of compound solids constructed from cubes, cuboids, cones, pyramids, spheres, hemispheres, and cylinders • solve problems involving more complex shapes and solids including segments of circles and frustums of cones • form equations involving more complex shapes and solve these equations • give answers in terms of π • use $\pi \approx 3.142$ and use the π button on a calculator Unit 2 – Accuracy and Bounds • calculate the upper and lower bounds of numbers given to varying degrees of accuracy • use inequality notation to specify an error interval due to truncation or rounding • find the upper and lower bounds of calculations involving perimeters, areas and volumes of 2D and 3D shapes • calculate the upper and lower bounds of an expression involving the four operations • by considering bounds, find the value of a calculation to a suitable degree of accuracy Unit 3 – Solving Quadratics • factorise quadratic expressions in the form $ax^2 + bx + c$ • solve quadratic equations by factorisation including cases that require rearranging • complete the square when the coefficient of x^2 is one

- solve quadratic equations by completing the square when the coefficient of x^2 is one including cases that require rearranging
- recall the quadratic formula
- solve quadratic equations by using the quadratic formula giving answers to a required degree of accuracy or exactly, including cases that require rearranging
- set up and solve quadratic equations

Unit 4 – Transformations

- carry out and describe translations using column vectors
- carry out and describe rotations using a centre
- carry out and describe reflections in lines including $x = a$, $y = a$, $y = x$, $y = -x$ and those not parallel to the axes
- carry out and describe an enlargement using a centre and positive scale factor
- carry out and describe an enlargement using a centre and negative scale factor
- describe and transform 2D shapes using combined rotations, reflections, translations, or enlargements
- distinguish properties that are preserved under transformation
- find the points of invariance following combinations of rotations, reflections and translations

Unit 5 – Simultaneous Equations

- solve exactly, by elimination of an unknown, two simultaneous linear equations in two unknowns where one needs multiplying
- solve exactly, by elimination of an unknown, two simultaneous linear equations in two unknowns where both need multiplying
- solve exactly, by elimination of an unknown, two simultaneous equations in two unknowns where one is linear / quadratic or linear / $x^2 + y^2 = r^2$
- set up and solve simultaneous equations in all formats including those used to represent real-life contexts
- interpret the solution to simultaneous equations in the context of the problem
- find approximate solutions to simultaneous equations formed from two linear functions using a graphical approach
- find graphically the intersection points of a given straight line with a circle

Unit 6 – Inequalities

- show inequalities on number lines
- write down whole number values that satisfy an inequality
- solve simple linear inequalities in one variable and represent the solution set on a number line

	• solve two linear inequalities in x, find the solution sets and compare them to see which value of x satisfies both • show the solution set of several inequalities in two variables on a graph • find the linear inequalities represented on a graph
Spring	Unit 7 – Probability • list all outcomes for single and combined events systematically • draw sample space diagrams and use them for to find probabilities • estimate the probability of an event using relative frequency • estimate the number of times an event will occur given the relative frequency and number of trials • know that the sum of the probabilities of all outcomes is 1 • use $1 - p$ as the probability of an event not occurring where p is the probability of the event occurring • understand that mutually exclusive events cannot happen at the same time • use the OR rule to calculate probabilities of combined mutually exclusive events • use the AND rule to calculate probabilities of combined independent events • find the probability of successive independent events such as several throws of a single dice • draw a probability tree diagram based on given information and use this to find probabilities of successive independent or dependent events • use a two-way table to calculate probabilities and conditional probabilities • work out probabilities and conditional probabilities from Venn diagrams • use union, intersection and complement notation Unit 8 – Constructions, Loci and Bearings • understand and draw front and side elevations, and plans of shapes made from simple solids • given the front and side elevations, and the plan of a solid, draw a sketch of the 3D solid • use the standard ruler and compass constructions to bisect an angle, the perpendicular bisector of a line segment, the perpendicular to a given line from/at a given point, triangles and angles of 90°, 60°, 45° and 30° • know that the perpendicular distance from a point to a line is the shortest distance to the line • construct a region bounded by a circle and an intersecting line

	• construct a given distance from a point and a given distance from a line • construct equal distances from two points or two line segments • find and describe regions satisfying a combination of loci • construct regions which may be defined by 'nearer to' or 'greater than' • understand, draw and measure bearings • use bearings to calculate missing angles on diagrams Unit 9 – Multiplicative Reasoning • work out the multiplier for repeated proportional change as a single decimal number • represent repeated proportional change using a multiplier raised to a power and use this to solve problems involving compound interest and depreciation including cases where a time period needs to be calculated • convert between metric speed measures • solve speed problems combining more than one journey • use kinematic formulae from the formulae sheet to calculate speed, acceleration, etc. • convert between density measures • convert between pressure measures • solve density problems combining more than one substance • solve proportion problems using the unitary method • work out which product offers best value and consider rates of pay • calculate an unknown quantity from quantities that vary in direct proportion • calculate an unknown quantity from quantities that vary in inverse proportion • recognise graphs of direct and inverse proportion
Summer	Unit 10 – Similarity and Congruence in 2D and 3D • understand the effect of enlargement on angles and perimeter of shapes • identify the scale factor of an enlargement of a similar shape as the ratio of the lengths of two corresponding sides • find missing lengths in similar 2D shapes • understand the effect of enlargement on areas of shapes • find missing areas in similar 2D shapes • know the relationships between linear and area scale factors of similar shapes • understand the effect of enlargement on volumes of solids • find missing volumes in similar solids

- know the relationships between linear, area and volume scale factors of similar shapes and solids
- solve problems involving frustums of cones where you have to find missing lengths first using similar triangles
- prove that two shapes are similar by showing that all 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
- understand and use SSS, SAS, ASA and RHS conditions to verify the congruence of triangles using formal arguments

Unit 11 – Graphs of Trigonometric Functions

- recognise, sketch and interpret graphs of the trigonometric functions (in degrees) of $y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size
- know the exact values of $\sin \theta$, $\cos \theta$ and $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° , and find them from graphs
- use graphs of trigonometric functions to solve simple trigonometric equations for obtuse and reflex angles

Unit 12 – Further Trigonometry

- know the sine rule and use it to find missing lengths and angles (including involving bearings)
- know the cosine rule and use it to find missing lengths and angles (including involving bearings)
- know and apply $\text{area} = \frac{1}{2} ab \sin C$ to calculate the area, length or angle of any triangle
- use a combination of the sine rule, cosine rule and area of a triangle to solve problems
- calculate the length of a diagonal of a cuboid using 3D Pythagoras
- calculate the length of a diagonal of a cuboid using 3D trigonometry
- calculate the angle between a line a plane using 3D trigonometry
- use the sine and cosine rules to solve problems in 3D

Unit 13 – Collecting Data

- understand primary and secondary data sources
- understand what is meant by a sample and a population
- understand how different sample sizes may affect the reliability of conclusions drawn
- write questions to eliminate bias, and understand how the timing and location of a survey can ensure a sample is representative
- take a stratified sample
- capture/recapture

Unit 14 – Cumulative Frequency, Boxplots and Histograms

- drawn and interpret cumulative frequency graphs including estimating frequency greater/less than a given value and finding the median and quartile values and interquartile range
- draw and interpret box plots to find median, quartiles, range and interquartile range
- identify outliers on a box plot
- relate box plots to cumulative frequency graphs
- compare data by comparing an average and the range
- construct histograms from class intervals with unequal width
- use and understand frequency density
- interpret histograms from class intervals with unequal width
- estimate the mean from a histogram
- estimate the median from a histogram with unequal class widths or any other information from a histogram such as the number of people in each interval

Unit 15 – Sketching and Solving

- sketch a graph of a quadratic function, by factorising or by using the formula, identifying roots, y-intercept and turning point by completing the square
- be able to identify from a graph if a quadratic equation has any real roots
- sketch a graph of a quadratic function, by factorising or by using the formula, identifying roots, y-intercept and turning point by completing the square
- solve quadratic inequalities in one variable, by factorising and sketching the graph to find critical values
- represent the solution set for inequalities using set notation, i.e. curly brackets and 'is an element of' notation
- for problems identifying the solutions to two different inequalities, show this as the intersection of the two solution sets, i.e. solution of $x^2 - 3x - 10 < 0$ as $\{x: -3 < x < 5\}$
- find approximate solutions to quadratic equations using a graph
- sketch a graph of a quadratic function and a linear function, identifying intersection points
- sketch graphs of simple cubic functions given as three linear expressions
- expand the product of more than two linear expressions