

## **GCSE Maths (9 - 1) Higher Tier Curriculum**

<b>GCSE (9-1) Higher</b>
Unit 1 Number
Unit 2 Algebra
Unit 3 Interpreting and representing data
Unit 4 Fractions, ratio and proportion
Unit 5 Angles and trigonometry
Unit 6 Graphs
Unit 7 Area and volume
Unit 8 Transformation and constructions
Unit 9 Equations and inequalities
Unit 10 Probability
Unit 11 Multiplicative reasoning
Unit 12 Similarly and congruence
Unit 13 More trigonometry
Unit 14 Further statistics
Unit 15 Equations and graphs
Unit 16 Circle theorems
Unit 17 More algebra
Unit 18 Vectors and geometric proof
Unit 19 Proportion and graphs

## Year 9 Higher Tier Curriculum

### Chapter 1 Topics - Number

Work out the total number of ways of performing a series of tasks

Estimate an answer

Use place value to answer questions

Write a number as the product of its prime factors

Find the HCF and LCM of two numbers

Use powers and roots in calculations

Work out a power raised to a power

Use negative indices

Use fractional indices

Write a number in standard form

Calculate with numbers in standard form

Understand the difference between rational and irrational numbers

Simplify a surd

Rationalise a denominator

## Chapter 2 Topics – Algebra

Use the rules of indices to simplify algebraic expressions

Expand brackets

Factorise algebraic expressions (linear/quadratic/difference of two squares)

Solve equations involving brackets and numerical fractions

Use equations to solve problems

Substitute numbers into formulae

Distinguish between expressions, equations, formulae and identities

Rearrange formulae

Find a general formula for the  $n$ th term of an arithmetic sequence

Determine whether a particular number is a term of a given arithmetic sequence

Solve problems using geometric sequences

Work out terms in Fibonacci-like sequences

Find the  $n$ th term of a quadratic sequence

### Chapter 3 Topics – Interpreting and Representing Data

Construct and use back-to-back stem and leaf diagrams

Construct and use frequency polygons

Construct and use pie charts

Plot and interpret time series graphs

Using trends to predict what might happen in the future

Plot and interpret scatter graphs

Determine whether there is a linear relationship between two variables

Drawing a line of best fit on a scatter graph to predict values

Comparing averages

Estimating the mean and range from grouped data

Find the modal class and the group containing the median

Construct and use two-way tables

Choose appropriate diagrams to display data

Recognise misleading graphs

## Chapter 4 Topics – Fractions, Ratio and Proportion

Add, subtract, multiply, divide fractions & mixed numbers

Find the reciprocal of an integer, decimal or fraction

Write ratios in the form 1:n or n:1

Comparing ratios

Finding quantities using ratios

solve problems involving ratios

Convert between currencies and measures

recognise and use direct proportion

solve problems involving ratios and proportion

Work out percentage increases and decreases

calculate using fraction, decimals and percentages

Convert a recurring decimal to a fraction

## Chapter 5 Topics – Angles and Trigonometry

Derive and use properties of triangles and quadrilaterals

Finding interior and exterior angles of regular polygons

Calculating the sum of interior & exterior angles of regular and irregular shapes

calculating the length of a hypotenuse in a right-angled triangle

Calculating the length of a shorter side

Solve problems using Pythagoras' Theorem

Using trig ratios to find length in a right-angled triangle

Using trig ratios to find angles in a right-angled triangle

Using trig ratios to solve problems

Finding angles of elevation and angles of depression

Know and use the exact values of the sine, cosine and tangent of some angles

## Chapter 6 Topics – Graphs

Find the gradient and y-intercept from a linear equation

Rearrange an equation in the form  $y = mx + c$

Compare two graphs from their equations

Plot graphs with equations  $ax + by = c$

Sketch graphs using the gradient and y-intercepts

find the equation of a line, given its gradient and one point on the line

Draw and interpret distance-time graphs

calculate average speed from a distance-time graph

Understand velocity-time graphs

Find acceleration and distance from velocity-time graphs

Draw and interpret real-life linear graphs

Recognise direct proportion

Find the coordinates of the midpoint of a line segment

Find the gradient and length of a line segment

Find the equations of lines parallel or perpendicular to a given line

Draw quadratic graphs

Solve quadratic equations using graphs

Identify the line of symmetry of a quadratic graph

interpret quadratic graphs relating to real-life situations

Draw cubic and reciprocal graphs and recognise their shape

interpret linear and non-linear real-life graphs

Draw the graph of a circle

## Chapter 7 Topics – Area and Volume

Find the area & perimeter of compound shapes

Recall and use the formula for area of a trapezium

Convert between metric units of area & volume

Calculate the minimum and maximum possible values of a measurement

Calculate volumes and surface areas of prisms and 3D shapes

Solve problems involving volumes and surface areas

Calculate the area and circumference of a circle

calculate the perimeter and area of semicircles and quarter circles

Calculate arc lengths, angles and areas of sectors of circles



## Chapter 8 Topics – Transformation and Construction

Draw plans and elevations of 3D solids

Reflect a 2D shape in a mirror line

Rotate a 2D shape about a centre of rotation

Describe reflections and rotations

Enlarge shapes by whole, fractional and negative scale factors about a centre of enlargement

Finding the centre of enlargement

Translate a shape using a vector

Carry out and describe combinations of transformations

Draw and use scales on maps and scale drawings

Solve problems involving bearings

Construct triangles using a ruler and compasses

Construct the perpendicular bisector of a line

Construct the shortest distance from a point to a line using a ruler and compasses

Bisect an angle using a ruler and compasses

Constructing angles using a ruler and compasses

Construct shapes made from triangles using a ruler and compasses

Drawing a locus & solving problems involving loci

## **Year 10 Higher Tier Curriculum**

### Chapter 9 Topics - Equations and Inequalities

Find the roots of quadratic functions

Rearrange and solve simple quadratic equations

Solve more complex quadratic equations

Use the quadratic formula to solve a quadratic equation

Complete the square for a quadratic expression

Solve quadratic equations by completing the square

Solve simple and more complex linear simultaneous equations

Using simultaneous equations to find the equation of a straight line

Interpret real-life situations involving two unknowns and solve them

Solving quadratic simultaneous equations

Solving inequalities and showing the solutions on a number line and using set notation

## Chapter 10 Topics – Probability

Use the product rule for finding the number of outcomes for two or more events

List all the possible outcomes of two events in a sample space diagram

Identify mutually exclusive outcomes and events

Find the probabilities of mutually exclusive outcomes and events

Find the probability of an event happening

Work out the expected results for experimental and theoretical probabilities

Compare real results with theoretical expected values to decide if a game is fair

Draw and use frequency trees

Calculate probabilities of repeated events

Draw and use probability tree diagrams

Decide if two events are independent

Draw and use tree diagrams to calculate conditional probability

Draw and use tree diagrams without replacement

Use two-way tables to calculate conditional probability

Use venn diagrams to calculate conditional probability

## Chapter 11 Topics – Multiplicative Reasoning

Find an amount after repeated percentage changes

Solve growth and decay problems

Calculate rates

Convert between metric speed measures

Use a formula to calculate speed and acceleration

Solve problems involving compound measures

Use relationships involving ratio

Use direct and inverse proportion

## Chapter 12 Topics – Similarity and Congruence

Show that two triangles are congruent

Know the conditions of congruence

Prove shapes are congruent

Use the ratio of corresponding sides to work out scale factors

Find missing lengths on similar shapes

Use similar triangles to work out length in real-life

Use the link between linear scale factor and area scale factor to solve problems

Use the links between scale factors for length, area and volume to solve problems

Find lengths and angles of shapes in nested diagrams

## Chapter 13 Topics – More Trigonometry

Understand and use upper and lower bounds in calculations involving trigonometry

Understand how to find the sine of any angle

Know the graph of the sine function and use it to solve equations

Understand how to find the cosine of any angle

Know the graph of the cosine function and use it to solve equations

Understand how to find the tangent of any angle

Know the graph of the tangent function and use it to solve equations

Find the area of a triangle and a segment of a circle

Use the sine rule to solve 2D problems

Use the cosine rule to solve 2D problems

Solve bearings problems using trigonometry

Use Pythagoras' theorem in 3D

Use trigonometry in 3D

Recognise how changes in a function affect trigonometric graphs

## Chapter 14 Topics – Further Statistics

Understand how to take a simple random sample

Understand how to take a stratified sample

Draw and interpret cumulative frequency tables and diagrams

Work out the median, quartiles and interquartile range from a cumulative frequency diagram

Find the quartiles and interquartile range from stem-and-leaf diagrams

Draw and interpret box plots

Understand frequency density (histograms)

Draw histograms

Interpret histograms

## Chapter 15 Topics – Equations and Graphs

Solve simultaneous equations graphically

Represent inequalities on graphs

Interpret graphs of inequalities

Recognise and draw quadratic functions

Find approximate solutions to quadratic equations graphically

Sketch graphs of cubic functions

Find the roots of cubic equations

Solve quadratic equations using an iterative process

Solve cubic equations using an iterative process



## Chapter 16 Topics – Circle Theorems

Solve problems involving angles, triangles and circles

Understand and use facts about chords and their distance from the centre of a circle

Solve problems involving chords and radii

Understand and use facts about tangents at a point and from a point

Give reasons for angle and length calculations involving tangents

Understand, prove and use facts about angles subtended at the centre and the circumference of circles

Understand, prove and use facts about the angles in a semicircle being a right angle

Find missing angles using these theorems and give reasons for answers

Understand, prove and use facts about angles subtended at the circumference of a circle

Understand, prove and use facts about cyclic quadrilaterals

Prove the alternate segment theorem

Solve angle problems using circle theorems

Give reasons for angle sizes using mathematical language

Find the equation of the tangent to a circle at a given point

## **Year 11 Higher Tier Curriculum**

### Chapter 17 Topics – More Algebra

Change the subject of a formula where the power of the subject appears once

Change the subject of a formula where the subject appears twice

Change the subject of a formula involving fractions where all the variables are in the denominators

Simplify algebraic fractions

Add and subtract algebraic fractions

Multiply and divide algebraic fractions

Solve equations that involve algebraic fractions

Simplify expressions involving surds

Expand expressions involving surds

Rationalise the denominator of a fraction

Use function notation

Find inverse functions

Prove a result using algebra

## Chapter 18 Topics – Vectors and Geometric Proof

Understand and use vector notation

Work out the magnitude of a vector

Calculate using vectors and represent the solutions graphically

Calculate the resultant of two vectors

Solve problems using vectors

Use the resultant of two vectors to solve vector problems

Parallel vectors and collinear points

Prove lines are parallel

Prove points are collinear

Solve geometrical problems in 2D using vector methods

Apply vector methods for simple geometric proofs

## Chapter 19 Topics – Proportion and Graphs

Write and use equations to solve problems involving direct proportion

Write and use equations to solve problems involving direct proportion

Solve problems involving square and cubic proportionality

Write and use equations to solve problems involving inverse proportion

Use and recognise graphs showing inverse proportion

Recognise graphs of exponential functions

sketch graphs of exponential functions

Find multiples of a vector

Calculate the gradient of a tangent at a point

Estimate the area under a non-linear graph

Understand the relationship between translating a graph and the change in its function notation

Understand the effect stretching a curve parallel to one of the axes has on its function form

Understand the effect reflecting a curve in one of the axes has on its function form