Key Stage 4 Mathematics

There are many routes for our key stage 4 learners to take in maths. This enables them to access a curriculum that best suits their needs and ability with being functional in everyday maths at the forefront.

AQA

Year 10 GCSE	Autumn	Spring	Summer

Year 11 GCSE	Autumn	Spring	Summer

Functional Skills Level 1	Years 10 & 11 (This is delivered in both KS4 & 5)

Pearson | Edexcel

Functionals Skills Entry Level 1/2/3	Level 1	Level 2	Level 3

Year 10 Autumn

⇒ Identify and apply circle. Definitions and properties, including centre, radius, diameter, circumference.

⇒ Know the formulae for the circumference and area of a circle; calculate areas and perimeters of composite shapes involving circles

⇒ Use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line
⇒ from/at a given point, bisecting a given angle)

⇒ Calculate arc lengths, angles and areas of sectors of circles

⇒ Use constructions to solve loci problems

⇒ Know that the perpendicular distance from a point to a line is the shortest distance to the line
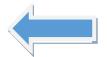
Year 10 Spring

- ⇒ Express one quantity as a fraction of another
- ⇒ Interpret percentages and percentage changes as a fraction or a decimal
- ⇒ Express one quantity as a percentage of another
- ⇒ Use and simplify ratios
- ⇒ Divide a quantity into a given ratio
- ⇒ Understand and use proportion as equality of ratio
- ⇒ Compare two quantities using percentages
- ⇒ Solve problems involving percentage change including percentage increase/decrease and original value problems and simple interest including in financial mathematics
- ⇒ Use the concepts and vocabulary of prime numbers, factors (divisors), multiples
- ⇒ Use the concepts and vocabulary of common factors, common multiples, highest common factor, lowest common multiple and apply systematic listing strategies
- ⇒ Use the concepts and vocabulary of prime numbers, factors (divisors), prime factorisation, including using product notation and the unique factorisation theorem
- ⇒ Use positive integer powers and associated real roots (square, cube and higher) and recognise powers of 2, 3, 4, 5
- ⇒ 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.
- ⇒ Identify and interpret gradients and intercepts of linear functions graphically and algebraically.
- ⇒ Interpret the gradient of a straight-line graph as a rate of change.
- ⇒ Plot and interpret graphs to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration.

Year 10 Summer

⇒ Identify properties of the faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres
⇒ Construct and interpret plans and elevations of 3D shapes
⇒ Know and apply formulae to calculate the volume of cuboids and other right prisms (including cylinders)
⇒ Use standard units of measure for volume, capacity and mass
⇒ Know and apply formulae to calculate the surface area and volume of spheres, pyramids, cones and composite solids
⇒ Calculate exactly with fractions and Multiples f π
⇒ Construct and interpret diagrams for grouped discrete data and Continuous data
⇒ Interpret and analyse distributions of data sets through the median, mean, mode and modal class
⇒ Construct scatter graphs and recognise correlation and know that it does not indicate causation
⇒ Draw estimated lines of best fit and make predictions
⇒ Interpret and construct tables, charts and diagrams, including [frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their appropriate use.
⇒ Calculate with roots and integer Indices
⇒ Calculate with and interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and integers
⇒ Recognise, sketch and interpret graphs of quadratic functions
⇒ Recognise, sketch and interpret graphs of simple cubic functions and the reciprocal function.
⇒ Plot and interpret graphs (including reciprocal graphs) and graphs of non-standard functions in real contexts

Year 11 Autumn

⇒ Apply Pythagoras' theorem to obtain simple proofs.
⇒ Apply the concepts of congruence and similarity, including the relationships between lengths.
⇒ Know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$, and the trigonometric ratios, sin θ = opposite/hypotenuse, cos θ = adjacent/hypotenuse and tan θ = opposite/adjacent; apply them to find angles and lengths in right-angled triangles in two dimensional figures.
⇒ Know the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60°.
⇒ Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors.
⇒ Compare lengths, make links to similarity (including trigonometric ratios).
⇒ Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams.
⇒ Construct theoretical possibility Spaces for single and combined experiments with equally likely outcomes.
⇒ Use possibility spaces to calculate theoretical probabilities.
⇒ Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions.

Year 11 Spring

- ⇒ Generate terms of a sequence from either a term-to-term or a position-to-term rule.
- ⇒ Deduce expressions to calculate the nth term of linear sequences.
- ⇒ Recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions.
- ⇒ Change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts
- ⇒ Use compound units such as speed, rates of pay, unit pricing, density and pressure.
- ⇒ Solve problems involving direct proportion, including graphical and algebraic representations.
- ⇒ Construct and interpret equations that describe direct proportion.
- ⇒ Interpret the gradient of a straight-line graph as a rate of change; recognise and interpret graphs that illustrate direct proportion.
- ⇒ Solve problems involving direct and inverse proportion, including graphical and algebraic representations.
- ⇒ Interpret equations that describe direct and inverse proportion.
- ⇒ Recognise and interpret graphs that illustrate direct and inverse proportion.
- ⇒ Solve and interpret the answers in growth and decay problems, including compound interest.

Year 11 Summer

The aim for this term is for students to revisit topics for their upcoming GCSE examinations. The learning aims depend on what grade the student is working towards and to address any gaps in their learning.

Functionals Skills Level 1

Using numbers and the number system – whole numbers
1 Read, write, order and compare large numbers (up to one million)
2 Recognise and use positive and negative numbers
• read and write numbers up to one million (both written in words and using digits)
• explain the value represented by a specific digit in a given number (up to one million)
• place numbers up to one million in ascending and/or descending order
• compare numbers up to one million using 'greater than' and 'less than' symbols
• recognise and use positive and negative numbers in practical contexts (e.g. temperature, profit/loss)
• count in steps of various sizes, including negative numbers
• calculate with positive and negative numbers.

Using numbers and the number system – whole numbers
3 Multiply and divide whole numbers and decimals by 10, 100, 1000
4 Use multiplication facts and make connections with division facts
• recognise multiples of 10, 100, 1000
• recognise multiples of 2 to 9 up to 100
• break down numbers into prime factors
• work out multiplication and division problems using mental and written methods.

Using numbers and the number system – whole numbers
5 Use simple formulae expressed in words for one or two-step operations
• substitute a variable in a formula with a correct value
• evaluate expressions in a given formula
• follow the correct order of operations to evaluate a formula.

Using numbers and the number system – whole numbers
6 Calculate the squares of one-digit and two-digit numbers
7 Follow the order of precedence of operators
• understand that squaring a number means multiplying the number by itself
• recall times tables to work out the squares of up to two-digit numbers
• follow the order of operations to solve calculations.

Using numbers and the number system – fractions

8 Read, write, order and compare common fractions and mixed numbers
9 Find fractions of whole number quantities or measurements
The learner should be able to:
• read and write common fractions and mixed numbers
• find equivalent fractions (simplify fractions)
• order fractions in ascending or descending order and compare them
• work out the value of a fraction of a whole number, some using various units (£, kg, m, etc.).

Using numbers and the number system – decimals

10 Read, write, order and compare decimals up to three decimal places
11 Add, subtract, multiply and divide decimals up to two decimal places
12 Approximate by rounding to a whole number or to one or two decimal places
• read and write decimals up to three decimal places (both written in words and using digits)
• explain the value represented by a specific digit in a given decimal (up to three decimal places)
• place decimals in ascending and/or descending order
• compare decimals up to three decimal places using 'greater than' and 'less than' symbols
• add, subtract, multiply and divide decimals up to two decimal places
• approximate by rounding to a whole number or to one or two decimal places.

Using numbers and the number system – percentages

13 Read, write, order and compare percentages in whole numbers
14 Calculate percentages of quantities, including simple percentage increases and decreases by 5% and multiples thereof
• read and write percentages in whole numbers
• order and compare percentages using 'greater than' and 'less than' symbols
• work out percentages of quantities, including increases and decreases by 5% and multiples thereof.

Using numbers and the number system – fractions, decimals, percentages

15 Estimate answers to calculations using fractions and decimals
16 Recognise and calculate equivalences between common fractions, percentages and decimals

• estimate answers to calculations using fractions and decimals
• recognise and calculate equivalences between common fractions, percentages and decimals.

Using numbers and the number system – whole numbers
17 Work with simple ratio and direct proportions
• understand the multiplicative relationship between two quantities in a simple ratio
• simplify ratio notation
• use proportion as equality of simple ratios
• relate simple ratios to fractions correctly
• work with direct proportion.

Using common measures, shape and space
18 Calculate simple interest in multiples of 5% on amounts of money
19 Calculate discounts in multiples of 5% on amounts of money
The learner should be able to:
• work out simple interest on amounts of money
• work out discount on amounts of money.

Using common measures, shape and space
20 Convert between units of length, weight, capacity, money and time, in the same system
21 Recognise and make use of simple scales on maps and drawings
The learner should be able to:
• convert between units of length, weight, capacity, money and time in the same system
• calculate accurately to two decimal places, using the correct units
• recognise and make use of simple scales on maps and drawings.

Using common measures, shape and space
22 Calculate the area and perimeter of simple shapes including those that are made up of a combination of rectangles
23 Calculate the volumes of cubes and cuboids
• work out the perimeter of simple shapes including those that are made up of a combination of rectangles
• work out the area of simple shapes including those that are made up of a combination of rectangles
• calculate the volumes of cubes and cuboids
• calculate accurately to two decimal places, using the correct units.

Using common measures, shape and space

24 Draw 2-D shapes and demonstrate an understanding of line symmetry and knowledge of the relative size of angles

25 Interpret plans, elevations and nets of simple 3-D shapes

26 Use angles when describing position and direction, and measure angles in degrees

The learner should be able to:

• draw common 2-D shapes and identify lines of symmetry

• place squares of different shading into a symmetrical pattern on a grid

• draw lines of symmetry on a given shape

• name common angles and their size (e.g. right angle = 90°, ¾ sector in a pie chart has 270° angle)

• interpret the front elevation and plan of simple 3-D shapes

• interpret a working net of a cube, cuboid, cylinder, pyramid and prism

• draw nets of simple 3-D shapes

• describe position or direction using angles, including bearings

• measure angles in degrees.

Handling information and data

27 Represent discrete data in tables, diagrams and charts including pie charts, bar charts and line graphs

28 Group discrete data and represent grouped data graphically

he learner should be able to:

• extract and interpret information from tables, diagrams, charts and graphs

• recognise features of charts to summarise and compare sets of data

• represent discrete data in tables, diagrams and charts including pie charts, bar charts and line graphs

• group discrete data and represent grouped data graphically.

Handling information and data

29 Find the mean and range of a set of quantities

• analyse information presented in different ways and apply simple statistics to interpret it

• work out the mean of a set of quantities

• work out the range of a set of quantities.

Handling information and data

30 Understand probability on a scale from 0 (impossible) to 1 (certain) and use probabilities
to compare the likelihood of events

31 Use equally likely outcomes to find the probabilities of simple events and express them as fractions
• understand probability on a scale from 0 (impossible) to 1 (certain)
• show probability as a fraction
• use equally likely outcomes to find the probabilities of simple events