

Year 8 Advanced Mathematics Curriculum

Numbers and the number system

- use the concepts and vocabulary of prime numbers, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem
- round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)
- interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer

Calculating

- apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative
- use conventional notation for priority of operations, including brackets, powers, roots and reciprocals

Visualising and constructing

- measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings
- identify, describe and construct similar shapes, including on coordinate axes, by considering enlargement
- interpret plans and elevations of 3D shapes
- use scale factors, scale diagrams and maps

Understanding risk 1

- relate relative expected frequencies to theoretical probability, using appropriate language and the 0 - 1 probability scale
- record describe and analyse the frequency of outcomes of probability experiments using tables
- construct theoretical possibility spaces for single experiments with equally likely outcomes and use these to calculate theoretical probabilities
- apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one

Algebraic proficiency: tinkering

- use and interpret algebraic notation, including: a^2b in place of $a \times a \times b$, coefficients written as fractions rather than as decimals
- understand and use the concepts and vocabulary of factors
- simplify and manipulate algebraic expressions by taking out common factors and simplifying expressions involving sums, products and powers, including the laws of indices
- substitute numerical values into scientific formulae
- rearrange formulae to change the subject

Exploring fractions, decimals and percentages

- work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $\frac{7}{2}$ or 0.375 or $\frac{3}{8}$)

Proportional reasoning

- express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)
- identify and work with fractions in ratio problems
- understand and use proportion as equality of ratios
- express a multiplicative relationship between two quantities as a ratio or a fraction
- use compound units (such as speed, rates of pay, unit pricing)
- change freely between compound units (e.g. speed, rates of pay, prices) in numerical contexts
- relate ratios to fractions and to linear functions

Pattern sniffing

- generate terms of a sequence from either a term-to-term or a position-to-term rule
- deduce expressions to calculate the n th term of linear sequences

Investigating angles

- understand and use alternate and corresponding angles on parallel lines
- derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)

Calculating fractions, decimals and percentages

- interpret fractions and percentages as operators
- work with percentages greater than 100%
- solve problems involving percentage change, including original value problems, and simple interest including in financial mathematics
- calculate exactly with fractions

Solving equations and inequalities

- solve linear equations with the unknown on both sides of the equation
- find approximate solutions to linear equations using a graph

Calculating space

- compare lengths, areas and volumes using ratio notation
- calculate perimeters of 2D shapes, including circles
- identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference
- know the formulae: circumference of a circle = $2\pi r = \pi d$, area of a circle = πr^2
- calculate areas of circles and composite shapes
- know and apply formulae to calculate volume of right prisms (including cylinders)

Algebraic proficiency: visualizing

- plot graphs of equations that correspond to straight-line graphs in the coordinate plane
- identify and interpret gradients and intercepts of linear functions graphically
- recognise, sketch and interpret graphs of linear functions and simple quadratic functions
- plot and interpret graphs and graphs of non-standard (*piece-wise linear*) functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance and speed

Understanding risk II

- apply systematic listing strategies
- record describe and analyse the frequency of outcomes of probability experiments using frequency trees
- enumerate sets and combinations of sets systematically, using tables, grids and Venn diagrams
- construct theoretical possibility spaces for combined experiments with equally likely outcomes and use these to calculate theoretical probabilities
- apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments

Presentation of data

- interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data
- use and interpret scatter graphs of bivariate data
- recognise correlation

Measuring data

- interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)
- apply statistics to describe a population