



The aim of the Key Stage 3 scheme of work is to extend the mathematical content taught and understood from Key Stage 2, building on the five key areas of maths with additional objectives to take their understanding further. The content is directly from the National Curriculum for Mathematics at Key Stage 3.

Year 8

This section of the scheme of work includes support objectives that students need to have mastered first; core objectives and extension objectives that students may move onto if they successfully master the core objectives quickly.

This is the plan for the taught curriculum during achievement period: **One (Sept-Feb)**

Brief summary of the topic/work being covered during this period

Substantive knowledge

- to interpret plans and elevations of 3D shapes
- to use compound units (such as speed) changing freely between compound units in numerical contexts

Disciplinary knowledge

- to use the extended concepts of prime numbers such as prime factorisation, including using product notation
- to round to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)
- to interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer
- to extend knowledge of priority of operations to include powers, roots and reciprocals as well as brackets
- to measure line and angles in geometric figures, and use results in context including interpreting maps and scale drawings and use of bearings
- to identify, describe and construct similar shapes, including on coordinate axes, by considering enlargement
- use scale factors, scale diagrams and maps
- to relate relative expected frequencies to theoretical probability, using the 0 - 1 probability scale including applying the property that the probabilities of an exhaustive set of outcomes sum to one
- to record, describe and analyse outcomes of probability experiments using tables; construct theoretical possibility spaces for single experiments with equally likely outcomes and use these to calculate theoretical probabilities
- to use and interpret algebraic notation, including: a^2b in place of $a \times a \times b$, and coefficients written as fractions rather than as decimals; to manipulate algebraic expressions by taking out common factors and simplifying expressions involving sums, products and powers
- to substitute numerical values into scientific formulae and rearrange formulae to change the subject
- to work with terminating decimals and their corresponding fractions (such as 3.5 and $\frac{7}{2}$ or 0.375 or $\frac{3}{8}$)
- to 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)
- to identify and work with fractions in ratio problems, understand and use proportion as equality of ratios
- to generate terms of a sequence from term-to-term or position-to-term rules and to deduce expressions to describe the n th term of linear sequences
- to understand and use alternate and corresponding angles on parallel lines
- to derive and use the sum of angles in a triangle; to deduce and use the angle sum in any polygon and to derive angle properties of regular polygons

Prior knowledge needed for this unit/topic from previous teaching

- understand prime numbers, factors, multiples, highest common factors, lowest common multiples, integer powers and associated roots
- know how to round to the nearest whole number, 10, 100, 1000 and to decimal places and approximate by rounding to the first significant figure in any number
- understand and use the priority of operations in basic calculations
- use a ruler and protractor accurately in measuring lines and angles
- understand the probability scale and associated language
- understand the equivalence between fractions, decimals and percentages
- understand and use the concepts of algebraic expressions, including expanding single brackets
- to be able to simplify a ratio and divide a given quantity into 2 parts.
- to be able to find the term to term rule for a sequence and generate terms using this rule
- to know angle rules relating to triangles, straight lines, angles at a point and vertically opposite angles.

Rationale for students studying this unit/topic

Rationale for studying this topic

Across Key Stage 3, students periodically return to topics in order to ensure skills are continually practised and not forgotten across the space of a year or two. As such, students will return regularly to the 5 key strands of mathematics: number, data handling, algebra, geometry, ratio and proportion, gradually building and developing their knowledge and skills in these areas.

All students study the core objectives in the scheme of work, the most able students in Year 8, those who exceeded the expected standard at the end of Year 7 may move onto the extension objectives after successfully mastering the core. These build upon the more challenging skills covered in Year 7, so that they can move, at a brisk pace, on to more complex calculations and concepts that engage, challenge and motivate. Support objectives are given as guidance for lower attainers with the priority being to build solid foundations of understanding before progressing.

Rationale for timing of this topic

The sequencing of the schemes of work across Key Stage 3 are such that topics later in the school year involve using and applying the basic number skills picked up and practised in the first half of the year.

In Year 8:

- Work with rounding numbers to a specified degree of accuracy and working with numbers in standard form is taught as early as possible as it is an important numerical concept used in a variety of subjects across the curriculum.
- Methods taught when manipulating algebra build on previous knowledge (e.g., expanding brackets), with new skills being focused upon (e.g. factorising) whilst gradually building the level of difficulty towards Year 9 and GCSE
- Sequence knowledge builds on term- to term knowledge from Year 7 and teaches finding and applying the n th term of linear sequences, with quadratic sequence knowledge left until Year 9 and GCSE.
- Students are encouraged to discover new angle rules (in parallel lines and in polygons), building upon the angle knowledge they already have, with the emphasis being placed upon increasing their technical vocabulary and explanation skills
- A more numerical and sophisticated understanding of probability is introduced, building upon learning and introducing concepts that will be built upon in Year 9 and GCSE studies

Key concepts/ideas that are taught to students in this unit/topic, including any anticipated gaps in knowledge and plan to overcome these

- Some pupils may think $35\ 934 = 36$ to two significant figures, so should be taught using real- life contexts that make this mistake unlikely e.g. football ground attendance figures
- Teachers are aware that when converting between ordinary and standard form some pupils may incorrectly connect the power to the number of zeros; e.g. $4 \times 10^5 = 400\ 000$ so $4.2 \times 10^5 = 4\ 200\ 000$
- Students should be taught to use brackets around negative numbers when putting them into calculations in their calculators to avoid sign errors occurring e.g. $(-4)^2$ rather than -4^2
- Some pupils will want to identify an additive relationship between two quantities that are in proportion and apply this to other quantities in order to find missing amounts - teachers should teach this misconception
- When converting between times units, some pupils may base their working on $100\ \text{minutes} = 1\ \text{hour}$
- When working with sequences: some pupils will think that the n th term of the sequence 2, 5, 8, 11, ... is $n + 3$ - links with times tables should form the starting point of this work so that students understand e.g. $3n$ is another way of writing the 3 times table, and $3n-1$ is just an adjustment to it.

New key terminology students will be taught during this topic/unit

Tier 3

prime factorisation, Venn diagram, highest common factor, lowest common multiple, standard form, indices, similar, enlargement, scaling, scale factor, scale drawing, bearing, plan, elevation, probability, theoretical probability, event, outcome, equally likely, sample space diagram, factorise, recurring, terminating, unitary method, compound unit, vertically opposite angles, parallel lines, alternate angles, corresponding angles, interior angle, exterior angle, regular polygon

Plan for Assessment

- Informal assessment is ongoing through class work, contributions to class discussion, teacher assessment during lessons.
- Teachers record homework marks each week on a centrally held department tracker; the homework tasks are detailed on the schemes of work and outlined centrally within the department to ensure consistency across all classes. Teachers will take in and formally mark a written piece of homework once every two weeks. Students will then have time during a subsequent lesson to review their work and make any corrections
- Formal assessment will take place twice during this achievement period, after October half term and February half term. This synoptic paper aims to assess students' progress in mathematics generally and covers questions from all topics that have been covered at any point in the students' mathematical history (not just this academic year).
- Mini start-of-topic tests will provide information for teachers regarding prior knowledge and existing misconceptions and mini end-of-topic tests will help students and teachers see the progress that has been made over the course of the teaching of the topic.