

Introduction to Mathematics (National Curriculum)

notes in green refer to Teaching School Scheme of Work

Purpose of study

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Aims

The national curriculum for mathematics aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions. *Children need to be given regular opportunities to use and apply their learning in maths both through solving word problems, investigations and through other curriculum areas. It should be remembered however, that children will need to be taught the skills of problem-solving and should experience a wide range of types of investigations:*
 - logic puzzles
 - finding all possibilities
 - finding rules and describing patterns
 - diagram problems and visual puzzles

Legacy resources (Mathematical Challenges for the More Able, Problem Solving) and current materials (n-rich website) are all good sources of information and ideas.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects. *On the Scheme of Work have included exemplification of medium term planning which shows the links within maths and across the curriculum. We have also exemplification of short term plans which show how some of the mathematical content can be grouped together with in a block of learning.*

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

The Scheme of Work has been written in such a way that teachers who have mixed age classes can select the appropriate year groups from the Scheme of Work, and see the progression within each domain. Indeed any teacher will need to refer to year groups above and below in order to check expectations and meet the needs of his/her pupils.

On the Scheme of Work, areas where we feel consolidation is necessary have been included in the autumn term, e.g. in Year 5, before moving on to multiplying 4 digit number in the spring term, we have included the Year 4 requirement to multiply 3 digit numbers. This will be especially important when the new National Curriculum is first introduced. Areas where children are likely to need regular practice e.g. counting in equal steps, have been included each term. This gives teacher the opportunity to decide on the balance between oral/mental starter learning and the main teaching within lessons. As indicated above however, teachers will need to make their own decisions about the speed at which they work through the Scheme of Work.

Information and communication technology (ICT)

Calculators should not be used as a substitute for good written and mental arithmetic. They should therefore only be introduced near the end of key stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure. In both primary and secondary schools, teachers should use their judgement about when ICT tools should be used. **As with any other piece of mathematical equipment, calculators have a valid place in the classroom. Teachers should use their judgement about when calculators will help mathematical learning and use them appropriately, whilst remembering that children will need to be taught the skills of how to use them effectively.**

Spoken language

The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

School curriculum

The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, schools can introduce key stage content during an earlier key stage, if appropriate. **Schools still need to have regard for the guidance within the National Curriculum as this is a source of useful information, e.g. although algebra only appears within a domain name in Years 5 and 6, algebra activities for younger children are suggested in the guidance notes (e.g. find the missing number $\square + 3 = 5$).**

All schools are also required to set out their school curriculum for mathematics on a year-by-year basis and make this information available online. **This Scheme of Work may be uploaded to school websites.**

Attainment targets

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.