Year 1

Progression in mathematics

The learner

At the start of Year 1, children are enthusiastic 'beginning' mathematicians. They have an understanding of the basic concepts of number, shape and measurement, and see mathematics as an exciting and practical element of the curriculum. They develop their knowledge, skills and understanding through a balance of whole-class activity. This involves, for example, counting, direct teaching, problem solving in groups and independent work, where children apply and practise their learning. A mix of mental, practical and informal written work engages and motivates children and fosters purposeful attitudes to mathematics. Home–school mathematics links are an important part of children's experiences.

Children receive systematic mathematics teaching every day and, where appropriate, have carefully planned opportunities to develop and apply their learning in other areas of the curriculum and beyond. Linking mathematics to practical experiences and learning in other curricular areas and other daily activities helps children to appreciate the role mathematics plays in their everyday lives.

Speaking and listening plays an important role in mathematics teaching and learning as children begin to acquire the new vocabulary and language of mathematics. Much of their learning at this stage is oral, visual and tactile. The activities they engage in help children to develop many of the key aspects of learning identified in *Excellence and Enjoyment: learning and teaching in the primary years*.

Using and applying mathematics

Children solve problems in a variety of practical contexts. They talk about the problem that they are going to solve and use practical materials, numbers and diagrams to represent and organise the problem. For example, to find the total number of children seated at five tables of four, they use toys or tally marks to represent the children at each table before recording the numbers involved. They solve the problem then place the answer back in the context of the problem: 'There are 20 children sitting down.'

Children understand how to represent number stories by number sentences. For example, they represent the number story 'Eleven people are on a bus and three get off; there are eight people left on the bus' by the number sentence 11 – 3 = 8. They use the +, – and = signs to write number sentences to record mental calculations. They begin to find the unknown number represented by a symbol in number sentences such as 17 – 10 = □, △ + 2 = 6 and 3 = 7 – ○.

Children solve problems involving 'paying' and 'giving change'. For example, they work out different ways of paying for an apple costing 6p using 1p and 2p coins. As they work with numbers and shapes, they identify and use patterns and properties. For example, they notice that all shapes with three sides have three corners, or that when they count in tens from zero all the numbers in the count end in zero. Children discuss their methods. They show how they arrive at an answer orally using pictures, lists and other representations. They begin to explain how they solved a problem and the choices that they made. They make and then test predictions. For example, they sort a set of 3-D shapes into those with and without a curved face to help them to predict which 3-D shapes will travel furthest when released from the top of a slope. They predict and check how many robot steps are needed for the floor robot to reach the traffic cone.

Counting and understanding number

Children recite the number names in order and continue to develop their counting skills, counting on or back in ones, twos, fives and tens in a range of contexts. They read and write numerals and position numbers on a number line. They begin to understand the importance of 10 in the number system. They identify multiples of 10, and recognise the structure of two-digit numbers. They know the number one more or less than a given number and 10 more or less than a multiple of 10.

Children count accurately at least 20 objects, sounds or actions, such as beads on a bead string, beats on a drum or paces across the floor. They estimate how many objects there are in a group and check by counting. They compare and order numbers using the words 'greater than', 'less than' and 'equal to' and the signs >, < and =. They use these skills to position numbers on a number track or line. They estimate quantities and measurements in a range of contexts; for example, they predict which of two pots contains more pencils, then count the pencils to check. They understand, use and compare ordinal numbers in practical situations, for example, to say which child is third in line in the dinner queue.

Children recognise and describe halves and quarters in contexts such as arrangements of beads where half are red and half are blue, or when explaining: 'I gave a quarter of my grapes to my friend.'

Knowing and using number facts

Children know all pairs of whole numbers that total 10. They begin to derive and recall addition facts for totals up to 10 and the corresponding subtraction facts. They use resources such as interlocking cubes or the images in the ITP 'Number facts' to generate different ways to make a total of 9. They generate and record the number sentences in order: 0 + 9 = 9, 1 + 8 = 9, 2 + 7 = 9, …, to see that the total stays the same when the first number increases by 1 and the second decreases by 1.

They recognise patterns in sequences of calculations. Children generate equivalent calculations for a given number such as 6 and record: 6 = 0 + 6 = 1 + 5 = 2 + 4 = 3 + 3. They use the patterns they observe to derive new sequences for, say, 11 and 12, and to identify associated number facts. They know the doubles of all numbers to at least 10 and begin to use these to calculate 'near-doubles', for example using 5 + 5 = 10 to find 5 + 6.

Children recognise the multiples of 10 in the number system, for example on ICT-generated number grids with 5 or 10 columns and then with, say, 6 or 7 columns. They use these multiples of 10 as milestones in their counting. When counting forwards and backwards in ones, twos or fives, they recognise and use the repeating patterns between multiples of 10 and begin to see how these patterns continue beyond 100. Children build on these counting skills to derive multiples of 2, 5 and 10. When counting in twos, children recognise odd numbers as 'every other number from 1', and even numbers as 'every other number from 2'. They count on in tens starting from zero or from a multiple of 10 such as 40, and count back to zero. They link counting in equal steps to making equal jumps along a bead string, a number track or a number line.

Calculating

Children begin to recognise the value of each digit in any two-digit number. They can exchange, say, 14 ones for 1 ten and 4 ones when using coins or structured place value materials. They use a calculator to confirm that numbers such as 57 are made up of 50 and 7 ones, and to develop their understanding of place value. They understand the distinct structure of the 'teen' numbers. They begin to partition numbers using place value cards, the ITP 'Place value' and other resources such as an abacus or calculator. They apply this understanding of exchange and place value to solve problems involving money.

Children understand addition as combining groups and as counting on. They use their understanding that addition can be done in any order to choose how to calculate, say, 2 + 17. They use a bead string or a number line to work out calculations such as 8 + 5 or 18 + 5 by counting on, using 10 and 20 as milestones, for example 8 + 2 = 10 and 10 + 3 = 13. They add 9 to a one-digit number by adding 10 then subtracting 1. Children apply this knowledge to problems. For example, they find different ways to make a rod of 12 units using rods of 2, 3 and 4 units or they explore the possible total scores when three rings are thrown at a ring board labelled 4, 5 and 6.

Children interpret subtraction as 'taking away'. They represent 'taking away' using objects and with number sentences, recognising that the number of objects remaining is the answer in a calculation such as 8 – 3 = 5. They begin to rely less on manipulating practical resources and use strategies such as counting back on a number line or software that provides images and diagrams.

Children build on their understanding of subtraction to interpret 14 – 9 as finding the difference between 14 and 9 or: 'How many more must I add to 9 to get 14?' They use a counting-on strategy and record the process as steps on a number line. They construct sequences of calculations involving subtraction such as: 5 – 1 = 4, 6 – 2 = 4, 7 – 3 = 4, … They continue sequences such as: 12 – 0 = 12, 12 – 1 = 11, 12 – 2 = 10, … to build up patterns of calculations that highlight the underlying process of subtraction. They begin to recognise that subtraction and addition 'undo each other'. Children apply their knowledge to problems; for example, they work out how many biscuits are left on a plate of 19 biscuits if 5 are eaten. They solve problems such as finding the biggest and smallest possible differences between a pair of numbers from the set 8, 5, 12 and 6.

Children record addition and subtraction number sentences using the operation signs + and –. They generate equivalent statements using the equals sign, for example 7 = 6 + 1 = 8 – 1. They recall the number that is 1 or 10 more or less than a given number and use this to support their calculations, for example to give answers to 12 + 1, 13 – 1 and 30 + 10 and 60 – 10.

Children carry out practical tasks that involve sharing objects into equal groups to solve problems such as: 'How many pencils are on each table if there are 4 tables and 12 pencils?' or 'How many 1p coins will two children each get when there are twelve 1p coins to share out?' They find combinations of groups of equal numbers of objects, such as working out the total number of blocks if there are three groups of five blocks, and they count in fives to check.

Understanding shape

Children build 3-D models and make 2-D shapes using practical equipment. They identify the names of common shapes and solids such as a cube, cone, triangle and rectangle. They use everyday language to describe some of their features, for example: 'Cuboids have six flat faces'. They build pictures and patterns using shapes and describe how these are formed, for example: 'My train has two rectangles and four circles'. They use ICT to record, duplicate and change their shapes, describing the effect their changes have on the shape.

Children use everyday language to describe the position of objects, such as: 'My chair is next to Abdul's chair and under the window'. They also describe movement, for example: 'If I turn left and walk to the end of the corridor, I will get to the computer room'. They talk about objects that turn about a point such as a wheel or spinner, or turn about a line such as the lid of a cuboid box or pages in a book, and they make and talk about simple models that turn. They experience and recognise whole, half and quarter turns and apply this when they read the time to the hour and half hour on an analogue clock.

Measuring

Children decide which of two or more lengths is greater or less by making direct comparisons. They compare two masses using a balance scale and compare two quantities of liquid using identical

containers. They recognise the need to use uniform units when measuring objects. They suggest suitable standard or uniform non-standard units and measuring equipment to measure a length, weight or capacity. They measure length using, say, interlocking cubes or a metre rule, weight using identical wooden bricks or 100-gram blocks, and capacity with a beaker or scoop, saying, for example, that the container holds '6 and a bit scoops'. Children begin to make more accurate estimates, such as: 'The room is about three and a half metre sticks long' or 'The bottle holds about five and a half cups of water'. They record their measures using pictures, symbols and numbers.

Children order familiar events in time, for example sequencing the days of the week, digital photographs taken on a school trip or events in a well-known story. They describe and place events in time using time-related vocabulary, such as: 'I play with my friends after school and before I go to bed at seven o'clock' and 'On Monday it was my birthday; that was three days ago'.

Handling data

Children collect information to answer a question linked to other areas of the curriculum. They use lists or tables to organise their results. For example, children use a science topic such as 'Ourselves' to decide if older children are always taller. They make tables to compare the results of tests on different types of paper to see how waterproof they are. They list objects that are magnetic. They present their findings and answers to questions using block graphs and pictograms to show, for example, children's eye colour. They use pictures to represent the numbers of cubes that can be placed on discs of different papers before each disc sinks.

Children sort shapes, for example, into those with curved faces and those without. They re-sort the shapes using another criterion, such as 'has eight or fewer edges' or a criterion of their own choosing. They explain differences and similarities between shapes, for example: 'The sides of the door are straight and the shape is a rectangle, but the window is not a rectangle as one of its sides is curved'.

Embedding key aspects of learning

Year 1 children's thinking, communication and social skills continue to develop through their learning in mathematics. They become more aware of patterns in numbers and properties of shapes, and begin to remember and use facts to support their learning.

Children use reasoning when they extend number sequences or sort shapes according to a given criterion and describe their reasons for the choices they made. They begin to develop evaluative skills as they listen to other children explain how they built a shape and judge whether the shape meets the conditions that were set.

Children's communication skills develop as they discuss and explain their methods and ideas using a wider range of mathematical vocabulary. They establish mathematical meanings of new words to describe features of shapes such as 'face' or properties of numbers such as 'even'. They extend their vocabulary as examples are introduced to establish similarities and differences between, say, the cube and the cuboid. They use a wider range of pictorial and other forms of recording to describe or explain how they arrived at an answer.

Children's problem-solving skills grow as they experiment with different approaches to a practical problem. Collaborative work helps to develop their social skills as they learn to share, take turns and listen and respond to their peers.