

Programme of Study for Mathematics at Key Stage 1

Introduction

At the beginning of a pupil's primary education, it is essential to lay a secure foundation of mathematical knowledge, skills and understanding in order for each pupil to attain his or her full potential. Pupils will embark on Key Stage 1 with a diversity of mathematical experiences, aptitudes and abilities. These should be identified and used as the basis for all planning.

Time should be allowed for pupils to develop and consolidate their mathematical ideas using practical materials before moving on to more formal recording. Through engaging in a wide range of activities, pupils should begin to develop their skills in mental mathematics. They should be given opportunities, on a regular basis, to estimate and approximate, and to make simple predictions in all areas of mathematics. These skills should be developed systematically and progressively throughout the key stage.

The sections of the programme of study interrelate. Processes in Mathematics should pervade the entire mathematics programme. Pupils should use and apply mathematics in practical tasks, in real-life situations and within mathematics itself.

Mathematical Activities

Throughout the whole mathematics programme, pupils should be engaged in a wide range of purposeful activities. These activities should:

- involve pupils in different modes of learning, including playing, exploring and investigating, doing and observing, talking and listening, discussing and asking questions;
- match the ability and stage of development of the pupil;
- include both independent and co-operative learning;
- bring together different areas of mathematics;
- develop mental skills;
- use, where appropriate, pupils' own interests or questions, either as a starting point, or as further lines of development;
- be balanced between tasks which develop knowledge, skills and understanding and those which develop the ability to tackle problems;
- be balanced between those which are short in duration and those which have scope for development over a longer period.

Contexts for Learning

Pupils should have opportunities to develop and apply their knowledge, skills and understanding of mathematics through activities in various aspects of the curriculum and the everyday experiences of the classroom, the home and the world around them. In the early years, they should develop and apply much of their early mathematical skills during structured play. This should involve pupils in activities, such as imaginative play, the exploration of natural materials, creative experiences, construction and domestic play.

Communication in Mathematics

Pupils should communicate in oral, pictorial and written form, progressing at their own pace from informal personal language to mathematical language and from personal recording to mathematical representations and symbols. As the development of mathematical language is of fundamental importance, talking about work has a higher priority than recording in the early years.

Contribution to Educational (Cross-curricular) Themes

Pupils should be given opportunities, where appropriate, to develop and apply their knowledge, skills and understanding of information technology. They should use calculators to explore, through play and number games, how a calculator works, and how it can be used as a tool for concept development and calculating with realistic data. They should use the computer to support and enhance their mathematical programme, with simple databases and programmable devices being included, where appropriate.

Resources

Through the varied activities in which they are engaged throughout Key Stage 1, pupils should have opportunities to explore and use a wide variety of materials including natural, man-made and scrap materials, semi-structured and structured materials. They should gain confidence in the use of these materials and use them to develop mathematical understanding and skills. They should come to appreciate the special characteristics of these materials.

PROCESSES IN MATHEMATICS

Using Mathematics

Pupils should have opportunities to:

- a select, with help from the teacher, materials and equipment required for a task; know the appropriate materials and equipment to select for a task by appreciating the special characteristics of these materials and equipment;
- b select and use the mathematics appropriate to a task, *for example, counting on when giving change in a shopping activity;*
- c develop different approaches to solving problems and look for ways to overcome difficulties, *for example*
 - *comparing and ordering heights of children in a group to find the tallest and the smallest;*
 - *drawing a simple diagram to find which television programme is the most popular;*
- d begin to organise their own work and work systematically, *for example, find the components of 14p using different coins and record the results; plan how the lengths of different items in the classroom should be measured and the results recorded.*

Communicating Mathematically

Pupils should have opportunities to:

- a understand the language of number, of properties of shapes and of comparatives, *for example, bigger than, the same 'weight' as, next to and before;*
- b talk about their work, initially by responding to questions from the teacher; ask questions about their work, *for example, 'How could I record the handspans of everyone in my group?';*
- c understand and use mathematical symbols, *for example, '+' and '=';*
- d use a variety of forms of mathematical representation, presenting results in a clear and organised way.

Mathematical Reasoning

Pupils should have opportunities to:

- a recognise simple patterns and relationships and make predictions about them based on experience, *for example, predict the next number in the sequence, 3, 6, 9, 12....;*
- b ask and respond to open-ended questions, *for example*
 - *'What would happen if more cubes were added to one side of the balance?' and Why?;*
 - *'How would you find how much more one container holds than another?';*
 - *'What would be the best way to record these results?'*

- c explain their way of working, *for example*
- give reasons for sorting when using a Carroll diagram;
 - explain how and why data was entered into a simple computer database;
- d know ways to check their own work, *for example, by repeating measurements or repeating calculations by adding from the top downwards; using a calculator.*

NUMBER

Understanding Number and Number Notation

Pupils should have opportunities to:

- a count orally, knowing the number names, initially working with small numbers; count collections of objects and know that the size of a set is given by the last number in the count; understand the empty set and the conservation of number;
- b read, write and order whole numbers, initially to 10, progressing to at least 1000; use the knowledge that the position of a digit indicates its value;
- c make a sensible estimate of a small number of objects, *for example, know that there are about 5 fish in a fish tank; begin to approximate to the nearest 10 or 100, for example, 68 is almost 70; 287 is nearer to 300 than 200;*
- d recognise and use simple everyday fractions and their notation in practical situations, *for example, $\frac{1}{2}$ and $\frac{1}{4}$ of an apple; $\frac{1}{2}$ of 10 counters; $\frac{1}{2}$ of the children in a group.*

Patterns, Relationships and Sequences in Number

Pupils should have opportunities to:

- a copy, continue and devise repeating patterns, *for example, continuing a bead threading pattern of red, red, blue, red, red, blue . . . ; distinguish between odd and even numbers;*
- b explore and record addition and subtraction patterns and patterns in number tables, *for example, the fifty array and hundred square, explaining and using them to make predictions, initially working with number patterns up to 20 and then to 100; progress to exploring multiplication and division patterns;*
- c understand the commutative property of addition and the relationship between addition and subtraction, *for example*
- $2 + 3 = 5$, $3 + 2 = 2 + 3$;
 - if $4 + 3 = 7$, then $7 - 4 = 3$;
- d understand the use of a symbol to stand for an unknown number, *for example*
- $6 = 2 + \square$;
 - $\square - 3 = 2$;
- e understand and use simple function machines.

Operations and their Applications

Pupils should have opportunities to:

- a understand the operations of addition and subtraction (as take away or comparison or complementary); add and subtract, initially using small numbers and progressing to working with hundreds, tens and units; develop a variety of methods for adding and subtracting; use these skills to solve problems involving whole numbers;
- b progress to understanding the operations of multiplication and simple division and use them to solve problems with whole numbers, working with remainders in practical situations only;
- c know addition and subtraction facts, initially to 10, and then to 20; add mentally up to three single digit numbers; subtract mentally a single digit number from a two-digit number; add mentally two two-digit numbers, initially using appropriate apparatus; know multiplication tables relating to the 2s, 5s, 10s and other tables, as appropriate; use these facts in problem-solving situations.

Money

Pupils should have opportunities to:

- a recognise and know how to use coins in simple contexts, *for example, shop play*; use and understand the conventional way of recording in money; add and subtract money, initially involving small amounts and progressing to working with money up to £10; use these skills in problem-solving situations.

MEASURES

Pupils should have opportunities to:

- a compare and order objects, developing and using mathematical language associated with length, 'weight', capacity, area and time, *for example, the same as, heavier than, half empty, will cover*;
- b use non-standard units in length, 'weight', capacity, area and time to measure a range of everyday objects and events; appreciate important ideas about measurement including the need for appropriate accuracy and the meaning of graduations on measuring instruments; recognise the need to use standard units;
- c know the most commonly used units in length, 'weight', capacity and time, including metres, kilograms, litres, hours and minutes and use them to measure in purposeful contexts; progress to measuring with greater accuracy using, *for example, cm, $\frac{1}{2}$ kilogram and $\frac{1}{2}$ litre*, choosing appropriately for a situation;
- d sequence everyday events, *for example, breakfast time, lunch time and teatime*; know the time within a day is comprised of morning, afternoon, evening and night; know the days of the week, months of the year and seasons; explore calendar patterns;
- e recognise times on the clock face, initially significant times, *for example, lunch time, home time* and progressing to the hour, half-hour and quarter hours; begin to read the five minute intervals on an analogue clock; compare analogue and digital displays for the hour and half-hour;

- f make estimates using arbitrary and standard units, *for example, the number of cupfuls that would fill a jug; heavier or lighter than a kilogram; how long it would take to wash your hands;*
- g choose and use simple measuring instruments, reading and interpreting them with some accuracy;
- h understand the conservation of measures.

SHAPE AND SPACE

Exploration of shape

Pupils should have opportunities to:

- a sort 2-D and 3-D shapes in different ways, giving reasons for each method of sorting;
- b make constructions, pictures and patterns with 2-D and 3-D shapes using scrap and commercial materials;
- c name 2-D and 3-D shapes including squares, rectangles, circles, triangles, cubes, cuboids, cones, cylinders and spheres; describe these shapes using mathematical language, including 'corners', edges, sides and faces; recognise reflective symmetry in simple cases in their immediate environment, *for example, a butterfly, a particular road sign.*

Position, Movement and Direction

Pupils should have opportunities to:

- a state a position using prepositions, *for example, on, inside, above, under, behind, next to;*
- b recognise, in practical situations, different types of movement, including straight (forwards and backwards), right and left turns and turning over, laying the foundation of the notion of an angle as a measure of turn; give and understand instructions for turning through right angles; recognise right-angled corners in 2-D and 3-D shapes; know the four points of the compass;
- c use programmable devices to explore movement and direction, *for example, the Roamer.*

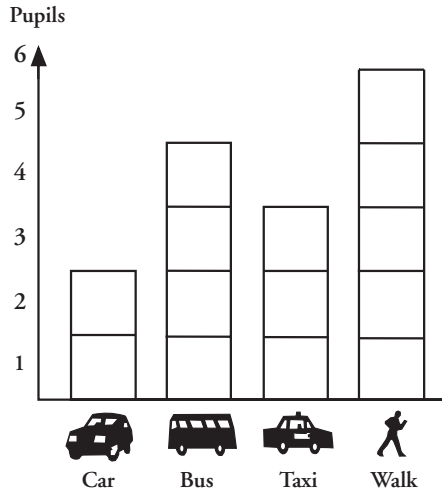
HANDLING DATA

Collect, Represent and Interpret Data

Pupils should have opportunities to:

- a sort everyday objects and talk about the reasons for sorting; select criteria for sorting a set of objects and apply consistently; sort and classify objects for one or two criteria; represent the results of classifying using Venn, Carroll and Tree diagrams with two criteria;

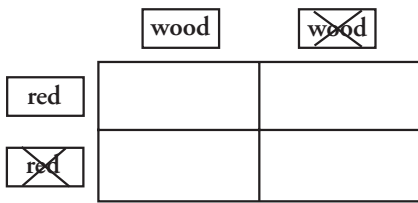
- b collect data and record it, using real objects or drawings and talk about the outcome; progress to recording data in a range of ways, including simple pictograms, block graphs, bar charts (given intervals), mapping diagrams and frequency tables; read and interpret the data (for examples, see page 8);
- c help to design an observation sheet and use it to record a set of data leading to a frequency table, *for example, recording the colours of cars passing the school*; collate and analyse the results;
- d extract information from an increasing range of charts, diagrams and tables; enter and access information in a simple database including a computer database.



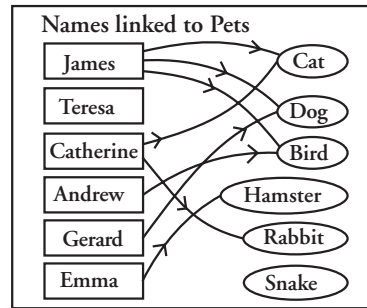
Block graph

4 years old						
5 years old						
Number of children	1	2	3	4	5	6

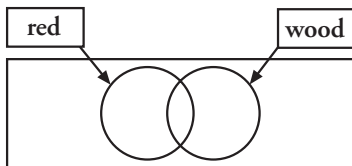
Pictogram



Carroll diagram



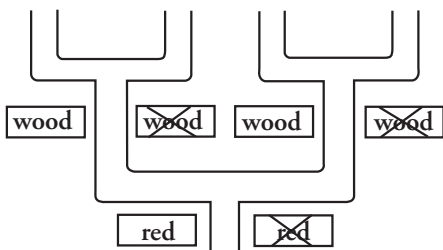
Mapping diagram



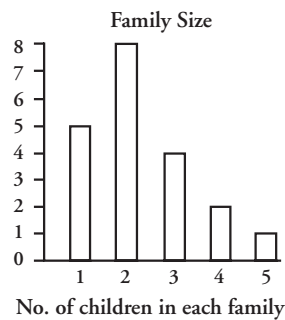
Venn diagram

Blackbird	XX	2
Sparrow	XXXXX	5
Robin	X	1
Blue Tit	XXX	3

Frequency table



Tree diagram



Bar chart