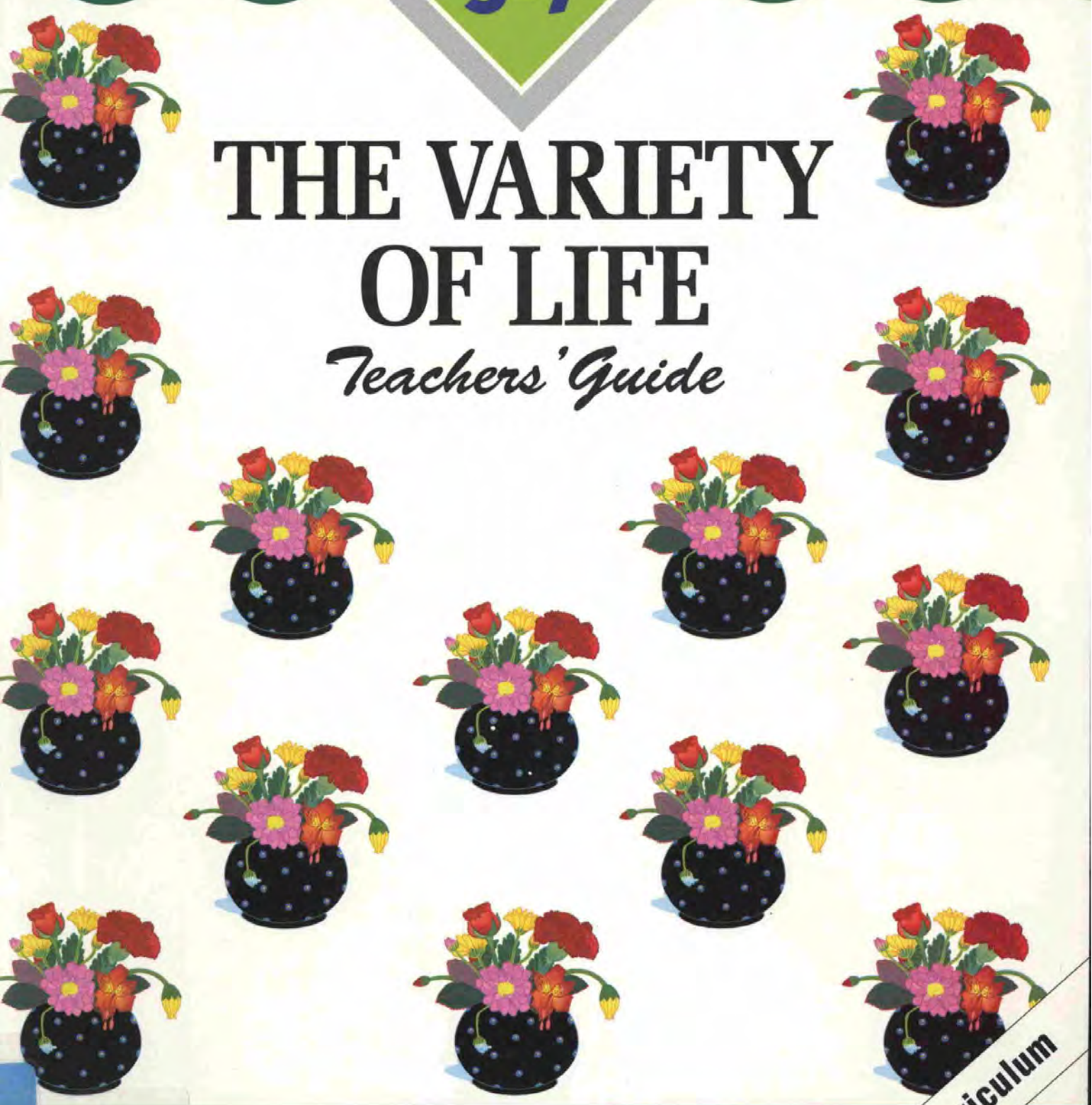


Nuffield Primary Science

SCIENCE PROCESSES AND CONCEPT EXPLORATION

AGES

5-7



THE VARIETY OF LIFE

Teachers' Guide

A 570.71 NUF

Collins Educational

1995 Curriculum

Trial schools

The SPACE Project and the Trust are grateful to the governors, staff, and pupils of all the trial schools. It will be obvious to readers of these publications how much we are indebted to them for their help, and especially for the children's drawn and written records of their hard work and their growing understanding of science.

All Saints Primary School, Barnet, Hertfordshire
Arnot County Primary Infant School, Arnot Street, Walton, Liverpool
Balladen Primary School, Rawtenstall, Rossendale
Blacko County Primary School, Blacko, Lancashire
Chalgrove JMI School, Finchley, London N3
Fairway JMI School, Mill Hill, London NW7
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Snarebrook Primary School, Wanstead, London E18
Stubbins Primary School, Ramsbottom, Lancashire
Thorn County Primary School, Cowtoot Lane, Bacup, Lancashire
Trawden County Primary School, Dean Street, Trawden, Lancashire
Walton-le-Dale County Primary School, Preston
Water County Primary School, Burnley Road East, Water, Rossendale
Waterfoot County Primary School, Thornfield Avenue, Waterfoot, Rossendale
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Ages
5-7

The variety of life



TEACHERS' GUIDE

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Explanation of symbols in the margins



Warning



Opportunities for children to use information technology



Good opportunities to develop and assess work related to Experimental and Investigative Science.



Equipment needed



Notes which may be useful to the teacher



Reference to the pupils' books



Vocabulary work

1.1 The SPACE approach to teaching and learning science

A primary class where the SPACE approach to science is being used may not at first seem different from any other class engaged in science activities; in either, children will be mentally and physically involved in exploring objects and events in the world around them. However, a closer look will reveal that both the children's activities and the teacher's role differ from those found in other approaches. The children are not following instructions given by others; they are not solving a problem set them by someone else. They are deeply involved in work which is based on their own ideas, and they have taken part in deciding how to do it.

The teacher has, of course, prepared carefully to reach the point where children try out their ideas. She or he will have started on the topic by giving children opportunities to explore from their own experience situations which embody important scientific ideas. The teacher will have ensured that the children have expressed their ideas about what they are exploring, using one or more of a range of approaches – from whole class discussion to talking with individual children, or asking children to write or draw – and will have explored the children's reasons for having those ideas.

With this information the teacher will have decided how to help the children to develop or revise their ideas. That may involve getting the children to use the ideas to make a prediction, then testing it by seeing if it works in practice; or the children may gather further evidence to discuss and think about. In particular, the teacher will note how 'scientific' children have been in their gathering and use of evidence; and should, by careful questioning, encourage greater rigour in the use of scientific process skills.

It is essential that it is the children who change their ideas as a result of what they find themselves, and that they are not merely accepting ideas which they are told are better.

By carefully exploring children's ideas, taking them seriously and choosing appropriate ways of helping the children to test them, the teacher can move children towards ideas which apply more widely and fit the evidence better – those which are, in short, more scientific.

You will find more information about the SPACE approach in the Nuffield Primary Science *Science Co-ordinators' handbook*.

1.2 Useful strategies

Finding out children's ideas

This guide points out many opportunities for finding out children's ideas. One way is simply by talking, but there are many others. We have found the following strategies effective. How you use them may depend on the area of science you are dealing with. In the teachers' guides you will find examples of these strategies, with suggestions as to where you might use them. More information about them is given in the *Science Co-ordinators' handbook*.

Talking and open questioning

Whole class discussions can be useful for sharing ideas, but they do not always give all children a chance to speak. It is often helpful if children are allowed to think of their own ideas first, perhaps working them out in drawings, and are then encouraged to share these with others – perhaps with just one other child, or with a larger group.

Annotated drawings

Asking children to draw their ideas can give a particularly clear insight into what they think. It also gives you a chance to discuss the children's ideas with them. Words conveying these ideas can then be added to the drawing, either by you or by the child, in the course of discussion to clarify what has been represented. Such work can be kept as a permanent record.

Sorting and classifying

This can be a useful way of helping children to clarify their ideas and to record their thinking. They could sort a collection of objects or pictures into groups.

Writing down ideas

When they have acquired some writing skill, this gives children the opportunity to express their own views. It will usually be in response to questions posed by you.

Log books and diaries

These can be used to record changes over a longer period of time. They need not necessarily be kept by individual children, but could be kept by a group or class as a whole. Children can jot down, as words or drawings, the changes they notice and something about what they think are the reasons for what they observe.

Helping children to develop their ideas

Letting children try out their own ideas

This will involve children in using some of the process skills of science: at first mainly observing, predicting, and communicating. Later, as children approach Key Stage 2, they will begin to make more use of measuring, hypothesizing, planning and carrying out fair tests, and interpreting results and findings.

As often as possible, children should see what happens when they put their ideas to test. They should be encouraged to observe and report carefully what happens and to give their ideas about why it happens.



Encouraging generalization from one context to another

In discussing a particular event, for example dissolving sugar in tea, consider whether the explanation proposed applies in another context, such as salt dissolving on a wet road. You or the children might suggest other contexts where the idea might be tried. This might be done by discussing the evidence for and against the explanation, or by gathering more evidence and testing the idea in the other context, depending on children's familiarity with the events being examined.

Discussing the words children use to describe their ideas

Children can be asked to be quite specific about the meaning of words they use, whether scientific or not. They can be prompted to think of alternative words which have almost the same meaning. They can be asked to think of examples of a word they are using, such as 'melt', so that you can decide when to introduce alternative or more precise words if necessary.

Extending the range of evidence

Some of the children's ideas may be consistent with their experience up to that time, but they could be challenged by extending the range of this experience. This applies particularly to things which are not easily observed, such as slow changes; or those which are normally hidden, such as the insides of objects. Books are useful in some cases.

Getting children to communicate their ideas

Expressing ideas in any way – through writing, drawing, modelling or, particularly, through discussion – involves thinking them through, and often rethinking and revising them. Discussion has a further advantage in that it is two-way and children can set others' ideas against their own. Just realizing that there are different ideas helps them to reconsider their own.

1.3 Charts to help children to develop their ideas

The charts on pages 22, 33 and 45 show how you can help children to develop their ideas from starting points which have given rise to different ideas.

The centre rectangles contain starter questions.

The surrounding 'thought bubbles' contain the sort of ideas expressed by children.

The further ring of rectangles contains questions posed by teachers in response to the ideas expressed by the children. These questions are meant to prompt children to think about their ideas.

The outer rounded boxes indicate ways in which the children might respond to the teacher's questions.

Some of the shapes have been left blank, as a sign that other ideas may be encountered and other ways of helping children to develop their ideas may be tried.

This teachers' guide is divided into themes; in each one there is a section on finding out children's ideas, examples of ideas children have, and a section on helping children to develop their ideas.

1.4 The variety of life and the curriculum

Nuffield Primary Science Themes

Naming and grouping living things

This theme explores the variety of living things and ways in which living things can be grouped. Children tend to mention more animals than plants in their ideas of what counts as living things. Some might include inanimate objects as well as mythical creatures in their description of living things. Often children judge that things are living because they move.

This theme encourages children to observe the features of living things, through visits or by caring for animals and plants in the classroom. These experiences will help children recognize the similarities and differences in living things and will enable them to sort living things into groups.

National Curriculum Programme of Study

Life Processes and Living Things

1 Life processes

- a** the differences between things that are living and things that have never been alive;
- b** that animals, including humans, move, feed, grow, use their senses and reproduce.

4 Variation and classification

- b** that living things can be grouped according to observable similarities and differences.

Environmental Studies 5-14 (Scotland): Science

Understanding Living Things and the Processes of Life (Stages P1 to P3)

Variety and characteristic features

- sorting living things into broad groups, according to easily observable characteristics;
- recognising and naming common plants and animals in the classroom and local environment.

Individual variation

This theme explores ways in which living things are similar to and different from each other. Children readily express ideas about how they differ from each other, often focusing on different hair and eye colour or the different clothes they are wearing. Children tend to believe that differences occur so that people can recognize each other or to prevent the world being boring. Generally young children are unaware that children share some of their parents' features.

Sorting activities and discussion will help familiarize children with the ways in which groups of living things are similar and different.

Past life forms

This theme helps children to recognize that some things that once lived on the Earth no longer exist.

Most children will be aware of some life forms that existed a long time ago such as dinosaurs. Some may be aware of species which are currently threatened. Very few children will be able to suggest life forms that are recently extinct. Young children will include mythical creatures in their descriptions of things that lived on Earth a long time ago. Children will generally explain that people are responsible for the extinction of groups of living things.

Through discussions and secondary sources, children can be helped to understand some of the reasons why living things have become extinct.

Life Processes and Living Things

4 Variation and classification

a to recognise similarities and differences between themselves and other pupils.

This theme is no longer in the Science National Curriculum, but it is still a very popular topic with pupils.

Understanding Living Things and the Processes of Life (Stages P1 to P3)

Variety and characteristic features


- similarities and differences between themselves and other pupils.

1.5 Experimental and Investigative Science

Two important aspects of children's learning in science are:

- ◆ learning how to investigate the world around them;
- ◆ learning to make sense of the world around them using scientific ideas.

These are reflected in the National Curriculum. 'Experimental and Investigative Science' covers the first aspect. The second aspect is covered by the rest of the Programme of Study. Although these two aspects of science learning are separated in the National Curriculum they cannot be separated in practice and it is not useful to try to do so. Through investigation children explore their ideas and/or test out the ideas which arise from discussion. As a result, ideas may be advanced, but this will depend on the children's investigation skills. Thus it is important to develop these skills in the context of activities which extend ideas. So there is no separate Nuffield Primary Science teachers' guide on scientific investigations, because opportunities to make these occur throughout all the guides and they form an essential part of the SPACE approach.

 Thus in this guide you will find investigations which provide opportunities to develop and assess the skills and understanding set out in Experimental and Investigative Science. These are marked in the text by the symbol shown here. In this teachers' guide, the investigation which covers the most skills is 'Identifying people by sound' (page 39).

It is important that teachers give active guidance to pupils during investigations to help them work out how to improve the way in which they plan and carry out their investigations.

Experimental and Investigative Science is about the ways scientific evidence can be obtained, about the ways observations and measurements are made, and about the way in which the evidence is analysed. It therefore sets out three main ways in which pupils can develop their ability to do experimental and investigative science, as follows:-

- 1 'Planning experimental work'. Here, children should be helped to make progress from asking general and vague questions, to suggesting ideas which could be tested. Teachers' discussion with pupils should aim to help them to make predictions, using their existing understanding, on the basis of which they can decide what evidence should be collected. This should lead them to think about what apparatus and equipment they should use.



When children describe plans for their work, they should be helped to think about what features they are going to change, what effects of these changes they are going to observe or measure, and what features they must keep the same. In this way they can come to understand what is meant by 'a fair test'.

- 2 'Obtaining evidence'. Children should make observations in the light of their ideas about what they are looking for and why. When they describe their observations, teachers may have to help them to improve, for example by reminding them of their original aims and plan for the work. Such help should also encourage progress from qualitative comparisons and judgements to appreciating the value of making quantitative measurements (for example 'cold water' is qualitative, 'water at 12°C' is quantitative). This should lead to the development of skills with a variety of instruments and to increasing care and accuracy in measurement, involving, for example, repeating measurements to check.
- 3 'Considering evidence'. Here, children should first learn to record their evidence in systematic and clear ways, starting with simple drawings and then learning to use tables, bar charts and line graphs to display the patterns in numerical data. Then they should be asked to think about and discuss their results, considering what might be learnt from any trends or patterns. As ideas develop, they should be careful in checking their evidence against the original idea underlying the investigation and should become increasingly critical in discussing alternative explanations which might fit their evidence. In such discussions, they should be helped to relate their arguments to their developing scientific understanding. They should also be guided to see possibilities for conducting their investigation more carefully, or in quite different ways.

Whilst these three may seem to form a natural sequence of stages, children's work might not follow this particular sequence. For example, some might start with evidence from their observations and proceed on this basis to propose a hypothesis and a plan to test it. For others, the results of one task may be the starting point for a new inquiry involving new measurements. Useful learning about how to investigate might arise when only one or two of the above aspects of an investigation are involved, or when the teacher tells children about some aspects so that they can concentrate on others. However, there should be some occasions for all pupils when they carry out the whole process of investigation by themselves.

The assessment examples given in chapter 3 are analysed in relation to the level descriptions, which describe children's progress in relation to these three aspects: *planning experimental work*, *obtaining evidence* and *considering evidence*. Thus, these three provide a framework both for guiding children and for assessing their progress in experimental and investigative work.

1.6 Planning your science programme in school

The following pages give examples of how two schools have planned their science programme for the whole of Key Stage 1. Planning of this kind helps to provide continuity and progression in children's learning in science. The development of such whole school programmes is discussed more fully in the *Science Co-ordinators' Handbook*.

Each plan covers the requirements for the National Curriculum at Key Stage 1 and shows which themes in the Nuffield Primary Science Teachers' Guides have been used for planning the topic in detail by the classteacher.

Example 1

This primary school has recently grown from 1.5 form entry to 2 form entry and so have had to take account of varying class sizes and vertical grouping. Their programme is based on fixed year topics which provide progression through the programme of study but by using the SPACE approach staff feel they are able to cater for individual children.

Each topic is planned out, by year group, in terms of the concept to be explored and the key ideas to be focused on using the Teachers' Guides. Some topics run for one term whilst others are restricted to half a term. A minimum of five lessons are allowed for each half term. Individual teachers use the topic plan to develop their own short term planning responding to the ideas of the children in their class.

	AUTUMN TERM	SPRING TERM		SUMMER TERM	
RECEPTION	Individual variation	Sources and uses of electricity	Light and dark	Changing materials	
Nuffield Primary Science Teachers' Guide	The variety of life 2.2	Electricity and magnetism 2.1	Light 2.1, 2.2	Materials 2.2	
Programme of Study †	Sc2:4a	Sc4:1a	Sc4:3a, b	Sc3:2a, b; Sc4:2d	
YEAR 1	Pushes and pulls	Making and hearing sounds	The human body and keeping healthy	Local habitats	Plants and animal growth
Nuffield Primary Science Teachers' Guide	Forces and movement 2.1 Using energy 2.2	Sound and music 2	Living processes 2.2	Living things in their environment 2.1 Rocks, soil and weather 2.1 Earth in space 2.3	Living processes 2.3
Programme of Study †	Sc4:2a, b, c, d	Sc4:3c, d, e	Sc2:2a, b, c, d, e, f	Sc2:5a, b	Sc2:2e; 3a, b, c
YEAR 2	Properties of materials	Magnets	Electricity - simple circuits	Naming and grouping living things	
Nuffield Primary Science Teachers' Guide	Materials 2.1 Rocks, soil and weather 2.1	Electricity and magnetism 2.3	Electricity and magnetism 2.2	The variety of life 2.1	
Programme of Study †	Sc3:1a, b, c, d, e	Sc3:1b, c	Sc4:1a, b, c	Sc2:1a, b; 4b	



Example 2

Situated in a large conurbation this primary school is 2.5 form entry but the number of children entering fluctuates from year to year causing difficulties with class size. The Nursery is an integral part of the school and work is shared with the Reception classes. Therefore this pre-YR1 time is planned as a whole providing a wide range of experiences for the children so that they are 'working towards' the requirements of the programme of study.

The plan is set out by year group and the different elements of the Programme of Study, covering five topics per year with each one to be covered in approximately half a term. Each year group decides the order of their topics during the year. The provision of a 'spare' half term allows teachers some flexibility in their planning and, if they wish, to introduce other aspects of science not prescribed by the National Curriculum.

	AUTUMN TERM		SPRING TERM		SUMMER TERM	
RECEPTION	This is me	Our school	Plants and animals	Homes using electricity	Toys	
Nuffield Primary Science Teachers' Guide	The variety of life 2.2	Living things in their environment 2.3	Living things in their environment 2.1; Living processes 2.3	Electricity and magnetism 2.1	Forces and movement 2.1	
Programme of Study (working toward) †	Sc2:2a, b, f; 4a	Sc2:1a, 3b, 5a; Sc3:2a	Sc2:1b, 3a, b, c, 4b, 5a, b	Sc4:1a, 3a, b	Sc4:2a, b, c	
YEAR 1	Ourselves	Growing things	Materials - clothes	Sounds/Night and day	Floating and sinking	
Nuffield Primary Science Teachers' Guide	Living processes 2.2; Variety of life 2.2	Living processes 2.3	Materials 2.1	Sound and music 2; The earth in space 2.1	Forces and movement 2.2	
Programme of Study †	Sc2:1b; 2a, b, e, f; 4a, b	Sc2:3a, b, c	Sc3:1a, b, c, d, e; 2a	Sc4:3c, d, e	Sc3:1a, c, e; Sc4:2a	
YEAR 2	Keeping healthy	Habitats	Materials - homes	Light and electricity	Moving things	
Nuffield Primary Science Teachers' Guide	Living processes 2.2	The variety of life 2.1; Living things in their environment 2.1; Rocks, soil and weather 2.1	Materials 2.1; 2.2	Electricity and magnetism 2.1, 2.2; Light 2.1; 2.2	Forces and movement 2.1; Using energy 2.2	
Programme of Study †	Sc2:1b; 2b, c, d	Sc2:4b; 5a, b	Sc3:1a, b, c, d, e; 2b	Sc4:1a, b, c; 3a, b	Sc4:2a, b, c, d	

† For the purposes of these charts the references to sections of the Programme of Study have been abbreviated as follows:

Sc2 = Life Processes and Living Things

Sc3 = Materials and their Properties

Sc4 = Physical Processes

1.7 Planning a topic

Here is a case study which may help you in planning a topic.

Case study: All about me

The topic focused on the variety of living things and living processes, and to a lesser extent also considered hearing and making sounds. Making measurements and recording them made a link with Maths. The teacher used a combination of ways of managing children's learning: investigations were carried out in small groups, whereas discussion of findings and interpretation of observations often took place as a class. The teacher was aware that consideration of individual differences needed to be handled sensitively.



SCIENCE

Individual variation



- ◆ Children were asked how people decided who they were. What was it about them that made them recognizable?
- ◆ They noticed the ways in which they were the same and the ways in which they differed.
- ◆ They attempted to disguise each other: this helped them to understand which features made them recognizable.
- ◆ They sorted pictures of different people into groups according to their similarities.

Living processes

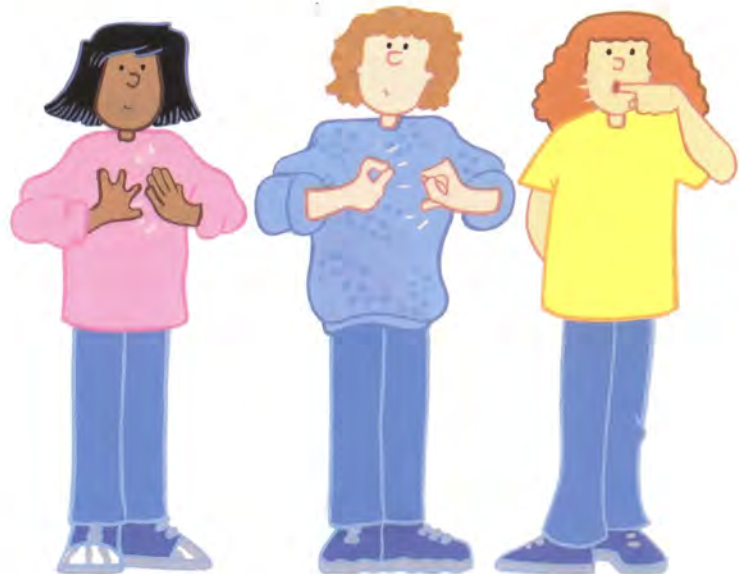
- ◆ Children drew pictures of all the meals they ate in one day.
- ◆ They discussed which foods they thought were healthy and unhealthy, and made collages of pictures of healthy and unhealthy foods.
- ◆ Children made Plasticine models of their favourite meal. This led them to discuss their sense of taste.

- ◆ Children tested each other, using a taste test they had devised. (The teacher supervised this very closely.) They recorded results on a computer.



Sound

- ◆ Children made sounds with different parts of their bodies.
- ◆ They discussed which were loud and which were quiet.
- ◆ They investigated whether sounds could be heard at different distances.
- ◆ Children drew pictures of different places where they might hear an echo, and discussed how an echo is produced.
- ◆ They sorted sounds into noises which people like or dislike.



OTHER CURRICULUM AREAS

Maths

- ◆ Children made a chart of their birthdays, using photographs of themselves.
- ◆ They made a picture graph of the sounds they liked or disliked.
- ◆ They measured parts of their bodies using personal and standard units of measurement.
- ◆ They measured distances at which sounds could be heard.

1.8 Pupils' books

The pupils' book accompanying this guide is called *A first look at different plants and animals*. The pupils' books are intended to be used spread by spread. The spreads are not sequential, and they are covered in these notes in thematic order.

Features of the pupils' books include:

- ◆ Stimulus spreads, often visual, designed to raise questions, arouse curiosity, and to promote discussion.
- ◆ Information spreads, which give secondary source material in a clear and attractive way.
- ◆ Activity ideas, to form the basis of investigations to be carried out by the children.
- ◆ Cross-curricular spreads and stories which can act as a basis for creative writing, or spreads with a historical or creative focus.
- ◆ Real life examples of applications of science in the everyday world.

A first look at different plants and animals

Grouping shoes pages 2–3

Purpose: An introductory spread about classification, providing a sorting exercise.

Questions for discussion: What would you wear these shoes for? How many shoes are there? How many pairs?

Pupils' book cross-references: *A first look at electricity and magnets*, pages 8-9, *A first look at what things are made of*, pages 22-3.

Teachers' guide cross-references: *The variety of life*, page 18; *Materials*, page 18.

Which are alive? pages 4–5

Purpose: A starting point for discussion, to encourage children to put forward ideas if a walk round the school is not possible.

Notes: The egg could be said to have been alive before it was cooked; if fertilized and incubated a chick might have developed inside it. The seeds inside the apple have the potential to grow. Respiration takes place in both eggs and apples.

Extension activity: The spread could also be used for development work. If children used their own ideas in the starter activity, it suggests some more things to consider.

Teachers' guide cross-reference: *The variety of life*, page 23.

Beetles pages 10–11

Purpose: To help children develop their ideas about the great diversity of different kinds of beetle. Also, if necessary, to remind children that not all creatures are mammals.

Notes: The beetle shown about to fly (page 10) is a cockchafer. Along the bottom (page 11, left to right) there is a devil's coach-horse, a dung beetle and a ground beetle.

Extension activities: Look for beetles. Make sure any that are collected are treated kindly and set free where they were found afterwards.

Pupils' book cross-references: A first look at where things live, pages 2-3, 10-11.

Teachers' guide cross-reference: The variety of life, page 26.

The Chinese lizard pages 12–13

Purpose: A starting-point for a discussion of the different uses of tails, and adaptations of tails. An opportunity to read a story.

Note: Lizards can deliberately drop their tails to confuse predators, and grow a new one.

Extension activities: Children could draw pictures to show how tails are used: for example, show a dog, who is saying: 'I use my tail to show I'm pleased', or a cat saying: 'I use my tail to show I am angry'. Go on to discuss different uses of hands or feet.

Teachers' guide cross-references: The variety of life, pages 26–28.

Looking at animals pages 14–15

Purpose: A starting point for a discussion about how we identify animals.

Notes: Some characteristics to consider: how many legs has it got? Does it have wings? Is it hairy or smooth? Where does it live?

Pupils' book cross-references: A first look at where things live, pages 2-3.

Teachers' guide cross-reference: The variety of life, page 26.

Looking at plants pages 16–17

Purpose: A starting point for a discussion about the different kinds of plants that exist, or a development discussion about which each one is and where it might grow.

Questions for discussion: How big are the plants? Compared with a child, are they much bigger/ a little bigger/ the same size/ smaller/ much smaller? (Cactus and seaweed are both very variable.)

Extension activities: Copy the pictures of the plants and then ask children to draw themselves beside each one, to scale. Children could examine a plant carefully, looking, as far as possible, right inside them as well as outside. Visit one of the habitats shown (check school policy).

Pupils' book cross-reference: A first look at living things, pages 20-1.

Teachers' guide cross-reference: The variety of life, page 28.

Cats pages 20–21

Purpose: A starter discussion about the variation within the cat family. This spread can also be used as a simple grouping activity.

Questions for discussion: Have children seen any of these wild animals? At a zoo? On television? Discuss the differences between the animals shown.

Teacher's guide cross-reference: The variety of life, page 26.

Our hands pages 6–7

Purpose: To provide a starting point for a discussion about the ways in which we are alike and at the same time, different from each other. (See also 'Differences', pages 18–19.)

Extension activities: The limited colour range among the hands could be brought out in the painting activity. Discuss how the

terms 'black' and 'white' are not indications of real colour, as people are all shades in between. Discuss left and right hands. Which are which? What is the difference? Talk about people who are left- or right-handed. The children may be ready to work with left and right in maths.

Teachers' guide cross-references: The variety of life, pages 10, 35

Differences pages 18–19

Purpose: To show that it is normal to be different.

Extension activities: Ask children what positions they can get into. In a PE lesson, you could see what different children can do.

Teachers' guide cross-reference: The variety of life, page 35.

Our carnival pages 8–9

Purpose: To help children think about ways in which the natural world can be an inspiration for decoration.

Questions for discussion: What are rain forests like? What kind of creatures live there? Do people live there?

Extension activities: Look at other books about rain forests. Make rain forest costumes.

Teachers' guide cross-references: The variety of life, pages 37, 40.

Dinosaurs pages 22–23

Purpose: A starter discussion about extinct animals and how we know about them.

Note: Seismosaurus was a plant-eating dinosaur that lived about 150 million years ago.

Questions for discussion: What other animals do children know about that are extinct? What about endangered species? Why may some animals no longer exist?

Extension activities: Find out more about dinosaurs from secondary sources. Go to a museum where there are dinosaur exhibits. Look for other dinosaur poems, and get them to write their own poems, or make a dinosaur book. What would it be like to be as big as Seismosaurus? Generally build on children's dinosaur enthusiasm to introduce new ideas.

Teachers' guide cross-references: The variety of life, pages 46–9.



1.9 Resources



This is what you may need to carry out the investigations shown in this book.

Pictures of animals, plants, people
Examples of living and non-living things
Containers and cages for keeping organisms in the classroom
Gloves for handling animals
Pictures and models of dinosaurs
Variety of school plants
Modelling clay, Plasticine
Dressing-up box and clothes

Collection of 'old things' such as coins, dolls, books, letters, plants, comics, programmes, toys, stones, photographs
Collection of clean bones from a variety of animals
Blindfold
Tape recorder



1.10 Warnings

Activities which need particular care are indicated by this symbol in the margin. Everything possible should be done to ensure the safety of the children during their investigations. You should consult any guidelines produced by your school or Local Education Authority and, if your school or LEA is a member, by CLEAPSS. See also the Association for Science Education publication *Be safe! some aspects of safety in school science and technology for Key Stages 1 and 2* (2nd edition, 1990). This contains more detailed advice than can be included here.

The points listed below require particular attention.

Work relating to children looking at themselves and others should be handled with great sensitivity. Questions about characteristics of parents need particularly careful handling.

The picking of wild flowers, the collection of animals from their habitats and keeping and using living things in schools and other places are restricted by law. Whilst these restrictions do not prevent teachers from carrying out the activities in this guide, you are advised to clarify the situation with your school or LEA.

All living things should be treated with respect and handled with care.

Some animals can be kept in the classroom. See the DES Administrative Memorandum 3/90 'Animals and plants in schools: legal aspects' and the RSPCA booklets 'Animals in schools' and 'Small mammals in schools'. Children should not bring their pets into school.

Seeds are often treated with pesticides. Avoid red kidney beans (toxic when uncooked) and castor oil seeds (very toxic). Hyacinth bulbs give some children a rash.

2.1 Naming and grouping living



AREAS FOR INVESTIGATION

- ◆ Finding out about the characteristics of 'living' things.

(This theme has links with *Living processes*.)



KEY IDEAS

- ◆ *There is a wide variety of living things, which includes plants and animals.
- ◆ *Living things are distinguished from non-living things by their ability to carry out certain processes.
- ◆ *Living things can be placed in groups according to their characteristics.

(*Asterisks indicate ideas which will be developed more fully in later key stages.)

A LOOK AT naming and grouping living things

A living thing can be described in terms of how it moves, behaves, breathes, eats, grows and reproduces.

Living things can be grouped in many different ways according to their characteristics. These may include:

- ◆ directly observable features;
- ◆ methods of feeding and reproduction;
- ◆ where the organism lives;
- ◆ the way it behaves.

We need to have names for living things so that we do not have to describe them every time we talk about them. Thus the word 'dog' or 'cat' or 'daisy' describes something which is recognized by most people. We can find out what something is called by asking someone or looking it up in a book that describes it and gives its name.

Finding out children's ideas

STARTER ACTIVITIES

What do children understand by 'living', 'animal' and 'plant'?



Take the class for a walk in the area around the school.

Q *Can you draw everything you notice during the walk which you think is living?*

On returning to school, ask the children to draw some other living things. While they are completing their drawings ask:

Q *What made you decide that these are living?*

Grouping animals and plants

Children's own drawings or other illustrations of the same kinds of animals or plants can be used for this activity. You might record the groupings children make as you talk to them about their ideas.

Q *Can you put together the animals/plants that you think should go together? Why did you decide that those animals/plants should go together?*

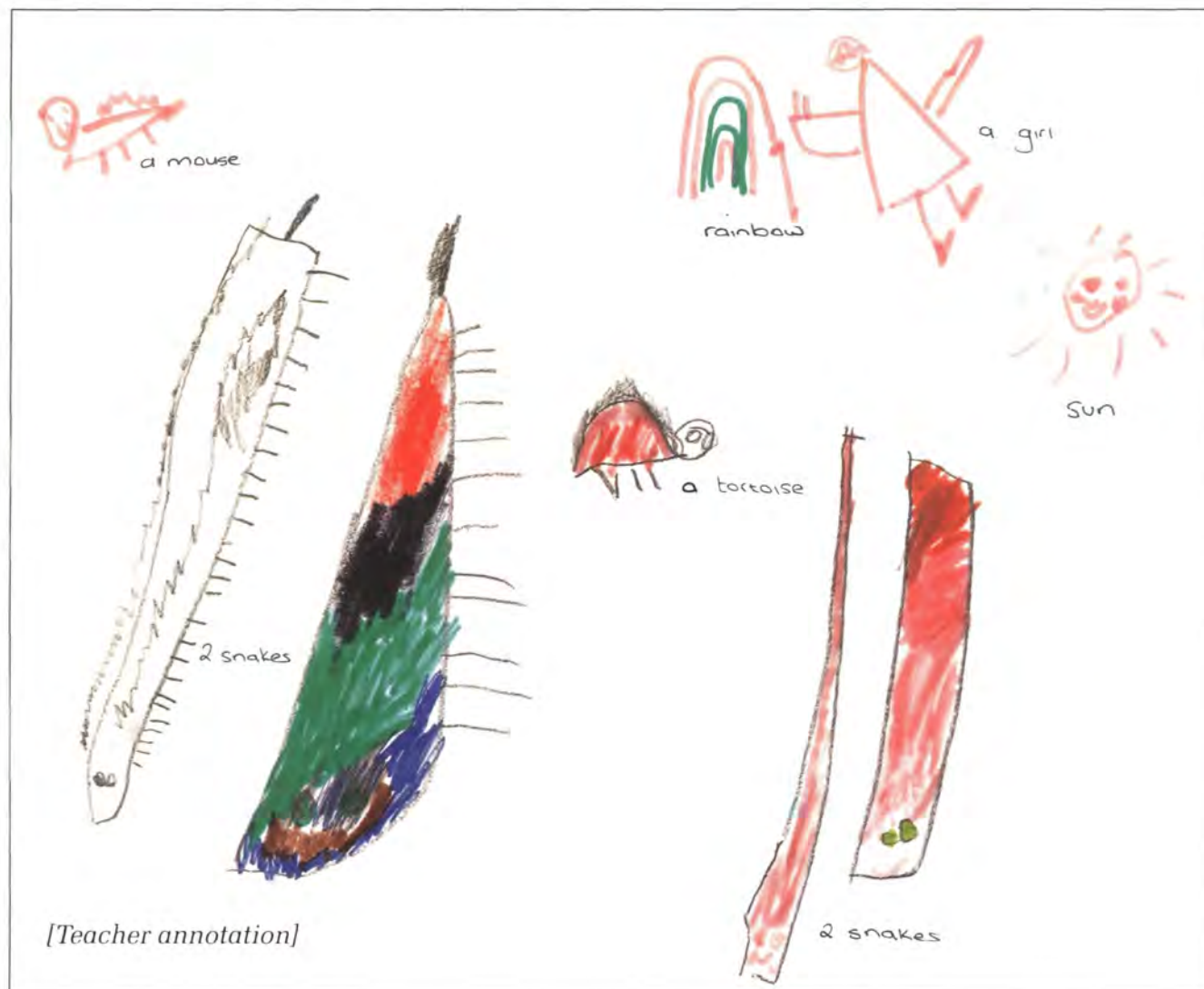


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Children's ideas

'Living', 'animal' and 'plant'

In their drawings of what is alive, children may include inanimate objects such as the Sun, clouds and cars, possibly with explanations that these are alive because they move.

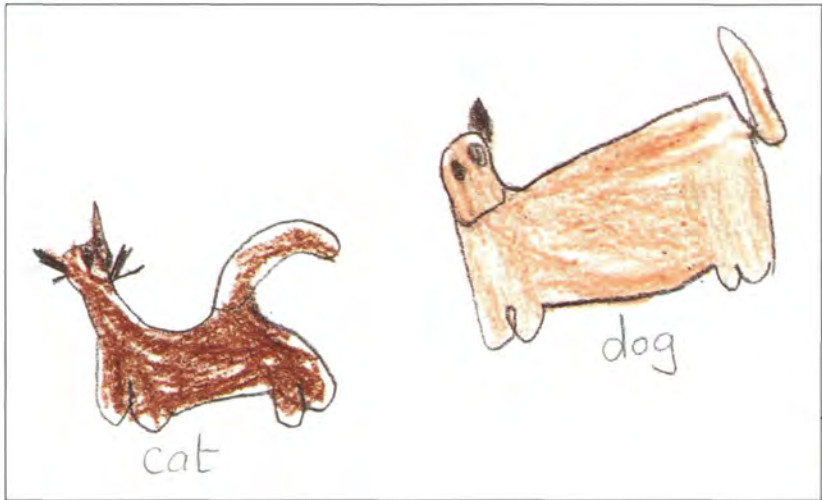


Children tend to focus on animals in their drawings of living things. They rarely show any awareness that plants are alive.

Grouping animals and plants

Children might confine their drawings of 'animals' to land mammals. Some children may extend this to birds but not, for example, insects or fish; they often exclude humans. (See the next page.)

Drawings of plants are often restricted to flowering plants. Even plants which do not flower may be represented with huge blooms.



Children may group animals according to visual cues such as how they move or the number of legs.

Children sometimes appear to identify categories, such as where animals live, before they begin a matching activity. These category labels may not always be maintained during the activity.

Teacher's notes

Handwritten notes on a yellow background showing animal groupings and reasons:

- frog
fish
because they live in water
- spider
stick insect
because they live in soil
- snail
worm
because they live on the ground
- sparrow
seagull
because they can fly
- horse
rabbit
(they run about in grass.)
- mouse
woodlouse
(they live on wood)

Handwritten notes on a white background showing animal groupings and reasons:

- stick insect
Spider
Because Both look same and have long legs
- Mouse
Horse
Because Both got tails
- Rabbit
Frog
Because Both jump
- worm
fish
Both wriggle
- sparrow
Wood louse
Because Both go fast
- Snail
seagull
Because Both long

Teacher's notes

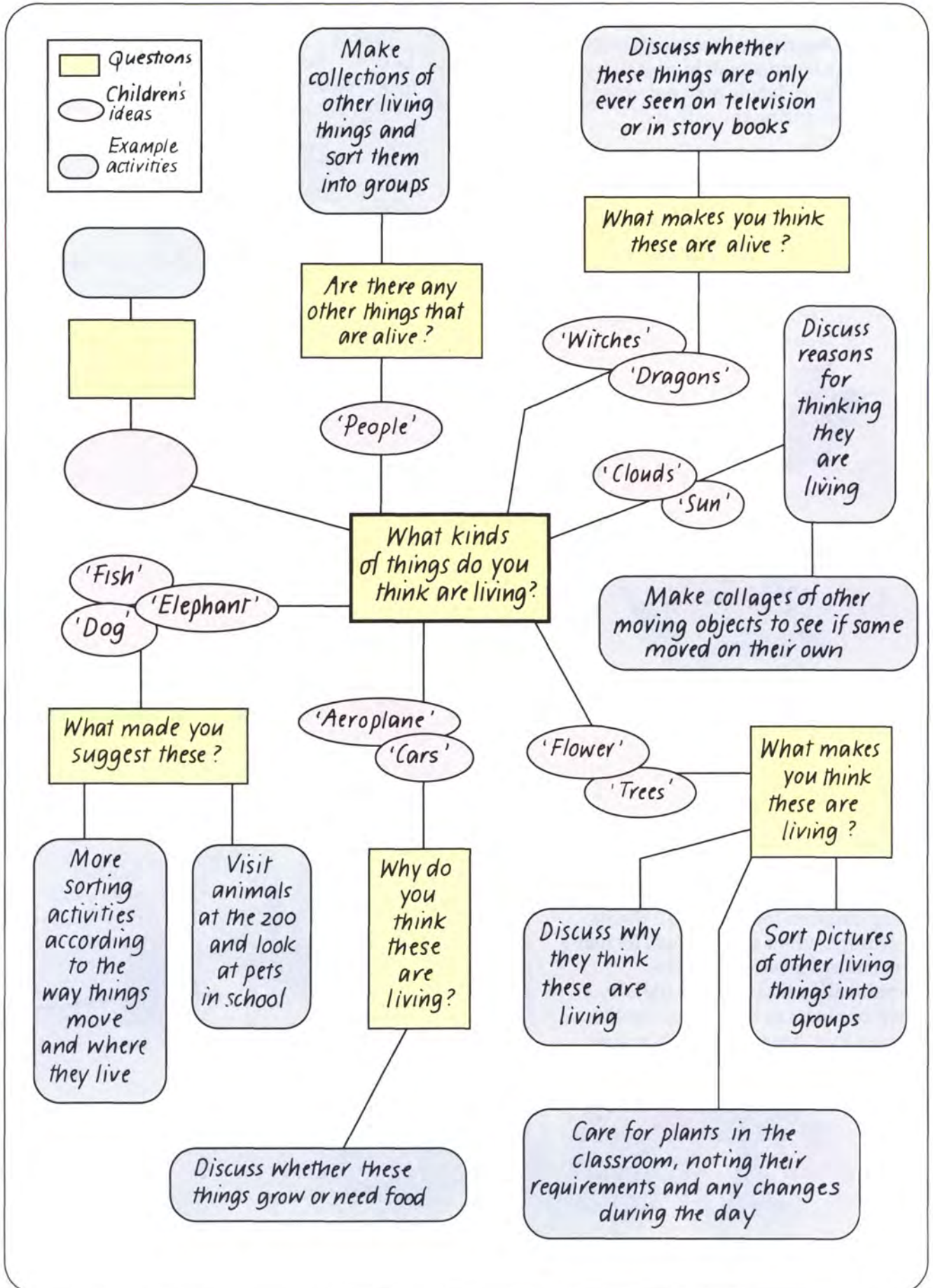
Teacher's notes

Young children tend to group plants according to their appearance, focusing on stems or leaves, or on size. Occasionally children may identify a group of plants as belonging together because they have seen them in the same place.

Handwritten notes on a light blue background showing plant groupings and reasons:

- conifer
dandelion
That one's like a Christmas tree
Prickly
- moss
grass
on the floor
on the mud
They're both on the ground
- water lily
privet
This is a water plant
Rain comes on this
- laurel
cactus
Yellow and green
Green
- spider plant
tree
New plants grow high
High

Helping children to develop their ideas about naming and grouping living things



Helping children to develop their ideas

The chart opposite shows how you can help children to develop their ideas from starting points which have given rise to different ideas.

1 Discussing living things



Let children make a class collage of their individual drawings, so that they can compare their ideas.

- Q** *Someone mentioned that these are living. Why do you think she said this?
Do you think there is anything in this collage which isn't living?
Are there any other things we could add to the picture that are living?
What makes you say that these are living?*

A first look at different plants and animals gives a selection of pictures of living and non-living things.

2 Characteristics of living things

A class discussion will help children think about the characteristics of living things.

- Q** *If you cut your finger will it get better?
If someone cuts a hedge will it grow again?
When the school gardener cuts the grass does it grow again?
What will happen to a torn page in a book? Will it grow again?
If the TV breaks down, do we say it is ill?*

AT
1

Communicating

pb

AT
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Predicting

*Does a flower grow bigger or change?
Does a television set grow bigger?
Does a doll grow?*

*What happens to you if someone tickles you?
What happens to a puppy if you tickle it?
What happens to a teddy bear if you tickle it?*

*What does a TV or toaster need to make it work?
What happens when the machine is switched off?
Can you switch off a cat or a dog?*

3 Challenging children's ideas about living things

Provide children with a range of pictures of items which will challenge their ideas of what is living. There is a suitable set on the opposite page. Ask them to sort the pictures into two groups:

- ◆ things which they believe are living;
- ◆ things which they believe are not living.

Children should share their ideas about why something is living by discussing this in small groups.

Some children may have allergies to some pets. Children should not bring their pets into school. Children must wash their hands before and after handling animals. Wash animal bites and scratches carefully, and consider the need for medical advice.

4 Animals in school



Classroom pets help children to understand the needs of animals, as well as providing an opportunity to appreciate the various ways in which animals differ from each other. (See 'Animals and plants in schools: legal aspects' (DES Administrative Memorandum 3/90).) In some classes it may be necessary to introduce animals, either because there are none in

school or to extend children's experience of animals. Stick insects are easily observed and have simple requirements, though they are not easy for young children to handle. Mealworms have a short life cycle and can be readily accommodated in the classroom.

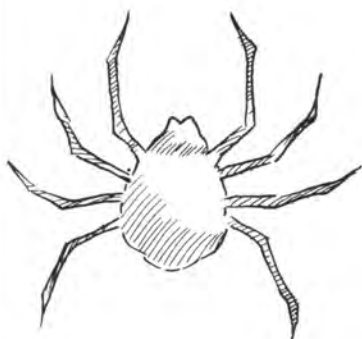
Many children will have pets at home and may be willing to talk about these animals with the other children.

Raise questions which will help children to become more aware of the many ways in which animals differ and are similar.



*Where does [Steven's] rabbit live?
Do you think all animals could live in that place?
Do you think all animals will eat the same food as [Sam's] budgie?
What do the class pets do?
When do they sleep?*

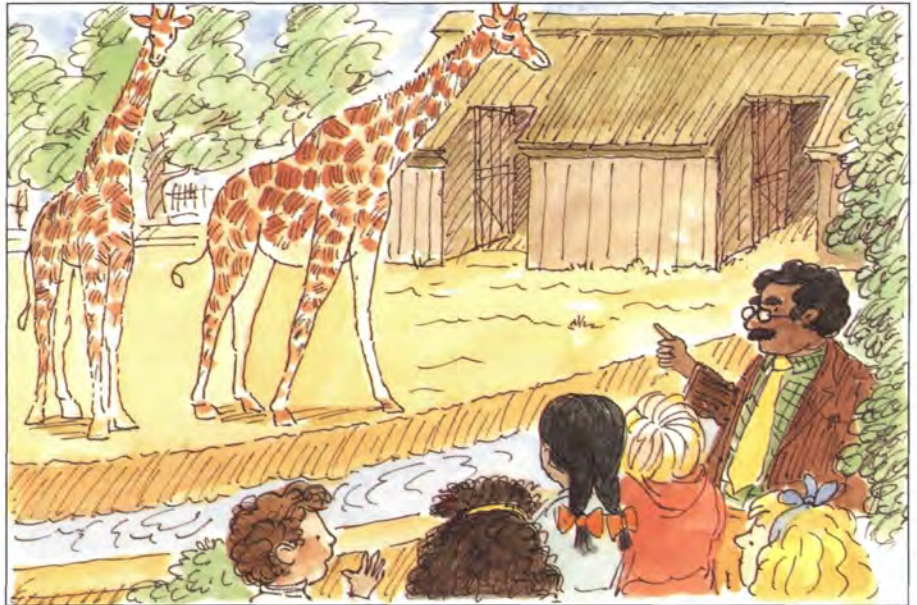
Which are living? Which are not living?



A first look at habitats gives examples of animals that might be kept as pets and encourages children to think about how pets are cared for.

5 Animals outside school

A visit to a farm, zoo, or pet shop will give children a chance to find out about a wider group of animals.



A first look at different plants and animals provides information about animals and encourages children to think about animals' needs.

- Q** *What are the animals eating?
Are there any clues to what this animal might eat?
Are the animals moving around slowly or quickly?
What colour are the animals?
What does this animal need to be comfortable?
Is it alone or with some other animals?
Are the animals grouped together in any way?
Do any of the animals have babies?*

Let children find out more about animals by questioning farmers, zookeepers, vets, breeders or pet shop owners.

Children could use modelling clay or manufactured models to recreate the place they have visited. Ask questions which will help children use their knowledge of animals.



- Q** *What will the lion/sheep need to be comfortable?
What kind of food should it be eating?
What animals could you put next to the lion/sheep?*

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Follow school or LEA rules about supervision. Check your school's policy on visits

AT
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Observing

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There are a number of ways in which animals differ

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Communicating

6 Detailed animal work

Each child could find out about one animal in greater detail, using secondary sources as well as animals they can observe. Ask questions which will focus children's attention on specific features which could help in classifying animals.

- Q** *How does it feel when you stroke it?
What has it got to help it to [pick up the seeds]?
How do you know when it hears something?
How does it move?
Where does it like to live?
Does it have any babies?*

AT
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Observing



Class presentations, posters or scrapbooks could be used to enable children to share their findings and compare the characteristics of their chosen animals.

7 Animal collage

Children could collect pictures of things they believe are animals and use them to make a large poster. During a class discussion children could explain why they think the things on their collage are animals. Encourage them to discuss why some things cannot be accepted as animals.

8 Grouping animals

Give children plenty of opportunities to group together illustrations of animals which they think belong together. They should discuss with each other their reasons for putting particular animals in the same group. Children's ability to sort can be developed by encouraging them to put pictures into a specific number of groups, using hoops. Alternatively, pose questions which will help children develop their classification skills.

AT
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Communicating

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Animals can be grouped in different ways

AT
1Observing
Classifying

pb

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Plants are different in many
waysAT
1Observing
Classifying

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Take care that children do
not uproot plants

Q

*In what way are these two the same?**How are they different?**Are you thinking of how they look, how they behave, how they move, where they live?*

A first look at different plants and animals has a story about what different animals use their tails for.

9 What are plants?

Children should investigate the variety of places where plants are kept in school. They should observe these plants and others outside the school closely, so as to develop their ability to classify them.

Q

*Do all the plants have flowers on them?**What do various parts of the plants look like?**Are all the plants the same shape?**What do the plants need to live?*

Ask children to bring to school things they think are plants, or pictures of plants. Encourage them to share ideas about why they think the things are plants.

A first look at different plants and animals shows different plants and encourages children to think about the places where they might be found.

A large collage showing the variety of plants could be made. Introduce some pictures which will challenge children's notions of what a plant is, for example, Christmas tree, grass, cactus, seaweed, oak tree, apple tree. During a class discussion they could share ideas on what is special about plants.

10 Grouping plants



Give children opportunities to sort illustrations of plants into groups, and encourage them to talk to each other and explain their reasons for putting some plants together. Help children to develop their understanding of plant groupings.

Q *Why did you decide that these plants go together?
Do all these plants have flowers on them at some time?
Should all the trees go in the same group?
Where do the plants live – in the garden, field, desert,
water?*

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Plants share some characteristics

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Communicating

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AT
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Observing
Classifying

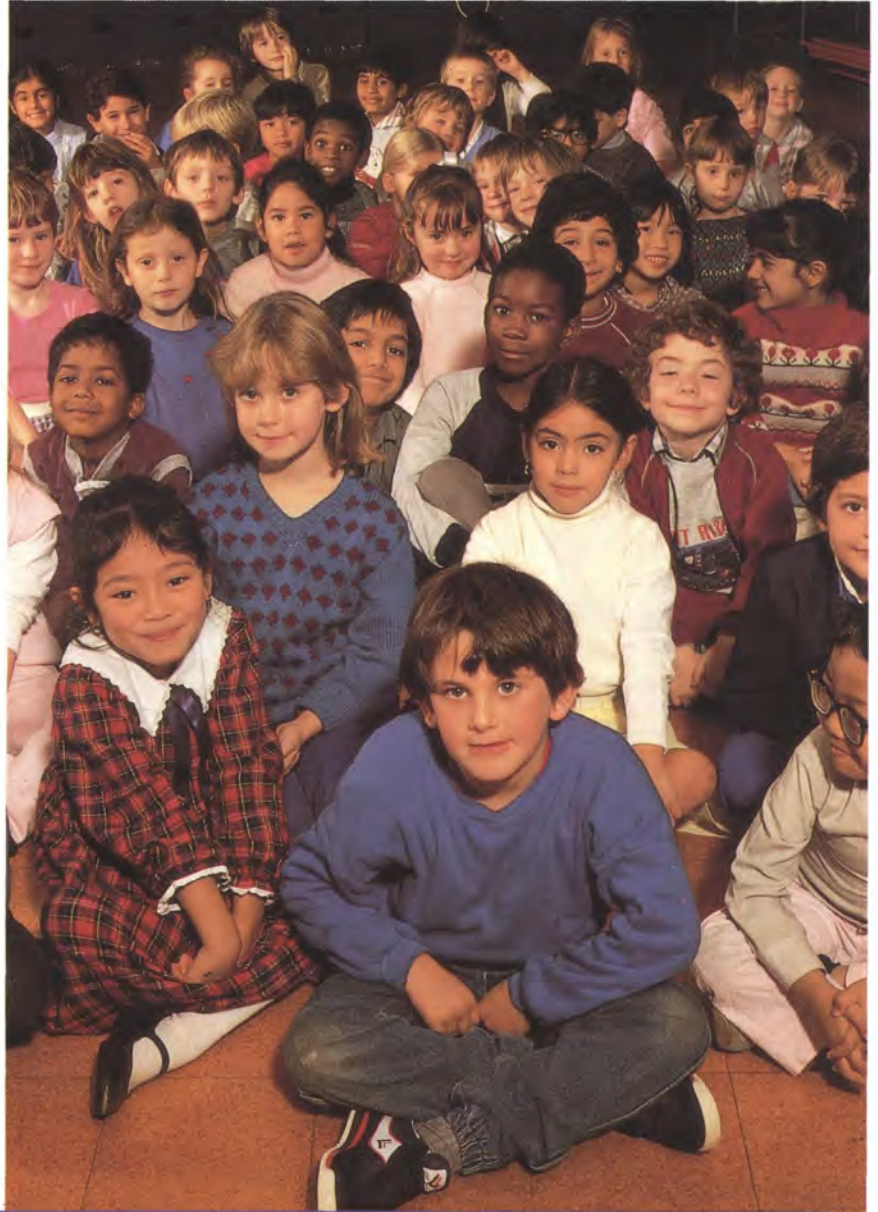
2.2 Individual variation

AREAS FOR INVESTIGATION

- ◆ Investigating the similarities and differences among children through observation and measurement.

KEY IDEAS

- ◆ Living things of the same kind vary from individual to individual.



A LOOK AT individual variation

There are a number of ways in which people are similar: people generally have skin, eyes, limbs, and things inside their bodies such as a heart and blood. Although children are similar to their parents they are never exactly the same, and it is often possible to see characteristics of both parents in their children.

There are also ways in which people differ, and it is these differences which enable us to identify individuals. Differences in height, mass, eye colour, and hair colour can be readily recognized. Some differences, such as

clothing, can be easily changed; others, such as eye colour, are fixed.



Sensitivity

Individual differences between children will need to be handled sensitively. A child may be sensitive to a long nose or large ears, or height or weight. Some children may be disabled. Mentioning differences in skin colour may cause anxiety among children. Consider those characteristics which individuals have in common as well as their differences.

Finding out children's ideas

STARTER ACTIVITIES

Differences and similarities among children

Ask the children to draw a picture of themselves. Help them to think about their main characteristics. You might make a collage of children's drawings of themselves, with annotations. Use this as a basis for class discussion.

- Q** *How do you think I know you are you when you come into class?*
How do your friends decide you are you when they see you?
How are you the same as/different from other children?

Children's ideas

Young children's descriptions of themselves commonly refer to eye and hair colour.



my home is Stewart.

my birthday is on Monday
 I have got curly hair. I am a boy.
 I have got green eyes

Some children mention their clothes in explanations of how they differ. They might focus on their appearance on a particular day rather than on characteristics which might change gradually. Children's clothes may be seen as an important part of how they

can be identified at school, except obviously in schools where children wear uniform.



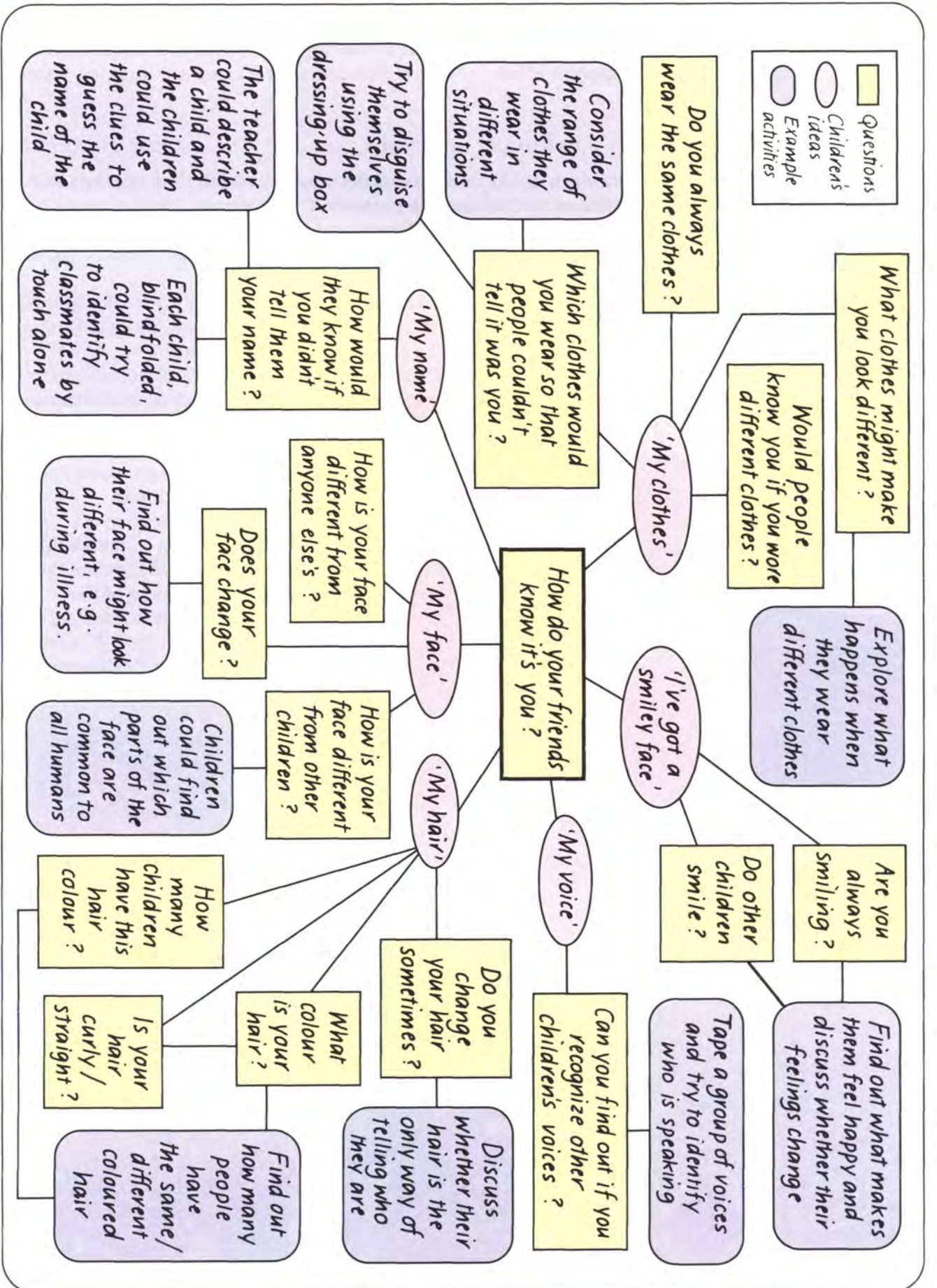
I am wearing a dress and I like it



I NO ROBERT
He has got a big R it voss

A few children will be aware that voices vary. They might suggest that a child can be identified by voice.

Helping children to develop their ideas about individual variations



Helping children to develop their ideas

The chart on the previous page shows how you can help children to develop their ideas from starting points which have given rise to different ideas.

1 Looking at a partner

Children could think about the ways in which they are the same or different by looking at a partner.



*How are you different from your partner?
Are you wearing the same clothes?
What colour eyes has she got?
Has she got the same colour eyes as you?
Has she got the same colour hair as you?
Is she the same size as you?*

*Do you both have the same size feet?
Do you have the same shade of skin? Is yours redder, paler, browner, freckled?*

Help children to notice the ways in which they are the same using some of the following questions.



*Do you both have legs?
Do you both have skin?
Do you both have a head?
Do you both have a heart that beats?*



AT
1

Measuring
Communicating

Encourage children to start to quantify the differences they notice and to consider other ways in which they might differ from each other.



Children could present their observations of how they are the same or different on a poster, chart, or pictogram or in a database; or they could share their ideas during a class discussion.

A first look at different plants and animals gives examples of ways in which people are the same or different. This could be used as a starting point or as a basis for further discussions.

2 Making faces

Give each child an outline of a face together with a pair of eyes, a nose, a mouth and two ears. The features and the outlines should be identical. There is a suitable set on page 36. Children should compare and discuss them so that they can see that they all match.

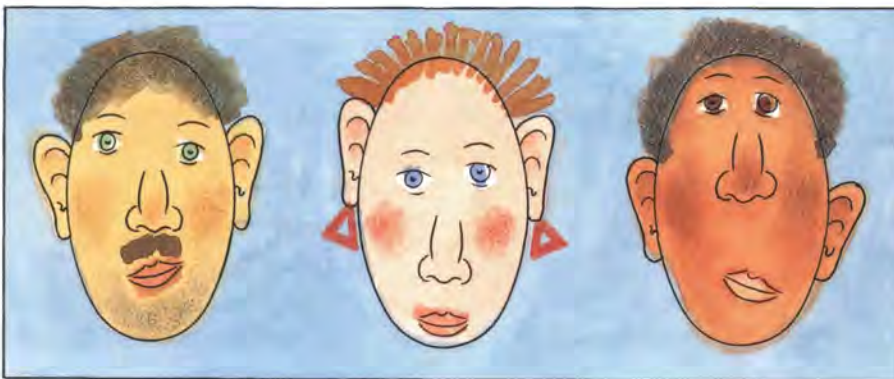
This will help the children to recognize that these features are common to all of us.

After the discussion, let the children stick the features on to their outline of the face.

Further discussion could develop children's ideas about how our faces share some features but may look different.

Q *Do people have the same colour eyes?
How are people's eyebrows different?
In what ways can people's hair differ?*

Now let the children find ways of making their outline faces look different. A final discussion will enable children to reflect on the ways in which faces may look different.



3 Painting faces

Ask the children to paint pictures of their faces. Give them identical coloured paints, which they should blend together until they achieve a close match to the shade of their own skin. Other features could then be added. Comparing and discussing the painted faces could lead to a discussion of the characteristics the children share and those which make them different from one another. Use the activity to discuss in a positive manner the ways in which all people are different.

Q *What do you notice about the faces? How are they different?*

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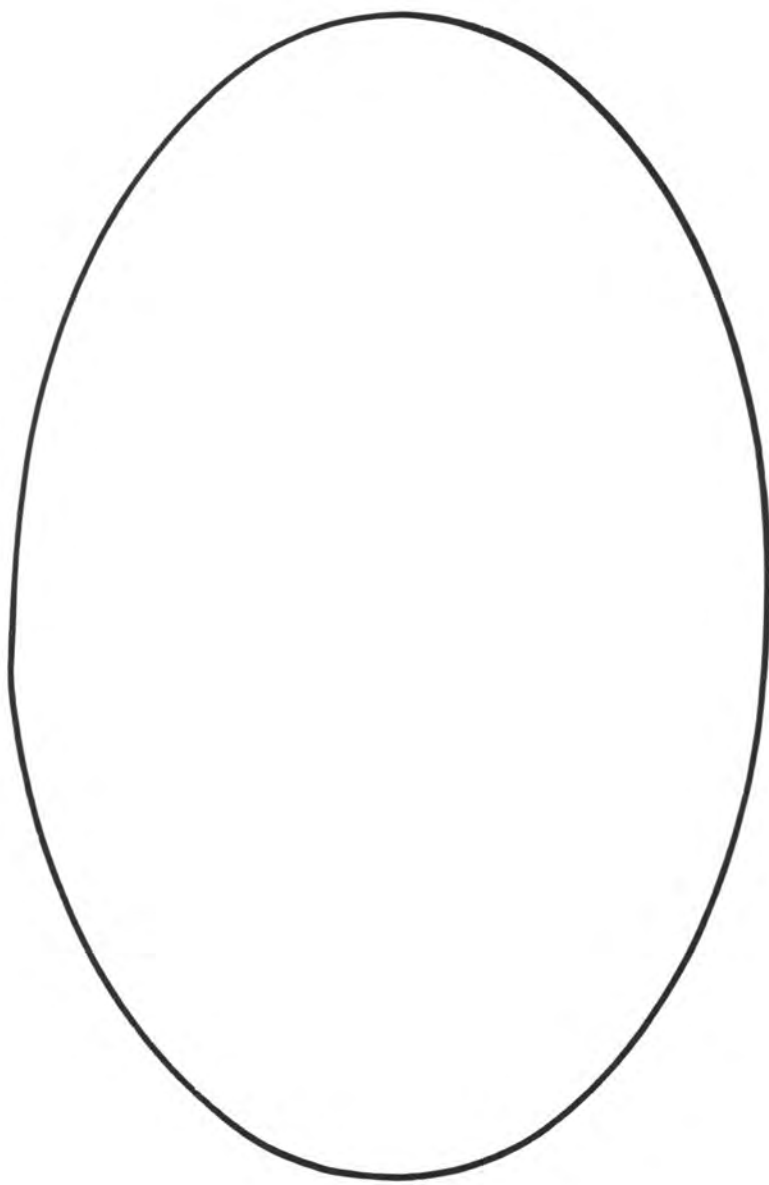
pb

AT
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Communicating

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Mentioning differences may cause anxiety among children



4 Who am I thinking of?

Think of a child and ask the children to try to identify the child by giving them some clues.

- ◆ My eyes are blue.
- ◆ My hair is brown.
- ◆ My jumper is red.



AT
1

Predicting

Let children talk about which clues were most helpful.

- Q** Will [Rachel] be wearing a [red] jumper tomorrow?
 Will [John's] hair be brown tomorrow?
 Will [Arzal's] eyes be brown tomorrow?

The 'Carnival' spread in *A first look at different plants and animals* may be useful here.

5 A book 'all about me'

Each child could make a book called 'All about me' which identifies some of the things that makes them special and different from each other.

The book could include

- ◆ writing about things they like, such as parents, friends, playing games;
- ◆ a paint print of a part of the body which might be different from other children's: foot, hand, finger;
- ◆ a picture of their family;
- ◆ a collage page of things they like to eat.

Children could use a concept keyboard to record some of their ideas, such as their name, age, colour of hair and eyes.

pb

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There are a number of ways in which people differ

AT
1

Communicating

it

Let the children talk about their books during a class discussion, and through careful questioning encourage them to use the evidence in the books to identify who has written them.

- Q** *Does the footprint match [Safeera's] foot?
Does [Caroline] have [three brothers] in her family?*

6 Identifying people by touch



Children will have focused on eye colour and hair colour in their judgements of how they differ. By feeling each other, children might become aware of other differences.

Playing a game where one child is blindfolded and has to decide the identity of another person by touch will help children identify other differences. Help children to focus on particular features.

- Q** *What does his hair feel like?
Is it straight or wavy?
Is it short or long?
What shape is his face?
Is he taller than you?*

Encourage children to think about the ways in which they identified each other and the features they found most helpful.

- Q** *Who do you think it might be?
What gave you that idea?
Which particular feature helped you say who it was?*

Mistaken identifications could lead to a discussion of how two children are similar.

- Q** *How do you think you came to make a mistake?
In what ways are these two people/children alike?*

e

Supervise children who are blindfolded

AT
1

Observing

t

Individuals have differences which distinguish them from each other

7 Identifying people by sound

Children could consider what other information they might use to help them identify a person. Help them to develop their ideas about how everybody makes different sounds.

- Q** *How can you tell who is coming along the corridor?
How can you sometimes tell if it's an adult or a child?
Can you tell exactly who it is from these sounds?
Would you be able to tell if it was a baby or a child that was crying?*



Are there any sounds that can tell you exactly who someone is?

A tape of a class or group discussion could be made to see if children can identify who is speaking.

- Q** *How can we tell who is speaking on the tape?
Do we all sound the same?*

Children could also try to identify a child who is speaking from behind a screen.

8 Changing people's appearance

In a class discussion help children to think about aspects of themselves which can be changed easily.

- Q** *What do you wear if you're going to school?
How might your hair change from day to day?*



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Individuals have differences which distinguish them from each other

AT
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Observing

it

AT
1

Planning and carrying out fair tests
Observing
Interpreting results and findings

Children could suggest other ways in which their appearance might change.

- Q** *What happens when you have chicken pox or swollen glands?
What happens when you fall?
What happens to your [hands at Diwali]?*

Encourage the children to consider whether these changes affect their chances of being recognized.

9 Dressing up



e

Using the dressing-up box, children should try to find out which clothes make them harder to identify. Encourage them to try a range of articles.

- Q** *Which clothes are best to choose if you don't want people to know who you are?
Can you tell who it is when she puts on the jacket?
Can you tell who it is when she puts on the hat?
Can you tell who it is when she puts on the beard?*

t

Individuals have differences which distinguish them from each other

After the activity, give the children a chance to share ideas about which disguises were most effective. They may be able to suggest parts of the body which should be hidden to stop people knowing who is in the disguise.

pb

A first look at different plants and animals gives an example of how dressing up can change appearance.

e

10 Grouping pictures of other people

Children could cut out pictures of people from magazines and sort them.

- Q** *How are the people the same as each other?
What makes them different from each other?
Can you put the people that are the same into groups?
Can you put the babies/grown-ups/grand-dads together?
How are these people the same?
Can you put all the sports men and women together?*

Encourage children to find some differences between people who have been put in the same group.

Q *Are there any ways in which those people are different?*

Help them to become aware that people in different groups share characteristics.

Q *Are there any people in the other groups with two legs, a nose, hair?
Can you find a different way of putting people who are the same together?*

Giving children the opportunity to talk about the ways in which they grouped people will encourage them to share their ideas about people's similarities and differences.



Q *We all have legs, but are all the legs the same?
How are they different?
Are all the heads/arms/feet the same?
How are they different?*

11 Families

Children can be helped to understand some of the ways in which they are like their parents.

Collect pictures of famous people and their children. This could lead to a discussion of some of the characteristics children share with their parents. Children could bring in their own family photos.

You may prefer to develop children's awareness of similarities between parents and offspring using pets or farm animals, or plants.

Pictures of a variety of animals with their young might be used as the focus of a group discussion. Encourage children to share ideas about how and why offspring are similar to their parents. There is a suitable set of pictures in *A first look at living things*.

AT
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Communicating

AT
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Observing



This issue should be dealt with sensitively, according to your children's needs

pb

2.3 Past life forms



AREAS FOR INVESTIGATION

- ◆ Organisms that no longer exist on Earth.
- ◆ Why species die out.

KEY IDEAS

- ◆ Many kinds of living things which existed in the past are no longer found on Earth.
- ◆ *Plants and animals, or parts of them, can be preserved as fossils.

(*Asterisks indicate ideas which will be developed more fully in later key stages.)

A LOOK AT past life forms

Some groups of living things existed in the past but can no longer be found on Earth. They existed a long time ago and have gradually died out over a long period of time. There are other groups of living things which still exist on Earth but are becoming so rare that they may die out.

Finding out children's ideas

STARTER ACTIVITIES

Thinking of extinct creatures

Q *Can you draw a picture of things that lived on Earth once but are no longer around?*

Find out children's views about why these things are no longer here.

Q *How many years ago did it live on Earth? Why do you think it doesn't live now?*

Children's ideas

Children often include people in their drawings of dinosaurs, perhaps because they cannot think of a time when people did not exist, or because of the influence of cartoons.



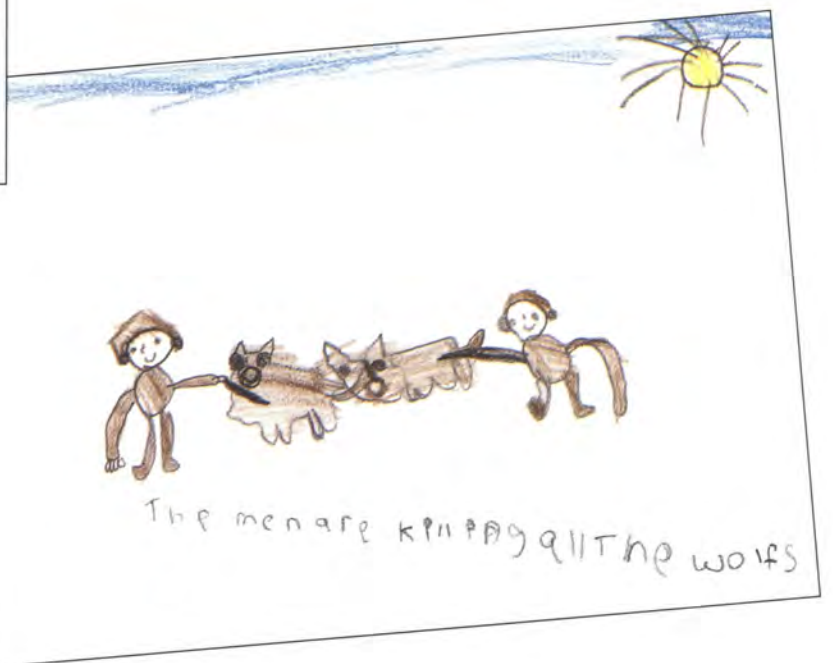
Mythical characters, such as aliens from space, giants, and witches, may feature in children's explanations, along with Red Indians and dinosaurs. This interpretation of different sources of

evidence suggests that some children are unable to distinguish between imaginary characters and historically documented people and creatures.

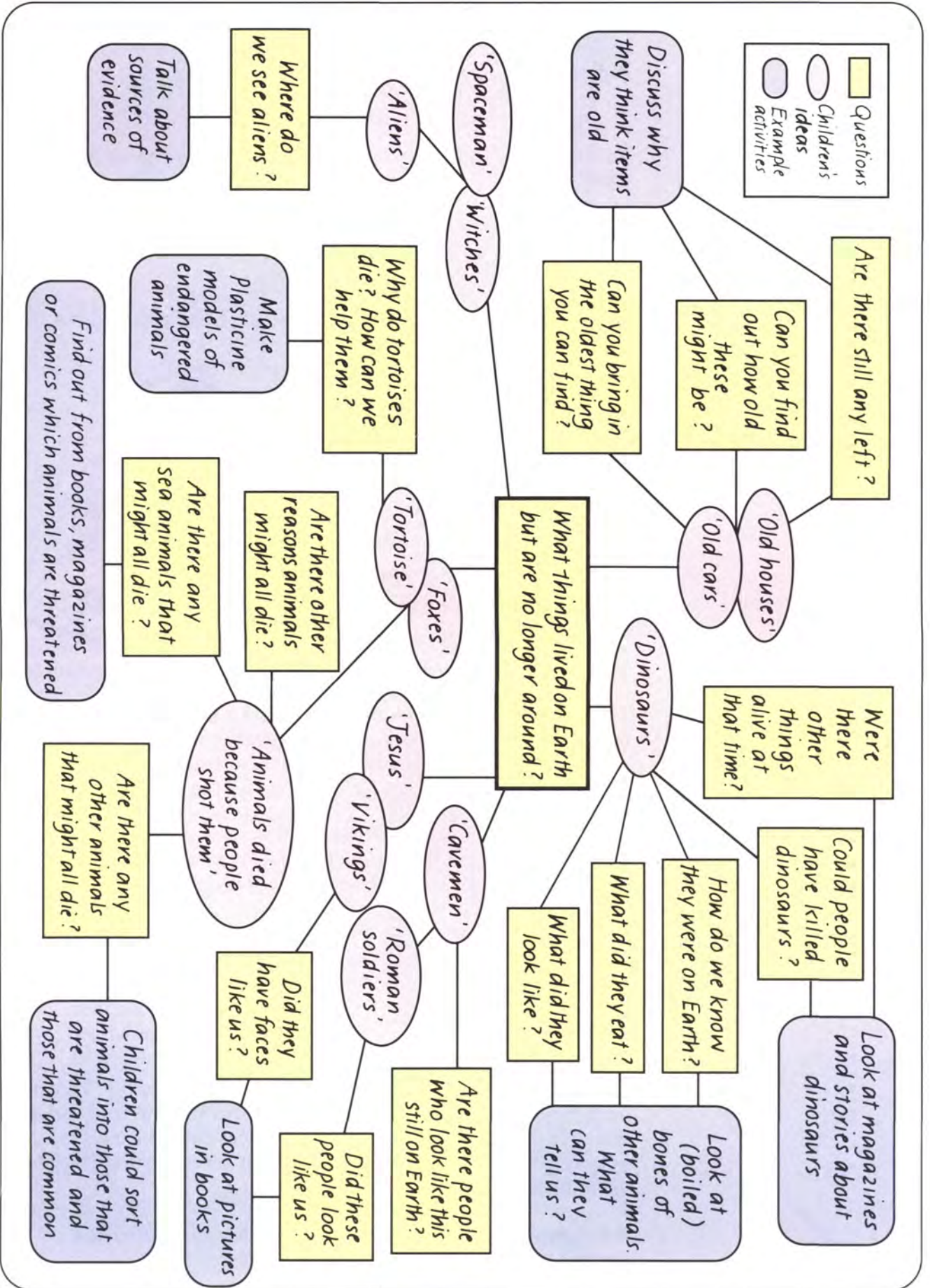


Some children may suggest that cavemen were once alive.

Children do mention some animals that have died or are presently threatened by extinction. They often suggest that human activities are responsible for extinction.



Helping children to develop their ideas about past life forms



Helping children to develop their ideas

The chart on the previous page shows how you can help children to develop their ideas from starting points which have given rise to different ideas.

1 Age and the passage of time

Encourage children to bring into school the oldest thing they can find.

Q *How old do you think it is?
What makes you think it is so old?*



e

The children could make a display of old things including books, coins, comics, programmes, letters, postcards, toys, stones, and photographs. You might add items to the display to challenge their ideas.

Let children discuss how old they believe some objects to be. Encourage them to decide which is the oldest and which is the most recent object and put them into order.

Q *How old do you think these are?
What made you decide that it was so old?
Can you think of anything else that is the same age?*

AT
1Observing
Hypothesizing

2 Dinosaurs

Even young children tend to know a lot about dinosaurs. They may have played with models, looked at pictures and watched cartoons which feature dinosaurs. These experiences could be used to develop an understanding of animals that became extinct in the distant past.

A first look at different plants and animals can be used as a starting point for this activity.

pb



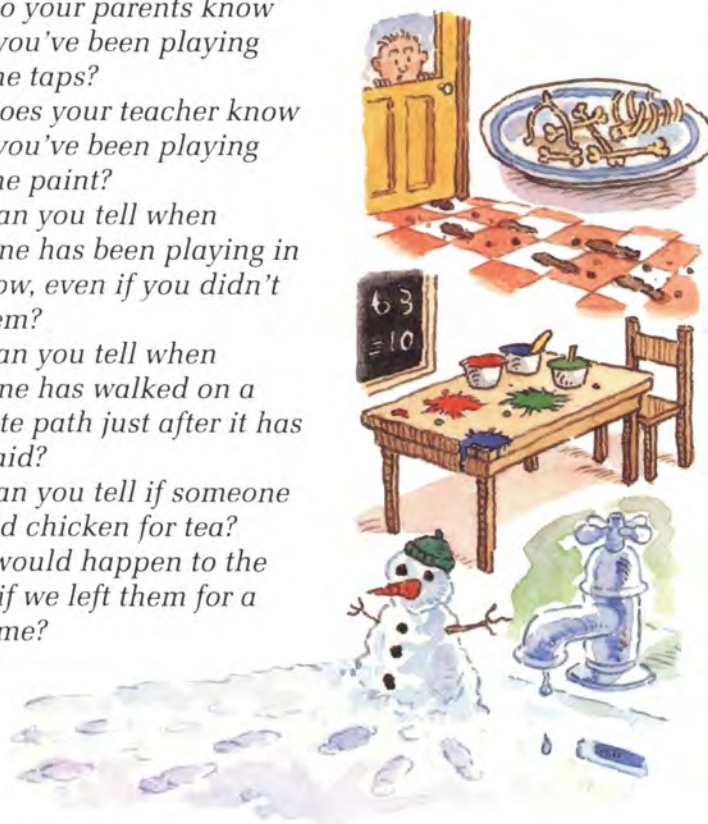
The children could make a display of dinosaurs, including toys, Plasticine models, dinosaur pictures and paintings. Encourage children to discuss the dinosaurs with each other.

- Q** *How are they the same?
How are they different?
Which dinosaurs have horns? Which have long tails?
Do you think all dinosaurs were the same size?*

3 Looking for evidence

Children will need to consider how they know something used to exist even when they have not seen it themselves.

- Q** *How do your parents know when you've been playing with the taps?
How does your teacher know when you've been playing with the paint?
How can you tell when someone has been playing in the snow, even if you didn't see them?
How can you tell when someone has walked on a concrete path just after it has been laid?
How can you tell if someone has had chicken for tea?
What would happen to the bones if we left them for a long time?*



e

AT
1Observing
MeasuringAT
1

Communicating

t

Clues provide information
about the past

2.3



Only use bones which are clean and have been well boiled and disinfected

AT
1

Predicting



Warn children about the dangers of handling dead animals or their bones; tell them not to touch or collect them

AT
1

Interpreting results and findings
Communicating

The children could examine a collection of bones.

Encourage children to think about what information bones might yield.



Can you tell me something about the bones?

Could the bones be from a big or small animal?

Which animal could the bones have come from?

How do you think we know that dinosaurs used to be in this world?

How could we know how big they were?



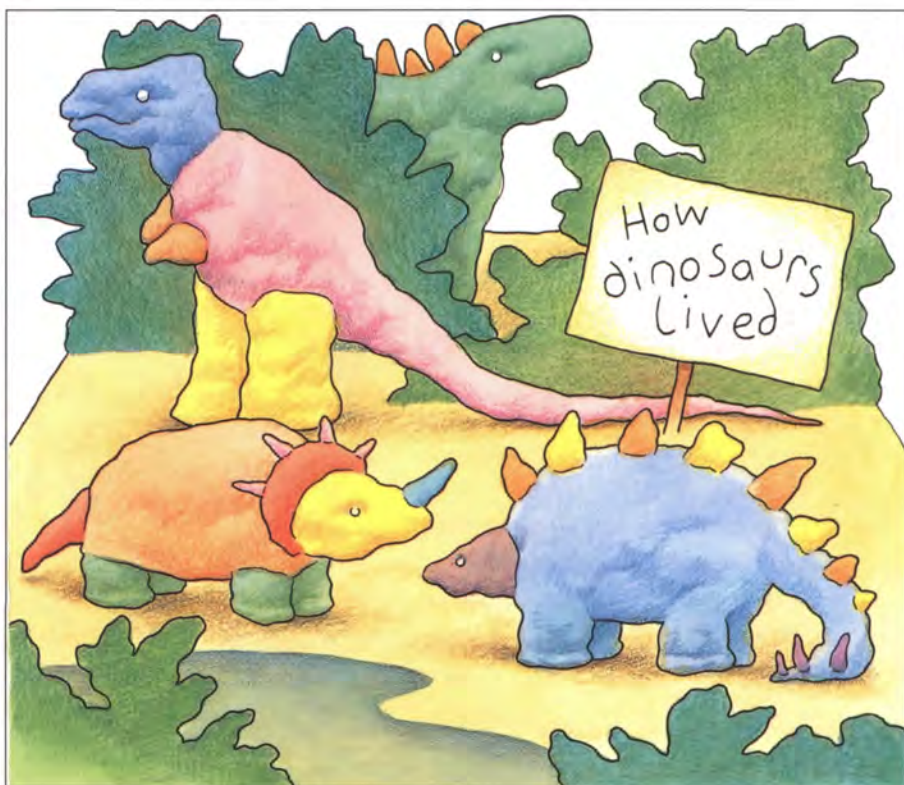
4 People and dinosaurs

Children may have included people in their pictures. Using secondary sources they could find out how dinosaurs lived. In a class discussion they could think about other animals that might have been there at the same time, and whether humans should be included.



Are there any people in the pictures of dinosaurs?

Why do you think there aren't any people in some pictures?



5 Endangered species

To start children thinking about recently extinct life forms encourage them to find out through discussion and secondary sources about species that are currently threatened.

- Q** *Why might it not be a good idea to bring tadpoles into the classroom?*
What do you think might happen if all the tadpoles were taken from the ponds?
Why do we take the tadpoles or frogs back to the pond they came from?
What happens if we catch too many fish?
Why are you not allowed to pick some flowers, such as bluebells?
Are there any other animals or plants you can think of that might die out soon?

A first look at where things live provides information about endangered animals (elephants) and encourages children to consider the effects of removing living things from a habitat (a rock pool at the seaside).

A visit could be made to a zoo, animal park, field, woodland or coastline to find out about endangered species. This could be followed up by using secondary sources.

Children can share their findings with each other in several ways:

- ◆ by making a poster, showing an animal or plant and the reason it is becoming scarce;
- ◆ by producing an assembly, in which they talk about why a species of animal or plant is threatened and how this might be prevented;
- ◆ by presenting a play in which some children explore the reasons why a species of animal or plant is endangered.

AT
1

Communicating

t

Living things may be threatened

pb

!

Safety on visits

AT
1

Communicating

t

There are various reasons why living things become extinct

3.1 Introduction

You will have been assessing your children's ideas and skills by using the activities in this teachers' guide. This on-going, formative assessment is essentially part of teaching since what you find is immediately used in suggesting the next steps to help the children's progress. But this information can also be brought together and summarized for purposes of recording and reporting progress. This summary of performance has to be in terms of National Curriculum level descriptions at the end of the key stages, and some schools keep records in terms of levels at other times.

This chapter helps you summarize the information you have from children's work in terms of level descriptions. Examples of work relating to the theme of this guide are discussed and features which indicate activity at a certain level are pointed out to show what to look for in your pupils' work as evidence of achievement at one level or another. It is necessary, however, to look across the full range of work, and not judge from any single event or piece of work.

There are two sets of examples provided. The first is the assessment of skills in the context of the activities related to the concepts covered in this guide. The second deals with the development of these concepts.

3.2 Assessment of skills (AT1)

Things to look out for when pupils are investigating the variety of life as indicating progress from level 1 to level 3:

Level 1: Making observations of a variety of living things, noting what they look like, where they live, how they feed, for example; talking about and drawing them.

Level 2: Making suggestions as well as responding to others' suggestions about how to find things out about living things. Using equipment, such as containers for living things and magnifying glasses, to make observations. Recording what they find and comparing it with what they expected.

Level 3: Saying what they expect to happen when something is changed and suggesting ways of collecting information to test their predictions. Carrying out fair tests, knowing why they are fair, and making measurements. Recording what they find in a variety of ways; noticing any patterns in it.

In a mixed infants' class, the teacher set up a collection of seeds, including some spices, nuts and pips and stones from fruit that would be familiar to the children. She didn't refer to them collectively but just as 'things she had found in the kitchen at home'.

With supervision, the children handled the seeds and arranged them in patterns. They grouped them in ways that put together all the ones that they thought were the same in some way. A range of groupings emerged. Tina's group put all the big ones together (avocado stone, nuts and broad beans) and then divided the rest according to colour (whitish, greenish and brownish).

Whilst doing this Tina affirmed that the broad beans would grow (they had grown some in the classroom) and someone else said that the mustard seeds would also grow. They agreed that the pips and nuts would not grow, however, Overhearing this discussion, the teacher asked how they would be sure about the ones they had said would grow.

Tina: *Plant them.*

Teacher: *What about the others?*

Tina: *No, if you plant them they won't grow.*

Teacher: *Let's plant some of each and see what happens.*

The children were surprised and delighted when some of the seeds that they did not think would grow (including the avocado stone and a peanut) began to sprout. Tina said 'There must be something in there, it isn't just a stone'.

By contrast with Tina's group, Dick and some younger children who had not been in the class when seeds had been grown offered few comments and simply asked 'What are they?'

Dick's group seemed to make only brief observations of the seeds and did not give evidence of yet working at level 1 in this respect.

Tina and her group made careful observations of the seeds in order to group them and discussed their observations. Their work went further than level 1, which this sorting activity indicates. They made predictions about whether the seeds would grow and responded to the teacher's enquiry about how to find out what would happen for each seed and not just the ones they thought would grow. They interpreted the appearance of shoots as evidence that the seeds were growing and their admission of surprise showed that they recognized that this was not what they expected. We have no written record of this work to judge from, but the description of their activity indicates work at level 2, which might be confirmed by looking at their records of other work.

3.3 Assessment of children's understanding (Part of AT2)

In terms of work relating to the variety of life, progression from level 1 to level 3 is indicated by:

Level 1: Realising that there is a wide variety of living things which includes human beings.

Level 2: Sorting living things into groups using observable features, such as shape, colour, number of legs; recognising similarities and differences between themselves and other pupils.

Level 3: Sorting living things into mutually exclusive groups using observable features.

Robert's drawing (overleaf) shows a common belief that things which move including the Sun and cars are living things. Robert has depicted some things which are indeed living things; however, his understanding of living things is at the moment too broad for what is required at level 1.

Robert



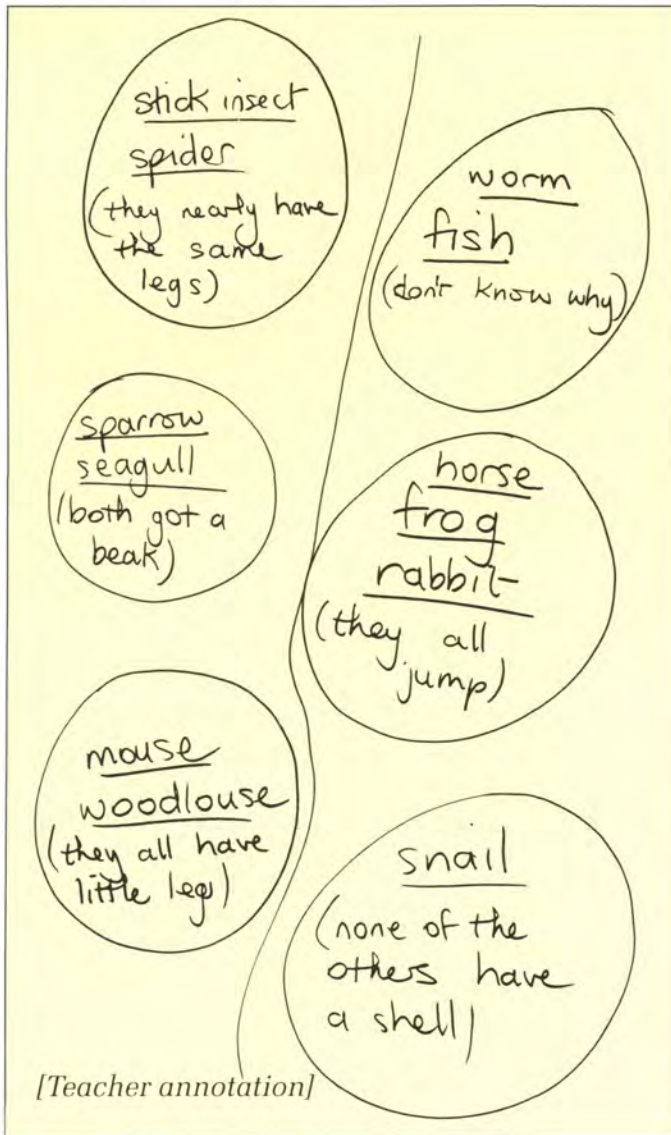
Sahim has depicted a variety of living things including plants and people. This awareness of the variety amongst living things demonstrates achievement at level 1.

Emma's teacher gave her some picture cards of animals and asked her 'Can you put together the animals you think are like each other?' Emma put all the animals in the same group. She said they all reminded her of each other. Some children like Emma have difficulty identifying how things might be the same or different. Even using one-to-one discussion they may be unable to sort a number of living things into groups, and so their work has not yet reached level 2.

Sahim

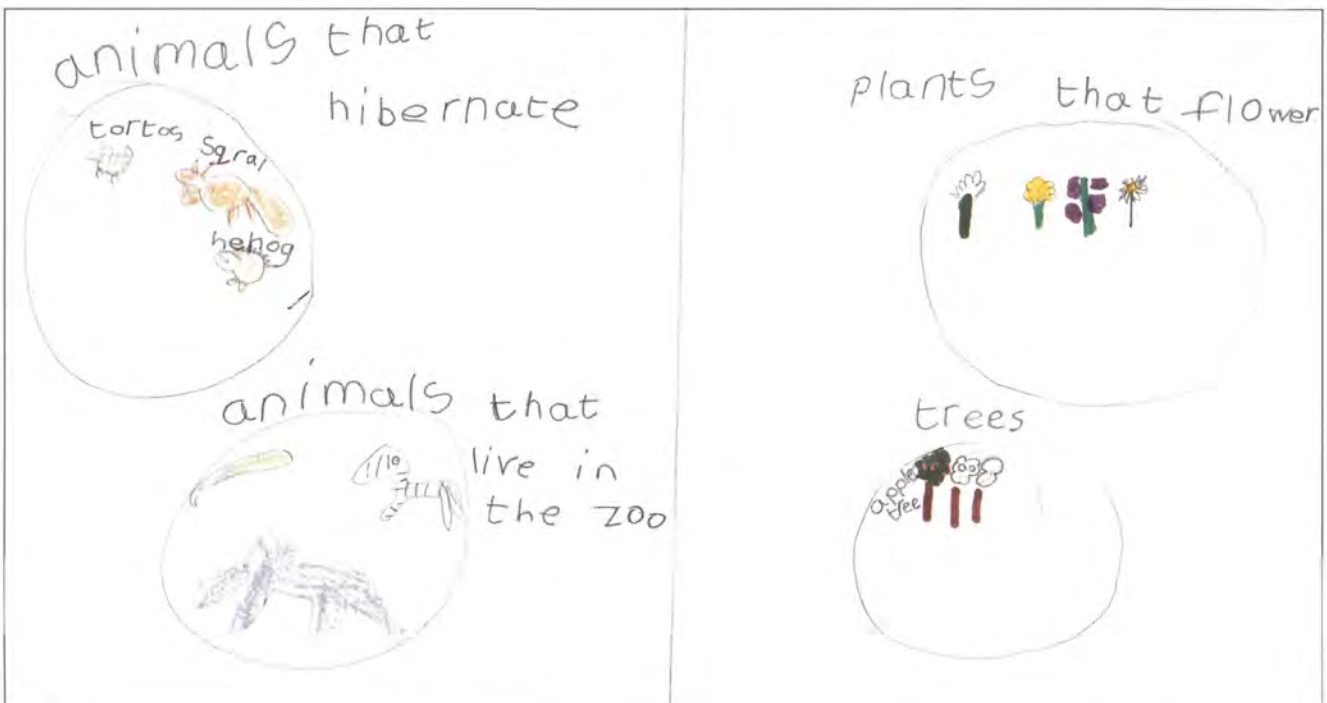


Ibrahim



Ibrahim has mainly used the visual features of animals to form his groupings. The exceptions are the ones that jump, but perhaps he did notice features of their legs as well as using his knowledge. Evidence that children can group living things together on the basis of observable features indicates work at level 2.

Gemma's drawing describes how she sorted plants into groups. Her work demonstrates an ability to group living things according to observable features necessary for achievement at level 2. However, the groups she has proposed overlap and her teacher should discuss this with her to help her make further progress towards level 3, which is indicated by using mutually exclusive groups.



Gemma

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