

Key stage 1

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' is described separately in the programme of study, but must always be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Working scientifically

Key stage 1 programme of study (statutory requirements)	Notes and guidance (non-statutory)
<p>During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none">• asking simple questions and recognising that they can be answered in different ways• observing closely, using simple equipment• performing simple tests• identifying and classifying• using their observations and ideas to suggest answers to questions• gathering and recording data to help in answering questions.	<p>Pupils in years 1 and 2 should explore the world around them and raise their own questions.</p> <p>They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions.</p> <p>They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships.</p> <p>They should ask people questions and use simple secondary sources to find answers.</p> <p>They should use simple measurements and equipment (e.g. hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what</p>

they have found out and how they found it out.

With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language.

These opportunities for working scientifically should be provided across years 1 and 2 so that the expectations in the programme of study can be met by the end of year 2. Pupils are not expected to cover each aspect for every area of study.

Year 2: All living things and their habitats

Year 2 programme of study (statutory requirements)	Notes and guidance (non-statutory)	Working Scientifically ideas
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • explore and compare the differences between things that are living, dead, and things that have never been alive • identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • identify and name a variety of plants and animals in their habitats, including micro-habitats • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. 	<p>Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things. Pupils should be introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro- habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter). They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example plants serving as a source of food and shelter for animals. Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest.</p>	<ul style="list-style-type: none"> • Do a greater variety of minibeasts live on the ground or in the trees? • Do wood lice prefer the light or the dark, dry or damp conditions? • Which tree has most birds on it? • Which type of bird visits our playground most? <p>Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions such as: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions. They could construct a simple food chain that includes humans (e.g. grass, cow, human); describing the conditions in different habitats and micro-habitats (under log, on stony path, under bushes); finding out how the conditions affect the number and type(s)</p>

		of plants and animals that live there.
<p>Other teaching ideas</p> <ul style="list-style-type: none"> • Discuss what is living, what is dead and what never lived at all. • Discuss animal and plant differences re: protection e.g. colour, poisons, pattern, spikes etc. • Draw the food chain grass, cows, humans • One child describes a plant/bird/minibeast and others have to guess it • Odd one out. A child chooses 3 pictures of a minibeast/bird/plant. Others say which is odd one out and why 		
<p>Key information</p> <p>Animals are especially suited to places where they live. To survive animals need the right food, water (or moisture) shelter, the right temperature and oxygen from <i>air or dissolved in water</i>. Habitats (except for ponds) do not have clear boundaries, animals can move away from the place where you found them, some e.g. birds may visit when you are not there.</p> <p>Animals have young so it is likely that different sizes of the same species will be found.</p> <p>Plants of the same species, growing in different places, often produce plants of a different size and shape to suit local conditions. This is called adaptation.</p> <p>Different habitats provide differing conditions for the animals that live there.</p> <p>Some animals are able to live in different habitats so you may find the same ones in different places.</p> <p>Animals are especially suited to the place where they live. Some animals, e.g. frogs / tadpoles need different conditions at different stages of their life cycle.</p> <p>Different plants grow in different habitats.</p> <p>Plants are adapted to suit the conditions where they grow. Plants of the same kind can grow differently if the conditions are not the same, e.g. bluebells grow taller in the shade than in the sun.</p> <p>All plants need different amounts of light and water to grow and produce flowers and seeds. Some plants grow best in certain kinds of soil. All species of plants have specific requirements.</p>		

Year 2: Plants

Year 2 programme of study (statutory requirements)	Notes and guidance (non-statutory)	Working Scientifically ideas
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • observe and describe how seeds and bulbs grow into mature plants • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. 	<p>Pupils should use the local environment throughout the year to observe how plants grow (including seeds, bulbs, fruit and vegetables, deciduous and evergreen bushes and trees). Pupils should be introduced to the requirements of plants for growth and survival, as well as the process of reproduction and growth in plants.</p> <p>Note: Seeds and bulbs need water to grow but do not need light; seeds and bulbs have a store of food inside them.</p> <p>Note: Seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.</p>	<ul style="list-style-type: none"> • Do shoots always grow up and roots always grow down? • Do plants need light in order to grow? • Will seeds grow in anything other than soil? <p>Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.</p>
<p>Other teaching ideas</p> <ol style="list-style-type: none"> 1. Keep a growing diary 2. Grow water so that you can see the roots system 3. Grow a bean plant and create a how-to-guide on how to look after it. 4. Observational drawings of different plants 		
<p>Key information</p> <p>Living things need light, air and water to stay alive. Living things grow and change as they get older.</p> <p>Plants in the scientific sense, include trees, bushes and grasses. Fruit, vegetables and leaves come from plants.</p> <ul style="list-style-type: none"> ▪ Seeds need water and light to grow well. ▪ Most seeds will germinate without light. ▪ Seeds will not germinate without water. ▪ The shoot needs light to turn green and grow into a healthy plant. ▪ Plants grown without light are often tall, thin and pale. ▪ They are not strong plants. 		

- Without water, plants droop or wilt. If they are not watered they will die.
- On the windowsill plants' leaves turn towards the light.

- All flowering plants have roots, stems, leaves and flowers.
- Roots, stems, leaves and flowers are similar on plants that are alike e.g. all dandelions. There are differences between roots, stems, leaves and flowers on different kinds of plants e.g. buttercup and dandelion.
- Seeds develop when petals fall.
- Seeds can grow to form new plants.

- The flower grows first as a bud and then opens up into a flower.
- When the petals fall the seed pod is left. The pod will continue to grow and the seeds will ripen.
- Some plants grow flowers to attract insects.
- Insects when taking nectar from the flower brush against the stamen and pollen sticks to them.
- The insects take the pollen to another flower of the same type so the plant can make seeds.
- Seeds can be different shapes and sizes.
- New plants grow from seeds.
- The plants produce flowers.
- Parts of the flower become a fruit.
- The fruits contain the seeds.

Year 2: Animals, including humans

Year 2 programme of study (statutory requirements)	Notes and guidance (non-statutory)	Working Scientifically ideas
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. 	<p>Pupils should be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. They should also be introduced to the processes of reproduction and growth in animals. The focus at this stage should be on questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs. The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager, adult.</p>	<ul style="list-style-type: none"> • How clean are your hands? • Do people grow at the same rate? • How many times can you jump up and down in a fixed time? <p>Pupils might work scientifically by: observing, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions.</p>
<p>Other teaching ideas</p> <ol style="list-style-type: none"> 1) Put food into main groups ie. Meat, fruit and veg., cereal or dairy products. 2) Collage of healthy/non healthy food etc. using pictures from magazines. 3) How are babies looked after? What do they need? 4) Look at photographs of children when they were younger - make a display. 5) Discuss children's illness and how we get better. 6) Match offspring with adult animals 		
<p>Key information</p> <p>Living things need light, air and water to stay alive. Living things grow and change as they get older. Our favourite toys let us play games of make-believe, but they have never been alive. Living things can be divided into two main categories - plants and animals. (Bacteria and fungi can be referred to, if necessary, as 'other living things')</p> <p>'Animals' in the scientific sense include birds, fish, mini beasts and humans.</p> <p>Plants, in the scientific sense, include trees, bushes and grasses. Fruit, vegetables and leaves come from plants.</p>		

REMEMBER! Treat all living things with care and respect. Always put them back in their own habitat.

Animals in the scientific sense include birds, fish, mini beasts and humans.

All animals move, feed, grow, use their senses and reproduce.

Animals of the same kind, eg dogs can be different breeds - spaniels, sheepdog etc.

Consider how to treat living things with care and sensitivity.

Our body is the same on both sides.

We need food to give us energy.

We need food to grow.

We need food to keep us healthy.

Too much fatty or sugary food and sugary drinks make us fat.

Sweet sticky foods and sugary drinks are bad for our teeth.

We need food and drink to stay alive.

It is best to eat breakfast before going to school.

We should eat some:

- meat, **fish**, cheese, eggs, nuts or beans every day.
- fruit and vegetables every day.

Too much sweet and fatty food is not good for us.

It is important to eat the right amount of food.

To be **fit** and healthy we need to: -

- eat and drink,
- keep clean,
- exercise,
- relax and sleep.

We need to do these things every day.

If we get ill we sometimes need to take medicines.

Medicines should be taken according to the instructions.,

A baby needs looking after. It has to be fed and kept clean and warm. A baby needs to be loved.

We learn to do things for ourselves as we grow up.

Sometimes people who are older or ill cannot do things for themselves.

We learn to look after others.

All animals need food, water and a place to live.

Pets' homes need regular cleaning.

Some animals need exercise.

We use all our senses to understand the world around us.

Taste is one of our five senses.

We use our tongue to taste.

We can identify different tastes.

Our sense of smell helps us to identify different flavours.

Human beings are all different. We say they are unique.

Some characteristics are often linked e.g. brown skin and brown eyes fair hair and pale skin red hair and freckles

Year 2: Uses of everyday materials

Year 2 programme of study (statutory requirements)	Notes and guidance (non-statutory)	Working Scientifically ideas
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 	<p>Pupils should identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass). They should think about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials. Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.</p>	<ul style="list-style-type: none"> • Which sponge is the best for mopping up spills? • When squashed, which materials return to their original shape? • What happens to materials when they are heated or cooled? • Which surface does a car roll down quickest? <p>Pupils might work scientifically by: comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.</p>
<p>Other teaching ideas</p> <ol style="list-style-type: none"> 1. Find equipment in a park play area that bends or twists. 2. Make a model/collage out of different materials. 3. Find different materials around the school. 4. Play material bingo around the school. 5. Group objects based on materials which they are made off. 		
<p>Key information</p> <p>These activities encourage children to make observations and predictions within their own everyday experiences.</p>		

Modelling materials can be changed in shape by squashing, bending, twisting and stretching. Some modelling materials e.g. dough and clay contain water which will evaporate if the material is left in a warm place. When the water evaporates the modelling material becomes hard and no longer pliable. Some modelling materials e.g. plasticine, become more pliable when they are warm. If left, they cool down and become harder but can be made pliable again by warming in our hands.

Flexible materials can be changed in shape by bending. Rigid materials do not bend as much. Rigid materials are not necessarily stronger materials; they may break instead of bending.

Flexible materials will roll into tubes. A more flexible material will roll into a smaller tube.

Fabrics can be sorted according to different properties e.g. smooth/rough; will tear/won't tear; loosely woven/close woven; shiny/matt; will stretch/won't stretch; soft/stiff; will crease/won't crease; natural/manufactured. We can change the shape of fabrics by twisting, stretching, squashing etc. Sometimes we need to use a material that will stretch for a particular purpose e.g. elastic on a tie. Some fabrics are more absorbent than others; this is usually related to texture and weave.

Optional Unit

Year 2: Sound

Year 2 programme of study (statutory requirements)	Notes and guidance (non-statutory)	Working Scientifically ideas
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • observe and name a variety of sources of sound, noticing that we hear with our ears • recognise that sounds get fainter as the distance from the sound source increases. 	<p>Linked with work in music, pupils should explore various ways of making sounds, for example using a range of musical instruments to make louder and softer and higher and lower sounds.</p>	<ul style="list-style-type: none"> • What size/shape makes the best ears? • What makes the best string telephones? • Which ear protector is best? Which sounds can be heard furthest away? • How can you make the sounds louder/softer? • How many ways can you play these instruments? • How far do you need to walk before you stop hearing eg. a clock tick? <p>Pupils might work scientifically by: comparing different sound sources and looking for patterns; carrying out tests to find the best places to locate fire bells in school.</p>
<p>Other teaching ideas</p> <ol style="list-style-type: none"> 1. Go on a sound walk either around school, in the school grounds or in the local community. If possible tape some of the sounds for use back in school. 2. Make a collection of objects that can be used to make sounds (not just instruments, also familiar objects). 3. Use the collection to make and describe as many different kinds of sound as they can eg. speaking, singing, striking, plucking, shaking, scraping, blowing, loud, soft, loudest, softest etc. 4. Listen to sounds through different objects eg. cardboard tubes, plastic funnels etc. 5. Use materials to muffle sounds like alarm clocks. 6. Use materials to keep sound from ears (NB nothing should be put into ears) 		

7. Listen to tape recordings of sounds made with instruments. Find the instrument and try to make the same sound.
8. Make up a story with sound effects.
9. Make junk musical instruments that can be shaken, plucked, blown etc.

Key information

- Sounds are heard when they enter the ear.
- Something that makes a sound is called the source of the sound.
- Sound travels away from the source getting fainter as it does so.
- There are many different kinds of sound.
- We can make sounds in different ways.
- We can blow, shake, bang or scrape.
- We can make loud and quiet sounds.
- We can make long and short sounds.
- We can make high and low sounds.
- There are many kinds of sound. We can make sounds using our voice, our hands, our fingers and our feet.
- Sounds can be loud or quiet.
- Rhythm is a kind of pattern of long and short sounds