



Topic: Electricity

Science Enquiries

- Classifying

Prior Learning - EYFS:

- Children know about similarities and differences in relation to places, objects, materials and living things.
- Children can explain why some things occur and talk about changes.

Key Learning for Y4

1. Identify common appliances that run on electricity.
2. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
3. Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.
4. Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.
5. Recognise some common conductors and insulators, and associate metals with being good conductors.
6. Know about some of the precautions for working safely with electricity.

Children don't need to learn the symbols for electrical circuits as they will learn this in Year 6.

Common Misconceptions

Some children might think that:

- electricity flows to bulbs, not through them
- electricity flows out of both ends of a battery
- electricity works by simply coming out of one end of a battery into the component.

Evidence/Activities for Key Learning:

- Name the components in a circuit
- Make electric circuits and control a circuit using a switch
- Can name some metals that are conductors and some materials that are insulators
- Explain how switches work

Evidence/Activities for science skills and science enquiries

- Construct a range of circuits and draw simple diagrams to show how the components are connected.
- Explore which materials can be used instead of wires to make a circuit and classify materials that were suitable/not suitable for wires.
- Explore how to connect a range of different switches and investigate how they function in different ways, by connecting switches do different insulators and conductors.
- Choose switches to add to circuits to solve particular problems, e.g. *a pressure switch for a burglar alarm*.
- Apply their knowledge of conductors and insulators to design and make different types of switch.
- *Make circuits that can be controlled as part of a DT project (cross-curricular link: DT).*

Progression/Future Learning

Year 6: Electricity

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
- Use recognised symbols when representing a simple circuit in a diagram.

Topic: Living things and their habitats

Science Enquiries

- Observing over time
- Pattern seeking
- Research

Prior Knowledge:

Year 1

Plants

- Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.
- Identify and describe the basic structure of a variety of common flowering plants, including trees.

Animals including humans

- Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.
- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)

Year 2 - Living things and their habitat

- Identify and name a variety of plants and animals in their habitats, including microhabitats.

Key Learning for Y4:

1. . Recognise that living things (including those in the locality) can be grouped in a variety of ways.
2. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
3. Recognise that environments can change and that this can sometimes pose dangers to living things.

Common Misconceptions

Some children might think that:

- the death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain
- there is always plenty of food for wild animals
- animals are only land-living creatures
- animals and plants can adapt to their habitats, however they change
- all changes to habitats are negative.

Evidence/Activities for key learning:

- Name living things living in a range of habitats, giving the key features that helped them to identify them
- Give examples of how an environment may change both naturally and due to human impact.
- Use classification keys to identify unknown plants and animals.

Evidence/Activities for science skills and science enquiries

- Observe plants and animals in different habitats throughout the year.
- Compare and contrast the living things observed.
- Use classification keys to name unknown living things.
- Classify living things found in different habitats based on their features.
- Create a simple identification key based on observable features.
- Use fieldwork to explore human impact on the local environment e.g. litter, tree planting.
- Use secondary sources to find out about how environments may naturally change.
- Use secondary sources to find out about human impact, both positive and negative, on environments.

Progression/Future Learning

Year 5 - Living things and their habitats

- Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
- Describe the life process of reproduction in some plants and animals.

Year 6 - Living things and their habitats

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.
- Give reasons for classifying plants and animals based on specific characteristics.

Topic: States of Matter

Science Enquiries

- Comparative testing
- Observing

Prior Learning:

Year 1 - Everyday Materials

- Distinguish between an object and the material from which it is made.
- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.
- Describe the simple physical properties of a variety of everyday materials.
- Compare and group together a variety of everyday materials on the basis of their simple physical properties.

Year 2 - Uses of everyday materials

- 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.

Key Learning for Y4

1. Compare and group materials together, according to whether they are solids, liquids or gases.
2. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).
3. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Common Misconceptions

Some children may think that:

- 'solid' is another word for hard or opaque
- solids are hard and cannot break or change shape easily and are often in one piece
- substances made of very small particles like sugar or sand cannot be solids
- particles in liquids are further apart than in solids and they take up more space
- when air is pumped into balloons, they become lighter
- water in different forms – steam, water, ice – are all different substances

- all liquids boil at the same temperature as water (100 degrees)
- melting, as a change of state, is the same as dissolving
- steam is visible water vapour (only the condensing water droplets can be seen)
- clouds are made of water vapour or steam
- the substance on windows etc. is condensation rather than water
- the changing states of water (illustrated by the water cycle) are irreversible
- evaporating or boiling water makes it vanish
- evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material.

Evidence/Activities for Key Learning:

- Link key vocabulary using diagrams or a concept map
- Name properties of solids, liquids and gases
- Give everyday examples of melting and freezing
- Explain why different substances have different melting and freezing points.
- Give everyday examples of evaporation and condensation
- Describe the water cycle

Evidence/Activities for science skills & science enquiries

- Observe closely and classify a range of solids and liquids, justifying why a substance is a solid or liquid.
- Explore making gases visible e.g. squeezing sponges under water to see bubbles, and showing their effect e.g. *using straws to blow objects, trees moving in the wind.*
- Classify materials according to whether they are solids, liquids and gases.
- Observe a range of materials melting e.g. *ice, chocolate, butter* and use a thermometer to measure temperatures.
- Investigate how to melt ice more quickly.
- Observe the changes when making rocky road cakes or ice-cream.
- Investigate the melting point of different materials e.g. ice, margarine, butter and chocolate.
- Explore freezing different liquids e.g. *tomato ketchup, oil, shampoo.*
- Observe water evaporating and condensing e.g. *on cups of icy water and hot water* and explain why these processes occur.
- Set up investigations to explore changing the rate of evaporation e.g. *washing, puddles, handprints on paper towels, liquids in containers.*
- *Use secondary sources to find out about the water cycle and present their learning in a range of ways e.g. diagrams, explanation texts, story of a water droplet (cross-curricular link: English).*

Progression/Future Learning

Year 5 - Properties and Changes of Materials

- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Topic: Sound

Science Enquiries

- Comparative Testing

Prior Learning

Year 1 - Animals including humans

- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

Key Learning in Y4

1. Identify how sounds are made, associating some of them with something vibrating.
2. Recognise that vibrations from sounds travel through a medium to the ear.
3. Find patterns between the pitch of a sound and features of the object that produced it.
4. Find patterns between the volume of a sound and the strength of the vibrations that produced it.
5. Recognise that sounds get fainter as the distance from the sound source increases.

Common Misconceptions

Some children may think that:

- sound is only heard by the listener
- sound only travels in one direction from the source
- sound can't travel through solids and liquids
- high sounds are loud and low sounds are quiet.

Evidence/Activities for Key Learning

- Name sound sources and state that sounds are produced by the vibration of the object
- State that sounds travel through different mediums such as air, water, metal
- Give examples to demonstrate how the pitch of a sound are linked to the features of the object that produced it
- Give examples of how to change the volume of a sound e.g. increase the size of vibrations by hitting or blowing harder
- Give examples to demonstrate that sounds get fainter as the distance from the sound source increases
- Explain what happens when you strike a drum or pluck a string and use a diagram to show how sounds travel from an object to the ear
- *Demonstrate how to increase or decrease pitch and volume using musical instruments or other objects (cross-curricular link: music).*

Evidence/Activities for scientific enquiries and science skills

- Classify sound sources.
- Explore making sounds with a range of objects, such as musical instruments and other household objects.
- Explore how string telephones or ear gongs work.
- Explore altering the pitch or volume of objects, such as the length of a guitar string, amount of water in bottles, size of tuning forks.
- Measure sounds over different distances.
- Measure sounds through different insulation materials.

Progression/Future Learning

Sound is taught again in KS3 so does not link to any further KS2 learning.

Topic: Animals including humans

Science Enquiries

- Research
- Classifying

Prior Learning

Year 1

- Identify and name a variety of common animals that are carnivores, herbivores and omnivores.

Year 2

- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans)
- Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

Year 3

- Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.

Key Learning in Y4

1. Describe the simple functions of the basic parts of the digestive system in humans.
2. Identify the different types of teeth in humans and their simple functions.
3. Construct and interpret a variety of food chains, identifying producers, predators and prey.

Common Misconceptions

Some children may think that:

- arrows in a food chains mean 'eats'
- the death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain
- there is always plenty of food for wild animals
- your stomach is where your belly button is
- food is digested only in the stomach
- when you have a meal, your food goes down one tube and your drink down another
- the food you eat becomes "poo" and the drink becomes "wee".

Evidence/Activities for Key Learning

- Sequence the main parts of the digestive system
- Draw the main parts of the digestive system onto a human outline
- Describe what happens in each part of the digestive system
- Identify the three different types of teeth in their mouth and talk about their shape and what they are used for.
- Name producers, predators and prey within a habitat
- Draw food chains based on research
- Record the teeth in their mouth (make a dental record)
- Explain the role of the different types of teeth
- Explain how the teeth in animal skulls show they are carnivores, herbivores or omnivores

Evidence/Activities for science skills and science enquiries

- Research the function of the parts of the digestive system.
- Create a model of the digestive system using household objects.
- Explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing).
- Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls.
- Use food chains to identify producers, predators and prey within a habitat.
- Use secondary sources to identify animals in a habitat and find out what they eat.

Progress/Future Learning

Year 6:

- Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.
- Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.
- Describe the ways in which nutrients and water are transported within animals, including humans.