



Year

6

Topic

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 micro-organisms, plants and animals.
- Give reasons for classifying plants and animals based on specific characteristics.

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning

Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other living things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot.

Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms.

Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.

Key vocabulary

Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering

Possible evidence

- Can give examples of animals in the five vertebrate groups and some of the invertebrate groups
- Can give the key characteristics of the five vertebrate groups and some invertebrate groups
- Can compare the characteristics of animals in different groups
- Can give examples of flowering and non-flowering plants

Common misconceptions

Some children may think:

- all micro-organisms are harmful
- mushrooms are plants.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities

- Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important.
- Use first-hand observation to identify characteristics shared by the animals in a group.
- Use secondary sources to research the characteristics of animals that belong to a group.
- Use information about the characteristics of an unknown animal or plant to assign it to a group.
- Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and keys.
- Create an imaginary animal which has features from one or more groups.

Possible evidence

- Can use classification materials to identify unknown plants and animals
- Can create classification keys for plants and animals
- Can give a number of characteristics that explain why an animal belongs to a particular group



Year

6

Topic

Animals, including humans

- 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.

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning

The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.

Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins. This content is also included in PSHE. The new statutory requirements for relationships and health education can be found below:

- [statutory guidance on Physical health and mental wellbeing \(primary and secondary\)](#).

Key vocabulary

Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle

Possible evidence

- Can draw a diagram of the circulatory system and label the parts and annotate it to show what the parts do
- Produces a piece of writing that demonstrates the key knowledge e.g. explanation text, job description of the heart

Common misconceptions

Some children may think:

- your heart is on the left side of your chest
- the heart makes blood
- the blood travels in one loop from the heart to the lungs and around the body
- when we exercise, our heart beats faster to work the muscles more
- some blood in our bodies is blue and some blood is red
- we just eat food for energy
- all fat is bad for you

- all dairy is good for you
- protein is good for you, so you can eat as much as you want
- foods only contain fat if you can see it
- all drugs are bad for you.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Create a role play model for the circulatory system. • Carry out a range of pulse rate investigations: <ul style="list-style-type: none"> ▪ fair test – effect of different activities on my pulse rate ▪ pattern seeking – exploring which groups of people may have higher or lower resting pulse rates ▪ observation over time - how long does it take my pulse rate to return to my resting pulse rate (recovery rate) ▪ pattern seeking – exploring recovery rate for different groups of people. • Research the negative effects of drugs (e.g. tobacco) and the benefits of a healthy diet and regular exercise by asking an expert or using carefully selected secondary sources. 	<ul style="list-style-type: none"> • Use the role play model to explain the main parts of the circulatory system and their role • Can use subject knowledge about the heart whilst writing conclusions for investigations • Can explain both the positive and negative effects of diet, exercise, drugs and lifestyle on the body • Present information e.g. in a health leaflet describing impact of drugs and lifestyle on the body



Year

6

Topic

Evolution and inheritance

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
- Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.
- Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning

All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other.

Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time, these inherited characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.

Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.

Possible evidence

- Can explain the process of evolution
- Can give examples of how plants and animals are suited to an environment
- Can give examples of how an animal or plant has evolved over time e.g. penguin, peppered moth
- Give examples of living things that lived millions of years ago and the fossil evidence we have to support this
- Can give examples of fossil evidence that can be used to support the theory of evolution

Key vocabulary

Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils

Common misconceptions

Some children may think:

- adaptation occurs during an animal's lifetime: giraffes' necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life
- offspring most resemble their parents of the same sex, so that sons look like fathers
- all characteristics, including those that are due to actions during the parent's life such as dyed hair or footballing skills, can be inherited
- cavemen and dinosaurs were alive at the same time.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities

- Design a new plant or animal to live in a particular habitat.
- Use models to demonstrate evolution e.g. 'Darwin's finches' bird beak activity.
- Use secondary sources to find out about how the population of peppered moths changed during the industrial revolution.
- Make observations of fossils to identify living things that lived on Earth millions of years ago.
- Identify features in animals and plants that are passed on to offspring and explore this process by considering the artificial breeding of animals or plants e.g. dogs.
- Compare the ideas of Charles Darwin and Alfred Wallace on evolution.
- Research the work of Mary Anning and how this provided evidence of evolution.

Possible evidence

- Can identify characteristics that will make a plant or animal suited or not suited to a particular habitat
- Can link the patterns seen in the model to real examples
- Can explain why the dominant colour of the peppered moth changed over a very short period of time



Year

6

Topic

Light

- Recognise that light appears to travel in straight lines.
- Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.
- Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning

Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen.

Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.

Possible evidence

- Can describe, with diagrams or models as appropriate, how light travels in straight lines either from sources or reflected from other objects into our eyes
- Can describe, with diagrams or models as appropriate, how light travels in straight lines past translucent or opaque objects to form a shadow of the same shape

Key vocabulary

As for Year 3 - Light, plus straight lines, light rays

Common misconceptions

Some children may think:

- we see objects because light travels from our eyes to the object.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities

- Explore different ways to demonstrate that light travels in straight lines e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shaped holes in card.
- Explore the uses of the behaviour of light, reflection and shadows, such as in periscope design, rear view mirrors and shadow puppets.

Possible evidence

- Can explain how evidence from enquiries shows that light travels in straight lines
- Can predict and explain, with diagrams or models as appropriate, how the path of light rays can be directed by reflection to be seen, e.g. the reflection in car rear view mirrors or in a periscope
- Can predict and explain, with diagrams or models as appropriate, how the shape of shadows can be varied



Year

6

Topic

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.

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning

Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well.

You can use recognised circuit symbols to draw simple circuit diagrams.

Key vocabulary

Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage

N.B.

Children do not need to understand what voltage is but will use volts and voltage to describe different batteries. The words “cells” and “batteries” are now used interchangeably.

Possible evidence

- Can make electric circuits and demonstrate how variation in the working of particular components, such as the brightness of bulbs, can be changed by increasing or decreasing the number of cells or using cells of different voltages
- Can draw circuit diagrams of a range of simple series circuits using recognised symbols

Common misconceptions

Some children may think:

- larger-sized batteries make bulbs brighter
- a complete circuit uses up electricity
- components in a circuit that are closer to the battery get more electricity.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities

- Explain how a circuit operates to achieve particular operations, such as to control the light from a torch with different brightnesses or make a motor go faster or slower.
- Make circuits to solve particular problems, such as a quiet and a loud burglar alarm.
- Carry out fair tests exploring changes in circuits.
- Make circuits that can be controlled as part of a DT project.

Possible evidence

- Can incorporate a switch into a circuit to turn it on and off
- Can change cells and components in a circuit to achieve a specific effect
- Can communicate structures of circuits using circuit diagrams with recognised symbols
- Can devise ways to measure brightness of bulbs, speed of motors, volume of a buzzer during a fair test
- Can predict results and answer questions by drawing on evidence gathered