Year 4 Science Curriculum

Autumn Term

Electricity

National Curriculum Objectives

Identify common appliances that run on electricity. (1)
Construct a simple electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.(2)
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. (3)
Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (4)
Recognise some common conductors and insulators, and associate metals with being good conductors. (5)
Providing further depth and breadth of understanding (6)

Direct Knowledge

All knowledge linked to prior learning
that everyday appliances run on electricity. **(1)** – washing machine; television; iron; games console; kettle
that electricity can occur naturally or be 'man-made'. **(6)**
that the source of electricity may be 'renewable' or 'non-renewable'. **(6)**
that all functioning electrical devices are part of a circuit. **(3)**
that a circuit contains a battery (cell), wires and an appliance that requires electricity to work (such as a bulb, motor or buzzer). **(2)**
that circuits can be drawn using pictorial representations (do not introduce circuit symbol). **(2)**
that electricity flows around a circuit from a power source to another component. **(4)**
that a switch can be used to connect or break an electrical circuit. **(4)**

that an electrical device will not work if there is no power source or a break in a circuit. **(4)**
that electricity may come from the mains or a battery. **(6)**
that a battery has two terminals (shown as + [anode] or – [cathode]). **(6)**
that everyday appliances are connected to the mains and must be used safely. **(6)**
that there are a number of common electrical hazards inc.: **(6)** - exposed wires; damaged wall sockets; overloading extension sockets; placing metal into electrical appliances or open sockets; electrical appliances near water
that some household items (remote control, clock) are powered by a battery. **(1)**
that items powered by a battery are safer to handle than those powered by the mains. **(6)**
that metals are good conductors of electricity and most other materials are not. **(5)**
that some metals conduct electricity better than others and are therefore suited to particular uses. **(5)** - **Good conductors:** copper, silver; aluminium - **Poor conductors**: steel; lead
that materials that do not conduct electricity well are called insulators. **(5)** - **Good insulators:** plastic, paper, wood
that metals are used to make wires and plastics are used to cover wires and as covers for plugs as they are good insulators. **(5)**

Common misconceptions

Some children may think:

• 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.

Sound

National Curriculum Objectives

Year 4 Science Curriculum

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

Direct Knowledge

All knowledge linked to prior learning
that sounds are made when objects or materials vibrate, causing the particles in the air to vibrate. **(1)**
that sounds cannot travel in a vacuum because there are no particles to vibrate. **(2)**
that vibrations may be as a result of: talking, whistling or clapping. **(4)**
that we can hear sounds using our ears. **(2)**
that when a sound wave reaches our ear, the 'outer ear' funnels the sound into the head down the ear canal. **(6)**
that at the end of the ear canal is the eardrum, which is waterproof and airtight. **(6)**
that beyond the ear canal is the middle ear. **(6)**
that inside the middle ear is the hammer, anvil and stirrup (three smallest bones in the body). **(6)**
that the hammer, anvil and stirrup vibrate and pass sound waves to the inner ear, which contains the cochlea. **(6)**
that the cochlea turns the vibrations into electrical signals. **(6)**
that these signals travel down the auditory nerve to the brain, which experiences the signal as a sound. **(6)**
that our sense of hearing is used for a range of purposes inc. communicating, and recognising hazards. **(6)**
that vibrations from sound sources travel through different materials to the ear (inc. solids, liquids and gases). **(2)**

that some materials are more effective than others in preventing vibrations from sound sources reaching the ear. **(2)**
that some sounds are so loud that ear protection needs to be worn when in close proximity to them. **(5)**
that there are many different ways of describing sounds. **(3 and 4)**
that the term 'pitch' describes how high or low a sound is. **(3)**
that the term 'volume' describes how loud or quiet a sound is. **(4)**
that louder sounds have a larger amplitude, and quieter sounds have a smaller amplitude. **(4)**
that high- or low-pitched sounds can be loud or quiet and loud or quiet sounds can be high- or low-pitched. **(3)**
that some sounds can be heard from a long distance. **(5)**
that sounds seem louder the nearer to the source you are. **(5)**
that sounds seem quieter (fainter) the further away from the source you are. **(5)**
that the pitch of a drum depends on its size and the tightness of the skin. **(3)**
that the volume of the sound produced by a drum depends on how hard the drum was struck. **(4)**
that the pitch of a stringed instrument depends on the length or tension of the strings. **(3)**
that the volume of the sound produced by a stringed instrument depends on how hard the strings are plucked. **(4)**

Common misconceptions

Pitch and volume are frequently confused, as both can be described as high or low.

Some children may think:

• 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 load and low sounds are quiet.

Year 4 Science Curriculum

Spring

States of Matter

National Curriculum Objectives

Compare and group materials together, according to whether they are solids, liquids or gases.
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.
Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
Providing further depth and breadth of understanding

Direct Knowledge

All knowledge linked to prior learning
that there are many substances and each of these can be classified as: solid, liquid or gas (states of matter). **(1)**
that there are differences in the properties of solids, liquids and gases. **(1)**
that solids retain their own shape and that liquids flow and take the shape of their container (viscosity). **(1)**
that liquids do not change in volume when poured into a different container. **(1)**
that gases are different to solids and liquids in terms of how they do not maintain their shape or volume. **(1)**
that gases flow more easily than liquids and, in all directions. **(1)**
that solids consisting of very small pieces (powders) that behave in the same way as liquids. **(1)**
that powders and sponges are solid materials with air 'gaps' in between particles. **(1)**
that the same material can often exist as both a solid and a liquid (use examples below). ○ plastic; metal; rock **(2)**
that using your hand is an inaccurate measure of temperature when compared to the use of a thermometer. **(4)**
that a liquid can be changed to a solid by cooling – this process may be called cooling or freezing. **(2)**

that a solid can be changed to a liquid by heating – this process is called melting. **(2)**
that different solids melt and cool at different temperatures. **(2)**
that melting and freezing are changes that can be reversed. **(2)**
that a liquid can be changed to a gas by heating – this process is called evaporation. **(2)**
that liquids other than water evaporate (perfume, iodine). **(4)**
that the boiling temperature of water is 100° C but water does not need to be at this temperature in order to evaporate. **(2)**
that water evaporates faster (rate of evaporation) as the temperature increases. **(4)**
that things 'drying out' relates to the process of evaporation. **(2)**
that water in a gaseous state (water vapor / steam) can be changed to a liquid by cooling – this process is called condensation. **(2)**
that water condenses faster (rate of condensation) as the temperature decreases. **(2)**
that evaporation and condensation are changes that can be reversed. **(2)**
that air contains water vapour and this condenses when it cools / comes into contact with a cold surface. **(2)**
that water evaporates from oceans, seas and lakes and turns into water vapour. **(3)**
that some water, which is absorbed by soil, is turned into water vapour by plants and evaporates into the atmosphere via the leaves. **(3)**
that water vapour rises into the atmosphere until it cools down and changes back into tiny drops of liquid water, forming clouds. **(3)**
that when these clouds become heavy, the water within them falls back to the ground in the form of rain, snow, sleet or hail. **(3)**
that when the water reaches the ground, it collects in streams and rivers before finding its way back to oceans, seas and lakes. **(3)**
that when the water reaches oceans, seas and lakes, the process of the water cycle begins again. **(3)**

Common misconceptions

Some children may think:

• '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.

Living Things and Their Habitats

National Curriculum Objectives

Recognise that living things can be grouped in a variety of ways.
Explore and use classification keys to help group, identify, and name a variety of living things in their local and wider environment.
Recognise that environments can change and that this can sometimes pose dangers to living things.
Providing further depth and breadth of understanding

Direct Knowledge

All knowledge linked to prior learning
that different animals and plants are found in different habitats. **(4)**
that animals and plants are suited to their habitats (adaptation). **(4)**

Year 4 Science Curriculum

that plants can be grouped in many different ways including: (1) flowering and non-flowering seed bearing or spore baring vascular or non-vascular.
that some plants and animals in their habitats may be familiar to us, whereas others may not. (4)
that classification keys can help us to identify plants and animals in their habitats (both local and wider). (2)
that plants (see selection below) may be classified based on a variety of observable characteristics. (1) thistle; daffodil; holly; iris; grass; cheese plant; rose
that animals (see selection below) may be classified based on a variety of observable characteristics. (1) wasp; snail; worm; spider; butterfly, bee, ant camel, polar bear, fish, (list to be confirmed 5.5.2022)
that animals can be grouped in lots of ways based upon their characteristics, inc. vertebrates and invertebrates. (1)
That animals can be classified as a carnivore, herbivore or omnivore, depending on what they eat. (1)
that vertebrates can be separated into five broad groups. **(2)** - mammals; fish; birds; reptiles; amphibians
that invertebrates can be separated into four broad groups. **(2)** - molluscs and annelids; insects; arachnids; myriapods and crustaceans
that environments can change naturally or as a result of the actions of humans (i.e., deforestation). **(3)**
- that environments may change in-line with the seasons. (3)
- that environments may change as a result of natural disasters including: tsunami / flooding; fires (inc. bushfires); earthquakes. (3)
that environmental change can have positive as well as negative effects. **(4)**
that environmental changes can sometimes pose dangers to living things. **(3)**
that living things and the environment need protection or may become endangered or extinct. **(4)**
that humans can have both a positive and negative impact on the environment: **(4)** - **Positive** – setting up a nature reserve; planting trees; creating a garden pond.

- **Negative** – littering; deforestation; air pollution; plastic pollution.

Summer Term

Animals Including Humans

National Curriculum Objectives

Describe the simple functions of the basic parts of the digestive system in humans (1)
Identify the different types of teeth in humans and their simple functions (2)
Construct and interpret a variety of food chains, identifying producers, predators and prey (3)
Providing further depth and breadth of understanding (4)

Direct Knowledge

All knowledge linked to prior learning
- that humans have teeth which are part of the skeletal system – although they play a key part in digestion. (2)
- that humans have two sets of teeth during their lifetime: 20 milk teeth and 32 adult teeth (inc. 4 wisdom teeth). (2)
- that most humans start losing milk teeth at the age of 5 and have lost them all by the age of 14. (2)
- that there are 4 different types of teeth: (1) incisors; (2) canines; (3) premolars; (4) molars. (2)
- that incisors are the 4 front teeth on the top and bottom jaw - used for cutting and chopping food. (2)
- that canines are sharp pointy teeth to the outside of your incisors – used to help tear food apart. (2)

- that premolars are the two teeth to the outside of each canine – used for crushing and grinding food. (2)
- that molars are the three teeth to the outside of each premolar (inc. 1 wisdom tooth) – used with the tongue to help swallow food, mashing it up until its ready to be swallowed safely. (2)
- that healthy teeth need healthy gums. (4)
- that some foods can be damaging to your teeth. (4)
- that humans have a digestive system that takes in food. (1)
- that the human digestive system breaks down food into the nutrients and energy that our bodies need. (1)
- that the major parts of the human digestive system are: (a) mouth and oesophagus; (b) stomach; (c) small intestine; (d) liver, pancreas and gallbladder; (e) large intestine [colon]; (f) rectum. (1) - - This small step should be read alongside the corresponding steps show below
- that the mouth takes in food, breaks it into small pieces, and moistens it with saliva from the salivary gland. (1)
- that the oesophagus pushes the broken-down food into your stomach. (1)
- that the stomach churns the broken-down food and mixes it with stomach acid. (1)
- that as food begins to dissolve in the stomach, the body begins to absorb nutrients. (1)
- that food waste does not pass through the liver pancreas or gallbladder. (1) - · The liver digests food by producing bile to break down fats, removing toxins and breaking down and storing some vitamins and minerals. - · The pancreas produces enzymes to help break down proteins, fats and carbohydrates. - · The gall bladder stores the bile that is produced by the liver. When needed, bile passes into the small intestine, where it breaks down fat.
- the small intestine is a winding, tightly folded tube that does most of the work of digesting food and absorbing nutrients. (See functions of liver, pancreas and gallbladder) (1)

- that the remaining food that is not absorbed moves to the large intestine. (1)
- that most of the food's water is absorbed in the large intestine. (1)
- that any remaining waste in the large intestine is stool (faeces) and this is pushed to the rectum. (1)
- that the rectum is a short tube at the end of the large intestine – it connects your colon to your anus. (1)
- that the anus pushes stool out of the human body. (1)
- that food chains can be used to represent feeding relationships in a habitat. (3)
- that food chains always begin with a plant (producer). (3)
- that food chains may also include: prey, predators (both consumers). (3)
- that food chains are often specific to different habitats. (3)

Common misconceptions

Some children may think:

• 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".