



Science Subject Learning at KS2

In Key Stage 2, children build on their learning from Key Stage 1, as well as being introduced to new and more abstract areas of science.

- **Animals including Humans**

As children continue to develop their understanding of life processes in KS2, they learn about movement by identifying that humans and some other animals have skeletons and muscles for support, protection and movement. They look at nutrition and identify that animals, including humans, need the right types and amount of nutrition, and that as animals cannot make their own food, they get nutrition from what they eat. They then move on to describe the simple functions of the basic parts of the digestive system in humans and as part of this identify the different types of teeth in humans and their simple functions. They also construct and interpret a variety of food chains, identifying producers, predators and prey. They examine the processes of growth and reproduction by describing the changes as humans develop to old age. Children then learn about the circulatory system, being able to identify and name the main parts and describe the functions of the heart, blood vessels and blood. They recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function and describe the ways in which nutrients and water are transported within animals, including humans.

- **Living Things and their Habitats**

At KS2, children learn to recognise that living things can be grouped in a variety of ways and explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. They go on to 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 and give reasons for classifying plants and animals based on specific characteristics. They look at different environments and recognise that these environments can change and that this can sometimes pose dangers to living things. They describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird and describe the life process of reproduction in some plants and animals.

- **Materials**

Continuing with their understanding of materials science at KS2, children will compare and group materials together, according to whether they are solids, liquids or gases. They will 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). They will identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

They will then investigate other properties of materials, such as their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets and use these properties to compare and group together everyday materials. They will move on to understand that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution and then use their growing knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.

Through comparative and fair tests, they will give reasons for the particular uses of everyday materials, including metals, wood and plastic. They will investigate how materials can be changes and demonstrate that dissolving, mixing and changes of state are reversible changes before explaining 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.

- **Rocks and Soils**

Children will learn to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties and describe in simple terms how fossils are formed when things that have lived are trapped within rock. They will recognise that soils are made from rocks and organic matter.

- **Plants**

As they continue learning about plants in KS2, children will learn to identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers, explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. They will investigate the way in which water is transported within plants and explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

- **Light**

In KS2 children begin to study light as a phenomenon. They recognise that they need light in order to see things, that dark is the absence of light and that light is reflected from surfaces. They recognise that light from the sun can be dangerous and that there are ways to protect their eyes. They begin to recognise that shadows are formed when the light from a light source is blocked by an opaque object and find patterns in the way that the size of shadows change. They go on to recognise that light appears to travel in straight lines and use this idea to explain that objects are seen because they give out or reflect light into the eye. They will be able to 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. Finally, they use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

- **Electricity**

At KS2, children also investigate the phenomenon of electricity where they identify common appliances that run on electricity and construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. They learn to 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 and recognise that a switch opens and closes a circuit, associating this with whether or not a lamp lights in a simple series circuit. recognise some common conductors and insulators, and associate metals with being good conductors. They go on to associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit and 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. They use recognised symbols when representing a simple circuit in a diagram.

- **Forces**

Children learn about forces at KS2, comparing how things move on different surfaces. They notice that some forces need contact between two objects, but magnetic forces can act at a distance and observe how magnets attract or repel each other. They investigate how magnets attract some materials and not others and compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet. This allows them to identify some magnetic materials. They will describe magnets as having two poles and predict whether two magnets will attract or repel each other, depending on which poles are facing. They then go on to look at other forces, explaining that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. They also identify the effects of air resistance, water resistance and friction, that act between moving surfaces and recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

- **Sound**

Children investigate sound and identify how sounds are made, associating some of them with something vibrating. They recognise that vibrations from sounds travel through a medium to the ear. They investigate and find patterns between the pitch of a sound and features of the object that produced it and find patterns between the volume of a sound and the strength of the vibrations that produced it. They recognise that sounds get fainter as the distance from the sound source increases.

- **Space**

At KS2, children learn about and describe the movement of the Earth, and other planets, relative to the Sun in the solar system. They describe the movement of the Moon relative to the Earth and describe the Sun, Earth and Moon as approximately spherical bodies. They use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

- **Evolution and Inheritance**

At KS2, children learn about evolution and inheritance. They recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. They recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. They identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Working Scientifically at KS2

Children's skills in working scientifically will include:

- asking relevant questions then planning and using different types of scientific enquiries to answer them, including recognising and controlling variables where necessary
- setting up simple practical enquiries, comparative and fair tests

- making systematic and careful observations and, where appropriate, taking measurements using standard units, using a range of scientific equipment, including thermometers and data loggers, with increasing accuracy and precision, taking repeat readings when appropriate
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording data and results of increasing complexity using simple scientific language, scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions to set up further comparative and fair tests
- identifying differences, similarities or changes related to simple scientific ideas and processes
- identifying and using straightforward scientific evidence to answer questions or to support or refute their ideas or arguments.