

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- ♣ 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.

Notes and guidance (non-statutory)

Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.

Pupils might work scientifically by: observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow.

Year Group = 5

AFL Questions:

- What is the same/different between the reproductive process in plants and animals?
- What environmental factors can impact on the reproductive process in plants and animals? Is this a positive/negative impact?
- Why do naturalists such as David Attenborough choose to study plants and animals? What impact will their research have on the future?
- How are humans impacting on the natural world? What do you think the natural world will look like 100 years from now? Is there anything we can do to limit the damage we have already done?

Animals, including humans

Statutory requirements

Pupils should be taught to:

- ♣ describe the changes as humans develop to old age.

Notes and guidance (non-statutory)

Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty.

Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.

Year Group = 5

AFL Questions:

- How are you different now to when you were a child?
- Why have these changes occurred?
- What changes will occur as you get older? Why are these necessary?
- What is the same/different between the puberty changes in men and women?

Properties and changes of materials

Statutory requirements

Pupils should be taught to:

- ♣ 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.

Notes and guidance (non-statutory) Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.

Notes and guidance (non-statutory) Note:

Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials. Pupils might work scientifically by: carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.

Year Group = 5

Opportunities to promote curiosity:

Given a material – describe it using scientific vocab. What is made from this material and why? Given an item – identify the materials (a variety of materials used).

Five AFL Questions:

- Would there be any clues that would tell you that you were examining a solution? How would you investigate this?
- What benefits are there in society to being able to classify materials based on their properties?
- How can you prove that changes in states of matter are reversible?
- Can you name the different scientific names for changes and describe the process?

Earth and space

Statutory requirements

Pupils should be taught to:

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

Notes and guidance (non-statutory)

Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night. Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).

Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.

Notes and guidance (non-statutory)

Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.

Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.

Year Group = 5

Opportunities to promote curiosity:

Liverpool World Museum trip. Moon phase diary. Tim Peak (recent events). First moon landing (50 year anniversary).

Sizes of sun, moon and Earth (Use balls and school field for scale)

Look in news for astronomical events. Growing soil on mars/moon. Moondog text

AFL Questions:

- Why does the moon appear to change shape?
- What impact on our day to day lives does the movement of the moon have? Can you think of any examples?
- T or F - When it is daytime it is light in England and in Australia it is night time & dark?
- Why are shadows different throughout the day?
- What evidence can you provide that the earth is continually rotating?

Forces

Statutory requirements

Pupils should be taught to:

- ♣ explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- ♣ identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- ♣ recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

Notes and guidance (non-statutory)

Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down. Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.

Pupils might work scientifically by: exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.

Year Group = 5

AFL Questions:

- Why is the presence of friction essential for our safety in everyday life? Give examples
- How does introducing levers, pulleys and gears allow a lesser force to have greater effect?
- How are forces used to our benefit at the fairground? Give examples.
- How could we provide evidence that gravity has the same impact on objects of differing weights? What conditions would we have to impose?
- How many ways can you think of to over-ride the effects of gravity? What are the benefits of doing this?