

5.1 Decay and Recycling

Overview of the unit: This unit is intended to be taught across the whole year with at least two lessons in each term. Pupils will carry out a number of visits in and around the school to look for evidence of decay. They will create a compost heap and observe it over time. Natural and man-made materials will be left in different places to see how well they break down. Pupils will also carry out a litter survey in the local area and report back through a school assembly.

<p>Children working below age-related expectations will be able to:</p>	<ul style="list-style-type: none"> ▪ Know that some things decay and others do not ▪ Know that some living things are decomposers ▪ Know that some materials can be recycled ▪ Plan a scientific enquiry with help ▪ Observe closely, recording findings
<p>Children working at age-related expectations will be able to:</p>	<ul style="list-style-type: none"> ▪ Describe the process of decay and its usefulness ▪ Identify materials that will decay ▪ Plan a scientific enquiry to find decay times of common materials, recognising and controlling variables ▪ Record findings and estimate degree of trust in results ▪ From investigation, estimate the time needed for some common materials from litter to decay ▪ Know that some materials can be recycled into useful new materials
<p>Children working above age-related expectations will be able to:</p>	<ul style="list-style-type: none"> ▪ Describe some of the factors that will accelerate or slow down decay ▪ Consider some of the ethical and financial aspects of recycling and waste ▪ Plan a scientific, recognising dependent, independent and control variables ▪ Select appropriate methods for presenting data ▪ Present reasoned, well evidenced conclusions

There are no specific resources needed for this unit unless the school wishes to purchase a compost bin.

5.2 Life Cycles

Overview of the unit:

Pupils revisit the life cycle of plants, and learn about pollination. They compare the life cycles of birds, mammals, insects and amphibians and learn that insects and amphibians undergo metamorphosis.

Lesson	Learning objectives
1 & 2	Observing life cycles <ul style="list-style-type: none">▪ Make observations of plant and animal life cycles
3	Reproduction in plants <ul style="list-style-type: none">▪ Recognise that flowering plants produce seeds from their flowers which grow into new plants▪ Describe the life cycle of flowering plants including pollination, fertilisation, seed production, seed dispersal and germination▪ Describe the structure of a flower, naming the main parts of the flower
4	Sexual and asexual reproduction in plants <ul style="list-style-type: none">▪ Describe different ways of growing new plants other than using seeds▪ Know the difference between asexual and sexual reproduction in plants▪ Compare the production of new plants through the planting of seeds and the taking of cuttings
5	Animal life cycles- birds and mammals <ul style="list-style-type: none">▪ Know that all animals have a life cycle that includes being born, developing into an adult, reproducing, and eventually dying▪ Know that life cycles vary from one class to another▪ Research the life cycle of an unfamiliar bird and an unfamiliar mammal
6	Animal life cycles - insects and amphibians <ul style="list-style-type: none">▪ Describe the changes that occur during the growth and development of insects and amphibians▪ Compare the life cycles of an insect and an amphibian in simple terms▪ Know that insects and amphibians undergo metamorphosis

Resources required for this unit

Nest boxes (optional)

Magnifying glasses

Plant pots, seeds, parent plants for taking cuttings

5.3 Earth and Space

Overview of the unit: Pupils study our solar system, learning about the relative movements of the planets and the Moon and relating these to the way we experience the Sun and the Moon on Earth. They carry out some research into planets and investigate the way meteorites have shaped the surface of the Moon.

Lesson	Learning objectives
1	The Earth, the Sun and the Moon <ul style="list-style-type: none">▪ Describe the relative motion of the Earth, the Moon and the Sun▪ State the difference between a sun, a planet and a moon▪ Know that the Sun, planets and moons in the solar system are approximately spherical in shape▪ Explain how ideas about the solar system have changes through the centuries
2	The Solar System <ul style="list-style-type: none">▪ Identify the eight planets within the solar system and their positions relative to the Sun▪ Compare planets in terms of atmosphere, time to orbit the Earth, period of rotation, number of moons etc.
3	Night and day <ul style="list-style-type: none">▪ Explain night and day in terms of the rotation of the Earth▪ Investigate differences in the time of day and the length of day in different parts of the World
4	Phases of the Moon <ul style="list-style-type: none">▪ Describe and explain in simple terms how the appearance of the Moon in the sky changes over the course of 28 days▪ Investigate factors that affect the formation of craters, taking measurements with increasing accuracy and precision, taking repeat readings when appropriate

Resources required for this unit

Globe and torch

Neodymium magnets for the optional activity

5.4 Mixtures and Reactions

Overview of the unit:

After reviewing and extending their knowledge of materials from previous years, pupils study dissolving and learn how to recover materials from a solution. They look at other methods of separating mixtures and carry out an investigation on “sewage” to clean it up before discharge into a river. They investigate chemical reactions including burning and use a key and a series of simple tests to identify some mystery powders. They learn about reversible and irreversible changes and they create a drama about the life of a famous materials scientist.

Lesson	Learning objectives
1	Review of material properties <ul style="list-style-type: none">▪ Extend their knowledge of properties to include more abstract properties such as hardness, thermal and electrical conductivity, magnetic attraction▪ Know that metals have similar, specific properties▪ Match material properties to their use
2	Dissolving <ul style="list-style-type: none">▪ Know that some materials dissolve in water and others do not and give examples of both▪ Know that a substance is still present in the solution when it has dissolved▪ Describe ways in which dissolved substances can be recovered from solution
3	More about dissolving <ul style="list-style-type: none">▪ Understand that melting and dissolving are different processes▪ Separate solute from a solution by crystallisation
4	The Big Stink <ul style="list-style-type: none">▪ Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering and sieving▪ Plan an investigation to determine ways in which solids can be removed from liquids▪ Report the findings from their investigation into treating sewage including conclusions and explanations of their findings
5	Chemical change – burning <ul style="list-style-type: none">▪ Know that burning results in the formation of new materials including gases that we cannot see▪ Know that chemical changes are usually not reversible▪ Identify hazards associated with burning materials
6	Chemical change <ul style="list-style-type: none">▪ Recognise that chemical reactions form new substances and that this kind of change is not usually reversible▪ Identify some changes as irreversible and explain reasons for doing so▪ Identify substances through their chemical and physical changes
7	Lives of materials scientists <ul style="list-style-type: none">▪ Know how post-its and/or wrinkle-free cotton were developed

Resources required for this unit

Electricity kits, magnets

Heating device such as hotplate for demonstrations

Test tubes and test tube racks

Tongs

Safety glasses

Trays, sand

Filter funnels, filter paper, sieves

Large bowls

5.5 Human Development

Overview of the unit: Pupils learn about the human life cycle and about the changes of the body during puberty. They learn about the development of a baby during pregnancy and about the birth of a baby. This unit has been written to match lessons in Personal, Social and Health Education on puberty and the feelings associated with growing up.

Lesson	Learning objectives
1	Changes through life <ul style="list-style-type: none">▪ Describe the basic changes as humans develop from birth to old age▪ Compare the human life cycle to the life cycle of other animals
2	Growing up <ul style="list-style-type: none">▪ Describe the changes that happen during puberty
3	Pregnancy and birth <ul style="list-style-type: none">▪ Describe the development of a baby▪ Know how babies are born

5.6 Forces

Overview of the unit: Pupils learn more about the forces of gravity and friction and investigate the friction of different surfaces. They study air resistance, investigate paper spinners falling, look at floating and sinking and build a self-righting boat. Learning about simple forces includes activities to study pulleys, gears and other simple machines and gives pupils the chance to use their knowledge of machines to build a catapult.

Lesson	Learning objectives
1	<p>Gravity</p> <ul style="list-style-type: none"> ▪ Know that the Earth and objects are pulled towards each other; this gravitational attraction causes objects to have weight ▪ Be able to use a force meter carefully, interpreting the scale correctly ▪ Know that weight is a force and is measured in Newtons and that mass is the amount of matter and is measured in kilograms
2	<p>Air resistance</p> <ul style="list-style-type: none"> ▪ Know that air resistance slows moving objects ▪ Know that when an object falls, air resistance acts in the opposite direction to the weight
3	<p>Floating and sinking</p> <ul style="list-style-type: none"> ▪ Know that when an object is submerged in water, the water provides an upward force (upthrust) on it ▪ Know that things will float if the upthrust is greater than the weight ▪ Know that water resistance acts to slow down objects that are moving through the water ▪ Compare air and water resistance
4	<p>Friction</p> <ul style="list-style-type: none"> ▪ Know that the force between two moving surfaces in contact is called friction ▪ Know that friction can be useful or a problem and provide examples of both
5	<p>Simple machines</p> <ul style="list-style-type: none"> ▪ Investigate a range of simple machines: pulleys, gears, ramps, wheel and axle and levers ▪ Describe how simple machines such as gears, levers and pulleys are used to transfer forces or to change speed or direction
6	<p>Building machines</p> <ul style="list-style-type: none"> ▪ Build a catapult and describe how it works, identifying any simple machines in its construction ▪ Evaluate the catapult they have built

Resources required for this unit:

Force meters of various sizes

Ramps

Globe

Smoke machine (for use with vortex cannons – optional)

Stopwatches

Large containers (e.g. washing up bowls, plastic aquarium tanks) for water

Small cars or carts for friction experiment

Different surfaces for friction experiment

Metre rules/tape measures

Pulleys

Gears

Masses