





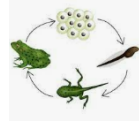



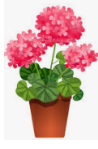



























Swindon Village Primary School








Science Curriculum










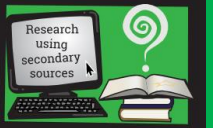


Swindon Village Primary School Science Overview

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS	Natural world around us 		Habitats 	Life cycles 	States of matter 	
Year 1	Use of everyday materials 		Animals including humans 		Plants 	
Year 1	Seasonal changes 		Seasonal changes 		Seasonal changes 	
Year 2	Use of everyday materials 		Animals including humans 	Living things and their habitats 	Plants 	
Year 3	Rocks 	Light 	Animals including humans 	Plants 	Forces and magnets 	
Year 4	Living things and their habitats 	Living things and their habitats <u>(DFSC visit)</u> 	Animals including humans 	Electricity 	States of matter SOLID Liquid GAS	Sound 
Year 5	Earth and Space 		Animals including humans 	Living things and their habitats 	Forces 	Properties & changes of materials 
Year 6	Electricity 	Living things and their habitats 	Animals including humans 	Evolution and Inheritance 	Light 	

Scientific Enquiry



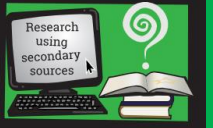


	Observing over time	Pattern seeking	Research	Identifying & classifying	Comparative & Fair tests
					
Reception					
Seasonal changes <small>To be completed over the terms to take advantage of different seasons</small>	What changes can I see in Welly Boot land?			What are the seasons?	
Animals including humans	What is the life cycle of a frog?		What kind of animal is a Lynx? Why doesn't live in our country anymore?	Which animals live in the wild? Which are pets? Which are both?	Do any animals live around our school? How could we find out?
Plants	What do I need to do to keep my plant alive?				
Every day materials					Which material will help stop our ice-cream from melting?

	Observing over time	Pattern seeking	Research	Identifying & classifying	Comparative & Fair tests
					
Year 1					
Seasonal changes <small>To be completed over the terms to take advantage of different seasons</small>	How much rain falls over the week?	Do the biggest trees have the biggest leaves?		How would you group these things based on which season you are most likely to see them in?	
Animals including humans	How does my height change over the year?		Are all bugs the same?	How can we organise all the zoo animals?	Is our sense of smell better when we can't see?
Plants	How does my plant change each week?	Is there a pattern in where we find weeds growing in the school grounds?		How can we sort the leaves that we collected on our walk?	
Every day materials	What happens to the ice balloon over time?		Which materials can be recycled?	Making an umbrella - which materials are waterproof?	Which materials are the most absorbent?

	Observing over time 	Pattern seeking 	Research 	Identifying & classifying 	Comparative & Fair tests 
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Year 2

Use of every day materials	Would a paper boat float forever?			Which materials are best for printing?	Which material would we make Polar's clothes from to protect him?
Animals including humans	How does a butterfly change over time?	Which age group of children wash their hands the most in a day?		Which offspring belongs to which animal?	Do bananas make us run faster?
Plants	What happens to my bean after I have planted it?	Do bigger seeds grow into bigger plants?	How do we plant and care for seeds?		Do beans grow quicker inside or outside?
Living things and their habitats	What conditions do woodlice prefer to live in?	Which habitat do worms prefer - where can we find the most worms?	How does the habitat of the artic compare to the habitat of the rainforest?	How would you group things to show which are living, dead or have never been alive?	

	Observing over time 	Pattern seeking 	Research 	Identifying & classifying 	Comparative & Fair tests 
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Year 3

Forces and magnets	If we magnetise a pin, how long does it stay magnetised for?	Does the size and shape of a magnet affect how strong it is?		Which materials are magnetic?	Which magnet is the strongest?
Light	How do shadows change throughout the day?	Are you more likely to have bad eyesight and to wear glasses if you are older?	How does the Sun make light?	Are you more likely to have bad eyesight and to wear glasses if you are older?	How does the distance between the shadow puppet and the screen affect the size of the shadow?
Animals including humans		Do male humans have larger skulls than female humans?		How do skeletons of different animals compare?	How does the angle that your elbow is bent affect the circumference of your upper arm?
Plants	What happens to carnations when they are left in a glass of coloured water?		What are all the different ways that seeds disperse?		Which conditions help seeds germinate faster?
Rocks	How does soil separate into different layers in water?		Who was Mary Anning and what did she discover?		Which soil absorbs the most water?

Observing over time



Pattern seeking



Research



Identifying & classifying








Comparative & Fair tests



Year 4

Living things and their habitats		Where in our school is the most polluted?	Can we find other animals to add complexity to our classification key?	Can we use the classification keys to identify all the animals that we caught pond dipping? (at Deanfield)	Does the amount of light affect how many woodlice move around?
Animals including humans	How does an egg shell change when it is left in cola?			What are the names for the main organs involved in the digestive system? How can we organize our teeth into groups?	
Electricity	How long does a battery light a torch for?			How would you group these electrical devices based on where the electricity comes from?	Do different brands of the same battery last as long as each other? Which material is the best conductor of electricity How does the thickness of a conducting material affect how bright the lamp is?
States of matter	How does the level of water in a glass change when left on the windowsill?	Is there a pattern in how long it takes different sized ice lollies to melt?			Do all liquids freeze at the same temperature? How does the surface area of a container of water affect how long it takes to evaporate?
Sound	When is our classroom the quietest?				Which material is best to use for muffling a sound? How does the volume of a drum change as you move further away from it? How does the length of a guitar string/tuning fork affect the pitch of the sound?

Observing over time	Pattern seeking	Research	Identifying & classifying	Comparative & Fair tests
				

Year 5

Earth and space	How does shadow length change over the day?	Is there a pattern between the size of a planet and the time it takes to travel around the sun?	Who was Galileo and what was his contribution to the understanding of the universe?	Can you observe and identify all the phases in the cycle of the moon?	
Forces		Do all objects fall through water in the same way?		Can you label and name all the forces acting on the objects?	Which shape parachute takes the longest to fall?
Animals including humans		Are the oldest children in our school the tallest?		Can you identify all the stages in the human life cycle?	Who grows the fastest, girls or boys?
Living things and their habitats	How does a chick change as it develops in it's shell and hatches?		Who is David Attenborough and what was his contribution to the understanding of the natural world?	What are the differences between the life cycle of an insect and a mammal?	
Properties & changes of materials	How does a container of salt water change over time? How does a nail in salt water change over time?				Which type of materials dissolve the fastest? How does the temperature of tea affect how long it takes for a sugar cube to dissolve?

Observing over time



Pattern seeking



Research



Identifying & classifying



Comparative & Fair tests



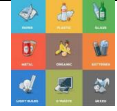
Year 6

Living things and their habitats	What happens to samples of bread that are left in different areas around the school?		What do different microorganisms do? Are they always harmful? Who was Carl Linnaeus?		
Animals including humans	How does my heart rate change before, during and after exercise?			Which organs of the body make up the circulatory system?	
Evolution and inheritance		Is there a pattern between the size and shape of a bird's beak and the food it will eat?	What happened when Charles Darwin visited the Galapagos islands?	Compare the skeletons of different animals as they evolved?	
Light				Can you identify all the colours of light that make white light when mixed together?	How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface?
Electricity					How does the voltage of the batteries in a circuit affect the brightness of the bulb/lamp?

Year 1

Autumn 1 and 2

Everyday materials



National Curriculum

Pupils should be taught to:

- distinguish between an object and the material from which it is made
- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- describe the simple physical properties of a variety of everyday materials
- compare and group together a variety of everyday materials on the basis of their simple physical properties

Notes and guidance (non-statutory)

Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil.

Pupils might work scientifically by: performing simple tests to explore questions, for example: 'What is the best material for an umbrella? ... for lining a dog basket? ... for curtains? ... for a bookshelf? ... for a gymnast's leotard?'

Key Vocabulary

object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through

Prior learning

Use all their senses in hands-on exploration of natural materials. (Nursery - Materials, including changing materials)

Explore collections of materials with similar and/or different properties. (Nursery - Materials, including changing materials)

Future learning

Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)

Talk about the differences between materials and changes they notice. (Nursery - Materials, including changing materials)

Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)

Spring 1 and 2

Animals, including humans



National Curriculum

Pupils should be taught to

- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- identify and name a variety of common animals that are carnivores, herbivores and omnivores
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to explore and answer questions about animals in their habitat. They should understand how to take care of animals taken from their local environment and the need to return them safely after study. Pupils should become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets.

Pupils should have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes.

Pupils might work scientifically by: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.

Key Vocabulary

carnivore
omnivore
herbivore
Head, body, eyes,
ears, mouth,
teeth, leg, tail,
wing, claw, fin,
scales, feathers,
fur, beak, paws,
hooves
Senses - touch,
see, smell, taste,
hear, fingers
(skin), eyes, nose,
ear and tongue

Prior learning

Future learning

Use all their senses in hands-on exploration of natural materials. (Nursery - Humans)

Name and describe people who are familiar to them. (Reception - Humans)

Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. (Y2 - 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 microorganisms, plants and animals. (Y6 - Living things and their habitats)

Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)

Summer 1 and 2

Plants



National Curriculum

Pupils should be taught to:

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- identify and describe the basic structure of a variety of common flowering plants, including trees

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted.

They should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem). Pupils might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees. Pupils might keep records of how plants have changed over time, for example, the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants.

Key Vocabulary

leaf, flower
blossom, petal
fruit, berry
root, seed
trunk, branch
stem, bark
stalk, bud
evergreen
deciduous

Prior learning

Future learning

Plant seeds and care for growing plants. (Nursery - Plants)

Understand the key features of the life cycle of a plant and an animal. (Nursery - Plants)

Begin to understand the need to respect and care for the natural environment and all living things. (Nursery - Plants)

Explore the natural world around them. (Reception - Living things and their habitats)

Recognise some environments that are different to the one in which they live. (Reception - Living things and their habitats)

Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants)

Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants)

Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)

Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants)

Investigate the way in which water is transported within plants. (Y3 - Plants)

Autumn

Spring

Summer

Seasonal changes



National Curriculum

Pupils should be taught to:

- observe changes across the 4 seasons
- observe and describe weather associated with the seasons and how day length varies

Notes and guidance (non-statutory)

Pupils should observe and talk about changes in the weather and the seasons.

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

Pupils might work scientifically by: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change.

Key Vocabulary

weather sunny,
rainy, windy,
snowy
Seasons (winter,
summer, spring,
autumn)
sun, sunrise,
sunset, day
length

Prior learning

Future learning

Understand the key features of the life cycle of a plant and an animal. (Nursery - Plants & Animals, excluding humans)

Explore the natural world around them. (Reception - Seasonal changes)

Describe what they see, hear and feel whilst outside. (Reception - Seasonal changes)

Understand the effect of changing seasons on the natural world around them. (Reception - Seasonal changes)

Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)

Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 - Earth and space)

The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3)

Year 2

Autumn

Use of everyday materials



National Curriculum

Pupils should be taught to:

- identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

Notes and guidance (non-statutory)

Pupils should identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass). They should think about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials. Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.

Pupils might work scientifically by: comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.

Key Vocabulary

Names of materials -
wood, metal, plastic,
glass, brick, rock,
paper, cardboard

Properties of
materials - as for
Year 1 plus opaque,
transparent and
translucent,
reflective, non-
reflective, flexible,
rigid

Shape, push/pushing,
pull/pulling,
twist/twisting,
squash/squashing,
bend/bending,
stretch/stretching

Prior learning

Future learning

Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)

Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)

Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)

Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)

Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks)

Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)

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. (Y5 - Properties and changes of materials)

Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials)

Animals including humans



National Curriculum

Pupils should be taught to:

- notice that animals, including humans, have offspring which grow into adults
- find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
- describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

Notes and guidance (non-statutory)

Pupils should be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. They should also be introduced to the processes of reproduction and growth in animals. The focus at this stage should be on questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs.

The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager, adult.

Pupils might work scientifically by: observing, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions.

Key Vocabulary

offspring,
reproduction, growth,
child, young/old
stages (examples -
chick/hen,
baby/child/adult,
caterpillar/butterfly),
exercise, heartbeat,
breathing, hygiene,
germs, disease, food
types (examples -
meat, fish,
vegetables, bread,
rice, pasta)

Prior learning

Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)

Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)

Future learning

Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans)

Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)

Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)

Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)

Living things and their habitats



National Curriculum

Pupils should be taught to:

- explore and compare the differences between things that are living, dead, and things that have never been alive
- identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
- identify and name a variety of plants and animals in their habitats, including microhabitats
- describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food

Notes and guidance (non-statutory)

Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things. Pupils should be introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'microhabitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter). They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest.

Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions like: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions. They could construct a simple food chain that includes humans (eg, grass, cow, human). They could describe the conditions in different habitats and microhabitats (under log, on stony path, under bushes); and find out how the conditions affect the number and type(s) of plants and animals that live there.

Key Vocabulary

living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed

- Names of local habitats e.g. pond, woodland etc.
- Names of microhabitats e.g. under logs, in bushes

Prior learning

Future learning

Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)

Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)

Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans)

Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1
Animals including humans)

Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans)

Observe changes across the four seasons. (Y1 - Seasonal changes)

Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats)

Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats)

Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)

Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)

Plants



National Curriculum

Pupils should be taught to:

- observe and describe how seeds and bulbs grow into mature plants
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to observe how plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as the processes of reproduction and growth in plants.

Note: seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.

Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.

Key Vocabulary

As for Year 1 plus
light, shade, sun,
warm, cool, water,
grow, healthy

Prior learning

Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)

Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)

Future learning

Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants)

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. (Y3 - Plants)

Investigate the way in which water is transported within plants. (Y3 - Plants)

Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)

Autumn 1

Rocks



National Curriculum

Pupils should be taught to:

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

Notes and guidance (non-statutory)

Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment.

Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed.

Key Vocabulary

Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil

Prior learning

Future learning

Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)

Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)

Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)

Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)

Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)

Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance)

The composition of the Earth. (KS3)

The structure of the Earth. (KS3)

The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. (KS3)

Light



National Curriculum

Pupils should be taught to:

- recognise that they need light in order to see things and that dark is the absence of light
- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light source is blocked by an opaque object
- find patterns in the way that the size of shadows change

Notes and guidance (non-statutory)

Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves. They should think about why it is important to protect their eyes from bright lights. They should look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change.

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

Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.

Key Vocabulary

light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous

Prior learning

Future learning

Explore how things work. (Nursery - Light)

Talk about the differences in materials and changes they notice. (Nursery - Light)

Describe what they see, hear and feel whilst outside. (Reception - Light)

Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)

Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials)

Recognise that light appears to travel in straight lines. (Y6 - Light)

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. (Y6 - Light)

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. (Y6 - Light)

Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. (Y6 - Light)

Animals including humans



National Curriculum

Pupils should be taught to:

- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
- identify that humans and some other animals have skeletons and muscles for support, protection and movement

Notes and guidance (non-statutory)

Pupils should continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.

Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy, and design meals based on what they find out.

Key Vocabulary

nutrition,
nutrients,
carbohydrates,
sugars, protein,
vitamins,
minerals, fibre,
fat, water,
skeleton, bones,
muscles, joints,
support, protect,
move, skull, ribs,
spine

Prior learning

Future learning

Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans)

Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)

Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans)

Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans)

Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)

Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)

Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)

Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)

Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)

Plants



National Curriculum

Pupils should be taught 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
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

Notes and guidance (non-statutory)

Pupils should be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.

Note: pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens.

Pupils might work scientifically by: comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed. They might observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.

Key Vocabulary

photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal)

Prior learning

Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants)

Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants)

Future learning

Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)

Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)

Summer

Forces and magnets



National Curriculum

Pupils should be taught to:

- compare how things move on different surfaces
- notice that some forces need contact between 2 objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
- describe magnets as having 2 poles
- predict whether 2 magnets will attract or repel each other, depending on which poles are facing

Notes and guidance (non-statutory)

Pupils should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe).

Pupils might work scientifically by: comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces, and gathering and recording data to find answers to their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets.

Key Vocabulary

force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole

Prior learning

Future learning

Explore how things work. (Nursery - Forces)

Explore and talk about different forces they can feel. (Nursery - Forces)

Talk about the differences between materials and changes they notice. (Nursery - Forces)

Explore the natural world around them. (Reception - Forces)

Describe what they see, hear and feel whilst outside. (Reception - Forces)

Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)

Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 - Forces)

Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 - Forces)

Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 - Forces)

Magnetic fields by plotting with compass, representation by field lines. (KS3)

Earth's magnetism, compass and navigation. (KS3)

Year 4

Autumn 1 and 2

Living things and their habitats



National Curriculum

Pupils should be taught to:

- 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.

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year. Pupils should explore possible ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants. Pupils could begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.

Note: Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses.

Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.

Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.

Key Vocabulary

classification
keys,
environment,
habitat,
human
impact,
positive,
negative,

Prior learning	Future learning
<ul style="list-style-type: none">• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)• Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans)• Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans)• Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)	<ul style="list-style-type: none">• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)• Describe the life process of reproduction in some plants and animals. (Y5 - 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 microorganisms, plants and animals. (Y6 - Living things and their habitats)• Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)

Year 4

Spring 1

Animals including humans



National Curriculum

Pupils should be taught to:

- Describe the simple functions of the basic parts of the digestive system in humans.
- Identify the different types of teeth in humans and their simple functions.
- Construct and interpret a variety of food chains, identifying producers, predators and prey.

Notes and guidance (non-statutory)

Pupils should be introduced to the main body parts associated with the digestive system, for example, mouth, tongue, teeth, oesophagus, stomach and small and large intestine and explore questions that help them to understand their special functions. Pupils might work scientifically by: comparing the teeth of carnivores and herbivores, and suggesting reasons for differences; finding out what damages teeth and how to look after them. They might draw and discuss their ideas about the digestive system and compare them with models or images.

Key Vocabulary

Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain

Prior learning

- Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)
- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans)
- Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)
- Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans)

Future learning

- Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. (Y6 - Animals, including humans)
- Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)
- Describe the ways in which nutrients and water are transported within animals, including humans. (Y6 - Animals, including humans)

Electricity



National Curriculum

Pupils should be taught to:

- Identify common appliances that run on electricity
- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- 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
- Recognise that a switch opens and closes a circuit and associate 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.

Notes and guidance (non-statutory)

Pupils should construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6.

Note: Pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity.

Pupils might work scientifically by: observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.

Key Vocabulary

Electricity,
electrical
appliance/
device, mains,
plug, electrical
circuit,
complete circuit,
component,
cell, battery,
positive,
negative,
connect/
connections,
loose
connection,
short circuit,
crocodile clip,
bulb, switch,
buzzer, motor,
conductor,
insulator, metal,
non-metal,
symbol

Prior learning	Future learning
<ul style="list-style-type: none">• Explore how things work. (Nursery - Electricity)	<ul style="list-style-type: none">• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. (Y6 - Electricity)• 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. (Y6 - Electricity)• Use recognised symbols when representing a simple circuit in a diagram. (Y6 - Electricity)

Year 4

Summer 1

States of matter



National Curriculum

Pupils should be taught to:

- 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 ($^{\circ}\text{C}$).
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

Notes and guidance (non-statutory)

Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled. Note: Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.

Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.

Key

Vocabulary

Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle

Prior learning

- Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)
- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)
- Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)
- Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)
- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)

Future learning

- 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. (Y5 - Properties and changes of materials)
- Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials)
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 - Properties and changes of materials)
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials)
- Demonstrate that dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials)
- 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. (Y5 - Properties and changes of materials)

Year 4

Summer 2

Sound



National Curriculum

Pupils should be taught to:

- 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.

Notes and guidance (non-statutory)

Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways.

Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.

Key Vocabulary

Sound,
source,
vibrate,
vibration,
sound waves,
ear drum,
ear canal,
travel, pitch
(high, low),
volume,
faint, loud,
insulation

Prior learning

- Explore how things work. (Nursery - Sound)
- Describe what they see, hear and feel whilst outside. (Reception - Sound)
- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)

Future learning

- Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel - superposition. (KS3)
- Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. (KS3)
- Sound needs a medium to travel, the speed of sound in air, in water, in solids. (KS3)
- Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. (KS3)
- Auditory range of humans and animals. (KS3)
- Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. (KS3)
- Waves transferring information for conversion to electrical signals by microphone. (KS3)

Year 5

Autumn 1&2

Earth and Space



National Curriculum

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.

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.

Key

Vocabulary

Earth, Sun, Moon, waxing, waning, crescent, gibbous (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets, axis,

Prior learning	Future learning
<ul style="list-style-type: none">• Explore the natural world around them. (Reception - Earth and space)• Describe what they see, hear and feel whilst outside. (Reception - Earth and space)• Observe changes across the four seasons. (Y1 - Seasonal changes)• Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes)	<ul style="list-style-type: none">• Gravity force, weight = mass x gravitational field strength (g), on Earth $g=10$ N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). (KS3)• Our Sun as a star, other stars in our galaxy, other galaxies. (KS3)• The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3)• The light year as a unit of astronomical distance. (KS3)

Year 5

Spring 1

Animals including humans



National Curriculum

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.

Key Vocabulary

Vocabulary to describe sexual characteristics:

Gestation
Puberty
Reproduce
Adolescence
Hormone
Fertilisation
Degeneration

Prior learning

- Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)

Future learning

- Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3)

Year 5

Spring 2

Living things and their habitats



National Curriculum

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.

Key Vocabulary

Life cycle,
reproduce,
sexual, sperm,
fertilises, egg,
live young,
metamorphosis,
asexual,
plantlets,
runners, bulbs,
cuttings

Prior learning	Future learning
<ul style="list-style-type: none">• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)	<ul style="list-style-type: none">• Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3)• Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)

Properties and changes of materials



National Curriculum

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.

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.

Key Vocabulary

Thermal/
electrical
insulator/
conductor,
change of
state, mixture,
dissolve,
solution,
soluble,
insoluble,
filter, sieve,
reversible/
irreversible
change,
burning,
rusting,

Prior learning

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)
- Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)
- Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter)
- 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 ($^{\circ}\text{C}$). (Y4 - States of matter)
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)

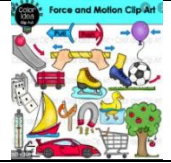
Future learning

- Chemical reactions as the rearrangement of atoms. (KS3)
- Representing chemical reactions using formulae and using equations. (KS3)
- Combustion, thermal decomposition, oxidation and displacement reactions. (KS3)
- Defining acids and alkalis in terms of neutralisation reactions. (KS3)
- The pH scale for measuring acidity/alkalinity; and indicators. (KS3)

Year 5

Summer 2

Forces



National Curriculum

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.

Key Vocabulary

Force,
gravity,
Earth, air
resistance,
water
resistance,
friction,
buoyancy,
streamline
Weight/
mass,
newtons

Year 6

Autumn 1

Electricity



National Curriculum

Pupils should be taught to:

- 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

Notes and guidance (non-statutory)

Building on their work in year 4, pupils should construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols.

Note: Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity.

Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.

Key

Vocabulary

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

Prior learning	Future learning
<p>Identify common appliances that run on electricity. (Y4 - Electricity)</p> <ul style="list-style-type: none">• Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. (Y4 - Electricity)• 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. (Y4 - Electricity)• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (Y4 - Electricity)• Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)	<p>Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. (KS3)</p> <ul style="list-style-type: none">• Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. (KS3)• Differences in resistance between conducting and insulating components (quantitative). (KS3)• Static electricity. (KS3)

Year 6

Autumn 2

Living things and their habitats



National Curriculum

Pupils should be taught 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
- give reasons for classifying plants and animals based on specific characteristics.

Notes and guidance (non-statutory)

Pupils should build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided.

Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish,

amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another. Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.

Pupils might work scientifically by: using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.

Key

Vocabulary

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

Prior learning

- Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats)
- Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats)
- Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)
- Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)

Future learning

- Differences between species. (KS3)

Year 6

Spring 1

Animals including humans



Pupils should be taught to:

- 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.

Notes and guidance (non-statutory)

Pupils should build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function. Pupils should learn how to keep their bodies healthy and how their bodies might be damaged - including how some drugs and other substances can be harmful to the human body.

Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.

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

Prior learning

Future learning

- Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)
- Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans)
- Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)
- Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)

- The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3)
- The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3)
- The structure and functions of the gas exchange system in humans, including adaptations to function. (KS3)
- The mechanism of breathing to move air in and out of the lungs. (KS3)
- The impact of exercise, asthma and smoking on the human gas exchange system. (KS3)

Evolution and inheritance



Pupils should be taught to:

- 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.

Notes and guidance (non-statutory)

Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living things on earth have changed over time. They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.

Key Vocabulary

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

Prior learning

- Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 - Living things and their habitats)
- Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)
- Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)
- Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
- Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5)

Future learning

- Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3)
- A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. (KS3)
- The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. (KS3)
- Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. (KS3)

Year 6

Summer 1 & 2

Light



Pupils should be taught to:

- 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

Notes and guidance (non-statutory)

Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions. Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).

Key Vocabulary
opaque
translucent
transparent
shadow
pupil
iris
lens
eyelid
reflection
refraction
convex
concave
kaleidoscope
Periscope
Rainbow
Prism
Source,
straight
lines, light
rays

Prior learning	Future learning
<ul style="list-style-type: none"> • Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light) • Notice that light is reflected from surfaces. (Y3 - Light) • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light) • Find patterns in the way that the size of shadows change. (Y3 - Light) • 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. (Y5 - Properties and changes of materials) 	<p>The similarities and differences between light waves and waves in matter. (KS3)</p> <ul style="list-style-type: none"> • Light waves travelling through a vacuum; speed of light. (KS3) • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. (KS3) • Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. (KS3) • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. (KS3) • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. (KS3)