

EFYS ELG: The Natural World	KS1 & 2 Working Scientifically Key Skills Matrix	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Our families, communities and belonging, our school, using the iPad, Autumn seasons, human body, senses, birthdays	Observing changes over a period of time	P3 SC1	P4, P5 A5	P8, P9 R2 L5	A11 SM1, SM3 LH7 SM2	ES2 A12	A14 EH3
Celebrations, different religious festivals, the gunpowder plot, World War 1, exploring timelines, alternative fairy tales with diverse characters	Noticing patterns	M4 SC1, SC2	A5	P9	L5, L6 A10 S1, S3, S4, S5	LH8 ES1, ES2, ES4 F7, F8	LH10, LH11 A14 EH3 L6 E6, E7
Making maps of the classroom/school, directing Beebots, historical transport, first moon landing, Eid-religious stories	Grouping and classifying things	P1 A1, A2, A3, A4 M1, M2, M3	LH1, LH2, LH3, LH4 M5, M6	P9 A7, A8 R1, R2 L1, L2 F2, F3, F4	A10 L5, L6 SM1 LH5, LH6 A9, A9 E1	LH8 M6 ES1 F7, F8	LH10, LH11 A13 EH3
Placing events in chronological order, how to care for animals, compare farm and jungle animals, habitats	Carrying out simple comparative tests	A4 M1, M2, M3, M4 SC1, SC2 P3	LH2 P5 M5, M6	P9 R1, R3 L2, L3, L4 F2, F3, F4, F5, F6	A10 SM2 S2, S3, S4, S5 E2, E3, E4, E5	F7, F8, F9 M7, M8, M9, M10, M11	A14 L6, L7, L8, L9 E6, E7
Experiments- ice, light, magnets, recycling, bug hotel, planting beans, Spring/seasons	Finding things out using secondary sources of information	P1, P2 A1, A2, A3, A4 M1 SC1, SC2	LH2, LH3, LH4 A6 M5, M6	P6, P7, P8, P9 A7, A8 R1, R2, R3 F6	L7 A11 SM2, SM3 LH7	LH8, LH9 ES1, ES2, ES4	A13, A14 LH10, LH11 EH1, EH2, EH3
Growing sunflowers, dinosaurs/Mary Anning Butterfly life cycle Seaside in the past Floating/ sinking Sharing non-fiction texts Summer/ seasons	Carry out simple fair tests			P7, P8, P9 A8 L5 F1, F3	A10, A11 SM2	F7, F8, F9 M9, M10, M11	A14 L6, L7, L8, L9 E6, E7
	Draw simple conclusions from tests using some scientific language			P7, P8, P9 A8 R3 L5 F1, F3	A10, A11 SM2 A10 S2, S3, S4, S5 E2, E3, E4, E5	F7, F8, F9 M7, M9, M10, M11 ES1, ES2, ES4	A14 EH2 L6, L7, L8, L9 E6, E7
	Observing changes over different periods of time					ES1, ES2, ES4 A12	A14 EH3
	Make predictions					M7, M8, M9, M10, M11 F7, F8	A14 L6, L7, L8, L9 E6, E7
	Understand that scientific findings may change over time					ES1, ES2, ES4	A14 EH1, EH2, EH3 E6, E7
	Finding things out using a wide range of secondary resources					LH9 ES1, ES2, ES4 F7, F8, F9	A13, A14 EH1, EH2, EH3 E6, E7
	Draw conclusions based on data and observations, use evidence to justify ideas and use scientific knowledge and understanding to explain findings					F7, F8, F9	A14

						M6, M7, M8, M9, M10, M11 ES1, ES2,ES4	EH1, EH2, EH3 L6, L7, L8, L9 E6, E7
	Carry out scientific enquiry including identifying independent, dependent and control variables.					F7, F8, F9	A14 E6, E7
		P: plants A: animals including humans M: everyday materials SC: seasonal changes	LH: living things and their habitats P: plants A: animals including humans M: everyday materials	WS: working scientifically P: plants A: animals including humans R: rocks L: light F: forces and magnets	WS: working scientifically LH: living things and their habitats A: animals including humans SM: states of matter S: sound E: electricity	WS: working scientifically LH: living things and their habitats A: animals including humans M: materials and their properties ES: Earth and space F: forces	WS: working scientifically LH: living things and their habitats A: animals including humans EI: evolution and inheritance L: light E: electricity

Statutory Requirements:

EYFS

ELG: The Natural World

Children at the expected level of development will:

- Explore the natural world around them, making observations and drawing pictures of animals and plants.
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Plants

EYP: Investigate where the best place is for a plant (cress seeds) to grow, label basic parts of plants, use magnifying glasses to explore plants and seeds, grow cress and look after cress seeds (use cameras to record growth).

Animals including humans

EYA: Use magnets to make a paper skeleton move

Everyday materials

ETM: Gingerbread people in different liquids

Seasonal changes

EYSC: Balloons and tissue paper, how tall is a tree?

Sound

EYS: making sounds from different materials

Key Stage 1

Year 1

Plants

P1: identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Field trip to the woods, identifying species of trees, investigating the structure of leaves

P2: identify and describe the basic structure of a variety of common flowering plants, including trees. Use of magnifying glasses to investigate and label parts of a flower

P3: Observe and record changes over time of trees/plants/bulbs/growing plants. Growing bulbs, investigate conditions for growing bulbs

Vocabulary: leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem

Animals including humans

A1: identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Group and classify range of animals

A2: identify and name a variety of common animals that are carnivores, herbivores and omnivores. Group and classify range of animals

A3: describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). Research a range of animals to explore features which are specific to animal groups

A4: identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Use human body book resources and human body display, draw around a child to use as template to identify body parts, use examples to connect to sensory organs e.g. musical instrument, lavender smell

Vocabulary: head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth

Everyday Materials

M1: distinguish between an object and the material from which it is made. Group and classify a selection of materials e.g. hard/soft, shiny/dull, bendy/stiff

M2: identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. Provide selection of natural and synthetic materials

M3: describe the simple physical properties of a variety of everyday materials. Provide selection of natural and synthetic materials

M4: compare and group together a variety of everyday materials on the basis of their simple physical properties. Provide materials that can be tested for floating and sinking, magnetic and non magnetic, waterproof and absorbent, opaque and transparent. Patterns – are all magnetic items metal?, are all rocks hard?

Vocabulary: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent

Questions: : 'What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?'

Seasonal Changes

SC1: observe changes across the four seasons. Monitor changing temperature, rainfall, weather.

SC2: observe and describe weather associated with the seasons and how day length varies, 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. Observe day length, seasonal changes including trees, plants, animals present (e.g. hibernating animals, frequency of birds), research different global climates

Year 2

Living things and their habitats

LH1: explore and compare the differences between things that are living, dead, and things that have never been alive. Use a Venn diagram to group and classify e.g. rock, fossil, plant

LH2: 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. Investigate/research habitats around school, nature area, pond and the rest of the world etc.

LH3: identify and name a variety of plants and animals in their habitats, including microhabitats. 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. Observe and research: magnifying glasses and sample pots, bug hunts, pond dipping.

LH4: 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. Sequence animals in basic food chains making links to A2.

Vocabulary: ‘habitat’ (a natural environment or home of a variety of plants and animals) and ‘micro-habitat’ (a very small habitat, for example for woodlice under stones, logs or leaf litter).

Plants

P4: observe and describe how seeds and bulbs grow into mature plants. Growing seeds and bulbs making links to P2 and P3, collect seeds from nature area, observe when seeds are produced making links with SC1 and SC2.

P5: find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. Investigate factors affecting growth of seeds and bulbs.

Working scientifically: 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.

Animals including humans

A5: notice that animals, including humans, have offspring which grow into adults. Caterpillar/tadpoles/bees/familiar farm animals (parent/local farmer/beekeeper visit).

A6: find out about and describe the basic needs of animals, including humans, for survival (water, food and air). Create a human survival pack, link to A4 and Ladies In Pigs.

A6: describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. [Dental hygiene, link to A4 and Ladies in Pigs.](#)

Vocabulary: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager, adult.

Uses of everyday materials

M5: identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. [Best material for castle building/link to reading e.g. the 3 little pig houses. Make links to M1-4.](#)

M6: find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. [Observe and investigate a variety of materials.](#)

Vocabulary: (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).

Scientist focus: Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.

Working scientifically: 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.

Lower Key Stage 2

Year 3 & 4

Working Scientifically

WS1: asking relevant questions and using different types of scientific enquiries to answer them.

WS2: setting up simple practical enquiries, comparative and fair tests.

WS3: making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers (carbon dioxide meters).

WS4: gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.

WS4: recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.

WS5: reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

WS6: using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

WS7: identifying differences, similarities or changes related to simple scientific ideas and processes.

WS8: using straightforward scientific evidence to answer questions or to support their findings.

Plants

P6: identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. Research/predict parts of plant and function (make links with P1-5)

P7: 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. Comparative fair test for conditions for growth (make links with P1-5)

P8: investigate the way in which water is transported within plants Food colouring through stem. Introduce control variable.

P9: explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal Flower dissection/label and laminate, sweet chestnuts/conkers on playground in October/village playground field trip, investigate/comparative test/pattern finding for types of seed dispersal and pollination/beehives. Make links with LH4.

Notes: 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. 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.

Working Scientifically: 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.

Animals including humans

A7: 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. [Skeleton model/research types of diet including pets/link to bone and dental health](#)

A8: identify that humans and some other animals have skeletons and muscles for support, protection and movement. [Skeleton model/research/compare and observe animals with and without skeletons/predict what would happen if we didn't have a skeleton/jelly person/bone bingo/The Human Body Game STEM Learning/cross curricular link to Roman armour vs human skeleton](#)

Notes: 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.

Working Scientifically: 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.

Rocks

R1: compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. [Observe/group/classify selection of rocks – link to M4, do all rocks sink? Permeable/impermeable/soft/hard/strong/colour/grains/smoothness](#)

R2: describe in simple terms how fossils are formed when things that have lived are trapped within rock. [Observe and investigate fossil samples/simulate and create a fossil STEM learning guidance/research fossil finds around the world.](#)

R3: recognise that soils are made from rocks and organic matter. [Soil sampling – observe and compare soil samples from multiple locations \(see NHM\)/research soils in other parts of the world and link to climate.](#)

Cross curricula link: geography, pupils should explore different kinds of rocks and soils, including those in the local environment.

Working Scientifically: 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.

Light

L1: recognise that they need light in order to see things and that dark is the absence of light. [Identify/group/compare natural and synthetic light sources, compare/predict light strength from candle/battery candle/torch.](#)

L2: notice that light is reflected from surfaces. [Observe/compare/group materials which are shiny/dull. Recreate the slaying of Medusa \(Greek Mythology link\).](#)

L3: recognise that light from the sun can be dangerous and that there are ways to protect their eyes. [Compare best materials for making sunglasses](#)

L4: recognise that shadows are formed when the light from a light source is blocked by an opaque object. Compare/group materials which form shadows. Test position of light source and effect on shadow size.

L5: find patterns in the way that the size of shadows change. Test changing shadow size throughout the school day/predictions/test/conclusion.

Notes: 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.

Working Scientifically: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.

Forces and Magnets

F1: compare how things move on different surfaces. Best material for trainers/ski skate, test different shoes on different surfaces/high and low friction.

F2: notice that some forces need contact between two objects, but magnetic forces can act at a distance. Contact/non contact circus of activities e.g. magnetism, static, gravity, push, pull.

F3: observe how magnets attract or repel each other and attract some materials and not others. Test size of magnet/strength of magnet attracting a paperclip. Concept cartoon support.

F4: compare and group together a variety of everyday materials the basis of whether they are attracted to a magnet, and identify some magnetic materials. Compare/investigate/group magnetic and non magnetic materials.

F5: describe magnets as having two poles. Make a compass practical/collate and compare group result.

F6: predict whether two magnets will attract or repel each other, depending on which poles are facing. Magnets/research uses of magnets

Notes: 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).

Working Scientifically: 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 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.

Year 4

Living things and their habitat

LH5: recognise that living things can be grouped in a variety of ways. Selection of living organisms/link to A1, A2, A3.

LH6: explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. **Selection of living organisms including flowering and non flowering plants and classification keys**

LH7: recognise that environments can change and that this can sometimes pose dangers to living things. **Research polar regions/BBC Blue Planet**

Notes: 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.

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.

Working Scientifically: 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.

Animals including humans

A9: describe the simple functions of the basic parts of the digestive system in humans. **Model of the body (link to A7 and A8 to show how the skeleton protects the internal organs), practical demonstration on STEM**

A10: identify the different types of teeth in humans and their simple functions. **Examples of skulls/knives. Make predictions about an animal's diet and teeth structure. Investigate cutting/chewing ability of different tooth functions.**

A11: construct and interpret a variety of food chains, identifying producers, predators and prey. **Eye to the side/eyes to the front concept, research food chains for different habitats, link to LH1-4. Comparative test: Egg experiment (coke, coffee, water, vinegar, toothpaste covered).**

Notes: 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.

Working Scientifically: 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.

States of Matter

SM1: compare and group materials together, according to whether they are solids, liquids or gases. **Melting ice/evaporating water**

SM2: observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). **Research melting and boiling points/show clips of liquid nitrogen. Investigate the best conditions for drying washing/observe a drying puddle**

SM3: identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **Water cycle demonstration/observation poster drawing exercise**

Notes: 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. Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.

Working Scientifically: 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.

Sound

S1: identify how sounds are made, associating some of them with something vibrating. String telephone experiment.

S2: recognise that vibrations from sounds travel through a medium to the ear. Investigate the best material for absorbing sound/ear defenders/test a range of ear defenders.

S3: find patterns between the pitch of a sound and features of the object that produced it. Bottles of water filled with different volumes of water.

S4: find patterns between the volume of a sound and the strength of the vibrations that produced it. Strumming a string instrument/create a rubber band instrument.

S5: recognise that sounds get fainter as the distance from the sound source increases. Playground messages.

Notes: 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.

Working Scientifically: 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.

Electricity

E1: identify common appliances that run on electricity. Examples of mains and battery operated appliances.

E2: construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. Demonstrate a multimeter and make one.

E3: 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. WS opportunity

E4: recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. WS opportunity

E5: recognise some common conductors and insulators, and associate metals with being good conductors Conduction tube, WS opportunity

Notes: 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.

Working Scientifically: 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.

Upper Key Stage 2

Year 5

Working Scientifically

WS9: planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.

WS10: taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.

WS11: recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

WS12: using test results to make predictions to set up further comparative and fair tests.

WS13: reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.

WS14: identifying scientific evidence that has been used to support or refute ideas or arguments.

Living things and their habitats

LH8: describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. [Research opportunity/poster recall team game](#)

LH9: describe the life process of reproduction in some plants and animals. [Tadpoles/butterflies/PSHE links](#)

Notes: 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.

Working Scientifically: 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.

Animals including humans

A12: describe the changes as humans develop to old age. [Research opportunity](#)

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

Working Scientifically: 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.

Properties and changes of materials

M6: 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. [Materials practical/simple comparative test/link properties to usage](#)

M7: know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. Salt crystal practical/dissolve/solution/evaporation

M8: use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. 'Magic potion' practical/link to magnetism and forces

M9: give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. M7

M10: demonstrate that dissolving, mixing and changes of state are reversible changes. BBC bitesize irreversible/irreversible change/'Nellie the Elephant' practical

M11: 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. 'Nellie the Elephant' practical/candle burning/cooking food

Notes: 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.

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.

Working Scientifically: 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.

Earth and Space

ES1: describe the movement of the Earth, and other planets, relative to the Sun in the solar system. Inflatable solar system/Planetarium visit

ES2: describe the movement of the Moon relative to the Earth. Phases of the moon practical task/Planetarium visit

ES3: describe the Sun, Earth and Moon as approximately spherical bodies. Planetarium visit

ES4: use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. Light/globe practical/Planetarium visit

Notes: 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). 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.

Working Scientifically: 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.

Forces

F7: explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. **Circus of forces experiment**

F8: identify the effects of air resistance, water resistance and friction, that act between moving surfaces. **Play doh falling through oil/parachute experiment**

F9: recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. **Pulley practical**

Notes: 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.

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

Year 6

Living things and their habitats

LH10: 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. **Classification of new species/YWP field trip/Whitby field trip**

LH11: give reasons for classifying plants and animals based on specific characteristics. **YWP field trip**

Notes: 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.

Working Scientifically: 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.

Animals including humans

A13: identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. **Heart/lung dissection**

A14: recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. **Heart rate practical/research opportunity/Ladies in Pigs**

A15: describe the ways in which nutrients and water are transported within animals, including humans.

Notes: 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.

Working Scientifically: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.

Evolution and Inheritance

EH1: recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.

EH2: recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.

EH3: identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Notes: 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. Note: At this stage, pupils are not expected to understand how genes and chromosomes work.

Working Scientifically: observing and raising questions about local animals and how they are adapted to their environment; comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.

Light

L6: recognise that light appears to travel in straight lines.

L7: 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.

L8: 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.

L9: use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Notes: 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.

Working Scientifically: 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).

Electricity

E6: associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.

E7: 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.

E8: use recognised symbols when representing a simple circuit in a diagram.

Notes: 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.

Working Scientifically: 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.