

Shiney Row Primary School



Science Curriculum

Science Year 1 - Plants

Statutory requirements

I can identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.

I can identify and describe the basic structure of a variety of common flowering plants, including trees.

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

Plants	Discuss with chn what we mean by plants and why plants are so important to us. Briefly discuss healthy eating!
Wild plants	Help chn to identify & name a range of wild plants, including wild flowers and trees. Compare & contrast the plants. Discuss taking care of wild plants in the environment.
Garden plants	Establish that we grow plants in our gardens to eat, look nice, play on (lawns), etc. Compare & contrast some commonly grown plants (including trees). Explain how important flowers are for bees.
Local walk	Organise a walk in your local environment for chn to identify & name local plants. Agree with chn how they will take care of plants they are observing.
Main parts	Establish the main parts that flowering plants have – leaves, roots, stems and flowers & mention their functions. Look in detail at some plant leaves – colour, texture, shape.
More parts	Help chn identify & name other plant parts, e.g. petals, twigs, buds. Look in detail at tree bark & the overall shape of trees.
Observational drawing	Chn look at different plant parts using magnifying glasses & then carefully draw & label what they can see.
Seasonal changes	Establish what is meant by the four seasons & discuss how plants change during the year.
Harvest	Discuss harvesting crops – vegetables, fruits, cereals, etc. in autumn & how this is celebrated all round the world.

Science Year 1 - **Animals, including humans**

Statutory requirements

I can identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals

I can identify and name a variety of common animals that are carnivores, herbivores and omnivores

I can describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)

I can identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense

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.

Human body parts	Children then name & label parts of the body of a volunteer & find out how to draw humans in proportion.
Animal body parts	Compare parts of human body with those of a wide range of animals. Discuss whether similar parts are called the same thing.
Senses	Identify the five senses & the parts of the body we use for them. Find out that some animals have better senses than us, while their other senses may not be as good as ours.
Pictograms	Discuss (sensitively) how all humans have the same body parts, but that we do have differences such as favourite food, etc. Point out that differences also include, e.g. eye & hair colours & draw pictograms.
Pets	Children describe their (or a family or friend's) pets. Discover other pets that people have. Explain how children can use their senses to tell their pets' needs.
Carnivores, herbivores & omnivores	Identify pets & other common animals that are herbivores, omnivores, carnivores, having first established what sort of food each eats.
Group animals	Identify animals found in the local environment including farm (& zoo) animals. Explain that scientists group animals together that are similar, e.g. fish/birds. Children sort animals depending on body parts, e.g. wings, using tree diagrams. Try bird watching!
Local environment	Establish a nature walk in school grounds or a nearby school, which can be visited at different times of year. How does the weather/season affect the animals? Collect minibeasts and draw, label & name them.
Farm animals	Arrange a visit to a local farm (or use online farm). Discuss farm animals & the foods they provide for us.

Science Year 1 - **Everyday materials**

Statutory requirements

I can distinguish between an object and the material from which it is made

I can identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock

I can describe the simple physical properties of a variety of everyday materials

I can compare and group together a variety of everyday materials on the basis of their simple physical properties.

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?'

Materials	Find out the meaning of 'material' used in scientific sense. Look at classroom objects & discuss what they are made of. Show a set of materials that are not recognisable objects & identify what they are made of. Explain where some materials originate.
Properties	Understand that the words used to describe the materials that objects are made from are called 'properties'. Differentiate between scientific & non-scientific words, e.g. wooden, bendy, hard, etc. compared to small or expensive. Identify some properties.
Man-made or natural?	Identify objects that are made from materials that are man-made & others which are made from naturally occurring materials. Point out that many different objects can be made from the same material.
Three Little Pigs	Think about the properties of the various materials. List the different types of houses we live in, e.g. flat, cottage. Chn make houses for the pigs!
Building materials	Look at buildings made from different materials – discuss the properties of the materials used. What building materials have been used for the school building? Chn explore & list them. What about building materials elsewhere in the world/ in the past?
Best material?	Chn carry out simple tests to answer questions like: What is the best material for an umbrella, lining a dog basket, curtains, bookshelf, gymnast's leotard, etc.?
Paper	In this session chn will study a range of different papers. Paper has countless uses. What properties of paper make it so useful? Find out where paper comes from.
Floating and sinking	Show chn some objects that float & some which sink. Chn help plan a simple enquiry into floating & sinking.
Why things float	Discuss why some things float & others sink. Carry out an enquiry to find out how many marbles/pebbles a plastic container boat can hold before it sinks.

Science Year 1 - **Seasonal changes**

Note: Some of these Sessions include enquiries that should be repeated at various times throughout the year, and others are linked to particular seasons. Therefore not all the Strand should be taught in any one Term – choose the relevant Sessions for the time of year, but remind children of their findings at other times of the year.

Statutory requirements

I can observe changes across the four seasons

I can observe and describe weather associated with the seasons and how day length varies.

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.

Sunny facts	Use a range of sources to gather facts about the sun.
Sun movement	See where the Sun is in the sky at different times of the day and at different times of the year. Discuss how to stay safe in the Sun.
Explore shadows	Choose a sunny day to investigate how shadows change throughout the day. This should be done at different times of the year.
More shadows	Show how silhouettes are like shadows & discuss where we use silhouettes on postage stamps, road signs & other signs.
Seasons	Order the seasons & months. Discuss the four seasons & which months are in each. Compare how the apparent movement of Sun through the sky changes through the year using previous observations.
Recording weather	Discuss the variety of weather we experience & look at weather map symbols & forecasts. Record weather over a week possibly using weather instruments chn have made.
Seasonal weather	Link the weather changes during the year to the observations chn made. Discuss how the weather is linked to the position of the Sun in the sky & the number of hours it's visible during the day. Study seasonal clothing matched to weather.
Migration & hibernation	Remind chn that weather around the world is quite varied. Look at some extreme examples & compare some countries. Discover that some animals migrate because of these differences & other animals hibernate to escape cold winters with less available food.
Sun myths	Discuss why the Sun is so important to us & explain that this is why myths about the Sun have existed for generations. Read several Sun myths.

Science Year 2 - Living things and their habitats

Statutory requirements

I can explore and compare the differences between things that are living, dead, and things that have never been alive

I can 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

I can identify and name a variety of plants and animals in their habitats, including micro-habitats

I can 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.

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 'micro-habitat' (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 for example: '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 (e.g. grass, cow, human). They could describe the conditions in different habitats and micro-habitats (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.

Alive or dead?	Discuss with chn how we know that something is alive. Introduce some life processes of animals & plants (i.e. organisms). Explore what animals and plants need to stay alive and healthy. Introduce chn to the idea that all living things are made of cells.
Life processes	Look in more detail at the characteristics of living things using MRS GREN as a reminder of the seven life processes: movement, reproduction, sensitivity, nutrition, excretion, respiration & growth.
Living v non-living	Sort a range of things into living and non-living. Include objects that were alive once, e.g. dead leaf, wooden ruler, cotton T-shirt & discuss what they were part of. Chn identify living & non-living things around school.
Habitats	Recap on the basic needs of animals & plants to keep them alive & healthy. Establish that plants & animals live in particular habitats which serve their needs. Discuss how many animals provide the needs of their offspring initially & how we help pets.
Dependency	Explain that animals & plants depend on each other for survival in their habitats. Animals depend on plants for food & shelter & plants depend on animals for seed dispersion.
Local habitats	Locate the different habitats in the school environment, including micro-habitats, e.g. under a log or stone, in leaf litter. Identify plants & minibeast found in these locations.
Other habitats	Compare the plants & animals found in local habitats with those found further afield, e.g. the seashore, an ocean, a rainforest, a woodland or a desert. Go on a real or virtual field trip to a

	contrasting habitat! Chn research living things in a habitat.
Habitat enquiry	Give chn the opportunity to carry out an enquiry to see what affects the number of a chosen minibeast in a habitat using a choice chamber. Suggested enquiries involve woodlice, meal worms, worms or snails. Chn draw conclusions from their findings.
Food chains	Remind chn that a suitable food source is one of the main criteria for animals to survive in a particular habitat. Plants make their own food, but animals eat plants &/or other animals. Introduce vocabulary involved & study some simple food chains.

Science Year 2 - Plants

Statutory requirements

I can observe and describe how seeds and bulbs grow into mature plants

I can find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

Non-statutory

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

Plants	Start this strand by rehearsing the basic structure of plants: stem, leaf, root, trunk and flower. Compare the characteristics of plants with animals to highlight that they are living things. Name some common plants and discuss their uses.
Germination & growth requirements	Two of the characteristics of living things are reproduction and growth. Chn plant some seeds and bulbs under a range of conditions in order to investigate what they need to germinate and then continue growing healthily. Chn make predictions.
Seeds	Establish that seeds are formed to produce new plants (reproduce). Chn look at a variety of seeds and examine one closely with a hand lens. They make a careful observational drawing of that seed.
Inside a seed	Open up a broad bean or sunflower seed to find out what is inside it. Make a careful observational drawing of the inside of a seed. Watch time-lapse photography of a seed germinating. Record changes in seeds/bulbs. Challenge chn to grow a tall sunflower!
Leaves	Agree that light is not required for germination (based on chn's enquiry). Discuss how leaves make food for the plant using sunlight, water & air.
Walk in the environment	Take children on a late spring/early summer walk to observe flowers and seeds. Include trees in their search. Chn sketch some flowers & seeds in situ & colour in later.
Bulbs	Rehearse what chn found inside a seed & compare with a cross-section through a bulb. Make a careful observational drawing of inside of a bulb. List bulbs that are edible. Explain that plants grown from bulbs also form seeds.
Plant enquiry	Observe plants & discuss the findings of their enquiry. Draw/write about results. Together conclude that plants need water, air & a suitable temperature to germinate & that plants need water, light, air & a suitable temperature to grow & remain healthy.
Walk in the environment	Take chn on an autumn walk to observe & collect seeds, nuts, berries and fruit (& autumn leaves). Link to harvest celebrations.

Science Year 2 - **Animals, including humans**

Statutory requirements

Animals, including humans

I can notice that animals, including humans, have offspring which grow into adults

I can find out about and describe the basic needs of animals, including humans, for survival (water, food and air)

I can describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

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.

Our bodies	Discuss how humans have babies that grow into adults & emphasise that they grow & develop. Talk thru stages: baby, toddler, child, teenager, adult. Children think about how they have changed since they were babies.
Frog life cycle	Study the life cycle of a frog in detail. Children draw, order & label life cycles & sequence life cycles online.
Butterfly life cycle	Read The Very Hungry Caterpillar to kick start this session. Then study the life cycle of a butterfly in detail. Chn draw & label a butterfly life cycle. Compare with dragonfly cycle.
Chicken life cycle	Study another different life cycle – that of a chicken. Look in detail at an egg & draw & label it & find out how the chick embryo develops in the egg. Match other baby animals with the relevant adults. Look at a variety of birds' eggs.
Basic needs	What do all animals need to survive? Basic survival needs – water, food, air (& shelter). Find out about looking after pets, zoo animals, farm animals & their young.
Food Groups	One thing humans need to survive is a balanced diet. Discuss food groups & what each type of food is needed for. Children draw their own representation of balanced diet.
Balanced diet	Sort a selection of foods/food labels. Find out which foods we can eat a lot of & which should be eaten sparingly. Discuss children's food diaries.
Keeping fit	Humans (and other animals) need exercise to be fit & healthy. Talk about why exercise is important for our muscles, bones & heart (which is also a muscle). Find out how exercise affects our bodies.
Hygiene	We need enough rest to stay healthy, so bedtime is important! Create a life-size pictogram of bedtimes. Discuss how keeping clean also helps us to stay healthy. Investigate hand washing. Mention that medicines can also help us to stay well.

Science Year 2 - Uses of everyday materials

Statutory requirements

I can identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses

I can find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

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.

Material properties	Rehearse the use of the word material in science. Identify objects made from a range of everyday materials. Reinforce the fact that similar objects can be made from different materials, e.g. rulers, sharpeners. Link properties to the uses of materials.
Uses	Continue the theme of linking properties of materials to their uses. Use an umbrella as an example of several materials used for one object. Compare spoons made from wood, plastic & metal.
Fabrics	Look at a range of different fabrics using touch, sight & smell. List vocabulary that describes them. Investigate the symbols used on clothes labels. Distinguish between natural & man-made fabrics & where they come from/are made.
Suitable fabrics	Introduce the concept of clothing that is suitable for a particular activity/climate. Identify specialist clothes.
Scientists	Find out about some scientists who developed new materials that are useful: John Boyd Dunlop, John Loudon McAdam & Charles Macintosh. Using Macintosh as a stimulus children set up an enquiry to find which materials are waterproof.
Forces	Identify pushes & pulls as simple forces. Use a Plasticine ball to show children how the shape of a solid object can be changed by bending, squashing, twisting & stretching (pushes/pulls).
Plastics	Study a range of objects made of different plastics. Discuss properties that make plastic useful for making a variety of things.
Recycling plastics	Discuss difficulties of disposal of plastics. Look at symbols used to show which type of plastic an object is made from & find out if they can be recycled in your area.
New uses!	Discuss upcycling as a way of converting waste materials into new materials or products. Challenge children to think of unusual/creative uses of other everyday items.

Science Year 3 - Plants

Statutory requirements

I can identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers

I can 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

I can investigate the way in which water is transported within plants

I can explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

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.

Structure and function	Recap on what children already know about plants. Identify the basic parts of plants: roots, leaves, stems and flowers. Look closely at roots and their functions. Find out how they are useful for humans too!
Photosynthesis	Discuss 7 life processes. Learn how plants make their own food in leaves. Measure plants & start an enquiry to answer 'Do leaves help plants grow?' Plant further seedlings to observe the effect of water on growth & grow cress under different conditions.
Soil nutrients	Though plants produce their own food, the roots also absorb small amounts of nutrients from the soil. Find out more about these nutrients & identify some plants suffering from nutrient deficiency. Find out about fertilisers & crop rotation.
Water transportation	Find out about the functions of stems by investigating what happens when wilting celery/white carnation is put in a red dye solution.
Plant life cycle	Children take a close look at the reproductive part of plants – the flower. They find out about the functions of the various parts within the flower & describe pollination by insects. Describe the complete life cycle of plants.
Seed dispersal	Discuss that plants disperse their seeds in different ways. What clues do seed sizes, shapes, weights and textures give us about how they are spread?
Seed dispersal	Which seeds get carried furthest on the wind? Children work together to create an enquiry to answer this question in the classroom. Their fair test identifies how far seeds travel and graphs make the conclusions clear.

Science Year 3 - **Animals, including humans**

Statutory requirements

I can 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

I can identify that humans and some other animals have skeletons and muscles for support, protection and movement.

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.

Food groups	Revise what humans and animals need to be healthy and grow. Learn the correct vocabulary for food groups.
Balanced diet	Discuss different diets & the need for a balanced diet. Design favourite healthy balanced meals. Look at food packaging details. Briefly consider food miles.
Transport	Find out how food is broken down into smaller bits in our mouths, stomach & intestine. These small nutrients are absorbed into the blood stream (circulatory system), which acts like a transport system to deliver nutrients to all parts of the body.
Skeletons	Discuss the main functions of skeletons: support, protection & movement. Find out that muscles are also needed for movement. Draw & label a skeleton. Talk about broken bones & look at some X-rays.
Compare skeletons	Find out that some animals have exoskeletons. Compare them with endoskeletons like humans have. Examine some sterilised bones closely & identify some properties. Link to fossils. Compare other endoskeletons with that of a human.
Muscles & joints	Children look at joints in the human body & the movements that each allow before looking at how muscles control every move we make. Models are constructed to show how pairs of antagonistic muscles pull to work together.
Effect of exercise	Discuss the short and long term effects of exercise.

Science Year 3 – Rocks

Statutory requirements

I can compare and group together different kinds of rocks on the basis of their appearance and simple physical properties

I can describe in simple terms how fossils are formed when things that have lived are trapped within rock

I can recognise that soils are made from rocks and organic matter.

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.

Rock detectives	Revisit vocabulary that describes properties of materials. Explore 'what we know' and 'what we would like to know' about rocks. Go for a walk to identify how materials that come from rocks are used in and around the school.
Under our feet	Explore what is under our feet – lots of rocks, sometimes hidden by grass, soil, buildings, sea, etc.! Study, draw and label a cross section of the earth. Find out how parts of the Earth's crust move against each other.
Volcanoes	Investigate where volcanoes are found! Understand that igneous rocks are produced as a result of volcanoes. They research specific volcanoes & label a volcano diagram.
Types of rock	Look at a range of rock samples. Discuss igneous & sedimentary (plus metamorphic) rocks. Take part in a range of activities including testing hardness of rocks, sorting rocks, finding information, drawing rocks & finding out how pebbles & sand are formed.
Explore rocks	Take part in more practical workshop activities including separating sand and stones by sieving, using ICT to research rocks, looking up vocab in dictionaries, sorting and naming rocks and testing the effect of vinegar on rocks.
Fossils	Find out more about sedimentary rocks & how fossils are formed from some animals and plants that die.
Properties of soil	Discuss how soil is formed and why it is important to look after it. Closely observe a soil sample and record what is found. Look at and draw a soil profile. Discuss erosion.
Soil investigation	Look at images, and discuss the effects and causes of flooding. Plan and carry out a practical investigation about the permeability of 3 different types of soils including measuring.

Science Year 3 - Light

Statutory requirements

I can recognise that they need light in order to see things and that dark is the absence of light

I can notice that light is reflected from surfaces

I can recognise that light from the sun can be dangerous and that there are ways to protect their eyes

I can recognise that shadows are formed when the light from a light source is blocked by a solid object

I can find patterns in the way that the size of shadows change.

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.

Light and darkness	In this session chn find out that light is needed to see things & that dark is the absence of light. Discover sources of light. Discuss temperature changes associated with darkness & how our eyes adjust to darkness. Investigate a Dark Box.
Reflection	Study how light is reflected from surfaces (including the moon!). Consider vocabulary used to describe surfaces reflecting light in different ways. Look at reflective & fluorescent materials & their uses. Discuss nocturnal animals & their adaptations.
Mirrors	Go through a brief history of mirrors before finding out how we use the light that is reflected to see a virtual image in a mirror. Use mirrors to reflect beams of light & to tackle symmetry activities.
Sun	Discuss sunny facts: the importance of the Sun for life, its structure & its apparent movement across the sky. Emphasis danger of looking directly at the Sun (including blindness) & discuss ways of protecting ourselves from the Sun.
Shadows	Find out that shadows are formed when the light from a source is blocked by a solid object. Remind chn of their enquiry about shadows cast by the Sun carried out in Year 1 (or repeat if appropriate). Talk about the history of sundials.
Transparency	Look at the different shadows formed by translucent, opaque & transparent objects. Discuss how the transparency of materials can affect their uses.
Enquiries	Discuss how to set up an enquiry about shadows. Consider predictions, fair testing & how to record & present their findings. Chn will look for patterns in what happens when the light source moves or the distance between the object & light source changes.

Science Year 3 - Forces and magnets

Statutory requirements

I can compare how things move on different surfaces

I can notice that some forces need contact between two objects, but magnetic forces can act at a distance

I can observe how magnets attract or repel each other and attract some materials and not others describe magnets as having two poles

I can predict whether two magnets will attract or repel each other, depending on which poles are facing.

I can 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.

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 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.

Pushes and pulls	Remind chn of work on changing the shape of solid objects in Y2. Discuss what we mean by forces, pushes & pulls requiring direct contact. Learn how to use arrows to show the direction of forces. Choose a setting to illustrate forces & their directions.
Different surfaces	Discuss how different things move, e.g. with simple pushes or pulls, or by wind, water, clockwork, electricity, radio control, etc. Chn set up an enquiry about how far toy vehicles move on different surfaces & draw conclusions from their findings.
Natural magnets & compasses	Look at a naturally occurring magnetic rock called lodestone (magnetite). Learn about the origins of, and myths about magnets. Find out how a compass works, and make a simple one.
Magnetic materials	Explain that materials that are attracted to magnets are called magnetic. Identify magnetic & non-magnetic materials in the classroom. Set up an enquiry to find out if all metals are magnetic. Discuss using magnets to sort recycled materials.
Attract and repel	Use bar magnets to find out like poles repel & opposite poles attract. Explain Earth acts like a large bar magnet & that two poles are called north & south. Emphasise that magnetic forces act at a distance. Demonstrate magnetic field using iron filings.
Uses of magnets	Explore a range of different shaped magnets, identifying their poles. Use sealed iron filings to show the magnetic fields. Discuss everyday uses of magnets at home, at school and in games/toys.
Magnet enquiries	Discuss fair testing through an investigation into which magnet is the strongest. Talk about drawing conclusions from their findings. Chn then set up enquiries based on their own ideas and questions about magnets.

Science Year 4 - Living things and their habitats

Statutory requirements

I can recognise that living things can be grouped in a variety of ways

I can explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment

I can recognise that environments can change and that this can sometimes pose dangers to living things.

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.

Habitats	Remind chn of MRS GREN (met in Year 2) – mnemonic for the seven characteristics of living things. Define a habitat and establish that animals & plants live in a particular habitat to meet their basic needs. Chn name living things in a range of habitats.
Classification	Explain that there are about 9 million different living things on Earth & discuss why is it useful to classify them to aid identification. Make chn aware of the importance of careful observations of living things.
Minibeasts	Observe &/or collect minibeasts & record them & any evidence (including plants) to show why the habitat is suitable for them. Use identification charts.
Classification keys	Introduce chn to available software for creating branching databases or dichotomous keys. Chn create their own classification key for the minibeasts collected.
Food chains & webs	Remind chn of the feeding relationship (food chains) between different living things in a particular habitat (Y2). Find out how food chains can be built into complex webs & weave one together. Discuss what happens if one link in the chain is removed.
Effects of change	Discuss natural & human-led changes in environments, both positive & negative, e.g. nature reserves, ecologically planned parks & garden ponds OR population, litter & deforestation.
Management	Find out how habitats are managed, both in the past & present. Discuss what happens to unmanaged habitats.

Science Year 4 - **Animals, including humans**

Statutory requirements

I can describe the simple functions of the basic parts of the digestive system in humans

I can identify the different types of teeth in humans and their simple functions

I can construct and interpret a variety of food chains, identifying producers, predators and prey.

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.

Digestion	Explain that digestion is the act of softening & changing food so that the body can absorb & use it for energy & growth. Chn find out which human organs are involved.
Digestive system	Discuss further details of the digestive system including functions of the various organs involved. Find out what happens when we eat poisonous or bad food & how illnesses can be caused by poor diets.
Animal diets	Compare human digestive system to other animals' particularly ruminants. Chn define carnivores, herbivores & omnivores & investigate examples of each type of animal.
Teeth	Look at models of teeth or sets of teeth. Use mirrors to look at & count own teeth. Compare teeth of different animals. Learn about incisors, canines, (premolars) & molars. Find out what they are used for.
Tooth decay	Learn about the importance of keeping your teeth healthy & watch an animation. Study tooth decay & draw a careful diagram of a tooth. Start an enquiry to see which liquid does least damage to an eggshell.
Eggshell enquiry	Continue with & complete the eggshell enquiry from the last session. Record the results. Can we use the results to draw a conclusion? Was our prediction right? Was it a fair test? Identify sugar content from labels.
Producers, predators & prey	All living things in a habitat are interdependent. Plants are producers & animals are predators &/or prey. Chn investigate a number of feeding relationships & create food chains to show the transfer of food (energy) from the producer to the consumers.
Food webs	Understand more complex feeding relationships. They discover the impact that small changes can have on the whole web. Discuss the importance of plants to all life on Earth!

Science Year 4 - States of matter

Statutory requirements

I can compare and group materials together, according to whether they are solids, liquids or gases
I can 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)

I can identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

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.

Solids, liquids or gases?	Chn compare the properties of the three states of matter & sort common materials into the three states. Water is used as an example of a material that can exist in all three states at reasonable temperatures.
Temperature	Use everyday examples to explain that temperature is a measure of how hot or cold something is & that it increases or decreases due to heat being transferred to or away from the object. Chn find that thermometers are the best way to measure temperature!
Using a thermometer	Look at a line graph of temperature changes in the classroom over 24h & explain why it goes up & down. Establish how to use a thermometer accurately & safely, including a close look at different scales. Look at a range of temps of diff places or objects.
Changing states	Materials change from one state to another at different temperatures. Chn discover at what temperatures water changes state & what effect adding salt has. Find out how the differences in freezing & boiling points of different materials can be utilised.
Evaporation and condensation	Look at evaporation & condensation of water as reversible changes. Discuss everyday examples & uses of evaporation & condensation. Plan & carry out an enquiry into the factors that speed up evaporation. If time carry out online melting point enquiry.
Water cycle	Chn explain how evaporation & condensation & other processes are involved in the water cycle. Identify different forms of water seen in weather conditions, including clouds. Remind chn how important water is to both plants & animals & how to conserve it.

Air	Talk about commonly occurring gases & their uses. We are surrounded by air, but what is it made of & how can we prove that it's there? Chn watch demonstrations & carry out enquiries to find out more about air pressure.
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Science Year 4 – Sound

Statutory requirements

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

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.

Introduction to sound	Find out what children already know about sound. Listen carefully to sounds in the environment. Children try a circus of activities to describe sounds, suggest how musical instruments make sounds, why animals prick up their ears and why some have very large ears.
Vibrations	Explain that all sounds are made by objects vibrating and that sound can travel through gases, liquids and solids. Children carry out some short investigations about vibrations. Compare light & sound waves.
Hearing sounds	Briefly examine the structure of the ear & how vibrations are heard as sounds. Compare light & sound waves further. Discuss echoes & how bats or dolphins use echolocation. Talk about deafness & introduce children to British Sign Language.
Investigate soundproofing	Discuss why sometimes it is important to prevent sounds travelling. Plan & carry out an investigation to find out which materials would be best to muffle sounds.
Pitch and loudness	Demonstrate how to make high, low, soft & loud sounds with drums, string instruments & wind instruments. Children investigate changes of pitch & volume of virtual instruments and create their own instruments.
Musical instruments	Listen to a variety of musical instruments & investigate how they make sounds in more detail. Explain how to change the pitch & volume of instruments.

Science Year 4 - Electricity

Statutory requirements

I can identify common appliances that run on electricity

I can construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers

I can 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

I can recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit

I can recognise some common conductors and insulators, and associate metals with being good conductors.

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.

Mains electricity vs batteries!	Learn that batteries & mains electricity are the most widely used sources of electricity & that electricity can be dangerous so care needs to be taken.
What is a circuit?	Chn make a simple circuit & recognise when/why a circuit will not work. They understand that a circuit needs a source of power & a device that uses that power to make it work. Use pictures to represent components of an electrical circuit in drawings.
Electrical conductors	Chn carry out an enquiry to find out which materials are good electrical conductors & which are good electrical insulators. Where might these materials be used? They then discover what to do if someone has an electric shock.
Cables and plugs	Relate the electrical conductivity of materials to their uses in wires & plugs & find out how to wire a plug successfully. Understand that wires are coloured to keep people who are colour blind safe. Look at static electricity.
Switches	Discover that switches are used to break an electrical circuit & that switches are used to stop and start an electrical appliance or to change how it works. There are various forms of switches. The chn design, make & test their own switch.
Brighter bulbs	Set up an enquiry to find out how changing the number of components in a series circuit can make a bulb brighter or dimmer. Swap the bulbs for motors or buzzers & make further enquiries. Predict, use fair tests & draw conclusions.
Scientists	Discuss Benjamin Franklin, Thomas Edison & Michael Faraday's contribution to our understanding of electricity. Children carry out research & write a fact file or biography.

Science Year 5 - Living things and their habitats

Statutory requirements

I can describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
I can describe the life process of reproduction in some plants and animals.

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.

Flowering plants	Recap on life cycles of flowering plants and plant some seeds to germinate & grow during the strand. Explain that plants can also reproduce asexually. Chn plant bulbs, corms, tubers and cuttings of roots, stems & leaves to see if they can propagate new plants.
Non-flowering plants	Study the life cycles of some non-flowering plants, e.g. algae, mosses, liverworts, ferns & gymnosperms, i.e. conifers, and compare them to flowering plants.
Mammals	Discuss the life cycle of humans and compare and contrast with those of other mammals, e.g. kangaroos & dogs. Identify features of mammals. Explain that there are two unusual mammals that lay eggs.
Birds	The main difference in the life cycles of mammals & birds is that birds lay eggs. Recap on the structure of eggs (looked at in Year 2). Explain that migration is part of the life cycle of many birds.
Amphibians and insects	Remind chn of the life cycles of butterflies & frogs & look at examples of other insect & amphibian life cycles. Understand differences between complete & incomplete metamorphosis. Compare with mammal & bird life cycles.
Scientists	Discuss the work that naturalists and animal behaviourists carry out & why it is important. Sit quietly in the school grounds to observe living things. Research & write a biography of a well-known scientist.
Plant propagation	Summarise the findings of the Strand & look at some unusual plants & animals from elsewhere in the world, including other egg-laying animals. Chn complete their observations of flowering plants.

Science Year 5 - **Animals, including humans**

Statutory requirements

I can describe the changes as humans develop to old age.

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.

Life cycles	Discuss life cycle of humans. Recap on life cycles of plants/animals. Chn draw graphs of gestation periods & life spans.
Babies	Encourage chn to think about their development since they were babies. Compare milestones reached with those of other animal babies that develop quickly into adults.
Growth	Investigate the shape changes between a baby and an adult human, concentrating on the head to body length ratio. Measure & draw graphs.
Puberty - physical	Look at the physical changes that take place during puberty. Some are seen easily, Discuss rights of passage in different cultures on reaching puberty.
Puberty - emotional	Look at the emotional changes in puberty. Look at the meaning of friendships & where help can be found.
Pregnancy	Changes at puberty prepare our bodies to have chn of our own. Look in more details at human fertilisation & pregnancy & learn how important it is for mother-to-be to look after her health. Look at baby growth in utero & explain function of umbilical cord.
Babies	Discuss how to care and look after babies. What kind of care do they need?
Life choices	Discuss relationships found in our society & marriage rites.

Science Year 5 - Properties and changes of materials

Statutory requirements

I can 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

I know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution

I can use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating

I can give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic

I can demonstrate that dissolving, mixing and changes of state are reversible changes

I can 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.

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.

Properties	Revise features of states of matter: solid, liquid & gas. Rehearse properties of materials discussed in earlier years, e.g. electrical conductivity Y4, transparency & magnetic Y3. Study hardness & carry out some enquiries related to other properties.
Solubility	Introduce solubility as another property of materials. Learn the terminology related to it. Chn carry out an enquiry to find out more about this property using salt & water. Ensure that chn don't confuse dissolving with melting.
Separating mixtures	Chn use magnets, filtering, sieving & evaporating to separate a range of mixtures. They decide on the best method for each mixture. Discuss everyday examples of separating mixtures by these methods & how these changes are reversible.

Thermal conductivity	Look at yet another property of materials: thermal conductivity. Compare with electrical conductivity. Discuss what chn wear in cold weather & relate to other common objects. Carry out enquiries with insulators for warm water & cold ice cream!
Irreversible changes	Compare & contrast reversible & irreversible changes. Discuss those they have already met & then look in detail at rusting nails. Set up an enquiry over a few days. Blow up a balloon using another reversible change caused by acid on bicarbonate of soda.
Heating and burning	Discuss findings of rusty nail enquiry & set up a further enquiry. Introduce another irreversible change – burning. Compare this with heating. Demonstrate the burning of many common materials & identify what is formed. Discuss fire safety.
New materials	Remind chn how properties of materials are linked to uses. Use Spencer Silver as an e.g. of a chemist who created a new material & eventually found a practical use for it. Research other new materials & make some plastic.

Science Year 5 - Earth and space

Statutory requirements

I can describe the movement of the Earth, and other planets, relative to the Sun in the solar system

I can describe the movement of the Moon relative to the Earth

I can describe the Sun, Earth and Moon as approximately spherical bodies

I can use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

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.

Earth, Moon & Sun	Children create drawn scale models of each and use a trundle wheel to measure scaled distances between them. Find out about Copernicus & Galileo's theory of a heliocentric solar system.
Day & night	In this session children shed light on why day and night occur on Earth & why day length changes throughout the year. They investigate movement & length of shadows during a sunny day – a sundial. Graph changes in day length during the year.
Eclipses & seasons	The Sun's a million times larger in volume than the Earth so how can its rays be obscured by the much smaller Earth & Moon? Children discover how eclipses are created & how the Earth's tilt on its axis creates seasons. Then describe the seasons in the UK.
Moon phases	Children discover why the moon appears to change shape in the night sky. They look at the lunar cycle & use the correct terminology. Study the life of Neil Armstrong & find out about the first men to walk on the Moon.
Stars	Children have stars in their eyes as they find out that the Sun is one star in the galaxy called the Milky Way, which is just one galaxy in the universe. Children identify common constellations. They then take a safe look at sun spots on the surface of the sun.
Planets	Find out more about the planets that make up our solar system. They investigate their distances from the Sun & collect data for a fact file.
Solar system	Look at photographs of Stonehenge & discuss how this may have been built as an astronomical clock a long time ago.

Science Year 5 - Forces

Statutory requirements

I can explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object

I can identify the effects of air resistance, water resistance and friction, that act between moving surfaces

I can recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

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.

Gravity	Children get to grips with the difference between weight and mass as they develop their understanding of gravity and balanced forces. Begin to measure forces using force meters.
Opposing forces	Find out more about Sir Isaac Newton after whom the unit of force is named & look more closely at balanced forces. Chn use a range of PE equipment to investigate the balancing of forces. These forces will be studied in more detail in later sessions.
Friction	Set up an enquiry to investigate on which surface their sports shoe will perform best. Ensuring it is a fair test, children record measurements & report findings.
Air resistance	Chn discover that travelling through air involves another drag force: air resistance. They repeat some enquiries that Galileo carried out in the 16 th century & then carry out their own enquiry into factors which affect the forces acting on paper spinners.
Water resistance	Water resistance (drag force) can slow objects passing through it. Chn carry out enquiries about the weight of objects in water, boat designs & the effect of different waters.
Mechanical devices	Mechanical devices that we use in everyday life help us transfer forces or motion & make tasks easier. Chn explore gears, levers & pulleys which are all simple machines & elastic bands & springs. Find out how these devices work & tackle some enquiries.
Design and make	Chn use their knowledge & experience to design and make an artefact that use simple levers, pulleys, gears and/or springs & explore their effects.

Science Year 6 - Living things and their habitats

Statutory requirements

I can describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals

I can give reasons for classifying plants and animals based on specific characteristics.

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.

Early classification	Recap on the classification of living things that chn already know: plants & animals & how they are grouped further. Establish that there are 5 Kingdoms altogether including Fungi, Protista & Monera too. Discuss early classification by Aristotle 350BCE.
Linnaeus	Introduce Carl Linnaeus as the 'father of classification'. Find out how he simplified & unified the naming of living things using a binomial Latin system which is still used today.
Levels	Explain that today we have 7 levels of classification compared to Linnaeus's 5: Kingdom, Phylum, Class, Order, Family, Genus, Species.
Micro-organisms	Take a closer look at micro-organisms – from Monera, Protista & Fungi Kingdoms. Also discuss whether or not viruses are living. Find out that some cause diseases, but that they can be very useful too. Set up mini compost bins & carry out a yeast enquiry.
Identification	Collect buttercup plants in local environment & identify them using classification keys to understand the details that taxonomists use to classify living things. Look in detail at a flowering plant & describe features.
Classification keys	In groups children create classification keys to identify a selection of birds, butterflies or bumblebees using photographs. Discuss the features that could be used. Children then use their expertise to create & trial keys for a selection of tree leaves.
Variation in Species	Point out that members of a species may not always look the same, which causes some problems for classification. Study continuous variation using heights of chn. In groups research & classify living things from different habitats. Report on compost bins.

Science Year 6 - **Animals, including humans**

Statutory requirements

I can identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood

I can recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

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

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.

The heart	Look at the structure of the human heart & compare to other animal hearts. Find out that it is muscle tissue that contracts & relaxes. Listen to a heart beating & discover how it pumps blood to the lungs & the rest of the body in a double circulation.
Double circulation	Find out more about the double circulation in humans & the history of this understanding. Explain the system and then research the biographies of both Galen & William Harvey.
The lungs	Discover some interesting details about the structure & function of the lungs. Discuss respiration (gas exchange) & the parts of the body involved with breathing in and out. Chn measure their lung capacity.
Blood	Blood has many important functions: transport of oxygen, nutrients & waste materials, fights against infection & helps keep the body at the right temperature. Find out about blood groups, blood transfusion, blood pressure & blood vessels!
Effect of exercise on pulse rate	Chn learn how to take their own pulse rate and then investigate the effect of exercise on their pulse rate & draw graphs of their findings. They will understand the importance of taking several measurements & then calculating the average (mean) result.
Healthy bodies	Discover why the pulse rate increases with exercise and how exercise helps keep us & our hearts healthy. Discuss the importance of a healthy balanced diet and plenty of rest too.
Staying healthy	Exercise is beneficial, but what about the effects of tobacco, alcohol, caffeine, solvents & other drugs. Many of the bad effects are associated with the heart & circulatory system.

Science Year 6 - Evolution and inheritance

Statutory requirements

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

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

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

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

Pupils might work scientifically by: 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.

Changes over time	Remind children of what they learnt about fossils in Year 3 & point out that fossils provide evidence about living things that inhabited the Earth millions of years ago. Discuss extinction of animals & plants & how there have been changes over time.
Mary Anning	Find out about the remarkable life story of the famous palaeontologist, Mary Anning from Lyme Regis. Discuss how it was remarkable that a woman from a poor family rose to such eminence in the 19 th century.
Offspring	Use dogs as an example to enable chn to recognise that living things produce offspring of the same kind, but that normally offspring vary & are not identical to their parents. Study identical twins & members of their own family.
Evolution	Discover that this variation can help survival of species & that Darwin described this as his theory of evolution by natural selection. Compare his ideas with some creation stories & how there is still controversy about conflicts with the Bible version.
Darwin, Wallace and Mendel	Tell chn that Alfred Wallace also came up with the idea of natural selection leading to evolution independently. Look at Darwin's finches & the later investigations of Gregor Mendel using pea plants, which helps explain why offspring differ from parents.

Plant adaptation	Look in detail at how some plants are adapted to their environment, e.g. cacti & rainforest plants. Point out that plants produce huge numbers of seeds but that only a few will develop into mature plants.
Animal adaptation	Animals have adapted to life in a range of different environments just like plants. Look in detail at adaptations of camels & penguins.
Advantages and disadvantages	Changes that happen by chance can give advantages that allow plant & animals to survive better in their environment. However sometimes there are disadvantages of specific adaptations too, e.g. discuss using 2 feet instead of 4!

Science Year 6 - Light

Statutory requirements

I can 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.

I can 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.

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

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).

Light travels in straight lines	Discuss the importance of the Sun as the main light source on Earth & list other sources of light. Demonstrate how we can show that light travels in straight lines & then challenge children to plan and carry out their own enquiry.
Shadows	The formation of shadows is further evidence that light travels in straight lines. In mixed ability groups children plan & carry out enquiries to answer questions about shadows. They record the results, then draw conclusions & report their findings.
Eyes	Children study sight in this session. They find out that objects are seen because they give out (light source) or reflect light into our eyes. They also find out how to care for their eyes & that sometimes eyes can even play tricks on us!
Reflection & Refraction	Children explore light reflection from flat, concave & convex surfaces & refraction when light passes from one material through another. Children investigate which surfaces reflect light best & use mirrors to bounce torch beams & use a kaleidoscope.
Colours	Watch what happens when white light passes through a triangular prism & discover how rainbows are formed in the same way. Children make their own rainbows & compare mixing light colours with pigment colours. Find out why objects appear coloured in our eyes.
Light investigations	How fast is the speed of light? Faster than the speed of sound but by how much? Measure just how fast it is in the classroom using a microwave! Compare with the speed of sound.

Science Year 6 - Electricity

Statutory requirements

I can associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit

I can 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

I can use recognised symbols when representing a simple circuit in a diagram.

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.

Revision	In this the first of eight sessions the children get some hands on experience & revision of what they already know through a circus of circuit activities. Can they complete & repair circuits & make switches that work? What dangers does electricity pose?
Circuit diagrams	Children discover the symbols that are used in circuit diagrams before using them to create their own circuits. Can they create working circuits from a diagram?
Circuit repairs	Children turn their attention to some circuits in need of attention! They repair broken circuits and identify repairs needed using circuit diagrams.
Wires	Look closely at the structure of a light bulb. Does the length of the wires make a difference to how brightly a bulb glows in a simple circuit? What about the thickness of the wire? Children plan & carry out enquiries to find answers.
Cells	Chn plan & carry out another enquiry to answer their own questions about the no. & voltage of cells used in a simple circuit. They predict outcomes & draw circuit diagrams. Then chn make further predictions based on findings & carry out further enquiries.
Series and parallel	In this session children learn about the differences between series and parallel circuits. Establish what a short circuit is & briefly discuss resistance.
Control technology	Children apply their knowledge & understanding of simple circuits to control technology. They can work online or with a control box & input & output devices to create a simulation of traffic lights, lighthouses, fridge doors, burglar alarms or similar.