Science at Hobletts

Science at Hobletts Manor Junior School:

As scientists, we will have the opportunity to explore the world around us; by talking about, testing and developing our ideas about everyday phenomena and living things. We will ask our own questions and decide which scientific enquiry skills will best help us to find the answers. We will also learn about how scientific ideas have changed and developed over time and learn about some famous scientists.

Aims:

The national curriculum for Science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

KS2 pupils should already be able to:

- observe phenomena, looking more closely at the natural and humanly-constructed world around them and ask questions about what they notice.
- use different types of scientific enquiry, with help, to answer their own questions, including being able to observe changes over a period of time, notice patterns, group and classify things, carry out simple comparative tests, and find things out using videos, photos or books
- use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways

Pupils should be taught to:

- broaden their scientific view of the world around them through exploring, talking about, testing and developing ideas about everyday phenomena
- ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information.
- draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out
- encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates.
- begin to recognise that scientific ideas change and develop over time.
- use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings

Curriculum Overview:

Year Group	Autumn Term Unit of learning	Spring Term Unit of learning	Summer Term Unit of learning
Three	**Investigating Plants**	**Animals, including Humans** (Healthy Eating, Healthy Bodies) **Forces** (Magnets)	**Rocks, Fossils & Soils** **Light and Shadows**
Four	**Living things and their Habitats** (Classification & Interdependence)	**Electricity** (Circuits and Components) **Animals including Humans** (Teeth & Digestion)	**Sound and Vibrations** **States of Matter** (Solids, Liquids & Gases)
Five	***Properties and Changes of Materials***	***Forces*** *(Gravity, Friction & Mechanisms)*	***Earth and Space*** ***Animals including Humans*** *(Life cycles & Reproduction and Humans as they age)*
Six	***Light*** *(Exploring how light behaves)* ***Electricity*** *(Variation in component function)*	***Living Things*** *(Classification)* ***Evolution & Inheritance***	***Animals including Humans*** *(Humans & Health)*

Within each unit of study, **scientific enquiry skills** should be used and developed to help children learn about the scientific knowledge. Across each year group, all **5 types of enquiry** should be used.

Scientific Enquiry Skills

Lower KS2 (Years 3 & 4)	*Upper KS2 (Years 5 & 6)*
▪ *asking relevant questions and using different types of scientific enquiries to answer them* ▪ *setting up simple practical enquiries, comparative and fair tests* ▪ *making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers* ▪ *gathering, recording, classifying and presenting data in a variety of ways to help in answering questions* ▪ *recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables* ▪ *reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions* ▪ *using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions* ▪ *identifying differences, similarities or changes related to simple scientific ideas and processes* ▪ *using straightforward scientific evidence to answer questions or to support their findings.*	▪ *planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary* ▪ *taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate* ▪ *recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs* ▪ *using test results to make predictions to set up further comparative and fair tests* ▪ *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* ▪ *identifying scientific evidence that has been used to support or refute ideas or arguments.*

*There are **five types of enquiry in science** and questions may need a different type of enquiry to be answered:*

1. ***Fair testing**- changing one variable to observe its effect while controlling all of the other variables e.g. how does the size of the parachute affect the time it takes to fall?*
   Variable (Independent) to change: size of the parachute
   Variable (Dependent) to measure: time taken to fall to the ground
   Variables (Constant) to keep the same: height of drop, material of parachute, length of string
2. ***Research from secondary sources** – this includes books, internet, pictures, visitors and experts*
3. ***Observing over time***
4. ***Identifying and classifying** – arranging and sorting objects, materials and livings things into particular sets according to certain characteristics. (These can be characteristics and groups designed by the children or recognised groups such as mammals, amphibians, reptiles, birds and fish).*
5. ***Looking for patterns**- observing and recording patterns in nature or carrying out a survey where all of the variables cannot be controlled, e.g. proportions and ratios within the human body, which type of paper aeroplane flies further?*

Subject specific key vocabulary:

Investigation, question, fair testing, factors, variables (independent, constant, dependent), equipment, prediction, predict, results, tables, graph, observation, explain, diagram, observe, measure, measurements, record, repeat, check, MR MR MR (More Results Make Results More Reliable), accurate, reliable, data, patterns, conclusion, evaluate

Year 3

Autumn

Through the Ages

Plants

- *identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers*
- *explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant*
- *investigate the way in which water is transported within plants*
- *explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal*

Notes and guidance (non-statutory)

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

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

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

Subject specific key vocabulary:

fruit, vegetable, root, stem, seed pod, leaf, leaves,
plant, growth, water, stem, transported, uptake
oxygen, carbon dioxide, gas, life cycle, germination
pollination, seed dispersal, photosynthesis, chlorophyll, sunlight, absorb, growth, seedlings

Word list- Year 3/ 4 spellings:

decide, describe, fruit, increase, important, natural, possible, question, special, appear, earth, different, experiment, length, potatoes,

Year 3

Spring

Romans

Animals, including Humans (Healthy eating, Healthy bodies)	*Forces and magnets*
▪ *identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat* ▪ *identify that humans and some other animals have skeletons and muscles for support, protection and movement* **Notes and guidance (non-statutory)** Pupils should continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions. **Pupils might work scientifically by:** identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy and design meals based on what they find out.	▪ *compare how things move on different surfaces* ▪ *notice that some forces need contact between two objects, but magnetic forces can act at a distance* ▪ *observe how magnets attract or repel each other and attract some materials and not others* ▪ *compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials* ▪ *describe magnets as having two poles* ▪ *predict whether two magnets will attract or repel each other, depending on which poles are facing* **Notes and guidance (non-statutory)** Pupils should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe). **Pupils might work scientifically by:** comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces and gathering and recording data to find answers 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.
Subject specific key vocabulary: *food, energy, growth, protein, carbohydrates, fibre starch, sugar, fats, vegetables, fruit, food groups fish, dairy, cereals, balanced diet, carnivores, herbivores, omnivore plants, meat, healthy, skeleton, endoskeleton, exoskeleton, hydroskeleton, backbone, vertebrates, invertebrates, function, support, protection, movement, cranium, femur, sternum* **Word list- Year 3/ 4 spellings:** *decide, describe, fruit, increase, important, natural, possible, question, special, experiment, therefore*	**Subject specific key vocabulary:** *forces, push, pull, movement, magnet, wand bar, horseshoe, ceramic, circular, poles, north pole, south pole, magnetic material, attracted, attracts attraction, repelled, repel, iron, springs, compress, squash* **Word list- Year 3/ 4 spellings:** *decide, describe, increase, important, natural, possible, question, special, experiment, earth, different, famous, material, therefore, strength, separate*

Year 3

Summer

Our World!

Rocks, Fossils & Soils

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

Notes and guidance (non-statutory)

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

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

Subject specific key vocabulary:

rocks, volcanic, sedimentary, igneous, metamorphic, lava, magma, slate, marble, chalk, granite, sand, clay, erosion, eroded, wearing, properties, permeable, impermeable, absorb, drain, soak, soil, particles, texture, chalky, clay, sandy, peaty, sieving, microscope, soak, drain, drainage

Word list- Year 3/ 4 spellings:

decide, describe, increase, important, natural, possible, question, special, experiment, therefore, notice, material, surprise, earth, disappear

Light & Shadow

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

Notes and guidance (non-statutory)

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

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

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

Subject specific key vocabulary:

shadow, shape, light, transparent, opaque, translucent, light source, block, object, sun light, direction, changes, light travels, shortest daytime, torch, sun, orbit, rotate, axis, Earth

Word list- Year 3/ 4 spellings:

decide, describe, increase, important, natural, possible, question, special, experiment, therefore, notice, material, surprise, earth, length,

Year 4

Autumn

Where We All Live!

Living Things and their Habitats (Classification & Interdependence)

- *recognise that living things can be grouped in a variety of ways*
- *explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment*
- *recognise that environments can change and that this can sometimes pose dangers to living things*
- *construct and interpret a variety of food chains, identifying producers, predators and prey*

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year. Pupils should explore possible ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants. Pupils could begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.
Note: Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses.
Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.
Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.

Subject specific key vocabulary:

habitat, food, shelter, life processes, movement
reproduction, sensitivity, nutrition, excretion
respiration, growth, predator, prey, key, energy
producer, consumer, top consumer, primary consumer, secondary consumer, tertiary consumer
nutrition, feeding, condition, organism, food chain,
food web

Word list- Year 3/ 4 spellings:

decide, describe, fruit, increase, important, natural, possible, question, special, experiment, therefore, appear, caught, complete, group,

Year 4

Spring

Ancient Egyptians

Electricity	*Animals including humans (Teeth & Digestion)*
▪ *identify common appliances that run on electricity* ▪ *construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers* ▪ *identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery* ▪ *recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit* ▪ *recognise some common conductors and insulators, and associate metals with being good conductors* **Notes and guidance (non-statutory)** Pupils should construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6. **Note:** Pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity. **Pupils might work scientifically by:** observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.	▪ *describe the simple functions of the basic parts of the digestive system in humans* ▪ *identify the different types of teeth in humans and their simple functions* **Notes and guidance (non-statutory)** Pupils should be introduced to the main body parts associated with the digestive system, for example, mouth, tongue, teeth, oesophagus, stomach and small and large intestine and explore questions that help them to understand their special functions. **Pupils might work scientifically by:** comparing the teeth of carnivores and herbivores, and suggesting reasons for differences; finding out what damages teeth and how to look after them. They might draw and discuss their ideas about the digestive system and compare them with models or images.
Subject specific key vocabulary: *wires, battery , batteries, bulbs, motors, switches buzzers, crocodile clip, battery holders, bulb holders, components, series circuit, current, electrons, brightness, dimmer, conductor, insulator, watt, filament, appliance, device, motor, switch, mains supply, static, volt, resistance, short circuit, Amp, symbols* **Word list- Year 3/ 4 spellings:** *decide, describe, fruit, increase, important, natural, possible, question, special, experiment, therefore, appear, centre*	**Subject specific key vocabulary:** *mouth, tongue, oesophagus, stomach, liver, duodenum, pancreas, small/large intestine, colon, rectum, anus, digestion, digest, enzymes, acid, fibre, nutrients, constipation, carnivore, herbivore, omnivore, food chains, producer, consumer, teeth, milk teeth, adult teeth, incisors, canines, molars, premolars, cutting, snipping, ripping, grinding, healthy teeth, gums, bacteria, sugar, plaque, decay, cavities, fillings, toothbrush, hygiene, gum disease* **Word list- Year 3/ 4 spellings:** *decide, describe, fruit, increase, important, natural, possible, question, special, experiment, therefore, appear, centre*

Year 4

Summer

Ancient Greece - Olympics

Sound	*States of Matter*
▪ *identify how sounds are made, associating some of them with something vibrating* ▪ *recognise that vibrations from sounds travel through a medium to the ear* ▪ *find patterns between the pitch of a sound and features of the object that produced it* ▪ *find patterns between the volume of a sound and the strength of the vibrations that produced it* ▪ *recognise that sounds get fainter as the distance from the sound source increases* **Notes and guidance (non-statutory)** Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways. **Pupils might work scientifically by:** finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.	▪ *compare and group materials together, according to whether they are solids, liquids or gases* ▪ *observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)* ▪ *identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature* **Notes and guidance (non-statutory)** Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled. **Note:** Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning. **Pupils might work scientifically by:** grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.
Subject specific key vocabulary: *sound, vibrate, vibration, movement, loudness, quietness, volume, pitch, sound waves, wave pattern, particles, solid, liquid, gas, air, vacuum, soundproof, instruments, noise pollution, decibels, ear drum, ear canal, data logger, travel, tuning for, frequency, shake, pluck, blow* **Word list- Year 3/ 4 spellings:** *decide, describe, fruit, increase, important, natural, possible, question, special, experiment, therefore, appear, centre*	**Subject specific key vocabulary:** *states, matter, change of state, solid, liquid, gas, molecules, particles, vibration, evaporation, evaporate, condensation, condense, temperature, melting, melt, melting point, freezing, freeze, freezing point, solidify, solidification, water cycle, reversible, non-reversible, irreversible, heating up, cooling down* **Word list- Year 3/ 4 spellings:** *decide, describe, fruit, increase, important, natural, possible, question, special, experiment, therefore, appear, breath, breathe, disappear, material, separate,*

Year 5

Autumn

Anglo Saxons and Scots

Properties and Changes of Materials

- *compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets*
- *know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution*
- *use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating*
- *give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic*
- *demonstrate that dissolving, mixing and changes of state are reversible changes*
- *explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda*

Notes and guidance (non-statutory)

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

Note: Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials.

Pupils might work scientifically by: carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.

Subject specific key vocabulary:

materials, wood, paper, plastic, glass, metal, rubber,
wool, cotton, ceramic, fabric, solid, liquid, gas, property, characteristic, evaporating, filtering,
sieving, melting, dissolving, melting, burning, rusting, smooth, rough, hard, soft, absorbent, waterproof, strong, brittle, light, heavy, transparent, opaque, flexible, rigid, suitable, reversible, irreversible

Word list- Year 5/ 6 spellings:

Attached, average, equipment, explanation, occur, physical, temperature

Year 5

Spring

Viking Invasion

Forces

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

Notes and guidance (non-statutory)

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

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

Subject specific key vocabulary:

forces, push, pull, twist, friction, gravity, air resistance, water resistance, upthrust, Forcemeter, Newton meter, Newtons, surface area, Isaac Newton, Galileo Galilei, balanced forces, unbalanced forces, levers, gears, pulleys, springs, mechanisms

Word list- Year 5/ 6 spellings:

Average, equipment, explanation, physical, vehicle

Year 5

Summer

Enchanting Earth!

Earth and Space	*Animals including Humans (Life cycles & Reproduction and Humans as they age)*
▪ *describe the movement of the Earth, and other planets, relative to the Sun in the solar system* ▪ *describe the movement of the Moon relative to the Earth* ▪ *describe the Sun, Earth and Moon as approximately spherical bodies* ▪ *use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky* **Notes and guidance (non-statutory)** Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night. Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones). **Note:** Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus. **Pupils might work scientifically by:** comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.	▪ *describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird* ▪ *describe the life process of reproduction in some plants and animals* ▪ *describe the changes as humans develop to old age* ***Notes and guidance (non-statutory)*** Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty. **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. They might research the gestation periods of other animals, comparing them with humans; by finding out and recording the length and mass of a baby as it grows.
Subject specific key vocabulary: *Spherical, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, (Pluto), Sun, Moon, Solar system, orbit, space, universe, Galaxy, Milky Way, axis, rotate, seasons, Equator, eclipse, solar umbra, penumbra, corona, gravitational pull, shadows, atmosphere, Galileo Galilei, distance, diameter* **Word list- Year 5/ 6 spellings:** *According, average, category, community, communicate, controversy, determined, develop, disastrous, environment, equipment, existence, explanation, neighbour, system, temperature, vehicle*	**Subject specific key vocabulary:** *life processes, movement, reproduction, sensitivity, nutrition, excretion, respiration, growth, life cycle, flower, stamen, style, stigma, sepal, petal, ovary, pollen, seeds, germination, pollination, fertilisation, dispersal, larvae, pupa, chrysalis, metamorphic, metamorphose, David Attenborough* **Word list- Year 5/ 6 spellings:** Aggressive, attached, average, develop, environment, occur, temperature, vegetable

Year 6

Autumn

History of London (WWII)

Light

- *recognise that light appears to travel in straight lines*
- *use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye*
- *explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes*
- *use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them*

Notes and guidance (non-statutory)

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

Subject specific key vocabulary:

shadow, shape, light, transparent, opaque, translucent, light source, block, object, sun light, torch, sun, orbit, rotate, axis, Earth, reflection, refraction, white light, spectrum, periscope

Word list- Year 5/ 6 spellings:

Average, develop, equipment, lightning, physical

Electricity

- *associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit*
- *compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches*
- *use recognised symbols when representing a simple circuit in a diagram*

Notes and guidance (non-statutory)

Building on their work in year 4, pupils should construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols.
Note: Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity.
Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.

Subject specific key vocabulary:

wires, battery, batteries, bulbs, motors, switches, buzzers, crocodile clip, battery holders, bulb holders, components, series circuit , parallel circuit, current, electrons, brightness, dimmer, conductor, insulator, watt, filament, appliance, device, motor, switch, mains supply, static, volt, resistance, short circuit, amp, symbols

Word list- Year 5/ 6 spellings:

Attached, average, equipment, explanation, interrupt, lightning, physical, symbol, system

Year 6

Spring

Rainforests

Living Things (Classification)	*Evolution & Inheritance*
▪ *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* ▪ *give reasons for classifying plants and animals based on specific characteristics* **Notes and guidance (non-statutory)** Pupils should build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another. Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification. **Pupils might work scientifically by:** using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.	▪ *recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago* ▪ *recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents* ▪ *identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution* **Notes and guidance (non-statutory)** Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living things on earth have changed over time. They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution. **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.
Subject specific key vocabulary: *habitat, food, shelter, life processes, movement, reproduction, sensitivity, nutrition, excretion, respiration, growth, predator, prey, key, vertebrates, invertebrates, energy, producer, consumer, nutrition, feeding, condition, organism, animal groups, sorting, classification system, observable features, fish, amphibians, reptiles, birds, mammals, insects, arachnids, molluscs, annelids, Carl Linnaeus, microorganisms* **Word list- Year 5/ 6 spellings:** *According, develop, environment, equipment, physical, recognise,*	**Subject specific key vocabulary:** *Theory of evolution, adaptation, genetic inheritance, mutation, species, natural selection, environment, environmental changes, organism, habitat, survival, fossils, evidence, sediment, decompose, offspring, selective breeding, variation* **Word list- Year 5/ 6 spellings:** *According, ancient, attached, controversy, develop, environment, equipment, explanation, occur, opportunity, variety*

Year 6

Summer
Mayans
Animals including Humans (Humans & Health)
▪ *identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood* ▪ *recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function describe the ways in which nutrients and water are transported within animals, including humans* **Notes and guidance (non-statutory)** Pupils should build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function. Pupils should learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body. **Pupils might work scientifically by:** exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.
Subject specific key vocabulary: *mouth, oesophagus, stomach, liver, duodenum, pancreas, small/large intestine, colon, rectum, digestion, circulation, circulatory system, heart, lungs, arteries, veins, capillaries, blood circulation, blood vessels, diet, exercise, prescribed drugs, illegal drugs, addiction* **Word list- Year 5/ 6 spellings:** *Aggressive, leisure, muscle, physical, recommend, stomach, sufficient, suggest, system, temperature, variety, vegetable*