

For specific progression of scientific skills for each year group see working scientifically skills ladders.

Outdoor learning is a focus throughout each unit.

TOPIC	SCIENCE	KNOWLEDGE	KEY SKILLS	KEY VOCABULARY
CYCLE A HOLES  AUTUMN	LIVING THINGS AND THEIR HABITAT - EVOLUTION AND INHERITANCE	<ul style="list-style-type: none"> <li>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</li> <li>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</li> <li>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</li> </ul>	<ul style="list-style-type: none"> <li>Observing and raising questions about local animals and how they are adapted to the environment.</li> <li>Comparing how some living things adapt to survive in extreme conditions, e.g. cactuses, penguins and camels.</li> <li>Analysing 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.</li> </ul> <p>Focus skills Exploring Observation Research</p>	<p>Evolution, change over time, species, population, features, trait, inherited, reproduce, offspring, variation, mutation, survive/survival/survival of the fittest, adaptation</p> <p>Consumer, producer, predator, prey, food chain, consumer, producer, key, suited</p>
CYCLE A HOLES  AUTUMN	LIGHT	<ul style="list-style-type: none"> <li>Recognise that light appears to travel in straight lines.</li> <li>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.</li> <li>Explain that we see things because the light that travels from light sources to our eyes or from light sources to objects and then to our eyes (and represent this in simple diagrammatic form).</li> <li>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</li> </ul>	<ul style="list-style-type: none"> <li>Deciding [observe/explore] where to place rear-view mirrors on cars.</li> <li>Designing and making [Create / Invent / Design] a periscope and using the idea that light appears to travel in straight lines to explain how it works.</li> <li>Investigating the relationship [looking for patterns] between light sources, objects and shadows by using shadow puppets.</li> <li>Extend their experience [explore and observe] of light by looking at 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).</li> </ul> <p>Focus skills Exploring Observation Modelling</p>	<p>see, seen, light source, eyes, travel</p> <p>shadow, opaque, block</p> <p>reflect, reflection, mirror, direction</p> <p>light travelling, light beam, straight lines,</p> <p>cast, periscope, rear-view mirror, object, shadow puppet, rainbow, colours, bend, split</p>
CYCLE A A COBBS BROW GUIDE TO THE GALAXY  SPRING	EARTH AND SPACE	<ul style="list-style-type: none"> <li>Describe the movement of the Earth, and other planets, relative to the Sun and each other in the solar system.</li> <li>Describe the movement of the Moon relative to the Earth.</li> <li>Describe Sun/Earth/Moon as approximately spherical bodies.</li> </ul>	<ul style="list-style-type: none"> <li>Comparing the time of day at different places on the Earth through internet links and direct communication.</li> <li>Creating simple models of the solar system.</li> <li>Constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day.</li> </ul>	<p>Sphere/spherical, revolve, orbit, spin, rotate, axis, sunrise, sunset, north, south, east, west, rotate around, rotate on its axis</p> <p>Solar system, Sun, Moon, star, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, planet</p>

		<ul style="list-style-type: none"> <li>Use the idea of the Earth's rotation to explain <u>day and night</u>. <ul style="list-style-type: none"> <li>The Earth spins once around its own axis in 24 hours, giving day and night.</li> <li>The Earth orbits the Sun in one year.</li> <li>We can see the Moon because the Sun's light reflects off it.</li> <li>The Moon orbits the Earth in approximately 28 days and changes to the appearance of the moon are evidence of this.</li> </ul> </li> <li>Use the Earth's movement in space to explain the <u>apparent movement of the sun across the sky</u>. <ul style="list-style-type: none"> <li>The Sun appears to move across the sky from East to West and this causes shadows to change during the day.</li> <li>Changes to shadow length over a day or changes to sunrise and sunset times over a year are evidence supporting the movement of the Earth.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>Finding out</b> why some people think that structures such as Stonehenge might have been used as astronomical clocks.</li> </ul> <p><b>Focus skills</b>  <b>Research</b>  <b>Questioning</b>  <b>Grouping and classifying (database)</b></p>	<p>Sundial, shadow clock</p> <p>Model, compare, evidence</p>
<p>CYCLE A ANCIENT GREECE</p> <p>SUMMER</p>	<p>FORCES</p>	<ul style="list-style-type: none"> <li>Explain that unsupported objects fall towards the Earth because of the <u>force of gravity acting between the Earth and the falling object</u>.</li> <li>Identify the effects of <u>air resistance, water resistance and friction that act between moving surfaces</u> (causing things to slow down)</li> <li>Recognise that some mechanisms, including <u>levers, pulleys and gears</u>, allow a smaller force to have a greater effect. <ul style="list-style-type: none"> <li>There are different types of forces (push, pull, friction, air resistance, water resistance, magnetic forces, gravity) which have different effects on objects</li> <li>Gravity can act without direct contact between the Earth and an object.</li> <li>Friction, air resistance and water resistance can be useful or unwanted.</li> <li>The effects of friction, air resistance and water resistance can be reduced or increased for a preferred effect.</li> <li>More than one force can act on an object simultaneously (either reinforcing or opposing each other).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>Exploring</b> falling paper cones or cup-cake cases.</li> <li><b>Designing and making [exploring]</b> a variety of parachutes.</li> <li><b>Carrying out fair tests</b> to determine which designs are the most effective.</li> <li><b>Exploring</b> resistance in water by making and testing boats of different shapes.</li> <li><b>Design and make [create/invent/design]</b> artefacts that use simple levers, pulleys, gears and/or springs and explore their effects.</li> </ul> <p><b>Focus skills</b>  <b>Planning &amp; Testing</b>  <b>Using Equipment</b>  <b>Considering results</b></p>	<p>Friction, air resistance, water resistance, forcemeter, Newtons, surface area, gravity, movement, between surfaces</p> <p>Friction, air resistance, water resistance, forcemeter, Newtons, surface area, gravity, movement, between surfaces</p>
<p>CYCLE A ANCIENT GREECE</p> <p>SUMMER</p>	<p>ANIMALS - EXERCISE, HEALTH AND CIRCULATORY SYSTEM</p> <p><b>HEALTH</b></p>	<ul style="list-style-type: none"> <li>Identify and name the main parts of the <u>human circulatory system</u>, and describe the <u>functions of the heart, blood vessels and blood</u>.</li> <li>Recognise the impact of <u>diet, exercise, drugs and lifestyle on the way their bodies function (in the long term and short term)</u>.</li> <li>Describe the ways in which <u>nutrients and water are transported within animals, including humans</u>.</li> </ul>	<ul style="list-style-type: none"> <li><b>Exploring the work of scientists</b> and</li> <li>Scientific <b>research</b> about the relationship between diet, exercise, drugs, lifestyle and health.</li> </ul> <p>*Additional suggestion beyond NC2014 to support pupils working scientifically and to provide an opportunity to use ICT to collect/interpret data</p>	<p>Heart, heartbeat, pulse, pulse rate, muscle, blood vessel, blood, lung, oxygen, carbon dioxide, circulate, circulatory system, organ</p> <p>Diet, exercise, drugs, lifestyle, body function, harmful, healthy, damaged, nutrients, water, transported, substances</p> <p>Food types: fats, sugars, starches, protein, carbohydrate, protein, vitamins and minerals.</p>

		<ul style="list-style-type: none"> <li>□ The heart is a major organ and is made of muscle.</li> <li>□ The heart pumps blood around the body through vessels and this can be felt as a pulse.</li> <li>□ The heart pumps blood through the lungs in order to obtain a supply of oxygen.</li> <li>□ Blood carries oxygen/essential materials to different parts of the body.</li> <li>□ During exercise muscles need more oxygen so the heart beats faster and our breathing and pulse rates increase.</li> <li>□ Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire and excrete.</li> <li>□ An adequate, varied and balanced diet is needed to help us grow and repair our bodies (proteins), provide us with energy (fats and carbohydrates) and maintain good health (vitamins and minerals).</li> <li>□ Tobacco, alcohol and other 'drugs' can be harmful.</li> <li>□ All medicines are drugs, not all drugs are medicines.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Observing/Measuring changes</b> to breathing, heart beat and or pulse rates after exercise.</li> </ul> <p><b>Focus skills</b> <b>Modelling</b></p>	<p>Tobacco, drugs, alcohol.</p> <p>Balanced diet, side effect, harmful effect.</p>
<p>CYCLE B CRIME AND PUNISHMENT</p> <p>AUTUMN</p>	<p>ELECTRICITY</p>	<ul style="list-style-type: none"> <li>□ <u>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</u></li> <li>□ <u>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.</u></li> <li>□ <u>Use recognised symbols (at least: cells, wires, switches, bulbs, buzzers and motors) when representing a simple circuit in a diagram.</u></li> <li>□ <u>Use/interpret circuit diagrams to construct a variety of more complex circuits predicting whether they will 'work'.</u></li> </ul>	<ul style="list-style-type: none"> <li>• Systematically identifying [<b>testing</b>] the effect of changing one [thing] component at a time in a circuit.</li> <li>• <b>Designing and making [Create / Invent / Design]</b> a set of traffic lights, a burglar alarm or some other useful circuit.</li> </ul> <p><b>Focus skills</b> <b>Questioning</b> <b>Considering the results of an investigation</b></p>	<p>cell (battery), wire, bulb, bulb holder, buzzer, motor, switch (open/closed), complete circuit, electrical conductor, electrical insulator, component, circuit symbol, circuit diagram, standard symbols, voltage</p> <p>connection, component, break, fault</p> <p>devices, appliances, mains electricity, safety</p> <p>common materials e.g. metal, wood, plastic</p> <p>Expressions for making suggestions using 'if', 'might', 'could'</p> <p>connection, mains, wire, break</p> <p>Comparative expressions e.g. brighter, less bright (bulbs); faster, slower (motors)</p> <p>Note words which have a different meaning in other contexts e.g. circuit, break, bulb, fault).</p>
<p>CYCLE B POLE TO POLE</p>	<p>MATERIAL CHANGES</p>	<p>Material changes – irreversible</p>	<p>Material changes – irreversible</p>	<p>Material changes</p>

SPRING

MATERIAL PROPERTIES

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 (producing a gas / fizzing).

Material changes – reversible

- 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.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
  - Changes can occur when different materials are mixed.
  - Some material changes can be reversed and some cannot.
  - Recognise that dissolving is a reversible change and recognise everyday situations where dissolving occurs.
  - Distinguish between melting and dissolving.
  - Mixtures of solids (of different particle size) can be separated by sieving.
  - Mixtures of solids and liquids can be separated by filtering if the solid is insoluble (undissolved).
  - Evaporation helps us separate soluble materials from water.
  - Changes to materials can happen at different rates (factors affecting dissolving, factors affecting evaporation – amount of liquid, temperature, wind speed, etc).
  - Freezing, melting and boiling changes can be reversed (revision from YR4).

Material properties

- 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.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic (advantages and disadvantages).
  - Compare a variety of materials and measure their effectiveness (e.g. hardness, strength, flexibility, solubility, transparency, thermal conductivity, electrical conductivity).

Temperature and Thermal Insulation

- Observing and comparing the changes that take place, for example, when burning different materials or baking bread or cakes.
- Researching and discussing how chemical changes have an impact on our lives, for example cooking.
- Discuss [research] the creative use of new materials such as polymers, super-sticky and super-thin materials.
- Explain how they know when a change is reversible or irreversible

Material changes – reversible

- Observing and comparing the changes that take place.
- Recognise and describe everyday situations where dissolving occurs.
- Explain how they know when a change is reversible

Material properties

- Carry out tests to answer questions such as '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?'
- Compare materials in order to make a switch in a circuit (although this might be done in an electricity unit in another yr. grp)

Focus skills

Considering Results  
Planning and testing  
Using equipment

Dissolved, undissolved, solution, mixture, filter, sieve, evaporate, condense, melting, separate, reversible, irreversible, reaction, product, material, powder, substance, acid, change, burning, rusting

Words and phrases related to data handling e.g. bar line graph, line graph, average, accurate

Material Properties

Words describing the characteristics of materials e.g. strong, hard, flexible, absorbent, transparent, thermal conductor, thermal insulator

Words and phrases related to warmth and cold e.g. temperature, thermometer, degrees Celsius

Words related to the investigation of these properties e.g. investigate, test, describe, explain, comparison, fair, conclude, evidence

Comparison/compare, description/describe

Words which have different meanings in other contexts e.g. test, fair, conclude

Words associated with rocks: slate, marble, chalk, granite, sand, sandstone, clay, rock, stone, pebble, texture, absorbent, particles, permeable, non-permeable, acid rain

		<ul style="list-style-type: none"> <li>Heat always moves from hot to cold.</li> <li>Some materials (insulators) are better at slowing down the movement of heat than others.</li> <li>Objects/liquids will warm up or cool down until they reach the temperature of their surroundings.</li> </ul>		
<p>CYCLE B CENTRAL AMERICA - MEXICO</p> <p>SUMMER</p>	<p>ANIMALS - HUMAN LIFE CYCLES</p>	<ul style="list-style-type: none"> <li>Describe the changes as humans develop to old age.</li> <li>Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire and excrete.</li> </ul>	<ul style="list-style-type: none"> <li>Researching the gestation periods other animals and comparing them with humans.</li> <li>By finding out and recording the length and mass of a baby as it grows.</li> </ul> <p>Focus skills Exploring and Observing Grouping and Classifying</p>	<p>Changes, develop/development, grow/growth, baby, toddler, young, teenager, adult, old age, timeline, stages, puberty, gestation periods, compare</p>
<p>CYCLE B CENTRAL AMERICA - MEXICO</p> <p>SUMMER</p>	<p>LIVING THINGS AND THEIR HABITATS</p> <p>ENVIRONMENT</p>	<p>Observing and animal life cycles</p> <ul style="list-style-type: none"> <li>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</li> <li>Describe the life process of reproduction in some plants and animals.</li> <li>Name, locate and describe the functions of the main parts of reproductive system of plants (stigma, stamen, petal, sepal, pollen, ovary)</li> </ul> <p>Classification</p> <ul style="list-style-type: none"> <li>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.</li> <li>Give reasons for classifying plants and animals based on specific characteristics. <ul style="list-style-type: none"> <li>Living things can be grouped into micro-organisms, plants and animals.</li> <li>Vertebrates can be grouped as fish, amphibians, reptiles, birds and mammals.</li> <li>Invertebrates can be grouped as snails and slugs, worms, spiders and insects.</li> <li>Plants can be grouped as flowering plants (incl. trees and grasses) and non-flowering plants (such as ferns and mosses).</li> </ul> </li> </ul>	<p>Observing and animal life cycles</p> <ul style="list-style-type: none"> <li>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).</li> <li>Asking pertinent questions.</li> <li>Suggesting reasons for similarities &amp; differences [grouping and classifying].</li> <li>They might try to [explore] grow new plants from different parts of the parent plant, for e.g., seeds, stem &amp; root cuttings, tubers, bulbs.</li> <li>Observe changes in an animal over a period of time (for example, by hatching &amp; rearing chicks).</li> <li>Comparing how different animals reproduce and grow.</li> </ul> <p>Classification</p> <ul style="list-style-type: none"> <li>Using classification systems and keys.</li> <li>Identifying [grouping &amp; classifying] some animals and plants in the immediate environment.</li> <li>Researching unfamiliar animals &amp; plants from a broad range of other habitats &amp;</li> <li>... decide where they belong in the classification system [grouping &amp; classifying].</li> </ul> <p>Focus skills Exploring and Observing Grouping and Classifying</p>	<p>Observing and animal life cycles</p> <p>Mammals, amphibians, reptiles and plants</p> <p>Live young/eggs, gestation/incubation period, grow, metamorphosis, internal/external sexual reproduction, parental care/no parental care</p> <p>Flowering and non-flowering plants, classifying, classification</p> <p>Reproduction/reproduce, fertilisation/fertilise, germination/germinate, pollination/pollinate,</p> <p>Stamen, style, stigma, sepal, petal, ovary, pollen,</p> <p>Adapted,</p> <p>Flowering and non-flowering plants</p> <p>Similarities and differences</p> <p>Observe over time</p> <p>Classification Sort, group, identify, classify, environment, suited, classification system, key, habitat</p>