The logo for Cherry Tree Academy is a circular emblem. It features a stylized tree with a white trunk and branches, a dense canopy of yellow-green leaves, and several red cherries hanging from the branches. The words "CHERRY TREE" are written in a light blue, sans-serif font across the middle of the circle, and "ACADEMY" is written in the same font along the bottom curve.

# Cherry Tree Academy

## SCIENCE

### Our Intended Curriculum

### Disciplinary Knowledge

- **Fair & comparative testing** - Comparative and fair test enquiries enable children to explore relationships between different variables. In simple comparative tests children compare one event with another and identify different outcomes. For example, does the red car go faster than the green car?
- **Identifying, classifying & grouping** - Classification makes identification easier and is based on grouping things by looking at similar observable characteristics.
- **Pattern Seeking** - Pattern-seeking enquiries involve children making measurements or observations to explore situations where there are variables that they can't easily control. In this type of enquiry, children are trying to answer 'big questions' by identifying patterns in the measurements and observations they record.
- **Observing over time** - Pupils identify and measure events and changes in living things, materials and physical process or events. These observations may take place over time spans of minutes or hours (e.g. puddles evaporating) up to several weeks or months (e.g. rearing young chicks).

**Research using secondary sources** - Common *secondary research* methods include *data* collection *through* the internet, libraries, archives, schools and organisational reports

### Substantive Knowledge

- **Structure** – anything composed of parts arranged together in some way
- **Function** - a specific job or procedure
- **Variation** – the differences between living things of the same species
- **Adaption** - The process by which animals, plants and other living things have changed so that they better suit their habitat
- **Cause and effect** - Cause is why something happens, effect is what event has happened as a result of this
- **Changes** – changing from one material/ state to another
- **Evolution** – The way that living things change over time
- **Growth** – the process of increasing in size
- **Energy** - Strength and power. There are many forms such as thermal (heat), radiant (light) or kinetic (movement)
- **Process** - A series of actions or steps taken in order to achieve a particular end
- **Similarity and difference** - Similarity is sameness or a likeness between things and differences are a point or way in which people or things are dissimilar

**Working scientifically** - The processes of science: asking questions, designing experiments, reasoning and arguing with scientific evidence

### Laws and theories

**Physics:** Quantum theory – light consists of tiny particles which have wavelike properties associated with them. Light is composed of particles called photons.

Newton's light theory – light is composed of coloured particles that combine to appear white

Sound theory – sound is a result of a vibration which is produced by a source and then it travels in a medium as a wave and is ultimately sensed in the ear-drum. Sound is a form of energy.

Hooke's Law of Elasticity states that the extension of a spring is directly proportional to the load applied to it i.e. the heavier the load, the longer the stretch

Newton's Universal law of Gravitation - any two objects, no matter their mass, exert gravitational force toward one another

Newton's first law of motion states an object in motion stays in motion unless acted upon by an outside force

Fourier's law of thermal conduction states that the time rate of heat transfer through a material is proportional to the negative gradient in the temperature and to the area

Archimedes Buoyancy principle - the force acting on a submerged or partially submerged object equals the weight of the liquid that the object displaces

The Law of Reflection states that the angle of the incident light ray is equal to the angle of the reflected light ray

Hubble's Law of Cosmic Expansion - established that the universe is made up of many galaxies

Kepler's Law of planetary motion - that planets orbit the sun elliptically

Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points

**Chemistry:** Dalton's Law of Partial Pressures states the total pressure by a mixture of gases is equal to the sum of the partial pressures of each of the constituent gases

Atomic theory - that matter is composed of particles called atoms

**Biology:** Cell theory - *cells* are the basic structural, functional, and organizational units of both single-celled and multicellular organisms

*Photosynthesis* is a process by which plants, algae and some types of bacteria convert light energy into chemical energy

Darwin's theory – Natural Selection

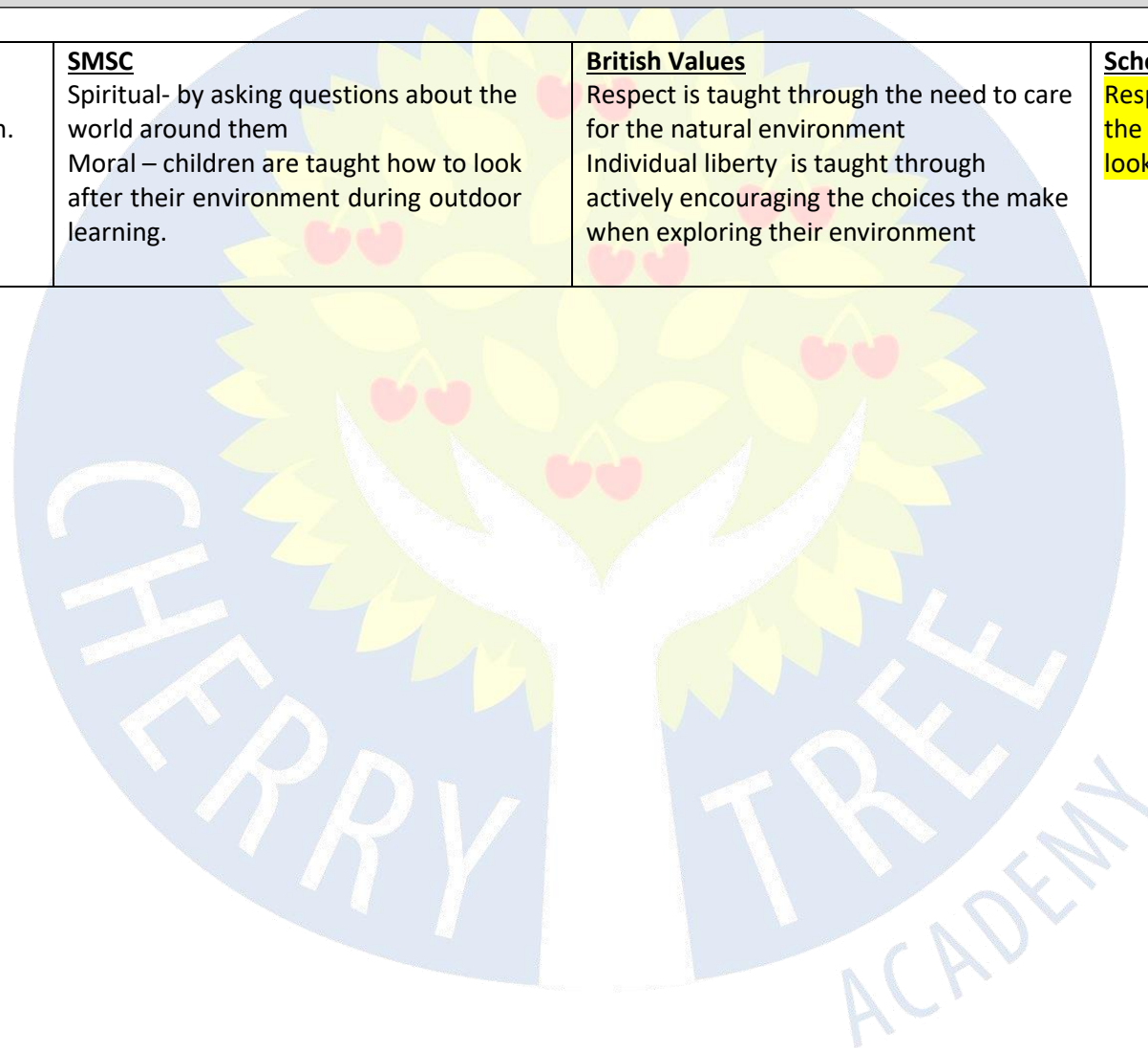
## Cherry Tree Academy - SCIENCE progression through EYFS

### UTW – The Natural World

Active Learning - Motivation		Active Learning - Motivation		Creating & Thinking Critically - Thinking	
<ul style="list-style-type: none"><li>Being involved &amp; concentrating</li><li>Keep on trying</li><li>Enjoying achieving what they set out to do</li></ul>		<ul style="list-style-type: none"><li>Being involved &amp; concentrating</li><li>Keep on trying</li><li>Enjoying achieving what they set out to do</li></ul>		<ul style="list-style-type: none"><li>Having their own ideas (creative thinking)</li><li>Making links (building theories)</li><li>Working with ideas (critical thinking)</li></ul>	
Understanding the World- The Natural World ELG - - Explore the natural world around them, making observations and drawing pictures of animals and plants - Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class - Understand some important processes and changes in the natural world around them, including the seasons					
Focus	Seasonal changes	Everyday materials	Plants	Animals including Humans	Vocabulary- To be used daily.
<b>Reception Skills</b>	<ul style="list-style-type: none"><li>Describe what they see, hear &amp; feel whilst outside</li><li>Observational drawings of the natural world</li><li>Discuss how to care for the living things &amp; their habitats</li><li>Examine change over time</li><li>Express opinions on natural &amp; built environments &amp; opportunities to hear different points of view on the quality of the environment. Use words such as busy, quiet, pollution</li><li>Understand the effect of changing seasons on the natural world around them</li></ul>	<ul style="list-style-type: none"><li>Explore collections of materials with similar and/ or different properties.</li><li>Talk about the differences between materials and changes that they notice</li><li>Characteristics of liquids &amp; solids e.g. cooking eggs, melting chocolate</li><li>Observe &amp; interact with natural processes, such as ice melting, a sound causing a vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object &amp; a boat floating on water</li></ul>	<ul style="list-style-type: none"><li>Extend vocabulary: blossom, buds, bulb, evergreen, deciduous</li><li>Describe what they see, hear &amp; feel whilst outside</li><li>Name &amp; describe some plants</li><li>Draw pictures of plants</li></ul>	<ul style="list-style-type: none"><li>Shows some understanding that good practices with regard to exercise, eating, drinking water, sleeping &amp; hygiene can contribute to good health</li><li>Describe what they see, hear &amp; feel</li><li>Identify different parts of their body &amp; animals</li><li>Be able to show care and concern for living things</li><li>Know the effects exercise has on their bodies</li><li>Have some understanding of growth and change</li><li>Talk about things they have observed including animals</li><li>Observational drawings of animals</li></ul>	Test, fair, why, senses, world, plants – leaf, stem, root, flower, animals, humans, materials - waterproof, natural, change, growth, decay, environment, heavy, light, float, sink, stretch, snap, magnetic, baby, toddler, child, teenager, adult, egg, caterpillar, chrysalis, bark, stick, branch, seasons, melt, liquid, solid, hard, soft, kitten, puppy, foal, calf etc
<b>Reception Knowledge</b>	<b>Autumn</b> Autumn/ Celebrations		<b>Spring</b> Animals/Lifecycles		<b>Summer 1</b> Minibeasts/Occupations
	<ul style="list-style-type: none"><li>Can name own body parts including shoulders, ribs, backbone, knees, elbow</li><li>Can piece back together the parts of the body and locate upon request.</li><li>Can describe key function of the skeletal system</li><li>Can name the 4 seasons</li><li>Can talk about similarities and differences between each season</li><li>Can describe/name the characteristics of each season</li></ul>		<ul style="list-style-type: none"><li>All plants need water, light and warmth to grow and survive</li><li>A seed produces roots to allow water to get into the plant and shoots to produce leaves to collect the sunlight</li><li>Can describe the life cycle of farm animals including chickens</li><li>Knows that meat is produced from animals</li><li>Can describe what changes occur as they change from a baby to an adult</li></ul>		<ul style="list-style-type: none"><li>Know the effects of heating and cooling on ingredients such as melting and freezing</li><li>Can classify a set of objects by their materials- Wood, plastic, fabric, and glass.</li><li>Can name the characteristics of materials</li><li>Can describe the most suitable materials for building and give explanations as to why.</li><li>Use correct terms e.g. chrysalis, pupa when observing life cycle of butterflies &amp; ladybirds</li></ul>
Seasonal changes		Everyday materials	Plants		Animals including humans

Children to be exposed to key vocabulary daily in provision. High quality text to be chosen for story times that allow for questioning opportunities relating to key events. The outdoor classroom will be used as a key feature in our science learning through the natural world.

<b>Experiences</b> Class caterpillars/butterflies Growing plants in the outside classroom.	<b>SMSC</b> Spiritual- by asking questions about the world around them Moral – children are taught how to look after their environment during outdoor learning.	<b>British Values</b> Respect is taught through the need to care for the natural environment Individual liberty is taught through actively encouraging the choices the make when exploring their environment	<b>School values</b> Responsibility is taught through caring for the class caterpillars/butterflies and looking after our plants.
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## KS1 Science Year A

### POS

#### Animals including humans (classification of animals)

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

#### Animals including humans ( animal basic needs)

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

#### Living things and their habitats (what is a living thing? Habitats in local environment)

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

### Working scientifically:

#### : Fair & comparative testing

- gathering and recording data to help in answering questions.
- performing simple tests

#### Research using secondary sources

- Use books from the library service linked to Science topics

#### Identifying, classifying & grouping

- identifying and classifying

#### Pattern seeking

- asking simple questions and recognising that they can be answered in different ways

#### Observing over time

- observing closely, using simple equipment
- using their observations and ideas to suggest answers to questions

### Laws and Theories

**Biology:** Cell theory - cells are the basic structural, functional, and organisational units of all living things

### KS1 Year A – End Points

<b>Animals including humans</b> Classification of animals	<ul style="list-style-type: none"> <li>• To know that vertebrates are divided into five groups - Fish – trout, amphibians -frog, reptiles - snake, birds - robin and mammals – human and dog</li> <li>• To identify, name and label the basic parts of the human body.</li> <li>• To explain which part of the body is associated with each sense.</li> <li>• To know animals can have different diets – carnivore eats other animals, herbivore eats plants and omnivore eats both plants and animals</li> <li>• To name the structure of common animals – Fish have fins, amphibians their skin absorbs water, reptiles have tough scales, birds have a light skeleton system and mammals have hair or fur</li> </ul>
<b>Animals including humans</b> Animals basic needs	<ul style="list-style-type: none"> <li>• Animals can have offspring which grow into adults</li> <li>• Name a life cycle (either frog, butterfly, chicken or human)</li> <li>• For survival - animals need water (fresh water for bodies to function), food (provides energy for existing cells and creates new cells) and air (oxygen to live)</li> <li>• Can explain why exercise, good hygiene and diet is important to animals (improves health and reduces the risk of developing diseases), good nutrition is part of leading a healthy life style, eat a balanced diet</li> </ul>
<b>Living things and their habitats</b>	<ul style="list-style-type: none"> <li>• To be able to sort things into living, dead and never lived</li> <li>• To explain key features that mean the animal or plant is suited to its habitat or micro-habitat and explain in simple terms why an animal or plant is suited to a habitat e.g. the caterpillar cannot live under the soil like a worm as it needs fresh leaves to eat; the seaweed we found on the beach cannot live in our pond because it is not salty</li> <li>• To be able to use a food chain to explain what animals eat</li> </ul>

<b>Experiences</b> Creative animal workshops in school.	<b>SMSC</b> Moral – all children have the right to clean water and food	<b>British Values</b> Respect and Tolerance – animals and people have different diets (herbivore/vegetarian or vegan) Democracy – take turns when grouping vertebrates	<b>school values</b> Honesty – through discussion be honest about the amount of exercise they do Responsibility – we are responsible for the living things within our school and local environment
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## KS1 Science Year B

### POS

#### Seasonal changes

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

#### Everyday materials ( classification of everyday materials and their properties)

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

#### Use of everyday materials

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

#### Plants (basic structure of flowering plants)

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

#### Plants (how seeds and bulbs grow and a plants needs)

observe and describe how seeds and bulbs grow into mature plants

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

### Working scientifically:

#### Fair & comparative testing

- gathering and recording data to help in answering questions.
- performing simple tests

#### Research using secondary sources

- Use books from the library service linked to Science topics

#### Identifying, classifying & grouping

- identifying and classifying

#### Pattern seeking

- asking simple questions and recognising that they can be answered in different ways

#### Observing over time

- observing closely, using simple equipment
- using their observations and ideas to suggest answers to questions

### Laws and Theories

**Physics:** Hooke's Law of Elasticity states that the extension of a spring is directly proportional to the load applied to it i.e. the heavier the load, the longer the stretch

KS1 Science Year B – End Points	
<b>Seasonal changes</b>	<ul style="list-style-type: none"> <li>• Know which months are - Winter (December, January, February), Spring (March, April, May), Summer (June, July, August) and Autumn (September, October, November)</li> <li>• Observe changes across the four seasons – weather, temperature, animals, plants</li> <li>• Explain what weather is usually associated with which season – Winter (snow, ice, cold rain), Spring (warmer, increased rainfall can cause floods), Summer (sun, temperature normally hottest of the year) and Autumn (temperature cools down, rain)</li> </ul>
<b>Everyday materials</b>	<ul style="list-style-type: none"> <li>• An object is something which can be seen or touched</li> <li>• Objects can be made from one or more materials</li> <li>• Know that a material is the matter from which a thing is or can be made from</li> <li>• Know that natural materials comes from plants, animals or the ground</li> <li>• Name a variety of natural everyday materials – water, wood or rock</li> <li>• Know that man-made materials have been made by man</li> <li>• Name a variety of man-made materials – plastic, metal or glass</li> <li>• Can name and know the meanings of some physical properties of every materials – transparent – allows light through, rigid – not flexible, absorbent – able to soak up liquid easily</li> </ul>
<b>Use of everyday materials</b>	<ul style="list-style-type: none"> <li>• Can name the uses for a variety of materials – wood (fuel, making tools, weapons furniture and paper), metal (screws, pots for cooking), paper (books, newspapers, money), rock (household tiles, statues)</li> <li>• Can name the ways solid objects can be changed by – squashing, bending, twisting and stretching</li> </ul>
<b>Plants – basic structure</b>	<ul style="list-style-type: none"> <li>• Plants are a living organism – wild plants grow without human invention and garden plants grow in a garden with human invention</li> <li>• Name a garden or wild plant – garden – Fuchsia, wild – Dandelion</li> <li>• Know the meaning of an evergreen tree and can give an example - has leaves throughout the year that are always green - pine</li> <li>• Know the meaning of a deciduous tree and give an example – shed their leaves seasonally – oak</li> <li>• Know that flowering plants have roots, stem, leaf, flower/petal and seed</li> <li>• Know the structure of a tree – trunk, branches, leaves, blossom and fruit</li> </ul>
<b>Plants- how plants and seeds grow and a plant's needs</b>	<ul style="list-style-type: none"> <li>• Describe that a seed can grow into a new plant, they need water to grow but not light and they store food inside them</li> <li>• Plants grow from bulbs, store food need water but not light</li> <li>• Seeds/bulbs grow into mature plants by being planted, growing roots, small plant will grow through the soil, plant then takes own food from the soil and continues to grow.</li> <li>• Can name types of seeds – sunflower, apple</li> <li>• Can name types of bulbs – daffodil, onion <ul style="list-style-type: none"> <li>• Know in order for plants to stay healthy they need – water, light and suitable temperature to grow</li> </ul> </li> </ul>



<b>Experiences</b> Growing plants from seeds and bulbs Exploring the local environment for changes through the seasons	<b>SMSC</b> Moral – it is our planet and we should look after it Spiritual – sense of enjoyment and fascination of growing things	<b>British Values</b> Respect – the children are taught about some differences between the plants that we grow in Britain and in other countries Individual liberty - children are encouraged to grow a plant of their choice	<b>school values</b> Responsibility – the children look after the plants within the school ground
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LSK2 Science Year A	
<b>POS</b> <b>Rocks</b> <ul style="list-style-type: none"> <li>•compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</li> <li>•describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> <li>•recognise that soils are made from rocks and organic matter</li> </ul> <b>Light</b> <ul style="list-style-type: none"> <li>•recognise that they need light in order to see things and that dark is the absence of light</li> <li>•notice that light is reflected from surfaces</li> <li>•recognise that light from the sun can be dangerous and that there are ways to protect their eyes</li> <li>•recognise that shadows are formed when the light from a light source is blocked by an opaque object</li> <li>•find patterns in the way that the size of shadows change</li> </ul> <b>Sound</b> <ul style="list-style-type: none"> <li>•identify how sounds are made, associating some of them with something vibrating</li> <li>•recognise that vibrations from sounds travel through a medium to the ear</li> <li>•find patterns between the pitch of a sound and features of the object that produced it</li> <li>•find patterns between the volume of a sound and the strength of the vibrations that produced it</li> <li>•recognise that sounds get fainter as the distance from the sound source increases</li> </ul> <b>Electricity</b> <ul style="list-style-type: none"> <li>•identify common appliances that run on electricity</li> <li>•construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</li> </ul>	<b>Working scientifically:</b> <b>Fair &amp; comparative testing</b> <ul style="list-style-type: none"> <li>• setting up simple practical enquiries, comparative &amp; fair tests</li> <li>• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, &amp; tables</li> <li>• using results to draw simple conclusions, make predictions for new values, suggest improvements &amp; raise further questions</li> <li>• asking relevant questions &amp; using different types of scientific enquiries to answer them</li> </ul> <b>Research using secondary sources</b> <ul style="list-style-type: none"> <li>• using straightforward scientific evidence to answer questions or to support their findings.</li> <li>• Use books from the library service linked to Science topics</li> </ul> <b>Identifying, classifying &amp; grouping</b> <ul style="list-style-type: none"> <li>• identifying and classifying</li> <li>• gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> <li>• identifying differences, similarities or changes related to simple scientific ideas and processes</li> </ul>



<ul style="list-style-type: none"> <li>• 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</li> <li>• recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</li> <li>• recognise some common conductors and insulators, and associate metals with being good conductors</li> </ul> <p><b><u>Living things and their habitats</u></b></p> <ul style="list-style-type: none"> <li>• recognise that living things can be grouped in a variety of ways</li> <li>• explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</li> <li>• recognise that environments can change and that this can sometimes pose dangers to living things</li> </ul>	<p><b><u>Pattern seeking</u></b></p> <ul style="list-style-type: none"> <li>• making systematic and careful observations &amp;, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers &amp; data loggers</li> <li>• reporting on findings from enquiries, including oral &amp; written explanations, displays or presentations of results &amp; conclusions</li> </ul> <p><b><u>Observation over time</u></b></p> <ul style="list-style-type: none"> <li>• using their observations and ideas to suggest answers to questions</li> </ul>
<p><b><u>Laws/theories</u></b></p> <p><b>Physics:</b> Quantum theory – light consists of tiny particles which have wavelike properties associated with them. Light is composed of particles called photons.</p> <p>Newton’s light theory – light is composed of coloured particles that combine to appear white</p> <p>Sound theory – sound is a result of a vibration which is produced by a source and then it travels in a medium as a wave and is ultimately sensed in the ear-drum. Sound is a form of energy.</p>	

LSK2 Year A – End Points	
<b>Rocks</b>	<ul style="list-style-type: none"> <li>• To sort and compare rocks</li> <li>• To explain the properties of rocks and why they are chosen for purpose (hard/soft, permeable/impermeable or durability)</li> <li>• To explain the stages of fossil formation (A plant or animal dies in a watery environment, the plant or animal is buried in mud and silt, soft tissues quickly decompose leaving the hard bones or shells behind, over time sediment builds over the top and hardens into rock.)</li> <li>• To name different types of soil (clay, sandy, loamy, peaty)</li> </ul>
<b>Light</b>	<ul style="list-style-type: none"> <li>• To describe how we see objects in light and can describe dark as the absence of light</li> <li>• To state that it is dangerous to view the sun directly and state precautions used to view the sun, for example in eclipse</li> <li>• To define transparent, translucent and opaque</li> <li>• To describe how shadows are formed and how the size of the shadow may change depending how close (bigger) or far away (smaller) it is from the light source</li> </ul>
<b>Sound</b>	<ul style="list-style-type: none"> <li>• To name sound sources and explain how sounds are produced by vibrations of an object</li> <li>• To state that sounds travel through different mediums such as air, water, metal</li> <li>• Explain how the features of an object affect the pitch of the sound and how the strength of the vibration affects the volume</li> <li>• To explain that sounds get fainter as the distance from the sound source increases</li> </ul>

<b>Electricity</b>	<ul style="list-style-type: none"> <li>to name the components in a circuit</li> <li>to make an electric circuit</li> <li>to control a circuit using a switch</li> <li>to give an example of a good conductor (metal - aluminium, copper, gold, water) and good insulators (rubber, plastics, wood , paper)</li> </ul>
<b>Living things and their habitats</b>	<ul style="list-style-type: none"> <li>To use a classification key to help group, identify and name a variety of living things – e.g. can it fly, does it crawl, does it belong in...</li> <li>To identify different types of invertebrates and vertebrates</li> <li>To give an example of how environments can change and how it can potentially pose a danger to living things -global warming, litter, oil spill, chemical pollution, deforestation and land development</li> </ul>

<b>Experiences</b> Local walk looking at uses of rocks Fascinating fossils exhibit at Wakefield Museum.	<b>SMSC</b> Cultural – British scientist Isaac Newton proven light theory that light is made up of coloured particles Moral – to be aware of the negative effects of humans on the planet Social – we discuss the different uses of electricity	<b>British Values</b> Individual liberty – to create a circuit made up of components of their choosing Democracy – turn-taking and collaboration when creating circuits, shadows and sounds	<b>School values</b> We learn from our mistakes – we keep going when our circuits do not work first time. We show respect for others as we work successfully as part of a team investigating sound, light and shadows.
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LSK2 Science Year B	
<b>POS</b> <b>Plants</b> <ul style="list-style-type: none"> <li>identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</li> <li>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</li> <li>investigate the way in which water is transported within plants</li> <li>explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</li> </ul> <b>Forces and magnets</b> <ul style="list-style-type: none"> <li>compare how things move on different surfaces</li> </ul>	<b>Working scientifically:</b> <u>Fair &amp; comparative testing</u> <ul style="list-style-type: none"> <li>setting up simple practical enquiries, comparative &amp; fair tests</li> <li>recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, &amp; tables</li> <li>using results to draw simple conclusions, make predictions for new values, suggest improvements &amp; raise further questions</li> <li>asking relevant questions &amp; using different types of scientific enquiries to answer them</li> </ul> <u>Research using secondary sources</u> <ul style="list-style-type: none"> <li>using straightforward scientific evidence to answer questions or to support their findings.</li> </ul>

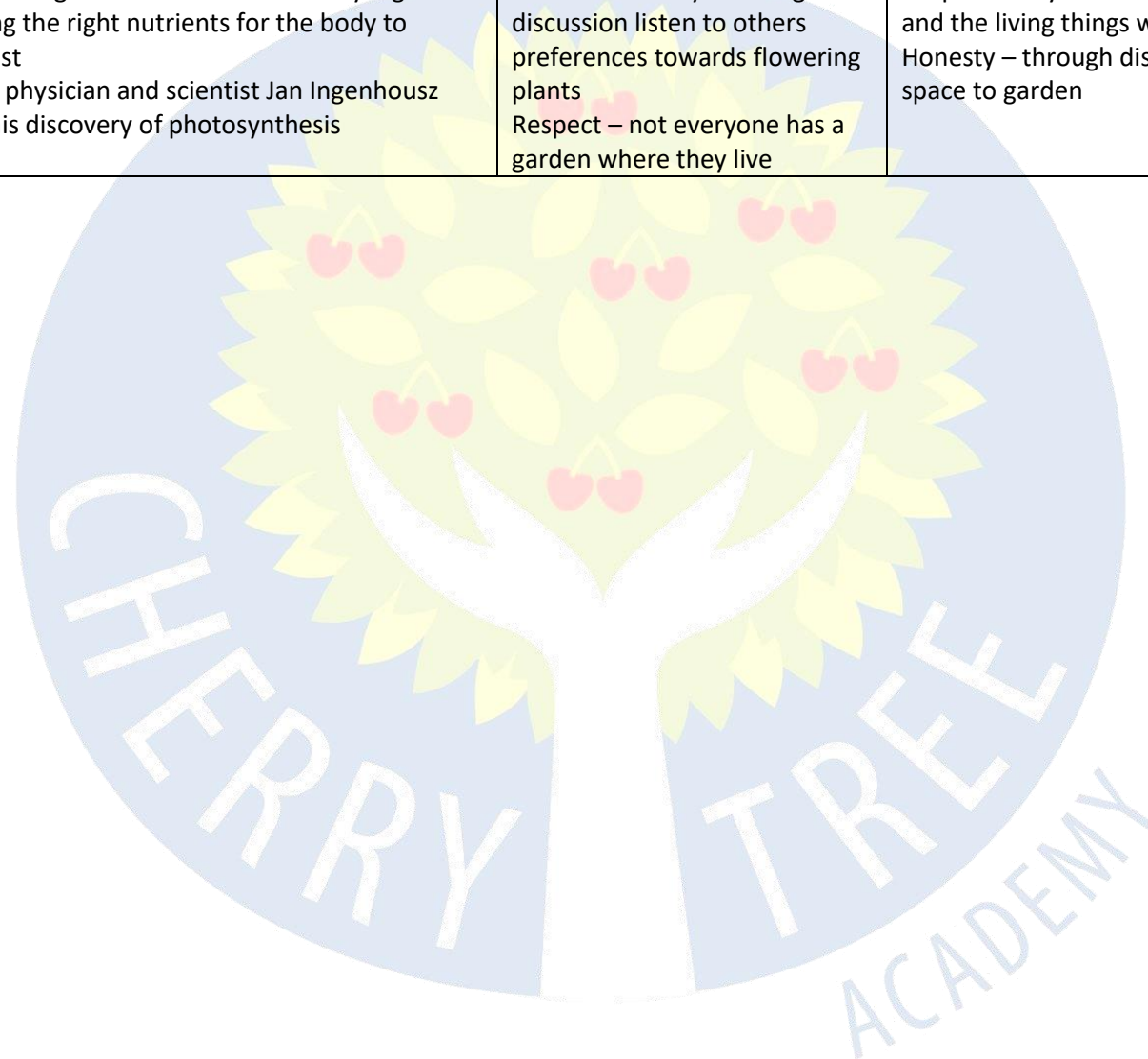
<ul style="list-style-type: none"> <li>•notice that some forces need contact between 2 objects, but magnetic forces can act at a distance</li> <li>•observe how magnets attract or repel each other and attract some materials and not others</li> <li>•compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials</li> <li>•describe magnets as having 2 poles</li> <li>•predict whether 2 magnets will attract or repel each other, depending on which poles are facing</li> </ul> <p><b><u>States of matter</u></b></p> <ul style="list-style-type: none"> <li>•compare and group materials together, according to whether they are solids, liquids or gases</li> <li>•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)</li> <li>•identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</li> </ul> <p><b><u>Animals including humans (nutrition, skeleton and muscles)</u></b></p> <ul style="list-style-type: none"> <li>•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</li> <li>•identify that humans and some other animals have skeletons and muscles for support, protection and movement</li> </ul> <p><b><u>Animals including humans ( digestive system, teeth and food chains)</u></b></p> <ul style="list-style-type: none"> <li>•describe the simple functions of the basic parts of the digestive system in humans</li> <li>•identify the different types of teeth in humans and their simple functions</li> <li>•construct and interpret a variety of food chains, identifying producers, predators and prey</li> </ul>	<ul style="list-style-type: none"> <li>• Use books from the library service linked to Science topics</li> </ul> <p><b><u>Identifying, classifying &amp; grouping</u></b></p> <ul style="list-style-type: none"> <li>• identifying and classifying</li> <li>• gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> <li>• identifying differences, similarities or changes related to simple scientific ideas and processes</li> </ul> <p><b><u>Pattern seeking</u></b></p> <ul style="list-style-type: none"> <li>• making systematic and careful observations &amp;, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers &amp; data loggers</li> <li>• reporting on findings from enquiries, including oral &amp; written explanations, displays or presentations of results &amp; conclusions</li> </ul> <p><b><u>Observation over time</u></b></p> <ul style="list-style-type: none"> <li>• using their observations and ideas to suggest answers to questions</li> </ul>
<p><b><u>Laws/theories</u></b></p> <p><b>Biology:</b> <i>Photosynthesis</i> is a process by which plants, algae and some types of bacteria convert light energy into chemical energy</p> <p><b>Chemistry:</b> Dalton's Law of Partial Pressures states the total pressure by a mixture of gases is equal to the sum of the partial pressures of each of the constituent gases</p> <p>Atomic theory - that matter is composed of particles called atoms</p> <p><b>Physics:</b> Newton's Universal law of Gravitation - any two objects, no matter their mass, exert <a href="#">gravitational</a> force toward one another</p> <p>Newton's first law of motion states an object in motion stays in motion unless acted upon by an outside force</p>	



LSK2 Year B – End Points	
<b>Plants</b>	<ul style="list-style-type: none"> <li>Can explain the function of a flowering plant - roots (anchors the plant, absorbs nutrients and water for growth), stem/trunk (supports the plants, elevates the leaves and flowers, transports water between the roots and the rest of the plant), leaves (produce food for the plant by photosynthesis) and flowers (the reproductive part of the plant)</li> <li>Depending on the plant, they need a certain amount of water, air, light, nutrients from soil and room to grow for life and growth.</li> <li>Explain water can be transported by roots through the stem to the leaves and flower</li> <li>Describe how flowering plants can reproduce – pollination (pollen carried by insects or blown by the wind from one flower to another), seed formation or seed dispersal (movement of seeds or transportation away from the parent plant or can be scattered by wind, animals, explosion, water and animal excretion)</li> <li>Name the life cycle of a plant - seed germination, growth, reproduction, pollination and seed dispersal</li> </ul>
<b>Forces &amp; Magnets</b>	<ul style="list-style-type: none"> <li>Objects can move differently on different surfaces – friction (is the contact force between two objects moving against each other), gravity (force that pulls objects down slopes or makes them fall)</li> <li>Some forces need contact between two objects but magnetic forces can act at a distance</li> <li>Give examples of materials which are magnetic (iron, cobalt, nickel, steel) and which repel (wood, plastic, water)</li> <li>Magnets have two poles – North to North and South to South repel, North to South or vice versa attract</li> </ul>
<b>States of Matter</b>	<ul style="list-style-type: none"> <li>Explain the differences between solids, liquids and gases and group objects into them categories</li> <li>Can explain materials can change state when heated (solid into a liquid, liquid into a gas) or cooled (liquid into a solid, gas into a liquid)</li> <li>Explain that in the Water cycle - evaporation (liquid water (in the ocean, lakes, or rivers) evaporates and becomes water vapour) and condensation (water vapour in the atmosphere condenses and becomes liquid) and water evaporates faster if the temperature is higher.</li> </ul>
<b>Animals including humans (nutrition, skeleton and muscles)</b>	<ul style="list-style-type: none"> <li>Name the 7 types of nutrition animals need - water (essential for survival), carbohydrates (gives animals energy and prevents loss of muscle mass), protein (helps form muscles), fats (boosts absorption of vitamins and protects the organs of the body), vitamins (help the bones grow and support the immune system), minerals (helps the body to work properly), and fibre (helps the digestive system stay healthy)</li> <li>Explain animals cannot make their own food and they get nutrition from what they eat</li> <li>Animals with skeletons and muscles have them to support the body, protect the organs and help the body to move</li> <li>Name some major muscles and bones - muscles (biceps, triceps and quadriceps) and bones (clavicle, pelvis and sternum)</li> </ul>
<b>Animals including humans (digestive system, teeth and food chains)</b>	<ul style="list-style-type: none"> <li>Explain the basic parts and functions of the digestive system - Mouth and teeth (breaks down food by chewing), salivary glands (produces saliva and lubricates the food so it can go down the oesophagus), Oesophagus (tube which moves food to the stomach), stomach (breaks down the food more and produces acid), pancreas (makes hormones (including insulin) to regulate the blood glucose level. Also, makes enzymes that break down food in the intestines), liver (stores energy and helps get rid of toxins), gallbladder (stores bile and releases it to help digest fats), small intestine (absorbs nutrients and minerals from food), large intestine (absorbs water from food), rectum (stores stool until it leaves the body) and anus (where stool leaves the body)</li> <li>Different types of human teeth – incisors (bite off and chew food), canines (tear and rip food) and molars (crush and grind food)</li> <li>Consumers are animals who don't make their own food but they eat plants and other animals</li> <li>Animals which are eaten are called prey</li> <li>Predators are animals who eat other animals</li> </ul>



<b>Experiences</b> Use of school's garden area. Visit by school dentist	<b>SMSC</b> Moral – making the right choices to aid a healthy digestive system and eating the right nutrients for the body to function at its best Cultural – British physician and scientist Jan Ingenhousz best known for his discovery of photosynthesis	<b>British Values</b> Individual liberty – through discussion listen to others preferences towards flowering plants Respect – not everyone has a garden where they live	<b>school values</b> Responsibility – looking after plants that they are growing and the living things within the allotment Honesty – through discussion about who gardens and has space to garden
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## POS

### 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

### 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

### 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

### Earth and Space

- 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

## Working scientifically:

### Fair & comparative testing

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- using test results to make predictions to set up further comparative and fair tests

### Research using secondary sources

- identifying scientific evidence that has been used to support or refute ideas or arguments.
- Use books from the library service linked to Science topics

### Identifying, classifying & grouping

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

### Pattern seeking

- making systematic and careful observations &, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers & data loggers
- 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

### Observation over time

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

<b>Animals including humans (stages in a human's growth)</b> •describe the changes as humans develop to old age	
<b>Laws/theories</b> <b>Physics:</b> Fourier's law of thermal conduction states that the time rate of heat transfer through a material is proportional to the negative gradient in the temperature and to the area Archimedes Buoyancy principle - the force acting on a submerged or partially submerged object equals the weight of the liquid that the object displaces The Law of Reflection states that the angle of the incident light ray is equal to the angle of the reflected light ray Hubble's Law of Cosmic Expansion - established that the universe is made up of many galaxies Kepler's law of planetary motion -that planets orbit the sun elliptically	

USK2 Year A – End Points	
<b>Properties and changes of materials</b>	<ul style="list-style-type: none"> <li>To suggest materials appropriate for particular uses based on their properties</li> <li>To explain dissolving and separation of solids from liquids using filters, sieves and evaporation.</li> <li>To know solids dissolve in water to form a solution</li> <li>To separate mixtures using a range of techniques.</li> <li>To explain which changes are reversible and which are not reversible.</li> </ul>
<b>Forces</b>	<ul style="list-style-type: none"> <li>To understand that objects fall due to gravity pulling them down towards the earth</li> <li>To understand friction, water resistance and air resistance and can explain the effect of these on moving objects.</li> <li>To give examples when it is beneficial to have high or low friction, water resistance and air resistance</li> <li>To recognise levers, gears and pulleys and that these enable a smaller force to have a greater impact.</li> </ul>
<b>Light</b>	<ul style="list-style-type: none"> <li>To describe, with diagrams or models as appropriate, how light travels in straight lines either from sources or reflected from other objects into our eyes</li> <li>To describe, with diagrams or models as appropriate, how light travels in straight lines past translucent or opaque objects to form a shadow of the same shape</li> </ul>
<b>Earth and Space</b>	<ul style="list-style-type: none"> <li>Earth is a sphere, spins on an axis as it travels round the sun, when one sides faces the sun the other faces space</li> <li>The side facing the sun is bathed in light and heat (daytime) Side facing space, cooler and darker (night)</li> <li>A day on Earth last 24 hours – how long it takes to orbit the sun</li> <li>Earth's tilt on its axis is what causes the 4 seasons. Sometimes it points towards the sun and other times it points away from the sun.</li> <li>Moon - moves around the Earth in an approximately circular orbit, once around the Earth is approximately 27.3 days and as it orbits the earth its position changes</li> </ul>
<b>Animals including humans – stages to old age</b>	<ul style="list-style-type: none"> <li>To explain the changes that takes place in boys and girls during puberty</li> <li>To explain how a baby changes physically as it grows and also what it is able to do</li> <li>To understand the lifecycle of a human (baby, child, adolescent, adulthood)</li> </ul>



<b>Experiences</b> Immersive Planetarium School nurse to discuss changes during puberty	<b>SMSC</b> Spiritual – by showing willingness to reflect on their experiences within their family Social – working with other pupils when completing experiments Culture – understanding the importance of Isaac Newton’s role in developing the principles of modern physics	<b>British Values</b> Individual liberty - through discussion children talk about their experiences within their family life Mutual respect and tolerance – through listening to others opinions when working with materials	<b>School values</b> We show respect for others as we work successfully as part of a team investigating sound, light and shadows
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USK2 Science Year B	
<p><b>POS</b></p> <p><b><u>Electricity</u></b></p> <ul style="list-style-type: none"> <li>•associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</li> <li>•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</li> <li>•use recognised symbols when representing a simple circuit in a diagram</li> </ul> <p><b><u>Evolution and inheritance</u></b></p> <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> <p><b><u>Living things and their habitats (life cycles)</u></b></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> </ul> <p><b><u>Living things and their habitats (classification of living things)</u></b></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</li> </ul> <p><b><u>Animals including humans (circulatory system and how to keep the body healthy)</u></b></p> <ul style="list-style-type: none"> <li>•identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</li> </ul>	<p><b>Working scientifically:</b></p> <p><u>Fair &amp; comparative testing</u></p> <ul style="list-style-type: none"> <li>• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> <li>• using test results to make predictions to set up further comparative and fair tests</li> </ul> <p><u>Research using secondary sources</u></p> <ul style="list-style-type: none"> <li>• identifying scientific evidence that has been used to support or refute ideas or arguments.</li> <li>• Use books from the library service linked to Science topics</li> </ul> <p><u>Identifying, classifying &amp; grouping</u></p> <ul style="list-style-type: none"> <li>• recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</li> </ul> <p><u>Pattern seeking</u></p> <ul style="list-style-type: none"> <li>• making systematic and careful observations &amp;, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers &amp; data loggers</li> <li>• 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</li> </ul> <p><u>Observation over time</u></p> <ul style="list-style-type: none"> <li>• taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</li> </ul>



<ul style="list-style-type: none"> <li>•recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</li> <li>•describe the ways in which nutrients and water are transported within animals, including humans</li> </ul>	
<b>Laws/theories</b> <b>Physics:</b> Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points <b>Biology:</b> Darwin's theory – Natural Selection	

USK2 Year B – End Points	
Electricity	<ul style="list-style-type: none"> <li>• Voltage - the difference in electrical energy between two parts of a circuit, bigger the voltage, bigger the current</li> <li>• Current - amount of electricity flowing through the circuit (a flow of electrons moving in a loop in the circuit).</li> <li>• Cells - More cells and voltage through a circuit the brighter (bulb) or louder (buzzer), Less cells and voltage through a circuit the dimmer (bulb) or quieter (buzzer)</li> <li>• Longer wires (bulb dimmer) - This is because there is more resistance.</li> <li>• More batteries, the bulbs will get brighter - This is because there is less resistance and a greater current.</li> <li>• Parallel circuit - more than one resistor (bulb) and they are arranged on many paths. Found in most homes and devices - provides more than one way for a current to flow through to a device.</li> <li>• Recognise symbols of a simple circuit</li> </ul>
Evolution and inheritance	<ul style="list-style-type: none"> <li>• Evolution - a change in the characteristics of living things over time. It happens when there is competition to survive (natural selection). Happens when there are differences within a species caused by inheritance and mutations.</li> <li>• Inheritance - something is passed on to the next generation. Offspring are not identical to their parents and some characteristics are inherited. Other differences new in the offspring – mutations</li> <li>• Fossils provide information about living things that inhabited the Earth millions of years ago</li> <li>• Animals and plants that have adapted to their environment - camel has humps of fat storage to use up for energy in the dry desert when there is a shortage of food, polar bear has camouflaged itself against white snow/ice so it can hunt without being seen, cactus stores water to help keep it alive in the desert.</li> <li>• Adaptation leading to evolution - Evolution by natural selection, organisms that possess heritable traits that enable them to better adapt to their environment compared with other members of their species will be more likely to survive, reproduce, and pass more of their genes on to the next generation</li> </ul>

Living things and their habitats (life cycles)	<ul style="list-style-type: none"> <li>• Typically 4 stages of the life cycle - birth , growth , reproduction and death</li> <li>• Life cycle of a mammal - live young born and get milk from mothers, grow from babies to adults, reproduce then die</li> <li>• Life cycle of an amphibian - egg in jelly laid in water, develops tail and legs, grows lungs to breathe and leaves water, takes 2 years to grow to adult size</li> <li>• Life cycle of an insect - eggs laid by the female insect, larva – Eggs hatch and larva is born. It sometimes looks different to the adult self, pupa – When the larva moults for the last time, a pupa is formed. It acts as a camouflaged, protective shell for the larva to transform, Adult – The adult breaks out of the pupa and matures. Some insects only have a 3 stage: The insect is born as an egg, hatches as a nymph and changes into an adult.</li> <li>• Life cycle of a bird – Egg, hatches and is fed by the parents, juvenile– leaves the nest when flight feathers are grown, adult attracts mate to reproduce</li> <li>• Reproduction in plants - the production of new offspring in plants, sexual reproduction involves pollen from one flower fertilising the egg of another to produce a seed, Only one parent is needed in asexual reproduction and the offspring are exact copies.</li> </ul>
Living things and their habitats (classification using observable characteristics)	<ul style="list-style-type: none"> <li>• Classification - the arrangement of animals and plants in groups according to their observable characteristics</li> <li>• Classified into broad groups- Invertebrates (insects, arachnids, snails, worms), Vertebrates (reptiles, fish, amphibians, birds, mammals), Plants (Non-flowering and flowering), Micro-organisms- (Bacteria, fungi (yeast and mould) viruses, algae, protists)</li> <li>• Micro-organism - is microscopic, making it too small to be seen unaided by the human eye</li> <li>• Examples of useful micro-organisms – in dairy products to make butter, cheese and yoghurt, used to make bread, in sewage treatment</li> </ul>
Animals including humans (circulatory system and how to keep the body healthy)	<ul style="list-style-type: none"> <li>• Nutrients - transport throughout body through blood via capillaries, tiny blood vessels that connect arteries to veins. Nutrients, oxygen and wastes all pass in and out of the blood through the capillary walls</li> <li>• A drug - medicine or other substance which has a physiological effect when ingested or otherwise introduced into the body. Stimulants speed or 'stimulate' the central nervous system making you feel more alert and confident. Can cause increased heart rate, blood pressure and body temperature, reduced appetite, agitation and sleeplessness</li> <li>• Main parts of human circulatory system - Heart (an organ that pumps blood throughout the body), blood vessels, (transport blood throughout the body), blood (supplies oxygen and essential nutrients to cells and tissues)</li> <li>• Blood vessels - Arteries (Take blood AWAY from the heart to the body organs and tissues. When blood is pumped through these, you can feel your pulse), Veins (Take blood TOWARDS the heart from body organs and tissues) Capillaries (tiny blood vessels which take the blood into organs and tissues).</li> </ul>

<p><b>Experiences</b></p> <p>Charles Waterton Exhibition at Wakefield Museum Use of garden area to classify plants and minibeasts</p>	<p><b>SMSC</b></p> <p>Spiritual- by asking questions about the world around them and how living things rely on and contribute to their environment. Moral – recognising the right choices to have a healthy body Cultural – through understanding how Charles Darwin’s original theory of natural selection has influenced genetics and the way evolution shapes our world.</p>	<p><b>British Values</b></p> <p>Individual liberty – recognising that people have a choice in how they look after their body (choice of diet) Mutual respect and tolerance – through listening to others when discussing life cycles of mammals.</p>	<p><b>School Values</b></p> <p>Responsibility is taught through keeping the body healthy discussions Honesty is taught through discussions of looking after the body</p>
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