**Bromesberrow St. Mary’s Science Curriculum**

In Early Years at Bromesberrow, we see it as essential that children connect with their world, engaging, responding and interacting with what they see, hear, smell, touch and taste. Children need to actively explore to forge these connections and understanding where they can and use books and virtual exploration to gain an understanding of the wider world. We work to foster a love and respect for the natural world and those people who inhabit it. We want our children to be ecologically aware, so that they grow up caring for the world, developing a strong sense of sustainability.

**Early Years: Knowledge of the World**

**Characteristics of Effective Teaching and Learning:**

Playing and Exploring:

* showing curiosity about objects and people.
* Using senses to explore the world around them.
* Showing particular interests.

Active Learning:

* Showing high levels of energy, fascination.
* Paying attention to details.

Creating and Thinking Critically:

* Making links and noticing patterns in their experiences.
* Making predictions.
* Testing their ideas
* Developing ideas of grouping, sequences, cause and effect.



**Working Scientifically in the Early Years:**

* I question why things happen **e.g. How come daffodils regrow every year and some flowers don’t?**
* I begin to use science words **e.g. the sea creatures all belong in this group and the birds in this one.**
* I can talk about things like plants, animals, natural and found objects **e.g. why do some trees lose their leaves in winter time?**
* I can create simple representations of people and objects **e.g. children draw an observational drawing of the human eye**
* I have my own ideas **e.g. what might happen if I mix this mud in the water? Will the water turn brown? Will the mud sink to the bottom?**
* I test my ideas **e.g. I wonder what will happen if I push this car down the ramp harder than last time?**
* I notice similarities and differences **e.g. this leaf is rougher compared to this leaf (which is soft and a little bit furry)**
* I can use my senses and look closely **e.g. I can hear that when I hit this pan it sounds deeper than the other one.**
* I use equipment and tools carefully.

 **Preschool (3-4 yrs)**:

**Materials and their properties:**

* Children need to use their senses in hands-on exploration of natural materials e.g. when looking at leaves use senses to describe how they look, feel, sound and smell e.g**. the leave feels bumpy on the back, but smoother on the front.**
* Children are able to explore different materials with similar/different properties to compare e**.g. looking at fabric materials and deciding which would be best to use for a waterproof den and investigating different bark patterns on trees**
* Children are able to talk about the things they explore, building new vocabulary with the adults around them e.g. **this isn’t just a stick; it is a bendy and rough stick.**

**Changing Materials**

* Children notice changes in materials **e.g. ice cubes melting in the sun.** They recognise that these changes happen for a reason **e.g. ice cubes change to water because they are heated by the sun, which makes them melt.**
* Through regular cooking opportunities, children recognise changes **e.g. when wet and dry ingredients are combined or when bread rises due to the effect of heat on the yeast ingredient.**
* Children are able to compare objects that float and sink and begin to connect this to material propertied **e.g. the metal ball is heavy so it sinks, but the plastic ball is lighter and so it floats.**
* Children see that light is ‘blocked’ by objects and notice the shadow formed **e.g. they spot a shadow of their hand and are able to share that their hand is blocking the sun.**
* Children are able to use and explore new vocabulary taught through direct teaching and quality interactions **e.g. melting, heat, change, shadow, sunlight, heavier, lighter, floating, sinking…**

**Plants and Animals**

* Children know that a seed needs soil, water and sunlight to grow **e.g. they notice that a plant left in a pot with no water will wilt and die or that plants that are overwatered will rot.**
* Children are actively involved in the process of ‘growing’. They sow seeds, noticing changes as they grow and then produce new seeds, to when they decay (and can be used in the composting process) **e.g. they plant carrot seeds, nurture these. They harvest the root and taste this. One of the plats they leave to ‘go to seed’. They collect the seeds from this and take these home to grow their own next year.**
* Children learn about animal life cycles, noticing and being curious about the changes **e.g. they watch caterpillars hatch, grow, change into chrysalises and then hatch out into butterflies.**
* Children know that living things need care **e.g. that ladybirds need to be handled with care or they will be harmed and that pets depend upon us for food and water.**

 **Reception**

**Materials and their properties:**

* Children explore the world around them using their senses at a deeper level of play (demonstrating their prior knowledge and experiences of materials) e.g:

-When wanting to build a stage they decide not to use the foam blocks but use the crates and wooden blocks instead. They explain that the foam blocks are too squishy and soft and will not hold their weight. They choose the crate and wooden blocks because they are stronger and do not bend.

-When exploring best material to use to make a ‘boat that floats’, they decide that paper will become ‘soggy’, soak up the water and sink. They discard cardboard for the same reason, although they did suggest that it would take longer to become soggy and sink. They decide to use ‘plastic’ as they felt this would float and not soak water up. They choose to use small Lego. They notice that sometimes their Lego models will float and other times they will sink.

* Children use their vocabulary taught and acquired to explain their choices and reasoning whilst investigating **e.g. when describing the effect of water on paper using words like soggy, change, soaked, absorb, sink.**
* Children learn more about materials and recognise that different materials can be used for different things **e.g. wool is good for soaking up a water spillage and is warm to wear.**

**Changing Materials**

* Children know that materials change, when ‘something happens’ e.g. they recognise that water can be changed by freezing it to make ice cubes and that these ice cubes can melt back to water; and that chocolate left in the sun will melt. They know that ‘heat’ and ‘cold’ make the change happen.
* Children use an increasing range of vocabulary to explain changes from their observation **e.g. when the sun heats up the chocolate it melts. It becomes all sticky and runny, not hard like chocolate usually is. If you put it in a fridge chocolate becomes really hard, so hard that I cannot bite it.**

**Plants and Animals**

* Children use their senses to explore the natural world at a deeper level of play e.g:
* They listen to the different bird calls of the blackbird and pheasants. They imitate these and can identify the birds from this.
* They discover that we have quite a few different beetles and bugs around. They decide to make them some homes after listening to the story ‘Bug Homes’ by Clover Robin. They use the story to decide that the beetles will need sticks, canes and straw. They collect some sticks. The following dy 2 children bring in starw from home. They work together to create some homes.
* Children collect a worm in a bug pot. They look closely through the magnifier top. They notice the ‘saddle’ and the ridges on the worm. They decide to draw their own worms including these features.
* Children learn to identify, name and describe some of the plants and animals they encounter regularly in their environment
* They notice that the rain gauge has filled up more because it has rained heavily
* They see the changes to the environment depending on the season, noticing that in Autumn the leaves change colour and begin to fall from the trees.

**Class 1/Y1 - Autumn term**

**Animals, inc Humans**

 **Our Curriculum:**

* Children need to know there are many different types of animals (**mammals, reptiles, amphibians, birds, fish**), that some live in water, some live on land, some fly in the sky.
* Children need to understand how to take care of animals taken from their local environment and the need to return them after study.
* Children need to be able to group animals according to their features, be able to label a picture of an animal and describe similarities and differences between animals.
* Children need to understand the meaning of **carnivore**, **herbivore** and **omnivore** and be able to classify animals according to these labels.
* Children need to name and label key body parts.
* Children need to know we have five **senses** (**sight, hearing, touch, taste and smell)** and to know which body parts are associated with our senses.
* Children need to know some of the different parts of the **eye** (**eyelashes, eyelids, cornea**) and what their purpose is.
* Children need to know that sounds travel through our **ears** to send messages to our brain.

**National Curriculum Objectives:**

* Identify and name a variety of common animals including fish, amphibians, reptiles, birds and animals.
* 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 (fish, amphibians, retiles, birds and mammals, including pets)
* Identify, name, draw and label the basic [arts of the human body and say which part of the body is associated with each sense.

**Key Questions:**

***Q: Am I a mammal, amphibian, reptile, bird or fish?***

***Q: How do scientists group animals?*** (classification)

***Q: How do my senses work?***

**Working Scientifically:**

* I can ask simple questions e.g. where does this animal live?
* I can compare things. I can sort and group them e.g. Is this animal a carnivore, herbivore or omnivore?
* I perform simple tests.
* I talk about what I have found out.
* I recognise that questions can be answered in different ways.
* I use simple scientific language e.g. What is the cornea?
* I gather and record simple data in different ways e.g. using a tally chart to measure how many different animals live in a habitat
* I observe closely
* I use simple equipment to make measurements.

**Working at Greater Depth:**

* Children are able to describe why an animal is suited to a particular habitat
* Children are beginning to classify animals according to a number of given criteria
* Children can point out differences between living and non-living things

 **Key Vocabulary:**

Mammal, amphibian, reptile, bird, fish, grouping, classification, similar, different, warm-blooded, cold-blooded, features,

Body, arm, leg, foot, toes, hand, fingers, neck, head, hair, face, mouth, teeth, stomach, back, knee, elbow, eye, eyelashes, eyelids, cornea, ear, eardrum, vibration, sound, touch, skin, taste, tongue, tastebuds, sweet, salt, bitter, sour, nose, smell, scent.

 **Our Curriculum:**

* Children need to know that ‘material’ is what an object is made from (not to be confused with fabric).
* Children need to be able to name a range of objects and name what they are made from.
* Children need to name a variety of different materials (**wood, plastic, glass, metal, water, and rock**)
* Children need to be able to describe the physical property of the material (**rough/smooth, flat/bumpy, sharp/blunt, hard/soft, rigid/floppy, waterproof/not waterproof)**
* Children need to be able to sort and compare materials using their physical properties.
* Children are able to sort materials by a given criteria e.g. waterproof and non- waterproof
* Children explore materials and how they can change their shape by **bending, squashing, twisting and stretching.**

**Class 1/Y1 - Spring term**

**Everyday Materials**

**National Curriculum Objectives:**

* 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.

**Key Questions:**

***Q: What material are objects made from?***

***Q: How can I compare everyday materials?***

**Working at Greater Depth**

* Children need to use more complex, advanced language to describe materials e.g. absorbent/ non-absorbent and opaque/transparent
* Children are able to describe things that are similar and different between materials
* Children can explain what happens to certain materials when they are heated, e.g. bread, ice, chocolate
* Children can explain what happens to certain materials when they are cooled, e.g. jelly, heated chocolate?

**Working Scientifically:**

* I can ask simple questions e.g. what material is this made out of?
* I can compare things. I can sort and group them e.g. I can sort objects based on whether they are made of wood or plastic
* I perform simple tests e.g. investigating which materials are most waterproof
* I talk about what I have found out e.g. being able to share that a material is most waterproof and why, using results of investigation as evidence.
* I recognise that questions can be answered in different ways.
* I use simple scientific language.
* I gather and record simple data in different ways e.g. recording waterproof material test using a simple table
* I observe closely
* I use simple equipment to make measurements.

 **Key Vocabulary:**

Material, object, property, wood, plastic, glass, metal, water, rock, rough, smooth, flat, bumpy, sharp, blunt, hard, soft, rigid, floppy, bendy, bendable, waterproof, non-waterproof, hard, squashing, squeezing, twisting and stretching

 **Our Curriculum:**

* Children need to observe the growth of trees and plants in the school environment throughout the year.
* Children need to observe the changes that occur throughout the year, relating these to the four seasons
* Children need to keep a record of how trees or plants change over time.
* Children need to know the difference between deciduous and evergreen.
* Children need to know tree and plant structures and be able to name the parts.

**Class 1/Y1 - Summer term**

**Plants**

**National Curriculum Objectives:**

* identify and name a variety of common plants, including garden plants, wild plants and trees, and those classified as deciduous and evergreen.
* identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers

**Key Questions:**

***Q: What trees and plants grow in our school grounds?***

***Q: What are the different parts of trees and plants called?***

***Q: How do the trees and plants change throughout the year?***

**Working Scientifically:**

* I can ask simple questions e.g. why do some trees lose their leaves in winter?
* I can compare things. I can sort and group them e.g. sorting trees based upon whether they are evergreen or deciduous
* I perform simple tests.
* I talk about what I have found out e.g. evergreen trees tend to have thinner, smaller and tougher leaves than deciduous trees. This helps them to survive the cold winter.
* I recognise that questions can be answered in different ways e.g. how do plants create more plants? Through pollination and seed dispersal or through clones (asexual reproduction)
* I use simple scientific language.
* I gather and record simple data in different ways.
* I observe closely e.g. noticing the changes in a plants growth, from tiny seed, through to adult and then dying back.
* I use simple equipment to make measurements.

**Working at Greater Depth**

* Children begin to describe what each part of a plant does (e.g. roots, stem, leaves, petals, pollen) on a range of plants.
* Children are able to identify and name a range of different trees and plants native to the UK
* Children know where some different native plants may live, describing habitat and environment

 **Key Vocabulary:**

Common, wild, garden, deciduous, evergreen, flower, tree, structure, leaves, blossom, buds, bark, petals, fruit, root, bulb, seed, trunk, branches, stem, oak, ash, horse chestnut, beech, daffodil, crocus, nettles, bluebells, sunflowers, (naming flowers and vegetables is dependent on what is being grown).

**Our Curriculum:**

**Uses of Everyday Materials**

* Children are able to describe (using their senses) the simple physical properties of a variety of everyday materials
* Children are able to compare and group together a variety of materials based on their simple physical properties
* Children are able to use scientific language to describe observations
* Children explore how the shapes of solid objects can be changed through squashing, bending, twisting and stretching
* Children use this knowledge of properties to suggest suitable uses for different materials
* Children practically and scientifically investigate the suitability of different materials for a particular purpose e.g. a flexible, bouncy, but strong material for a ball.

**Rocks**

* Children are able to compare and group together different rocks based upon their observations
* Children are able to describe the differences between a sedimentary, igneous and metamorphic rock
* Children know some of the ways we use rocks e.g. granite for worktops
* Children are able to describe how a fossil is formed and understand that this is an imprint of the object or living thing that once existed.
* Children know that soils are made from rocks and organic matter

**Class 2 - Autumn A**

Uses of Everyday Materials (Y2) Rocks (Y3)

**National Curriculum Objectives:**

**Y2**

* 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.

**Y3**

* 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.

**Key Questions:**

***Q: Are you able to describe materials and group based on properties?***

***Q: How can a material be changed?***

***Q: Which material is most suitable for a specific purpose?***

***Q: Can you describe different types of rocks?***

***Q: How were fossils formed?***

***Q: What is soil made of?***

**Working at Greater Depth**

**Materials**

* Children are able to give reasons why a material would be unsuitable for a purpose e.g. why clay would be of no use in making a football.
* Children use more advanced scientific language to describe properties e.g. transparent or opaque.
* Children are confident to group materials and are able to justify and explain their choices
* Children are able to recognise the effect of heating and cooling on a material and describe these changes e.g. heat added to chocolate makes it melt and turn into a liquid.
* Children recognise the effect of exerting pressure on an object through bending or twisting e.g. an elastic band gets longer and will return to its original shape, unless stretched too far.
* Children can explore the work of notable Scientists e.g. John Dunlop and rubber

**Rocks**

* Children are able to explain the differences between igneous, sedimentary and metamorphic rocks based on how they were formed.
* Children can confidently describe and offer uses for rocks in our everyday lives

 **Key Vocabulary:**

Y2-–fabric, cardboard, wood, metal, plastic, glass, rubber, elastic, twist, stretch, bend, squash, material, recycle, reuse, property, use, compare, sort, group, different, hard, soft, tough, strong, weak, shiny, dull, rock, fossil

Y3- fabric, cardboard, wood, metal, plastic, glass, rubber, elastic, twist, stretch, bend, squash, material, recycle, reuse, property, use, compare, sort, group, different, hard, soft, tough, strong, weak, shiny, dull, rigid, brittle, transparent, opaque, absorbent, non-absorbent, John Dunlop, igneous, sedimentary, metamorphic, permeable, impermeable, organic matter, topsoil, subsoil, trace fossil, cast fossil

**Working Scientifically:**

**Y2**

* I ask simple questions and recognise that they can be answered in different ways
* I observe closely, using simple equipment
* I perform simple tests e.g. testing the waterproof properties of different materials
* I identify and classify e.g. children group materials into man made or natural
* I use my observations and ideas to suggest answers to questions
* I gather and record data to help in answering questions.

**Y3**

* I ask relevant questions and use different types of scientific enquiries to answer them e.g. what material would be best to make an umbrella?
* I set up simple practical enquiries, comparative and fair tests
* I make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers e.g. testing insulating materials for a thermal flask
* I gather, record, classify and present data in a variety of ways to help in answering questions e.g. using an identification key to find out the name of different rocks
* I record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables e.g. recording temperature fall over time using a line graph
* I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
* I use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
* I identify differences, similarities or changes related to simple scientific ideas and processes
* I use straightforward scientific evidence to answer questions or to support their findings.

**Our Curriculum:**

* Children understand animal and human lifecycles, recognising that animals give birth to life young who grow into adults
* Children are able to describe some different animals life cycles
* Children are able to describe the importance and impact of good , balanced nutrition and exercise on the body
* Children understand the importance of hygiene in keeping the body safe and well.
* Children know what animals and humans need to survive in terms of nutrition, water and air
* Children understand that animals and humans cannot make their own food and that they get their nutrition from what they eat.
* Children know how animals and humans take in nutrition, water and air
* Children are able to recognise the importance and role of the skeleton in animals and humans (knowing this provides protection, support and movement)

**Class 2 – Spring A**

Animals including humans

**National Curriculum Objectives:**

**Y2**

* 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.

**Y3**

* 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.

**Key Questions:**

***Q: What is the life cycle of a human?***

***Q: How can humans stay fit and healthy?***

***Q: What is the skeleton for?***

**Working at Greater Depth**

* Children are able to explain about connectivity in food chains and how some animals are dependent on others for their survival
* Children are able to explain how the skeletal and muscular systems work together to create movement
* Children use scientific language to describe e.g. oxygen instead of air

**Working Scientifically:**

**Y2**

* I ask simple questions and recognise that they can be answered in different ways
* I observe closely, using simple equipment e.g. looking at different lifecycles and changes from birth to adulthood
* I perform simple tests
* I identify and classify
* I use my observations and ideas to suggest answers to questions
* I gather and record data to help in answering questions.

**Y3**

* I ask relevant questions and use different types of scientific enquiries to answer them e.g. what would happen to the body if it didn’t get the right nutrition?
* I set up simple practical enquiries, comparative and fair tests
* I make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
* I gather, record, classify and present data in a variety of ways to help in answering questions e.g. measuring and recording my heart rate as I exercise and explaining why this is important
* I record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
* I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
* I use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
* I identify differences, similarities or changes related to simple scientific ideas and processes
* I use straightforward scientific evidence to answer questions or to support their findings.

 **Key Vocabulary:**

Y2- basic needs, survive, food, water, vitamins and minerals, hygiene, baby, toddler, child, teenager, adult, age, lungs, air, life cycles, exercise, hygiene

Y3- basic needs, survive, food, water, vitamins and minerals, hygiene, baby, toddler, child, teenager, adult, lungs, air, life cycles, exercise, hygiene, oxygen, skeleton, nutrition, endoskeleton, carbohydrates, protein, fibre, dairy, vitamins, minerals, exoskeleton, movement, support, strength, protect, contract, relax, body, organ

**Our Curriculum:**

Y2

* Children know what plants need to grow and flourish e.g. water, sunlight, nutrients in soil and the correct temperature.
* Children are able to observe, describe and illustrate how seeds and bulbs grow into mature plants
* Children investigate the impact of removing one of the key ‘needs’ of a plant e.g. water, light or warmth

Y3

* Children can recognise a range of different trees and plants native to the UK
* Children are able to identify and describe the functions of different parts of flowering plants e.g. root, stem, trunk, petals, buds, leaves and flowers
* Children know what plants need to survive e.g. water, air, sunlight, nutrients, the correct temperature and space
* Children gain an understanding of how water is transported in plants e.g. through carnations/daffodils and coloured water.
* Children explore the life cycle of a flowering plant e.g. watching videos on pollination, seed formation and seed dispersal-leading to new flowering plants

**Class 2 – Summer A**

Plants

**National Curriculum Objectives:**

**Y2**

* 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.

**Y3**

* 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.

**Key Questions:**

***Q: What do plants need to grow?***

***Q: What are the functions of different parts of a flowering plant?***

***Q: How is water transported in plants?***

***Q: What is the role of flowers?***

**Working at Greater Depth**

* Children are able to classify a range of common plants based on habitat, appearance and size
* Children are able to describe the process of germination, knowing that seeds need a growing medium e.g. soil, ten the right temperature and amount of water. Children recognise that light is not needed at the stage.
* Children can explain clearly and present regarding the role of flowers in flowering plants e.g. pollination, seed formation and dispersal

**Working Scientifically:**

**Y2**

* I ask simple questions and recognise that they can be answered in different ways
* I observe closely, using simple equipment
* I perform simple tests e.g. bean seeds growing under different conditions (absence of light/water and temperature variation)
* I identify and classify
* I use my observations and ideas to suggest answers to questions
* I gather and record data to help in answering questions e.g. looking at different fruits and comparing seeds in terms of position and how these might be best dispersed

**Y3**

* I ask relevant questions and use different types of scientific enquiries to answer them
* I set up simple practical enquiries, comparative and fair tests
* I make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
* I gather, record, classify and present data in a variety of ways to help in answering questions
* I record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
* I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions e.g. explaining different mathods of seed dispersal and how plants have adapted well to this.
* I use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions e.g. will seeds grow the same plant from parent?
* I identify differences, similarities or changes related to simple scientific ideas and processes
* I use straightforward scientific evidence to answer questions or to support their findings.

 **Key Vocabulary:**

Y2- Temperature, germination, life cycle, life process, grain, growth, observe, record, inside, outside, flower, petal, stem, trunk, nutrients, mature

Y3- Temperature, germination, life cycle, life process, grain, growth, observe, record, inside, outside, flower, petal, stem, trunk, nutrients, mature, variety, variation, pollen, seed dispersal, fertilisation, ovary, ovule, sepal, stamen, anther, absorb, nonflowering, germination

**Our Curriculum:**

* Children recognise that they need light in order to see things
* Children know that dark is the absence of light
* Children are able to identify different sources of light
* Children know that the sun is a powerful light source and that it should not be looked at directly
* Children understand that light is reflected from surfaces e.g. they know that light travels in a straight line to the object, which reflects in a straight line to the mirror, which reflects in a straight line to the eye.
* Children recognise that shadows are formed when an object blocks the light from a light source, so the light cannot travel through and is reflected (e.g. light shirt) or absorbed (dark shirt).
* Children explore the change in shadows dependent on the position and strength of the light source.

**Class 2 - Autumn B**

Light

**National Curriculum Objectives:**

**Y3**

* 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 an opaque object
* Find patterns in the way that the size of shadows change

**Key Questions:**

***Q: Why do we need light?***

***Q: How can see reflections in a mirror?***

***Q: How does light travel?***

***Q: How is a shadow formed?***

***Q: Why do shadows change?***

**Working at Greater Depth**

* Children are able to explore shadows in more depth and explain why a shadows changes dependent on power, position and distance of light source.
* Children can explore sundials and shadows- making their own.
* Children recognise the differences in the power of light sources and why this is based upon need e.g. a night light will be a dimmer, wrmer light with less power than a desk light, so that this aids sleep.
* Children are aware that light can bend, beginning to question light movement based on their own reading and research e.g. black holes

**Working Scientifically:**

 **Working Scientifically:**

**Y2**

* I ask simple questions and recognise that they can be answered in different ways
* I observe closely, using simple equipment
* I perform simple tests
* I identify and classify
* I use my observations and ideas to suggest answers to questions
* I gather and record data to help in answering questions e.g. measuring and recording shadow changes throughout the day and explaining why.

**Y3**

* I ask relevant questions and use different types of scientific enquiries to answer them
* I set up simple practical enquiries, comparative and fair tests
* I make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
* I gather, record, classify and present data in a variety of ways to help in answering questions
* I record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables e.g. drawing a labelled diagram showing how light itravels and is reflected from a mirror so the image is seen by the eye.
* I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
* I use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
* I identify differences, similarities or changes related to simple scientific ideas and processes e.g. what happens when light travels and hits an uneven surface?
* I use straightforward scientific evidence to answer questions or to support their findings.

 **Key Vocabulary:**

Y2- Dark, light, light source, visible, ray, beam, mirror, sun, shadow, surface, material, position, strength, power, eye, protect

Y3- Dark, light, light source, visible, ray, beam, mirror, sun, shadow, surface, material, position, strength, power, eye, protect, pupil, retina, straight, translucent, absorb, reflect, heat, bounce,

**Class 2 - Spring B**

Forces and Magnets

**Our Curriculum:**

* Children are able to compare how things move on different surfaces e.g. noticing the effect of different textures creating friction and resistance.
* Children know that a magnet has a north and south pole
* Children recognise that forces can at a distance e.g. moving magnetic filings through paper without touching.
* Children observe how magnets attract and repel each other noticing that like poles repel and opposite attract
* Children can compare and group materials into magnetic and non-magnetic
* Children are able to identify some magnetic materials e.g. iron and some non-magnetic metal materials e.g. aluminium?
* Children are able to use prediction prior to testing to see if a material is magnetic or non-magnetic.

**National Curriculum Objectives:**

**Y3**

* 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.

**Key Questions:**

***Q: Are all metals magnetic?***

***Q: How does friction work?***

***Q: Do like poles attract or repel each other?***

***Q: Can a magnet work at a distance?***

**Working at Greater Depth**

* Children are able to investigate the strengths of different magnets and be able to compare these through testing
* Children can explore the concept of nonmagnetic metals, testing, identifying and naming these

**Working Scientifically:**

 **Working Scientifically:**

**Y2**

* I ask simple questions and recognise that they can be answered in different ways
* I observe closely, using simple equipment e.g. exploring magnets and how these work
* I perform simple tests
* I identify and classify
* I use my observations and ideas to suggest answers to questions
* I gather and record data to help in answering questions.

**Y3**

* I ask relevant questions and use different types of scientific enquiries to answer them
* I set up simple practical enquiries, comparative and fair tests
* I make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers e.g. compare magnetism over a distance
* I gather, record, classify and present data in a variety of ways to help in answering questions
* I record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
* I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
* I use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
* I identify differences, similarities or changes related to simple scientific ideas and processes
* I use straightforward scientific evidence to answer questions or to support their findings.

 **Key Vocabulary:**

Y2- pull, push, magnet, material, metal, non-metal, plastic, attract, repel, distance

Y3- pull, push, magnet, material, metal, non-metal, plastic, attract, repel, distance, change, contact, attract, repel, strength, force, friction, acting, field, magnetic, north, south, poles, objects, slows, compass, action, sorting

**Class 2 - Summer B**

Living Things and their Habitats

**Our Curriculum:**

* Children know the differences between living and non-living things
* Children are able to identify and name a variety of plants and animals from different habitats
* Children can match a living thing to its habitat
* Children recognise how different habitats are suited to different living things e.g. cacti are suited to hot, desert habitats and certain fungi to damp, woodland habitats
* Children can recognise how different living things are dependent on each other e.g. birds need trees for shelter and food and birds removing pests from other animals
* Children are able to describe some of the life processes common to animals and humans
* Children are able to describe how some animals get their food using basic food chains
* Children recognise how different plants and animals are suited to their habitats

**National Curriculum Objectives:**

**Y2**

* 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 at Greater Depth**

* Children are able to explain different food chains and how these are interlinked. They use language such as ‘prey’ and ‘predator’ and begin to understand the idea of producer and consumer.
* Children understand why an animal may prefer a certain habitat e.g. a frog living close to a pond.
* Children begin to explore adaptation and may offer ideas as to how some animals may have changed to suit a habitat or environment
* Children understand that some living things compete within a habitat

**Key Questions:**

***Q: How can you tell if something is living?***

***Q: Can you match different animals to their habitats?***

***Q: How are different habitats suited to different plants and animals?***

***Q: What is a food chain?***

**Working Scientifically:**

**Y2**

* I ask simple questions and recognise that they can be answered in different ways
* I observe closely, using simple equipment
* I perform simple tests
* I identify and classify e.g. sorting living and non-living things
* I use my observations and ideas to suggest answers to questions
* I gather and record data to help in answering questions.

**Y3**

* I ask relevant questions and use different types of scientific enquiries to answer them e.g. which living things live in this habitat?
* I set up simple practical enquiries, comparative and fair tests
* I make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
* I gather, record, classify and present data in a variety of ways to help in answering questions
* I record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables e.g. recording how plants are in a section of a field.
* I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
* I use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
* I identify differences, similarities or changes related to simple scientific ideas and processes
* I use straightforward scientific evidence to answer questions or to support their findings.

 **Key Vocabulary:**

Y2- Living, non-living, alive, dead, exist, habitat, micro-habitat, obtain, food, prey, predator, consumer, producer, food chain

Y3- Living, non-living, alive, dead, exist, habitat, micro-habitat, obtain, food, prey, predator, consumer, producer, food chain, food web, competition, adapt, out compete, shelter, protection, diet, interdependence

 **Our Curriculum:**

* Children need to know the names and properties of everyday materials.
* Children need to group and classify a variety of different materials.
* Children need to 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)
* Children need to observe water as a solid, a liquid and a gas.
* Children need to notice changes to water when it is heated and cooled.
* Children need to explore the effect of temperature on substances such as chocolate, butter, cream.
* Children need to observe, record and investigate the changes in materials for example, evaporation over time, solids to liquids, and effect of temperature.

**Class 3 - Autumn A**

**Properties and Changes to Materials(Y4)**

**National Curriculum Objectives:**

 **Y4**

* 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

**Key Questions:**

***Q: What happens when water is heated or cooled?***

***Q: At what temperature do certain materials change state?***

***Q: Can you identify solids, liquid and gases?***

***Q: What happens to different materials when they are heated?***

***Q: What happens in the water cycle?***

**Working at Greater Depth**

* Children are able group and classify materials according to the impact of change e.g. temperature change
* Children can explain scientifically changes to material over time e.g puddles on the playground or washing on the line
* Children are able to classify materials based upon their knowledge of the material and states of matter, thinking solids, liquids and gases.

**Working Scientifically:**

* I ask different kinds of questions
* I plan different types of scientific enquiries to answer questions
* I can set up fair tests
* I decide what observations and measurements to make e.g. using a thermometer to measure the temperature of melting chocolate, recording changes at set points
* I use different scientific equipment to measure with precision. I take repeat readings when appropriate.
* I decide how to record data and results. I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graphs e.g. temperatures recorded in a line graph
* I report and present findings using speaking and writing including displays and presentations
* I use relevant scientific language and illustrations.
* I use results to make predictions and set up more tests (including fair tests).

 **Key Vocabulary:**

Y4-Strong, hard, weak, flexible, transparent, transparency, solid, liquid, gas, gases, air, melt, melting, freeze, warm, warmth, cold, temperature, changing state, evaporate, evaporation, condense, condensation, dissolving, dissolve, undissolved, temperature, degrees Celsius, water cycle

Y5- Strong, hard, weak, flexible, transparent, transparency, solid, liquid, gas, gases, air, melt, melting, freeze, warm, warmth, cold, temperature, changing state, evaporate, evaporation, condense, condensation, dissolving, dissolve, undissolved, temperature, degrees Celsius, water cycle, water vapour, state, solubility, transparency, conductivity

Y6-- Strong, hard, weak, flexible, transparent, transparency, solid, liquid, gas, gases, air, melt, melting, freeze, warm, warmth, cold, temperature, Changing state, , evaporate, evaporation, condense, condensation, dissolving, dissolve, undissolved, temperature, degrees Celsius, water cycle, water vapour, state, solubility, transparency, conductivity, magnetism, , magnetism, filtration, distillation, chemical reactions

Needs more advanced vocab for year 5 and 6

 **Our Curriculum:**

**Earth and Space**

* Children need to use a model of the sun and moon to help them understand and be able to explain day and night.
* Children need to know that the Sun is a star at the centre of our solar system.
* Children need to know that our solar system has eight planets; Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
* Children need to know that the moon is a celestial body that orbits a planet.
* Children need to understand the difference between a geo and heliocentric solar system and how views have evolved (considering the views of scientists such as Ptolemy, Alhazen, Copernicus and Galileo)
* Children need to have opportunity to reconstruct a model of the solar system in the form of an Orrery.
* Children need to plan, investigate and present findings to support the idea that the Earth moves on its own axis.
* Children need to understand, investigate and demonstrate why the moon appears as it does in the sky.
* Children need to understand about the lunar phases.

**Class 3 - Spring A**

**Earth & Space**

**National Curriculum Objectives:**

**Earth & 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.

**Key Questions:**

***Q: Why do unsupported objects fall towards the Earth?***

***Q: How can you demonstrate that the Earth spins on its own axis?***

***Q: Why does the moon appear to change shape throughout the month?***

**Working at Greater Depth**

**Earth and Space**

* Children are able to compare the time of day at different places on the earth
* Children are able to explore how ancient civilisations began to gain a concept of time through shadow clocks, astronomical clocks (Stonehenge potential use) and sundials
* Children are able to research and discuss the works of some scientists and discuss these confidently in relation to theories such as a geo or heliocentric solar system e.g. Ptolemy, Alhazen and Copernicus

 **Key Vocabulary:**

Y4-gravity, Earth, planets, Sun, solar system, Moon, sphere/spherical, rotate/rotation, spin, night & day, orbit, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto ‘dwarf’ planet, eclipse, light, reflection

Y5- gravity, Earth, planets, Sun, solar system, Moon, sphere/spherical, rotate/rotation, spin, night & day, orbit, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto ‘dwarf’ planet, eclipse, light, reflectionMoon, sphere/spherical, rotate/rotation, spin, night & day, orbit, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto ‘dwarf’ planet, eclipse, light, reflection, celestial body, sundials, mass, telescope, tide, geo, heliocentric, orrery, lunar phase

Y6- gravity, Earth, planets, Sun, solar system, Moon, sphere/spherical, rotate/rotation, spin, night & day, orbit, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto ‘dwarf’ planet, eclipse, light, reflection, Moon, sphere/spherical, rotate/rotation, spin, night & day, orbit, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto ‘dwarf’ planet, eclipse, light, reflection, celestial body, sundials, mass, telescope, tide, geo, heliocentric, orrery, lunar phase, celestial body, sundials, mass, telescope, tide, astronomical clocks, shadow clocks, satellite, Isaac Newton, Galileo Galilei

**Working Scientifically:**

* I ask different kinds of questions
* I plan different types of scientific enquiries to answer questions
* I can set up fair tests e.g. comparing the speed of different parachutes (or other objects) falling
* I decide what observations and measurements to make e.g. deciding how to record and measure the effect of wind resistance on different sized paper aeroplanes
* I use different scientific equipment to measure with precision. I take repeat readings when appropriate e.g. using Newton meters to measure the weight of different objects
* I decide how to record data and results. I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graph.
* I report and present findings using speaking and writing including displays and presentations.
* I use relevant scientific language and illustrations.
* I use results to make predictions and set up more tests (including fair tests).

 **Our Curriculum:**

 **Forces**

* Children need to explore falling objects, knowing that the force of gravity acting between the Earth and the object means that the object will fall to Earth.
* Children need to raise questions about air resistance, water resistance and surface resistance acting against gravity e.g. ice skaters and surface resistance
* Children need to explore forces that make things begin to move, get faster and slow down e.g. a boulder pushed to begin with, then speeds up down a hill with gravity and then slowed down by water resistance in a lake
* Children need to explore the effects of friction on movement and how it slows or stops moving objects.
* Children need to recognise that some mechanisms including levers, pulleys and gears allow a small force to have a great effect
* Children need to understand centripetal force and planets in orbit

**Class 3 - Summer A**

**Forces**

**National Curriculum Objectives:**

 **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.
* understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs.

**Key Questions:**

***Q: Why do unsupported objects fall towards the Earth?***

***Q: How does friction and resistance work on an object e.g. boat or car?***

***Q: What is centripetal force?***

***Q: How can a small force become a bigger force?***

**Working at Greater Depth**

**Forces**

* Children are able to describe how forces affect motion e.g. magnetic attraction and friction
* Children are able to explain and model air resistance (and how this acts against gravity) e.g. through designing and making a very effective parachute
* Children are able to explain the how water can cause resistance to floating objects e.g. investigating upthrust, gravity, propulsion and water resistance in boats

● Children are able to research and explore the theory of gravity, learning about scientists such as Galileo Galilei and Isaac Newton

**Working Scientifically:**

* I ask different kinds of questions
* I plan different types of scientific enquiries to answer questions
* I can set up fair tests e.g. comparing the speed of different parachutes (or other objects) falling
* I decide what observations and measurements to make e.g. deciding how to record and measure the effect of wind resistance on different sized paper aeroplanes
* I use different scientific equipment to measure with precision. I take repeat readings when appropriate e.g. using Newton meters to measure the weight of different objects
* I decide how to record data and results. I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graph.
* I report and present findings using speaking and writing including displays and presentations.
* I use relevant scientific language and illustrations.
* I use results to make predictions and set up more tests (including fair tests).

 **Key Vocabulary:**

Y4-gravity, air resistance, water resistance, forces, friction, balancing force, weight,

Y5-gravity, air-resistance, water resistance, forces, friction, surface friction, balancing force, weight, newtons, decelerate, equilibrium, upthrust, newton metre, mass, centripetal force, mechanism, lever, pulley, gear

Y6- gravity, air-resistance, water resistance, forces, friction, balancing force, weight, surface friction, newtons, decelerate, equilibrium, upthrust, newton metre, mass, centripetal force, mechanism, lever, pulley, gear terminal velocity, Isaac Newton, Galileo Galilei

**Class 3 - Autumn B**

**Sound**

 **Our Curriculum:**

* Children need to explore and identify the way sound is made through vibration in a range of different instruments/sources e.g. finding patterns between the volume of sounds and the strength of vibrations that produce it/distance of the source
* Children need to know how the pitch and volume of sounds can be changed in a variety of ways e.g. how to make a sound louder/quieter and how pitch is changed based on the features of the source/instrument that makes it
* Children need to know how a sound travels through a medium to an ear, being received by the ear drum and then sent as a message to the brain
* Children need to recognise how different materials can affect the pitch and volume of sounds

**National Curriculum Objectives:**

 **Sound**

* 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

**Working at Greater Depth**

**Sound**

* Children are able to explain why sound gets fainter or louder according to the distance
* Children can explain how pitch and volume can be changed in a variety of ways
* Children are able to work out which materials give the best insulation for sound
* Children can accurately present and explain how sound travels from a source to the ear and then the brain for the sound to be perceived

**Key Questions:**

***Q: How does sound travel?***

***Q: What happens to sound as the distance from it increases?***

***Q: Do larger vibrations produce louder sounds?***

**Working Scientifically:**

* I ask different kinds of questions e.g. How are sounds altered through different mediums?
* I plan different types of scientific enquiries to answer questions
* I can set up fair tests e.g. keeping all variables the same bar one (distance) when exploring sound vibration over distance
* I decide what observations and measurements to make
* I use different scientific equipment to measure with precision. I take repeat readings when appropriate.
* I decide how to record data and results. I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graph.
* I report and present findings using speaking and writing including displays and presentations.
* I use relevant scientific language and illustrations
* I use results to make predictions and set up more tests (including fair tests) e.g. making predictions based different sources (variety of drums with different tautness of skins) what pitch it will make

 **Key Vocabulary:**

**Sound**

Y4-Sound, listen, hear, ears, noise, loud, quiet, silent, vibrations, air, water, solid, source, sound waves, travel, volume, loudness,

Y5- Sound, listen, hear, ears, noise, loud, quiet, silent, vibrations, transmit, medium, air, water, solid, source, sound waves, travel, volume, loudness, particles, messages, brain, ear drum

Y6- Sound, listen, hear, ears, noise, loud, quiet, silent, vibrations, transmit, medium, air, water, solid, source, sound waves, travel, volume, loudness, particles, messages, brain, ear drum, sound receptors, amplitude, frequency

**Class 3 - Spring B**

**States of Matter**

 **Our Curriculum:**

* Children need to be able to group everyday materials using evidence and scientific investigations e.g. is a material a good conductor of electricity?
* Children need to explore and recognise reversible changes including evaporating, filtering, sieving, melting, dissolving.
* Children need to decide based on their knowledge of states of matter how to separate mixtures e.g. how to separate salt from water
* Children need to recognise that melting and dissolving are two different processes.
* Children need to explore changes that are difficult to reverse e.g. burning and rusting
* Children need to undertake a scientific study that involves carrying out tests, comparing materials, observing and comparing changes that take place.
* Children need to research and discuss how chemical changes have an impact on our lives for example cooking.
* Children need to discuss the creative use of new materials for example such as polymers, super-sticky and super-thin materials.

**National Curriculum Objectives:**

* -compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
* -understand 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.

**Key Questions:**

***Q: Which materials are good conductor or insulator?***

***Q: How can you separate salt from water?***

***Q: Will all materials once changed return back to their original form?***

***Q: Can you describe a material change that is irreversible?***

**Working at Greater Depth**

* Children begin to understand how particles are arranged and move in different states
* Children can chose materials based upon their properties for a specific job and explain how this works e.g. foam around pipes as an insulator to prevent water freezing and burst pipes
* Children can actively explore and also scientifically explain methods of separating materials e.g. filtration and distillation
* Children can explore and present the work of chemists who created new materials e.g. Roy J Plunket (Teflon polymer) and Spencer Silver (glue on sticky notes)

**Working Scientifically:**

* I ask different kinds of questions
* I plan different types of scientific enquiries to answer questions
* I can set up fair tests
* I decide what observations and measurements to make
* I use different scientific equipment to measure with precision. I take repeat readings when appropriate.
* I decide how to record data and results. I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graphs e.g. temperatures recorded in a line graph
* I report and present findings using speaking and writing including displays and presentations e.g. explore and present the work of Roy J Plunket who invented the polymer Teflon.
* I use relevant scientific language and illustrations.
* I use results to make predictions and set up more tests (including fair tests).

 **Key Vocabulary:**

Y4- solid, liquid, gas, gases, air, melt, melting, freeze, warm, warmth, cold, temperature, changing state, evaporate, evaporation, condense, condensation, dissolving, dissolve, undissolved, rusting, burning, filter, sieve, predict, experiment ,test

Y5- Strong, hard, weak, flexible, transparent, transparency, solid, liquid, gas, gases, air, melt, melting, freeze, warm, warmth, cold, temperature, changing state, evaporate, evaporation, condense, condensation, dissolving, dissolve, undissolved, rusting, burning, sieve, fair test, particle, solution, solubility, reversible, irreversible, change, experiment, state of matter, separation, properties, accurate, results, variables, prediction, filter, mixing, conductor, insulator, chemical change, polymer

Y6-- Strong, hard, weak, flexible, transparent, transparency, solid, liquid, gas, gases, air, melt, melting, freeze, warm, warmth, cold, temperature, Changing state, , evaporate, evaporation, condense, condensation, dissolving, dissolve, undissolved, rusting, burning, sieve, fair test,particle, solution, solubility, reversible, irreversible, change, experiment, state of matter, separation, properties, accurate, results, variables, prediction, conductivity, magnetic, distillation, control, variable

 **Our Curriculum:**

 Y4-

* Children are able to identify, name and describe the different parts and functions of the human digestive system
* Children are able to identify the simple function of different types of teeth in humans e.g. know that canine teeth were for tearing meat, incisors cutting through and molars for grinding
* Children know the significance of saliva and the role of the tongue in the digestion process within the mouth e.g. the tongue helps to keep the food in place whilst the teeth grind and detects flavours and temperature
* Children are able to compare the different sets of teeth in herbivores and carnivores
* Children are able to identify, construct and interpret a variety of food chains, identifying producers, predators and prey

Y5-

* Children are able to describe the physical changes as humans develop to old age
* Children can use basic ideas of inheritance, variation and adaptation to describe how living things have changed over time

Y6-

* Children are able to identify and name the main parts of the human circulatory system; describing the functions of the heart, blood vessels and blood
* Children know the importance and impact of diet, exercise, drugs and lifestyle on the body. They know how to stay healthy.
* Children know how different animals get their nutrition and hydration, recognising plants are autotrophs and animals heterotrophs

**Class 3 - Summer B**

**Animals including Humans**

**National Curriculum Objectives:**

Y4

* 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
* construct and interpret a variety of food chains, identifying producers, predators and prey

Y5

* describe the changes as humans develop to old age

Y6

* 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

**Key Questions:**

***Q: How do humans digest food?***

***Q: Can you identify and record a food chain?***

***Q: How do humans change over time?***

***Q: How does the human circulatory system work?***

***Q: How can we stay healthy?***

***Q: How do animals get their water and nutrition?***

**Working Scientifically:**

* I ask different kinds of questions
* I plan different types of scientific enquiries to answer questions
* I can set up fair tests e.g. comparing the effect of different liquids on teeth and keeping the controls, variables the same.
* I decide what observations and measurements to make
* I use different scientific equipment to measure with precision. I take repeat readings when appropriate.
* I decide how to record data and results. I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graph.
* I report and present findings using speaking and writing including displays and presentations
* I use relevant scientific language and illustrations.
* I use results to make predictions and set up more tests (including fair tests) e.g. predicting what will happen to your heart rate when you increase exercise

**Working at Greater Depth**

* Children are able to identify and describe a more complex food chain, recognising pioneer species (e.g. moss and lichen) and primary producers, then primary and tertiary consumers
* Children are able to compare the organ systems to that of other animals e.g. recognising that a cow has two stomachs and the reason for this.
* Children can create a timeline to display the stages of growth in different animals e.g. frogs and butterflies, and growth and development of humans
* Children are able to describe the changes that occur during puberty
* Children are able to make a diagram of the human body and explain how the different parts are connected and work together e.g. sensory receptors in the skin send messages along sensory neurons to alert the brain that the hand has touched something hot. The brain will then send message back to move hand away from heat source, which involves the muscular system.

 **Key Vocabulary:**

Y4- tooth, saliva, tongue, incisor, stomach, liver, intestines, pancreas, gallbladder, rectum, anus

Y5-tooth, saliva, tongue, incisor, stomach, liver, intestines, pancreas, gallbladder, rectum, anus, puberty, womb, fetus (foetus), adolescence, elderly, life expectancy, adulthood, childhood, length

Y6- tooth, saliva, breakdown, enzymes, chemical reaction, tongue, incisor, stomach, liver, intestines, pancreas, gallbladder, rectum, anus, excretion, puberty, womb, fetus (foetus), adolescence, elderly, life expectancy, adulthood, childhood, length, oxygenated, circulatory system, heart, lungs, blood artery, vein, pulmonary, alveoli, capillary, nutrients

**Key Questions:**

***Q***

 **Our Curriculum:**

* Children need to know that all living things have offspring of the same kind and features in the offspring are inherited from the parents but the offspring are not identical to their parents and vary from each other.
* Children need to know about evolution, recognising that although individuals in a species share similarities, they are not exact copies of each other; there were small differences or variations between them.
* Children need to recognise that through competition species have evolved different characteristics over time e.g. Darwin’s Finches or the penguin
* Children need to be able to recognise how plants and animals are uniquely adapted to their environment e.g. cacti spines to protect the plant from being eaten
* To be able to use fossils as evidence of what lived on the Earth millions of year ago
* Children are able to record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models

**Class 3 - Autumn C**

**Living Things and Habitats**

**National Curriculum Objectives:**

* 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

**Key Questions:**

***Q: How have living things changed over time?***

***Q: How does reproduction work?***

***Q: How do living things adapt to their environment?***

**Working at Greater Depth**

\* Children are able to compare the works of Scientists such as Charles Darwin and Mary Anning to show how living things have changed over time, using theories backed by scientific evidence

Children are able to explain how some living things adapt to survive in extreme conditions e.g. the vampire finch in the Galapagos islands has adapted to survive by feeding on the blood of the Blue Footed Boobie

**Working Scientifically:**

* I ask different kinds of questions
* I plan different types of scientific enquiries to answer questions e.g. what happened when Charles Darwin visited the Galapagos Islands?
* I can set up fair tests
* I decide what observations and measurements to make e.g. deciding upon an investigation to see how different plants adapt to different conditions and observing what happens
* I use different scientific equipment to measure with precision. I take repeat readings when appropriate.
* I decide how to record data and results. I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graph.
* I report and present findings using speaking and writing including displays and presentations e.g. presenting evidence for and against evolution.
* I use relevant scientific language and illustrations.
* I use results to make predictions and set up more tests (including fair tests).

 **Key Vocabulary:**

Y4- change, evolve, adapt, different, variety, species, parent, offspring, extinct, mate

Y5- Change, evolve, adapt, different, variety, species, parent, offspring, extinct, mate, evolution, adaptation, inherit, characteristic, offspring, physical features, environment, habitat

Y6 Change, evolve, adapt, different, variety, species, parent, offspring, extinct, mate, evolution, adaptation, inherit, characteristic, offspring, physical features, environment, habitat, sexual reproduction, inhabited, hybrid

 **Our Curriculum:**

* Children need to explore the way that light behaves, including light sources, reflection and shadows.
* Children need to investigate the relationship between light sources, objects and shadows.
* Children need to understand that light appears to travel in straight lines and undertake a scientific enquiry to observe this.

**Class 3 - Spring C**

**Light**

**National Curriculum Objectives:**

* 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

**Working at Greater Depth**

**Light**

* Children are able to explain how different colours of light can be created
* Children use and explain how simple optical instruments work e.g. periscope, telescope, binoculars, mirror, magnifying glass and Newton’s first reflecting telescope
* Children are able to explore a range of phenomena, including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters
* Children explore and explain how a camera uses light the camera’s use of light
* Children can share their thoughts and explain their understanding on light being able to bend

**Key Questions:**

***Q: How can we see reflections in a mirror?***

***Q: How does light travel?***

***Q: How does a rainbow form?***

***Q Why do shadows have the same shape as the object casting them?***

 **Key Vocabulary:**

**Light**

Y4-Light, lights sources, dark, reflect, reflective, mirror, shadow, block,

Y5- Light, lights sources, dark, reflect, reflective, mirror, shadow, block, absorb, direct/direction, transparent, opaque, translucent, straight, rainbow, colours, absorb,

Y6- Light, lights sources, dark, reflect, reflective, mirror, shadow, block, absorb, direct/direction, transparent, opaque, translucent, straight, rainbow, colours, absorb, periscope, telescope, binoculars, mirror, magnifying glass, Newton’s first reflecting telescope, prism, filters

**Working Scientifically:**

* I ask different kinds of questions e.g. why do shadows change when a light source is closer or further away?
* I plan different types of scientific enquiries to answer questions
* I can set up fair tests
* I decide what observations and measurements to make e.g. deciding on cm as the unit to measure the distance from a torch and size of shadow created.
* I use different scientific equipment to measure with precision. I take repeat readings when appropriate.
* I decide how to record data and results. I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graph.
* I report and present findings using speaking and writing including displays and presentations.
* I use relevant scientific language and illustrations e.g. design and make a periscope to explain how light travels in straight lines
* I use results to make predictions and set up more tests (including fair tests).

 **Our Curriculum:**

 Y4

* Children are able to identify common appliances that run on electricity form within a familiar environment
* Children are able to construct a simple series electric circuit
* Children are able to identify and name the basic part in a series circuit, including cells, wires, bulbs, switches and buzzers
* Children recognise and use symbols to represent simple series circuit diagrams
* Children can identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
* Children know that a switch opens and closes a circuit
* Children recognise some common insulators and conductors from their previous work on materials, knowing that metals make good conductors.

Y6

* Children are able to identify and name the basic part in a series circuit, including cells, wires, bulbs, switches and buzzers
* Children are able to compare and give reasons for variations
* Can they compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers, the on/off position of switches
* Children can confidently use recognised symbols when representing a simple circuit in a diagram

**Class 3 - Summer C**

**Electricity**

**National Curriculum Objectives:**

**Y4**

* 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.

**Y6**

* 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.

**Key Questions:**

***Q: What are the main components of a simple electrical circuit?***

***Q: Which materials are good conductors of electricity?***

***Q: How can you get a bulb to glow brighter?***

**Working at Greater Depth**

* Children are able to make a parallel circuit and describe the differences between this and a series circuit
* Children can explain what changes/influences would make a light bulb glow brighter
* Children investigate different types of metals as conductors and know that some (iron and copper) are very good conductors
* Children understand the importance of safety with electricity e.g. they know that water and electricity are very dangerous as water is an excellent conductor of electricity and can conduct to you)
* Children can create a lemon battery and understand how lemons conduct electricity e.g. electrolytes are present in the citric acid of lemons

**Working Scientifically:**

* I ask different kinds of questions e.g. how can I light a bulb?
* I plan different types of scientific enquiries to answer questions
* I can set up fair tests e.g. testing conductors and keeping all variables the same apart from the material being tested
* I decide what observations and measurements to make
* I use different scientific equipment to measure with precision. I take repeat readings when appropriate.
* I decide how to record data and results.
* I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graphs e.g. labelling key components of a circuit
* I report and present findings using speaking and writing including displays and presentations e.g. describing how a series circuit works using scientific language
* I use relevant scientific language and illustrations e.g. series and parallel circuit diagrams and labels/functions explained
* I use results to make predictions and set up more tests (including fair tests).

 **Key Vocabulary:**

Y4- current, light, wire, cell, bub, bulb holder, circuit, switch, conductor, loop, nucleus, construct, appliances, mains, crocodile clips, battery, battery holder, motor, buzzer, insulator, atom

Y5- current, light, wire, cell, bub, bulb holder, circuit, switch, conductor, loop, nucleus, construct, appliances, mains, crocodile clips, battery, battery holder, motor, buzzer, insulator, atom, generator, convert, fossil fuel, coal, gas, oil, green energy, wind, solar, hydro, nuclear, brightness, dimmer

Y6- current, light, wire, cell, bub, bulb holder, circuit, switch, conductor, loop, nucleus, construct, appliances, mains, crocodile clips, battery, battery holder, motor, buzzer, insulator, atom, generator, convert, fossil fuel, coal, gas, oil, green energy, wind, solar, hydro, nuclear, brightness, dimmer, volume, circuit, function, position, flow, voltage, component, neutron, proton, electron, atom,