Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

# Bromesberrow St. Mary's Science Curriculum

***"The important thing is not to stop questioning. Curiosity has its own reason for existing.' Albert Einstein***

## Intent

At Bromesberrow St. Mary's school our intent for Science is (as for the whole curriculum) to build knowledge 'cumulatively', so that children build on their knowledge of Science through substantive and disciplinary concepts, as they grow throughout the school, reaching for the stars with Hope and Aspiration. Our core drivers for Science are to ensure children develop:

- An understanding of what it means to be a scientist, knowing the disciplinary knowledge and skills to be able to investigate scientifically, as well as communicate their findings appropriately (using scientific language, technical and specific vocabulary and the right grammatical structures)
- A strong sense of scientific enquiry. We want to hear children asking questions and being curious about scientific phenomena and the material world
- Their scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics by repeated, cumulative exposure to the same concepts, but at a deeper level. We want children to develop schema to internally organise this knowledge, so that it sticks!
- A scientific knowledge and understanding that enables them to understand the uses and implications for science today and the future.
- A good scientific vocabulary, which enables them to connect, engage in and understand new scientific concepts.

## Implementation

We have a clear coverage plan in place to enable all children to experience the breadth of the National Curriculum for Science based around these core foci:

- Substantive knowledge, as the products and nature of science (children's knowledge of the specific concepts of biology, chemistry and physics).
- Disciplinary knowledge, as the practices and methods of science (children's knowledge about how scientists ask questions, investigate, record and communicate scientifically)

Our golden 'substantive' threads, which will repeat throughout, building children's cumulative knowledge are:

**Life on Earth**

**Energy**

**Matter**

The following are golden disciplinary threads which weave throughout our curriculum, enabling children to develop substantive knowledge, skills and understanding:

- **Questioning**
- **Predicting**
- **Testing and investigating**
- **Observing and measuring**
- **Recording**
- **Communicating**
- **Evaluating**

Our curriculum is constructed with Class One has three (with the knowledge, experiences and understanding growing each year when revisited from Preschool through to Year One), Class Two, a two year cycle and Class Three, a three year cycle. Topics are carefully planned in advance to ensure that learning is 'cumulative' and progressive, however there is room for adjustment to ensure that teachers capitalise on the children's interests and national and local events at the time. We have worked hard to ensure that our Bromesberrow curriculum connects the children to science diversity, introducing different significant figures who have influenced and shaped science as we know it.

**Impact**

In order for our Science Curriculum to have had an impact, we would want to be able to see that children have a well-developed knowledge, skills and understanding, preparing them for the next stage of their education:

- Children who are questioners, who have a curiosity, confidence and enthusiasm to learn about scientific phenomena
- Children who know how to investigate scientifically, Questioning, Predicting, Testing and investigating, Observing and measuring, Recording, Communicating and Evaluating

Bromesberrow
St Mary's CofE (VA) Primary School
We're Reaching for the Stars

- Children who have a robust and connected knowledge and understanding of the substantive products of biology, chemistry and physics
- Children who know of the diverse scientific community and significant scientists who have contributed to the body of science we know and understand today
- Children who understand the significance of the substantive concepts: Life on Earth, Energy and Matter

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

**Class One (EYFS and Y1)**

**Autumn Term**
**Focus: Marvellous Materials!**
**Matter**
**Questions:**
**Q: What material is it made from?** *Questioning, Predicting, Observing, Testing and Investigating, Recording, Communicating*
**Q: How can I compare everyday materials?** *Questioning, Observing, Testing and Investigating, Recording, Classifying, Communicating*
**Q: What can I use this material for?** *Questioning, Predicting, Observing, Testing and Investigating, Recording, Communicating*

| | **Knowledge of the World** |
|---|---|
| **Preschool (3-4 yr olds)** | **Children:**<br>• 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.**<br>• 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**<br>• 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.** |
| **Reception (4-5 yr olds)** | **Children:**<br>**Materials and their properties:**<br>• 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, 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.**

**Investigations to inspire scientific questioning and enquiry:**

Which Materials make the Best Boats? https://www.science-sparks.com/materials-make-best-boat/

Lollypop Pirate Ships https://www.science-sparks.com/materials-make-best-boat/

Pirate Density Jar https://www.science-sparks.com/density-experiment-pirate-themed/

| | |
|---|---|
| | Pirate Magnets https://www.science-sparks.com/pirate-magnet-sensory-bottle/<br><br>Make a Bridge for a Gingerbread Man https://www.science-sparks.com/a-bridge-for-the-gingerbread-man/<br><br>Float or sink- using clear tank and vitamin tablets, food colouring, rice, oil and sugar |

**Vocabulary**

Preschool: smooth, bumpy, nature, material, wood, stone, hard, soft

Reception: smooth, bumpy, nature, material, soggy, change, warm, hot, cold, soak, sink, float, freeze, melt, hard, soft, wood, stone, strong, rough

**Year One**

- 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**) https://www.youtube.com/watch?v=xOKr462HLc0 – materials song
- 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.**

**Working at Greater Depth Indicators**

- 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 e.g. **material**
- I gather and record simple data in different ways **e.g. recording waterproof material test using a simple table**
- I observe closely **e.g. I notice that the cotton soaks up (absorbs) more water than the nylon material**
- I use simple equipment to take measurements **e.g. using a pipette to dispense 4 drops of water**

**Investigations to inspire scientific questioning and enquiry:**

Making Sandcastles Enquiry: Children to investigate the perfect sand to water ratio to make the perfect sandcastle

Paper Towel Magic: Children to investigate if they can put the paper towel into a tank filled with water. Cup to be provided (air pocket can keep the towel dry)

Waterproof Teddy: Which material would be best to keep teddy dry? A range of materials, children to explore.

Three Little Pigs: Making houses of brick, straw and sticks. Which material is the best for the build and why?

Explorify: https://explorify.uk/en/activities?search Creature Comforts, Bird Feeders and Charles Mackintosh

Bromesberrow St Mary's CofE (VA) Primary School
We're Reaching for the Stars

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

Bromesberrow St Mary's CofE (VA) Primary School
We're Reaching for the Stars

**Spring Term**
**Amazing animals!**
**Life on Earth**
**Focus:**
**Questions:**
**Q: Am I a mammal, amphibian, reptile, bird or fish?** *Questioning, Observing, Recording, Communicating*
**Q: How do scientists group animals?** *Classifying, Observing, Recording, Communicating*
**Q: How do my senses work?** *Questioning, Observing, Recording, Communicating*

| | **Knowledge of the World** |
|---|---|
| **Preschool (3-4 yr olds)** | **Children:**<br>Learn about animal life cycles, noticing and being curious about the changes **e.g. they share the story of the Ugly Duckling and recognise the journey egg-signet-swan. This learning can be practically revisited in the Spring by watching caterpillars hatch, grow, change into chrysalises and then hatch out into butterflies or chicks hatch from eggs, grow into chicks and then adult hens/cockerels.**<br>Sort objects and living things, beginning to understand that things can be sorted into groups depending on different characteristics **e.g. they sort the marbles by their colours or size**<br>Use developing taught vocabulary to explain their sorting choices **e.g. the earthworm is ridged and bumpy and the ladybird is smooth and shiny.**<br>Learn about living things through hands on experiences and careful observations noticing similarities and differences in characteristics **e.g. the slug leaves a slimy trail and so does the snail**<br>Are able to talk about their body parts beginning to recognise what these are for **e.g. my legs are for walking and running, and my hands help me to cut, stick and make things.** |
| **Reception (4-5 yr olds)** | **Children:**<br>Use their senses to explore the natural world at a deeper level of play e.g:<br>- They listen to the different bird calls of the blackbird and pheasants. They imitate these and can identify the birds from this.<br>- 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 day 2 children bring in straw from home. They work together to create some homes.<br>- 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.<br>- They sort and categorise animals based on their similarities and differences e.g. these are all cats so they go together and these are the dogs so they go together<br>- Children learn to identify, name and describe some of the animals they encounter regularly in their environment. They use taught vocabulary to support them in these descriptions.<br>- Children learn about their bodies and how these work e.g. my eyes let me see things, my teeth need cleaning and my hands need to be washed to keep germs at bay |
| **Working Scientifically** | • I question why things happen **e.g. how tadpoles change into frogs (spring term practical re-visitation) or why owls leave pellets?**<br>• I begin to use science words **e.g. the sea creatures all belong in this group and the birds in this one.**<br>• I can talk about things like plants, animals, natural and found objects **e.g. why do narwhals have horns and blue whales don't?**<br>• I can create simple representations of people and objects **e.g. children draw an observational drawing of the human eye**<br>• 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?**<br>• I test my ideas **e.g. I wonder what will happen if I push this car down the ramp harder than last time?**<br>• I notice similarities and differences **e.g. this leaf is rougher compared to this leaf (which is soft and a little bit furry)**<br>• 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.**<br>• I use equipment and tools carefully.<br><br>**Investigations to inspire scientific questioning and enquiry:** |

| | |
|---|---|
| | How to Keep Teeth Healthy investigation https://www.science-sparks.com/how-to-keep-teeth-healthy/<br><br>Wash your Hands- glitter germs! https://www.science-sparks.com/germs-and-worms/<br><br>Giant Bubbles in the Garden- https://www.science-sparks.com/making-giant-bubbles/ |

**Vocabulary**

Preschool: Animal, person, body, face, leg, arm, teeth, mouth, eyes, hair, ears, hands, fingers, feet, toes, lips, nose, arms, tongue, bird, fish, feathers, claws, beak, tail, fur, group, sort

Reception: Animal, human, body, face leg, arm, teeth, mouth, eyes, hair, ears, hands, fingers, feet, toes, lips, nose, arms, eyebrows, stomach, eyelashes, finger and toe nails, tongue, taste, smell, touch, see, hear, bird, fish, feathers, claws, beak, tail, fur, tusks, horns, scales, fins, group, sort, water, land, sky, healthy, sound

## Year One

**Year One NC Objectives**

**School Objectives:**

- 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 **habitat)** 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.

- Children need to know how to keep their teeth clean and healthy

**Working at Greater Depth Indicators**

- 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

**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.

**Investigations to inspire scientific questioning and enquiry:**
Peace At Last: Read 'Peace at Last' by Jill Murphy. Discuss how annoying the sounds are. Is there a way we can 'stop' these sounds, helping Mr Bear to sleep. Children to investigate sound and sound insulating materials to find out which materials absorb the sound best.
Explorify: https://explorify.uk/en/activities?search Unexpected Eggs, Baby Animals, Maria Sibylla Merian (scientist), Florence Nightingale (scientist)

**Vocabulary**
Mammal, amphibian, reptile, bird, fish, grouping, classification, similar, different, warm-blooded, cold-blooded, features, omnivore, carnivore and herbivore, land, ocean, sea, sky
Neck, head, hair, face, mouth, teeth, stomach, back, knee, elbow, eye, eyelashes, eyelids, cornea, pupil ear, eardrum, vibration, sound, touch, skin, taste, tongue, tastebuds, sweet, salt, bitter, sour, nose, smell, scent, travel, brain, healthy

**Summer Term**
**Focus: Plants**
**Life on Earth**
**Questions:**
**Q: What trees and plants grow in our school grounds?** *Questioning, Observing, Testing and Investigating, Recording, Communicating*
**Q: What are the different parts of trees and plants called?** *Observing, Recording, Communicating*
**Q: How do the trees and plants change throughout the year?** *Questioning, Predicting, Observing, Testing and Investigating, Recording*

| | **Knowledge of the World** |
|---|---|
| **Preschool (3-4 yr olds)** | **Children:**<br>• 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.**<br>• 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, look after these. They harvest the root and taste this. One of the plants they leave to 'go to seed'. They collect the seeds from this and take these home to grow their own next year.**<br>• Children know that living things need care **e.g. that a seedling will need to be protected (not trodden on) in order for it to survive to grow into an adult tree.** |
| **Reception (4-5 yr olds)** | **Children:**<br>Use their senses to explore the natural world at a deeper level of play e.g:<br>- They find some seeds left over from the ash tree (ash keys) and decide to plant these. They dig a hole, water the seeds and then cover them over carefully with soil. They then make a sign to alert everyone that a seed is growing. Thoughts then turn to how to keep the birds away… |

| | |
|---|---|
| | - They notice that under our oak tree a small seedling is growing. They wonder how this happened. The adult shares 'the life cycle of a tree book'. Together the child and adult use the illustrations to predict what stage the seedling will be at next. Other children join in and decide they need to protect the seedling from animals/children. They find some sticks and string to create a guard.<br>- Children learn to identify, name and describe some of the plants they encounter regularly in their environment and notice how these have changed throughout the year.<br>- They notice that the rain gauge has filled up more because it has rained heavily<br>- 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.<br><br>Growing a Beanstalk for Jack- https://www.science-sparks.com/jack-and-the-beanstalk-beans/<br><br>Be a plant detective! Explore plants outside. Are they big, small? Spiky or soft? Where do plants grow? Do they all need soil?<br><br>How do Plants Grow? Investigating what plants need to grow.<br><br>Parts of a Tree- explore what parts a tree has e.g. branches, trunk, bark, leaves, sap, roots, twigs and sticks. |

**Vocabulary**

Preschool: grow, plant, water, sun, care, see, seed, leaf, flower, stem/stalk

Reception: grow, plant, water, sun, care, notice, change, seed, seedling, sapling adult, leaf, petal, stem

**Year One**

**School Objectives:**

- 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 (Seasonal Change) * throughout the year.*

- *Children need to understand the importance of the weather, length of day and changing seasons on plant life (Seasonal Change) *throughout the year.*
- 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.

**Working at Greater Depth Indicators**

- 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

**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 **e.g. I draw diagrams and add labels to show the different stages of growth of my bean**
- 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 take measurements **e.g. I use a ruler to measure and compare the height of the different beans, planted a week apart.**

**Investigations to inspire scientific questioning and enquiry:**

Seed Dispersal: what is the best way to sow a lawn? How can we spread the seed so that it grows evenly?

Plants to make plants? Investigating cuttings and strawberry plant a sexual reproduction. Can we make new plants?

Making friends with a tree: Children are blindfolded and encouraged to use their senses to investigate a tree. They should be encouraged to describe features e.g. I can wrap my arms around it, I can feel long thin finger like things on it, it has smooth bark, the bark feels flaky, the leaves are spiky. Children are then taken back and need to find their tree.

Beans over time: Do plants catch up? Measuring and recording the bean growth over time. Do they catch up with each other?

Explorify: Seasons, Autumn Leaves, Craggy Surface

**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).

## Class 2 (Year 2/3)

**Autumn term One A**
**Matter**
**Focus: Marvellous Materials!**
**Questions:**
**Q: Are you able to describe materials and group based on properties?** *Questioning, Classifying, Observing, Recording, Communicating*
**Q: How can a material be changed?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating*
**Q: Which material is most suitable for a specific purpose?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Evaluating, Communicating*

**Year One**

**School Objectives:**

**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.
- Children can share the discoveries of John Dunlop and rubber, understanding the significance this material had on the world

## Working at Greater Depth Indicators

- 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 understand and can articulate the impact of notable Scientists e.g. John Dunlop and rubber on the scientific world and 'general world'

## Working Scientifically

**Y2**

- I ask simple questions and recognise that they can be answered in different ways **e.g. realising that there is more than one type of waterproof material to be used for a coat**
- I observe closely, using simple equipment **e.g. I measure the time it took for a material to break when it is being stretched.**
- I perform simple tests **e.g. testing the waterproof properties of different materials**, **including a fine tune focus on how waterproof different waterproof materials are.**
- 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 **e.g. Observing that the waxed waterproof material was more waterproof than the nylon synthetic material, so deciding that this would be the better choice for a farmer out in the rain all day.**
- I gather and record data to help in answering questions **e.g. recording times in a table as to how long (time wise) it took for a material to 'let through' water.**

**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 **e.g. narrowing down material choices as 'most waterproof' prior to testing and then thinking about how to ensure the test used is fair (thinking about variables)**
- 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. classifying different materials by their properties**

- I record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables **e.g. recording temperature fall over time testing insulating materials**
- using a line graph **e.g. temperature fall**
- I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions **e.g. sharing why a material is the best insulator**
- 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.

**Investigations to inspire scientific questioning and enquiry:**

Materials- investigating the common materials, their properties and 'sorting and grouping'
https://www.stem.org.uk/resources/community/collection/12724/year-2-uses-everyday-materials

Badger science- investigating how different materials are suitable for different purposes
https://www.stem.org.uk/resources/community/collection/12724/year-2-uses-everyday-materials

Explorify: https://explorify.uk/en/activities?search Needed to Dry Something Quickly, Relaxed Roll, Point of View

**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,

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

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

**Autumn term One B**
**Matter**
**Focus: Rocks Rock!**
**Questions:**
**Q: Can you describe different types of rocks?** *Questioning, Classifying, Observing, Recording, Communicating*
**Q: How were fossils formed?** *Investigating and communicating*
**Q: What is soil made of?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating*

**School Objectives:**

**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

**Working at Greater Depth Indicators**

- Children are able to suggest their own investigations, plan and lead a group on these

- Children draw on their previous knowledge and experience of different rocks to support their predications, enabling these to be more informed and accurate
- Children automatically consider fair testing and variables when investigating. They are precise and methodical in this.

**Working Scientifically**

**Y2**

- I ask simple questions and recognise that they can be answered in different ways **e.g. are all sedimentary rocks equally weak? No Dolomite and Limestone tend to be strongest compared to Sandstone and Shale**
- I observe closely, using simple equipment **e.g. using a magnifying glass to look closely at different rock samples**
- I perform simple tests **e.g. testing how hard different rocks are using an iron nail and 'fair test' consistent pressure and time.**
- I identify and classify **e.g. I sort rocks in to igneous, metamorphic and sedimentary**
- I use my observations and ideas to suggest answers to questions **e.g. Observing that marble is a very hard rock and that this would be best for a long lasting gravestone compared to sandstone.**
- I gather and record data to help in answering questions **e.g. recording the time it took to break into the rock using equal, consistent pressure**

**Y3**

- I ask relevant questions and use different types of scientific enquiries to answer them **e.g. which rock would be best to build a gravestone out of?**
- I set up simple practical enquiries, comparative and fair tests **e.g. when testing acid erosion of rocks, use the same amount of vinegar and the same amount of time (keeping the variables the same)**
- 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. writing up a method of investigation and what I found out (results)**
- 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 **e.g. when testing water erosion children notice that they are not very accurate with the drops from the pipette. They decide that a better, more accurate way to measure would be to use a test tube first to a set amount and then to pipette out.**
- 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 **e.g. using the evidence from the acid test, to decide which rock is the least susceptible to acid erosion.**

**Investigations to inspire scientific questioning and enquiry:**

Investigating rocks and fossils, the rock cycle, investigating Mary Anning : https://www.stem.org.uk/resources/elibrary/resource/26719/rocks-rocks-and-fossils

Explorify: https://explorify.uk/en/activities?search Crush the Rock, Which Rock would be best for a Skate Ramp, Why Don't all Rocks Look the Same

**Vocabulary**

Y2- man-made rocks, brick, tile, concrete, Igneous, sedimentary, metamorphic, acid, erode, marble, chalk, limestone, slate, granite, sandstone, identification key, fossil

Y3- petrologist, man-made rocks, brick, tile, concrete, Igneous, sedimentary, metamorphic, permeable, impermeable, acid, erosion, marble, chalk, limestone, slate, granite, sandstone, identification key, pumice, basalt, shale, conglomerate, dolomite, organic matter, topsoil, subsoil, trace fossil, cast fossil, imprint

**Spring Term One**

**Life on Earth**

**Focus: Awesome Animals, Marvellous Me!**

**Questions:**

**Q: What is a life cycle?** In terms of animals and humans. *Questioning, Investigating, Observing and Communicating*

**Q: How can animals and humans stay fit and healthy?** *Questioning, Classifying, Observing, Recording, Communicating*

**Q: What is the skeleton for?** *Questioning, Investigating, Observing and Communicating*

**School Objectives:**

- Children are able to recognise the key characteristics of different animals and how they belong to different families (building on previous knowledge of reptiles, mammals, amphibians, fish and birds) e.g. cat and dog family and different types of whales

- 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, warmth 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)

**Working at Greater Depth Indicators**

- 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 **e.g. I am able to identify and name different 'young' from different animal families. I can sort these by their characteristics.**
- I use my observations and ideas to suggest answers to questions **e.g. recognising that there are different types (species) of whales and using this knowledge to suggest why certain whales have certain characteristics (why does the Narwhal have a horn/tusk and the blue whale doesn't? Answer- it doesn't have any teeth like other whales so needs this to survive/hunt/eat.)**
- 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 **e.g. recording and comparing how much water I drink in a day at school, measuring in litres and millilitres.**
- 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 **e.g. drawing a labelled diagram of the lifecycle of a human**
- I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions **e.g. creating a poster to share how a human can stay healthy including managing their own personal hygiene.**
- 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.

**Investigations to inspire scientific questioning and enquiry:**

Stupendous Steppers- hands on investigation and How Much Water do we Waste
https://www.stem.org.uk/resources/community/collection/12727/year-2-animals-including-humans
Hatching eggs https://www.hamilton-trust.org.uk/science/unit/621-hatching-eggs/
Explorify: https://explorify.uk/en/activities?search Funky Feet, Why do Some Birds Migrate, Light as Air, Funny Bones

**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

Bromesberrow
St Mary's CofE (VA) Primary School
We're Reaching for the Stars

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

Bromesberrow
St Mary's CofE (VA) Primary School
We're Reaching for the Stars

**Summer Term One**
**Life on Earth**
**Focus: Plants!**
**Questions:**
**Q: What do plants need to grow?** *Questioning, Classifying, Observing, Recording, Communicating*
**Q: What are the functions of different parts of a flowering plant?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating*
**Q: How is water transported in plants?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating*
**Q: What is the role of flowers?** *Questioning, Investigating, Observing and communicating*

**School Objectives:**

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

**Working at Greater Depth Indicators**

- 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 **e.g. investigating the growth of a bean seed, changing some variables (amount of water and light) but keeping others the same (e.g. amount of soil, same pot).**
- 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. using a data logger to record the temperature in a small greenhouse and outside, comparing what they find and the impact this has on seed germination.**
- 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 methods 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.

**Investigations to inspire scientific questioning and enquiry:**

Design a Seed: Children collect and explore different types of seeds that are dispersed in different ways e.g. ash key, burdock, seeds on a strawberry, seeds inside a melon/pepper/pomegranate, teasels, catkins. Children to build their seed out of a range of materials (junk modelling, Velcro, balloons, plastic bags, fabric, small boxes, bubble wrap)

Investigating if plants grow better with fertiliser, tree rings and the lifecycle of a flowering plant
https://www.stem.org.uk/resources/collection/84753/primary-science-investigations-plants

Explorify: https://explorify.uk/en/activities?search Keira Nirghin, Heard of Anyone Feeding Their Plants, Three Weeds, Noticed a Plant Growing Through the Cracks in the Pavement, What's Inside a Flower, Out to Grass, Pink and White

**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

Bromesberrow
St Mary's CofE (VA) Primary School
We're Reaching for the Stars

**Autumn term Two**
**Energy**
**Focus: Let there be Light!**
**Questions:**
**Q: Why do we need light?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: How can see reflections in a mirror?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: How does light travel?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: How is a shadow formed?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: Why do shadows change?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

- 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.

## Working at Greater Depth Indicators

- 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

**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 **e.g. is this object a light source? I think it is because…**
- 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 travels 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 a surface?**
- I use straightforward scientific evidence to answer questions or to support their findings

**Investigations to inspire scientific questioning and enquiry:**

Investigating shadow size- exploring what happens when you move a light source and the impact of this on an object shadow size https://www.outstandingscience.co.uk/index.php?action=view_page&page=view_unit&unit=3d
Modelling Light and Making Shadows https://www.stem.org.uk/resources/community/collection/12719/year-3-light
Explorify: https://explorify.uk/en/activities?search In the Shade, Had to Move Position Because of a Shadow, In the Shadows, Shine On

**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

**Spring term Two**
**Energy**
**Focus: Forces and Magnets**
**Questions:**
**Q: Are all metals magnetic?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: How does friction work?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: Do like poles attract or repel each other?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: Can a magnet work at distance?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

- 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 work 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.

## Working at Greater Depth Indicators

- 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
- Children relate magnetic polarity to the polar Earth, making connections and hypothesizing

## Working Scientifically

**Y2**

- I ask simple questions and recognise that they can be answered in different ways **e.g. why do like poles repel each other?**
- I observe closely, using simple equipment **e.g. observing the impact of 2 magnets and their poles on each other**
- I perform simple tests **e.g. testing which materials are magnetic and which ones are not**
- I identify and classify **e.g. classifying non-magnetic and magnetic materials**
- I use my observations and ideas to suggest answers to questions **e.g. I can see that the iron filings can be moved without the magnet touching; this shows that there is something invisible between them to pull the filings towards the magnet.**
- 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. are all metals magnetic? Testing to ascertain and answer this**
- I set up simple practical enquiries, comparative and fair tests **e.g. comparing the soles of different shoes for grip, based on friction.** 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. measuring and comparing the distance and force of different strength magnets**
- I gather, record, classify and present data in a variety of ways to help in answering questions **e.g. classifying different materials based on magnetic properties**
- I record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables **e.g. using a bar chart to record the distance measured when testing the force of a magnet**
- I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions **e.g. orally explain their findings on the strength of different magnets**
- I use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions **e.g. testing out which material would be the best to slow a car down safely, if its brakes were broken and suggesting an improvement on what we use on roads today**
- 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 **e.g. finding out which magnet is most powerful**

**Investigations to inspire scientific questioning and enquiry:**

- Cars down the ramp: Investigating the effect of friction on car tyres. Comparative: *If I change the car (the independent variable), what will happen to the distance the car travels (the dependent variable)?* Fair Test: *If I change the surface of the ramp (the independent variable), what will happen to the distance the car travels (the dependent variable)? Children can think in terms of safety and slowing down quickly.*
- Can you turn an iron nail into a magnet? Why does this happen?
- How can you test the strength of a magnet? Paper clips it 'holds', distance it attracts…
- Can you reduce a magnet's strength? Investigating using different fabrics and materials to 'block' this.

Explorify: **https://explorify.uk/en/activities?search** Ridden your Bike or Scooter off the Pavement, Used a Magnet, You Have Magnets for Fingers, Give it a Pull, Marvellous Magnets

**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

**Summer Term Two**

**Life on Earth**

**Focus: Life on Earth!**

**Questions:**

**Q: How can you tell if something is living?** *Questioning, Classifying, Observing, testing and investigating*
**Q: How are different habitats suited to different living things?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating*
**Q: What is a food chain?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating*
**Q: What are the life processes of living things?** *Questioning, Investigating, Observing and communicating*

**School Objectives:**

- 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

**Working at Greater Depth Indicators**

- 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

**Working Scientifically**

**Y2**

- I ask simple questions and recognise that they can be answered in different ways **e.g. Do living things make their own food? Learning that some do and some don't.**
- I observe closely, using simple equipment **e.g. using wildlife cameras to record birds in their habitats**
- I perform simple tests **e.g.**
- I identify and classify **e.g. identifying and classifying living things such as mini beasts**
- I use my observations and ideas to suggest answers to questions **e.g. observing woodlice and offering ideas on what they may eat**
- 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 materials are do woodlice prefer for shelter? Investigating by putting a pile of leaves, a pile of bark, a pile of erasers and a pile of stone on a tray with woodlice-which do they mostly go too?**
- I set up simple practical enquiries, comparative and fair tests **e.g. woodlice experiment thinking about the quantity of the material used and why this is important.**
- 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. comparing the number of living things found in different areas of the school grounds through tables and drawings**
- I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions **e.g. explaining why they think more living things were found at certain sites.**
- I use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions **e.g. suggesting improvements to sampling methods of insect collection.**
- 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

**Investigations to inspire scientific questioning and enquiry:**

Biodiversity: Using quadrats and random sampling to investigate what lives in different areas (plants) and 'white sheet/piece of paper and shake' method to find insects.

Woodlice habitat: Investigating by putting a pile of leaves, a pile of bark, a pile of erasers and a pile of stone on a tray with woodlice-which do they mostly go too? What are we keeping the same to make it a fair test? The distance from the woodlice to the habitats is equal.

Soil and Earthworms Survey: https://www.stem.org.uk/resources/elibrary/resource/33666/education-pack-soil-and-earthworms-worm-survey

Explorify: https://explorify.uk/en/activities Funky Feet, Furry Flyers, Strange Stripes, Mya-Rose Craig (scientist), Jane Goodall (scientist)

**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

**Class 3 (Yr 4, 5 and 6)**

**Cycle 1**

**Autumn term One**
**Matter**
**Focus: Materials Matter!**
**Questions:**
**Q: What happens when water is heated or cooled?** *Questioning, Predicting, Observing, Testing and investigating, Recording, Communicating*
**Q: At what temperature do certain materials change state?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating*
**Q: What is the difference between solids, liquids and gases?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating*
**Q: What happens to different materials when they are heated?**, *Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: What happens in the water cycle?** *Questioning, Observing, Recording and Communicating*

**School Objectives:**

- 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

**Working at Greater Depth Indicators**

- 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 (molecular), thinking solids, liquids and gases.

**Working Scientifically**

- I ask different kinds of questions **e.g. can chocolate return to its previous state once it has been melted?**
- I plan different types of scientific enquiries to answer questions **e.g. how can I separate the small stones from the soil? Setting up filtration investigation.**
- I can set up fair tests **e.g. ensuring all equipment and processes are the same to ensure accurate and reliable results when experimenting**
- 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 and observing the state change.**
- I use different scientific equipment to measure with precision. **e.g. using a data logger to record and measure the time it takes for water to boil.**
- I take repeat readings when **appropriate e.g. repeating the experiment again to check for accuracy and reliability or taking a reading twice to ensure accuracy.**
- I decide how to record data and results **e.g. recording temperature change in a line graph**
- 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. reporting and communicating on the reversible change of salt mixed in water.**
- I use relevant scientific language and illustrations **e.g. using scientific diagrams and scientific labels to communicate filtration**
- I use results to make predictions and set up more tests (including fair tests) **e.g. testing if sugar dissolved in water is a reversible process too and keeping the variables the same as the salt test**

**Investigations to inspire scientific questioning and enquiry:**
Water cycle in a plastic bag- investigate what happens to water in the water cycle www.ziploc.com/en/Inspiration/Stem-Activities/Ages-9-12/Water-Cycle-Bags
Pinch of Salt, Plastics Playtime, Growing Crystals, How Can we Clean our Dirty Water with Professor Brian Cox https://www.stem.org.uk
Explorify: https://explorify.uk/en/activities Scarf Shooters, Watched **Water Being Drained from Rice or Pasta, Marie Curie (scientist), Hot or Cold, Feeling Hot, Hot, Hot, Tiny Grains**

**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, molecules, states of matter

**Spring term One**
**Energy**
**Focus: Earth and Space**
**Questions:**

**Q:What is the Solar System?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: How can you demonstrate that the Earth spins on its axis?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: Why does the moon appear to change throughout the month** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

- 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.

**Working at Greater Depth Indicators**

- 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 understand the pattern of when the sun culminates in the summer and winter months and discuss the changes in altitude
- 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

**Working Scientifically**

- I ask different kinds of questions **e.g. where do the stars go during the day? Does the moon give off light?**
- I plan different types of scientific enquiries to answer questions **e.g. what do the different phases of the moon tell us about the correlation of the Earth and Moon?**
- I can set up fair tests
- I decide what observations and measurements to make **e.g. deciding to measure the time of sunset over the course of a month**
- I use different scientific equipment to measure with precision.
- I take repeat readings when appropriate
- I decide how to record data and results **e.g. deciding on using a moon diary to record the phases of the moon**
- I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graph **e.g. using a scatter to record and look for correlation when testing chemical Pop Rockets and seeing if there is any correlation between weight and height/distance travelled**
- I report and present findings using speaking and writing including displays and presentations **e.g. share the difference of thinking of heliocentric and geocentric solar systems in a written report with diagrams to enhance.**
- I use relevant scientific language and illustrations **e.g. own scientifically labelled diagrams of planets within the Solar System**

- I use results to make predictions and set up more tests (including fair tests). **e.g. predicting what time the sun will be seen at 'full height' or highest altitude in the day and setting up different sundial experiments to investigate this**

**Investigations to inspire scientific questioning and enquiry:**
Measuring the time of sunset over the course of a month
Keeping a moon diary
Chemical Pop Rockets www.teachengineering.org/activities/view/cub_rockets_lesson04_activity3
Explorify: https://explorify.uk/en/activities To the Moon and Beyond, Katherine Johnson, Space Engineer, Goldilocks Planets, Far, Far Away

**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, 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

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

Bromesberrow St Mary's CofE (VA) Primary School
We're Reaching for the Stars

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

Bromesberrow St Mary's CofE (VA) Primary School
We're Reaching for the Stars

**Summer term One**
**Energy**
**Focus: Fabulous Forces!**
**Questions:**

**Q: Why do unsupported objects fall to Earth?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: How does friction and resistance work on an object?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: What is centripetal force?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: How can a small force become a bigger force?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

- 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
- Children need to know that Sir Isaac Newton discovered gravity and how

**Working at Greater Depth Indicators**

- 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 **e.g. how do rockets 'get past' gravity?**
- I plan different types of scientific enquiries to answer questions **e.g. how do chemical rockets work?**
- I can set up fair tests **e.g. investigating centripetal force, systematically changing the variables like force exerted or using the same amount of tin foil, but changing the shape to investigate water resistance**
- 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 **e.g. measuring the distance of the 'effort' exerted over the distanced travelled by the load (mini mangonels) investigating how a small force can become a bigger force.**
- 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 **e.g. recording the results of water resistance experiment in a table**
- I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graph **e.g. using a scatter to record and look for correlation when testing chemical Pop Rockets and seeing if there is any correlation between weight and height/distance travelled**
- I report and present findings using speaking and writing including displays and presentations **e.g. write a lab report on the Pop Rocket experiment**
- I use relevant scientific language and illustrations **e.g. explaining Sir Isaac Newton's discovery and theories on gravity, understanding the impact of this on our science thinking today.**
- I use results to make predictions and set up more tests (including fair tests).
-

**Investigations to inspire scientific questioning and enquiry:**
Investigating change in shape and density of tin foil in water, looking at water resistance
Wind Resistance and paper aeroplanes
Explorify https://explorify.uk/en/activities Tried to Push a Floating Toy Under the Water, Hit a Ball with a Bat, Been Given Medicine in a Syringe, Moved position to get a Seesaw to Work Better, Tried to Keep a Balloon in the Air

**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

Bromesberrow
St Mary's CofE (VA) Primary School
We're Reaching for the Stars

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

Bromesberrow
St Mary's CofE (VA) Primary School
We're Reaching for the Stars

**Cycle 2**

**Autumn term Two (b)**
**Life on Earth**
**Focus: Life on Earth!**
**Questions:**

**Q: How can we group living things?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: Are bacteria good or bad?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: What is the impact of environmental change?** *Questioning, Predicting, Investigating, Observing, Recording, Communicating, Evaluating*

**School Objectives**

.

- Children need to recognise that living things can be grouped in a variety of ways
- Children are able to classify and group animals into vertebrates and non-vertebrates
- *Children can identify change in habitat throughout the year e.g. noticing that the hedgerows change with some plants retaining their leaves (evergreen) and others losing them (deciduous). * All year round*
- Children are able to use classification keys to group, identify and name a variety of living things in their local and wider environment e.g. using a wildlife camera and bird survey to monitor the variety of bird species we have in school, or classifying plants based on: with seeds or without seeds; flowering plants, conifers, ferns and mosses.
- Children need to understand how micro-organisms can be divided into groups, according to common observable characteristics
- Children to know that bacteria can be harmful to us e.g. strep throat and streptococcus Aureus and beneficial, Penicillin and yogurt cultures
- Children need to know that Alexander Flemming discovered Pencillin from experiments involving mould
- Children need to understand how animals can be divided into groups, according to common observable characteristics. e.g. a pigeon and a blackbird both have feathers, beaks and wings and are animals, but can be subdivided and classified as birds
- Children are able to use and devise classification keys for living things, giving reasons for why animals and plants belong in particular group https://www.stem.org.uk/resources/elibrary/resource/32764/newly-discovered-species-age-7-11

- Children to understand the impact of the Swedish scientist (taxonomist) Linnaeus, who developed a way of organising living things that forms the basis of how we classify living things today
- Know that there are 8 steps to classifying living things, Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species
- Children recognise that environments can change and that this can sometimes pose dangers to living things e.g. exploring the positive impact of conservation headlands around the Bromesberrow Estate fields and the impact of plastic pollution in the sea on marine animals.

**Working at Greater Depth Indicators**

- Children are able to classify with more depth e.g. Monera, Protista and Fungi; recognising that bacteria belong to Monera, an amoeba is a single celled organism with a nucleus belonging to Protista and that yeast and mould are fungi.
- Children recognise that creatures such as whales and dolphins are mammals because they breathe air as opposed to fish who have gils to breathe. They understand that this goes beyond observable characteristics.
- Children go further in depth in regards to classifying insects, understanding that there are arachnids etc… that are subcategorised.

**Working Scientifically**

- I ask different kinds of questions **e.g. how does our plastic waste harm marine animals? What is the evidence for this?**
- I plan different types of scientific enquiries to answer questions **e.g. making guides or keys to explore identify local plants and animals**
- I can set up fair tests **e.g. investigating and comparing the plants and mini beasts found in the field headlands and our school field, keeping sampling methods the same**
- I decide what observations and measurements to make
- I use different scientific equipment to measure with precision **e.g. using a wildlife camera, setting up on a timer to measure how many birds visit the feeding station within a certain time frame or using a quadrant to precisely survey an area in $cm^2$**
- I take repeat readings when appropriate.
- I decide how to record data and results **e.g. using a tally chart to record the different species of birds or plants observed**
- I can use scientific diagrams, labels, classification, keys, tables, scatter, bar and line graph **e.g. using classification keys to group animals seen or bar charts to record how many of each bird/plant species observed.**
- I report and present findings using speaking and writing including displays and presentations.
- I use relevant scientific language and illustrations **e.g. observational drawings of potato starch grains or plant cells magnified using the microscope**
- I use results to make predictions and set up more tests (including fair tests) **e.g. what temperature will yeast grow best at and why?**

**Investigations to inspire scientific questioning and enquiry:**

**At what temperature does yeast grow best experiment** https://www.bbc.co.uk/teach/class-clips-video/ks2-science-what-temperature-does-yeast-grow-the-most/zprdqfr
**Yogurt making**
**Bee Detectives** https://www.stem.org.uk/resources/community/collection/12774/year-4-living-things-and-their-habitats

**Vocabulary**
Y4- group, classification, species, organism, microorganism, cell, bacteria, mosses, conifers, ferns, mould, yeast, fungi, microscope

Y5- group, classification, species, kingdom, organism, microorganism, cell, bacteria, mosses, conifers, ferns, mould, yeast, fungi, microscope, nucleus, unicellular and multicellular organism, photosynthesis, chlorophyll, Alexander Flemming, Carl Linnaeus , taxonomist

Y6- group, classification, species, kingdom, organism, microorganism, cell, bacteria, mosses, conifers, ferns, mould, yeast, fungi, microscope, nucleus, unicellular and multicellular organism, photosynthesis, chlorophyll, Alexander Flemming, Carl Linnaeus, taxonomist, Penicillin, Protista, Monera, Amoeba

**Spring term Two (a)**
**Matter**
**Focus: Matter Matters!**
**Questions:**

**Q: Which materials are good conductors or insulators?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: How can you separate salt from water?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: Will all materials once changed return back to their original form?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: Can you describe a material change that is irreversible?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**School Objectives**

- 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 (PTFE and Roy J Plunket and Glue on sticky notes and Spencer Silver https://www.youtube.com/watch?v=bvalMbOdseU (how Post its were 'accidentally created' explained).

**Working at Greater Depth Indicators**

- 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) https://www.youtube.com/watch?v=bvalMbOdseU (how Post its were 'accidentally created' explained)

**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).

**Investigations to inspire scientific questioning and enquiry:**

Teflon (PTFE) tape investigation: exploring the properties of Teflon tape through secret messaging!
https://www.google.com/search?q=teflon+experiments+kids&rlz=1C1GCEA_enGB1041GB1041&oq=teflon+experiments+kids&aqs=chrome..69i57.6627j0j4&sourceid=chrome&ie=UTF-8#fpstate=ive&vld=cid:d2873ccf,vid:J88rcZxGEq0

Rainbow Density Lab: Children to explore following specific instructions to measure accurately using a graduated cylinder to explore what happens to coloured water with different densities of salt water. https://www.instructables.com/Rainbow-Density-Lab/

Jelly cube dissolving experiment (an investigation to determine if large or small particles dissolve quicker): Jelly cubes cut into large and small pieces. Variables to include stirring, temperature of water, shaking. Children to think about fair testing through this.

Making own glue: investigating using flour, water, white vinegar and salt. Who can make the stickiest glue? Whose post it notes will hold on the longest? Can the children think of their own ways of testing adhesion? Children to think of variables in this e.g. how much of each substance will be needed.
Explorify: https://explorify.uk/en/activities Burnt Toast, Watch Water being Drained from Rice or Pasta, Tasted Sugar in your Cereal Milk, All Mixed Up

**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, reversible, soluble, insoluble, 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, soluble, insoluble, reversible, irreversible, change, experiment, state of matter, separation, properties, accurate, results, variables, prediction, conductivity, magnetic, distillation, control, variable

**Spring term Two (b)**

**Energy**

**Focus: Sound!**

**Questions:**

**Q: How does sound travel?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: What happens to sound as the distance from it increases?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: Do larger vibrations produce louder sounds?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**School Objectives**

- 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

**Working at Greater Depth Indicators**

- 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
-

**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 **e.g. investigating why different instruments make a louder sound (due to soundboxes)**
- 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 **e.g. using a data logger to record the volume against the amplitude**
- 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 **e.g. using a scatter graph to record and compare the correlation between amplitude and volume**
- 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**

**Investigations to inspire scientific questioning and enquiry:**

Explorify https://explorify.uk/en/activities Heard Your Neighbours in the Next House or Flat, Pitch Perfect, You Could Hear Every Sound at Equal Volume, Make Sound Louder, Rice and Rhythm

**Vocabulary**

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

Bromesberrow St Mary's CofE (VA) Primary School
We're Reaching for the Stars

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

Bromesberrow St Mary's CofE (VA) Primary School
We're Reaching for the Stars

**Summer Term Two**

**Energy**

**Focus: Awesome animals (including humans)!**

**Questions:**

**Q: How do humans digest food?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: Can you identify and record a food chain?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: How do humans change over time?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: How does the human circulatory system work?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: How can we stay healthy?** *Questioning, Observing, Recording, Communicating, Evaluating*

**Q: How do animals get their water and nutrition?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating*

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

**Working at Greater Depth Indicators**

- 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.

**Working Scientifically**

- I ask different kinds of questions **e.g. why do we have different types of teeth? What might happen if a species in a food chain became extinct?**
- I plan different types of scientific enquiries to answer questions **e.g. what is in our blood? Children can research this then could make blood using water, food colouring, cereal hoops for red blood cells etc…**
- 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 **e.g. measuring heart rate when at rest and after exercise. Monitoring the impact of time on pulse rate after exercise.**
- 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. learning about and presenting the scientific work of Charlotte Armah on broccoli and healthy eating**
- I use relevant scientific language and illustrations **e.g. describing heterotrophic and autotrophic feeding through diagrams and written explanations**
- 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**

**Investigations to inspire scientific questioning and enquiry:**

Digestion Investigation- modelling and exploring the process of digestion in a practical https://www.stem.org.uk/resources/elibrary/resource/35396/digestive-system-experiment Variables explored (amount of water and ingredients- controlled, squeezing technique-could be the independent variable)

A Bloody Investigation- making your own blood! https://www.risingstars-uk.com/blog/may-2018/a-bloody-investigation
Explorify: https://explorify.uk/en/activities/what-if/we-had-four-stomach-parts-like-a-cow What if we had Four Stomach Parts like a Cow, How are These Linked to Digestion https://explorify.uk/en/activities/odd-one-out/how-are-these-linked-to-digestion Had Your Heart Rate Measured, Had a Blood Test, Notice How Babies Change as They Become Toddlers

**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, 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, foetus, adolescence, elderly, life expectancy, adulthood, childhood, length, oxygenated, circulatory system, heart, lungs, blood artery, vein, pulmonary, alveoli, capillary, nutrients

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

**Cycle C**

**Autumn term Three**

**Energy**

**Focus: Let there be Light!**

**Questions:**

**Q: How does light travel?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: How does light enable us to see different colours?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: What happens when light hits an object?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: Why do shadows have the same shape as the object casting them?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: Can you make a shadow disappear?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**School Objectives**

- Children need to understand that light can be absorbed, reflected, transmitted or refracted
- Children need to investigate the relationship between light sources, objects and shadows.
- Children need to investigate the effect of different light source positioning on shadows.
- Children need to understand that a prism splits white light into the colour spectrum of light.
- Children need to understand how a convex and concave lens works making a water lens to investigate this
- Children need to explore different colour filters and understand that a colour filter only allows light of that colour to pass through it (be transmitted)
- Children need to understand that light appears to travel in straight lines and undertake a scientific enquiry to observe this.
- Children need to understand the significance of Sir Isaac Newton's scientific discoveries on light e.g. making light spinners to prove that rainbow colours combine so that we see white light.

**Working at Greater Depth Indicators**

- Children need to gain an understanding of refraction in prisms, recognising that each colour is refracted by a slightly different amount to show the rainbow

- 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. They can give clear scientific explanations as to why these occur.
- Children explore and explain how a camera uses light
- Children can share their thoughts and explain their understanding on light being able to bend
-

**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 **e.g. deciding how to prove that light travels in straight lines using a show box and torch**
- 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 **e.g. deciding to use a table to record how much light is transmitted through translucent, opaque and transparent objects.**
- 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). **e.g. extending on an investigation with 2 torches and an object to eliminate shadows, experiment with different coloured card to see if this can also reduce shadows and to what extent.**

**Investigations to inspire scientific questioning and enquiry:**

Curtains: Children explore a range of materials to 'solve the sleep problems' of a night shift worker. They measure the darkness of shadows and use light meters and potentially layering of materials to see which material is best for 'black out' curtains.

Newton's Colour Wheels https://www.youtube.com/watch?v=_z7BDab3N7w Recognising that white light is made up of a spectrum

Making a water lens https://www.youtube.com/watch?v=FFWNvcjEjDQ Investigating what happens with image inversion using a convex 'water' lens

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

Light travels in straight lines investigation https://www.google.com/search?q=shoe+box+experiement+light+travels+in+straight+lines&rlz=1C1GCEA_enGB1041GB1041&oq=shoe+box+experiement+light+travels+in+straight+lines&aqs=chrome..69i57j33i10i160.13082j0j7&sourceid=chrome&ie=UTF-8#kpvalbx=_00P_Y4_PKsSpgQaloYX4DQ_34

Explorify: https://explorify.uk/en/activities?search Build a Sundial, Sine A Light, Now You See Me, We Couldn't See Colours, Find Your Focus, There Were Two Suns

**Vocabulary**

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, refract, direct/direction, transparent, opaque, translucent, straight, rainbow, colours, absorb, periscope, telescope, binoculars, mirror, magnifying glass, Newton's first reflecting telescope, prism, filters, spectrum

**Spring term Three**

**Energy**

**Focus: Electrifying!**

**Questions:**

**Q: What are the main components of a simple electrical circuit?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: Which materials are good conductors of electricity?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**Q: How do you get a bulb to glow brighter?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**School Objectives**

- 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.
- 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

**Working at Greater Depth Indicators**

- 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).

**Investigations to inspire scientific questioning and enquiry:**
Investigating and creating switches that conduct electricity
Super Sucker! Designing a Machine to Clear up Litter – using knowledge of circuitry, motors and batteries
https://www.stem.org.uk/resources/community/collection/12390/year-6-electricity

Fruit Lights- using a lemon to light up a bulb https://www.stem.org.uk/resources/community/collection/12390/year-6-electricity

How Does Voltage Impact on the Brightness of a Bulb? Independent variable- number of batteries (cells), Dependent Variable- brightness of bulbs, Controlled Variable-number of bulbs

Explorify: https://explorify.uk/en/activities?search Not Been Able to Find a Battery When you Need One, Red, Amber, Green, A Mars Rover Broken Down, Roving Robots, Soak up Some Rays

**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,

Bromesberrow St Mary's CofE (VA) Primary School
We're Reaching for the Stars

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

Bromesberrow St Mary's CofE (VA) Primary School
We're Reaching for the Stars

**Summer Term Three**
**Life on Earth**
**Focus: Evolution and Inheritance**
**Questions:**

**Q: How have living things changed over time?** *Questioning, Observing, Recording, Communicating, Evaluating*
**Q: How does reproduction work?** *Questioning, Testing and Investigating, Observing, Recording, Communicating, Evaluating*
**Q: How do living things adapt to their environment?** *Questioning, Predicting, Testing and Investigating, Observing, Recording, Communicating, Evaluating*

**School Objectives**

- 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, the Peppered Moth or lapwings
- 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

**Working at Greater Depth Indicators**

- 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 **e.g. using a classification key to classify birds by their features**
- 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)

**Investigations to inspire scientific questioning and enquiry:**

Best Beaks investigation: Children to investigate using a range of 'beaks' (variables) e.g. chopsticks, spoons, tweezers to see which is best adapted for the food. The food can be control variable if it is kept the same. https://www.stem.org.uk/resources/elibrary/resource/33665/education-pack-seeds-and-fruits-adaptation-suitable-home-learning Teaching and explanation through: https://classroom.thenational.academy/lessons/what-is-the-theory-of-evolution-6ru32d?activity=video&step=1

Design a species: Using ARKive's Adaptation STEM resource https://www.stem.org.uk/elibrary/resource/28087 . Children explore how different animals have adapted to different habitats and then design their own.

Snail Hunt: investigating Darwin's theory on evolution, adaptation, variation and distribution https://www.stem.org.uk/resources/collection/4114/evolution-megalab

Explorify: https://explorify.uk/en/activities?search In the Flap, Blackbird Variation, Star Shaped Survivor, Orange and Waxy, Been Told you Look Like Your Parents or Other Relatives?

Bromesberrow
St Mary's CofE (VA) Primary School
We're Reaching for the Stars

Respect, Motivation, Cooperation, Kindness, Pride, Perseverance

Bromesberrow
St Mary's CofE (VA) Primary School
We're Reaching for the Stars

**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, organism, inherit, characteristic, offspring, physical features, environment, habitat

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