

Bluecoat Primary Academy Science Progression Document 2020

**Bluecoat Primary Academy Science Intent Statement**

At Bluecoat Primary Academy we believe a high-quality science education provides the foundations for understanding the world, by promoting experiences of exploring and investigating scientific phenomena in a range of contexts leading to a development of natural curiosity. Children will be encouraged to build their knowledge and understanding through asking questions, taking risks, experimenting, reflecting, making and learning from mistakes; whereby they acquire and apply core skills equipping them for an ever-changing diverse world.

**Science Progression Document Guide**

Key Ideas: provides an overview of the key ideas and procedural knowledge pupils should know by the end of the year.

Working scientifically: specifies the understanding of the nature, processes and methods of science for each year group and should be taught continuously encouraging pupils to use features of scientific enquiry to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data

Vocabulary: The quality and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. Pupils should be encouraged to use this during lessons and refer back to in retrieval lessons.

Types of Working Scientifically:

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| **Identifying and Classifying** | **Comparative testing** | **Fair tests** | **Pattern seeking** | **Research** | **Ideas over time** |
| Increased focus on measuring and using data to answer ‘Big Questions’.  Continue to build on their observational skills, becoming more independent in identifying, through the use of increasingly complex tools, as well as developing higher order skills in reasoning and justification when explaining how they have chosen to group things.  Design simple tests to help them classify materials, as well as independently using a range of secondary sources to support them in identifying a range of living things. | Use an increasingly wide range of equipment to make measurements.  Learn what it means to measure accurately and check for reliability.  Learn to independently plan how to record and analyse the data, using tables, pictograms, and bar charts to compare the measurements they make.  Use bar charts to draw conclusions about what they have found out to be the answer to their ‘Big Question’.  Evaluate the procedure they used and the quality of their data, suggesting ways they could improve their test. | Plan their own tests to collect data. Through fair testing learn to understand the different types of variables:   * The dependent variable that they will change in their test, * The independent variable that they are going to measure so that they can find out how the dependent variable affects it, * The control variables which the children will need to keep the same so that they don’t affect the results.   Measure and record data that can be displayed in a scatter or line graph. Use their data to draw conclusions that identify a relationship. Become more systematic in how they approach fair tests more independently. Written conclusions to become more focussed on scientific explanations. Focus on their skills in evaluating their enquiries. | Decide what they should measure and observe.  Choose equipment that are appropriate to collect data.  Use a data logger to collect accurate data.  Using data analysis techniques to spot patterns.  Use data and graphs to support their explanations.  Use their findings to form and justify their own predictions, then propose further investigations to test predictions. | Reading for information and note-taking.  Learn to interpret information they find and critically consider its relevance.  Use a range of secondary sources, including books, websites and video.  Listen to professionals/experts to get information, ask questions/ interviews or send letters/emails.  Create questionnaires and interviews to collect data.  Evaluate the quality of information they have found and how well it has enabled them to draw conclusions and answer their ‘Big Question’. | Explore and talk about their own and other people’s scientific ideas.  Begin to recognise how scientific ideas change and develop over time.  Use a range of secondary sources of information  Develop their use of scientific language.  Explain ideas using their scientific knowledge and understanding.  Evaluate the significance, strengths and weaknesses of different scientists’ ideas. |

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| **Plants** | | | | | | |
| **National curriculum objectives:**  -identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers  - explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant  - investigate the way in which water is transported within plants  - explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.*(see NC notes and guidance for more detail)*  ***Pupils should*** be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in [nutrition](http://primaryscienceonline.org.uk/glossary-of-terms/nutrition/) and support, leaves for [nutrition](http://primaryscienceonline.org.uk/glossary-of-terms/nutrition/) and [flowers](http://primaryscienceonline.org.uk/glossary-of-terms/flowers/) for reproduction.  **Note:** Pupils can be introduced to the idea that [plants](http://primaryscienceonline.org.uk/glossary-of-terms/plants/) can make their own [food](http://primaryscienceonline.org.uk/glossary-of-terms/food/), but at this stage they do not need to understand how this happens.  ***Pupils might work scientifically by:*** comparing the effect of different factors on plant growth, for example, the amount of [light](http://primaryscienceonline.org.uk/glossary-of-terms/light/), the amount of fertiliser; discovering how [seeds](http://primaryscienceonline.org.uk/glossary-of-terms/seeds/) are formed by observing the different stages of plant [life cycles](http://primaryscienceonline.org.uk/glossary-of-terms/life-cycles/) over a period of time; looking for patterns in the structure of fruits that relate to how the [seeds](http://primaryscienceonline.org.uk/glossary-of-terms/seeds/) are dispersed. They might observe how water is transported in [plants](http://primaryscienceonline.org.uk/glossary-of-terms/plants/), for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the [flowers](http://primaryscienceonline.org.uk/glossary-of-terms/flowers/). | | | | | **Key ideas:**   1. Plants make their own food in their leaves to provide them with energy, growth, repair and reproduce. 2. Leaves absorb sunlight and carbon dioxide. 3. Plants have roots to provide support and to draw moisture from the soil, through stems to take water to the rest of the plant. 4. The plant makes its food from water and carbon dioxide, using sunlight as energy, in the green parts of the plants (mainly leaves). 5. Flowering plants have evolved specific parts to carry out pollination, fertilization and seed growth. 6. Seed dispersal improves chances of enough seeds germinating snf growing to mature. 7. Seeds and bulbs need the right conditions to germinate. They contain a food store for the first stages of growth (ie until the plant is able to produce its own food). | |
| **Prior Learning** | **How plants reproduce** | | | | **How plants make food** | **Vocabulary** |
| **In Year 2:**   * Observe and describe how seeds and bulbs grow into mature plants. * Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. | **Reproductive parts of flowering plant**  Flowering plants have evolved specific parts to carry out pollination, fertilisation and seed growth. Coloured and scented petals and attract insects. Stamen hold pollen, stigma collect pollen. Ovaries contain eggs that grow into seeds when pollen from the male moves down the stigma. | **All flowers are similar but different**  All flowering plants reproduce by pollen from the male reaching the stigma of the female. However all plants look slightly different because they pollinate in different ways. Most plants use insects to pollinate and so have colourful petals and strong scents, a few plants use the wind, these often have less colourful petals and scents. | **Seed dispersal**  Plants have evolved many different ways to disperse their seeds. Seed dispersal increase the chances of the seeds germinating and growing into mature plants. | **What does a seed do?**  Seeds and bulbs need the right conditions to germinate. They contain a food store for the first stages of growth (ie until the plant is able to produce its own food through its leaves). | **Plants don’t eat.**  Plants don’t eat and so have to make their own food to provide them with energy and material to grow.  The modal of how plants grow  Plants turn water from the ground and carbon dioxide from the air into sugar, which is used for energy and making new material to grow. | Air, Light, Water, Nutrients, Soil, Reproduction, Transportation, Dispersal, Pollination, Flower |
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| **Working scientifically opportunities:**  Revisit KS1 skills: focus on asking questions about the similarities and differences between things. Go outside to explore the world around them at all times of the year. | | | | | | |
| **Identifying and Classifying** | Teach children how pollination and fertilisation occur, let them dissect a flower (lilies and daffodils are good) and identify the parts of the flower. Use a microscope to observe the pollen. Children then chose a flower from the school and try to identify the reproductive organs. | Bring in as many different flowers as possible (check for hay fever sufferers and allergies) including grasses and trees. Children try and work out if they are wind or insect pollinated. They could check their predictions using the internet. |  |  | Do plants take water through their roots alone, their leaves or both? How could we find out?  Does carbon dioxide enter at the top of the leaf or underside of the leaf? How could you find out? | Explore  Relationships  Fair tests  Enquiry  Independent variable  Controlled variable  Patterns  Relationships  Comparisons  Conclusions  Predictions  Scientific premise |
| **Comparative testing** |  |  | Collect as many different ‘helicopter’ seeds as possible and ask which ones would be able to go further. Draw out questions like ‘how does the wing length affect how long it takes to fall? ‘ this could be investigated with real seeds or modelling with paper helicopters.  How does the space between seeds affect how well they grow? |  | Provide children with small pots of already growing cress/grass. Cut back each plant to about ½ inch – predict and monitor how they both respond. How does the amount of light affect how well a plant grows? |
| **Fair tests** |  |  | Leave a tub of compost outside and let weeds develop. Where did they come from? Were the seeds already in the compost or have they come from elsewhere? Plan and carry out an investigation to find out. |  |  |
| **Pattern seeking** |  |  |  | Plants grow best when they are damp, warm and in light. Is this true for seed germination?  What can you predict about a plant and how it grows from the size of its seed? Plan and carry out investigations to test your theory. |  |
| **Research** |  |  |  |  | How are soils that retain water well different from those that don’t? Do all plants prefer the same type of soil? |
| **Ideas over time** |  |  |  |  | If you set up a sealed glass dome containing damp soil, normal air and some small flowering plants, what would you predict to happen over a long period of time? |
| **In Year 6:**   * **Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.** * **Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.** * **Identify how animals and plants are adapted to suit their environment in different ways and that adaption may lead to evolution.** | | | | | | |

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| **Animals including Humans** | | | | | |
| **National curriculum objectives:**   identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat   identify that humans and some other animals have skeletons and muscles for support, protection and movement.  Pupils should continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.  Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy and design meals based on what they find out. | | | | **Key ideas:**   1. Different animals have adapted to eat different foods. 2. Many animals have skeletons to support their bodies and protect vital organs. 3. Muscles are connected to bones and move them when they contract. 4. Moveable joints connect bones. | |
| **Prior Learning** | **Skeletons and movement** | | | | **Vocabulary** |
| **In Year 2:**  **-know that animals, including humans, have offspring which grow into adults.**  **-know the basic stages in a life cycle for animals, including humans.**  **-find out and describe the basic needs of animals, including humans, for survival (water, air and food).**  **-describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene.** | **Skeletons protect vital organs**  All vertebrates have internal skeletons that protect vital organs. | **Skeletons support weight**  Skeletons support the weight of land animals. Stronger bones can support more weight. | **Skeletons support movement**  Bones are connected (but can move relative to each other) at joints. Muscles connect to bones and move them when they contract. Stronger bones can anchor stronger muscles. | | Nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, hydrostatic, skeleton, vertebrates, invertebrates, muscles, contract, relax |
| **Working scientifically opportunities:**  Revisit KS1 skills: focus on asking questions about the similarities and differences between things. Go outside to explore the world around them at all times of the year. | | | | | |
| **Identifying and Classifying** | How do skeletons of different animals compare?  Compare x-rays and skeletons of animals looking for similarities and differences – predicting where vital organs are. |  |  | |  |
| **Comparative testing** |  |  |  | |
| **Fair tests** |  | How does the length of a bone affect its bending strength and compressional strength? (could use paper tubes)  Look at x-rays to identify broken and healed bones.  Consider why might some bones need to be stronger than other and then get them to predict relative size of bones from some animals based on how they move. |  | |
| **Pattern seeking** | Do male humans have larger skulls than females? |  |  | |
| **Research** |  |  | Give children a large empty torso where they sketch in pencil what they think the skeleton is like. Get them to move in a variety of ways and feel how they | |
| **Ideas over time** | Why might some bones need to be stronger than others? | | | |
| **In Year 4:**   * Describe the simple functions of the basic parts of the digestive system in humans. * Identify the different types of teeth in humans and their simple functions. * Construct and interpret a variety of food chains, identifying producers, predators and prey. | | | | | |

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| **Light and Sound** | | | | |
| **National curriculum objectives:**   * Recognise that they need light in order to see things and that dark is the absence of light. * Notice that light is reflected from surfaces. * Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. * Recognise that shadows are formed when the light from a light source is blocked by a solid object. * Find patterns in the way that the sizes of shadows change.   ***Pupils should*** explore what happens when [light](http://primaryscienceonline.org.uk/glossary-of-terms/light/) reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how [light](http://primaryscienceonline.org.uk/glossary-of-terms/light/) behaves. They should think about why it is important to protect their eyes from bright lights. They should look for, and measure, [shadows](http://primaryscienceonline.org.uk/glossary-of-terms/shadows/), and find out how they are formed and what might cause the [shadows](http://primaryscienceonline.org.uk/glossary-of-terms/shadows/) to change. Note: pupils should be warned that it is not safe to look directly at [the sun](http://primaryscienceonline.org.uk/glossary-of-terms/the-sun/), even when wearing dark glasses. ***Pupils might work scientifically by:*** looking for patterns in what happens to [shadows](http://primaryscienceonline.org.uk/glossary-of-terms/shadows/) when the [light](http://primaryscienceonline.org.uk/glossary-of-terms/light/) source moves or the distance between the [light](http://primaryscienceonline.org.uk/glossary-of-terms/light/) source and the object changes. | | | **Key ideas:**   1. There must be light for us to see. Without light it is dark. 2. We need light to see things even shiny things. 3. Transparent materials let light through them and opaque materials don’t let light through. 4. Beams of light bounce off some materials (reflection) 5. Shiny materials reflect light beams better than non-shiny materials 6. Light comes from a source. | |
| **Prior Learning** |  | | | **Vocabulary** |
| **In Year 1:**  **-**Name the seasons and know about the type of weather in each season.  -May have some knowledge of were light comes from.  -Will most likely have seen their shadows and may know they appear when it is sunny.  -Some understanding of a reflection.  -May understand they need light to be able to see things. | **Light and Sight**  We can only see things when there is light and the light had to come from somewhere. | **What light does when it hits materials**  When light hits and object it can do a number of things:   * If the object is transparent it will go through it and we will be able to see through it. * If the object is opaque it will block the light and no light will get through. * If the object is perfectly reflective light will bounce back off it and we will see reflections of objects. * If the material is translucent it will allow light through but we won’t be able to see through it. | | Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent. |
| **Working scientifically opportunities:**  Revisit KS1 skills: focus on asking questions about the similarities and differences between things. Go outside to explore the world around them at all times of the year. | | | | |
| **Identifying and Classifying** | How would you organise these light sources into artificial and natural light sources? | What colour would be best to make a safety jacket from? How does the colour of a material affect how reflective it is? | |  |
| **Comparative testing** | How does the distance from a light source affect how bright it looks? |  | |
| **Fair tests** | How does being in darkness affect your sense of hearing? Is this how nocturnal animals survive? | How does the number of layers of transparent plastic affect how much light can pass through?  How does the distance between the shadow puppet and the screen affect the size of the shadow? | |
| **Pattern seeking** |  |  | |
| **Research** | How does the sun produce light? |  | |
| **Ideas over time** | How have our ideas about eclipses changed over time? | | |
| **In Year 6:**  **-recognise that light appears to travel in straight lines.**  **-use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.**  **-explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.**  **-use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.**  **-know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.** | | | | |

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| **Forces and Magnets** | | | | | |
| **National curriculum objectives:**   * compare how things move on different surfaces * notice that some [forces](http://primaryscienceonline.org.uk/glossary-of-terms/forces/) need contact between 2 objects, but magnetic [forces](http://primaryscienceonline.org.uk/glossary-of-terms/forces/) can act at a distance * observe how [magnets](http://primaryscienceonline.org.uk/glossary-of-terms/magnets/) attract or repel each other and attract some [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/) and not others * compare and group together a variety of everyday [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/) on the basis of whether they are attracted to a magnet, and identify some magnetic [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/) * describe [magnets](http://primaryscienceonline.org.uk/glossary-of-terms/magnets/) as having 2 poles * predict whether 2 [magnets](http://primaryscienceonline.org.uk/glossary-of-terms/magnets/) will attract or repel each other, depending on which poles are facing  ***Pupils should*** observe that magnetic [forces](http://primaryscienceonline.org.uk/glossary-of-terms/forces/) can act without direct contact, unlike most [forces](http://primaryscienceonline.org.uk/glossary-of-terms/forces/), where direct contact is necessary (for example, opening a door, pushing a swing). They should explore the behaviour and everyday uses of different [magnets](http://primaryscienceonline.org.uk/glossary-of-terms/magnets/) (for example, bar, ring, button and horseshoe). ***Pupils might work scientifically by:*** comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces, and gathering and recording data to find answers to their questions; exploring the strengths of different [magnets](http://primaryscienceonline.org.uk/glossary-of-terms/magnets/) and finding a fair way to compare them; sorting [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/) into those that are magnetic and those that are not; looking for patterns in the way that [magnets](http://primaryscienceonline.org.uk/glossary-of-terms/magnets/) behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make [magnets](http://primaryscienceonline.org.uk/glossary-of-terms/magnets/) useful in everyday items and suggesting creative uses for different [magnets](http://primaryscienceonline.org.uk/glossary-of-terms/magnets/). | | | | **Key ideas:**   1. Magnets exert attractive and repulsive forces on each other. 2. Magnets exert non-contact forces, which work through some materials. 3. Magnets exert attractive forces on some materials. 4. Magnet forces are affected by magnet strength, object mass, distance from object and object material. | |
| **Prior Learning** |  | | | | **Vocabulary** |
| **No KS1 objectives.** | **What magnets do**  Magnets exert attractive forces on some metals. | **Magnets don’t need to touch**  Magnetic forces work through other materials including air, so magnets don’t need to be touching to exert their force. It is caked a non-contact force. | **Magnets attract and repel**  Each end of a magnet is called a pole, opposite poles are called north and south.  Magnets exert attractive forces on each other when the poles facing each other are north and south (opposites).  Magnets exert repulsive forces on each other when the poles facing each other are the same. | **What affects magnetic strength?**  The strength of magnetic forces are affected by:  -The strength of the magnet.  -The distance between the magnet and the object.  -The material the object is made from. | Force, push, pull, friction, surface, magnet, magnetic, magnetic field, pole, north, south, attract, repel, compass |
| **Working scientifically opportunities:**  Revisit KS1 skills: focus on asking questions about the similarities and differences between things. Go outside to explore the world around them at all times of the year. | | | | | |
| **Identifying and Classifying** | Magnetic material hunt, what can they say about magnetic materials?  Can I make a magnetic material non-magnetic? |  |  |  |  |
| **Comparative testing** |  | How far away does a magnet need to be before it attract a magnetic material? |  | Are bigger magnets stronger? |  |
| **Fair tests** |  |  | How far away can the magnetic attraction between two magnets be experienced? Is the repulsive force the same size?  How is the magnetic attraction or repulsion force affected by putting materials between the magnets? | How does the mass of an object affect how much force is needed to make it move? |
| **Pattern seeking** |  |  |  |  |
| **Research** | How have our ideas about forces changed over time?  Or  How does a compass work? | | | |
| **Ideas over time** | How have our ideas about forces changed over time? | | | |
| **In Year 5:**  **-explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the impact of gravity on our lives.**  **-identify the effects of air resistance, water resistance and friction, which act between moving surfaces.**  **-recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.**  **-describe the movement of the Earth, and other planets, relative to the Sun in the solar system.**  **-describe the movement of the moon relative to the Earth.**  **-describe the Sun, Earth and Moon as approximately spherical bodies.**  **-describe the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky.** | | | | | |

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| **Rocks and Soils (Materials and their uses)** | | | | | | | |
| **National curriculum objectives:**   * compare and group together different kinds of [rocks](http://primaryscienceonline.org.uk/glossary-of-terms/rocks/) on the basis of their appearance and simple [physical properties](http://primaryscienceonline.org.uk/glossary-of-terms/physical-properties/) * describe in simple terms how [fossils](http://primaryscienceonline.org.uk/glossary-of-terms/fossils/) are formed when things that have lived are trapped within rock * recognise that soils are made from [rocks](http://primaryscienceonline.org.uk/glossary-of-terms/rocks/) and organic matter  *****Pupils might work scientifically by*****: observing [rocks](http://primaryscienceonline.org.uk/glossary-of-terms/rocks/), including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify [rocks](http://primaryscienceonline.org.uk/glossary-of-terms/rocks/) according to whether they have grains or crystals, and whether they have [fossils](http://primaryscienceonline.org.uk/glossary-of-terms/fossils/) in them. Pupils might research and discuss the different kinds of [living things](http://primaryscienceonline.org.uk/glossary-of-terms/living-things/) whose [fossils](http://primaryscienceonline.org.uk/glossary-of-terms/fossils/) are found in sedimentary rock and explore how [fossils](http://primaryscienceonline.org.uk/glossary-of-terms/fossils/) are formed. Pupils could explore different soils and identify similarities and differences between them and investigate what happens when [rocks](http://primaryscienceonline.org.uk/glossary-of-terms/rocks/) are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed. | | | | | | **Key ideas:**   1. Fossils provide evidence that living things have changed over time. | |
| **Prior Learning** |  | | | | | | **Vocabulary** |
| **In Year 2:**  -Identify and compare the suitability of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.  -Find out how shapes of solid objects made from materials can be changed by squashing, bending, twisting and stretching. | **There are different types of rock.**  **There are different types of soil.** | | | **Soils change over time.**  **Different plants grow in different soils** | **Fossils tell us what has happened before.**  **Fossils provide evidence.**  **Palaeontologists use Fossils to find out about the past.** | | Rocks, igneous, metamorphic, sedimentary, anthropic, permeable, impermeable, Fossils, Soils, Sandstone, Granite, Marble, Pumice, Crystals, Absorbent, organic matter, top soil, sub soil, base rock |
| **Working scientifically opportunities:**  Revisit KS1 skills: focus on asking questions about the similarities and differences between things. Go outside to explore the world around them at all times of the year. | | | | | | | |
| **Identifying and Classifying**  Increased focus on measuring and using data to answer ‘Big Questions’.  Continue to build on their observational skills, becoming more independent in identifying, through the use of increasingly complex tools, as well as developing higher order skills in reasoning and justification when explaining how they have chosen to group things.  Design simple tests to help them classify materials, as well as independently using a range of secondary sources to support them in identifying a range of living things. | Locate soil and rock types in the school grounds (scavenger hunt) | |  | | Investigate different fossils.  Children could then make their own fossils. | |  |
| **Comparative testing**  Use an increasingly wide range of equipment to make measurements.  Learn what it means to measure accurately and check for reliability.  Learn to independently plan how to record and analyse the data, using tables, pictograms, and bar charts to compare the measurements they make.  Use bar charts to draw conclusions about what they have found out to be the answer to their ‘Big Question’.  Evaluate the procedure they used and the quality of their data, suggesting ways they could improve their test. | Soil detectives (qus to support comparitives)  How are the soils different?  What characteristics are the same?  Which do you think has best drainage?  Which is more likely to lead to flooding?  How many soil types have we found?  Where might you find out more?  How might the soil be different in different countries?  Which soil absorbs the most water? | |  | |  | |
| **Fair tests**  Plan their own tests to collect data. Through fair testing learn to understand the different types of variables:   * The dependent variable that they will change in their test, * The independent variable that they are going to measure so that they can find out how the dependent variable affects it, * The control variables which the children will need to keep the same so that they don’t affect the results.   Measure and record data that can be displayed in a scatter or line graph. Use their data to draw conclusions that identify a relationship. Become more systematic in how they approach fair tests more independently. Written conclusions to become more focussed on scientific explanations. Focus on their skills in evaluating their enquiries. | Make chocolate rocks: Chocolate can be ground into small particles (weathered), heated, cooled and compressed – just like rocks.  Use the chocolate to create ‘sedimentary’, ‘metamorphic’ and ‘igneous’ chocolate. | The Soil Factory:  Why is your recipe the best for effective soil?  What would grow best in your soil?  Why do you think worms are important to the creation of soil?  How can we use composting to make our own soil?  Does it currently look like real soil?  How long do you think this process will take and why? | | |  | |
| **Pattern seeking**  Decide what they should measure and observe.  Choose equipment that are appropriate to collect data.  Use a data logger to collect accurate data.  Using data analysis techniques to spot patterns.  Use data and graphs to support their explanations.  Use their findings to form and justify their own predictions, then propose further investigations to test predictions. |  |  | | |  | |
| **Research**  Reading for information and note-taking.  Learn to interpret information they find and critically consider its relevance.  Use a range of secondary sources, including books, websites and video.  Listen to professionals/experts to get information, ask questions/ interviews or send letters/emails.  Create questionnaires and interviews to collect data.  Evaluate the quality of information they have found and how well it has enabled them to draw conclusions and answer their ‘Big Question’. |  | *Use the rocks in the school grounds to build a structure – could become a permanent fixture within the school grounds.* | | |  | |
| **Ideas over time**  Explore and talk about their own and other people’s scientific ideas.  Begin to recognise how scientific ideas change and develop over time.  Use a range of secondary sources of information  Develop their use of scientific language.  Explain ideas using their scientific knowledge and understanding.  Evaluate the significance, strengths and weaknesses of different scientists’ ideas. | What were James Hutton’s ideas about how rocks were made and what was his evidence?  How did Mary Anning’s work help us understand prehistoric life? | | | | | |
| **In Year 4:**   * **Compare and group material together, according to whether they are solids, liquids or gases.** * **Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees celcius.** * **Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.**   **In Year 6: Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.** | | | | | | | |