

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.

**Working scientifically:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Identifying and classifying** | **Comparative testing** | **Pattern seeking** | **Research** | **Ideas over time** |
| Focus on asking questions about similarities and differences. Go outside to explore the world around them all year round. Reporting through scientific drawings of their observations.Develop scientific vocabulary. | Report findings using tally charts, pictograms or block graphs. | Begin to look for patterns in measurements and observations.Describe them both orally and in writing.Start to think about the cause and effect relationships. | Pose their own ‘big question’.Interpret information they find and use it to help answer their question.Use a range of secondary sources: books, websites and videoListen to presentations from experts and science professionals(ask them questions in interviews or letters) | Report findings using poster, leaflets, newspapers, reports or letters.Timeline of scientists |

|  |
| --- |
| **Plants** |
| **National curriculum objectives:**-identify and name a variety of common wild and garden plants, including deciduous and evergreen trees-identify and describe the basic structure of a variety of common flowering plants, including trees.**-**identify and name the roots, trunk, branches and leaves of a tree.Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted. They should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem). Pupils might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees. Pupils might keep records of how plants have changed over time, for example the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants.  | **Key ideas:**1. Plants usually grow from seeds and bulbs.
2. Plants need warmth, light and water to grow and survive.
3. Flowering plants make seeds to reproduce and make more plants. Some plants die after producing seeds and others live for many generations.

***Duplicated in Year 2*** |
| **Prior Learning** | **How do plants grow?** | **Vocabulary** |
| **In Early Years:**-Develop an understanding of growth.-Shows care and concern for living things and the environment.-Make observations of plants and explain why some things occur and talk about changes.-Can talk about some of the things they have observed, such as plants. | **Where do plants come from?**Most plants start growing from a seed or bulb | **Plant survival**All plants need water, light and warmth to grow and survive. | **How do plants get what they need to survive?**A seed produces roots to allow water to get into the plant and shoots to produce leaves to collects the sunlight. | deciduous, evergreen trees, leaves, flowers(blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem |
| * Provide a range of seeds, bulbs and objects that look like these. Children predict what they think might be real seeds and bulbs and then plan how they could check.
* Go on a seed hunt trying to identify any seeds from a key (you will need to construct one for the kinds of seeds they may find). Plant the seeds they have found and tried to identify and see if they grow into the plants they predicted.
* Plant a seed in a jar so it is possible to see it germinate. As it germinates children observe, describe and predict what they think each bit emerging from the seed is for. Continue observing and describing over a few weeks and refine their ideas.
 | * Using quick growing plants like mustard cress, fast growing grass and beans to test if light, water and warmth are needed. (do the test on already growing plants as seeds need often different conditions to germinate and we don’t need to confuse children)
* How does the amount of light and warmth affect how well my plant grows?
* What are the perfect conditions for my cress to grow?
 | * Which direction do shoots and roots grow after germination?
* If a seed is planted upside down will the roots pop out of the soil?
* **How long does a stem need to be before it produces leaves and is it the same for all plants?**
* If plants need water could we grow cress in water but no soil? (let them grow cress in water and on wet cotton wool and examine the difference)
* Do all plants have roots, how could we find out?
* Do all plants have leaves, how could we find out?
* **If plants need water to grow, then surely the more the better? How does the amount of water affect how well a plant grows?**
 |
| **Common misconceptions** | Some children may think:• plants are flowering plants grown in pots with coloured petals and leaves and a stem• trees are not plants• all leaves are green• all stems are green• a trunk is not a stem• blossom is not a flower. |
| **Working scientifically opportunities: observing closely, using magnifying glasses and comparing and contrasting familiar plants. Describing how they were able to identify and group them – draw diagrams showing parts of different plants including trees. Compare and contrast what they have found out about different plants.** |
| **Identifying and Classifying** |  |  | How can we sort the leaves that we collected on our walk? | ObservationsClassifyTestRecordPredict |
| **Comparative testing** |  | Which type of compost grows the tallest sunflower? | Which tree has the biggest leaves? |
| **Pattern seeking** |  | Is there a pattern in where we find moss growing in the school grounds? |  |
| **Research** | What are the most common British plants and where can we find them? |  |  |
| **Ideas over time**. | How does Beatrix Potter help our understanding of mushrooms and toadstools? |
| **In Year 2:*** Observe and describe how seeds and bulbs grow into mature plants.
* Find out and describe how plants need water, light and suitable temperatures to grow and stay healthy.
 |

|  |
| --- |
| **Animals including humans** |
| **National curriculum objectives:**--identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals- identify and name a variety of common animals that are carnivores, herbivores and omnivores-describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. *(see NC notes and guidance for more detail)* Pupils should use the local environment throughout the year to explore and answer questions about animals in their habitat. They should understand how to take care of animals taken from their local environment and the need to return them safely after study. Pupils should become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets. Pupils should have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes. Pupils might work scientifically by: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.  | **Key ideas:**1. There are many different animals with different characteristics.
2. Animals have senses to help individuals survive. When animals sense things they are able to respond.
3. Animals need food to survive.
4. Animals need a variety of food to help them grow, repair their bodies be active and stay healthy.
 |
| **Prior Learning** | **How animals survive** | **Vocabulary** |
| **In Early Years:**-Children should be able to identify different parts of their body.-Have some understanding of healthy food and the need for variety in their diets.-Be able to show care and concern for living things.-Know the effects exercise has on their bodies.-Have some understanding of growth and change.Can talk about things they have observed including animals. | **Feeding for survival**Animals need food to survive; it gives them energy to move and material to grow. Animals are all different and so eat different foods, some eat other animals (carnivores) and others only eat vegetables (herbivores). | **Moving for survival**Animals have to get their food so they have to move to where it is, which means they have to move in different ways depending upon where their food is. Animals that eat other animals have to hunt them (predators) animals that are hunted are prey. | **Sensing for survival**Animals use their senses to detect where their food is and if there are any predators around, animals have different ways of avoiding being eaten e.g. Camouflage, protection and moving away fast. | fish, reptiles, mammals, birds, amphibians (+ eg of each), herbivore, omnivore, carnivore, leg, arm, elbow, head, ear, nose, back, wings, beak, sight, touch, smell, teeth, knee, taste, hearing, toes |
| * Hunt for snails in the school grounds describing/ photographing where they were found and what other plants and animals were also there. Predict from this what snails might eat and test predictions.
* Children keep food diaries for themselves and a pet to tackle the question: ‘Do all animals eat the same food?’ use what they find to predict what hyenas (dogs) and tigers (cats) and field mice (hamsters) might eat.
 | * Show short videos of animals hunting or trying to avoid being predated. Children describe how predators and prey move similarly and differently. Then show some unknown animals and children predict if they think they are predators or prey.
* Explore habitats in the local environment identifying the plants and minibeasts that live there. Children predict what might eat what and why they think that. Check their ideas through internet research and construct a simple food chain from what is found.
 | * Which of our senses is the most accurate at identifying food? Make different coloured and flavoured jellies (make sure the colour does not match the flavour), they then test each jelly using their sight, taste and smell separately.
* Spiders prey on woodlice; what senses do woodlice use to detect the spiders and how do they avoid being eaten (they could test their ideas)
* Children take photos of a part of the school grounds and make a camouflage coat that a teddy could wear to protect from being eaten by the great teddy bear eating monster.
 |
| **Common misconceptions** | Some children may think:• only four-legged mammals, such as pets, are animals• humans are not animals• insects are not animals• all ‘bugs’ or ‘creepy crawlies’, such as spiders, are part of the insect group• amphibians and reptiles are the same. |
| **Working scientifically opportunities: use observations to compare and contrast animals at first hand or through videos and photographs. Describing how they identify and group them. Grouping animals according to what they eat. Use their senses to compare different textures, sounds and smells.** |
| **Identifying and Classifying** | How can we organise all the animals in the pet shop?What are the names for all the parts of our bodies? | ObservationsClassifyTestRecordPredict |
| **Comparative testing** |  |  | Is our sense of smell better when we can’t see? |
| **Pattern seeking** |  |  | Do you get better at smelling as you get older? |
| **Research** |  | How are animals in …… different to ones that we find in Britain? | Do all animals have the same senses as humans? |
| **Ideas over time** | What strange ideas did Italian scientist Luigi Galvani have about animals in 1780? Why did he think that? |
| **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, food and air).
* Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene.
 |

|  |
| --- |
| **Everyday materials** |
| **National curriculum objectives:**-distinguish between an object and the material from which it is made-identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock-describe the simple physical properties of a variety of everyday materials- compare and group together a variety of everyday materials on the basis of their simple physical properties. Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil. Pupils might work scientifically by: performing simple tests to explore questions, for example: ‘What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast’s leotard?’  | **Key ideas:**1. There are different materials.
2. Materials have describable properties.
3. Different materials have different properties.
 |
| **Prior Learning** | **What are materials?** | **Vocabulary** |
| **In Early Years:**-children should be able to ask questions about the place they live.-talk about why things happen and how things work.-discuss the things they have observed such as natural and found objects.Manipulates materials to achieve a planned effect. | **The big idea about materials:*** There are many different materials that have different describable and measurable properties.
* Materials that have similar properties are grouped into metals, rocks, fabrics, wood, plastic and ceramics (including glass).

The properties of a material determine whether they are suitable for a purpose. | wood, plastic, glass, paper, water, metal, rock, hard, soft, bendy, rough, smooth |
| Great fire of London link?Are there any other links here? Toys? |
| **Common misconceptions** | Some children will think:• only fabrics are materials• only building materials are materials• only writing materials are materials• the word ‘rock’ describes an object rather than a material• ‘solid’ is another word for hard. |
| **Working scientifically opportunities: asking simple questions and recognising that they can be answered in different ways. Observing closely, using simple equipment. Performing simple tests, identifying and classifying. Using observations and ideas to suggest answers to questions. Gathering and recording data to help in answering questions.** |
| **Identifying and Classifying** | Which materials will float and which will sink?We need to choose a material to make an umbrella. Which materials are waterproof? | ObservationsClassifyTestRecordPredict |
| **Comparative testing** | Which materials are the most flexible?Which materials are the most absorbent? |
| **Pattern seeking** | Is there a pattern in the types of materials that are used to make objects in a school? |
| **Research** | How are bricks made?Which materials can be recycled? |  |
| **Ideas over time** | How are building materials different now to when Queen Elizabeth I was on the throne?What ideas did Chinese monks have in 800 CE that led to their discovery of gunpowder? |
| **In Year 2:*** Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.
* Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
 |

|  |
| --- |
| **Seasons** |
| **National curriculum objectives:**-- observe changes across the four seasons- observe and describe weather associated with the seasons and how day length varies.  Pupils should observe and talk about changes in the weather and the seasons. **Note:** Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. Pupils might work scientifically by: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change.  | **Key ideas:**Children need to learn about how a number of things change with the seasons, including the weather, the temperature and the number of daylight hours. They do not need to know why these things change. It would be best to teach these phenomena through exploring the local environment rather than on topics to do with Earth and space. |
| **Prior Learning** |  | **Vocabulary** |
| **In Early Years:**-developing an understanding of change.-observe and explain why certain things may occur (e.g leaves falling off trees, weather changes).-look closely at similarities, differences, patterns and change.-comments and questions about the place they live or the natural world. | Longitudinal studies:Children should carry out a study of the environment over the entire year. Children should draw conclusions from what they find and make suggestions for how they expect things to change. In tracking temperature and rainfall, pupils can make suggestions for why certain things happen and certain times in the year. Tipping points of temperature are vital as two degree change can impact a wide range of organisms meaning they are no longer visibly present in the local area. | summer, spring, autumn, winter, sun, day, moon, night, light, dark, overcast, windy, snow, rain, temperature |
| Why do more frequent day of rain saturate the ground?How long does it take for the ground to dry after it has been raining? (*Does more water take longer to dry*?)Do countries with higher temperature have less rain? (*Compare UK and one other country as a minimum*).Track rain fall and temperature in different areas of the school grounds. | Investigate the properties of leaves 1. Which leaf is the strongest?
2. Which is the most effective shade cover?
3. Which is most effective at directing water?
4. Which turns brown quickest?
5. What do you notice about the different leaves?

Use ID cards to identify trees in the grounds.1. What purpose do leaves serve for trees?
2. Why do you think leaves turn brown in winter?

Sticky cards – collect colours from the outdoors.1. Why did you choose to select that object to add to your card?
2. Why did you choose to select that colour?
3. Will you be able to collect that in a different season?
 | And down came the rain1. What effect does rain have on the environment?
2. How might it change on different types of soil?
3. How does it differ in the nature trail?
4. What would the effect on the environment be if there was too much rain?
5. What would the effect on the environment be if there was not enough rain?
 |
| **Common misconceptions** | Some children will think:• it always snows in winter• it is always sunny in the summer• there are only flowers in spring and summer• it rains most in the winter. |
| **Working scientifically opportunities: observing closely, using simple equipment. Keep records of how plants have changed over time, for example the leaves falling off trees and buds opening. Making tables and charts about weather; and making displays of what would happen in the world around them, including day length as the seasons change.** |
| **Identifying and Classifying** | How would you group these things based on which season you are most likely to see them in? |  |  | ObservationsClassifyTestRecordPredict |
| **Comparative testing** |  |  | In which season does it rain the most? |
| **Pattern seeking** |  | Do trees with bigger leaves lose their leaves first in autumn?Does the wind always blow the same way? |  |
| **Research** |  |  |  |
| **Ideas over time** |  |
| **In Year 3:**- 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. |