

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:*** 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.

Pupils should use the local environment throughout the year to observe how plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as the processes of reproduction and growth in plants.Note: seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy  | **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 other live for many generations.
 |
| **Prior Learning** |  | **Vocabulary** |
| **In Year 1:**-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.-identify and name the roots, trunk, branches and leaves of a tree. | **What are flowers for?** | **What happens after a plant has produced seeds?** | Seeds, bulbs, water, Light, temperature, growth, observation, record, compare, roots, stem, leaf, flower, measure, diagram, life cycle, life process, germinate, grain |
| Grow some flowers, let them pollinate and show children where the seed grows. They then go on a walk looking for plants and flowers, taking pictures and deciding if a seed could form the plant and if it has yet formed.Does cress produce seeds, how could we find out?Do all plants produce flowers and seeds? Pupils choose a few plants in the school grounds and keep a simple diaries of how they change over the year in order to answer the question. | Do all plants produce flowers and seeds and what happens to them after they have flowered? Pupils choose a few plants in the school grounds and keep simple diaries of how they change over the year in order to answer the question.From this information pupils group plants into those that die after flowering and those that carry on living, are there any patterns?What happens to a daffodil (or other such flower) if it is left outside to form a seed and how is this different if it is cut and placed in water inside? |
| **Common misconceptions** | Some children will think:• plants are not alive as they cannot be seen to move• seeds are not alive• all plants start out as seeds• seeds and bulbs need sunlight to germinate. |
| **Working scientifically opportunities: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth. Setting up a comparative test to show that plants need light and water to stay healthy.** |
| **Identifying and Classifying** | Draw seeds before and after they have grown, observing changes. Observe plant growth and then order plant life cycle. | How can we identify the trees that we observed on our tree hunt? | MethodsChangesPatternsObservingObservationMeasurementsTestsIdentifyingClassifyingGatheringRecordingScientific premise |
| **Comparative testing** | Do cress seeds grow quicker inside or outside? |  |
| **Pattern seeking** | Do bigger seeds grow into bigger plants? |  |
| **Research** |  | How does a cactus survive in a desert with no water? |
| **Ideas over time** | What ideas did botanist Arthur Tansley have about habitats in 1935? |
| **In Year 3:*** Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.
* Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
* Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary from plant to plant.
* Know the way in which water is transported within plants.
 |

|  |
| --- |
| **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 carnivore, herbivores and omnivores.

Pupils should be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. They should also be introduced to the processes of reproduction and growth in animals. The focus at this stage should be on questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs.The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager, adult.Pupils might work scientifically by: observing, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions. | **Key ideas:**1. **Animals move in order to survive.**
2. **Different animals move in different ways to help them survive.**
3. **Exercise keeps animal’s bodies in good condition and increases survival chances.**
4. **All animals eventually die.**
5. **Animals reproduce new animals when they reach maturity.**
6. **Animals grow until maturity and then don’t grow any larger.**
 |
| **Prior Learning** |  | **Vocabulary** |
| **In Year 1:****-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.** | **The modal of animal life** **All animals are born** **which is when they** **can eat and breathe.** When animals are no longer able to reproduce they **They grow and develop** usually die **until they are strong**  **enough to reproduce.** | **How it varies between different animals*** **Different animals live to different ages**
* **Different animals reproduce at different ages**
* **What do animals need to survive?**
 | survival, water, air, food, adult, baby, offspring, kitten, calf, puppy, exercise, hygiene, living, dead, never alive, habitats, micro-habitats, shelter, damp, shade, litter |
| Construct a large bar chart for the wall of person’s height against ages. Add in details of the class, teachers, parents and grandparents. Children use this to try and work out at what age people typically stop growing. | Create a large timeline on the wall from 0-100 years.* Children bring in pictures of pets their parents had when they were younger with information about how old the pet was when it died. Hang the pets on the timeline at the age they were when they died.
* Do the same for great grandparents (or a relative that died long before the child was born).
* Children use the timeline to try and spot any patterns for how long animals live (e.g. do bigger animals live longer?)
* Show children some examples of animals they don’t know (e.g. whale, elephant, desert mice, chimpanzees) and ask them to predict how long they might live for.

Encourage children to use the timeline to come up with questions and look for patterns. |
| **Common misconceptions** | Some children will think:• an animal’s habitat is like its ‘home’• all animals that live in the sea are fish• respiration is breathing• breathing is respiration. |
| **Working scientifically opportunities: observing through video or first-hand observation and measurement, how humans grow. Asking questions about what humans need to stay healthy and suggesting ways to find answers to their questions.** |
| **Identifying and Classifying** |  |  | MethodsChangesPatternsObservingObservationMeasurementsTestsIdentifyingClassifyingGatheringRecordingScientific premise |
| **Comparative testing** |  | Do bananas make us run faster? |
| **Pattern seeking** | Which age group of children wash their hands the most in a day? |  |
| **Research** | Compare different hand spans:Can the children suggest questions and then answer them? | What food do you need in a healthy diet and why? |
| **Ideas over time** | When the first fizzy drink machine was invented in 1775, scientist Joseph Priestly said it was the cure to many health problems. What ideas do scientists have about fizzy drinks today? |
| **In Year 3:*** Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.
* Know how nutrients, water and oxygen are transported within animals and humans.
* Know about the importance of a nutritious, balanced diet.
* Identify that humans and some other animals have skeletons and muscles for support, protection and movement: know about the skeletal and muscular system of a human.
 |

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

Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things. Pupils should be introduced to the terms ‘habitat’ (a natural environment or home of a variety of plants and animals) and ‘microhabitat’ (a very small habitat, for example for woodlice under stones, logs or leaf litter). They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest.Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions like: ‘Is a flame alive? Is a deciduous tree dead in winter?’ and talk about ways of answering their questions. They could construct a simple food chain that includes humans (eg, grass, cow, human). They could describe the conditions in different habitats and microhabitats (under log, on stony path, under bushes); and find out how the conditions affect the number and type(s) of plants and animals that live there. | **Key ideas:**1. **Some things are living, some were once living but now dead and somethings never lived.**
2. **There is variation between living things**
3. **Different animals and plants live in different places.**
4. **Living things are adapted to survive in different habitats.**
5. **Environmental change can affect plants and animals that live there.**
 |
| **Prior Learning** |  | **Vocabulary** |
| **In EYFS:****-**comments and questions about the place they live or the natural world.-shows care and concern for living things and the environment.-can talk about things they have observed such as plants and animals-notices features of objects in their environment.-comments and asks questions about their familiar world. | **Carnivores and Herbivores**All animals get their nutrients by eating. Some animals hunt and eat other animal (predators) and some animals are hunted and eaten by other animals (prey). Animals that eat only other animals are called *carnivores*. Animals that only eat plants are called *herbivores*, and animals that wat both are *omnivores*. | **Adapted to survive**All animals are adapted to eat and survive (predators and prey). Animals have adapted many different ways to survive as predators or prey. Plants are also adapted to survive; they have adapted to get the water and light they need and avoid being eaten. | **Surviving seasonal changes**The changing seasons have a dramatic effect on plants, which has an impact on animals that feed on them. Animals have adapted ways of surviving when the seasons change and food become scarce including hibernating, storing food (fattening up), migrating. | **Longitudinal studies**Children should raise and explore questions that demand the identification of creatures and plants in their local environment and how their populations change through the seasons. Linking the properties of the seasons to the changing populations and beginning to question how populations of different organisms are related. |

|  |
| --- |
| living, dead, habitat, energy, food chain, predator, prey, woodland, pond, desert, never alive, habitats, micro-habitats, shelter, sea shore, ocean, rainforest, damp, shade |

 |
| Each group chooses a small area of the school grounds and collects and identifies the plants and mini-beasts that live there. Construct a food chain that might exist between these organisms. Test the food chain by completely removing the plants from the small area and monitor what happens to the mini-beasts over a few weeks. | Place sizeable pieces of materials e.g. wood or brick, over a patch of grass and carefully monitor what happens every few days. Many questions flow from this e.g. will all the plants grow back when we lift the materials? Does the type of material we put on the grass make a difference? Find a piece of wild ground with lots of weeds. Remove the tall weeds and keep them cut, what happens to the other plants? | Children choose or are allocated a small habitat area. They identify all the mini-beasts they can over a few days. Which ones do they think will hibernate and why? Check again a few times over the year to see what happens. Be aware that some animals don’t hibernate but are only active above certain temperatures e.g slugs are only active 5 degrees whereas snails hibernate. | Steve the stick insect wants to visit from Australia. Where in the school grounds will he find most friends and will they be there all year? |
| **Common misconceptions** | Some children will think:• an animal’s habitat is like its ‘home’• plants and seeds are not alive as they cannot be seen to move• fire is living• arrows in a food chain mean ‘eats’. |
| **Working scientifically opportunities: sorting and classifying things according to whether they are living, dead or were never dead or never alive and recording their findings using charts. Describe where to place things, exploring questions e.g. ‘is a flame alive? Is a deciduous tree dead in winter? Describe the conditions in different habitats and micro-habitats (under log, on stony path, under bushes) and find out how the conditions affect the number and type(s) of plants and animals that live there.** |
| **Identifying and Classifying** |  |  | How would you group these plants and animals based on what habitat you would find them in? | How would you group things to show which are living, dead, or have never been alive? | MethodsChangesPatternsObservingObservationMeasurementsTestsIdentifyingClassifyingGatheringRecordingScientific premise |
| **Comparative testing** |  | Do amphibians have more in common with reptiles or fish? |  |  |
| **Pattern seeking** |  |  | What conditions do woodlice prefer to live in?Which habitat do worms prefer – Where can we find the most worms? | How does the habitat of the Arctic compare with the habitat of the rainforest? |
| **Research** |  | Woodlice habitat:Can children identify where plants and animals live?Can children make a record of where plants and animals live? |  |
| **Ideas over time** |  |
| **In Year 4:*** Recognise that living things can be grouped in a variety of ways.
* Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
* Know and label the features of a river.
* Recognise that environments can change and that this can sometimes pose danger to living things.
 |

|  |
| --- |
| **Everyday Materials**  |
| **National curriculum objectives:*** 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.

***Pupils should*** identify and discuss the uses of different everyday [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/) so that they become familiar with how some [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/) are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/) are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass). They should think about the properties of [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/) that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/). Pupils might find out about people who have developed useful new [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/), for example [John Dunlop, Charles Macintosh or John McAdam](http://primaryscienceonline.org.uk/famous-scientists/).***Pupils might work scientifically by***  comparing the uses of everyday [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/) in and around the school with [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/) found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different [materials](http://primaryscienceonline.org.uk/glossary-of-terms/materials/), and recording their observations. | **Key ideas:**1. Materials can be changed by physical force (twisting, bending, squashing and stretching).
 |
| **Prior Learning** |  | **Vocabulary** |
| **In Year 1:**- distinguish between an object and the material from which it is made.-identify and name a variety of everyday materials, including wood, metal, plastic, glass, 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 properties. | - Explore ideas through testing materials to see if they are appropriate for particular jobs (link to Antarctic topic where appropriate).- Explore all the main groups of materials and look at their properties through investigation (strength, flexibility, waterproof, absorbency, softness, slip, stretchiness, brittleness) | Hard, Soft, Stretchy, Stiff, Shiny, Dull, Rough, Smooth, Bendy, Waterproof, Absorbent, Opaque, Transparent Brick, Paper, Fabrics, Squashing, Bending, Twisting, Stretching Elastic, Foil |
| **Buildings**(rocks, wood, ceramics, metals)* Which rocks are the least crumbly?
* Which materials absorb the most water?
* Which type of brick would be the easiest to drag to make a pyramid?
* Which material would be the strongest to use as a floor tile?
 | **Clothing**(fabrics, plastics) |
| **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: comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits and in stories/rhymes/songs) Observing closely, identifying and classifying the uses of different materials and recording their observations.** |
| **Identifying and Classifying** | Which materials are shiny and which are dull? |  | MethodsChangesPatternsObservingObservationMeasurementsTestsIdentifyingClassifyingGatheringRecordingScientific premise |
| **Comparative testing** | Which shapes make the strongest paper bridge?Which material would be best for the roof of the little pig’s house? | * Which material could be used to make a waterproof hat for the explorers?
* How could the hat be insulated and still keep it waterproof?
* Which material could I wrap my ice egg/snowman in to stop it melting, or would it make it melt quicker?
 |
| **Pattern seeking** |  |  |
| **Research** | How have materials changed over time? |
| **Ideas over time** |  |
| **In Year 3:*** **Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.**
* **Describe in simple terms how fossils are formed when things that have lived are trapped with rock.**
* **Recognise that soils are made from rock and organic matter.**
 |

|  |
| --- |
|  |
|  |  |
|  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |
|  |
|  |  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |
|  |  |
|  |