Science at Princess Frederica

Overview

At Princess Frederica the children study a broad, exciting and enriching science curriculum. The science curriculum aims to provide the children with the foundations for understanding the world by equipping them with knowledge of key concepts, scientific vocabulary and scientific enquiry skills. Children are taught through a wide variety of topics which cover the three main disciplines; biology, chemistry and physics. Within each of these topics children are given the opportunity to develop 'working scientifically' skills which supports their understanding of the nature, processes and methods of science.

In KS1 the key focus is to enable the children to experience and observe phenomena and look more closely at the world around them. The children cover a range of topics in KS1, which includes: materials, animals (including humans), plants, living things and their habitats and seasonal changes. Throughout these topics, children are encouraged to be curious and ask questions about the things they notice and are given opportunities to develop their understanding through scientific enquiry. The children are given opportunities to conduct different types of scientific enquiries, which includes: observing changes, grouping and classifying things, noticing patterns, carrying out comparative tests and using secondary sources. In KS1 the children begin to use simple scientific language to talk about what they have found from their enquiries.

In KS2 the key focus is to enable the children to broaden their scientific view of the world around them and deepen their understanding of a wide range of scientific ideas. The children cover a range of topics in KS2, which includes: electricity, light, forces and magnets, animals (including humans), plants, rocks, evolution, earth and space, states of matter and materials. Throughout these topics children are encouraged to develop their understanding by exploring and talking about their ideas and asking their own questions about scientific phenomena. They are encouraged to ask questions about things they observe and begin making their own decisions about which types of scientific enquiry are likely to be the best way of answering them. In KS2 the children should then begin drawing conclusions and be able to talk about what they have found using scientific language.

For each year group there is a detailed outline of the topics covered, the national curriculum references are in bold alongside other non-statutory guidance. There are also investigation suggestions for each topic and assessment guidance and helpful web links.

Vision

- To provide pupils with the foundations for understanding the world through the specific disciplines of biology, chemistry and physics
- To enable pupils to develop an understanding of the nature, processes and methods of science through different types of science enquiries
- To equip pupils with scientific knowledge required to understand the uses and implications of science, today and in the future
- To immerse pupils in scientific vocabulary to aid knowledge and understanding
- To foster curiosity and excitement about science
- To enable pupils to build up an understanding of key scientific concepts
- To provide children with plenty of investigation opportunities

Intent

By the end of EYFS, children should be able to,

- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.
- Use their senses in hands-on exploration of natural materials.

- Plant a seed and care for it identifying some key features of its life cycle.
- Explore the natural world around them, making observations and drawing pictures of plants.
- Identify some similarities and some differences between the natural world around them and a contrasting environment (one they might see pictures of or read about).
- Begin to understand the need to respect and care for the natural environment and all living things.

Working scientifically skills

- Play and explore the natural environment around them.
- Find different ways to solve a problem.
- Know some similarities and differences in relation to places, objects, materials and living things
- Give an answer to an 'I wonder' question.

By the end of Year 1, children should be able to,

- Describe the four seasons and the changes across them (Seasonal Changes and Weather)
- Describe the weather associated with the seasons and how day length varies (Seasonal Changes and Weather)
- Describe the difference between an object and the material it is made from (Everyday Materials)
- Name 4 common everyday materials and describe their properties using some key vocabulary (Everyday Materials)
- Compare and notice similarities between everyday objects (Everyday Materials)
- Compare and notice differences between everyday objects (Everyday Materials)
- Name an animal from each group (Animals including humans)
- Understand the difference between carnivores, herbivores and omnivores (Animals including humans)
- Use the correct vocabulary to name the main parts of the body (Animals including humans)
- Use correct vocabulary to name the 5 senses (Animals including humans)
- Name a variety of common wild and garden plants (Plants)
- Describe the basic structure of a plant and tree (Plants)
- Describe the difference between deciduous and evergreen trees (Plants)
- Name 2 types of trees (Plants)

Working Scientifically skills:

- ask simple questions and recognise that they can be answered in different ways
- Observe closely, using simple equipment
- Perform simple tests
- Identify and classify
- Use their observations and ideas to suggest answers to questions
- Gather and record data to help in answering questions

By the end of Year 2, children should be able to,

- Describe what plants need in order to grow and stay healthy (Plants)
- Describe how seeds and bulbs grow into mature plants (Plants)
- Describe the life cycle of a human (Animals including humans)
- Describe the life cycle of 1 animal (chicken/frog/butterfly) (Animals including humans)
- Describe what humans need to survive (Animals including humans)
- Understand the importance of exercise and a healthy diet (Animals including humans)
- Compare the suitability of different materials for different purposes (Everyday Materials)
- Name materials suitable for certain purposes (Everyday Materials)
- Describe how the shape of certain materials can be changed (Everyday Materials)
- Explain the difference between things that are dead, living and never been alive (Living things and their habitats)

- Describe a habitat and name some of the animals and plants that live within it (Living things and their habitats)
- Explain how some animals are suited to their habitats (Living things and their habitats)
- Explain a simple food chain (Living things and their habitats)

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By the end of Year 3, children should be able to,

- Understand that animals and humans need the correct nutrition (Animals including humans)
- Name 4 different types of nutrients (Animals including humans)
- Understand that humans and animals cannot produce their own nutrients (Animals including humans)
- Use correct vocabulary to describe the human Skelton and muscles (Animals including humans)
- Understand that skeletons and muscles are for protection and movement (Animals including humans)
- Understand that light is needed to see things and darkness Is the absence of light (Light)
- Describe how shadows are formed when light is blocked and spot patterns in the way shadows change (Light)
- Understand that light from the sun can be dangerous and describe 2 ways that you can protect your eyes from the sun (Light)
- Name 3 different types of rock and describe their properties (Rocks)
- Group rocks together based on properties and appearance (Rocks)
- Describe in simple terms how fossils are made (Rocks)
- Understand that soils are made from rocks and organic matter (Rocks)
- Describe the functions of each part of a flowering plant (Plants)
- Explain what the requirements are for plant life and growth and how these requirements vary from plant to plant (Plants)
- Explain how water is transported in plants (Plants)
- Describe the part that the flower plays in the lifecycle of a plant (plants)
- Compare how objects move on different surfaces (Forces and magnets)
- Describe how magnets either attract or repel each other (Forces and magnets)
- Name a magnetic material (Forces and magnets)
- Name 2 non-magnetic materials (Forces and magnets)
- Group objects based on whether they are magnetic or not (Forces and magnets)
- Understand that magnets have 2 poles (Forces and magnets)
- Predict whether 2 magnets will attract or repel each other depending on which poles are facing (Forces and magnets)

Working Scientifically skills:

- ask relevant questions and use different types of scientific enquiries to answer them
- set up simple practical enquiries, comparative and fair tests
- make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gather, record, classify and present data in a variety of ways to help in answering questions
- record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- report on findings from enquiries, including oral and written explanations, displays or presentations of

results and conclusions
- use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identify differences, similarities or changes related to simple scientific ideas and processes
- use straightforward scientific evidence to answer questions or to support their findings

By the end of Year 4, children should be able to,

- Understand that living things can be grouped in different ways (living things and their habitats)
- Use a classification key to identify living things (Living things and their habitats)
- Identify if a material is a liquid, gas or solid (States of matter)
- Describe how some materials can change when heated (States of matter)
- Describe how some materials can change when cooled (States of matter)
- Measure temperatures accurately in degrees Celsius (States of matter)
- Describe the water cycle using the key vocabulary (condensation and evaporation) (States of matter)
- Explain how we hear sounds using correct scientific vocabulary (Sound)
- Identify pattern between volume and the strength of vibrations (Sound)
- Identify patterns between pitch and the features of an object that produces the sound (Sound)
- Describe that sounds get fainter as the distance from the sound increases (Sound)
- Name 3 common appliances that run off electricity (Electricity)
- Independently construct a simple series circuit (Electricity)
- Name the common components of a simple series circuit (Electricity)
- Identify if a lamp will light in a simple series circuit (Electricity)
- Recognise that a switch opens and closes a circuit (Electricity)
- Name 2 common insulators and conductors (Electricity)
- Describe the simple functions of the digestive system using scientific vocabulary (Animals including humans)
- Name the 3 different types of teeth and their functions (Animals including humans)
- Construct 2 different food chains that have a producer, predator and prey (Animals including humans)
- Explain some of the ways the environments can change and the danger it can pose (Living things and their habitats)

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By the end of Year 5, children should be able to,

- Name some of the planets in the solar system (Earth and Space)
- Describe the movement of the earth and other planets relative to the sun (Earth and Space)
- Describe that the earth, sun and moon are approximately spherical bodies (Earth and Space)
- Explain day and night and the apparent movement of the sun across the sky using the idea of the

Earth's rotation (Earth and Space)

- Explain the effect that gravity has on objects (Forces)
- Explain the effect (air resistance/water resistance or friction) can have on a moving object (Forces)
- Recognise that some mechanisms allow a smaller force to have greater effect (Forces)
- Explain the life cycle of 1 mammal, amphibian, insect and bird (Living things and their habitats)
- Describe some of the differences in life cycles (Living things and their habitats)
- Describe the life processes of reproduction in some animals and plants (Living things and their habitats)
- Compare and group materials based on their hardness, solubility, transparency, conductivity and response to magnets
- Understand how solutions are made (Properties and Changes of materials)
- Describe a method of separating mixture (Properties and Changes of materials)
- Conduct a fair/comparative test to test the suitability of uses of everyday materials (Properties and Changes of materials)
- Describe 1 irreversible change of state (Properties and Changes of materials)
- Describe 1 reversible change of state (Properties and Changes of materials)
- Describe the changes that humans go through as develop from a baby into adulthood and then into old age using scientific vocabulary (Animals including humans)

Working scientifically skills:

- plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, take repeat readings when appropriate
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- use test results to make predictions to set up further comparative and fair tests
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identify scientific evidence that has been used to support or refute ideas or arguments

By the end of Year 6, children should be able to,

- Recognise that light appears to travel in straight lines through investigation opportunities (Light)
- Explain that objects can be seen because they reflect light (Light)
- Explain why shadows have the same shape as objects (Light)
- Explain that living things have changed over time and that fossils provide information about animals that lived before (Evolution and Inheritance)
- Understand that living things produce offspring but although similar is not identical to their parents (Evolution and Inheritance)
- Explain the meaning of evolution (Evolution and Inheritance)
- Explain how some animals and plants are adapted to suit their environment (Evolution and Inheritance)
- Name the key parts of the circulatory system and their function (Animals including humans)
- Understand some of the impacts that drugs and lifestyle can have on the body (Animals including humans)
- Describe how nutrients are transported within animals, including humans (Animals including humans)

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Implementation

- Weekly science lesson (1 hour per week)
- Science week
- Outdoor area to enhance learning (embankment, garden, pond)
- Trips to support and extend in class experiences
- Science vocabulary displayed in class to support learning
- Themed science days that focus on a specific unit of learning

Impact

- Pupils will have a wide variety of skills linked to both scientific knowledge and understanding, and scientific enquiry/investigative skills.
- Pupils have a rich vocabulary which will enable them to articulate their understanding of taught concepts.
- Pupils will have high aspirations, which will see them through to further study, work and a successful adult life.
- Pupils will develop curiosity about the world around them and develop critical thinking and problem solving skills.

Supporting all learners

Children are supported through differentiation where this is needed. SEND Pupils are supported by additional scaffolding in the lesson. This might be through personalised templates for written work, word mats, visuals, overlays or personalised visuals such as focus slides. More able children are encouraged to apply their knowledge with less confident children so they are using and applying. There is also an expectation that SEND children will succeed against targets outlined in bold on the end of year expectations for what a child has achieved. These act as an overriding focus through the unit for SEND children (This is a minimum expectation and any SEND children who show confidence and success in a particular area will be challenged with our areas).

Assessment

Children broadly move through the curriculum at the same pace. In lessons, there is an expectation that the teacher focuses on the bottom 20% of the class ensuring they are supported with in the moment and over the shoulder feedback to support them with succeeding. At the end of the unit, progress is measured against the assessment question and against the unit targets which link to the expectations for what children will be able to do by the end of the year. Any children who have not succeeded in achieving the unit targets, this is indicated by the teacher on their assessment overviews.