

### NC Purpose of Study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

| Intent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Implementation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| <p>At Broadway Junior School we believe that a high quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational 'Big Ideas', pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.</p> <p>Science in our school is about developing children's ideas and ways of working that enable them to make sense of the world in which they live through investigation, as well as using and applying process skills. The staff here ensure that all children are exposed to high quality teaching and learning experiences, which allow children to explore their outdoor environment and locality, thus developing their scientific enquiry and investigative skills. They are immersed in scientific vocabulary, which aids children's knowledge and understanding not only of the topic they are studying, but of the world around them. We intend to provide all children regardless of ethnic origin, gender, class, aptitude or disability, with a broad and balanced science curriculum.</p> | <p>Teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all children are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following: Science will be taught in planned and arranged blocks by the class teacher, to have a subject specific approach. This is a strategy to enable the achievement of a greater depth of knowledge. Through our planning, we involve problem solving opportunities that allow children to find out for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess children regularly to identify those children with gaps in learning, so that all children keep up. Teachers build upon the learning and skill development of the previous years. As the children's knowledge and understanding increases, and they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence.</p> <p>Working Scientifically skills are embedded into lessons to ensure these skills are being developed throughout the children's school career and new vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics.</p> | <p>The impact and measure of this is to ensure children not only acquire the appropriate age related knowledge linked to the science curriculum, but also skills which equip them to progress from their starting points, and within their everyday lives.</p> <p>All children will have:</p> <ul style="list-style-type: none"> <li>A wider variety of skills linked to both scientific knowledge and understanding, and scientific enquiry/investigative skills</li> <li>A richer vocabulary which will enable to articulate their understanding of taught concepts</li> <li>High aspirations, which will see them through to further study, work and a successful adult life.</li> </ul> |

### Key Vocabulary

Classification Classify Classification key Characteristics Similarities Differences Organism Vertebrate Invertebrate Mammal Bird Fish Amphibian Reptile Species Genus Kingdom Carl Linnaeus Microorganism Bacteria Fungus Mould Yeast Habitat

| Knowledge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| <ul style="list-style-type: none"> <li>Know that living things can be classified according to their characteristics.</li> <li>Understand that classification helps scientists identify and study living things.</li> <li>Know that Carl Linnaeus developed a classification system that is still used today.</li> <li>Recognise that organisms are grouped according to shared characteristics.</li> <li>Understand that classification keys help identify unknown organisms.</li> <li>Know that invertebrates can be classified into different groups.</li> <li>Understand that microorganisms are living organisms that are too small to be seen without a microscope.</li> <li>Know that microorganisms can be both beneficial and harmful.</li> <li>Recognise that mould is a type of fungus that grows under suitable conditions.</li> </ul> | <ul style="list-style-type: none"> <li>Observe and compare the characteristics of living things.</li> <li>Sort and classify organisms using evidence.</li> <li>Use and create branching and classification keys.</li> <li>Research organisms using secondary sources.</li> <li>Identify patterns and relationships.</li> <li>Plan and carry out comparative investigations.</li> <li>Record observations accurately.</li> <li>Draw conclusions using scientific evidence.</li> <li>Communicate findings using scientific vocabulary.</li> </ul> |

### Enrichment Opportunities

- Nature walk to classify local organisms.
- Use digital classification keys.
- Explore pond or woodland habitats.
- Grow bread mould safely over time.

### Learning Objectives/End Points

Pupils will be able to:

- Classify living things according to observable characteristics.
- Explain why scientists classify organisms.
- Describe Carl Linnaeus' contribution to classification.
- Use classification keys to identify organisms.
- Explain the characteristics of major invertebrate groups.
- Describe what microorganisms are and explain their importance.
- Plan and carry out investigations involving living things.

### Key Questions/Learning Objectives/End Points

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| How can living things be classified?<br><br>Identify similarities and differences between organisms. Group organisms according to shared characteristics.                                                                                                                                                | Who was Carl Linnaeus and why is his classification system important?<br><br>Explore how Linnaeus developed a scientific system for classification. Explain how scientists use classification today.                                                                | <a href="#">How can we classify invertebrates? (TAPS Focused Assessment)</a><br><br>Research and classify invertebrates using observable characteristics. Use evidence to justify classification decisions.                                                                                    | What characteristics help us identify living things?<br><br>Use classification keys to identify unknown organisms. Explain how characteristics determine classification.                                                                                                                    | What are microorganisms?<br><br>Identify different types of microorganisms. Explain that microorganisms can be helpful or harmful.                                                                                                                                                                                                           | How do conditions affect the growth of mould?<br><br>Investigate the conditions needed for bread mould to grow. Explain how evidence supports scientific conclusions.                                                                                      |
| Classifying Animals According to Their Similarities and Differences – Explore how animals can be grouped using observable characteristics. Observe and classify a range of vertebrates and invertebrates. Create simple branching keys and justify classification decisions using scientific vocabulary. | Carl Linnaeus' Classification System – Understand how Linnaeus developed a scientific system for naming and grouping living things. Investigate the Linnaean classification system. Classify familiar animals from kingdom to species and explore scientific names. | <a href="#">TAPS Focused Assessment – Invertebrate Investigation</a><br>Children research a range of invertebrates, identify shared characteristics and develop or use a classification key to classify unknown specimens. They explain and justify their decisions using scientific evidence. | Identifying Characteristics – Curious Creatures Activity<br>Children use the Outstanding Science 'Curious Creatures' activity to identify and classify mystery organisms using observable characteristics and branching keys. They explain why each organism belongs to a particular group. | Microorganisms in Everyday Life – How are microorganisms helpful and harmful? Explore the uses of microorganisms in food production (e.g. yeast in bread, bacteria in yoghurt) and compare these with harmful microorganisms. Children create an information poster or presentation explaining the roles of microorganisms in everyday life. | Microorganisms and Bread Mould Investigation<br>Investigate microorganisms by growing bread mould under different conditions (e.g. warm, cold, light, dark). Observe changes over time, record results and explain the conditions needed for mould growth. |

### Substantive Knowledge

- Living things can be classified according to their observable characteristics.
- Classification helps scientists organise, identify and study living organisms.
- Organisms can be grouped by their similarities and differences.
- Carl Linnaeus developed a hierarchical classification system that is still used today.



- Classification keys help identify unknown organisms by answering questions about their characteristics.
- Vertebrates have a backbone; invertebrates do not.
- Invertebrates can be grouped according to shared features such as body structure and number of legs.
- Living things are organised into groups such as kingdom, phylum, class, order, family, genus and species.
- Microorganisms are living organisms too small to be seen without a microscope.
- Common microorganisms include bacteria, fungi and yeast.
- Mould is a type of fungus.
- Mould grows best in warm, damp conditions and reproduces by releasing spores.
- Some microorganisms are useful (e.g. making bread and yoghurt), while others can cause disease or food spoilage. The number of cells in a circuit can affect how components work.

## Careers

### Linking Curriculum Learning to Careers

Discuss how the skills developed in this unit are used in a range of careers, including:

- Ecologist
- Conservation biologist
- Conservation officer
- Biodiversity officer
- Environmental scientist
- Environmental consultant
- Habitat management officer
- Nature reserve warden
- Countryside ranger
- Park ranger
- Conservation ranger
- Woodland officer
- Forestry worker
- Forest ranger
- Wildlife conservationist
- Marine conservationist
- Habitat restoration officer
- Environmental education officer
- Sustainability officer
- Biodiversity scientist
- Zoologist
- Wildlife biologist
- Wildlife researcher
- Wildlife ranger
- Food scientist
- Food technologist

Transferable skills such as Curiosity Observation Investigation Problem solving Teamwork Communication  
Research Organisation Attention to detail Classification Data handling Critical thinking Decision making  
Creativity Resilience Responsibility Confidence

### Learning from career and labour market information

- Introduce pupils to the wide range of careers involved in studying and protecting living things, including ecologists, zoologists, botanists, microbiologists, conservation officers, environmental scientists, wildlife rangers and veterinary professionals. Discuss how environmental challenges and biodiversity loss are increasing the importance of conservation and environmental careers.

#### Addressing the needs of each pupil

- Use outdoor learning, fieldwork, practical investigations, classification activities, digital resources, research and collaborative challenges. Pupils can demonstrate different strengths through observation, drawing, sorting, investigation, technology, communication and problem-solving.

#### Linking curriculum learning to careers

- Link classification to taxonomists and zoologists; invertebrates to zoologists and entomologists; microorganisms to microbiologists and food scientists; habitats to ecologists and conservationists; fieldwork to ecological surveyors; and plant identification to botanists and horticulturalists.

#### Encounters with employers and employees

- Invite a wildlife ranger, ecologist, vet, microbiologist, zoologist, botanist, conservation officer or environmental scientist to share how they study and protect living things.

#### Experiences of workplaces

- Explore workplaces including nature reserves, wildlife centres, zoos, veterinary practices, laboratories, museums, botanical gardens, universities, farms, environmental organisations and conservation projects.

#### Encounters with further and higher education

- Highlight pathways through GCSE Science, A levels, T Levels, college, university, apprenticeships and practical training. Explore routes into biology, ecology, environmental science, zoology, microbiology, veterinary science and horticulture.