

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
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. 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.	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. 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.	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. All children will have: - A wider variety of skills linked to both scientific knowledge and understanding, and scientific enquiry/investigative skills - A richer vocabulary which will enable to articulate their understanding of taught concepts - High aspirations, which will see them through to further study, work and a successful adult life.

Key Vocabulary

Solid, liquid, gas, particle, properties, material, shape, volume, melting, freezing, evaporation, condensation, water vapour, heating, cooling, temperature, thermometer, degrees Celsius (°C), water cycle, precipitation, collection, investigation, fair test, observe, measure, record, compare, conclude

Knowledge	Skills
Children will know: - Materials exist as solids, liquids or gases. - Solids keep their own shape. - Liquids flow and take the shape of their container. - Gases spread out and fill the space available. - Heating and cooling can change the state of some materials. - Different materials melt and freeze at different temperatures. - Temperature is measured using a thermometer in degrees Celsius (°C). - Water changes state through evaporation and condensation. - Evaporation and condensation are part of the water cycle. - Increasing temperature increases the rate of evaporation.	By the end of the unit, pupils will be able to: - Compare and group materials according to whether they are solids, liquids or gases. - Observe how materials change state. - Measure temperature accurately using a thermometer. - Record results in tables. - Make careful observations over time. - Ask scientific questions. - Carry out comparative and fair tests. - Identify variables in an investigation. - Use evidence to draw simple conclusions. - Use scientific vocabulary accurately when explaining findings

Enrichment Opportunities

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- Observe puddles disappearing after rain around the school grounds.
- Create a mini water cycle in a plastic bag on a classroom window.
- Visit the school kitchen to observe melting and freezing in everyday life.
- Outdoor temperature measurements throughout the day.
- Link to Geography by studying the water cycle.
- Link to Maths through reading scales, measuring temperature and presenting results in tables and charts.

Learning Objectives/End Points

Pupils will be able to:

- Identify solids, liquids and gases.
- Explain the properties of each state of matter.
- Describe how heating and cooling changes the state of materials.
- Measure and record temperature accurately.
- Explain evaporation and condensation.
- Describe the stages of the water cycle.
- Plan and carry out a simple scientific enquiry.
- Draw conclusions from evidence collect

Key Questions/Learning Objectives/End Points

Recognising and grouping Solids, Liquids and gases	Investigating Melting points	TAPS Focused Assessment – Measuring Temperature	The water cycle	TAPS Focused Assessment – drying materials	Apply knowledge of states of matter through scientific enquiry and review learning.
Sort a variety of everyday materials and justify classifications. Observe gases using balloons and syringes.	Melt chocolate, butter and ice. Compare melting points and discuss why materials melt at different temperatures.		Create a mini water cycle in a bag or jar. Sequence and label the stages of the water cycle.		Children complete a challenge such as identifying unknown materials, explaining changes of state or solving real-life problems involving melting, freezing and evaporation.
Starter (10 mins) Show a selection of everyday objects (e.g. brick, water bottle, balloon). Children discuss with a partner: <i>What are these made of? How are they different?</i> Introduce the terms solid, liquid and gas. Main (40 mins) Teach the properties of solids, liquids and gases.	Starter (10 mins) Recap the three states of matter. Show an ice cube and ask: <i>What will happen if I leave this on the table?</i> Main (40 mins) Observe ice melting. Compare other materials (e.g. chocolate, butter) melting in warm conditions. Discuss that different materials melt at different temperatures.	Starter (10 mins) Introduce a thermometer. Discuss degrees Celsius (°C) and how to read the scale. Main (40 mins) Children measure the temperature of cold, room temperature and warm water. Record results in a table. Complete the TAPS assessment activity. Plenary (10 mins)	Starter (10 mins) Show a picture of wet washing drying outside. Ask: <i>Where has the water gone?</i> Main (40 mins) Teach evaporation and condensation. Demonstrate a simple water cycle (e.g. warm water in a bowl with cling film and ice or a water cycle bag). Children label and sequence the stages of the water cycle. Plenary (10 mins)	Starter (10 mins) Show two damp cloths. Ask: <i>Which one will dry first? Why?</i> Main (40 mins) Plan a fair test. Place identical damp cloths or paper towels in different conditions (e.g. warm/cool, indoors/outdoors, near a fan). Observe and record how dry they become over time. Complete the TAPS assessment.	Starter (10 mins) Quick quiz using pictures of solids, liquids, gases and changes of state. Main (40 mins) Carousel of activities, for example: Sort materials into solids, liquids and gases. Match scientific vocabulary to definitions. Explain changes of state. Label the water cycle.

Children work in groups to sort a range of objects/materials into the three categories. Discuss any tricky examples (e.g. toothpaste, jelly). Complete a simple sorting activity in books. Plenary (10 mins) Hold up an object or picture. Children show thumbs up or hold up a card to identify whether it is a solid, liquid or gas and explain why.	Children record observations in a simple table. Plenary (10 mins) Children explain the difference between melting and freezing using key vocabulary.	Discuss: Which water was warmest? Why is it important to measure accurately?	Children explain the water cycle to a partner using the words: evaporation condensation precipitation collection	Plenary (10 mins) Discuss: Which dried the quickest? What evidence supports your conclusion?	Answer reasoning questions using scientific vocabulary. Complete an end-of-unit assessment or concept map. Plenary (10 mins) Children complete an exit ticket: One thing I have learned. One scientific word I can now use confidently. One question I still have.
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Substantive Knowledge

- Materials can be classified as solids, liquids or gases according to their observable properties.
- Some materials change state when heated or cooled.
- Melting and freezing happen at particular temperatures.
- Temperature is measured in degrees Celsius.
- Water continuously changes state within the water cycle.
- Evaporation changes liquid water into water vapour.
- Condensation changes water vapour back into liquid water.
- The rate of evaporation increases as temperature increases.

Careers

Linking Curriculum Learning to Careers

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

- Materials Scientist
- Chemist
- Laboratory Technician
- Scientific Researcher
- Environmental Scientist
- Physical Scientist
- Research Technician
- Meteorologist
- Climate Scientist
- Hydrologist
- Environmental Consultant
- Weather Technician
- Climate Researcher
- Water Quality Scientist
- Environmental Monitoring Technician
- Food Scientist
- Food Technologist
- Chef
- Baker
- Chocolatier

Learning from Career and Labour Market Information

- Introduce pupils to careers involving materials, weather, water, food, engineering, construction, manufacturing and environmental science. Explore jobs pupils may encounter locally and in the wider North East.
- Addressing the Needs of Each Pupil**
- Provide varied opportunities for pupils to explore careers through practical investigations, discussion, role play, visual resources and hands-on challenges. Recognise that different careers require different combinations of practical, mathematical, creative, communication and problem-solving skills.
- Linking Curriculum Learning to Careers**
- Explicitly link learning about materials and their properties to materials scientists and engineers; temperature and measurement to laboratory technicians and meteorologists; melting and freezing to food scientists and chefs; evaporation and condensation to environmental scientists and meteorologists; and the water cycle to hydrologists and water engineers.
- Encounters with Employers and Employees**
- Invite a meteorologist, environmental scientist, engineer, chef, food scientist, water engineer or laboratory technician to speak to pupils. Pupils could prepare questions about their role, equipment, workplace, qualifications and how they use Science.
- Experiences of Workplaces**



Subject: Science

Topic: States of Matter

Year: 4

Term: Spring 2

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	Explore photographs, videos or virtual tours of laboratories, weather stations, water treatment works, food production facilities, engineering workplaces, construction sites and scientific research centres. Identify how knowledge of materials and changes of state is used in each workplace.
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