**Year 4 Science Curriculum – Autumn 1**

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| **Theme: Changes of state** | | | | | | | | | |
| **Curriculum objectives** | | | **Vocabulary** | | | | | | **Links across the curriculum** |
| Compare and group materials together, according to whether they are solids, liquids [or gases].  Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).  Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. | | | **Cool** | To reduce the temperature | **Empty** | | Having nothing inside | | Maths:   * Recording data in bar graphs and tables   Geography   * The water cycle * Seven Trent Water talk   English   * Persuasive writing * Oracy for presentation   DT   * Cooking – chocolate and courgette muffins | |
| **Flow** | Continuous movement | **Heat** | | To increase the temperature | |
| **Horizontal** | A straight line viewed left to right | **space** | | The area or volume between, inside or around objects | |
| **Flood** | To cover or fill with a flow of water | **Vertical** | | A straight line viewed top to bottom | |
| **Tier 3 vocabulary** | [SNAP23\_Y4\_M1\_states\_ms.docx (live.com)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fstatic.collins.rhapsode.com%2FSnap_Science%2FTeaching_Science%2FYear_4%2FSNAP23_Y4_M1_states_ms.docx&wdOrigin=BROWSELINK) |  | |  | |
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| **Prior knowledge:** *What specifically have pupils learned that is relevant to this unit that they are building upon?* | | | | | | **Future knowledge:** *What specifically will pupils learn in the future that is relevant to this unit?* | | | |
| Children have previously learnt:  ● about suitability of a variety of everyday materials for particular uses, based upon their properties (Year 2 Chemistry – Uses of everyday materials)  ● how temperature can be measured using a thermometer (Year 2 Biology – Plants). | | | | | | This prepares children for later learning:  ● about dissolving, solutions, separating mixtures, filtering, sieving and evaporating and reversible and irreversible changes (Year 5 Chemistry – Properties and changes of materials). | | | |
| **Lesson Sequence** | | **Key Knowledge** | | | | **Key Skills** | | | |
| Is this material a liquid or a solid? | | * Properties of solids: A solid will hold its shape under normal conditions. This can be altered when a large enough force is applied to it. Solids such as sponge or cotton wool can apparently be compressed; this is because of the spaces in them. The actual solid material (sponge or cotton) does not change. * A solid keeps its own volume. * Properties of liquids: Liquids can be poured and will spread out. Some liquids flow so slowly that you cannot actually see them moving. The surface of a liquid remains horizontal when the container is tipped. Liquids take on the shape of the container they are in. They can make pools. * A liquid keeps its own volume. | | | | Working scientifically:   * recording findings using simple scientific language, [drawings, labelled diagrams, keys, bar charts,] and tables * identifying differences, similarities or changes related to simple scientific ideas and processes.   Scientific enquiry type:   * identifying and classifying. | | | |
| How is temperature measured? | | * The hotter the location in the classroom, the quicker the ice should melt. * How do the different thermometers measure temperature. * A liquid-in-glass thermometer is a narrow, sealed glass tube containing liquid alcohol which expands and moves along the hollow tube as the temperature rises. * A data logger uses a sensor to measure the temperature and takes a digital reading. * A forehead strip thermometer contains a heat-sensitive material in a plastic strip that changes colour to indicate different temperatures. * When should different thermometers be used. Different thermometers are suitable for different uses based upon the materials used to make them and the range of temperatures that they measure. For example, a forehead strip thermometer is flexible, to fit on a forehead, and has a small temperature range of approximately 35–40°C. An oven thermometer is made of heat-resistant materials and has a range of 0–350°C. A data logger has the advantage that it can take readings when no one is present and can take a series of readings close together. * What happens when the milk bottle ‘thermometer’ is placed in hot water and iced water. When heated, the water rises up the straw for a combination of reasons: a) the air in the bottle expands (takes up more space) and pushes on the liquid; b) the water in the bottle also expands. As the bottle is sealed, the only place the liquid can go is up the straw. The process is reversed when it is cooled. In a liquid-in-glass thermometer, the liquid expands in the same way as it is heated. | | | | Working scientifically:  - making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.  - identifying differences, similarities or changes related to simple scientific ideas and processes.  - using straightforward scientific evidence to answer questions or to support their findings.  Scientific enquiry type:   * observing over time. | | | |
| What difference does temperature make to how quickly the ice blocks melt? | | * Ice is a solid but when it melts it is a liquid. * Variables that could affect the rate at which an ice block melts: size of block, shape of block, temperature of room, type of liquid frozen. * Variables that could be observed/measured: weight of block, width/height/depth of block, volume of melted water. | | | | Working scientifically:   * Setting up simple practical enquiries, comparative and fair tests . * Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. * Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.   Scientific enquiry type:   * Fair testing. | | | |
| What are melting and freezing? | | * How different materials behave when they are heated or cooled. * Observe and measure the melting points of different materials: * Butter: approximately 35°C * White chocolate: approximately 37°C * Milk chocolate: approximately 40°C * Dark chocolate: approximately 46°C * Observe the process of freezing when liquids are cooled. | | | | Working scientifically:   * Gathering, recording, [classifying] and presenting data in a variety of ways to help in answering questions. * Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.   Scientific enquiry type:   * Observing over time. | | | |
| Are spaces really empty? | | * The properties of a gas. * Air is not a solid or a liquid; it is a type of material called a gas. We cannot see air but it is all around us. * Spaces that appear to be empty are filled with air/gases. * Top facts about air/gases: * Air is a gas. * Air is a material. * A gas has substance and takes up space and can move or be moved from one place to another. * Gases can push. * Gases have weight. * Carbonated (fizzy) drinks contain bubbles of gas (carbon dioxide). * Bubbles of gas are lighter than water so the bubbles rise. * Gas can be compressed (squashed). | | | | Working scientifically:   * Making systematic and careful observations [and, where appropriate, taking accurate measurements using standard units,] using a range of equipment, [including thermometers and data loggers]. | | | |
| What is evaporation and how does it help to get things dry? | | * Plan and carry out a fair test enquiry to answer a question about drying washing. * Use the data they collect to answer a question and describe patterns in the data. * Use what they know about evaporation to explain their findings. | | | | Working scientifically:   * Setting up simple practical enquiries, comparative and fair tests. * Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. * Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. * Using straightforward scientific evidence to answer questions or to support their findings.   Scientific enquiry type:   * Fair testing. | | | |
| Where did the water come from? | | * Observe examples of water vapour changing state from gas into liquid and becoming water. This process is called condensation and that it is an example of a change of state. * Describe what happens when water boils or evaporates. | | | | Working scientifically:   * Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. * Identifying [differences, similarities or] changes related to simple scientific ideas and processes. * Using straightforward scientific evidence to answer questions or to support their findings. | | | |
| Where does the rain come from? | | Parts of the water cycle:   1. The sun heats the water. 2. Some of the water evaporates into a gas (water vapour). 3. The water vapour mixes with the other gases in the air. 4. The warm air rises just like a hot air balloon. 5. High up in the sky it is much cooler. 6. When it cools, the water vapour changes back into droplets of water. It condenses. 7. The water droplets are seen as white clouds in the sky. 8. If there are a lot of droplets, they join together to form bigger drops of water in a rain cloud. 9. When the drops of water get too heavy to stay in the air, they fall as rain drops. 10. This is where rain comes from. 11. The sea never runs out of water because the rainwater flows into rivers and back into the sea. 12. Some of the rainwater is taken from rivers and cleaned to be used by people. 13. The wastewater from houses is cleaned and put back into the sea. 14. Some of the rainwater soaks into the ground. 15. Water can also evaporate from the ground, puddles, rivers, lakes and oceans. 16. This means there are not just clouds near the sea. 17. The water goes round and round, evaporating and condensing. 18. This is where the water cycle gets its name. | | | | Working scientifically:   * Making systematic and careful observations [and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers]. * Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. * Identifying differences, similarities or changes related to simple scientific ideas and processes. | | | |
| **Themes and links** | | | | | | | | | |
| **Themes (types of enquiry)** | **Where these are covered:** | | | | | | | **Links across the science curriculum** | |
| **Observation over time** | * Lesson 3 * Lesson 4 | | | | | | | |  |  | | --- | --- | | **EYFS** |  | | **1** |  | | **2** |  | | **3** | Rocks, fossils and soil | | **4** | Changes of state | | **5** | Earth and space | | **6** | Evolution and inheritance | | |
| **Research** |  | | | | | | |
| **Pattern seeking** |  | | | | | | |
| **Comparative and fair testing** | * Lesson 2 * Lesson 3 * Lesson 4 * Lesson 5 * Lesson 6 | | | | | | |
| **Identifying, classifying and grouping** | * Lesson 1 | | | | | | |  | |