



Portfields Primary School Medium Term Plan



Year Group – 4




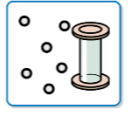









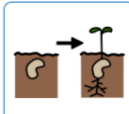

Subject - **Science**

Strand – **States of Matter**

Term – **Summer 1**

National Curriculum	Key Questions		Substantive Knowledge	Key Vocabulary	Real-Life Links
<p>Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>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).</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p>	<p>What state of matter is this material? Which state of matter takes up the most space? Can you pour a solid? Can you think of a time you have used or seen freezing/melting? Can you think of a time you have used or seen evaporating/condensing? Can you name any reversible or irreversible reactions? Are these reactions reversible or irreversible? Can you think of examples when you have used water in its different states? How could ice be melted quickly? Does liquid water only turn to a gas when it is heated to 100 °C? Are there times when things dry quicker than other times?</p>	<p>How could we make a damp paper towel dry quickly? What does your bar chart show? Can you name any gases? What gases are in the air? If bubbles rise, do they weigh anything? Do different gases behave in different ways? Can you pour gas? Is the water cycle the same all over the world? Can humans affect the water cycle? Does climate change affect the water cycle? How much water do you predict will be collected? Does the size of the contained affect the amount of water collected?</p>	<p>Know that matter is anything that takes up space and can be weighed.</p> <p>Know that materials can be in one of three states (solid, liquid or gas) and understand the differences between them.</p> <p>Understand the difference between and name some reversible and irreversible reactions.</p> <p>Understand that heat causes materials to change state (melt, evaporate, freeze, condense).</p> <p>Know that water can change can change easily between 3 states of matter: solid (ice), liquid (water) and gas (water vapour).</p> <p>Know that evaporation is the process of a liquid changing into a gas through heating.</p> <p>Explain that if water (liquid) is heated, it changes to water vapour (gas).</p> <p>Explain how some gases are used.</p> <p>Know that carbon dioxide gas has a variety of uses, from certain fire extinguishers to providing the bubbles in fizzy drinks.</p> <p>Know that the water cycle describes the continuous movement of water on, above, and below the surface of the Earth.</p> <p>Know that processes such as evaporation, condensation, precipitation, and collection move water to different places in different states.</p>	<p>Conclusion Heat Ice Material Melting Observation Prediction Record Shape Volume Water</p>	<p>Reversible reactions e.g. chocolate melting. Irreversible reactions e.g. frying an egg.</p> <p>Using a thermometer to measure body temperature when unwell.</p> <p>Putting ice in drinks to cool them down.</p> <p>Carbon dioxide making drinks fizzy.</p>
Non-Statutory	Technical Questions				Key Scientists
<p>Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.</p> <p>Note: Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning. Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.</p>	<p>What is matter? <i>Matter is anything that takes up space and can be weighed.</i></p> <p>Are materials always in the same form? <i>No, materials can be in three states: solid, liquid and gas.</i></p> <p>What is a solid? <i>Solids have a definite shape and volume. Their particles are tightly packed together.</i></p> <p>What is a liquid? <i>Liquids have a definite volume, but take the shape of their container. Their particles are close together, but can move around.</i></p> <p>What is a gas? <i>Gases have no definite shape or volume. Their particles are far apart and move freely to fill up a container.</i></p> <p>What is it called when materials change state? <i>Solid to liquid = melting Liquid to solid = freezing Liquid to gas = evaporating Gas to liquid = condensing</i></p> <p>What are reactions? <i>Reactions are processes where substances change into different substances.</i></p> <p>What is the difference between reversible and irreversible reactions? <i>Reversible reaction = you can go back to what you started with. Irreversible reactions = you cannot go back to what you started with.</i></p> <p>How can materials change state? <i>Heating causes matter to melt or evaporate. Cooling causes matter to freeze or condense.</i></p> <p>Can water change state? <i>Water can change can change easily between 3 states of matter: solid (ice), liquid (water) and gas (water vapour).</i></p> <p>What causes water to change state? <i>A change in temperature. Adding heat causes melting and evaporation/boiling. Removing heat causes condensation and freezing.</i></p> <p>At what temperature does water change state? <i>Water freezes into ice at 0 °C and evaporates into water vapour at 100 °C.</i></p>	<p>What is evaporation? <i>The process of a liquid changing into a gas through heating.</i></p> <p>What affects the process of evaporation? <i>Temperature.</i></p> <p>Which is the odd-one-out? Steam, clouds and mist and water vapour. <i>Water vapour is the odd-one-out because it is water as a gas which is why it is invisible. Mist, clouds and steam are tiny droplets of liquid water.</i></p> <p>Why will we display our results in a bar chart? <i>So we can easily compare our results. The higher the bar, the longer the paper towel took to dry.</i></p> <p>How do you know gas is there? <i>Whilst most gases are invisible, some are visible so you can see them. Some gases have a smell. You can observe gases taking up space, for example filling a balloon.</i></p> <p>What makes a fizzy drink fizzy? <i>Bubbles of carbon dioxide gas are pumped into the liquid.</i></p> <p>Does gas have mass and weight? <i>Gases might seem light and invisible, but they are composed of particles that possess mass, and therefore, they have weight.</i></p> <p>What is the water cycle? <i>The continuous movement of water on, above, and below the surface of the Earth.</i></p> <p>How does water change in the water cycle? <i>Processes such as evaporation, condensation, precipitation, and collection move water to different places in different states.</i></p> <p>What is precipitation? <i>Any liquid or frozen water that forms in the atmosphere and falls back to the earth. It comes in many forms, like rain, sleet, and snow.</i></p> <p>What is condensation? <i>The process of a gas changing into a liquid through cooling.</i></p> <p>What is evaporation? <i>The process of a liquid changing into a gas through heating.</i></p>	<p style="text-align: center;">Disciplinary Knowledge</p> <p>Identify materials as either solid, liquid or gas.</p> <p>Group materials according to their state of matter.</p> <p>Predict and observe the time it takes materials to melt in different temperatures using °C.</p> <p>Identify and observe the processes that cause water to change state.</p> <p>Use a range of methods to melt ice in the shortest time and draw conclusions from observations.</p> <p>Investigate the effect of temperature on the process of water evaporation of damp paper towels.</p> <p>Display results in a bar chart and use the data to draw a conclusion.</p> <p>Investigate the mass of carbon dioxide by comparing a fizzy drink when it is carbonated to when it is 'flat' using weighing scales.</p> <p>Record the amount of rainwater collected in the local environment.</p>	<p style="text-align: center;">Technical Vocabulary</p> <p>°C Anders Celsius Bar chart Carbon dioxide Condensation Evaporation Freezing Gas Irreversible reaction Liquid Mass Particles Precipitation Reversible reaction Solid State State of matter Water cycle Weighing scales Weight</p>	<p style="text-align: center;">Working Scientifically</p> <p>Predict and observe the time it takes materials to melt in different temperatures using °C.</p> <p>Use a range of methods to melt ice in the shortest time and draw conclusions from observations.</p> <p>Investigate the effect of temperature on the process of water evaporation of damp paper towels. Display results in a bar chart and use the data to draw a conclusion.</p> <p>Investigate the mass of carbon dioxide by comparing a fizzy drink when it is carbonated to when it is 'flat' using scales.</p> <p>Record the amount of rainwater collected in the local environment.</p>

Lesson Breakdown					
Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
<p>Learning Objective To understand that materials can be in different states.</p> <p>Success Criteria Understand the difference between states of matter. I can identify materials as either solid, liquid or gas. I can group materials according to their state of matter.</p> <p>Star Knowledge The three states of matter are solid, liquid and gas. A solid keeps its shape. A liquid takes the shape of its container. A gas fills its container.</p>	<p>Learning Objective To investigate how materials change state.</p> <p>Success Criteria I understand that heat causes materials to change state. I can use the terms melt, evaporate, freeze and condense when explaining changes of state. I can measure the temperature that different materials melt at using °C.</p> <p>Star Knowledge Materials change state when they are heated or cooled. Heating causes matter to melt or evaporate, while cooling causes matter to freeze or condense.</p>	<p>Learning Objective To investigate how water changes state.</p> <p>Success Criteria I can identify the different states water can be in. I can identify and observe the processes that cause water to change state. I can use a range of methods to melt ice in the shortest time and draw conclusions from what I observe.</p> <p>Star Knowledge Water can change between 3 states of matter: solid (ice), liquid (water) and gas (water vapour).</p>	<p>Learning Objective To investigate how water evaporates.</p> <p>Success Criteria I can explain how water changes from a liquid to a gas. I can investigate the effect of temperature on the process of evaporation. I can display my results in a bar chart.</p> <p>Star Knowledge Evaporation is the process of a liquid changing into a gas through heating. If water (liquid) is heated, it changes to water vapour (gas).</p>	<p>Learning Objective To investigate the different uses of gas.</p> <p>Success Criteria I can explain how some gases are used. I can explain some of the uses of carbon dioxide. I can investigate the weight of a gas.</p> <p>Star Knowledge Carbon dioxide gas has a variety of uses, from certain fire extinguishers to providing the bubbles in fizzy drinks.</p>	<p>Learning Objective To identify and describe the different stages of the water cycle.</p> <p>Success Criteria I can describe the different stages of the water cycle. I can explain the role of evaporation, condensation, precipitation and collection in the water cycle. I can record the amount of rainwater collected in the local environment.</p> <p>Star Knowledge The water cycle describes the continuous movement of water on, above, and below the surface of the Earth. Processes such as evaporation, condensation, precipitation, and collection move water to different places in different states.</p>

Flashback Four											
Lesson 1		Lesson 2		Lesson 3		Lesson 4		Lesson 5		Lesson 6	
<p>Last Topic Y4 SE L1 What is a data Logger?</p>  <p>A data logger records and stores data over time.</p>	<p>Last Lesson Y4 States of Matter L1 In what state does matter take the shape of its container?</p> <p>A liquid takes the shape of its container.</p> 	<p>Last Topic Y4 SE L1 True or False Data loggers are more accurate than humans at recording data?</p> <p>True</p>	<p>Last Lesson Y4 States of Matter L2 What does heating cause matter to do?</p> <p>a) Freeze or condense b) Melt or evaporate c) Bend or stretch</p> <p>Melt or evaporate</p>	<p>Last Topic Y4 SE L2 True or False. Data loggers can be used to measure taste?</p>  <p>False</p>	<p>Last Lesson Y4 States of Matter L3 What is the gaseous state of water known as?</p>  <p>Water Vapour</p>	<p>Last Topic Y4 SE L2 Which can data loggers be used to measure and record data?</p> <p>a) Opinion b) Attitude c) Temperature</p> <p>Temperature</p>	<p>Last Lesson Y4 States of Matter L4 What is the name given to the process of a liquid changing into a gas through heating?</p> <p>Evaporation</p>	<p>Last Topic Y4 SE L3 True or False. Presenting data allows us to understand and explain information.</p>  <p>True</p>	<p>Last Lesson Y4 States of Matter L5 What is the name of the gas that produces the bubble in fizzy drinks?</p>  <p>Carbon dioxide</p>	<p>Last Topic Y4 SE L4 What can humans 'do' that makes using a data logger more suitable for capturing data?</p>  <p>Humans can make mistakes.</p>	
<p>Last Year Y3 Light L1 What is the opposite of light?</p>  <p>Dark is the absence of light energy.</p>	<p>Previous Key Stage Y2 Plants L1 What do all living things do?</p> <p>a) listen b) swim c) grow</p> <p>Grow</p> 	<p>Last Year Y3 Light L2 True or False. Rough surfaces scatter the reflected light in a single direction.</p> <p>False</p>	<p>Previous Key Stage Y2 Plants L2 How do plants make their own food?</p>  <p>A plant's leaves catch sunlight. This is turned into energy for the plant.</p>	<p>Last Year Y3 Light L3 Why does a mirror give a clearer reflection than a rough surface?</p>  <p>A mirror has a smooth polished surface that reflects light accurately.</p>	<p>Previous Key Stage Y2 Plants L3 Which of the following is NOT a method of seed dispersal?</p> <p>a) Moved by the wind b) Animal droppings c) Planted by humans</p> <p>Planted by humans</p>	<p>Last Year Y3 Light L4 Which of the Sun's rays can cause damage to the eye?</p>  <p>UV Rays</p>	<p>Previous Key Stage Y2 Plants L4 What does a plant need to grow well?</p> <p>Water, air, light, the right temperature, and space</p>	<p>Last Year Y3 Light L5 If light is blocked from reaching an area, what is formed?</p>  <p>A shadow.</p>	<p>Previous Key Stage Y2 Plants L5 Do seeds need light to germinate?</p>  <p>No. Most seeds can germinate without light.</p>	<p>Last Year Y3 Light L6 What happens to the shadow when an object moves further away from the light source?</p> <p>The shadow gets smaller as the object is blocking less light.</p>	<p>Previous Key Stage Y2 Plants L6 Why do plants that grow in very wet, warm places have large, waxy leaves with pointy tips?</p>  <p>It helps the rain to easily drain off.</p>