





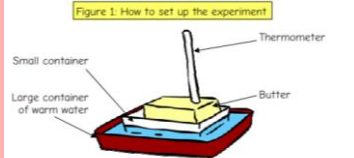


# Unit plan – Year 4 Spring 2 States of Matter

	Concept	Subject Skill (Learning Objective)	Subject Knowledge	Pedagogical Content (how you will teach)			
Week 1	States of Matter	<p>I am learning to compare and group materials together, according to whether they are solids liquids or gases</p>	<p>I know that solids, liquids and gases are states of matter</p> <p>I know that the particles in each state differ</p>	<p><b>Lesson 1</b> <b>What are states of matter?</b> Children to work in groups. On each table, have a range of examples of different states of matter mixed up: solids - wood, glass, pebble/stone; liquids – water, orange juice, tea and Gas – use pictures to represent oxygen and steam. There are photos in your resource folder, which you can use alongside real solids and liquids too to support. Ask the children to sort them into 3 groups based on similarities some of them may have. Feedback how the children/groups have decided to sort these.</p> <p>Show the children the correct groupings based on their state of matter. <i>Why do you think I have grouped them this way?</i> Feedback their thinking before explaining that you have separated them in to solids, liquids and gases. Go through an explanation of each of the states of matter using a visual representation of the particles in each state.</p> <div><div><p><b>Solids</b></p><p>In a solid, such as wood, the particles are closely packed together so don't move around.</p><div><p>Due to this, solids keep their shape unless you apply a force to them (think about how you can change the shape of modelling clay by pressing it). Solids don't have to be hard. Far is an example of a soft solid. You can't pour a solid.</p></div></div><div><p><b>Liquids</b></p><p>In a liquid, such as water, the particles can move around.</p><div><p>Due to this, a liquid can be easily poured. A liquid will take the shape of the container it is in. Think about when you pour a drink from a bottle into a cup.</p></div></div><div><p><b>Gases</b></p><p>In a gas, such as helium, the particles are spread out and will fill whatever space they are in.</p><div><p>Gases can be squashed. Think about a balloon filled with air. You can squeeze the balloon as all the air is squashed to one side of the balloon.</p></div></div></div> <p>Children to complete the solids liquids and gases sorting table by adding in a definition of each state of matter, drawing a diagram of the particles and then listing examples underneath. You could use the PDF sorting activity to give them ideas. For LAPs, you may wish to print out the definitions, particle diagrams and pictures of examples of the different types of states of matter for them to sort accordingly.</p> <p><b>Lesson 2- Before this lesson, you will need to have frozen Lego pieces/Lego people into an ice cube</b> <b>Are states of matter permanent or can they change?</b> Recap previous learning by starting the lesson with the three images of the particles of different states of matter such as below.</p> <div></div> <p>Ask the children to label each state of matter. Introduce key question- Are states of matter permanent or can they change?</p> <p>Give the children the Lego pieces frozen in ice. Explain to the children that their challenge is to get the Lego out of the ice cube. Before they start, ask the children to discuss their ideas of how they could do this quickly and safely. Give chn the ice cubes to attempt the task. Bring the class back together and discuss what happened. <i>How did you rescue the Lego?</i> Encourage the children to think about what happened to the ice. Show diagram such as the one below to support them with their explanations.</p> <div></div> <p>Guide the discussion to explain how the ice cube started as a solid and when they applied heat (through their hands); it changed the ice cube in to water (liquid). Discuss what happened to the particles (in the diagram). Now the chn have an idea about materials changing state, Ask children if they think you can reverse this change. <i>Can we turn the water (liquid) into an ice cube (solid)? How? What would happen with the particles as it changes back to a solid?</i></p> <p>Use the following video to explain the different processes, which causes certain materials can change their state of matter. <a href="#">Interactive Changing States Video Lesson   Twinkl Go!</a></p> <p>Using the changes in states of matter examples document, children to label on the diagrams, the states of matter names and include the particle images below to demonstrate their understanding of how certain materials can change in their state of matter. Included on this, is bread to toast to ensure they understand this is not a change in state of matter.</p> <div></div>	<p>I know that states of matter can change and can name the processes involved in this e.g. melting, freezing, evaporating, condensing</p>		
	Working Scientifically	<p><b>Lesson 3-5</b> I am learning to observe that some materials change state when they are heated or cooled, and measure</p>		<p>I know that not all materials melt at the same temperature</p>	<p><b>Lesson 3-4</b> <b>Do all materials melt at the same temperature?</b> Recap learning in regards to changes in state of matter. Melting is what happens when a solid heated. It changes state and becomes a liquid as the particles get more energy and move past each other. Introduce scientific question- <i>Do all materials melt at the same temperature?</i> How could we investigate this? Children to plan their investigation, ensuring they include their predictions, hypothesis and their variables. Follow the investigation below:</p>		

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		<p>and research the temperature at which this happens in degrees Celsius</p> <p>I am learning how to set up simple practical enquiries comparative and fair tests</p> <p>I am learning to make systematic and careful observations and, where appropriate, taking accurate measurements using standards units, using a range of equipment, including thermometers and data loggers</p> <p>I am learning to record findings using simple scientific language and tables</p> <p>I am learning to report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>I am learning to use straightforward scientific evidence to answer questions or to support their findings</p>	<p>I know that metals melt at different temperatures</p>	<p><b>Scientific question</b> Do all materials melt at the same temperature?</p> <p>You will need:</p> <ul style="list-style-type: none"><li>• 250g butter</li><li>• 250g chocolate (in pieces)</li><li>• 250g ice</li><li>• 3 smaller containers</li><li>• 1 large container of warm (not boiling) water</li><li>• Thermometer</li></ul> <p><b>Method</b> Place the butter, chocolate and ice into their containers Predict the melting point of butter. Place the container of butter into the larger container of water and position the thermometer so that it is in the middle of the butter (see fig. 1). Observe the point at which the butter melts and record this temperature. Repeat for the ice and chocolate.</p> <p>Children to record the results in the table provided in your resource folder, and write their conclusions in relation to the key question using prompts such as: <i>How accurate were your predictions? How accurate were your measurements? How could you make them more accurate? Are these changes reversible?</i></p> <p><b>Lesson 5</b> <b>At what temperature do metals change state of matter?</b></p> <p>Explain that in a solid, the particles have little energy and are packed tightly together. This causes solids to tend to keep their shape. When we heat a solid, we are giving the particles more energy. When they get enough energy, they stop begin packed together and stat to slide over one another. The solid has become a liquid. When a solid is heated and changes state to become a liquid, it is called melting. The temperature at which this happens is called the melting point.</p> <p>Today we are going to be researching the melting and boiling points of six different metals.</p> <p>Children to fill in the missing information on your table. When they have all the information, create a bar chart showing the melting point of the different metals on the frame provided. It might be useful to round the melting points to the nearest 100 degrees in order to put this on to the bar chart.</p> <p>Conclude findings</p>	<p><b>Figure 1: How to set up the experiment</b></p>  <p><b>Table showing the temperature at which different materials melt</b></p> <table><tr><th>Material</th><th>Predicted melting point (°C)</th><th>Observed melting point (°C)</th></tr><tr><td>Butter</td><td></td><td></td></tr><tr><td>Ice</td><td></td><td></td></tr><tr><td>Chocolate</td><td></td><td></td></tr></table>	Material	Predicted melting point (°C)	Observed melting point (°C)	Butter			Ice			Chocolate		
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Week 2	States of Matter (Water Cycle)	<p>I am learning the part played by evaporation and condensation in t water cycles and associate the rate of evaporation with temperature.</p>	<p>I know what is meant by the term evaporation and can explain this process</p> <p>I know what is meant by the term condensation and can explain this process</p> <p>I know what is meant by the term evaporation and can explain its role in the water cycle</p> <p>I know what is meant by the term condensation and can</p>	<p><b>Start the week by making own water cycle example:</b> Use a large jug. Place smaller cup in the empty jug. Fill the jug with water (add food colouring for effect) ¼ of the way. Tightly wrap cling film around the top of the jug and tie off with string or elastic bands. Place on a window ledge that gets a bit of sun.</p> <p><b>Lesson 1</b> <b>What is evaporation? What is condensation?</b> Start the lesson by recapping last week's learning Have a kettle at the front of the class and turn on. Ask chn to watch what happens to the water, as it gets warmer. <i>What is happening? What does the water turn to? Does it disappear?</i> Take a photo of this. Use the evaporation PPT to talk through the process of evaporation. Children to use the photo you took as a class (or find one on the internet to show evaporation from a kettle Children to write an explanation on what evaporation is. They can do this using just a written paragraph, or they could use the pictures of the particles from liquid and gas to show what happens, or story board etc. Bring the class back together. Show them an image of condensation on window. Ask them to consider what is happening here. <b>What is condensation?</b> You could leave mirrors in fridge prior to the lesson. When lesson starts, ask chn to breathe on their mirror. <i>What happens? Why does this happen?</i> Explain that our breath has water vapour. Ask chn again, what do you think happened when you breathe on the cold mirror? Use the PPT on condensation to talk this process through together. Children to write an explanation on what condensation is. They can do this using just a written paragraph, or they could use the pictures of the particles from liquid and gas to show what happens, or story board etc. There are writing frames in your resource folder for both processes to support.</p> <p><b>Lesson 2-3</b> <b>What role does evaporation and condensation have in the water cycle?</b> Explain that there is only a certain amount of water on the planet Earth. It does not get 'used up' - it moves around. We call this movement of water the water cycle. The water cycle is vital for life on Earth because it supplies the land with fresh water. The water cycle is based around water changing its state of matter. There is no start or end to a cycle, so it doesn't matter where we start as we explore the water cycles. Make sure children have their water cycle examples on their desk as you are going through the explanation. You can use the water cycle outstanding science resource to support with your explanation. Children to then use the water cycle diagram included on the same resource to label the different stages. They should then also give a description of what happens in each stage. There are ready-made descriptions, which you might provide for some children to match with the correct stage.</p>													

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	Working scientifically	<p>I am learning how to set up simple practical enquiries comparative and fair tests</p> <p>I am learning to make systematic and careful observations and, where appropriate, taking accurate measurements using standards units, using a range of equipment, including thermometers and data loggers</p> <p>I am learning to record findings using simple scientific language and tables</p> <p>I am learning to report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>I am learning to use straightforward scientific evidence to answer questions or to support their findings</p>	<p>explain its role in the water cycle</p> <p>I know that evaporation happens more quickly when it's warmer</p>	<p><b>Lesson 4-5</b>  <b>Does water evaporate more quickly when it is warmer?</b>  Children to set up an investigation to answer the key scientific question. You will need to revisit this experiment over a few weeks.</p> <div> <p><b>Scientific question</b>  Does water evaporate more quickly when it is warmer?</p> <p><b>You will need:</b></p> <ul style="list-style-type: none"> <li>4 identical cups, marked in ml</li> <li>Thermometer</li> <li>Water</li> </ul> <p><b>Method:</b>  Place 100ml of water in each cup. Place one in the fridge, one on the windowsill, one next to a radiator, and one in a cupboard. Over a period of 2 weeks, measure how much water is left in each cup. Record this information in the table provided.  Make sure that you leave the entries blank on the days that you do not take a measurement (usually Saturday and Sunday). Your data will still work.</p> </div> <p>Children to record their results over time in the table provided in your resource folder. They can then present their findings using the line graph template provided. Children will need to conclude their findings using scientific vocabulary and referring to the investigation question. You can use the following prompts to support this:  <i>Does water evaporate more quickly when it is warmer? Can you place the locations in order of rate of evaporation? Which would be the best location to dry your wet clothes?</i></p>
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### Vocabulary

Solid, liquid, state, matter, particle, grain, category, gas, Solidifying, freezing, melting, condensing, evaporating, thermometer, temperature, Celsius, Fahrenheit, degrees, evaporation, condensation. Water cycle

### Resources.

#### Week 1

Lesson 2- ice cubes with Lego pieces frozen inside,

Lesson 3-4 – 250g Butter, 250g chocolate, 250g ice, 3 small containers, 1 large container of warm water, thermometers

Lesson 5- iPads

#### Week 2

Lesson 1- mirrors

Lesson 4- 4 identical cups marked in ml, thermometers, water