

Autumn 2 OVERVIEW YEAR 3/4 – Science

Term 2 Book - The Lion, The Witch and The Wardrobe - 'The World Beyond Us'

Topic – States of Matter	
Assessment:	Twinkl - End of Unit States of Matter Assessment.
Links to prior learning (sequencing) and canon book	<p>The Lion, The Witch and The Wardrobe.</p> <p>Children will build upon their prior KS1 learning of 'Materials' of being able to describe simple physical properties of everyday materials. Children should be able to build on their prior knowledge of grouping and classifying different materials based on appearance. They will also build on their year 3 knowledge on rocks by using different ways to group rocks. Children should have prior knowledge of working scientifically skills of asking questions, grouping and classifying and using investigative techniques.</p>
Links to other learning (cross fertilisation)	<p>Geography – the water cycle and investigating how water pollution is affecting everyday life in today's society.</p> <p>Art – researching the famous artist Simon Beck and how he uses snow to create different pieces of art.</p> <p>Maths – using tables and diagrams to present and sort data.</p> <p>DT – designing, creating and evaluating a sledge.</p> <p>English – a written explanation of investigations</p> <ul style="list-style-type: none"> - Spoken language through presenting scientific ideas. <p>Thematic Questions</p> <p>The World Beyond Us</p> <p>How are states of matter similar and different in space?</p> <p>How might states of matter be different when travelling to space?</p> <p>Modern Britain</p> <p>Explain the impact gases have had on our lives today.</p> <p>Have there been any recent 'new discoveries' of gases?</p> <p>Healthy Bodies & Healthy Minds</p> <p>How does water support our physical and mental health?</p> <p>The World Around Us</p> <p>How might the water cycle be affected in different areas of the world?</p>
	<p>Very Important Points (VIPs):</p> <ul style="list-style-type: none"> - Main three types of states of matter are solids, liquids and gases. - A solid retains a fixed shape and if squished often goes back to its original shape. The particles do not flow easily and cannot slide past one another. - A liquid assumes the shape of the container it occupies and particles can move past one another. - A gas freely moves around the particles can easily move past each other. - Air is made up of many different gases mainly nitrogen and oxygen. - Different gases have different weights. - Carbonated drinks weigh more when there is carbon dioxide in because carbon dioxide has a mass. - When a solid turns into a liquid it is called melting and different materials have different melting points. - When a liquid turns into a solid it is called freezing and different materials have different freezing points. - Evaporation occurs when water liquid turns into water vapour. - Condensation occurs when water collects as droplets on a cold surface when humid air is in contact with it. - Water vapour is the gaseous phase of water. - Ice is the frozen/solid state of water. <p>Fat Question: How would the world be different if we did not have water in a liquid form?</p>

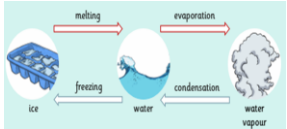
	<p>Have some countries got access to more resources for clean water? Why?</p> <p>Culture How have humans contributed to water pollution? How do some cultures bring water as part of their community?</p> <p>Technology in Action How has technology supported how we change through the three different states?</p>	
Links to future learning	<p>This unit will support the children's learning when moving onto UKS2 science units, in particular: Year 5: Properties and changes in materials.</p>	
Character/Wider Development ('50 things', cultural capital, skills)	<p><u>Visit to Yorkshire Water</u> – this will allow children to reinforce their learning of the water cycle but enable them to see the importance of keeping our water clean and safe. They will understand how they can play a part in keeping the water cycle as clean as possible and learn about the impact of water pollution. They will be able to see the different jobs perspectives as a result of learning about these topics.</p>	

OVERVIEW OF TEACHING SEQUENCE

Key Facts/Learning	Learning Focus or Key Question	Learning Outcomes (NC)	Key Words/ Vocabulary	Greater Depth/SEND	Misconceptions	Activities and Resources
<p>Week 1</p> <p>There are three states of matter: solid, liquid and gas.</p> <p>Solids hold their shape and their particles are packed tightly.</p> <p>Liquids fit the shape of the container and their particles have some room to move about.</p> <p>Gases freely move around as do their particles.</p> <p>Children will test different materials to see whether they are a solid, liquid or gas.</p>	<p>To compare and group materials based on solids, liquids, gases.</p>	<p>NC: Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>Asking relevant questions and using different types of scientific enquiries to answer them.</p> <p>Using straightforward scientific evidence to answer questions or to support their findings.</p>	<p>Solid Liquid Gas Particles State Material Properties</p>	<p>GD: Year 3 – Pose questions to children based on their groupings of the materials to extend their understanding- e.g. how do you know this is a solid? What makes a liquid a liquid? Can a liquid turn into a solid?</p> <p>Year 4 – Ask children to create their own questions based on how they have grouped the materials to extend their understanding- e.g. What makes a liquid a liquid? Can a solid turn into a liquid? These can then be placed on Science wall and answered. Children should draw their own recording tables, choosing the correct sub-headings needed to present work accurately. Put in 'red herring' materials such</p>	<p>Children may think that:</p> <p>Sand/salt/sugar is a solid because it can be poured into a container.</p> <p>Gases are not a state of matter because you can't see them.</p> <p>A material is only one state of matter – it can't change state.</p>	<p>Children will start by looking at a variety of different materials and grouping them with their shoulder partner. How they want to group them should be left up to the children to see if they correctly identify solids, liquids and gases or group them based on colour etc.</p> <p>After writing a hypothesis of what they think a solid, liquid and a gas is they will be introduced to a variety of different materials to test their hypothesis and record it onto their tables.</p> <p>As a class, we will share findings and uncover the properties of a solid, liquid and gas.</p> <p>See planning slides on trust shared.</p> <p>Resources: Honey, bubbles, sponges, squirty cream, paper, sand, fabric, rocks, plastic cups, balloons, cola/lemonade</p> <p>Other useful resources: https://www.youtube.com/watch?v=DE3LCPfP8N8 https://www.bbc.co.uk/bitesize/topics/zkgg87h/articles/zsgwwxs https://www.bbc.co.uk/bitesize/clips/zrdkjsx https://www.bbc.co.uk/bitesize/clips/zmx76sg</p> <p>Year 3 Deepen the moment: "Liquids do not have their own shape but can take the shape of the container they are in." Based on this fact, Jenny says that salt</p>

				<p>as 'bubbles' to get children debating whether it is a gas or liquid and why.</p> <p>SEND: Children to know the properties of a solid, liquid and gas before testing the materials. Give children support cards to remind them of each one. Children will also have a prefilled recording sheet. Take pictures of children working and allow children to talk with each other as opposed to writing things down.</p>		<p>is a liquid because it takes the shape of the container. Do you agree? Give reasons for your answers.</p> <p>Year 4 Deepen the moment: The particles in a solid are tightly packed and unable to move around. Outline the significance of this fact based on your learning of states of matter.</p> <p>Explain the properties of solids, liquids and gases by identifying its viscosity, malleability and conductivity.</p>
<p>Week 2</p> <p>Different gases have different weights.</p> <p>Carbonated drinks weigh more when there is carbon dioxide in because carbon dioxide has a mass.</p> <p>Children to complete fair test</p>	<p>To investigate gases and explore their properties.</p>	<p>NC: Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>Setting up simple practical enquiries, comparative and fair tests.</p>	<p>Gas Air Oxygen Nitrogen Carbon Dioxide State Matter Material Weight Mass</p>	<p>GD:</p> <p>Year 3 – Promote child to 'team leader' in their group, whose job it is to oversee the experiment and ensure the test is kept fair. Encourage children to show other team members how to find the difference between the before and after results when testing.</p> <p>Year 4 – Allow the children to create their own method to this</p>	<p>Children may think that:</p> <p>Gases don't weigh anything because you cannot see them.</p> <p>The world is just made up of oxygen.</p> <p>Carbon dioxide is only used when we breathe it out – it has no other uses/bad for the world.</p>	<p>Children will recap on their previous learning and how that will support them in the testing of gases. For the main task, they will weigh a variety of different carbonated drinks before and after they have been shaken (to get rid of the carbon dioxide) to see how much gas is within the drinks. They will be working scientifically to ensure it is a fair test. This lesson may need to be over two lessons to ensure depth is there if children need more time to 'experiment'.</p> <p>See planning slides on trust shared.</p> <p>Resources: Weighing scales, plastic cups, spoons, variety of carbonated drinks.</p> <p>Other useful resources: https://www.bbc.co.uk/bitesize/clips/zt3fb9q</p>

<p>to weigh amount of gas in each carbonated drink.</p>				<p>investigation. Children should work together as a team and record using their own choices. Red herring equipment to be put out.</p> <p>SEND: Children to have support with step by step method of completing task. Take pictures of children working and allow children to talk with each other as opposed to writing things down. More accessible template for children to record results.</p>	<p>Carbonated drinks are not made with gas.</p>	<p>https://www.youtube.com/watch?v=yhNqJzzfFXI</p> <p>https://www.bbc.co.uk/bitesize/clips/z2mqxnb</p> <p>https://www.bbc.co.uk/bitesize/clips/zkcb4wx</p> <p>https://www.bbc.co.uk/bitesize/clips/ztc4wxx</p> <p>Year 3 Deepen the moment: Always. Sometimes. Never. Gases do not have any weight because you can't see them. Prove it!</p> <p>Year 4 Deepen the moment: When you place a Mentos mint into a bottle of cola, an explosion will occur. Why? Use what you have learnt today to help support your answer.</p>
<p>Week 3</p> <p>When a solid turns into a liquid it is called melting and different materials have different melting points.</p> <p>When a liquid turns into a solid it is called freezing and</p>	<p>To investigate materials as they change state.</p>	<p>NC: 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>Making systematic</p>	<p>Solid Liquid Particles Melt Freeze Thermometer Temperature</p>	<p>GD: Year 3 – Responsible for stop watch timing during experiment and showing team how to record the timings onto their table. Draw their own bar chart, whereas other children will be provided with a frame.</p> <p>Year 4 – Talk about how the variety of chocolates could impact the speed of melting and why this would be. Allow</p>	<p>Children may think that:</p> <p>A material is the state it originally was in but just 'melted' or 'frozen'.</p> <p>Once chocolate has changed state to a liquid it cannot be changed back to a solid.</p>	<p>Children will complete another fair test after learning about the terms melting and freezing points with some examples. They will test to see which is the best temperature to melt a variety of chocolate. They will present their results on a bar chart and write a conclusion.</p> <p>This lesson may need to be over two lessons to ensure depth is there if children need more time to 'experiment'</p> <p>See planning slides on trust shared.</p> <p>Resources: Variety of different chocolates, foil, trays, thermometers, timers, ice</p> <p>Other useful resources: https://www.bbc.co.uk/bitesize/topics/zkgg87h/articles/z9ck9qt</p>

<p>different materials have different freezing points.</p> <p>Children to work scientifically to investigate the best melting point for different types of chocolate.</p>		<p>and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.</p>		<p>children to debate by posing questions which might not link with their original theories.</p> <p>SEND: Children to have support with step by step method of completing task. Take pictures of children working and allow children to talk with each other as opposed to writing things down. More accessible template for children to record results.</p>		<p>https://www.bbc.co.uk/bitesize/clips/zb2qxn timer</p> <p>https://www.bbc.co.uk/bitesize/clips/zv4rkq timer</p> <p>Year 3 Deepen the moment: Rachel says that ice is a liquid because it's just water that is cold. Do you agree? Explain your answer. Always. Sometimes. Never. Most solids have the same melting points. Use examples to support your answer.</p> <p>Year 4 Deepen the moment: When a solid becomes a gas it is called sublimation. In what situations may this be appropriate?</p>
<p>Week 4</p> <p>Evaporation occurs when water liquid turns into water vapour.</p> <p>Condensation occurs when water collects as droplets on a cold surface when humid air is in contact with it.</p> <p>Water vapour is the gaseous phase of water.</p>	<p>LO: To investigate water as it changes state.</p>	<p>NC: Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p> <p>Making systematic and careful observations and, where appropriate,</p>	<p>Melt Freeze Condense Evaporate Process State Water Ice Water vapour</p>	<p>GD: Year 3 –</p>  <p>'Children as teachers'- Allow children some time at the start of the lesson to observe and discuss the above diagram as a small GD group (see slides) Children present their initial ideas to the class regarding what the diagram shows. For the main task children pick one</p>	<p>Children may think that:</p> <p>Water can only be two states – solid and liquid.</p> <p>Water cannot be a gas.</p> <p>Once water is a gas, it cannot change state again.</p> <p>Water cannot change from gas form to solid form. It has to become</p>	<p>Children will complete a variety of different activities to show their understanding of evaporation, condensation, precipitation and collection. They will move around each activity and record the results to discuss at the end of the lesson. This lesson will allow children to use everything they have learnt to articulate what they are observing. Teachers should be allow children to use the scientific vocabulary and peer questioning to deepen their understanding. They will record there results on the worksheet provided but might want to allow children to decide how to record observations. Children to write their observations down underneath pictures of them working.</p> <p>See planning slides on trust shared.</p> <p>Resources: Ice cubes, cling film, kettle, baking tray, beakers, salt, and thermometers.</p> <p>Other useful resources:</p>

<p>Ice is the frozen/solid state of water.</p> <p>Children to work at three different mini experiments to write down observations about how water can change state.</p>		<p>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.</p>		<p>observation they have completed and work as a group to present the process back o the class.</p> <p>Year 4 – Give children the words and arrows from the above diagram (cut up as individual parts) Allow children some time as a small GD group at the start of the lesson to organise the diagram and then explain the process to the rest of the class. For the main task, after completing the observations, the children could write some questions to test each other’s understanding of each process.</p> <p>SEND: Provide children with word mat using images to support to explain the different words. Children work in a small group with an adult to complete 2 of the 4 experiments- this will allow them time to discuss their ideas and work at a pace they are</p>	<p>liquid before it becomes a solid.</p>	<p>https://www.youtube.com/watch?v=tuE1LePDZ4Y</p> <p>https://www.bbc.co.uk/bitesize/clips/z9jd7ty</p> <p><u>Year 3 Deepen the moment:</u> Emma says: ‘Water can only be a liquid in the form of water or a solid in the form of ice.’ Do you agree with her statement? Give reasons for your answer.</p> <p><u>Year 4 Deepen the moment:</u> ‘Gas can transform directly into a solid. This process is called deposition.’ Give some examples of when this would occur and explain why.</p>
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				comfortable with. Children should assigned jobs to encourage an active role in the experiment rather than simply observing.		
<p>Week 5</p> <p>Evapotation occurs when water liquid turns into water vapour.</p> <p>Children will work on an experiment that will build upon their observational skills and enquiring skills.</p>	<p>To investigate how water evaporates in relation to the water cycle.</p>	<p>NC: Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p> <p>Using straightforward scientific evidence to answer questions or to support their findings.</p>	<p>Evaporation Condensation Precipitation Collection Clouds Rain Sleet Hail Snow</p>	<p>GD: Children to decide how they want to measure the evaporation process and how they will record results.</p> <p>SEND: Provide children with word mat using images to support to explain the different words. Children work in a small group with an adult to complete the experiments. Children should assigned jobs to encourage an active role in the experiment rather than simply observing. Adult to take picture/record discussion as opposed to getting children to write.</p>	<p>Children may think that:</p> <p>Wet clothes just become dry without the water cycle.</p> <p>Wet clothes can't dry/water can't be evaporated in the shade.</p> <p>You can only dry clothes outside.</p> <p>Clothes are dried because of the wind (not evaporation.)</p>	<p>Children will be completing an evaporation lesson which may be best to start the lesson in the morning, set up the investigation, then return to it in the afternoon to gather results and form conclusions. Or it could be set up in the afternoon and completed the next day. They will be working in groups to complete the evaporation lesson to see the impact temperature has on wet clothes. They will be using wet tea towels and putting them in different areas of the playground (e.g. in direct sunlight, shade etc) to see the affect temperature has on the evaporation process. They will go through the full investigation process of predicting, completing and evaluating.</p> <p>See planning slides on trust shared.</p> <p>Resources: Tea towels, water, measuring jugs, weighing scales, washing lines and pegs, thermometers, clock.</p> <p>Other useful resources:</p> <p>https://www.youtube.com/watch?v=k9l0s5zVibo</p> <p>https://www.youtube.com/watch?v=iRLqAhaniyg</p> <p>https://www.youtube.com/watch?v=auvGBmlxG08</p> <p>Year 3 Deepen the moment: Jane says that the water cycle does not occur in the desert as there isn't any water to be evaporated. Do you agree? Explain your answer fully.</p>

						<p>Always. Sometimes. Never. Precipitation in the Polar Regions only falls as snow. Do you agree? Give reasons for your answer.</p> <p>Year 4 Deepen the moment: Ben says that you could be drinking water that dinosaurs drank. Do you agree? Give reasons for your answer.</p>
Week 6 & 7	Consolidation Week & End of unit assessment – States of Matter					
<p>Context (big picture learning)</p> <p>In LKS2, Science is a vital part of the curriculum that allows children to explore, examine and think about scientific ideas. It is an important part of the Science curriculum journey where there is a heavy emphasis on getting children to work scientifically, ask and answer questions and problem solve as they understand the knowledge behind each unit. In this unit children will explore a variety of everyday materials which builds on their KS1 learning and develop a simple understanding of the three states of matter. They will complete a variety of different experiments with emphasis on observing water as a solid, liquid and a gas identifying the changes water makes when it is heated or cooled. This will be cross fertilised heavily with the Geography topic of the water cycle where the children will be introduced to more complex topics of water pollution and how to keep water safe.</p>						

Folder name (Trust shared > Primaries > KS2 > Year 3/4 Planning > Cycle B > Autumn 2 – The Lion, The Witch and The Wardrobe > Science)

Week 1 L1

Week 2 L2

Week 3 L3 x 2 lessons

Week 4 L4

Week 5 L5

Week 6 Consolidation Week

Week 7 Assessment

Key Vocabulary

States of matter – Materials can be one of three states: solids, liquids or gases. Some can change from one state to another.

Solid – Materials that keep their shape unless a force is applied to them. They take up the same amount of space no matter what has happened to them.

Liquid – Take the shape of their container. They can change shape but do not change the amount of space they take up. They can flow or be poured.

Gas - Can spread out to completely fill the container or room they are in. They do not have any fixed shape but they do have mass.

Water vapour – Water in the form of a gas. When water is boiled, it evaporates into water vapour.

Melt – When a solid changes to a liquid.

Freeze – When a liquid turns to a solid during the freezing process.

Evaporate – When a liquid turns to a gas.

Condensation – When a gas turns into a liquid.

Precipitation – Liquid or solid particles that fall from a cloud as rain, sleet, hail or snow.

Temperature – how hot or cold something is, normally measured in degrees Celsius.

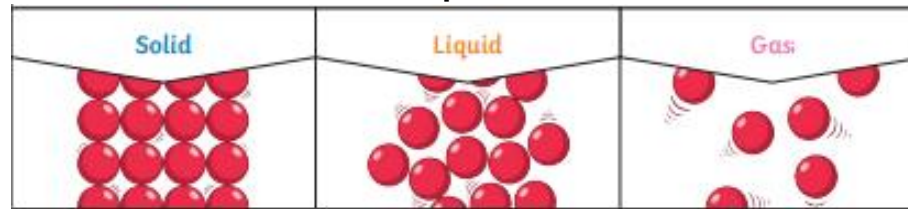
Particle – an extremely small unit of matter.

Intent: To enable you, as learners, to understand the three states of matter (solid, liquid, gas) and how they change state. You will understand the importance of this in the world around us as everything falls under one of the titles of states of matter. Through your investigations, discussions and research you will know how states of matter can impact on everyday life with a focus on freezing and melting.

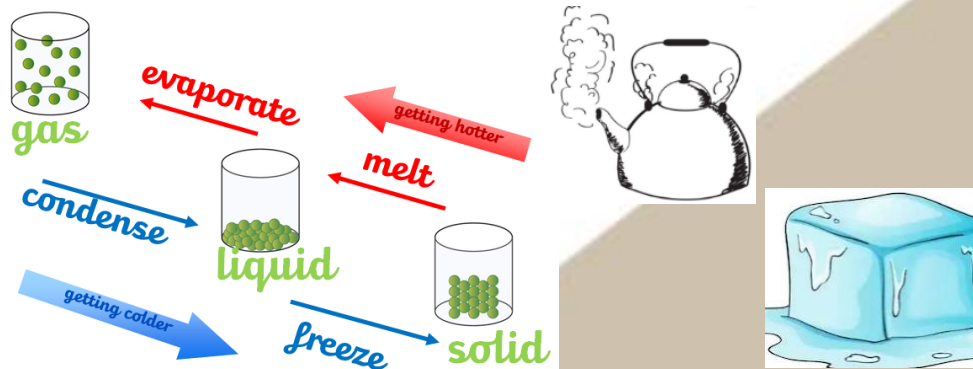
Fat Question:

How would the world be different if water was not available in liquid form?

Properties



Solid particles are close together and cannot move. They can only vibrate.
Liquid particles are close together but can move around each other easily.
Gas particles are spread out and can move around very quickly in all directions.



Changing State

If a solid is heated to its melting point, it melts and changes into a liquid because the particles start to move faster and are unable to move around each other. When a liquid gets to its freezing point, the particles begin to slow down as they get colder and eventually stay in one spot giving them a solid structure.

VIPs:

- Main three types of states of matter are solids, liquids and gases.

- A solid retains a fixed shape and if squished often goes back to its original shape. The particles do not flow easily and cannot slide past one another.

- A liquid assumes the shape of the container it occupies and particles can move past one another.

- A gas freely moves around the particles can easily move past each other.

- Air is made up of many different gases mainly nitrogen and oxygen.

- Different gases have different weights.

- Carbonated drinks weigh more when there is carbon dioxide in because carbon dioxide has a mass.

- When a solid turns into a liquid it is called melting and different materials have different melting points.

- When a liquid turns into a solid it is called freezing and different materials have different freezing points.

- Evaporation occurs when water liquid turns into water vapour.

- Condensation occurs when water collects as droplets on a cold surface when humid air is in contact with it.

- Water vapour is the gaseous phase of water.

- Ice is the frozen/solid state of water.