

YEAR 4 STATES OF MATTER PLANNING

Class:

Term:

Subject: Science

Unit: States of matter

Differentiation and support (Detailed differentiation in weekly plans.)

SEN: write up investigations on writing frames. Support from more able partners in mixed ability work. Additional adult support.

GT: provide headings for experiment sections. Encourage predictions conclusions that draw on scientific knowledge. Provide extension activities to apply their own knowledge and to research information independently

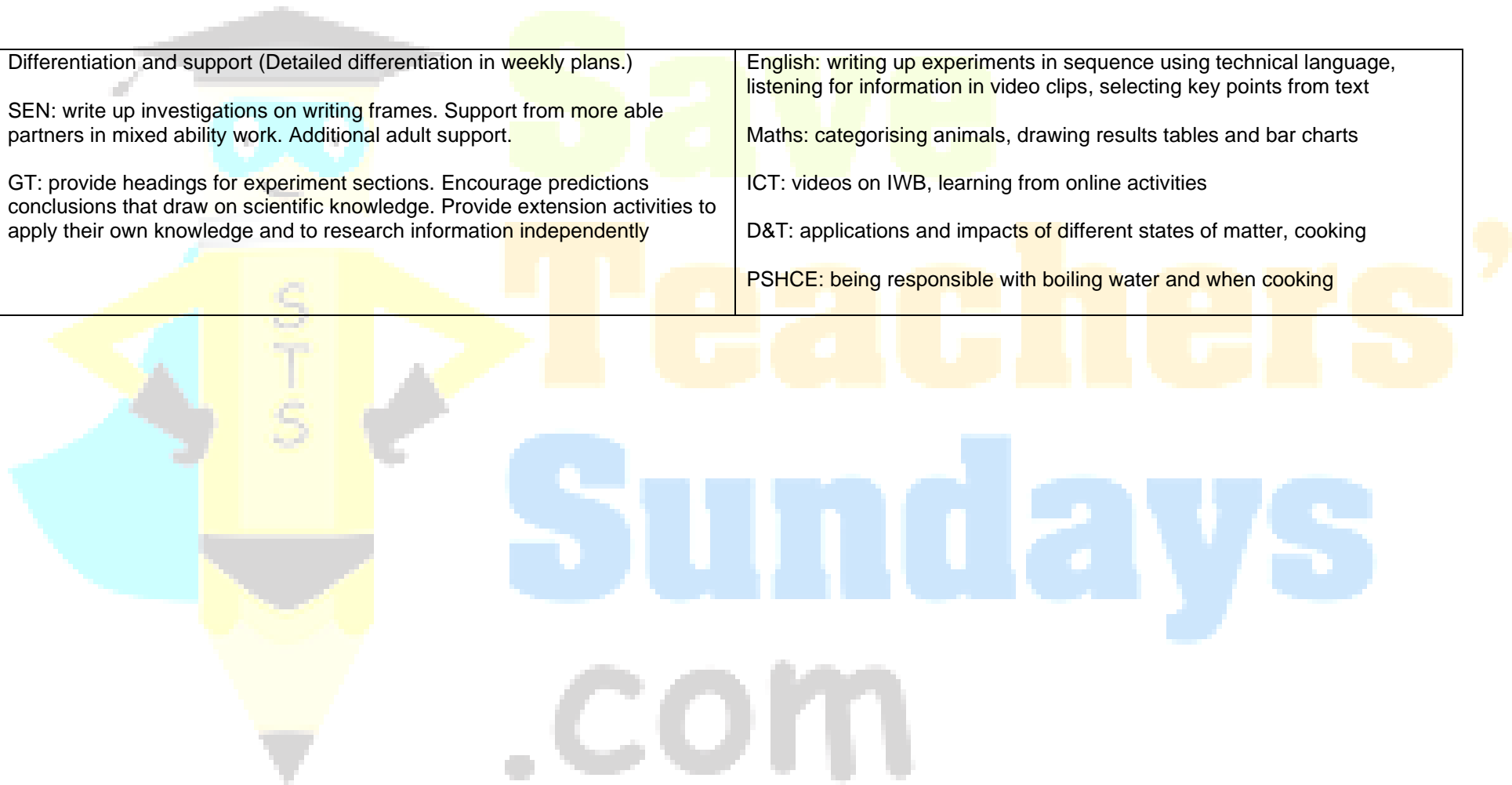
English: writing up experiments in sequence using technical language, listening for information in video clips, selecting key points from text

Maths: categorising animals, drawing results tables and bar charts

ICT: videos on IWB, learning from online activities

D&T: applications and impacts of different states of matter, cooking

PSHCE: being responsible with boiling water and when cooking



W	Learning objective	Teaching activities	Resources	Assessment: Success Criteria
1	<p>To understand that everything in the universe is made of matter</p> <p>To classify items as being solid, liquid or gas</p> <p>(1 hour)</p>	<p>Intro:</p> <p>Have real items on children's table that are solids, liquids and gases (or contain gas) – an equal number of each (tell them to think about what is inside the items)</p> <p>Ask children in groups to classify the items, <i>without telling them what groups to put them into</i> (they should decide this for themselves)</p> <p>Ask any group/s that classified them into solids, liquids and gases how they decided which item should go in which group</p> <p>Ask all groups to sort their items into solids, liquids and gases, and to agree a definition in pairs for the terms solid, liquid and gas</p> <p>Explain that everything around us is made up of matter; everything in the universe is made of the same tiny bits (particles), just that the particles are put together in different ways</p> <p>Use the analogy of Lego – Lego has a limited number of types of building blocks, but you can use them to make an infinite amount of different structures and objects</p> <p>Explain that there are three 'states of matter' – three main ways that the particles can be put together: solid, liquid or gas:</p> <ul style="list-style-type: none"> • solids hold (keep) their shape • liquids form a pool, not a pile, and take the shape of any container that they are put into • gases escape if they are not sealed in a container <p>(Note the unusual spelling of 'gas' / 'gases' (usually the short a sound is followed by double s, as in pass/es, glass/es etc)</p> <p>Explain that matter is made up of particles, which are too tiny for our eyes to see them (but we can see them with microscopes)</p> <p>Ask children to stand up (or go outside for more space) and:</p> <ul style="list-style-type: none"> • stand very tightly together and to grab each other tightly (but sensibly) – this is like being a solid. You can't move away and you are packed in tightly with the other particles • stand a yard, apart, holding hands – this is like being a liquid. You can move a bit, but not too far away from the other particles • spread out and be as far away from each other as you can – this is like being a gas • repeat this and this time open the door/s. As a solid, the children do not move; as a liquid, they move out, but still holding hands; as a gas they all leave, with those closest to the exit going first <p>Main:</p> <p>For main independent work activity, children need to draw a table with headings of 'solids', 'liquids' and 'gases'</p> <p>Once they have drawn this, they first need to copy each of three different diagrams to represent a gas, solid or liquid in the correct column of the table</p> <p>Children to then cut and stick images of solids, liquids and gases in the table</p> <p>Extension: Add their own examples (for gases, think of things that smell or that can be sprayed)</p> <p>Plenary:</p> <p>Ask children in their house teams to record as many things as they can from the intro</p> <p>Have each team read them out, award points to one with most and cover any missed points</p>	<p>Real examples of solids liquids and gases</p> <p>Scissors</p> <p>Glue sticks</p> <p>Items to cut and stick</p>	<p>MUST: be able to classify items as being solids, liquids or gases</p> <p>SHOULD: think of some of their own examples of solids, liquids and gases</p> <p>COULD: understand and recall the different characteristics of each state of matter</p>

<p>2</p>	<p>To understand evaporation and condensation</p> <p>To understand freezing and melting</p> <p>To understand that matter can change state</p> <p>(1 hour)</p>	<p>Intro:</p> <p>Go through PowerPoint that:</p> <ul style="list-style-type: none"> revises the names of the 3 states of matter and some examples of each of them revises how we define each of the three states of matter revises how particles are like Lego blocks – there are only a limited number of different types, but they can be combined in an infinite number of ways to make different structures and items revises the difference in how tightly packed together particles are in solids, liquids and gases ask the children questions that get them thinking about situations in which evaporation and condensation occur e.g. Why do puddles disappear? Why do water droplets appear on windows on cold days? explains that in the scenarios where evaporation occurs, heat causes the particles to move around more and to move away from each other explains that in the scenarios where condensation occurs, lower temperatures cause the particles to move around less and to move closer to each other includes links to some videos about evaporation and condensation and explains how these processes and heating and cooling are opposites <p>At this point, children to complete the first part of their independent work</p> <ul style="list-style-type: none"> ask the children questions that get them thinking about situations in which melting and freezing occur e.g. Why do ice cubes disappear in your drink? Why does water turn to ice in a freezer? explains that in the scenarios where melting occurs, heat causes the particles to move around more and to move away from each other explains that in the scenarios where condensation occurs, lower temperatures cause the particles to move around less and to move closer to each other includes links to some videos about melting and freezing and explains how these processes are opposites <p>Ask children to stand up (or go outside for more space) and:</p> <ul style="list-style-type: none"> stand very tightly together and to grab each other tightly (but sensibly) – this is like being ice. You can't move away and you are packed in tightly with the other particles. Then tell them it is getting gradually warmer. What should they begin doing? (moving apart and holding each other less tightly) when they are spread out far away from each other, tell them that it is getting cooler again. What should they begin doing? (moving closer towards each other again) as they are doing the above, explain that they are acting like particles when they condense / evaporate and freeze / melt <p>Main:</p> <p>Children need to complete a 'fill in the blanks' worksheet (given answers to choose from in a box) – lower attaining children given the first letter of each missing word</p> <p>Slower working children to work on the sheets; faster working children to write in their books</p> <p>Extension: Children to read more about solids, liquids and gases at https://www.dkfindout.com/uk/science/solids-liquids-and-gases/states-matter/ - click 'Solid', 'Liquid' and 'Gas' links at bottom of page too (if the link does not work, Google 'DK Findout Solids, Liquids and Gases') and / or in non-fiction books on the topic</p>	<p>Videos from PowerPoint open and ready to play</p> <p>Worksheets</p> <p>Computers / tablets, with link saved so that children can access it and / or non-fiction books on the topic (for extension)</p>	<p>MUST: become familiar with the terms evaporation, condensation, freezing and melting</p> <p>SHOULD: understand the changes that take place in the processes of evaporation, condensation, freezing and melting</p> <p>COULD: independently learn additional information about the processes of evaporation, condensation, freezing and melting</p>
----------	---	--	---	---

		<p>Plenary: Complete the activities and quizzes at: https://www.bbc.co.uk/bitesize/topics/zkqg87h/articles/z9ck9qt (if the link does not work, Google BBC Bitesize KS2 What are freezing and melting?) https://www.bbc.co.uk/bitesize/topics/zkqg87h/articles/zydxmnb (if the link does not work, Google BBC Bitesize KS2 What is evaporation and condensation?) Revise the key vocabulary and ideas from the lesson Explain that materials and substances other than water can also go through the processes of evaporation, condensation, freezing and melting Explain that different substances and materials will go through these processes at different temperatures; for example, chocolate melts at about 35°C</p>		
3a	<p>To know the terminology associated with states of matter (30 mins)</p>	<p>Intro: Revise how it is important that we know the precise meanings of terminology in science and that we use words and language accurately in it Ask children to think, pair, share some of the terms that we have learnt and used in the last couple of lessons Explain that we are going to be learning the precise definitions of many of these words today: cool, freeze, heat, boil, melt, solid, liquid, gas, condense, evaporate, evaporation, condensation, matter, particle and freezing / boiling point Show children the cards that we will be using and cover the following subtle differences:</p> <ul style="list-style-type: none"> • cooling and freezing – cooling means to reduce the temperature of, whereas freezing means to reduce the temperature <i>until a substance turns from liquid to solid</i> • heating and boiling – heating means to increase the temperature of, whereas boiling means to increase the temperature <i>of a liquid until bubbles start to form</i> • gas and vapour – a vapour is a gas <i>that is normally a liquid at room temperature</i> • condense / condensation and evaporate / evaporation – evaporate and condense are <i>verbs</i>, whereas evaporation and condensation are <i>nouns</i> <p>Give each child a card (some will need to be given two of the cards with the terms on them, as there are 32 cards) and children need to find their matching partner Children to read out their term and their definition Explain how to play the game for the independent work</p> <p>Main: Give each pair of children 3 sets of cards: a double-sided set, a set with just the terms and a set with just the definitions Children to play 'Go Fish' – 2 sets of cards, placed face down. Children need to find the two matching cards They can use the double-sided cards to check if they have found a matching pair (To begin with, they could play the game with the cards facing up to make it easier)</p> <p>Plenary: Collect in all of the sets of cards (and store safely for next year) Memory competition – in pairs / groups to write down as many of the terms as they can remember and their definitions Ask pairs / groups how many they got and go to the team who says they have the most terms</p>	<p>Sets of cards laminated / printed on card back-to-back</p> <p>Sets of cards laminated / not printed back-to-back</p>	<p>MUST: know some of the terms and their definitions</p> <p>SHOULD: know more of the terms and their definitions</p> <p>COULD: know all of the terms and their definitions</p>

		written down Briefly check that they got all of the definitions correct; if they did, award them points; if not go to pair who got the next most; repeat until find winners		
3b	To use scientific reasoning to make decisions To understand that matter has the same mass whatever form it is in (15 mins)	Intro: Explain that mass is the amount of matter (or 'stuff) in an object and that when we measure in kilograms, we are actually measuring mass, not weight (this is enough detail for now) Explain what we will be investigating: Does the mass of water change when it changes from a solid (ice) to a liquid (water)? Ask children to think, pair, share their predictions, and listen to some as a class Main: Have a glass/es of ice and weigh them Allow the ice to melt and weigh them again to see if there mass has changed at all Discuss why the mass has / has not changed Plenary: Revise how what we call weight in kilograms is actually mass, not weight	Glasses Water Ice Weighing scales	MUST: make a prediction SHOULD: attempt to give a scientific justification for their predictions COULD: use states of matter associated terminology accurately
3c	To use scientific reasoning and language to make and justify decisions (15 mins)	Intro: Explain the task: Each child will be given an ice cube. The winner will be the child who turns the ice cube completely into a liquid the fastest. When a child thinks that they have done this, he / she needs to put their hand up, not call out Main: Children to complete the task Plenary: Children to share their approaches and their reason for choosing them with a partner Listen to justifications as a class and discuss what made the ice melt the fastest	Ice cubes (enough for one each)	MUST: describe the ice cube as having melted SHOULD: give a scientific reason for their chosen approach COULD: accurately use scientific language to justify their approach and any observed outcomes

To access the complete version of this [Year 4 States of Matter planning](http://www.saveteacherssundays.com/science/year-4/371/), and all of the resources to go with it, visit

<http://www.saveteacherssundays.com/science/year-4/371/>