# Year 4– Materials (States of Matter)

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| **National Curriculum Objectives** | **Declarative Knowledge** | **Procedural Knowledge** |
| <u>States of matter</u><br>Pupils should be taught to:<br>• Compare and group materials together, according to whether they are solids, liquids or gases.<br>• 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)<br>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation and temperature. | • Know that all the particles in solids are packed tightly together and can hardly move.<br>• Know that solids can be cut or shaped.<br>• Know that solids keep their shape.<br>• Know that anything you can take hold of is a solid.<br>• Know that the particles in liquids are not so tightly packed and can move a little.<br>• Know that liquids are runny – they flow downwards.<br>• Know that liquids take up the shape of a container.<br>• Know that liquids form a pool not a pile.<br>• Know that the surface of a liquid in a container stays level.<br>• Know that the particles in gases have lots of room and move all over the place, all the time.<br>• Know that gases are all around us, spreading into any empty space.<br>• Know that most gases are invisible.<br>• Know that gases escape from an unsealed container.<br>• Know some examples of different solids, liquids and gases.<br>• Know that temperature tells us how hot or cold things are.<br>• Know that we use a thermometer to measure temperature.<br>• Know we measure temperature in degrees Celsius (˚C)<br>• Know that water freezes at 0˚C<br>• Know that water boils (changes to steam) at 100˚C<br>• Know that evaporation when liquid turns into a gas<br>• Know that the sun heats water and the water evaporates into a gas.<br>• Know that liquids evaporate into a gas when they are warmed.<br>• Know that condensation is the turning of gas back into liquid.<br>• Know that gas (water vapour in the water cycle) condenses into a liquid when it is cooled. | • To be able to explore a variety of everyday materials and develop simple descriptions of states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container).<br>• To be able to observe water as a solid, a liquid and as a gas.<br>• To be able to group and classify a variety of different materials.<br>• To be able to explore the effect of temperature on substances such as chocolate, butter and cream.<br>• To be able to research the temperature at which materials change state – iron melting, oxygen condensing into a liquid.<br>• To be able to observe and record evaporation over a period of time, such as a puddle on the playground or washing on a line.<br>• To be able to investigate the effect of temperature on washing drying or a snowman melting. |

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| | • Know that water vapour in the air cools and turns into water droplets.<br>• Know the key stages of the water cycle. | |
| **Prior Learning** | **Key Questions** | **Future Learning** |
| **In KS1 Children should:**<br>• Distinguish between an object and the material from which it is made.<br>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.<br>• Describe the simple physical properties of a variety of everyday materials.<br>• Compare and group together a variety of everyday materials based on their simple physical properties.<br>• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.<br>• Find out how the shapes of solid objects made from some materials can be changed by squashing, | • How does the amount of water added to flour affect its state?<br>• How does the amount of detergent added to water affect how slippery it is?<br>• How does the temperature affect how viscous a liquid is (use cooking oil)?<br>• Place a peach in a glass of lemonade and watch it spin. Why does it behave that way, and can you prove it?<br>• How does the material sprinkled on ice and snow affect how quickly it melts?<br>• What chocolate would be best to smuggle? How does the type of chocolate affect its melting temperature?<br>• What is the melting temperature of ice and how does it compare with the freezing temperature of water?<br>• Is the melting temperature of wax the same as its freezing temperature? | **In Year 5 Children will:**<br>• Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.<br>• Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.<br>• Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.<br>• Give reasons based on evidence from comparative and fair tests, for the uses of everyday materials, including wood, metals and plastic.<br>• Demonstrate that dissolving, mixing and changes of state are reversible changes.<br>• Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda. |
| **Vocabulary** | **Key Scientists** | **Linked Texts** |
| Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection | **Anders Celsius**<br>(Celsius Temperature Scale)<br>**Daniel Fahrenheit**<br>(Fahrenheit Temperature Scale / Invention of the Thermometer) | **Once Upon a Raindrop: The Story of Water**<br>(James Carter)<br>**Sticks**<br>(Diane Alber) |

## Teaching Ideas

| Comparative tests | Identify & Classify | Observation over time | Pattern seeking | Research | Big Question |
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| How does the mass of a block of ice affect how long it takes to melt? | Can you group these materials and objects into solids, liquids and gases? | Which material is best for keeping our hot chocolate warm? | Is there a pattern in how long it takes different sized ice lollies to melt? | What are hurricanes and why do they happen? | Where do ice cubes go when they disappear?<br>Why does it rain and hail? |

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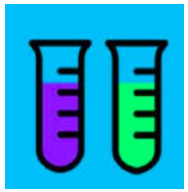
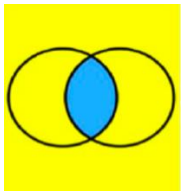
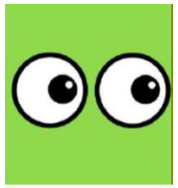
| How does the surface area of water affect how long it takes to evaporate?<br>Does seawater evaporate faster than fresh water? | How would you sort these objects/materials based on their temperature? | How does the level of water in a glass change when left on the windowsill? | How does evaporation rate change as you add salt to your water? | | |
|  |  |  |  |  |  |