

## Knowledge Organiser

Year: 4

Subject: Science

Unit: States of Matter

### Overview:

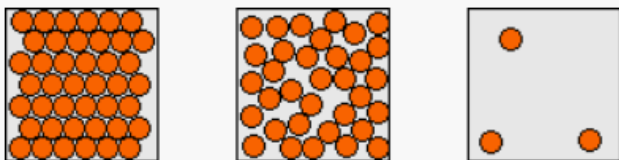
During this sequence of learning, pupils will compare and group together materials according to whether they are solids, liquids or gases. They will also observe that some materials change state when they are heated or cooled and the role that evaporation and condensation play in the water cycle.

### What should I already know?

- An object is made from/of a material.
- Materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material.
- Know that matter (stuff) is made from tiny building blocks.

### What will I know by the end of the unit?

- Things are composed of a material in one of three states of matter: solid, liquid or gas e.g. water is a liquid, oxygen is a gas and wood is a solid.
- Things are made of particles (tiny building blocks) and that these are organised differently in different states (see below).



solid

liquid

gas

- Particles within a solid are tightly packed together whilst particles in a gas are very spaced out. Particles within a liquid have a small amount of space between them.
- Materials can change state when temperature changes e.g. water which is a liquid can change to a solid when it is frozen.
- There are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas.

### Vocabulary:

absorb  
(revision)

To take in or suck up e.g. a sponge absorbs water.

dissolving  
(revision)

To mix something with a liquid so that it is the same throughout e.g. sugar will dissolve in tea.

evaporation

When a liquid turns into a vapour once heated.

bond

A way in which atoms are held together.

condensation

When a vapour or gas turns back into a liquid.

reversible

When something can be changed back e.g. water can be frozen into ice but this is reversible as it can be melted back into water.

boiling point

The temperature at which a substance boils. Water boils at 100° C.

melting point

The temperature at which a substance changes from a solid to a liquid.

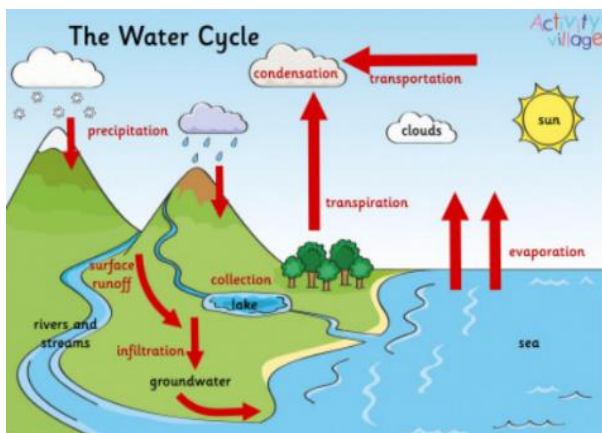
liquid

A substance that flows freely but has a constant volume.

gas

A substance which can move freely with no fixed shape or volume.

- When solids turn into liquids, this is called melting and that the reverse process is called freezing.
- When liquids turn into gases, this is called evaporation and the reverse process is called condensation.
- When a solid turns into a gas without passing through the liquid state, this is called sublimation.
- The melting point of water is  $0^{\circ}\text{C}$  and that the boiling point of water is  $100^{\circ}\text{C}$ .
- Water flows around our world in a continuous process called the water cycle.



- There are four main stages of the water cycle - evaporation, condensation, precipitation and collection.
- When the sun heats the surface of the lakes, seas and rivers it turns some of the water into water vapour which mixes with air in a process called evaporation.
- When the air cools down the water vapour condenses back into water droplets which collect together to form clouds.
- The water droplets in clouds attract other water droplets to them and grow bigger. When the clouds get too big and heavy the water falls to the ground as rain. If the weather is cold enough the droplets remain frozen and fall as hail or snow. This is known as precipitation.
- When the water falls to the ground it collects in streams, rivers or lakes. It can also filter into the ground where it flows until it reaches a body of water.
- Some of the water can be used by plants and animals. Plants take this water through their roots and they can then 'breathe' the water out through their leaves in a process called transpiration.

thermometer

An instrument for measuring temperature.

water cycle

The cycle by which water circulates between the ocean, the atmosphere and the land.

precipitation

Water that falls to Earth in different forms e.g. rain, snow, hail.

transpiration

The process by which plants give off water vapour through their leaves.

surface runoff

Water that flows over the land before collecting in a body of water such as a lake or river.

process

A series of actions leading to a result.

sublimation

When a solid turns into a gas without passing through the liquid state.

