Knowledge Organiser	Subject: Science	Topic: States of Matter	Year: 4

Key Knowledge

A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes shape to fit its container. It can be poured and keeps a level, horizontal surface. A gas has no fixed shape or volume and fills all available space. Granular solids like sand can seem like liquids because they pour, but they form a heap and don't keep a level surface. Each grain is still a solid. Melting is when a solid turns to liquid. Freezing is liquid to solid; water freezes at 0°C. Boiling is liquid to gas with bubbles forming; water boils at 100°C. Evaporation is also liquid to gas, but slower and at lower temperatures, only at the surface. It speeds up with heat, wind, or when spread out. Condensation is gas changing back to liquid by cooling. Water evaporates from seas and rivers, rises as vapour, cools, and condenses into clouds. When too much condenses, droplets fall as rain, snow, etc. — called precipitation. This is the water cycle.

Common misconceptions

- 'solid' is another word for hard or opaque.
- Solids are hard and cannot break or change shape easily and are often in one piece.
- Substances made of very small particles like sugar or sand cannot be solids.
- Particles in liquids are further apart than in solids and they take up more space.
- Water in different forms – steam, water, ice – are all different substances.
- All liquids boil at the same temperature as water (100 degrees).
- Melting, as a change of state, is the same as dissolving.
- Steam is visible water vapour (only the condensing water droplets can be seen,

Key Learning

- To compare and group materials together, according to whether they are solids, liquids or gases.
- To 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).
- To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Disciplinary Skills

- Observing closely over time.
- Setting up simple practical enquiries.
- Measuring accurately using standard units.
- Recording findings using drawings, keys, bar charts, and tables,
- Using results to draw simple conclusions.
- Identifying differences, similarities, or changes.

Key Concepts

1. States of Matter

Materials can be solids, liquids, or gases, each with different properties.

Solids keep their shape and volume. Liquids have a fixed volume but change shape. Gases have no fixed shape or volume and fill any space.

Some solids (like sand) may behave like liquids but are still solids.

2. Changing States

Materials can change state when heated or cooled:

- Melting (solid → liquid)
- Freezing (liquid → solid, e.g. water freezes at 0°C)
- Boiling (liquid → gas, e.g. water boils at 100°C)
- Evaporation (slow liquid → gas from surface)
- Condensation (gas → liquid)

Temperature affects how and when these changes happen.

The Water Cycle

Evaporation and condensation play key roles in the water cycle.

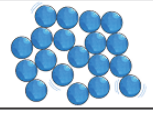
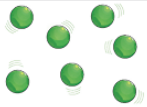
Water evaporates from surfaces, condenses into clouds, then falls as precipitation (rain, snow).

The rate of evaporation increases with higher temperature, wind, or greater surface area.

The Big Question

What are solids, liquids and gases?

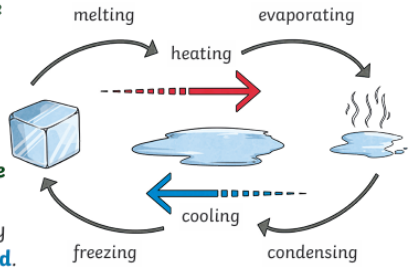
Key Vocabulary	
States of Matter	Materials can exist in any of three states: solids, liquids or gases. Some materials can change from one state to another and back again.
Solid	Solids are materials that keep their shape unless a force is applied to them. They can be hard, soft or even squashy. Solids take up the same amount of space no matter what has happened to them.
Liquid	Liquids 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	Gases can spread out to completely fill the container or room they are in. They do not have any fixed shape but they do have a mass.
Particle	A particle is a small piece of matter that cannot be seen with the naked eye.

Solids	Liquids	Gases
		
The particles are close together in clear formations. The particles vibrate on the spot.	The particles are quite close together but move around each other much more easily.	The particles move quickly in all directions, filling the space. There is much more space between the particles.

Changing State

Increasing the **temperature** of a **solid** can cause it to **melt** into a **liquid** and eventually **evaporate** the **liquid** into a **gas**.

Decreasing the **temperature** of a **gas** can **condense** it into a **liquid** and eventually **freeze** the **liquid** into a **solid**.



Melting Point

This is the **temperature** at which a **solid** turns into a **liquid**.

Linking Thinking Across Our Learning Journey

Early Years	Year One	Year Two	Year Three	Year Four	Year Five	Year Six
	Everyday materials Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties.	**Uses of everyday materials** Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.		**States of Matter**	**Properties and changes of materials** Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.	