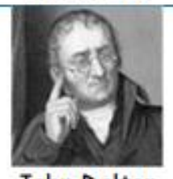
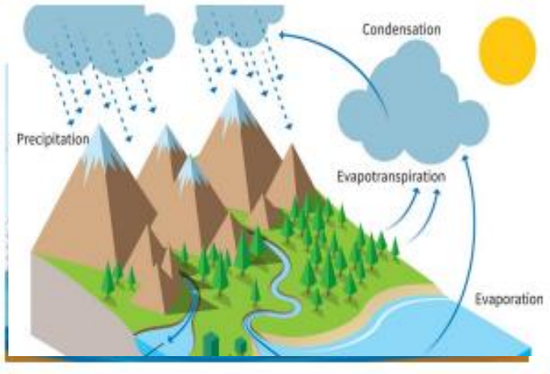
Knowledge Organiser: States of Matter

Who: Scientific Influences

Name/Picture	Why significant
 Antoine Lavoisier 1743 – 1794	Most noted for his discovery of the role oxygen plays in combustion. He recognized and named oxygen (1778) and hydrogen (1783).
 Robert Boyle 1627–1691	Boyle discovered that the volume of a gas decreases with increasing pressure and vice versa—the famous Boyle's law
 John Dalton 1766 - 1844	In 1803 he proposed matter is made up of atoms that are indivisible and indestructible.

Sticky Knowledge

Sticky Knowledge
Know that things are composed of a material in one of three states of matter: solid, liquid or gas
Know that things are made of particles (tiny building blocks) and that these are organised differently in different states
Know that materials can change state when temperature changes
Know that when solids turn into liquids, this is called melting and the reverse process is called freezing
Know that when liquids turn into gases, this is called evaporation and the reverse process is called condensation
Know that when a solid turns into a gas without passing through the liquid state, this is called sublimation
Know that the melting point of water is 0°C and the boiling point 100°C
Know that water flows around our world in a continuous process called the water cycle
Know that, along with evaporation, water on the Earth's surface moves to the air in a process called transpiration, where water turns into water vapour (gas) on the surface of leaves on plants
Know that there are bonds between particles in a solid; as temperature increases, these bonds are partially 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



Possible Scientific Enquiry Questions

Observing over time	How does the level of water in a glass change when left on a windowsill?
Pattern seeking	Is there a pattern in how long it takes different sized ice lollies to melt?
Identifying, classifying and grouping	Can you group these materials into solids, liquids and gases?
Fair testing	How does the mass of a block of ice affect how long it takes to melt?

Extended Specialist Vocabulary

Word	Definition
New Vocabulary	
bond	joined securely to something else
condensation	turn a gas into a liquid.
evaporation	turn a liquid into a gas.
precipitation	liquid or solid particles that fall from a cloud as rain, sleet, hail or snow.
boiling point	the temperature at which a liquid boils and turns to vapour
melting point	the temperature at which a given solid will melt
states of matter	materials can be one of three states: solids, liquids or gases. Some materials can change from one state to another and back again.
liquid	a substance that flows freely but is of constant volume
gas	a substance which will expand freely to fill a whole container and has no fixed shape or volume
thermometer	an instrument for measuring and indicating temperature
water cycle	the cycle of processes by which water circulates between the earth's oceans, atmosphere, and land
transpiration	the exhalation of water vapour in plants
sublimation	When a substance changes from a solid to a gas, without going through the liquid change

Solids, Liquids and Gases

What is a solid?

When materials hold their shape. Their particles are closely packed and form a regular pattern. Their shape is fixed and they will always take up the same amount of space. Examples: Ice, Wood, Glass, Diamond.

What is a liquid?

When materials hold the shape of the containers they are in and so can change shape. Their particles are close together but can move over each other. Liquids can be poured. Examples: Water, Milk, washing-up liquid.

What is a gas?

Gases can escape from open containers. They often cannot be seen. They have particles which can spread it and move in all directions.
Examples: Steam, Hydrogen, Oxygen, Carbon Dioxide.

Changes of State (heating and cooling)

Warming solid ice makes it melt into liquid water. Adding more heat makes it evaporate, at 100°C, into steam (a gas). When it is cooled it condenses back into liquid water. If it is cooled to 0°C it freezes and forms