

# Brentley Primary School - Science

**Topic: States of Matter**

**Year: 4**

**Strand: Chemistry**

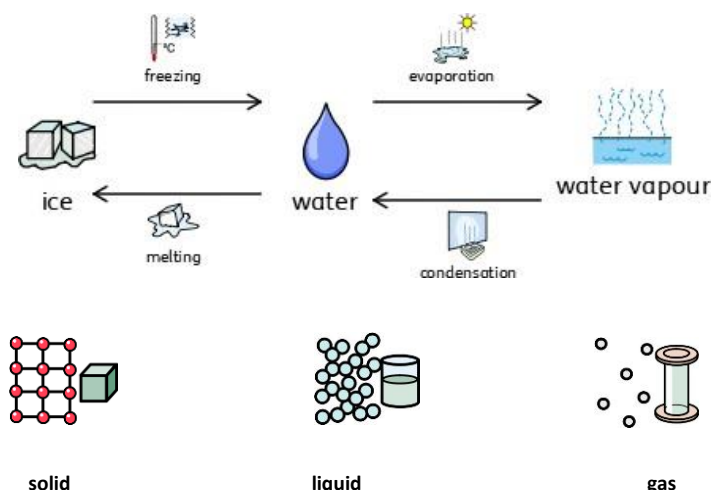
## What should I already know?

- Why some materials are used for certain purposes because of their **properties**
- The **water cycle**, and the **processes** of **evaporation**, **condensation** and **precipitation**.

## Vocabulary

|                |                                                                                                                                                                             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| condensation   | small drops of water which form when <b>water vapour</b> or steam touches a cold <b>surface</b> , such as a window                                                          |
| cooling        | lowering the <b>temperature</b> of something                                                                                                                                |
| evaporation    | to turn from liquid into gas; pass away in the form of <b>vapour</b> .                                                                                                      |
| freezing       | If a <b>liquid</b> or a substance containing a <b>liquid</b> <b>freezes</b> , it becomes <b>solid</b> because of low <b>temperatures</b>                                    |
| freezing point | The <b>freezing point</b> of a particular substance is the <b>temperature</b> at which it <b>freezes</b> . The <b>freezing point</b> of water is 0°C.                       |
| gas            | a form of matter that is neither <b>liquid</b> nor <b>solid</b> . A <b>gas</b> rapidly spreads out when it is warmed and contracts when it is <b>cooled</b> .               |
| heating        | raising the <b>temperature</b> of something                                                                                                                                 |
| liquid         | in a form that flows easily and is neither a <b>solid</b> nor a <b>gas</b> .                                                                                                |
| melting        | to change from a <b>solid</b> to a <b>liquid</b> state through heat or pressure                                                                                             |
| melting point  | The <b>melting point</b> of a particular substance is the <b>temperature</b> at which it <b>melts</b> .                                                                     |
| particles      | a tiny amount or small piece                                                                                                                                                |
| precipitation  | rain, snow, sleet, dew, etc, formed by <b>condensation</b> of <b>water vapour</b> in the atmosphere                                                                         |
| process        | a series of actions used to produce something or reach a goal.                                                                                                              |
| properties     | the ways in which an object behaves                                                                                                                                         |
| solid          | having a firm shape or form that can be measured in length, width, and height; not like a <b>liquid</b> or a <b>gas</b>                                                     |
| temperature    | a measure of how hot or cold something is                                                                                                                                   |
| vibrations     | when something <b>vibrates</b> , it shakes with repeated small, quick movements                                                                                             |
| water cycle    | the <b>process</b> by which water on the earth <b>evaporates</b> , then <b>condenses</b> in the atmosphere, and then returns to earth in the form of <b>precipitation</b> . |
| water vapour   | water in the <b>gaseous</b> state, esp when due to <b>evaporation</b> at a <b>temperature</b> below the boiling point                                                       |

## Diagram

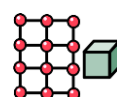


## What will I know by the end of the unit?

What is a **particle**?

- Particles** are what materials are made from.
- They are so small that we cannot see them with our eyes.
- The **properties** of a substance depend on what its particles are like, how they move and how they are arranged
- Particles** behave differently in **solids**, **liquids** and **gases**.

What is a **solid**?



- In the **solid** state, the material holds its shape.
- Solids** have **vibrating particles** which are closely packed in and form a regular pattern.
- This explains the fixed shape of a solid and why it can't be poured.
- Solids** always take up the same amount of space.

What is a **liquid**?



- In the **liquid** state, the material holds the shape of the container it is in.
- This means that **liquids** can change shape, depending on the container.
- Liquids** have **particles** which are close together but random.
- Liquid particles** can move over each other.
- Liquids** can be poured.

What is a **gas**?



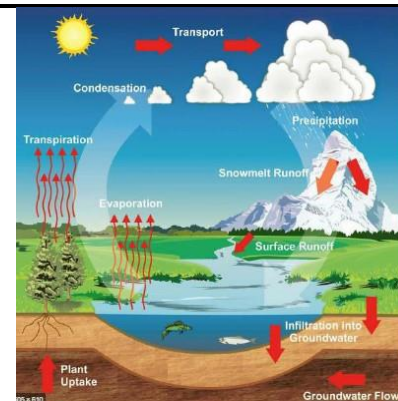
- In the **gas** state, **particles** can escape from open containers.
- Gases** have **particles** which are spread out and move in all directions.

What happens to the **particles** in water when it is **heated** or **cooled**?

- When water (in its **liquid** form) is **heated**, the particles start to move faster and faster until they have enough energy to move about more freely. The water has **evaporated** into a **water vapour**.
- When water is **cooled**, the particles start to slow down until a solid structure (ice) is formed. The water has **frozen**.
- The **temperature** at which water turns to ice is called the **freezing point**. This happens at 0°C.

What is the **water cycle**?

(see separate knowledge organiser Geography - The Water Cycle)



## Investigate!

- Group materials according to their states.
- Explain the **particle** structure of **solids**, **liquids** and **gases**.
- Explore the effect of **temperature** on substances such as chocolate, butter, cream. Compare their **melting points** and place them in a table.
- Research the **temperature** at which materials change state, for example, when iron **melts** or when oxygen **condenses** into a **liquid**.
- Observe and record **evaporation** over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of **temperature** on washing drying or snowmen melting.
- Analyse and interpret different forms of data (tables, graphs) to show the effects of **temperature** on states of matter.
- Present what you know about the water cycle using a variety of skills using appropriate vocabulary (The Water Cycle Knowledge Organiser).
- Observe **evaporation** and **condensation** in action by using bowls of water and mirrors /glass (The Water Cycle Knowledge Organiser).

# Brentry Primary School - Science

## Topic: States of Matter

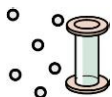
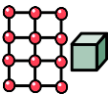
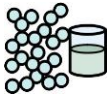
Year: 4

## Strand: Chemistry

| Question 1: The particles in a solid:                                 | Start of unit: | End of unit: |
|-----------------------------------------------------------------------|----------------|--------------|
| are closely packed together and vibrate                               |                |              |
| move freely over each other within a container in which they are held |                |              |
| can be poured                                                         |                |              |
| are very spread out and can escape an open container                  |                |              |

| Question 2: The particles in a liquid (tick two):                     | Start of unit: | End of unit: |
|-----------------------------------------------------------------------|----------------|--------------|
| are closely packed together and vibrate                               |                |              |
| move freely over each other within a container in which they are held |                |              |
| can be poured                                                         |                |              |
| are very spread out and can escape an open container                  |                |              |

| Question 3: The particles in a gas:                                   | Start of unit: | End of unit: |
|-----------------------------------------------------------------------|----------------|--------------|
| are closely packed together and vibrate                               |                |              |
| move freely over each other within a container in which they are held |                |              |
| can be poured                                                         |                |              |
| are very spread out and can escape an open container                  |                |              |

| Question 4: Match the states to their particle structure:                                                                                                                                                                         | Start of unit: | End of unit: |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|
| <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">solid</div>  </div>  |                |              |
| <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">liquid</div>  </div> |                |              |
| <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">gas</div>  </div>    |                |              |

| Question 5: What is the freezing point of water? | Start of unit: | End of unit: |
|--------------------------------------------------|----------------|--------------|
|                                                  |                |              |

| Question 6: Name the process that describes the change from water to ice. | Start of unit: | End of unit: |
|---------------------------------------------------------------------------|----------------|--------------|
|                                                                           |                |              |

| Question 7: Write solid, liquid or gas to label each part of the diagram.          | Start of unit: | End of unit: |
|------------------------------------------------------------------------------------|----------------|--------------|
|  |                |              |

| Question 8: Match these changes to the scientific name for the process.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Start of unit: | End of unit: |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|
| <div style="display: flex; flex-wrap: wrap;"> <div style="border: 1px solid black; padding: 5px; margin: 5px;">ice turns to water</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">condensation</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">water turns to water vapour</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">evaporation</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">water vapour turns to water</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">melting</div> </div> |                |              |

| Question 9: Solids, liquids and gases have different properties. Indicate using an S, L or G, which state these properties apply to. | Start of unit: | End of unit: |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|
| keeps its own shape                                                                                                                  |                |              |
| can be poured                                                                                                                        |                |              |
| flows easily through a pipe                                                                                                          |                |              |
| takes the shape of the container it is in                                                                                            |                |              |
| can escape from an open container                                                                                                    |                |              |

| Question 10: Explain why puddles get smaller after it has rained. | Start of unit: | End of unit: |
|-------------------------------------------------------------------|----------------|--------------|
|                                                                   |                |              |