Year 4 SCIENCE – States of Matter KNOWLEDGE ORGANISER

What have we learnt in this topic before, what we will learn this year and what will we learn next?

In Year 2, we learnt in our topic:

Uses of everyday materials (Materials for different uses)

- To identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching
- Our Focus Scientist was John McAdam-building roads

In Year 4, we will learn:

- 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.
- Our focus Scientist will be: Spencer Silver – Materials - Post it notes

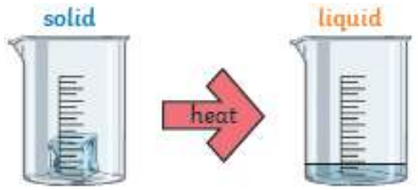
In Year 5, we will develop this further and learn about Properties and Changes of materials including **Dissolving, reactions & separation.**

PARTICLES – FREEZING AND MELTING

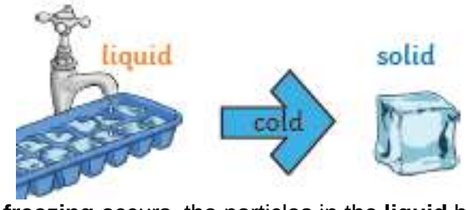
Particles are what materials are made from.

- 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**

Solids and liquids can be changed from one state to another by heating or cooling.



If a **solid** is heated to its **melting** point, it **melts** and changes to a **liquid**. This is because the particles start to move faster and faster until they are able to move over and around each other.



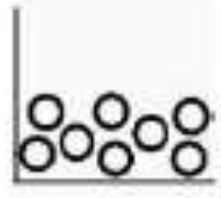
When **freezing** occurs, the particles in the **liquid** begin to slow down as they get colder and colder. They can then only move gently on the spot, giving them a **solid** structure. The **temperature** at which water turns to ice is called the **freezing point.** This happens at 0 degrees C.

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 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.

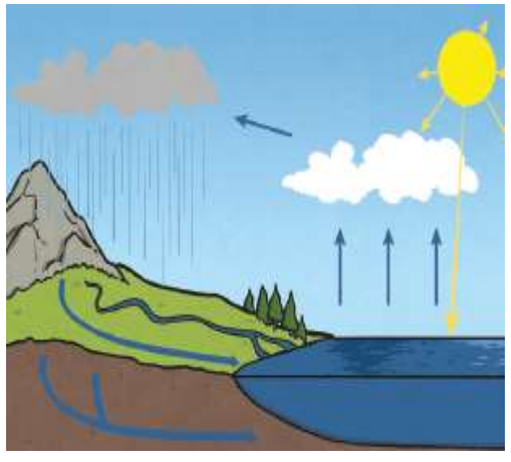
What is a gas?

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

THE WATER CYCLE

Water on Earth is **constantly moving**. It is recycled over and over again. This recycling process is called the water cycle.

1. **Water evaporates into the air**
   The sun **heats up** water on land, in rivers, lakes and seas and turns it into water vapour. The water vapour rises into the air.
2. **Water vapour condenses into clouds**
   Water vapour in the air **cools** down and changes back into tiny drops of liquid water, forming clouds.
3. **Water falls as precipitation**
   The clouds get **heavy** and water falls back to the ground in the form of rain or snow.
4. **Water returns to the sea**
   Rain water runs over the land and collects in lakes or rivers, which take it **back to the sea**. The cycle starts all over again.



FOCUS SCIENTIST – SPENCER SILVER – POST IT NOTES

Dr. Spencer Silver, a 3M scientist, was busily researching **adhesives** in a laboratory. In the process, he discovered something peculiar: an adhesive that stuck lightly to surfaces but didn't bond tightly to them. "It was part of my job as a researcher to develop new adhesives, and at that time we wanted to develop bigger, stronger, tougher adhesives,"
said Silver. "This was none of those." What Silver discovered was something called **microspheres** which retain their stickiness but with a "**removability characteristic**," allowing attached surfaces to peel apart easily.

Key Vocabulary

melt freeze evaporate condense precipitation cooling condensation evaporation solids liquids gases particles water cycle process