

Medium Term Plan: Supporting Implementation of LTP/Progression Grid

Subject: Science Year: Y4 – States of matter

NC/PoS:

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

Prior Learning (what pupils already know and can do)

Recognise a material and name its properties. Know a material is used because of its properties. Know the difference between a natural and manufactured material.

End Goals (what pupils MUST know and remember)

- Know that materials can be solids, liquids, or gases (the three states of matter)
- Know the shape and volume of a solid does not change unless a bit is broken off
- Know the shape of a liquid can change, depending on the container it is in, but its volume does not change
- Know that most gases are invisible
- Know the gas in a container completely fills the container so has the same shape and volume of the container it is in
- Know liquids, change into gases when they are heated – this is evaporation
- Know liquids, change into solids when they are cooled – this is freezing
- Know gases, change into liquids when they are cooled – this is called condensation
- Know solids, change into liquids when they are heated – this is called melting e.g. heating sand at elevated temperatures produces liquid glass
- Know the rate of evaporation depends on the temperature
- Know evaporation is slow when it is cold and fast when it is hot
- Know the water on Earth is constantly recycling using evaporation and condensation
- Know the heat from the sun makes the water from the sea, lakes and rivers evaporate into water vapour
- Know that as the water vapour rises, it cools and condenses to form clouds, then falls as rain

Key Vocabulary:

water cycle, evaporation, water vapour, condensation, precipitation, property, matter, states, particles, mass, shape, volume, heat, melting, melting point, evaporating, evaporation, boiling points, process, condensing, condensation, freezing, freezing point, temperature, rate of evaporation

Session 1: review prior learning - What is a material? What is a property of a material?

Give children a group of materials and ask them to group in different ways. Tease out magnetic, transparent, opaque, malleable, stiff/rigid etc.

Look at career scientist:

[https://pstt.org.uk/application/files/1116/2851/6355/Materials_scientist -](https://pstt.org.uk/application/files/1116/2851/6355/Materials_scientist_-_Pearl_Agyakwa.pdf)

[_Pearl_Agyakwa.pdf](https://pstt.org.uk/application/files/1116/2851/6355/Materials_scientist_-_Pearl_Agyakwa.pdf)

[https://pstt.org.uk/application/files/4616/2851/6691/Water_Scientist - Zoe_Ayres.pdf](https://pstt.org.uk/application/files/4616/2851/6691/Water_Scientist_-_Zoe_Ayres.pdf)

Session 2: Recap: uses of materials - why are some tables made of wood, wood and metal or plastic?

Children learn that materials can be solids, liquids, or gases (the three states of matter). The shape and volume of a solid does not change unless a bit is broken off. The shape of a liquid can change, depending on the container it is in, but its volume does not change. Most gases are invisible and the gas in a container completely fills the container so has the same shape and volume of the container it is in.

FOCUS : to compare and group solids liquids and gases

Watch <https://www.youtube.com/watch?v=wclY8F-UoTE>

Give children a variety of solids, liquids and gases to group. Include things like rice, sugar and sand which can appear to act like a liquid as can be poured. Use a hand-held microscope to look at the structure of sugar etc. to prove it is a solid.

Discuss arrangement of particles in a solid, liquid, gas



Children write about groupings, giving reasons why - using the properties of solids, liquids, gases to justify

Vocabulary: **property, matter, states, particles, mass, shape, volume**

Session 3: Recap: the 3 states of matter and their properties

Children learn liquids, change into gases when they are heated – this is evaporation and solids, change into liquids when they are heated – this is called melting e.g. heating sand at elevated temperatures produces liquid glass

FOCUS: to research the effects of heating solids and liquids

<https://www.youtube.com/watch?v=pVTZySPJh5w> melting points

https://www.youtube.com/watch?v=gZBt4_Ds3II boiling points up to 2.03

Melt chocolate, butter and wax (use oil burner and a tealight)

Children research melting and boiling points of different substances

e.g. gold, leather, silver, rubber are some examples for melting

Vocabulary: **heat, melting, melting point, evaporating, evaporation, boiling points, process**

Session 4: Recap: what are the processes called when we heat solids and liquids?

Children learn liquids, change into solids when they are cooled – this is freezing and gases, change into liquids when they are cooled – this is called condensation.

FOCUS: to research the effects of cooling gases and liquids

Children research the freezing points of different liquids

Vocabulary: **condensing, condensation, freezing, freezing point**

Session 5: Recap: what are the processes called when we cool gases and liquids?

Children learn the rate of evaporation depends on the temperature; evaporation is slow when it is cold and fast when it is hot

FOCUS: to observe how temperature affects the rate of evaporation

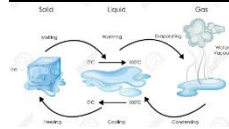
What is evaporation? Watch <https://www.youtube.com/watch?v=Z4qgBT48NaU>

Experiment evaporation: using hand prints on paper towels, where in the playground would the hand print disappear more quickly? Why? Place towels in different locations.

Set up class experiment: Set up 2 glass jars with the same amount of liquid in, add food colouring then mark the level of the water. Put a lid on one jar and place both on a windowsill in the sun. over next few days mark any differences in water levels in preparation for next week's lesson

Vocabulary: temperature, rate of evaporation

Session 6: Recap the processes to change states of matter



Model the changes of state for water

Children learn the water on Earth is constantly recycling using evaporation and condensation. The heat from the sun makes the water from the sea, lakes and rivers evaporate into water vapour. As the water vapour rises, it cools and condenses to form clouds, then falls as rain

FOCUS: to research the processes within the water cycle

the water cycle <https://www.youtube.com/watch?v=y5qFI3pMvoI>

N.b .video has great real-life images but spells vapour incorrectly

Vocabulary: water cycle, evaporation, water vapour, condensation, precipitation

Link to career scientist:

https://pstt.org.uk/application/files/1116/2851/6355/Materials_scientist_-_Pearl_Agyakwa.pdf

https://pstt.org.uk/application/files/4616/2851/6691/Water_Scientist_-_Zoe_Ayres.pdf

Scientists who have helped develop understanding in this field: the ancient Greeks