

NATIONAL CURRICULUM LINKS**THE PARTICULATE NATURE OF MATTER**

- the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure
- changes of state in terms of the particle model.

TASK:

Draw a poster that explains why an ice cube melts (and evaporates) when left out of the freezer.

SUGGESTED APPROACH:

Please read the introduction to this book to get the most out of this task. It is suitable for a homework task or class activity.

In class, use a starter activity as the stimulus to the task; introduce the task and ACE Learning Ladder, and allow 30–40 minutes to complete it. Starter suggestions: matching key words – melting, evaporating, condensing, solidification, freezing – to pictures of these events, e.g. melting ice cube. Match words and phrases describing the behaviour of solids, liquids and gases to the correct state. Allow learners to use secondary resources such as class notes, textbooks and library books to develop their poster. In the plenary, peer or self assess using the ACE Learning Ladder.

RESOURCES:

A4 plain paper, pencils, pens, rulers.

PRIOR LEARNING EXPERIENCE:

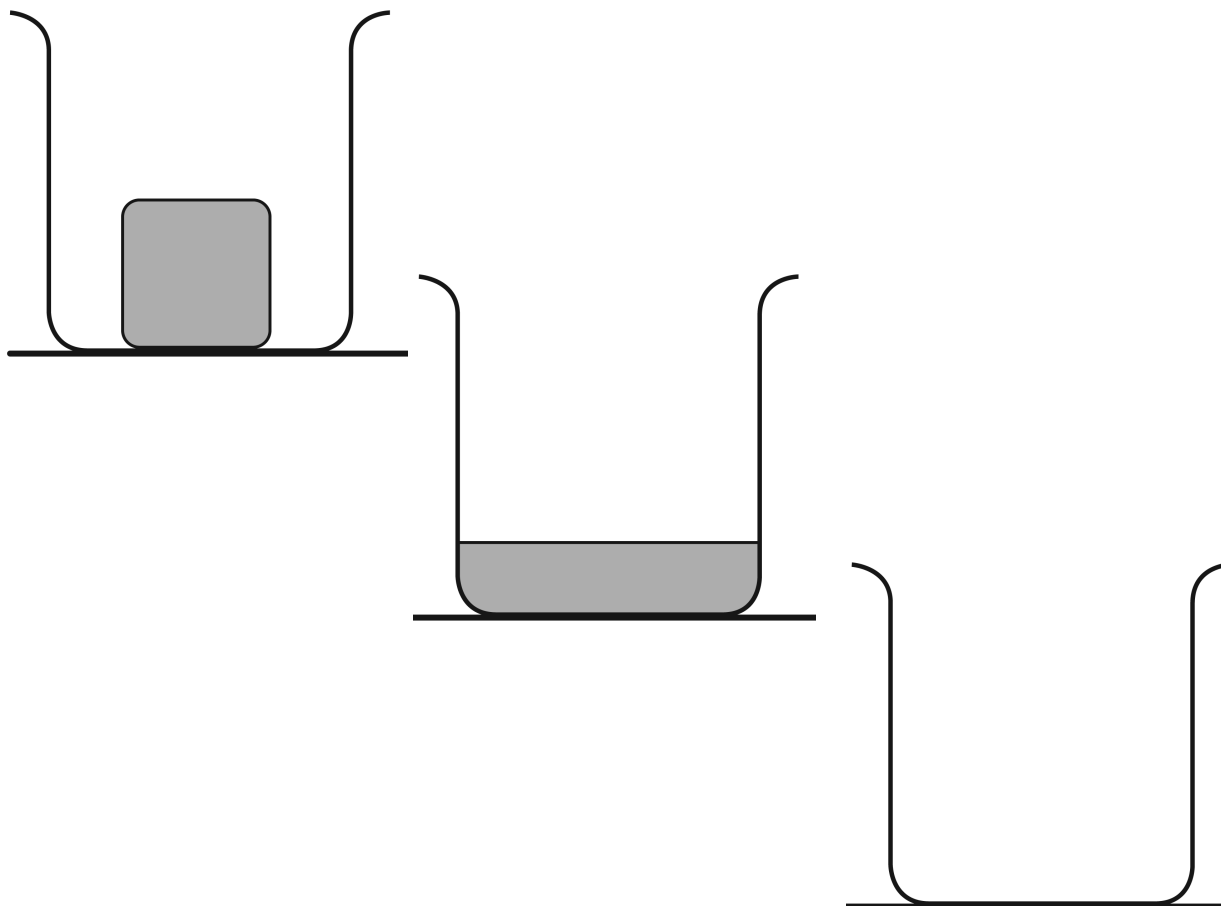
Before students attempt this task, they must be familiar with:

- properties of solids, liquids and gases
- changes of state between the three states of matter
- particle theory, arrangement and behaviour of particles in the three states of matter.

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TASK SHEET: ICE CUBE POSTER

Some students were watching an ice cube in a beaker as it slowly melted. They were wondering why it melts. When they inspected the beaker the next lesson, the water was gone.



Draw a poster that explains why an ice cube melts when left out of the freezer and what happens to the water when it is left in a beaker for a while. Use a particle model to help explain your ideas.

KEY WORDS

boiling, compressible, conservation of mass, density, energy, evaporating, fixed, forces between particles, freezing, gas, liquid, melting, moving randomly, particles, solid, solidification, states of matter, temperature, vibrating

ACE LEARNING LADDER: ICE CUBE POSTER

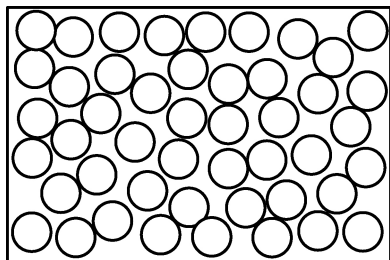
ACE LEARNING LADDER

Assessment check	What you could include:
Advanced	<p>You will have drawn a detailed poster explaining why an ice cube melts, drawing on detailed scientific knowledge and understanding. You might:</p> <ul style="list-style-type: none"> • Draw a detailed particle diagram for the water particles in each state, showing that water particles are molecules. • Explain why energy is required for the ice to melt or evaporate and where this comes from. • Use the idea of melting points and boiling points to describe the changes. • Compare the melting and evaporating of an ice cube to observations that would be expected from other substances undergoing the same processes. • Use a range of appropriate scientific words, symbols and units accurately.
Confident	<p>You will have drawn a poster explaining why an ice cube melts, drawing on scientific knowledge and understanding. You might:</p> <ul style="list-style-type: none"> • Draw a particle diagram for the water particles in each state. • Explain the differences in movement and energy of the particles at each state. • Explain what has to happen to the particles to be able to melt or evaporate. • Describe whether the melting and evaporating of an ice cube is a physical or chemical change. • Use a range of appropriate scientific words, symbols and units.
Establishing	<p>You will have drawn a simple poster explaining why an ice cube melts, drawing on some scientific knowledge and understanding. You might:</p> <ul style="list-style-type: none"> • Draw a simple particle diagram for the water particles in each state, with help. • State how the particles are arranged in each state, what their movement is like and how much energy they have. • Describe what happens when the ice cube melts and when it evaporates, in terms of what would be observed. • State if melting and evaporating are a physical or chemical change. • Use some appropriate scientific words, symbols and units.

SUPPORT SHEET 1: ESTABLISHING TO CONFIDENT

ICE CUBE POSTER

Correctly identify the state of matter shown in the diagrams below. Complete the sentences about each before starting the task, by choosing which sentence finishers correctly describe the state shown in each diagram.



This represents a

The particles have

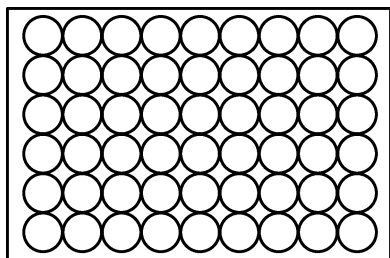
- high levels of energy
- medium levels of energy
- low levels of energy.

They

- can move about past one another
- cannot move about
- can move about completely freely.

The particles are arranged

- in a regular pattern
- randomly and apart from one another
- randomly but in contact with one another.



This represents a

The particles have

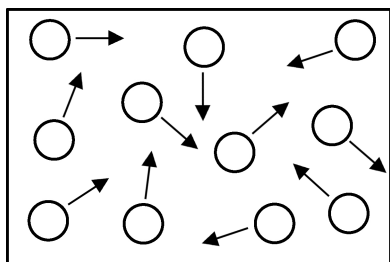
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SUPPORT SHEET 2: CONFIDENT TO ADVANCED ICE CUBE POSTER

Use the spaces below to plan particle diagrams for each state of matter.

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- What explanations will you need to include to describe what each state is like?

- How could you describe what happens to particles within substances moving between each of the states shown?

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SUPPORT SHEET 3: ADVANCED EXTEND AND STRETCH ICE CUBE POSTER

Water has the chemical formula H_2O . It exists as molecules.

- What does this formula tell us about what water is made from?
- Use the spaces below to plan particle diagrams for each state of matter, which clearly show water is a molecule.

