1.1

States of matter

Name _____ Class _____ Mark _____ / 14

What you are practising

I can use the particle model to describe the three states of matter and explain changes of state.

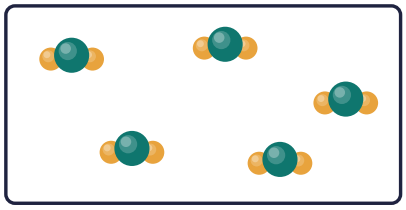
Worked example: why does a gas fill its container?
The particles have a lot of kinetic energy. They move quickly in all directions and are far apart, so the forces of attraction hardly hold them. They spread out to fill any space.

The particle model: a substance is a collection of tiny, identical particles, with forces of attraction between them. They have kinetic energy: always moving. **Heating** makes them move faster; **cooling** makes them move more slowly. The particles themselves do not change.

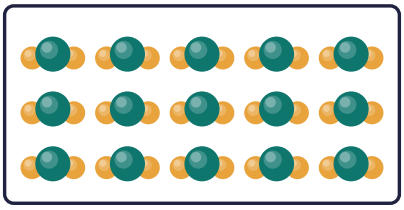
Solid, liquid or gas?

Water, H_2O. One = one water particle. Use the pictures and the words below. **[6]**

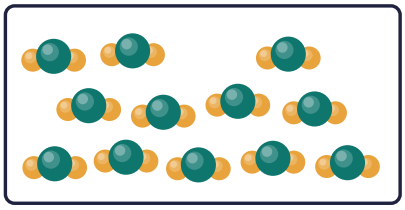
Picture A



Picture B



Picture C



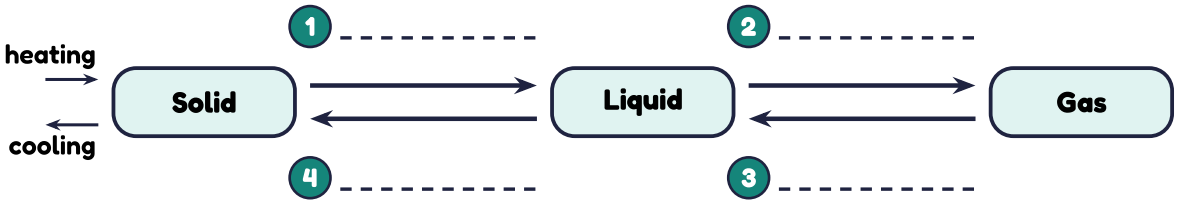
Arrangement: regular pattern / random **Spacing:** touching / far apart
Movement: vibrate in fixed positions / slide past each other / move quickly in all directions

State	Picture	Arrangement	Spacing	Movement
1 Solid				
2 Liquid				
3 Gas				

Page done? Tick it off

Changes of state

Name the four physical processes, 1 to 4, that happen on heating and cooling. **[4]**



Explain

A Use the particle model to explain why a sample of substance expands when it is heated. **[2]**

Who is right?

B **Maya:** "When ice melts, the water particles melt too." **Sami:** "The particles stay the same. They move more and are no longer held in fixed positions." Who is right, and why? **[2]**

Year 9 · Unit 1 · 1.1 Modelling matter · Worksheet B

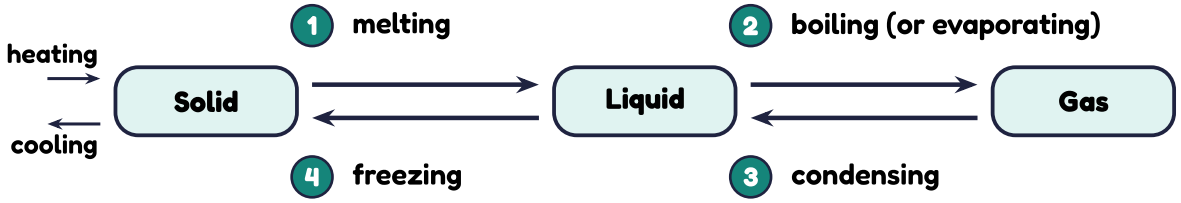
Answers

Solid, liquid or gas? [6]

State	Picture	Arrangement	Spacing	Movement
1 Solid	B	regular pattern	touching	vibrate in fixed positions
2 Liquid	C	random	touching	slide past each other
3 Gas	A	random	far apart	move quickly in all directions

One mark for each correct picture letter (3). One mark for each row with arrangement, spacing and movement all correct (3). The particles are the same in every picture: only how they are arranged, spaced and moving changes.

Changes of state [4]



One mark each. These are physical changes: the water particles do not change.

Explain [2]

A Heating gives the particles more kinetic energy, so they move faster **(1)**. They move further apart and take up more space; the particles themselves do not get bigger **(1)**.

Who is right? [2]

B Sami **(1)**. Melting is a physical change: the particles stay the same and are still water particles. They gain energy, move more and can slide past each other. The sample melts; the particles themselves do not **(1)**.

How to revise this

Look at the table and the four processes. Cover them. Write them out from memory. Check against this page. Repeat only the ones you missed.