

7Ga

- 1 What are the three states of matter?
 - A air, water, fire
 - B solids, liquids, gases
 - C ice, water, steam
 - D USA, UK, UAE
- 2 Which of these materials will have the most similar properties?
 - A air, oxygen, ice
 - B water, iron, air
 - C iron, stone, wood
 - D oil, water, wood
- 3 All liquids:
 - A have a fixed volume and take the shape of their container.
 - B have a fixed volume and a fixed shape.
 - C will spread out until their volume has doubled.
 - D can change their volume but not their shape.
- 4 The mass of a certain volume of material is the material's:
 - A concentration.
 - B weight.
 - C density.
 - D pressure.

7Gb

- 1 The particles in solids:
 - A do not move at all.
 - B vibrate in one place.
 - C can move past each other.
 - D can move freely in all directions.
- 2 Which is the best description of a solid?
 - A The particles are very close together.
 - B The particles are as far apart as possible.
 - C The particles are quite close together.
 - D There are no particles.

- 3 In which state are the particles close together but can still move past each other?
 - A gases only
 - B liquids only
 - C solids only
 - D all three states
- 4 A gas can be squashed because:
 - A the particles are held tightly in place.
 - B there are no particles.
 - C the particles are far apart.
 - D the particles are squashy.

7Gc

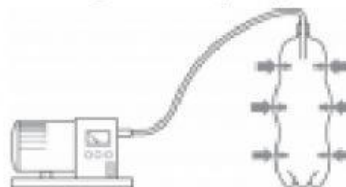
- 1 Brownian motion is observed when:
 - A a gas spreads out in a room.
 - B two liquids are mixed together.
 - C a tea bag is placed in hot water.
 - D pollen grains are floating in water.
- 2 To observe Brownian motion you need to:
 - A use a microscope.
 - B measure distance accurately.
 - C observe carefully for a few days.
 - D heat different solids, liquids and gases.
- 3 Brownian motion is caused by:
 - A vibrations in solid particles.
 - B spaces between gas particles.
 - C particles getting bigger when heated.
 - D moving particles hitting specks of matter.
- 4 The unit symbol for a nanometre is:
 - A Nm
 - B mn
 - C nam
 - D nm

7Gd

- 1 If you put a drop of coloured liquid into a glass of cold water and leave it to stand without stirring, the colour spreads through the water. What is this called?
A divination
B dissolving
C dissuasion
D diffusion
- 2 Which of these changes involve the mixing of particles of different substances?
A water boiling in a kettle
B chocolate melting in your hand
C particles of dust moving about in the air
D perfume being smelled across a room
- 3 Gases spread out and mix together more quickly than liquids because gas particles:
A are lighter.
B are heavier.
C are further apart.
D are closer together.
- 4 If you put some sugar into cold water and leave it *without stirring*, the sugar will eventually dissolve and mix with the water. This happens because:
A particles are extremely small.
B particles in a liquid are always moving.
C water particles are bigger than sugar particles.
D sugar particles are bigger than water particles.

7Ge

- 1 Pressure in a container full of gas is caused by:
A particles sticking to the walls.
B particles bumping into the walls.
C particles sticking to each other.
D particles falling to the bottom of the container.
- 2 You can increase the pressure in a container full of gas by:
A making the container smaller.
B making the container bigger.
C making the container heavier.
D taking some of the gas out.
- 3 If you put more gas into a container the pressure increases because:
A the particles all cool down.
B there is more space for the particles to move around.
C more particles fall to the bottom of the container.
D there are more particles, so there are more collisions with its walls.
- 4 The air is being sucked out of this bottle. Why is it collapsing?



- A There is more pressure inside than outside.
- B There is more pressure outside than inside.
- C There are more particles inside it.
- D Air particles are sticking to the walls and pulling them in.

Particle theory states that all materials are made of particles.

Tick **one** box in each column of the table to show the **best** description for how the particles move in solids, liquids and gases.

Movement of particles	In solids	In liquids	In gases
do not move at all			
move very quickly			
vibrate at fixed points			
vibrate and can move past one another			

Petrol is a liquid. When someone fills the petrol tank of a car, petrol flows through a pipe into the tank.



(a) If a car uses a solid fuel, such as coal, the petrol tank cannot be filled up using a pipe. Give a reason for this. Tick **one** box.

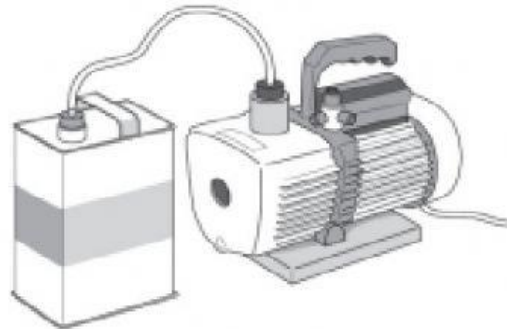
- ☐ **A** Coal burns too slowly.
- ☐ **B** Coal would scratch the car.
- ☐ **C** Solids cannot flow through a pipe.
- ☐ **D** Solid particles are too close together.

(b) Some car engines use a gas as fuel.

State **one** problem someone would have if they wanted to fill a fuel tank with a gas.

A vacuum pump is attached to a metal can as shown in the diagram.

After the pump has been switched on for a few seconds, the can is suddenly squashed and crushed in.

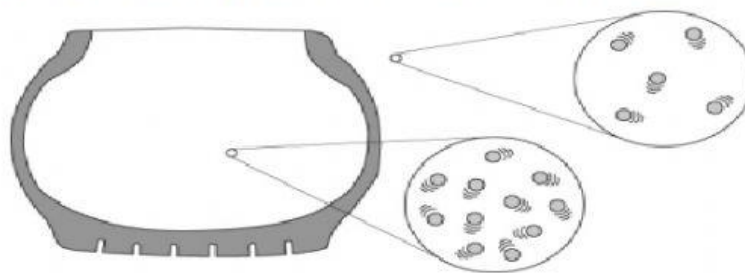


a) Explain why the can suddenly squashed and crushed in.

b) What would happen if the same can is sealed, taken up in a space craft and released into space where there is no air? Tick **one** box.

- ☐ **A** The can would be crushed quickly.
- ☐ **B** The can would be crushed slowly.
- ☐ **C** The can would explode.
- ☐ **D** The can would not change.

The diagram below shows the air particles inside and outside a car tyre.



Complete these sentences about air pressure.

The particles of all gases _____ freely in all directions.

Air pressure is caused by the moving gas particles _____ with surfaces.

Inside the tyre there are _____ air particles, in the same volume, than outside the tyre.

Air pressure inside a tyre increases if you put _____ gas particles into the tyre.

The air pressure is higher because more gas _____ are hitting the surface.

A purple crystal of potassium permanganate is placed in a beaker of water. Use particle theory to explain the following observations.

(a) Over a few hours, the crystal got smaller and the water became pale purple throughout.

(b) It was not possible to see through the purple crystal at the start, but you could see through the pale purple liquid at the end.

Two groups of students are classifying substances using the state and properties of the substances. The classifications of the two groups are shown below.

Group 1		
Solids	Liquids	Gases
brick	water	air
sand	petrol	methane
wood	vegetable oil	
glass		

Group 2		
Solids	Liquids	Gases
brick	vegetable oil	air
wood	water	methane
glass	petrol	
	sand	

(a) Explain what you know about the following properties of gases.

Use particle theory in your answer.

(i) volume: _____

(ii) compressibility _____

b One of the groups has made a mistake in their classification. Identify the mistake and explain why that group might have made the mistake. Explain about properties of substances in your answer.

In 1827, Robert Brown saw random movements of pollen grains in water under a microscope. He thought the movements were because the pollen grains were alive.

To check, he repeated the experiment with 100-year-old 'dead' pollen grains. He saw the same random movements.

The same random movements happened when small specks of soot were mixed with water and with smoke. The movements are now called Brownian motion.

- (a) Describe Robert Brown's first hypothesis about the movements of the pollen grains and describe how he tested his hypothesis.

- (b) Explain how the results of his second experiment showed that his first idea was wrong.

- (c) Explain Brownian motion using the particle theory of matter.
