

1 A cup contains hot liquid.

Some of the liquid evaporates.

What happens to the mass and what happens to the weight of the liquid in the cup?

	mass	weight
A	decreases	decreases
B	decreases	stays the same
C	stays the same	decreases
D	stays the same	stays the same

2 Which statement about evaporation is correct?

A Evaporation causes the temperature of the remaining liquid to decrease.

B Evaporation does not occur from a cold liquid near its freezing point.

C Evaporation does not occur from a dense liquid, such as mercury.

D Evaporation occurs from all parts of a liquid.

3 A gas is stored in a sealed container of constant volume. The temperature of the gas increases. This causes the pressure of the gas to increase.

What happens to the gas molecules during this pressure increase?

A The average kinetic energy of the molecules increases.

B The average separation of the molecules decreases.

C The average separation of the molecules increases.

D The volume of each molecule increases.

4 A liquid is evaporating. The liquid is not boiling.

Which statement about the liquid is correct?

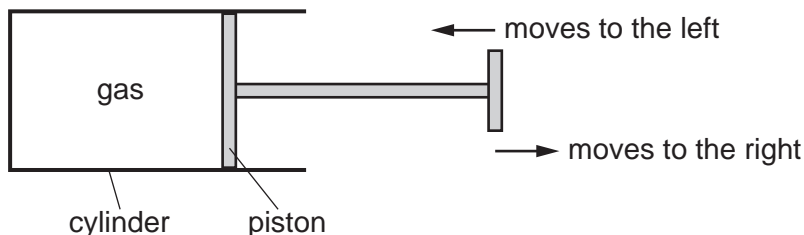
A Any molecule can escape, and from any part of the liquid.

B Any molecule can escape, but only from the liquid surface.

C Only molecules with enough energy can escape, and only from the liquid surface.

D Only molecules with enough energy can escape, but from any part of the liquid.

5 The diagram shows a quantity of gas enclosed in a cylinder by a piston.



The piston is moved to the left or to the right. The temperature of the gas is kept constant.

Which row describes the effect of moving the piston slowly in the direction shown in the table?

	movement of piston	speed of gas molecules	pressure of gas
A	to the left	increases	decreases
B	to the left	no change	increases
C	to the right	increases	decreases
D	to the right	no change	increases

6 What causes the random, zig-zag movement (Brownian motion) of smoke particles suspended in air?

- A** air molecules colliding with smoke particles
- B** convection currents as the hot smoke rises
- C** smoke particles colliding with each other
- D** smoke particles reacting with oxygen molecules in the air

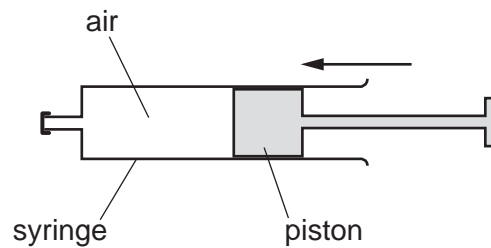
7 A sealed bottle of constant volume contains air.

The air in the bottle is heated by the Sun.

What is the effect on the average speed of the air molecules in the bottle, and the average distance between them?

	average speed of air molecules	average distance between air molecules
A	decreases	decreases
B	decreases	stays the same
C	increases	increases
D	increases	stays the same

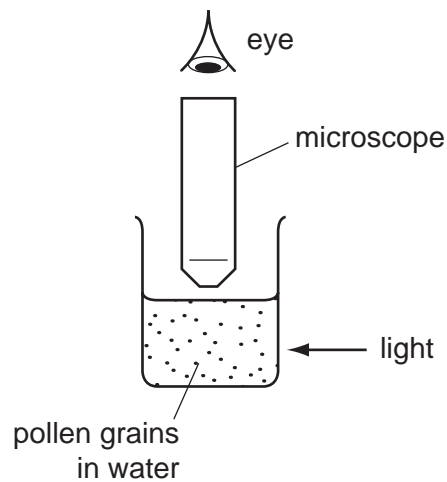
- 8 Air in a sealed syringe is slowly compressed by moving the piston. The temperature of the air stays the same.



Which statement about the air is correct?

- A The pressure of the air decreases because its molecules now travel more slowly.
 - B The pressure of the air decreases because the area of the syringe walls is now smaller.
 - C The pressure of the air increases because its molecules now hit the syringe walls more frequently.
 - D The pressure of the air increases because its molecules now travel more quickly.
- 9 Very small pollen grains are suspended in a beaker of water. A bright light shines from the side.

Small, bright dots of light are seen through a microscope. The dots move in rapidly changing, random directions.



What are the bright dots?

- A pollen grains being hit by other pollen grains
- B pollen grains being hit by water molecules
- C water molecules being hit by other water molecules
- D water molecules being hit by pollen grains

10 A sealed gas cylinder is left outside on a hot, sunny day.

What happens to the average speed of the gas molecules and to the pressure of the gas in the cylinder as the temperature of the gas rises?

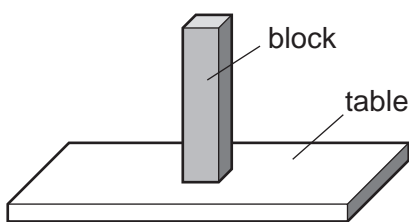
	average speed of gas molecules	pressure of gas in cylinder
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

11 A pool of water evaporates. As molecules escape, the temperature of the water left in the pool changes.

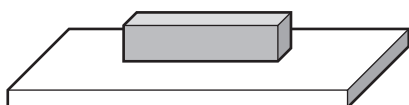
From where do the molecules escape and what is the effect on the temperature of the water in the pool?

	molecules escape from	temperature of water in the pool
A	all parts of the liquid	decreases
B	all parts of the liquid	increases
C	only the liquid surface	decreases
D	only the liquid surface	increases

12 A block with flat, rectangular sides rests on a table.



The block is now turned so that it rests with its largest side on the table.



How has this change affected the force and the pressure exerted by the block on the table?

	force	pressure
A	decreased	decreased
B	decreased	unchanged
C	unchanged	decreased
D	unchanged	unchanged

13 Two states of matter are described as follows.

In state 1, the molecules are very far apart. They move about very quickly at random in straight lines until they hit something.

In state 2, the molecules are quite closely packed together. They move about at random. They do not have fixed positions.

What is state 1 and what is state 2?

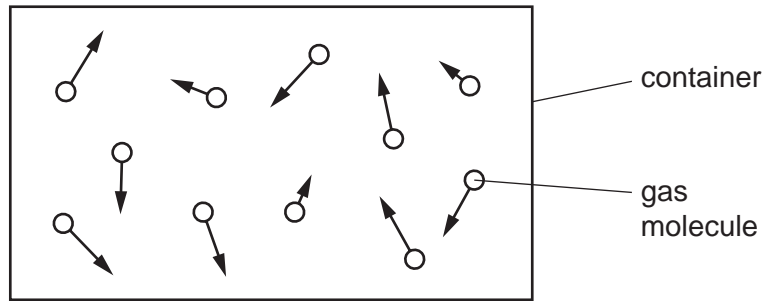
	state 1	state 2
A	gas	liquid
B	gas	solid
C	liquid	gas
D	solid	liquid

14 Puddles of rain water remain after a storm. The water in the puddles gradually evaporates.

How does the evaporation affect the temperature of the water remaining in the puddle, and how does it affect the average speed of the remaining water molecules in the puddle?

	temperature of water in puddle	average speed of water molecules in puddle
A	decreases	decreases
B	decreases	decreases
C	increases	increases
D	increases	increases

15 The diagram represents moving gas molecules in a sealed container of fixed volume.



The temperature of the gas is now increased.

What happens to the pressure of the gas, and what happens to the speed of the gas molecules?

	pressure of gas	speed of molecules
A	increases	increases
B	increases	unchanged
C	unchanged	unchanged
D	unchanged	increases

16 Small smoke particles suspended in air are viewed through a microscope.

The smoke particles move randomly.

What does this show?

- A** The air consists of fast-moving molecules.
- B** The pressure of the air is increasing.
- C** There are convection currents in the air.
- D** The temperature of the air is increasing.

17 Molecules escape from a liquid during evaporation. The temperature of the remaining liquid changes.

Which molecules escape and how does the temperature change?

	molecules escaping	temperature of remaining liquid
A	least energetic	decreases
B	least energetic	increases
C	most energetic	decreases
D	most energetic	increases

18 The gas in a container is heated but is kept at constant volume.

Why does the gas pressure increase?

- A** The molecules expand.
- B** The molecules increase in mass.
- C** The molecules move further apart.
- D** The molecules move more rapidly.

19 Which row is correct for the evaporation of a liquid?

	the particles escaping from the liquid are on average	the average kinetic energy of particles remaining in the liquid
A	the least energetic	decreases
B	the least energetic	increases
C	the most energetic	decreases
D	the most energetic	increases

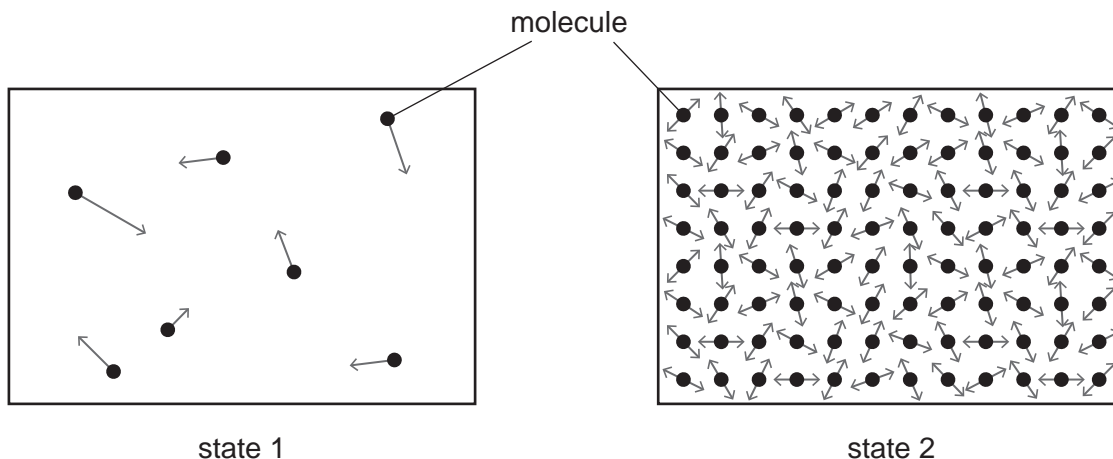
20 A cylinder of constant volume contains a fixed mass of gas. The gas is cooled.

What happens to the pressure of the gas and what happens to the kinetic energy of the gas molecules?

	pressure of gas	kinetic energy of molecules
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

- 21 A swimmer feels cold after leaving warm water on a warm, windy day.
Why does she feel cold even though the air is warm?
- A** The less energetic water molecules on her skin escape quickly.
 - B** The more energetic water molecules on her skin do not escape quickly.
 - C** The water on her skin does not evaporate quickly enough to keep her warm.
 - D** The water on her skin evaporates quickly and cools her skin.

- 22 The diagrams represent the molecules in two different states of matter. The arrows show the motion of the molecules.



What is state 1, and what is state 2?

	state 1	state 2
A	gas	liquid
B	gas	solid
C	liquid	gas
D	liquid	solid

- 23 The water in a lake is at 5°C . A diver measures the pressure of the water at two different depths in the lake. He repeats the measurements on a different day when the water is at 15°C .

The density of the water decreases when its temperature increases.

Which combination of depth and temperature produces the greatest water pressure?

	depth/m	temperature/ $^{\circ}\text{C}$
A	10	5
B	10	15
C	20	5
D	20	15

- 24 A car tyre has a constant volume.

Why does the pressure of the air in the tyre increase when its temperature increases?

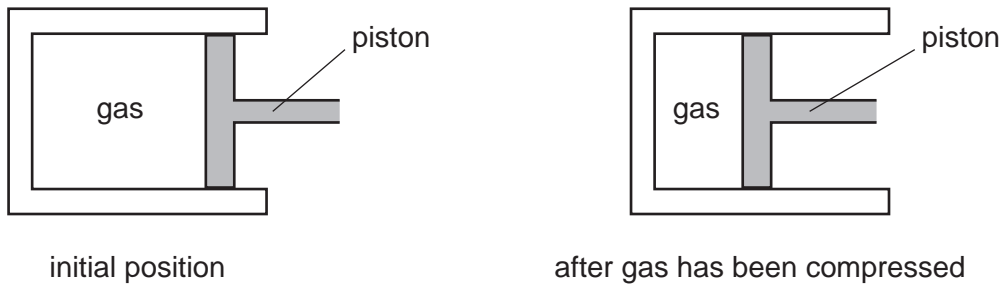
- A** The air molecules hit each other less often.
- B** The air molecules hit the inside of the tyre less often.
- C** The average speed of the air molecules in the tyre is greater.
- D** There are more air molecules in the tyre.

25 Extremely small pollen grains in water are viewed through a microscope. The grains are seen to move continually and randomly.

What is the reason for this random movement?

- A The grains are moved by randomly moving water molecules.
- B The grains are moved by random convection currents in the water.
- C The grains are moved by random rays of light reflecting off them.
- D The grains are moved by the random motion of their own atoms.

26 A gas is compressed in a sealed cylinder by moving a piston.



Which row in the table states what happens to the density of the gas and to the pressure of the gas when it is compressed?

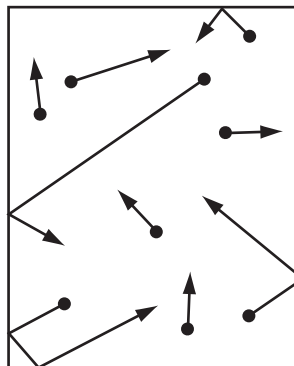
	density	pressure
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

27 During evaporation, molecules escape rapidly from the surface of a liquid.

What happens to the average energy of the molecules of the remaining liquid and what happens to the temperature of the remaining liquid?

	average energy of remaining molecules	temperature of remaining liquid
A	decreases	decreases
B	decreases	increases
C	stays the same	decreases
D	stays the same	increases

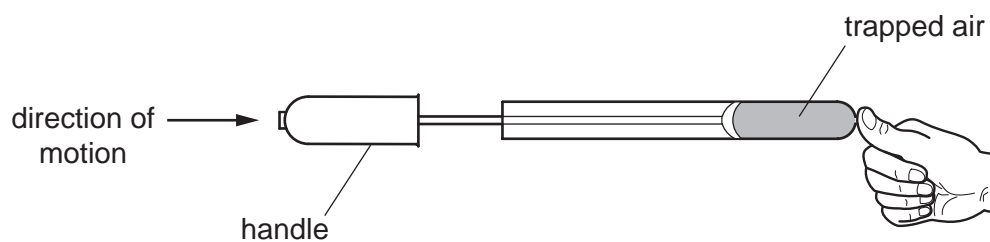
28 The diagram represents molecules of gas moving in a container.



What happens to the gas molecules when the temperature of the gas increases?

- A** They move more quickly.
- B** They move more slowly.
- C** They vibrate more quickly.
- D** They vibrate more slowly.

29 A student places his thumb firmly on the outlet of a bicycle pump, to stop the air coming out.

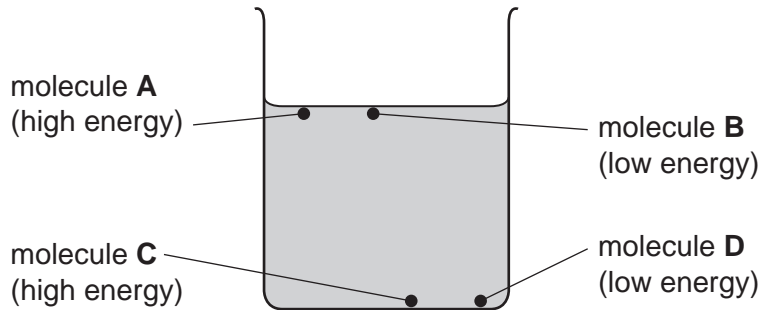


What happens to the pressure and what happens to the volume of the trapped air as the pump handle is pushed in?

	pressure	volume
A	decreases	decreases
B	decreases	remains the same
C	increases	decreases
D	increases	remains the same

30 The diagram shows a beaker of water. Four molecules are labelled. The relative amount of energy of each molecule is shown.

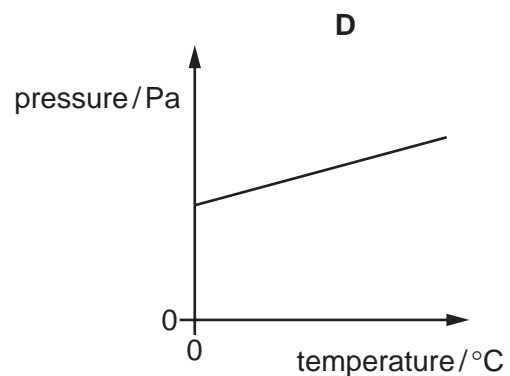
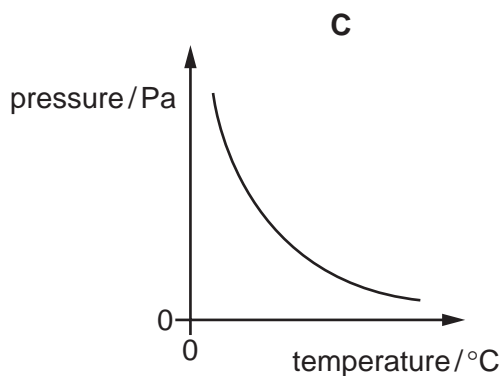
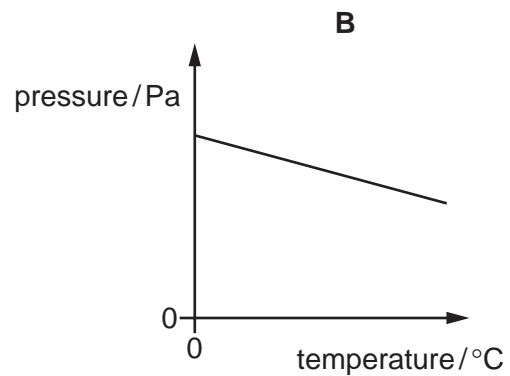
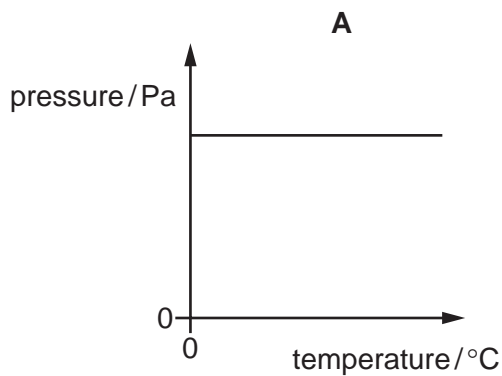
Which molecule is most likely to escape from the liquid?



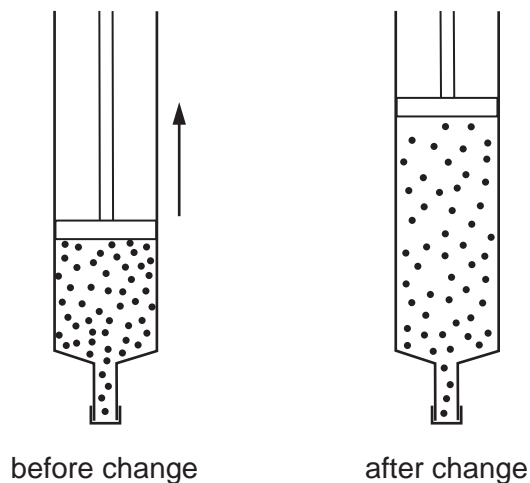
31 Some gas is trapped in a container of fixed volume.

The temperature of the gas increases.

Which graph shows how the pressure of the gas changes with temperature?

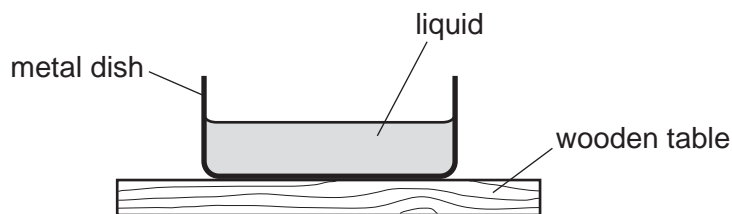


- 32 The volume of a gas in a sealed syringe is increased. The temperature of the gas does not change.



After this change is made, what has happened to the gas molecules in the syringe?

- A They move more quickly.
 - B They move more slowly.
 - C They hit the syringe walls less often.
 - D They hit the syringe walls more often.
- 33 Some liquid is poured into a metal dish on a wooden table. The dish, the liquid, the table and the air around the dish are all at the same temperature.

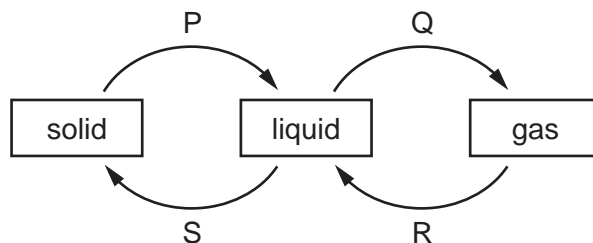


The temperature of the liquid now starts to decrease.

What could cause this temperature decrease?

- A convection currents in the liquid
- B conduction of heat through the metal dish
- C evaporation of the liquid
- D heat radiation from the liquid

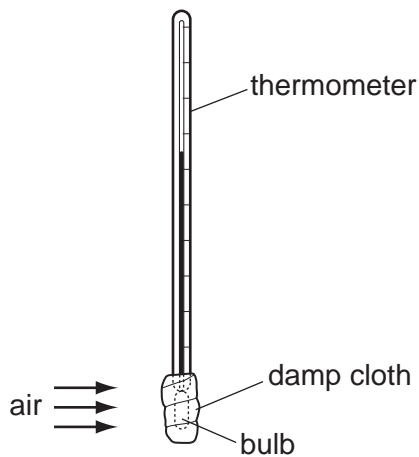
34 The diagram shows four labelled changes of state between solid, liquid and gas.



Which changes need an energy input?

- A** P and Q **B** Q and R **C** R and S **D** S and P

35 A thermometer bulb is covered by a piece of damp absorbent cloth.

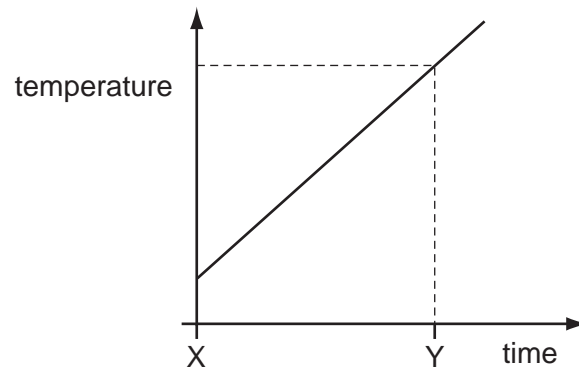


Air at room temperature is blown across the damp cloth.

What happens to the thermometer reading?

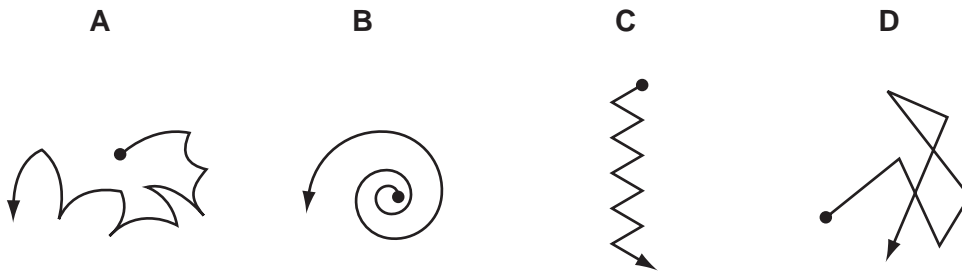
- A** It remains constant.
B It rises.
C It rises then falls.
D It falls.

- 36 A gas storage tank has a fixed volume. The graph shows how the temperature of the gas in the tank varies with time.

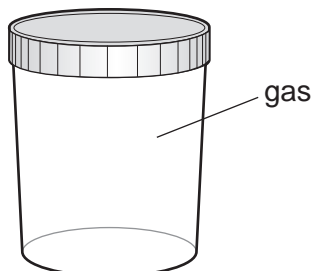


At time Y, the gas molecules are

- A closer together than at time X.
 - B hitting the sides of the tank harder than at time X.
 - C larger in size than at time X.
 - D moving more slowly than at time X.
- 37 Which diagram best shows the path of a gas molecule?



38 The diagram shows a sealed jar containing a gas.



Which statement about the gas in the jar is correct?

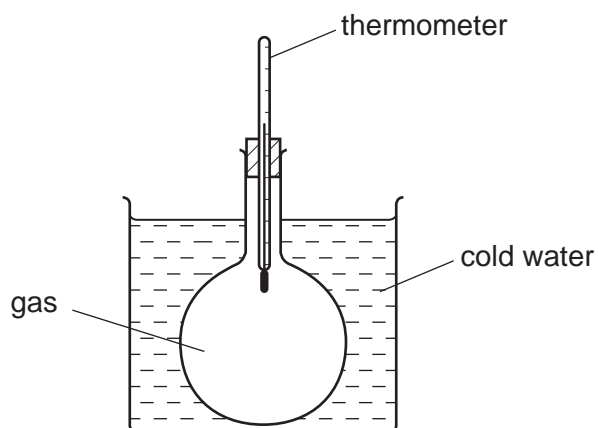
- A** The gas molecules collide with the inside of the jar more often as the temperature increases.
- B** The gas molecules move more slowly as the temperature increases.
- C** The pressure of the gas decreases as the temperature increases.
- D** The pressure of the gas is higher at the top of the jar than at the bottom of the jar.

39 A block of ice cream is prevented from melting by wrapping it in newspaper soaked in water. The water evaporates from the newspaper.

Which molecules escape from the water and what happens to the average speed of the water molecules that remain in the newspaper?

	escaping molecules	average speed of the remaining water molecules
A	the less energetic ones	decreases
B	the less energetic ones	increases
C	the more energetic ones	decreases
D	the more energetic ones	increases

40 A closed flask of gas is placed in a cold-water bath.



As the flask cools, the temperature of the gas decreases.

What happens to the molecules of the gas?

- A** They contract.
- B** They expand.
- C** They move more quickly.
- D** They move more slowly.

41 Brownian motion is observed when looking at smoke particles in air using a microscope.

What causes the smoke particles to move at random?

- A** Smoke particles are hit by air molecules.
- B** Smoke particles are moved by convection currents in the air.
- C** Smoke particles have different weights and fall at different speeds.
- D** Smoke particles hit the walls of the container.

42 The molecules of a substance become more closely packed and move more quickly.

What is happening to the substance?

- A** A gas is being heated and compressed.
- B** A gas is being heated and is expanding.
- C** A liquid is boiling.
- D** A liquid is evaporating at room temperature.

43 A metal block is heated until it is completely melted. It is then allowed to solidify.

What happens to the mass of the metal during the changes of state?

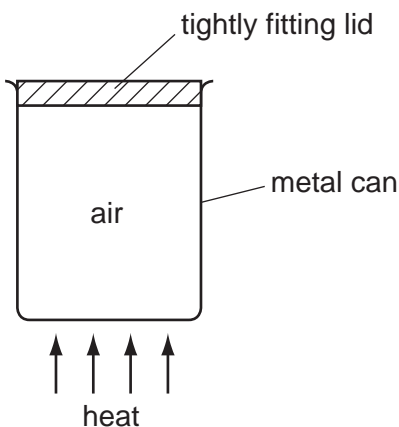
	mass during melting	mass during solidification
A	decreases	increases
B	increases	decreases
C	increases	stays constant
D	stays constant	stays constant

- 44 On a warm day, a swimmer climbs out of a swimming pool into the open air and water evaporates from his skin.

As the water evaporates, which molecules escape into the air first and what happens to the average speed of the remaining water molecules?

	first molecules to escape	average speed of the remaining molecules
A	least energetic	decreases
B	least energetic	increases
C	most energetic	decreases
D	most energetic	increases

- 45 Some air is trapped inside a metal can with a tightly fitting lid.



When the can is heated strongly behind a safety screen, the lid is blown off by the increased pressure inside the can.

What causes the increase in pressure of the air inside the can?

- A** The air molecules expand and take up more room.
- B** The air molecules move more quickly.
- C** The number of molecules inside the can increases.
- D** The volume occupied by the molecules decreases.

46 A sealed gas cylinder is left outside on a hot, sunny day.

What happens to the average speed of the molecules and to the pressure of the gas in the cylinder as the temperature rises?

	average speed of the gas molecules	gas pressure
A	falls	falls
B	falls	rises
C	rises	falls
D	rises	rises

47 When a liquid evaporates, some molecules escape from it and its temperature changes.

From where do the molecules escape and what is the effect on the temperature of the liquid?

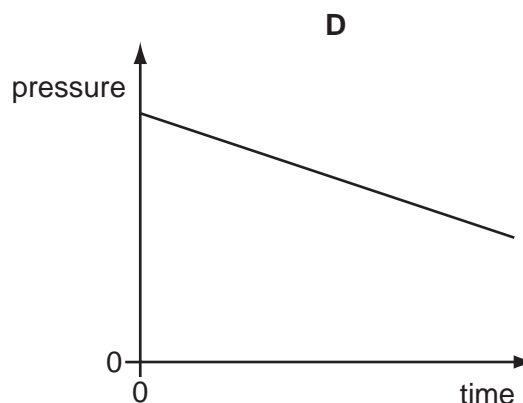
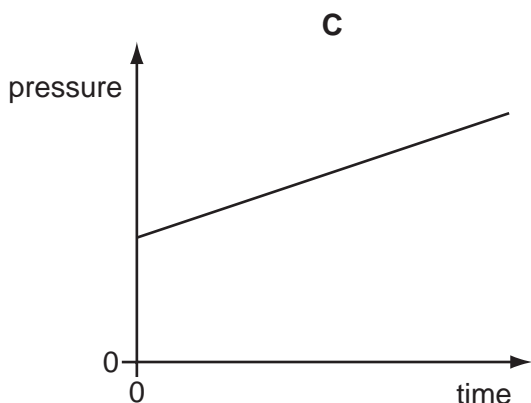
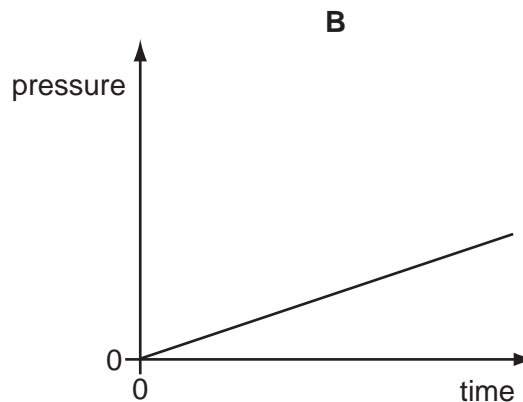
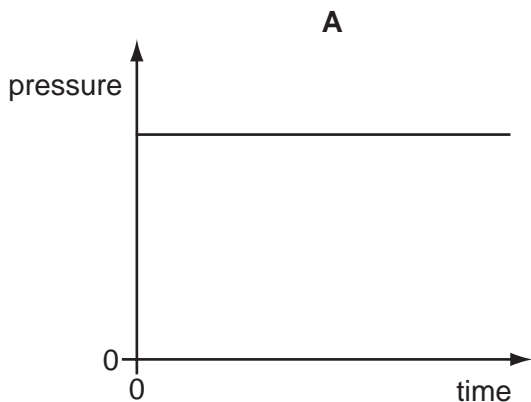
	molecules escape from	temperature of liquid
A	all parts of the liquid	decreases
B	all parts of the liquid	increases
C	only the liquid surface	decreases
D	only the liquid surface	increases

- 48 Evaporation occurs when molecules escape from a liquid surface into the air above it. During this process the temperature of the liquid falls.

Why does the temperature of the liquid fall?

- A** The molecules in the vapour expand because the pressure is less.
 - B** The molecules left in the liquid have more space to move around.
 - C** The molecules move more slowly when they escape into the air.
 - D** The molecules with the highest energies escape into the air.
- 49 The pressure of a fixed mass of gas in a cylinder is measured. The volume of the gas in the cylinder is then slowly decreased. The temperature of the gas does not change.

Which graph could show the change of pressure of the gas during this process?



- 50 A beaker contains 0.500 kg of water at a temperature of 3.0°C. The beaker is heated, and the internal energy of the water increases by 21.0 kJ.

The specific heat capacity of water is 4200 J/(kg °C).

What is the temperature of the water after it has been heated?

- A** 5.5°C **B** 10.0°C **C** 13.0°C **D** 31.5°C

- 51 Smoke particles, illuminated by a bright light, are seen through a microscope. They move about randomly.

What causes this motion?

- A** attraction between the smoke particles and the molecules of the air
B collisions between the smoke particles and the molecules of the air
C evaporation of the faster-moving smoke particles
D warming of the smoke particles by the lamp

- 52 A sealed bottle of constant volume contains air.

The air in the bottle is heated by the Sun.

What is the effect on the average speed of the air molecules in the bottle, and the average distance between them?

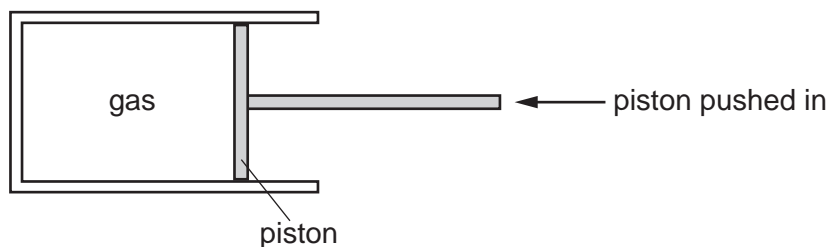
	average speed of air molecules	average distance between air molecules
A	decreases	decreases
B	decreases	stays the same
C	increases	increases
D	increases	stays the same

53 Gases can be compressed, but liquids cannot.

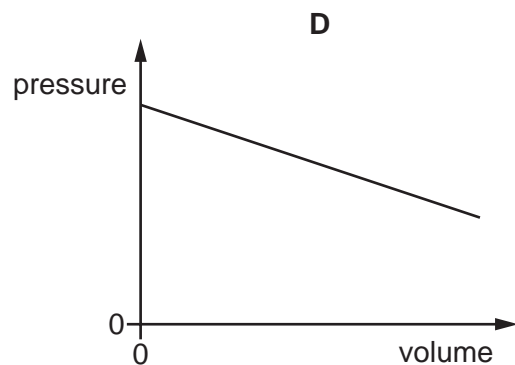
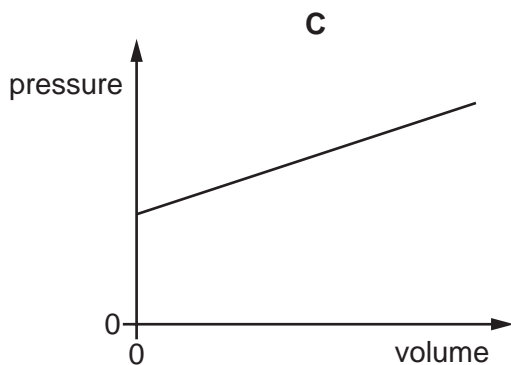
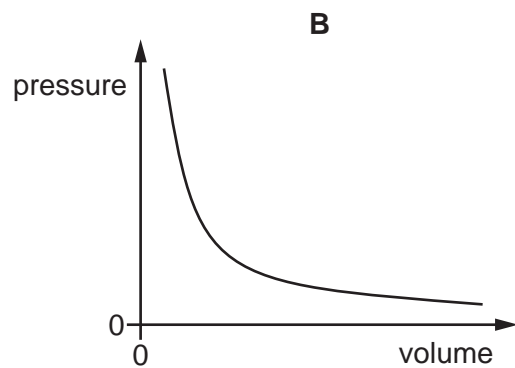
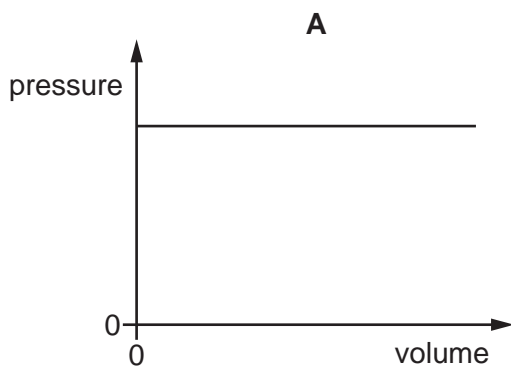
Which statement explains this difference?

- A** Each molecule in a gas is more compressible than each molecule in a liquid.
- B** Molecules in a gas are further apart than molecules in a liquid.
- C** Molecules in a gas attract each other more strongly than molecules in a liquid.
- D** Molecules in a gas move more slowly than molecules in a liquid.

54 The diagram shows a quantity of gas trapped in a cylinder. The piston is pushed in slowly and the gas is compressed. The temperature of the gas does not change.

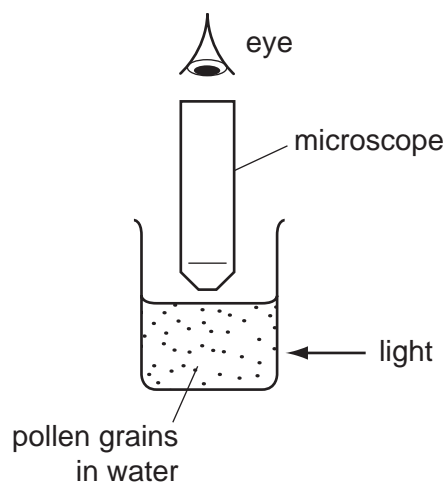


Which graph shows the relationship between the pressure and the volume of the gas?



55 Very small pollen grains are suspended in a beaker of water. A bright light shines from the side.

Small, bright dots of light are seen through a microscope. The dots move in rapidly changing, random directions.



What are the bright dots?

- A pollen grains being hit by other pollen grains
- B pollen grains being hit by water molecules
- C water molecules being hit by other water molecules
- D water molecules being hit by pollen grains

56 A sealed gas cylinder is left outside on a hot, sunny day.

What happens to the average speed of the gas molecules and to the pressure of the gas in the cylinder as the temperature of the gas rises?

	average speed of gas molecules	pressure of gas in cylinder
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

- 57 The diagram shows four beakers **A**, **B**, **C** and **D**. The beakers contain different amounts of the same liquid at the same temperature. The beakers are left next to each other on a laboratory bench overnight. The diagrams are all drawn to the same scale.

From which beaker does the largest quantity of liquid evaporate?

