Chapter 2

Thermal physics

2.1 Simplekineticmoleculamodelof matter

01. 0625_m22_qp_22 Q: 15

Smoke particles, illuminated by a bright lamp, 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

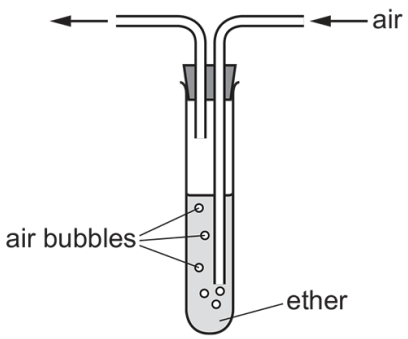
D warming of the smoke particles by the lamp

02. 0625_m22_qp_22 Q: 16

Ether is a liquid that evaporates easily at room temperature.

The rate at which ether evaporates can be increased by bubbling air through it.

The diagram shows this process.



Students give three suggestions why the rate of evaporation increases when air is bubbled through.

Student 1 suggests that the temperature of the ether is decreased.

Student 2 suggests that the surface area of the ether is increased.

Student 3 suggests that evaporated molecules are removed at a greater rate.

Which students are correct?

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 only

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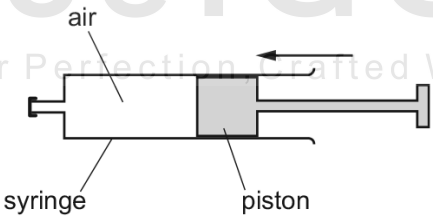
03. 0625_m21_qp_22 Q: 14

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.

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04. 0625_m21_qp_22 Q: 15

In an experiment, smoke particles are suspended in air and viewed through a microscope.

The smoke particles move about with short random movements.

Which of the following statements is correct?

A Air particles have large masses compared to smoke particles and they move in one direction only.

B Air particles have large masses compared to smoke particles and they move in random directions.

C Air particles move at high speeds compared to smoke particles and they move in one direction only.

D Air particles move at high speeds compared to smoke particles and they move in random directions.

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05. 0625_s21_qp_21 Q: 14

The table gives information about molecules.

Which row describes a gas?

	force between molecules	distance between molecules
A	strong	close together
B	strong	far apart
C	negligible	far apart
D	negligible	close together

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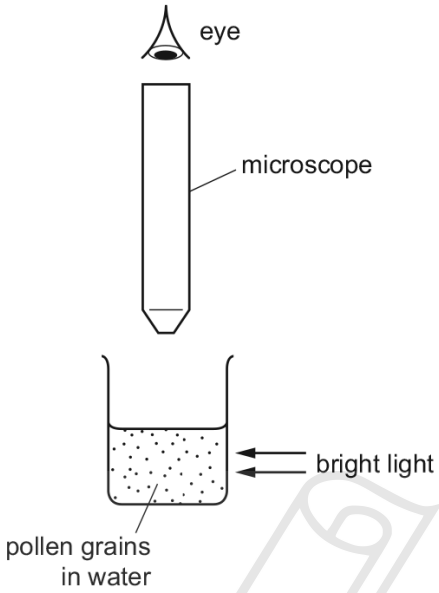
06. 0625_s21_qp_21 Q: 15

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

When looked at through a microscope, small specks of light are seen to be moving in a random, jerky manner.



What are the moving specks of light?

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

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07. 0625_s21_qp_22 Q: 14

Which row describes the forces between the molecules and the motion of the molecules in a gas?

	forces between molecules	motion of molecules
A	strong	move freely
B	strong	vibrate only
C	weak	move freely
D	weak	vibrate only

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08. 0625_s21_qp_23 Q: 14

A liquid at room temperature is put on a metal surface which is also at room temperature.

A student blows gently across the liquid and its temperature decreases.

What causes the liquid to become cooler?

A Bubbles of water vapour form in the liquid and go into the air.

B The moving air reduces the kinetic energy of all the particles in the liquid.

C Thermal energy flows from the liquid into the metal.

D The more energetic particles in the liquid escape into the air.

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09. 0625_w21_qp_21 Q: 12

A liquid is evaporating. The liquid is not boiling.

Which statement about the liquid is correct at an instant in time?

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

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

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

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

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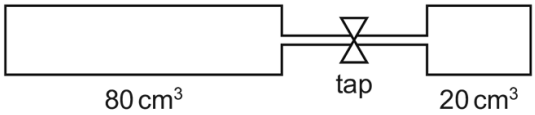
10. 0625_w21_qp_21 Q: 13

The diagram shows two cylinders connected by a narrow tube fitted with a tap.



One cylinder contains 80 cm^3 of gas at a pressure of 2.0×10^5 Pa. The other cylinder contains a vacuum.

The volume of the evacuated cylinder is 20 cm^3. The tap is opened so that the gas can flow to fill both cylinders.

The temperature of the gas remains constant.

What is the new pressure of the gas?

A 0.50×10^5 Pa

B 1.6×10^5 Pa

C 2.5×10^5 Pa

D 8.0×10^5 Pa

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11. 0625_w21_qp_22 Q: 13

A gas is contained in a sealed container in a laboratory. The temperature of the gas increases.

What happens to the average speed and what happens to the total kinetic energy of the gas molecules?

	average speed	total kinetic energy
A	does not change	does not change
B	does not change	increases
C	increases	does not change
D	increases	increases

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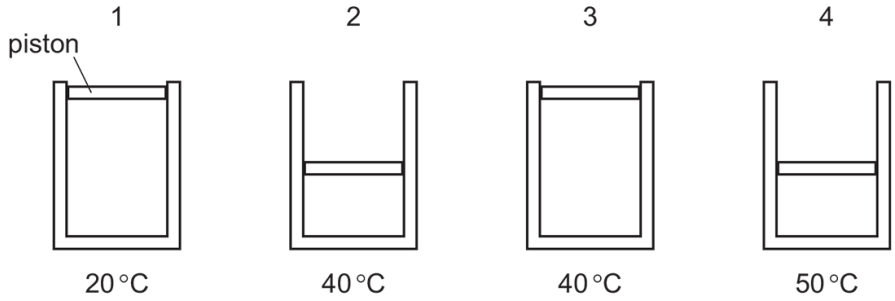
12. 0625_w21_qp_23 Q: 13

The same mass of a gas is trapped in four identical cylinders by a piston that can move.

The diagrams show the samples of gas in different conditions of volume and temperature.



Which list gives the pressure of the gas in order from lowest to highest?

A 1 → 2 → 3 → 4

B 1 → 3 → 2 → 4

C 4 → 2 → 3 → 1

D 4 → 3 → 2 → 1

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13. 0625_w21_qp_23 Q: 15

A solid and a gas are each given the same increase in temperature. The gas is kept at a constant pressure.

Which row is correct?

	the one which expands most	the reason
A	the gas	molecules in the gas each expand more than the solid molecules
B	the gas	the molecules in the solid are held strongly together
C	the solid	molecules in the solid each expand more than the gas molecules
D	the solid	all the molecules in the gas are separate from one another

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14. 0625_m20_qp_22 Q: 16

When pollen grains in water are viewed through a microscope, they are seen to be in continuous, rapid random motion.

What causes a pollen grain to move in this way?

A convection currents in the water

B bombardment by a single molecule of water

C uneven bombardment on different sides by water molecules

D collision with another pollen grain due to their kinetic energies

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15. 0625_m20_qp_22 Q: 17

A student measures the mass of warm water in an open container over two minutes. The container is kept at a constant temperature. The results are in the table.

time / minutes	mass / g
0.0	33.9
0.5	30.6
1.0	27.6
1.5	24.9
2.0	22.5

Why does the mass of the water change?

A The water evaporates.

B The water freezes.

C The water condenses.

D The water boils.

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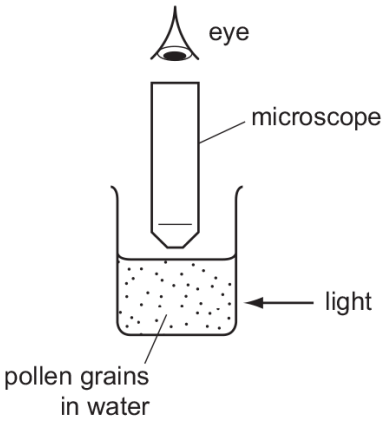
16. 0625_p20_qp_20 Q: 16

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

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17. 0625_p20_qp_20 Q: 17

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?

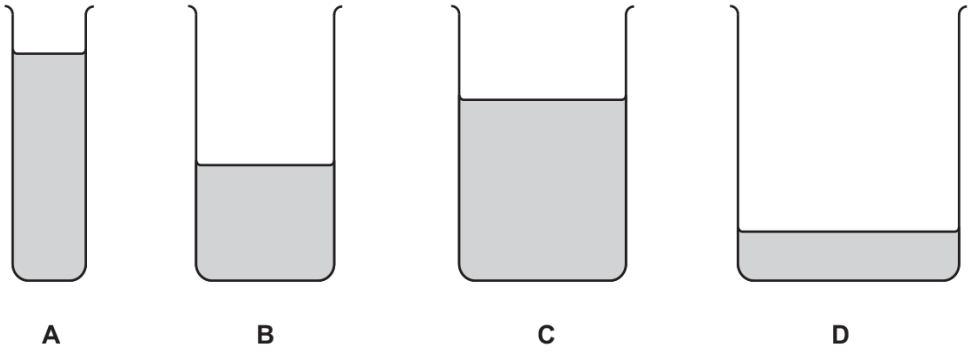
	average speed of gas molecules	pressure of gas in cylinder
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

---

18. 0625_p20_qp_20 Q: 18

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?



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19. 0625_s20_qp_21 Q: 14

A gas is heated in a sealed container.

The volume of the container does not change.

What happens to the molecules of the gas?

A The average distance between molecules increases.

B The average kinetic energy of the molecules increases.

C The mass of each molecule increases.

D The volume of each molecule increases.

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20. 0625_s20_qp_21 Q: 15

Water in a beaker evaporates when left on a bench for a period of time.

Which three factors all affect the rate of evaporation of the water?

A wind speed, surface area, temperature

B wind speed, temperature, volume

C wind speed, surface area, volume

D surface area, temperature, volume

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21. 0625_s20_qp_22 Q: 14

Which row describes the forces between the molecules and the motion of the molecules in a solid?

	forces between molecules	motion of molecules
A	strong	move freely
B	strong	vibrate only
C	weak	move freely
D	weak	vibrate only

---

22. 0625_s20_qp_22 Q: 15

Wet clothes are hanging outside to dry.

Which condition decreases the rate of evaporation of the water from the clothes?

A folded clothes

B higher temperature

C wetter clothes

D windy day

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23. 0625_s20_qp_23 Q: 14

When a molecule rebounds from a wall, a force is exerted on the wall.

What causes this force?

A the kinetic energy gained by the molecule

B the kinetic energy lost by the molecule

C the change of momentum of the molecule

D the change of speed of the molecule

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24. 0625_s20_qp_23 Q: 15

The relationship between pressure *p* and volume *V* of a gas is given as *pV* = constant.

Under which conditions for the mass of a gas and for its temperature does the equation hold?

	mass	temperature
A	changing	changing
B	changing	constant
C	constant	changing
D	constant	constant

---

25. 0625_w20_qp_21 Q: 15

A student splashes water on to her face. Here are three statements about the effects.

P The water uses energy to evaporate.

Q The water gains energy from the student.

R The face of the student cools.

Which statements are correct?

A P and Q only **B** P and R only **C** Q and R only **D** P, Q and R

---

26. 0625_w20_qp_22 Q: 15

A student splashes water on to her face. Here are three statements about the effects.

P The water uses energy to evaporate.

Q The water gains energy from the student.

R The face of the student cools.

Which statements are correct?

A P and Q only **B** P and R only **C** Q and R only **D** P, Q and R

---

27. 0625_w20_qp_23 Q: 15

A student splashes water on to her face. Here are three statements about the effects.

P The water uses energy to evaporate.

Q The water gains energy from the student.

R The face of the student cools.

Which statements are correct?

A P and Q only **B** P and R only **C** Q and R only **D** P, Q and R

---

28. 0625_m19_qp_22 Q: 16

Gas molecules exert a pressure when they collide with the walls of a container.

Which statement is correct?

A They experience a change in force which exerts a pressure equal to momentum × area on the walls.

B They experience a change in force which exerts a pressure equal to $\frac{\text{momentum}}{\text{area}}$ on the walls.

C They experience a change in momentum which exerts a pressure equal to force × area on the walls.

D They experience a change in momentum which exerts a pressure equal to $\frac{\text{force}}{\text{area}}$ on the walls.

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29. 0625_s19_qp_21 Q: 14

A stationary smoke particle is hit by a fast-moving nitrogen molecule.

Which row describes the motion of the smoke particle and of the nitrogen molecule after the collision?

	smoke particle	nitrogen molecule
A	moves	rebounds
B	moves	stops
C	remains stationary	rebounds
D	remains stationary	stops

---

30. 0625_s19_qp_22 Q: 14

At room temperature, iron is difficult to compress.

At the same temperature, oxygen is much easier to compress.

Which comparison of the structures of iron and oxygen explains this?

A The iron particles are closer together.

B The iron particles have a greater mass.

C The iron particles can be magnetised.

D The iron particles have less average kinetic energy.

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31. 0625_s19_qp_23 Q: 14

Water in a beaker evaporates when it is left on a bench for a period of time.

Increasing the surface area and increasing the temperature of the water each change the rate of evaporation.

Which row is correct?

	increasing the surface area	increasing the temperature
A	rate of evaporation decreases	rate of evaporation decreases
B	rate of evaporation decreases	rate of evaporation increases
C	rate of evaporation increases	rate of evaporation decreases
D	rate of evaporation increases	rate of evaporation increases

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32. 0625_w19_qp_21 Q: 15

Which statement about the evaporation of a liquid is correct?

A The least energetic molecules escape from the surface and the temperature of the liquid decreases.

B The least energetic molecules escape from the surface and the temperature of the liquid increases.

C The most energetic molecules escape from the surface and the temperature of the liquid decreases.

D The most energetic molecules escape from the surface and the temperature of the liquid increases.

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33. 0625_w19_qp_21 Q: 16

A bubble of gas is formed deep under water. The bubble has a volume of 40 cm^3 and the pressure inside the bubble is *P*.

The bubble rises up through the water. The volume of the bubble increases to 56 cm^3 and the pressure becomes 100 kPa. The temperature of the gas does not change.

What is the initial pressure *P*?

A 71 Pa **B** 71 kPa **C** 140 Pa **D** 140 kPa

---

34. 0625_w19_qp_22 Q: 16

Which row describes the arrangement and the motion of the molecules in a gas?

	arrangement	motion
A	far apart	move freely
B	far apart	vibrate only
C	tightly packed	move freely
D	tightly packed	vibrate only

---

35. 0625_w19_qp_23 Q: 15

Which row compares the separation and the motion of the molecules of a hot gas with those of a cool liquid? (Both the gas and the liquid are at the same pressure.)

	separation	motion
A	greater for a gas	faster for a gas
B	greater for a gas	slower for a gas
C	smaller for a gas	faster for a gas
D	smaller for a gas	slower for a gas

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36. 0625_w19_qp_23 Q: 16

A fixed mass of gas has a volume of 25 cm^3. The pressure of the gas is 100 kPa.

The volume of the gas is slowly decreased by 15 cm^3 at constant temperature.

What is the change in pressure of the gas?

A 67 kPa **B** 150 kPa **C** 170 kPa **D** 250 kPa

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37. 0625_m18_qp_22 Q: 16

Liquid evaporates from a beaker.

What happens to the temperature of the remaining liquid and how does this temperature change affect the rate of evaporation?

	temperature	rate of evaporation
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

---

38. 0625_s18_qp_21 Q: 15

When molecules of a gas rebound from a wall of a container, the wall experiences a pressure.

What is the cause of this pressure?

A the change in energy of the molecules

B the change in momentum of the molecules

C the change in power of the molecules

D the change in speed of the molecules

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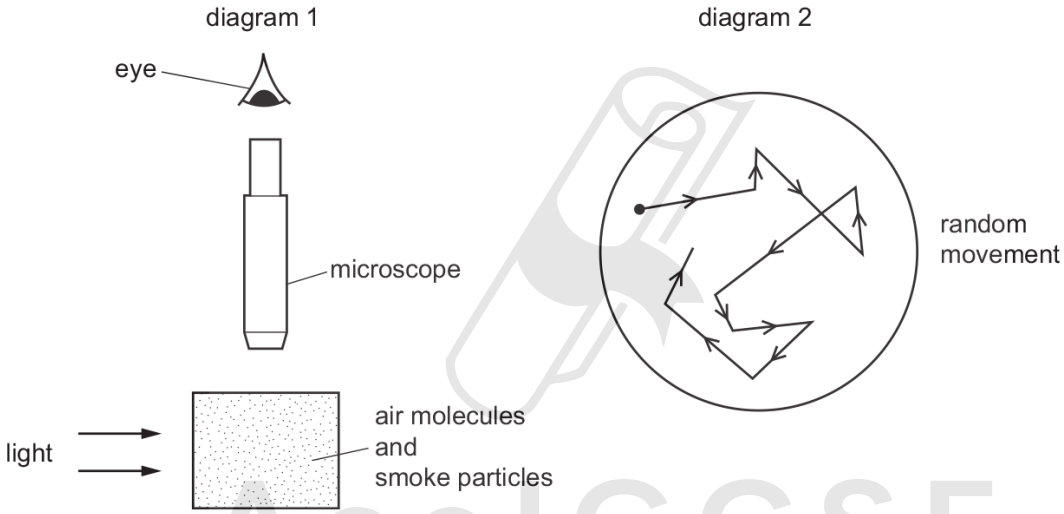
39. 0625_w18_qp_21 Q: 14

Diagram 1 shows apparatus being used to observe smoke particles.

Diagram 2 shows how a smoke particle moves randomly.



Why do the smoke particles move randomly?

A They are hit by air molecules.

B They are less dense than air.

C They are moved by convection currents.

D They gain energy from the light.

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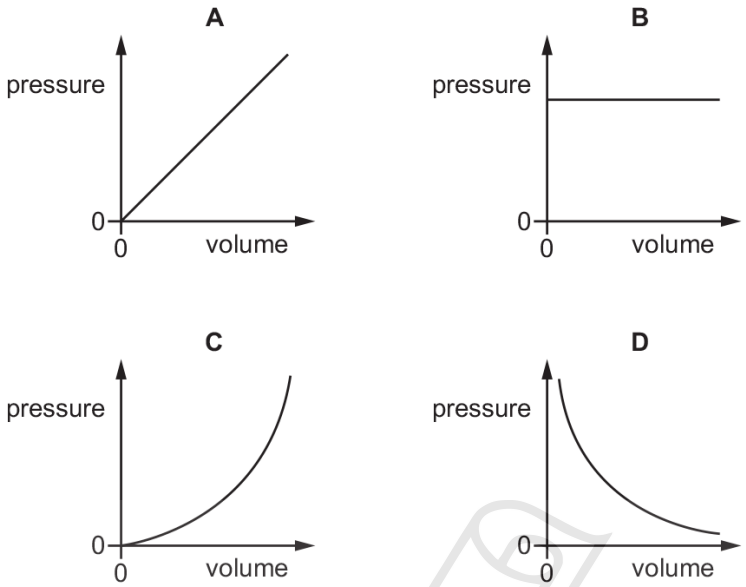
40. 0625_w18_qp_21 Q: 15

The gas in a sealed container is compressed at constant temperature.

Which graph shows how the pressure of the gas changes with its volume?



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41. 0625_w18_qp_22 Q: 15

A closed container of gas is heated. The pressure of the gas increases.

Which statement explains this increase in pressure?

A The changes in the momentum of the gas molecules striking the walls of the container increase.

B The forces of attraction between the gas molecules and the walls of the container increase.

C The gas molecules collide with each other more frequently.

D The gas molecules lose more energy when they strike the walls of the container.

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42. 0625_w18_qp_23 Q: 15

A bubble of air has a volume of $2.0\,cm^3$ at the bottom of a lake where the total pressure is $4.0 \times 10^5\,Pa$. The temperature of the water in the lake is constant. The atmospheric pressure at the surface is $1.0 \times 10^5\,Pa$.

What is the volume of the bubble when it rises to the surface?

A $0.13\,cm^3$ **B** $0.17\,cm^3$ **C** $6.0\,cm^3$ **D** $8.0\,cm^3$

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43. 0625_s17_qp_21 Q: 14

Brownian motion is observed when using a microscope to look at smoke particles in air.

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.

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44. 0625_s17_qp_21 Q: 15

Gas molecules striking a container wall cause a pressure to be exerted on the wall.

Which statement explains this?

A When a molecule rebounds there must be a change in its energy.

B When a molecule rebounds there must be a change in its momentum.

C When a molecule rebounds there must be a change in its speed.

D When a molecule rebounds there must be a change in its temperature.

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45. 0625_s17_qp_22 Q: 15

A student blows air through a liquid using a straw. This causes the liquid to evaporate quickly and therefore to cool.

Which statement explains why the remaining liquid cools?

A Slower-moving molecules are carried away by the air bubbles.

B The air molecules conduct heat from the liquid.

C The air sets up convection currents in the liquid.

D The molecules with most energy leave the liquid.

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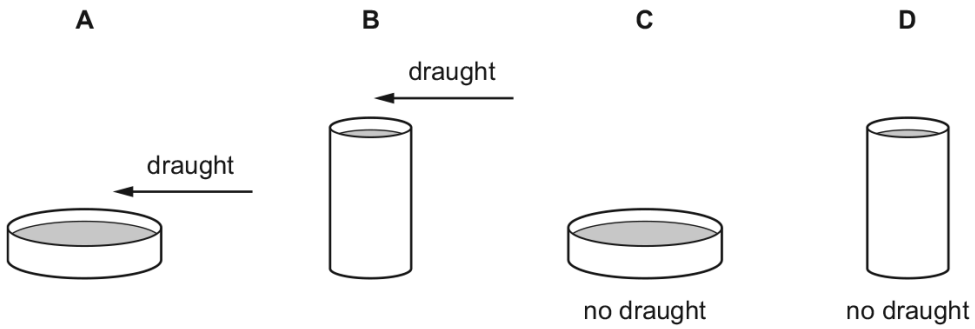
46. 0625_s17_qp_23 Q: 15

The diagrams show four open dishes. Each dish contains water at the same temperature.

The dishes are different shapes and a draught blows over two of them.

From which container does the water evaporate at the greatest rate?



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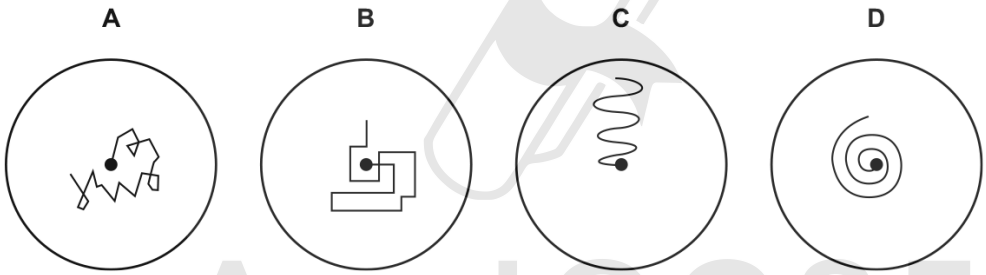
47. 0625_w17_qp_21 Q: 15

A pollen grain in a beaker of still water is viewed through a microscope.

Which diagram shows the most likely movement of the pollen grain?



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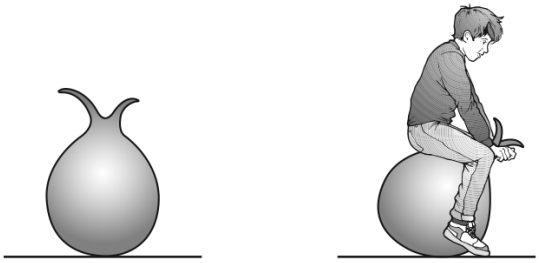
48. 0625_w17_qp_21 Q: 16

The diagram shows an air-filled rubber toy. A child sits on the toy and its volume decreases.

The temperature of the air in the toy does not change.



How does the air pressure in the toy change and why?

	pressure	reason
A	decreases	air molecules move more slowly
B	decreases	air molecules strike the rubber less frequently
C	increases	air molecules move more quickly
D	increases	air molecules strike the rubber more frequently

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49. 0625_m16_qp_22 Q: 14

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.

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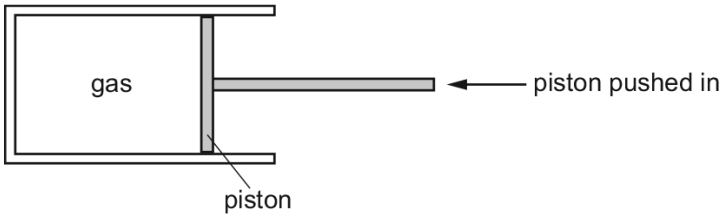
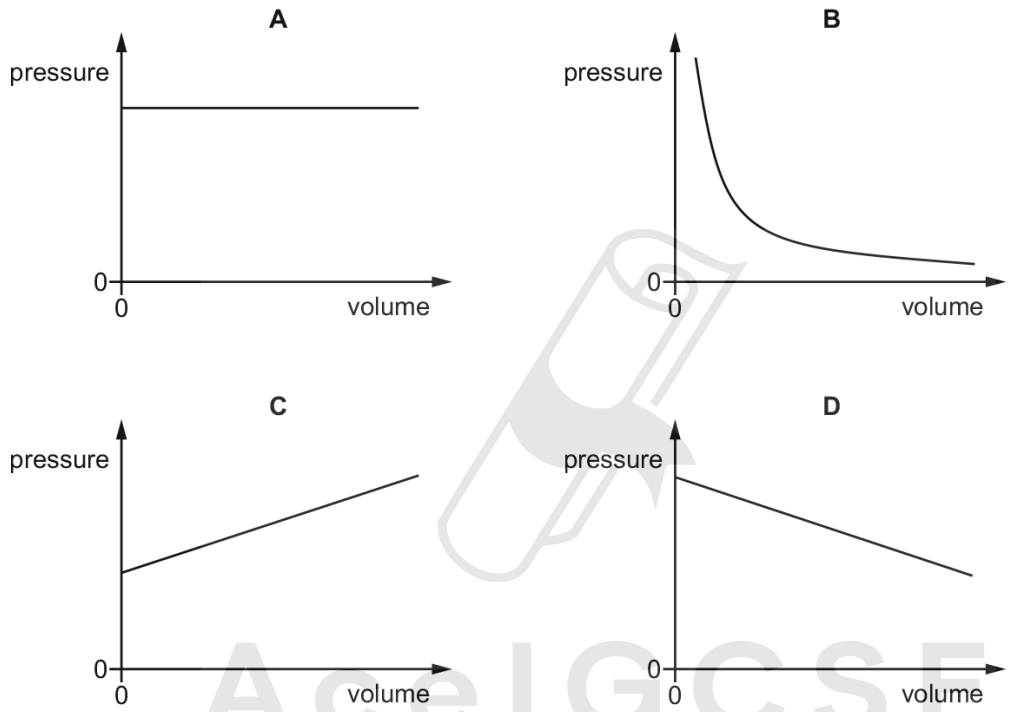
50. 0625_m16_qp_22 Q: 15

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?



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51. 0625_p16_qp_20 Q: 17

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

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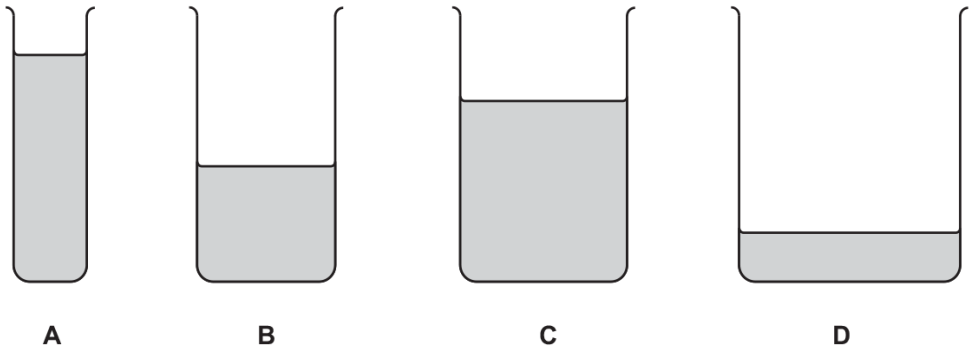
52. 0625_p16_qp_20 Q: 18

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?



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53. 0625_s16_qp_21 Q: 12

A diver under water uses breathing apparatus at a depth where the pressure is 1.25×10^5 Pa.

A bubble of gas breathed out by the diver has a volume of $20\,cm^3$ when it is released. The bubble moves upwards to the surface of the water.

At the surface of the water, the atmospheric pressure is 1.00×10^5 Pa.

The temperature of the water is the same at all depths.

What is the volume of this bubble when it reaches the surface?

A $15\,cm^3$ **B** $16\,cm^3$ **C** $20\,cm^3$ **D** $25\,cm^3$

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54. 0625_s16_qp_21 Q: 14

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.

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55. 0625_s16_qp_22 Q: 15

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

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56. 0625_s16_qp_22 Q: 16

A liquid is at a temperature below its boiling point.

The liquid is then heated so that it becomes a gas at a temperature above its boiling point.

Which row correctly compares the liquid with the gas?

	average distance between the particles	average speed of the particles
A	greater in the liquid	greater in the liquid
B	greater in the liquid	smaller in the liquid
C	smaller in the liquid	greater in the liquid
D	smaller in the liquid	smaller in the liquid

---

57. 0625_s16_qp_22 Q: 17

A beaker of liquid is left on a laboratory bench. There is an electric fan in the laboratory causing a draught over the liquid.

The liquid evaporates.

Which row shows two changes that will **both** cause the liquid to evaporate more quickly?

	change to surface area of the liquid	change to speed of fan
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

---

58. 0625_s16_qp_23 Q: 14

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

---

59. 0625_s16_qp_23 Q: 15

A sealed bottle of constant volume contains air.

The air in the bottle is heated by the Sun.

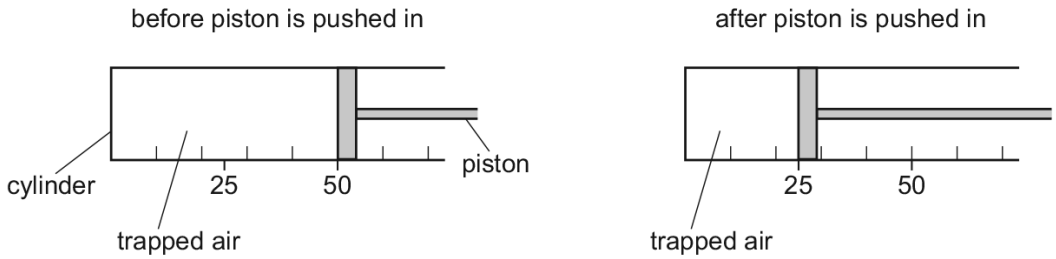
What is the effect on the average speed of the air molecules in the bottle, and the average distance between them?

	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

---

60. 0625_w16_qp_21 Q: 13

Air is trapped in a cylinder by a piston. The original volume of the trapped air is V and the original pressure of the trapped air is P. The piston is pushed to the left. The temperature of the gas does not change.



What is the new volume and what is the new pressure of the trapped air?

	new volume	new pressure
A	$2V$	$\frac{P}{2}$
B	$2V$	$2P$
C	$\frac{V}{2}$	$\frac{P}{2}$
D	$\frac{V}{2}$	$2P$

---

61. 0625_w16_qp_21 Q: 14

When a liquid evaporates, some of its molecules escape from the surface and the temperature of the liquid changes.

Which row describes the escaping molecules and the change in temperature of the liquid?

	escaping molecules	temperature of the liquid
A	less energetic	goes down
B	less energetic	goes up
C	more energetic	goes down
D	more energetic	goes up

---

62. 0625_w16_qp_21 Q: 15

A gas at a constant temperature is in a container of fixed volume. The gas exerts a pressure on the walls of the container. The pressure is caused by the gas molecules striking the walls.

Which statement about the gas molecules when they strike the walls is correct?

A The average kinetic energy of the gas molecules changes.

B The average momentum of the gas molecules changes.

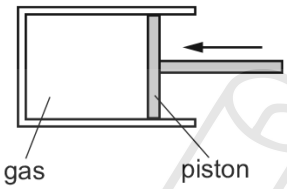
C The average speed of the gas molecules changes.

D The chemical energy of the gas molecules changes.

---

63. 0625_w16_qp_22 Q: 14

The diagram shows a gas that is trapped in a cylinder by a piston. The volume of the gas is 120 cm^3 and the pressure of the gas is P.



The piston is moved slowly to the left so that the volume of the gas is reduced to 30 cm^3. The temperature of the gas does not change.

What is the new pressure of the trapped gas?

A $\frac{P}{4}$ **B** $\frac{P}{2}$ **C** P **D** $4P$

---

64. 0625_w16_qp_22 Q: 16

A puddle of water is formed after a rain shower on a windy day.

Which statement explains the effect of the wind on the rate of evaporation of the water in the puddle?

A The wind gives molecules in the water extra kinetic energy and so increases the rate of evaporation.

B The wind removes evaporated water from near the surface and so decreases the rate of evaporation.

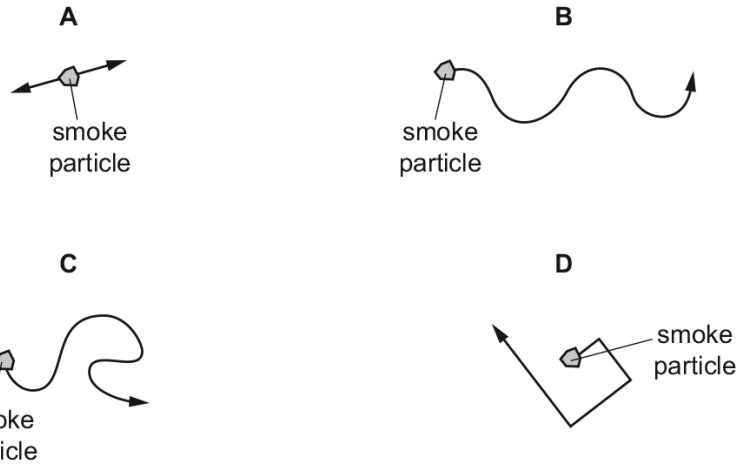
C The wind removes evaporated water from near the surface and so increases the rate of evaporation.

D The wind takes energy from molecules near the surface and so decreases the rate of evaporation.

---

65. 0625_w16_qp_23 Q: 14

Which diagram best represents the movement of a smoke particle displaying Brownian motion?



---

66. 0625_w16_qp_23 Q: 15

The volume of a gas is measured at different pressures.

The pressure p and the volume V of the gas are found to be related by the equation:

$$pV = \text{constant}.$$

Which quantities are kept constant and which quantities change?

	density of gas	mass of gas	temperature of gas
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✓
D	✗	✗	✓

key
✓ = constant
✗ = changed

---

67. 0625_m15_qp_12 Q: 12

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.

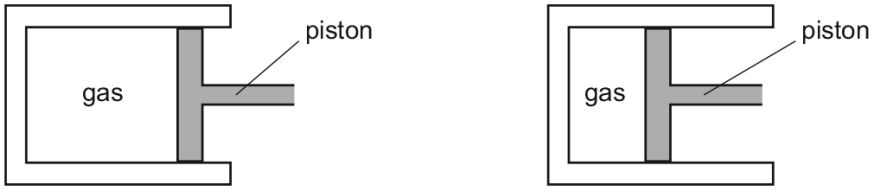
C The grains are moved by random rays of light reflecting off them.

D The grains are moved by the random motion of their own atoms.

---

68. 0625_m15_qp_12 Q: 13

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



initial position after gas has been compressed

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

---

69. 0625_s15_qp_11 Q: 12

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?

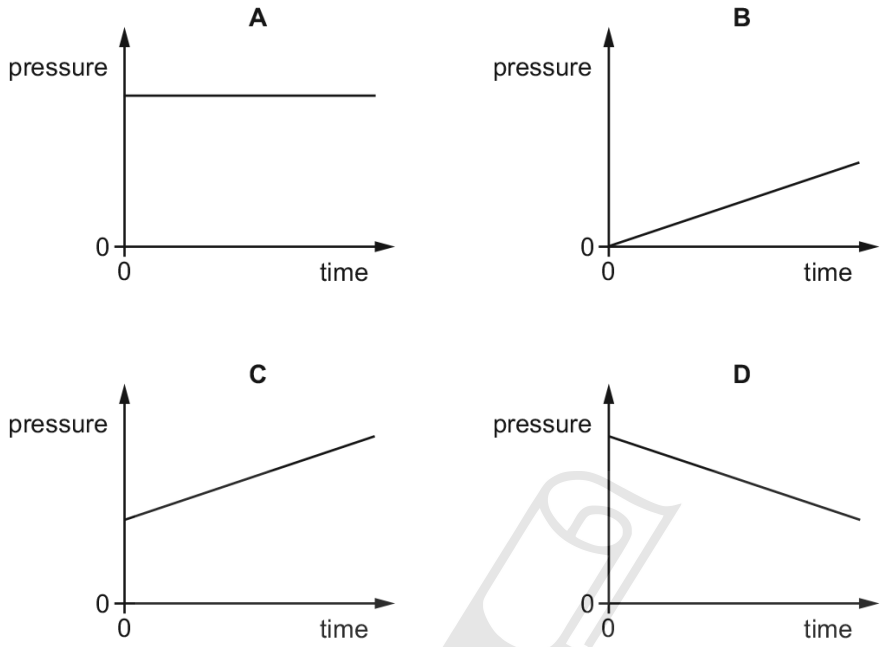
	state 1	state 2
A	gas	liquid
B	gas	solid
C	liquid	gas
D	solid	liquid

---

70. 0625_s15_qp_11 Q: 13

The pressure of a fixed mass of gas in a cylinder is measured. The temperature of the gas in the cylinder is then slowly increased. The volume of the cylinder does not change.

Which graph shows the pressure of the gas during this process?



---

71. 0625_s15_qp_12 Q: 12

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

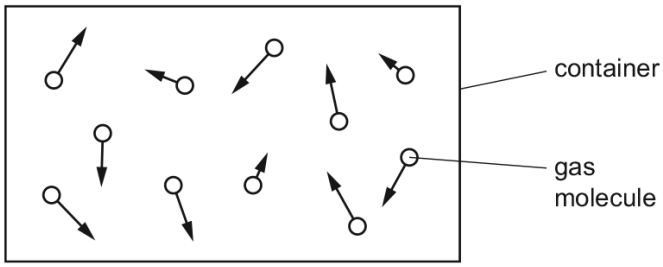
How does the evaporation affect the temperature of the water remaining in the puddle, and how does it affect the average speed of the remaining water molecules in the puddle?

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

---

72. 0625_s15_qp_12 Q: 13

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	increases
D	unchanged	unchanged

---

73. 0625_s15_qp_13 Q: 12

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.

---

74. 0625_s15_qp_13 Q: 13

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

---

75. 0625_w15_qp_11 Q: 12

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

---

76. 0625_w15_qp_11 Q: 13

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.

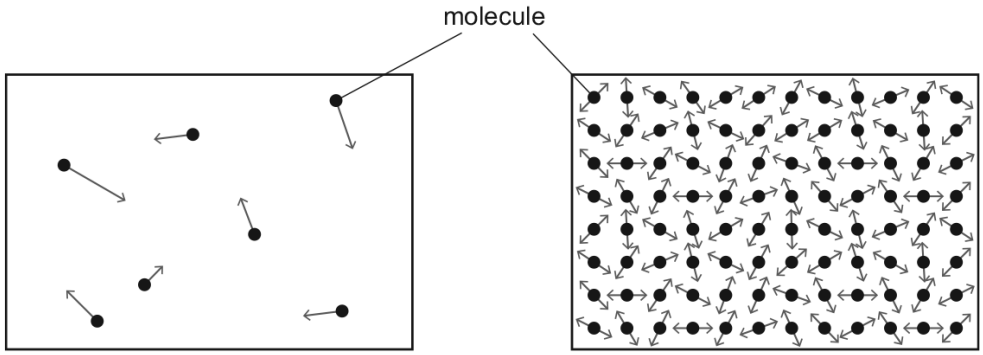
C The water on her skin does not evaporate quickly enough to keep her warm.

D The water on her skin evaporates quickly and cools her skin.

---

77. 0625_w15_qp_12 Q: 12

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

---

78. 0625_w15_qp_12 Q: 13

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.

---

79. 0625_w15_qp_13 Q: 12

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.

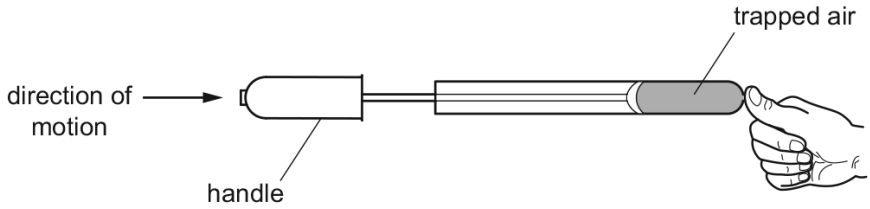
C The average speed of the air molecules in the tyre is greater.

D There are more air molecules in the tyre.

---

80. 0625_s14_qp_11 Q: 12

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

---

81. 0625_s14_qp_11 Q: 13

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

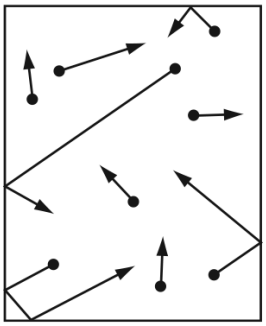
What happens to the average energy of the molecules of the remaining liquid and what happens to the temperature of the remaining liquid?

	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

---

82. 0625_s14_qp_12 Q: 13

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.

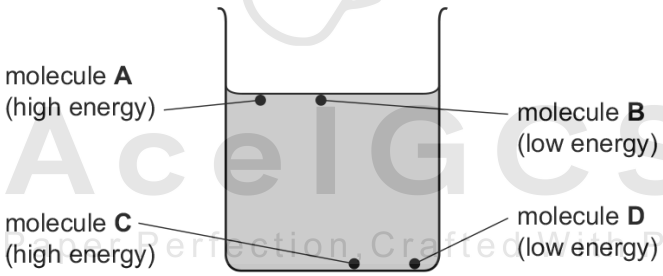
D They vibrate more slowly.

---

83. 0625_w14_qp_11 Q: 13

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?



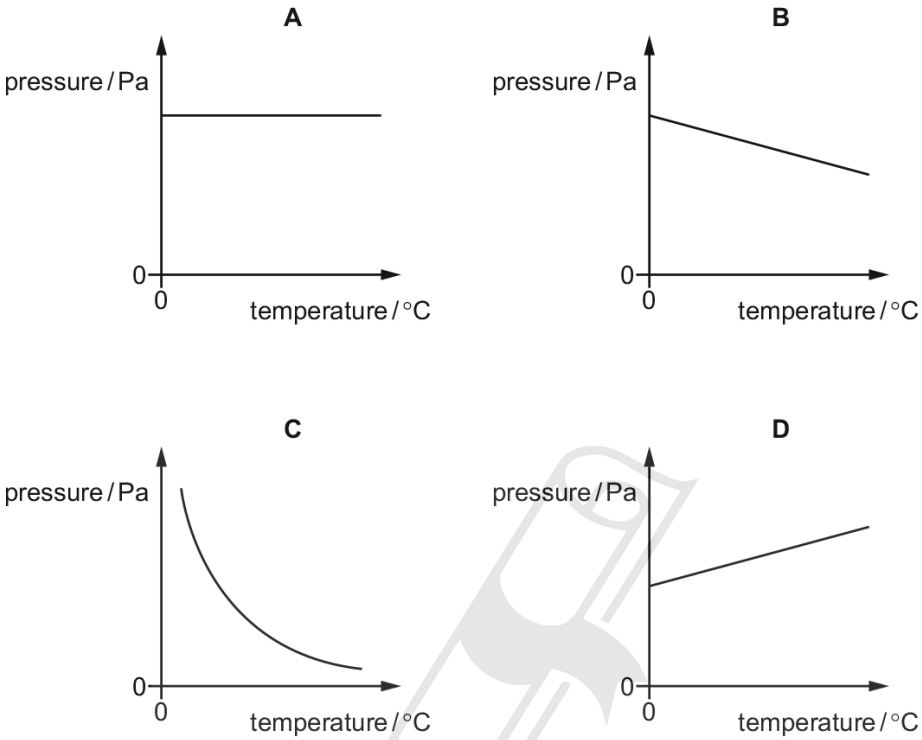
---

84. 0625_w14_qp_11 Q: 14

Some gas is trapped in a container of fixed volume.

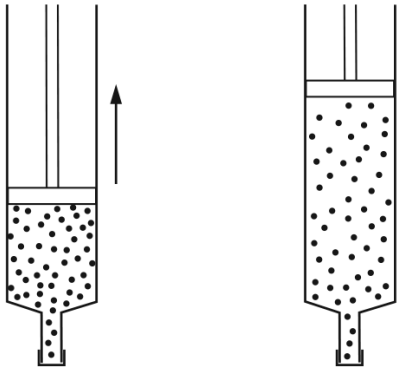
The temperature of the gas increases.

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



85. 0625_w14_qp_13 Q: 13

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



before change after 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.

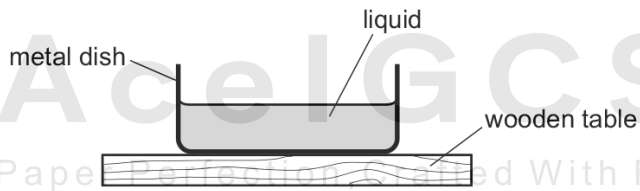
C They hit the syringe walls less often.

D They hit the syringe walls more often.

---

86. 0625_w14_qp_13 Q: 14

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

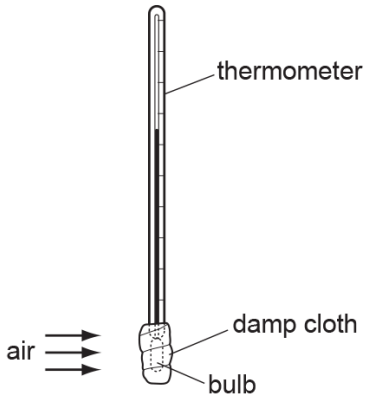
C evaporation of the liquid

D heat radiation from the liquid

---

87. 0625_s13_qp_11 Q: 13

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.

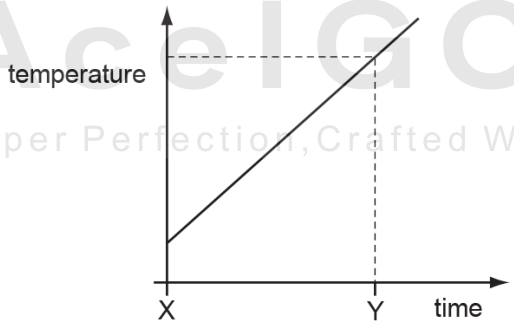
C It rises then falls.

D It falls.

---

88. 0625_s13_qp_11 Q: 14

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.

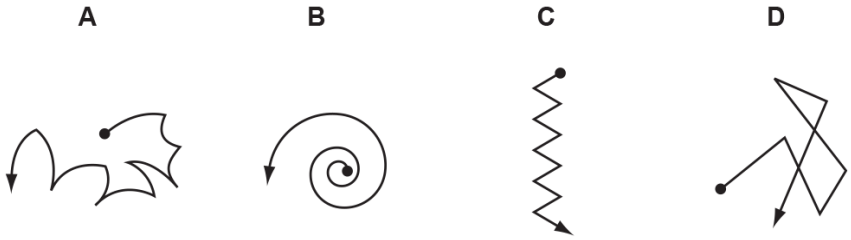
C larger in size than at time X.

D moving more slowly than at time X.

---

89. 0625_s13_qp_12 Q: 13

Which diagram best shows the path of a gas molecule?



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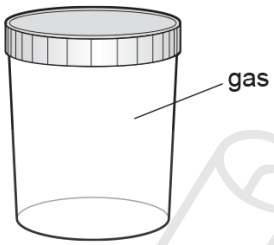
90. 0625_w13_qp_11 Q: 13

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.

---

91. 0625_w13_qp_11 Q: 14

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

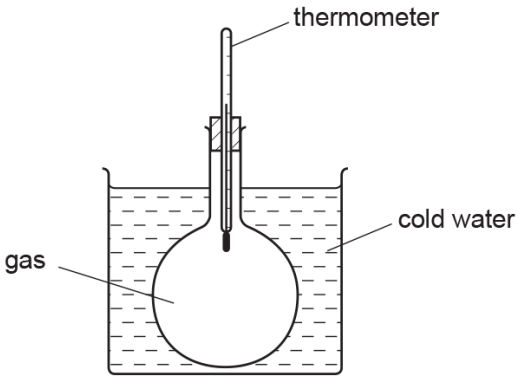
Which molecules escape from the water and what happens to the average speed of the water molecules that remain in the newspaper?

	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

---

92. 0625_w13_qp_13 Q: 13

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.

---

93. 0625_s12_qp_11 Q: 13

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.

---

94. 0625_s12_qp_11 Q: 14

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.

---

95. 0625_s12_qp_12 Q: 13

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

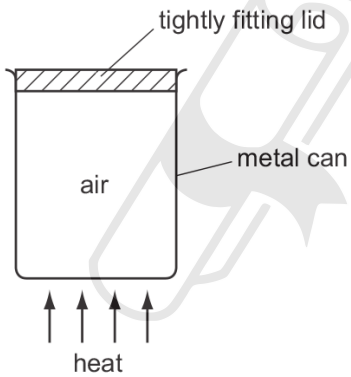
As the water evaporates, which molecules escape into the air first and what happens to the average speed of the remaining water molecules?

	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

---

96. 0625_s12_qp_12 Q: 14

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.

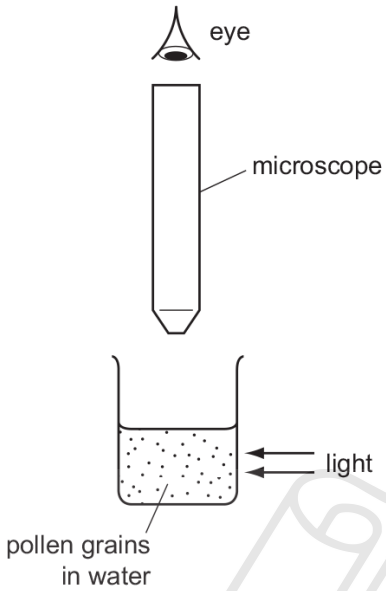
D The volume occupied by the molecules decreases.

---

97. 0625_w12_qp_11 Q: 14

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

Looking through a microscope, small specks of light are seen to be moving in a random, jerky manner.



What are the moving specks of light?

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

---

98. 0625_w12_qp_11 Q: 15

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.

---

99. 0625_w12_qp_13 Q: 14

A car tyre contains a constant volume of air.

During use, the air gets hotter and the air pressure increases.

What explains this increase in pressure in terms of the motion of air molecules?

	number of air molecules in tyre	force between air molecules and tyre wall	number of collisions per second between air molecules and tyre wall
A	increased	increased	decreased
B	increased	unchanged	decreased
C	unchanged	increased	increased
D	unchanged	unchanged	increased

SN	Paper	Q. No.	Answer
01	0625_m22_qp_22	15	B
02	0625_m22_qp_22	16	C
03	0625_m21_qp_22	14	C
04	0625_m21_qp_22	15	D
05	0625_s21_qp_21	14	C
06	0625_s21_qp_21	15	B
07	0625_s21_qp_22	14	C
08	0625_s21_qp_23	14	D
09	0625_w21_qp_21	12	C
10	0625_w21_qp_21	13	B
11	0625_w21_qp_22	13	D
12	0625_w21_qp_23	13	B
13	0625_w21_qp_23	15	B
14	0625_m20_qp_22	16	C
15	0625_m20_qp_22	17	A
16	0625_p20_qp_20	16	B
17	0625_p20_qp_20	17	D
18	0625_p20_qp_20	18	D
19	0625_s20_qp_21	14	B
20	0625_s20_qp_21	15	A
21	0625_s20_qp_22	14	B
22	0625_s20_qp_22	15	A
23	0625_s20_qp_23	14	C
24	0625_s20_qp_23	15	D
25	0625_w20_qp_21	15	D
26	0625_w20_qp_22	15	D
27	0625_w20_qp_23	15	D
28	0625_m19_qp_22	16	D
29	0625_s19_qp_21	14	B
30	0625_s19_qp_22	14	A
31	0625_s19_qp_23	14	D
32	0625_w19_qp_21	15	C
33	0625_w19_qp_21	16	D
34	0625_w19_qp_22	16	A
35	0625_w19_qp_23	15	A
36	0625_w19_qp_23	16	B
37	0625_m18_qp_22	16	A
38	0625_s18_qp_21	15	B
39	0625_w18_qp_21	14	A
40	0625_w18_qp_21	15	D
41	0625_w18_qp_22	15	A
42	0625_w18_qp_23	15	D
43	0625_s17_qp_21	14	A
44	0625_s17_qp_21	15	B
45	0625_s17_qp_22	15	D
46	0625_s17_qp_23	15	A
47	0625_w17_qp_21	15	A
48	0625_w17_qp_21	16	D
49	0625_m16_qp_22	14	B

SN	Paper	Q. No.	Answer
50	0625_m16_qp_22	15	B
51	0625_p16_qp_20	17	D
52	0625_p16_qp_20	18	D
53	0625_s16_qp_21	12	D
54	0625_s16_qp_21	14	A
55	0625_s16_qp_22	15	B
56	0625_s16_qp_22	16	D
57	0625_s16_qp_22	17	D
58	0625_s16_qp_23	14	A
59	0625_s16_qp_23	15	D
60	0625_w16_qp_21	13	D
61	0625_w16_qp_21	14	C
62	0625_w16_qp_21	15	B
63	0625_w16_qp_22	14	D
64	0625_w16_qp_22	16	C
65	0625_w16_qp_23	14	D
66	0625_w16_qp_23	15	C
67	0625_m15_qp_12	12	A
68	0625_m15_qp_12	13	D
69	0625_s15_qp_11	12	A
70	0625_s15_qp_11	13	C
71	0625_s15_qp_12	12	A
72	0625_s15_qp_12	13	A
73	0625_s15_qp_13	12	A
74	0625_s15_qp_13	13	C
75	0625_w15_qp_11	12	A
76	0625_w15_qp_11	13	D
77	0625_w15_qp_12	12	B
78	0625_w15_qp_12	13	D
79	0625_w15_qp_13	12	C
80	0625_s14_qp_11	12	C
81	0625_s14_qp_11	13	A
82	0625_s14_qp_12	13	A
83	0625_w14_qp_11	13	A
84	0625_w14_qp_11	14	D
85	0625_w14_qp_13	13	C
86	0625_w14_qp_13	14	C
87	0625_s13_qp_11	13	D
88	0625_s13_qp_11	14	B
89	0625_s13_qp_12	13	D
90	0625_w13_qp_11	13	A
91	0625_w13_qp_11	14	C
92	0625_w13_qp_13	13	D
93	0625_s12_qp_11	13	A
94	0625_s12_qp_11	14	A
95	0625_s12_qp_12	13	C
96	0625_s12_qp_12	14	B
97	0625_w12_qp_11	14	B
98	0625_w12_qp_11	15	D

SN	Paper	Q. No.	Answer
99	0625_w12_qp_13	14	C