AQA GCSE PHYSICS (HIGHER) · 8463

PHYSICS



EXAM QUESTION PACK

4.3.3 PARTICLE MODEL AND PRESSURE (PACK 2)

SCORE	PERCENTAGE
/31	%

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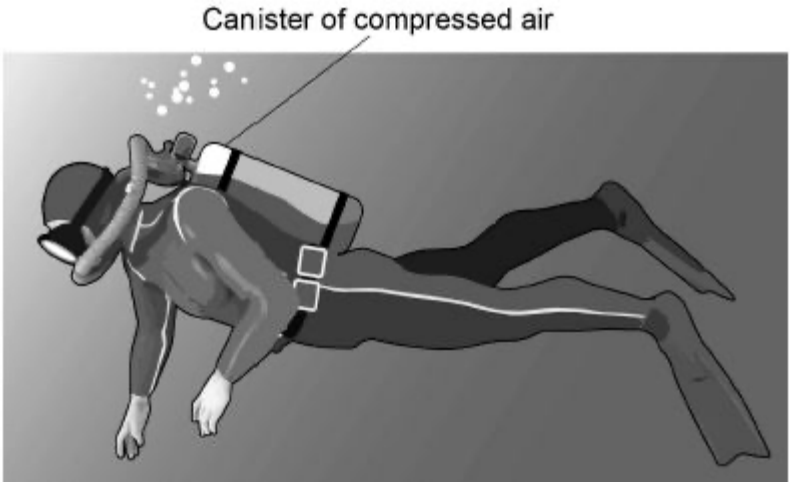
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Q1.

Figure 1 shows a diver.

Figure 1



(a) Which two sentences describe the movement of the air particles in the canister?

Tick **two** boxes.

They vibrate about a fixed position. ☐

They move in random directions. ☐

The motion of all the particles is predictable. ☐

They move with a range of different speeds. ☐

They move in circular paths. ☐

(2)

(b) The temperature of the air inside the canister increases.

What happens to the movement of the air particles?

_____

(1)

(c) It could be dangerous if the temperature of the air inside the canister increased by a large amount.

Explain why.

_____

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_____

_____

_____

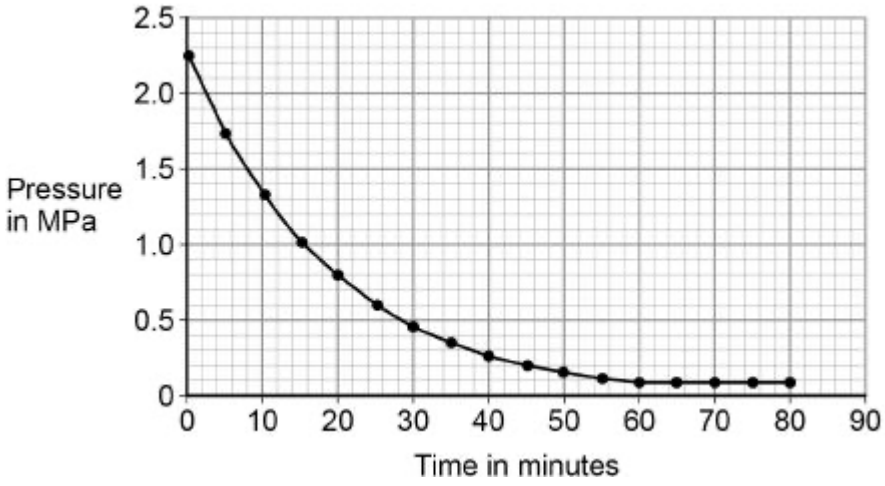
(2)

A canister of air was tested to find out how the pressure changed when it was used by a diver.

- Air was allowed to escape from the canister.
- The pressure of the air in the canister was recorded every 5 minutes for 80 minutes.

Figure 2 shows the results.

Figure 2



(d) Estimate the atmospheric pressure.

Use **Figure 2**

Atmospheric pressure = _____ MPa

(1)

(e) Divers can safely stay underwater until the pressure of the air in the canister has reduced to 25% of its original value.

Determine the maximum time the diver can safely stay underwater.

Use **Figure 2**

_____

_____

Time = _____ minutes

(3)

(f) What happens to the volume of the air when it is released from the canister?

_____

(1)

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(Total 10 marks)

Q2.

The particle model can be used to explain the properties of gases.

(a) Describe the direction of motion of the particles in a gas.

(1)

(b) Explain why heating a gas increases the average speed of the gas particles.

(3)

(c) Water can exist as either a liquid or a gas at 100 °C.

Explain why a mass of gaseous water at 100 °C contains more energy than an equal mass of liquid water at 100 °C.

(2)

(d) Water vapour is a gas. Gases change state when they cool.

The figure below shows condensation on a cold bathroom mirror.

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A volume of 2.5×10^{-5} m^3 of condensation forms on the mirror.

Density of water = 1000 kg / m^3

Specific latent heat of vaporisation of water = 2.26×10^6 J / kg.

Calculate the energy released when the condensation forms.

Energy released = _____ J

(5)

(e) Central heating boilers burn gas and use the energy released to heat water.

Modern condensing central heating boilers take advantage of the energy that is released when water condenses.

Waste water vapour produced when the water is heated in the boiler is used to preheat the cold water entering the boiler.

Give some of the arguments in favour of condensing boilers compared to older non-condensing boilers.

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(4)
(Total 15 marks)

Q3.

Density can be explained using the particle model.

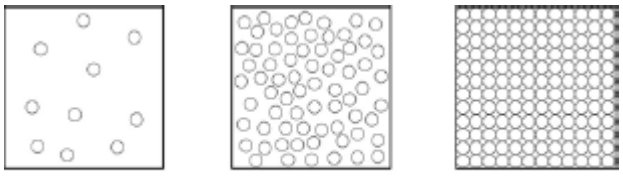
(a) What is the unit of density (ρ)?

Tick **one** box.

joules, J	☐
joules per kilogram, J / kg	☐
kilograms, kg	☐
kilograms per metre cubed, kg / m^3	☐

(1)

(b) The figure below shows particles of the same substance in three states of matter.



Use the figure above to explain why the solid has the highest density.

(2)

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(c) Complete the sentences.

Use answers from the box.

downwards	**kinetic**	**nuclear**	**potential**	**randomly**	**slowly**

The particles in a gas are constantly moving.

The particles move _____

When the temperature of the particles in a gas is increased

the particles have more _____energy .

(2)

(d) A gas is put into a closed container.

The container and the gas inside it are heated.

What will happen to the pressure inside the container?

_____

(1)

(Total 6 marks)

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