

Name of the Student: _____

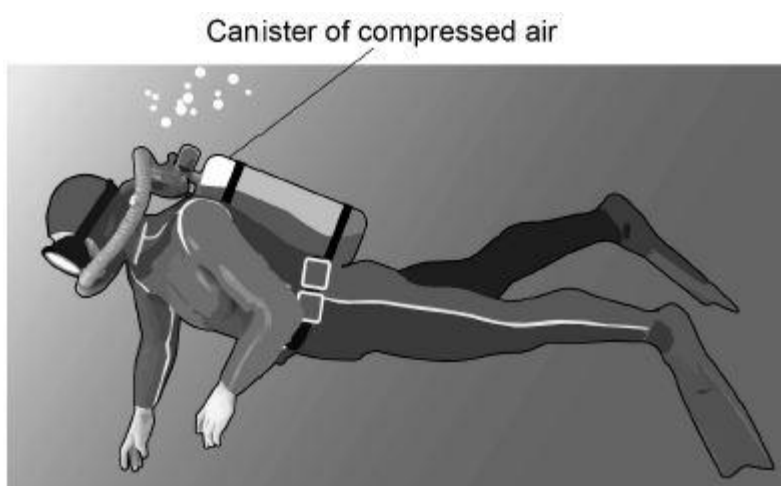
Max. Marks : 27 Marks

Time : 27 Minutes

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?

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

Explain why.

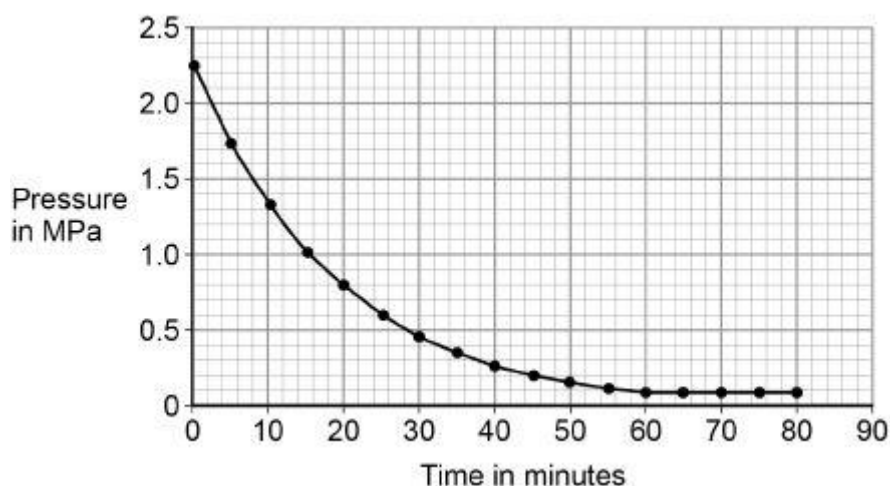
(2)

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

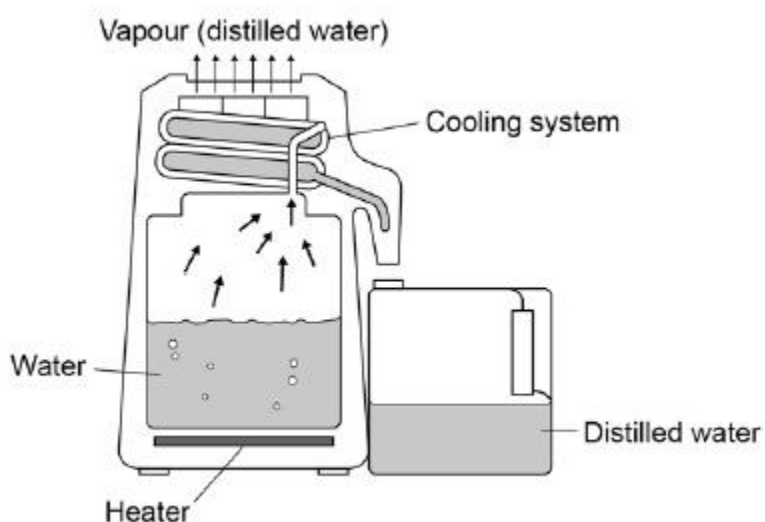
- (f) What happens to the volume of the air when it is released from the canister?

(1)

(Total 10 marks)

Q2.

Figure 1 shows a water distiller which is used to purify water.

Figure 1

The distiller boils water and then condenses most of the water vapour back to water.

- (a) The water distiller is filled with 5.0 kg of water at 20 °C

The specific heat capacity of water = 4 200 J/Kg °C

Calculate the energy needed to raise the temperature of the water to 100 °C

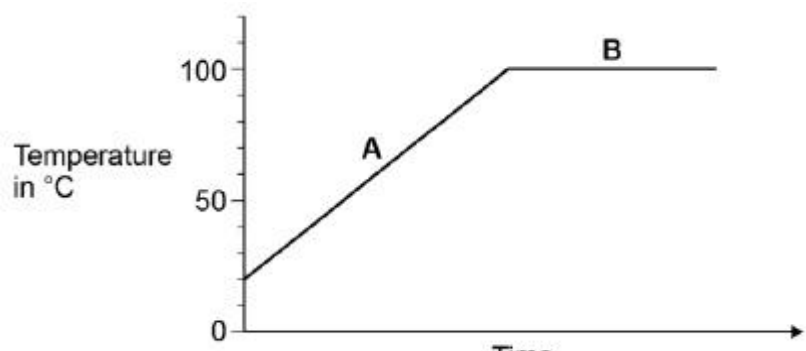
Use the Physics Equations sheet.

Energy = _____ J

(3)

Figure 2 shows how the temperature of the water in the distiller changes with time.

Figure 2



- (b) Energy is transferred to the water at a constant rate.

Explain why the graph is a different shape in parts **A** and **B**.

(3)

- (c) When the water drops to a low level, the heater automatically switches off.

Explain what problem would be caused if the heater did **not** automatically switch off.

(3)

- (d) The distiller is connected to the mains by a three-core cable.

The wires are covered by different coloured insulation.

What colour is the insulation covering each of the wires?

Live wire _____

Neutral wire _____

Earth wire _____

(2)

- (e) Which statement gives the purpose of the earth wire?

Tick **one** box.

It carries an alternating potential difference.

☐

It melts if the current in the circuit is too high.

☐

It provides a connection to complete the circuit.

☐

It stops the casing of the appliance becoming live.

☐

(1)

(f) The heating element has a power of 2.5 kW

The resistance of the heating element is $17\ \Omega$

Calculate the current in the heating element.

Give your answer to 2 significant figures.

Write any equations that you use.

Current = _____ A

(5)

(Total 17 marks)