Pressure

Question Paper

Course	CIE IGCSE Physics
Section	1. Motion, Forces & Energy
Topic	Pressure
Difficulty	Hard

Time Allowed 50

Score /39

Percentage /100

Question 1a

Fig. 4.1 shows liquid in a cylinder.

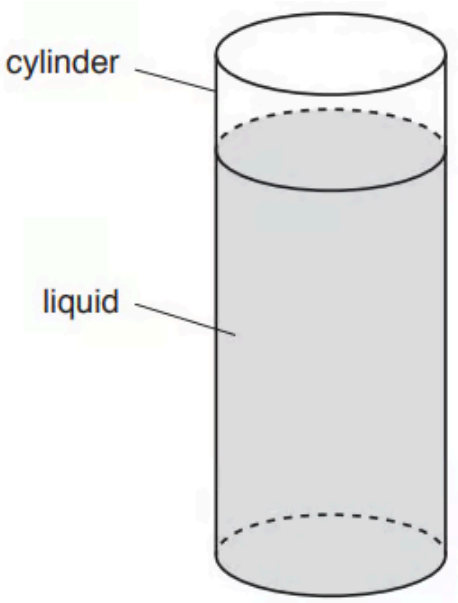

Fig. 4.1

The depth of the liquid is 10 cm and the radius of the cylinder is 3.0 cm. The weight of the liquid in the cylinder is 2.5 N.

Calculate the density of the liquid. You can assume that acceleration of free fall is 10 m/s^2.

density = ...

[3 marks]

Question 1b

Extended tier only

Fig. 4.2 shows a device called a manometer that measures the pressure of a gas supply.

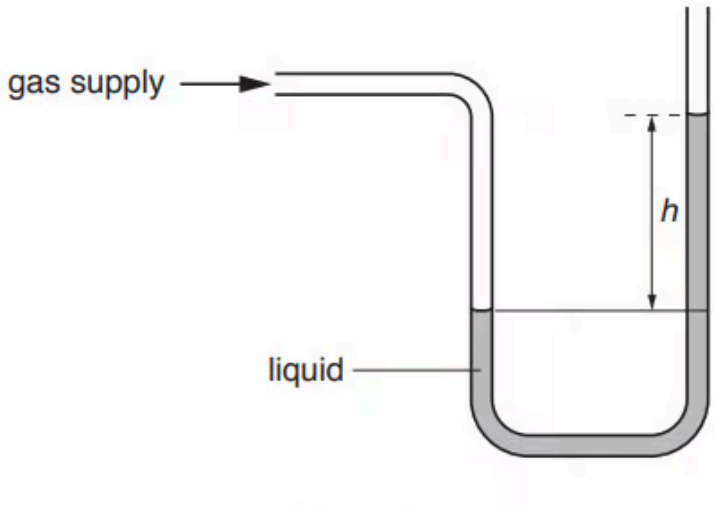

Fig. 4.2

(i) The difference *h* between the two liquid levels is 2.0 cm. The density of the liquid is 800 kg/m^3.

Calculate the difference between the pressure of the gas and atmospheric pressure.

pressure difference = ...[2]

(ii) A similar device with a tube of smaller cross-sectional area is connected to a gas supply at the same pressure.

State and explain any effect on the value of *h*.

[2]

[4 marks]

Question 2a

A rectangular container has a base of dimensions 0.12 m × 0.16 m. The container is filled with a liquid. The mass of the liquid in the container is 4.8 kg.

Calculate

(i) the weight of liquid in the container

weight = ...[1]

(i) the pressure due to the liquid on the base of the container

pressure = ...[2]

[3 marks]

Question 2b

Explain why the total pressure on the base of the container is greater than the value calculated in (a)(ii).

[1 mark]

Question 2c

Extended tier only

The depth of liquid in the container is 0.32 m.

Calculate the density of the liquid.

density = ...

[2 marks]

Question 3a

A scientist fills a container with seawater. The container has dimensions 30 cm × 30 cm × 40 cm. The density of seawater is 1020 kg/m^3.

Calculate the mass of the seawater in the container.

mass = ...

[3 marks]

Question 3b

Extended tier only

Fig. 2.1 shows a submarine. The submarine is fully submerged in the sea.

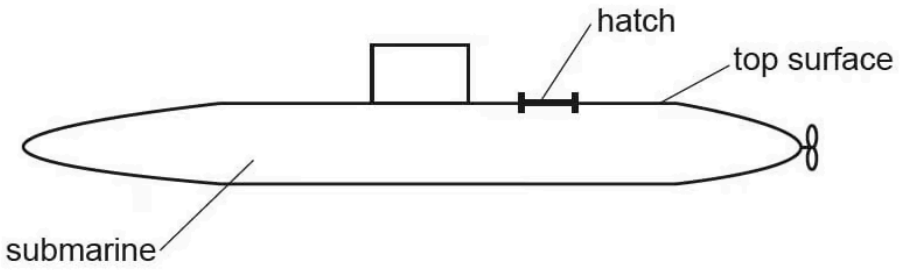

Fig. 2.1

(i) The atmospheric pressure is 100 kPa and the total pressure on the top surface of the submarine is 500 kPa.

Calculate the depth of the top surface of the submarine below the surface of the sea.

depth = ... [3]

(ii) A hatch (an opening door) on the top surface of the submarine has an area of 0.62 m^2.

Calculate the downward force on the hatch due to the total pressure on the top surface of the submarine.

force = ... [2]

[5 marks]

Question 4a

Fig. 2.1 shows a hollow metal cylinder containing air, floating in the sea.

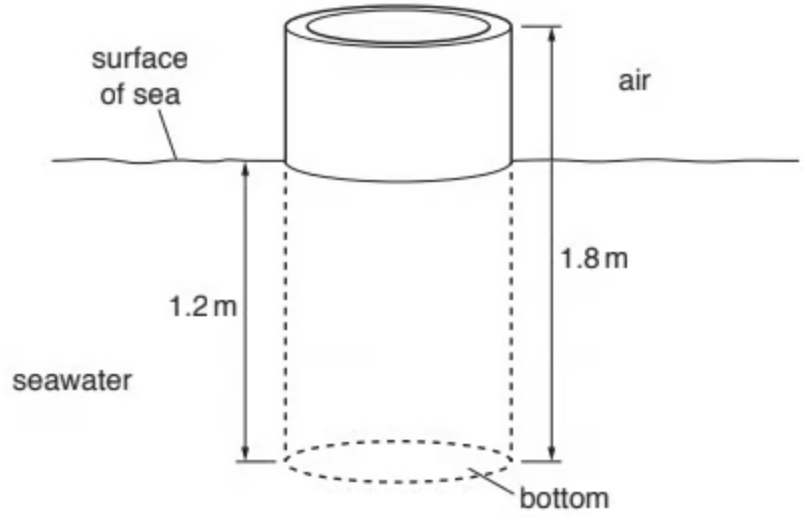

Fig. 2.1

The density of the metal used to make the cylinder is greater than the density of seawater.

Explain why the cylinder floats.

[1 mark]

Question 4b

Extended tier only

The cylinder has a length of 1.8 m. It floats with 1.2 m submerged in the sea. The bottom of the cylinder has an area of cross-section of 0.80 m^2.

The density of seawater is 1020 kg/m^3. Calculate the force exerted on the bottom of the cylinder due to the depth of the seawater.

force = ...

[4 marks]

Question 4c

Deduce the weight of the cylinder. Explain your answer.

[2 marks]

Question 5a

A cylindrical container has a base with diameter of 0.15 m and is filled with water to a depth of 0.35 m as shown in Fig. 1.1.

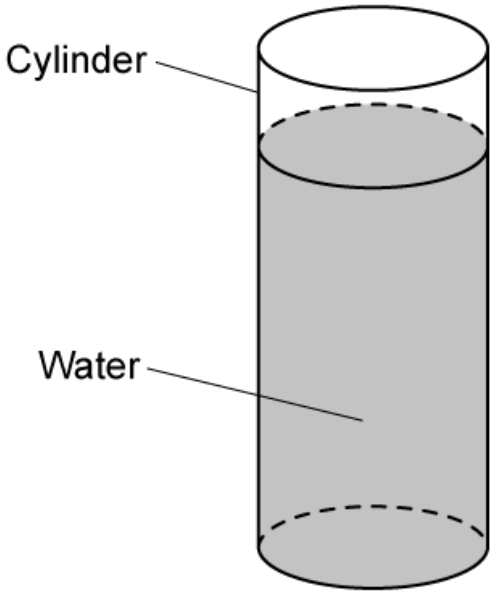

Fig. 1.1

The mass of the water is 6.2 kg.

Calculate the weight of the water in the container.

[1 mark]

Question 5b

Calculate the pressure due to the liquid on the base of the container.

[3 marks]

Question 5c

The water-filled cylinder is placed on a laboratory bench.

Suggest reasons why the total pressure on the bench is higher than the value calculated in part (b).

[2 marks]

Question 5d

Extended tier only

A bead of hollow glass is dropped into the water and comes to rest floating 12 cm above the base of the cylinder as shown in Fig. 1.2.

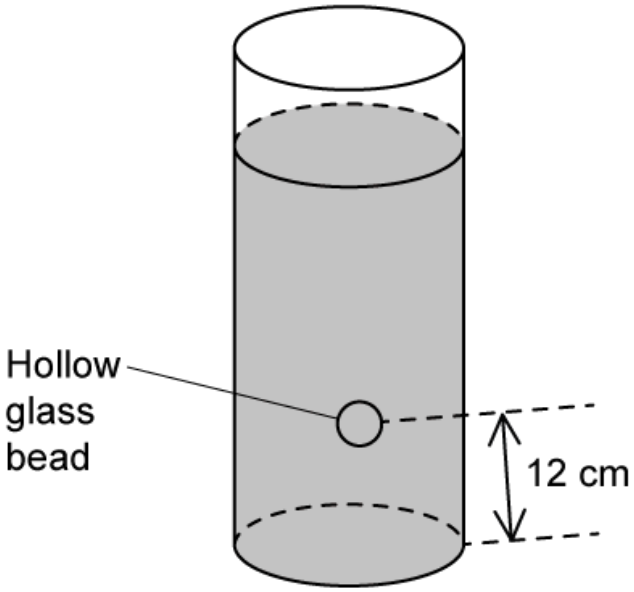

Fig. 1.2

Calculate the total pressure on the bead.

Atmospheric pressure at sea level = 1.01×10^5 Pa
Density of water = 1000 kg/m^3

[5 marks]