AQA GCSE PHYSICS (HIGHER) · 8463

PHYSICS



EXAM QUESTION PACK

4.5.5.2 ATMOSPHERIC PRESSURE

SCORE	PERCENTAGE
/42	%

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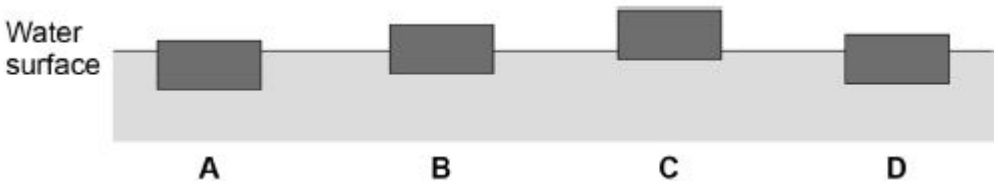
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Q1.

Figure 1 shows four blocks of different materials floating on water.

The four blocks are the same volume.

Figure 1



(a) Which of the blocks has the smallest weight?

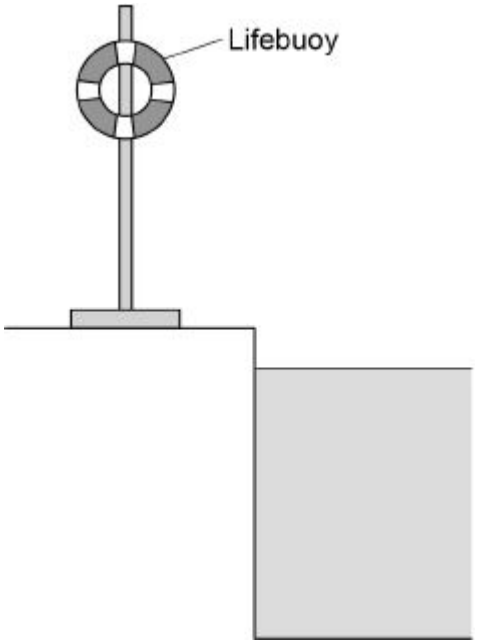
Tick **one** box.

A ☐ B ☐ C ☐ D ☐

(1)

Figure 2 shows a lifebuoy next to a deep swimming pool.

Figure 2



(b) The lifebuoy has a mass of 2.5 kg.

gravitational field strength = 9.8 N/kg

Calculate the weight of the lifebuoy.

Use the equation:

weight = mass × gravitational field strength

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_____

_____

_____

_____

Weight = _____ N

(2)

(c) When thrown into the water the lifebuoy floats. The two forces acting on the lifebuoy are the weight of the lifebuoy downwards and upthrust upwards.

How big is the upthrust on the lifebuoy compared to the weight of the lifebuoy?

Tick **one** box.

The upthrust is greater than the weight. ☐

The upthrust is less than the weight. ☐

The upthrust is the same as the weight. ☐

(1)

(d) Write down the equation which links acceleration, mass and resultant force.

_____

(1)

(e) A rope is used to pull the lifebuoy to the side of the swimming pool.

A resultant force of 4.0 N acts on the lifebuoy.

The mass of the lifebuoy is 2.5 kg.

Calculate the acceleration of the lifebuoy.

_____

_____

_____

_____

Acceleration = _____ m/s^2

(3)

(Total 8 marks)

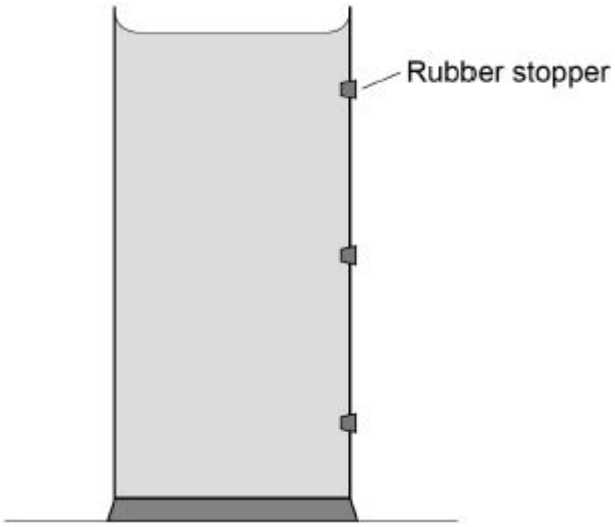
Q2.

Figure 1 shows a container filled with water.

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The three holes in the side of the container are sealed with rubber stoppers.

Figure 1



(a) The water exerts a force of 27 N on the bottom of the container.
The cross-sectional area of the bottom of the container is 0.009 m^2.

Calculate the pressure exerted by the water on the bottom of the container.

Use the equation:

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Choose the unit.

kg/m^3	**N/m**	**Pa**

_____

_____

_____

_____

Pressure = _____ Unit = _____

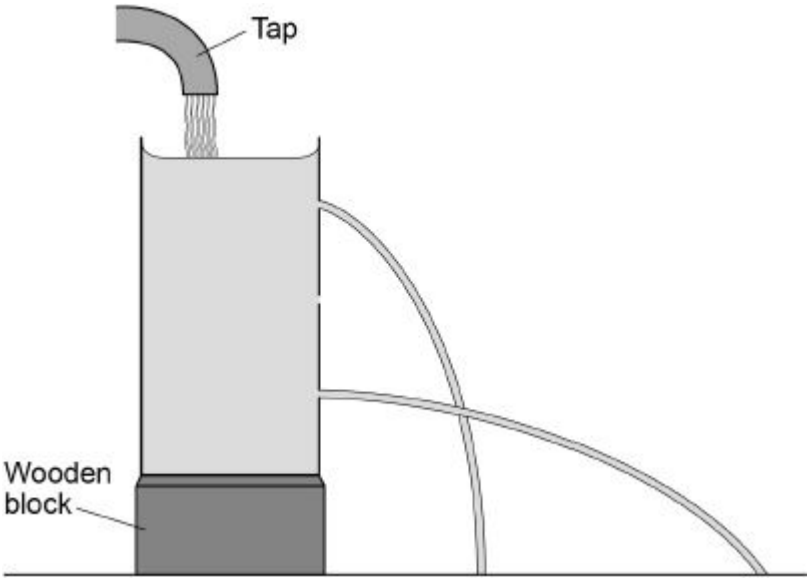
(3)

The container is put under running water from a tap and the three rubber stoppers removed.

Figure 2 shows the path taken by the water escaping from the top and bottom holes.

Figure 2

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(b) Complete **Figure 2** to show the path taken by the water escaping from the centre hole.

(1)

(c) What can be concluded from **Figure 2** about the pressure in a liquid?

_____

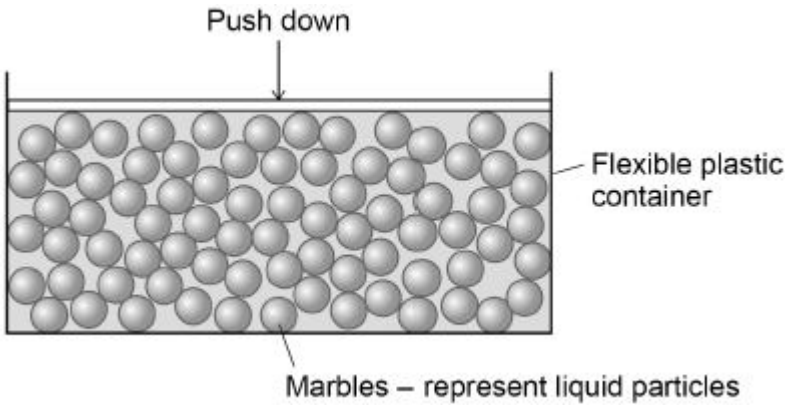
_____

(1)

(d) **Figure 3** shows a simple model of a liquid.

When a force pushes down on the marbles, the marbles push the sides and bottom of the container outwards.

Figure 3



What can be concluded from this model about the pressure in a liquid?

_____

_____

(1)

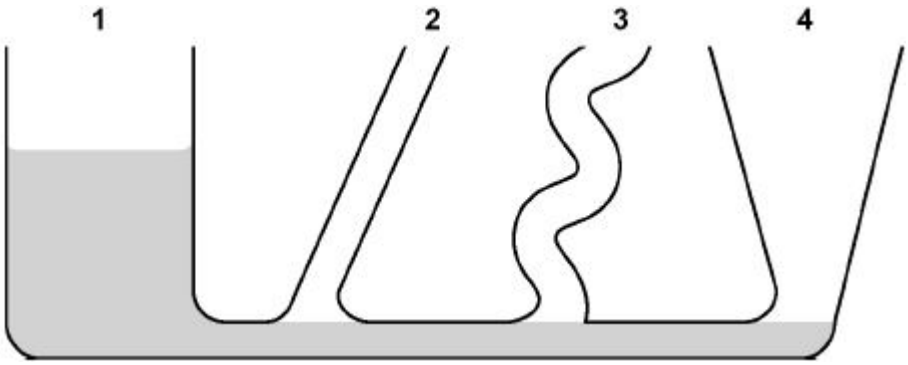
(Total 6 marks)

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Q3.

The diagram below shows an unusually shaped container.

The container has four vertical tubes of different shape and size.



Water is poured into the container up to the level shown in tube **1**.

(a) Complete the diagram above to show the height of the water in tubes **2**, **3** and **4**.

(1)

(b) The further a swimmer dives below the surface of the sea, the greater the pressure on the swimmer.

Explain why.

_____

_____

_____

_____

(2)

(c) A person swims from a depth of 0.50 m to a depth of 1.70 m below the surface of the sea.

density of the sea water = 1030 kg/m^3

gravitational field strength = 9.8 N/kg

Calculate the increase in pressure on the swimmer.

Give the unit.

Use an equation from the Physics Equation Sheet.

_____

_____

_____

_____

Increase in pressure = _____ Unit _____

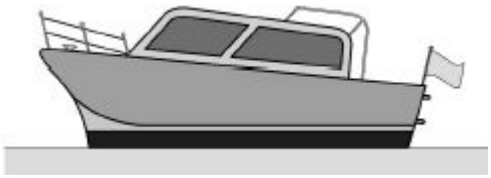
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(4)
(Total 7 marks)

Q4.

Figure 1 shows a boat floating on the sea. The boat is stationary.

Figure 1



(a) **Figure 2** shows part of the free body diagram for the boat.

Complete the free body diagram for the boat.

Figure 2



(2)

(b) Calculate the mass of the boat.

Use the information given in **Figure 2**.

gravitational field strength = 9.8 N/kg

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Give your answer to **two** significant figures.

_____

_____

_____

_____

Mass = _____ kg

(4)

(c) When the boat propeller pushes water backwards, the boat moves forwards.
The force on the water causes an equal and opposite force to act on the boat.

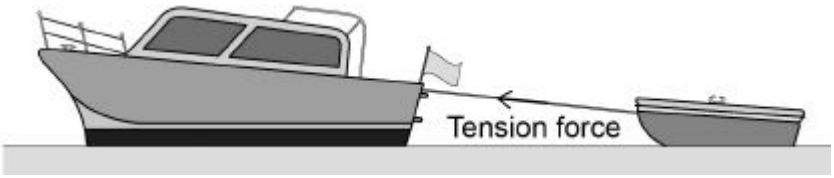
Which law is this an example of?

_____

(1)

(d) **Figure 3** shows the boat towing a small dinghy.

Figure 3



The tension force in the tow rope causes a horizontal force forwards and a vertical force upwards on the dinghy.

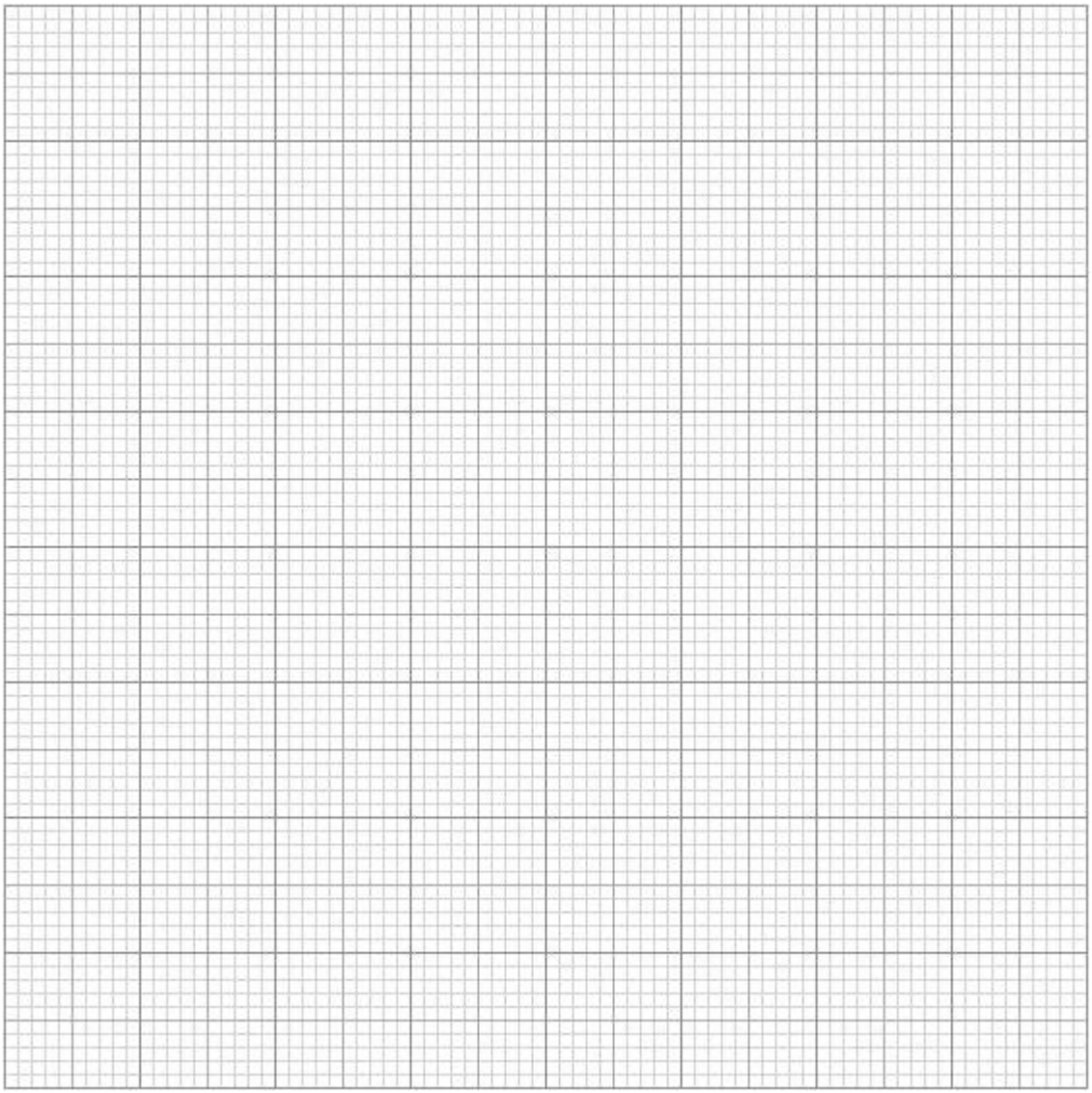
horizontal force forwards = 150 N
vertical force upwards = 50 N

Figure 4 shows a grid.

Draw a vector diagram to determine the magnitude of the tension force in the tow rope and the direction of the force this causes on the dinghy.

Figure 4

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Magnitude of the tension force in the tow rope = _____ N

Direction of the force on the dinghy caused by the tension force in the tow rope = _____

(4)

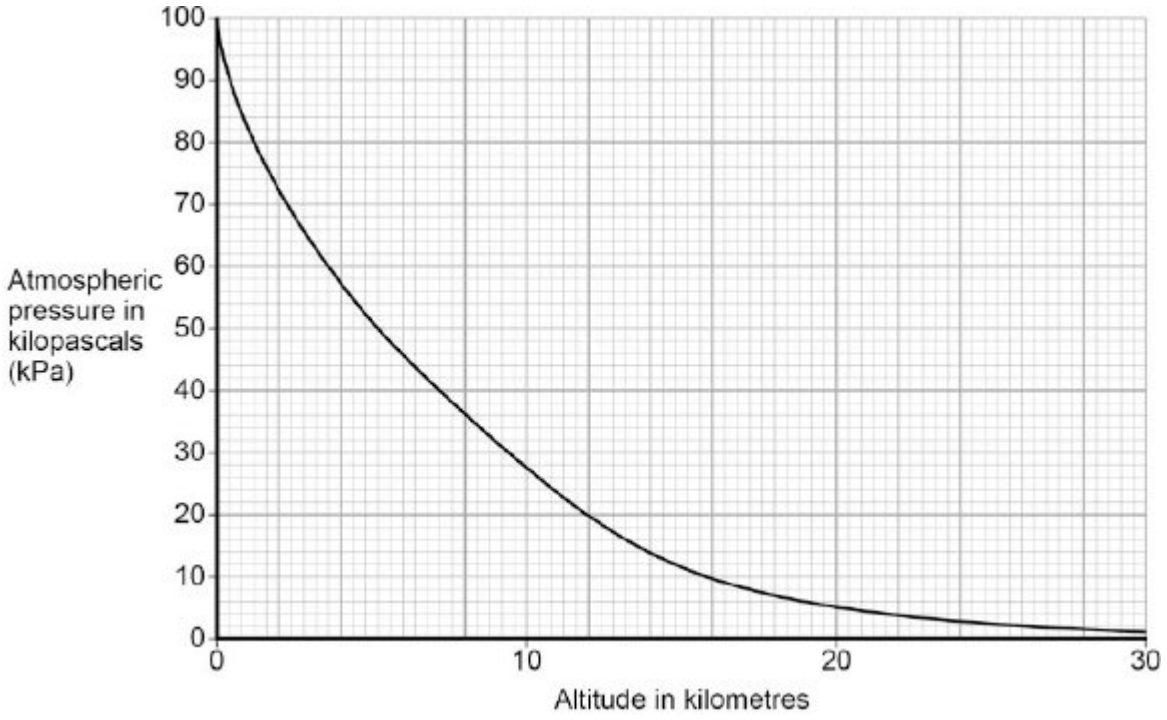
(Total 11 marks)

Q5.

Figure 1 shows how atmospheric pressure varies with altitude.

Figure 1

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(a) Explain why atmospheric pressure decreases with increasing altitude.

(3)

(b) When flying, the pressure inside the cabin of an aircraft is kept at 70 kPa.

The aircraft window has an area of 810 cm^2.

Use data from **Figure 1** to calculate the resultant force acting on an aircraft window when the aircraft is flying at an altitude of 12 km.

Give your answer to two significant figures

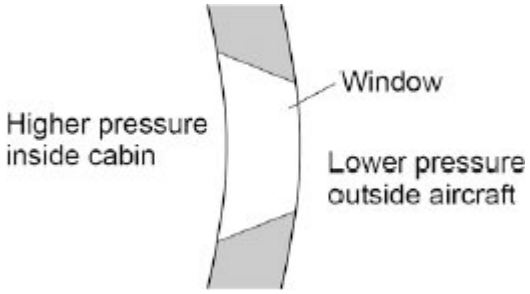
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Resultant force = _____ N

(5)

(c) **Figure 2** shows the cross-section of one type of aircraft window.

Figure 2



Explain why the window has been designed to have this shape.

_____

_____

_____

(2)

(Total 10 marks)

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