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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Pressure

Paper 1 — Multiple-Choice Questions (topical compilation)

Fahad H. Ahmad

Contact: **+92 323 509 4443**

M.Eng NUS Singapore · B.Eng NUST · 15+ years of teaching experience in Singapore, UAE & Pakistan · 60,000+ subscribers and 20 million+ video lecture views.

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PRESSURE

PAPER 1 QUESTIONS

Pressure and force

QUESTION # 1: M/J 16 P12

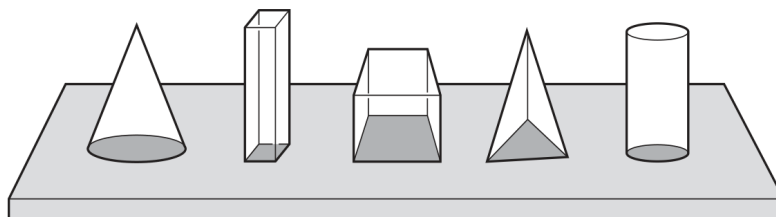
- 11 A block of weight W rests on a side of area A . The gravitational field strength is g .

What is the pressure exerted on the ground due to the block?

- A WA B $\frac{W}{A}$ C $\frac{WA}{g}$ D $\frac{W}{g}$

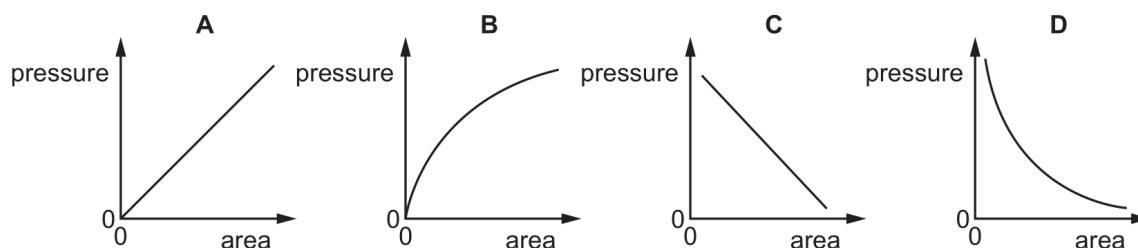
QUESTION # 2: M/J 18 P11

- 14 Five blocks have the same mass but different base areas. They all rest on a horizontal table.



A graph is plotted to show the relationship between the pressure exerted on the table and the base area of the block.

Which graph shows this relationship?



QUESTION # 3: M/J 18 P11

- 15 Each tyre of a car has an area of 100 cm^2 in contact with the ground.

The car has a mass of 1600 kg . The weight of the car is equally distributed amongst the four tyres.

The gravitational field strength g is 10 N/kg .

What is the pressure exerted on the ground?

- A 4.0 N/cm^2 B 16 N/cm^2 C 40 N/cm^2 D 160 N/cm^2

QUESTION # 4: M/J 19 P11

- 11** A garden table weighs 60 N and has a top surface of area 2.0 m^2 . It is raining and the rain produces a pressure of 4.0 N/m^2 on the table.

Ignoring the pressure of the atmosphere, what is the force exerted by the table on the ground?

- A** 52 N **B** 58 N **C** 62 N **D** 68 N

QUESTION # 5: O/N 16 P11

- 12** The pressure of the atmosphere is 100 000 Pa.

What force does the atmosphere exert on the upper surface of a pond of surface area 20 m^2 ?

- A** 5000 N **B** 100 000 N **C** 100 020 N **D** 2 000 000 N

QUESTION # 6: O/N 18 P12

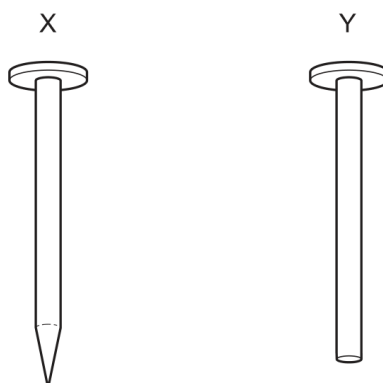
- 14** A rectangular block of metal has weight 6.0 N and measures $3.0\text{ cm} \times 4.0\text{ cm} \times 5.0\text{ cm}$.

What is the smallest pressure that it can exert when resting on a horizontal surface?

- A** 0.10 N/cm^2 **B** 0.30 N/cm^2 **C** 0.40 N/cm^2 **D** 0.50 N/cm^2

QUESTION # 7: O/N 19 P12

- 14** Nail X is tapped into wood. Nail Y is tapped into the same wood using the same force.



Which nail moves furthest into the wood and why?

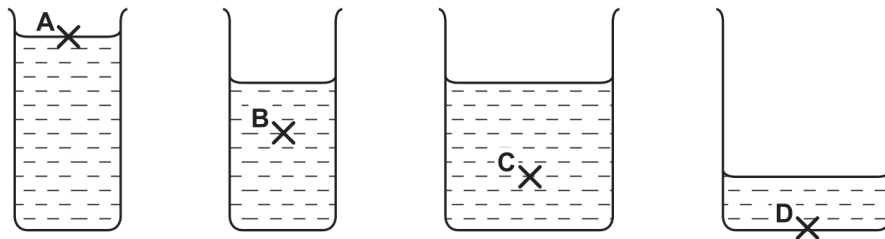
	nail	why
A	X	X produces greater pressure on the wood
B	X	X produces smaller pressure on the wood
C	Y	Y produces greater pressure on the wood
D	Y	Y produces smaller pressure on the wood

Pressure in liquids

QUESTION # 1: M/J 16 P11

15 Four beakers contain the same liquid.

At which point is the pressure the greatest?



QUESTION # 2: M/J 16 P11

16 Water of depth 10 m exerts a pressure equal to atmospheric pressure.

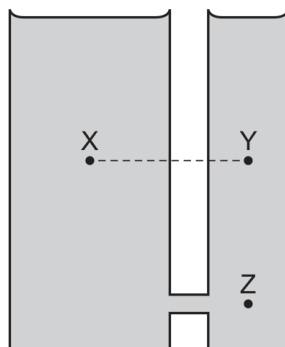
An air bubble rises to the surface of a lake which is 20 m deep. When the bubble reaches the surface, its volume is 6.0 cm^3 .

What is the volume of the air bubble at the bottom of the lake?

- A** 2.0 cm^3 **B** 3.0 cm^3 **C** 12 cm^3 **D** 18 cm^3

QUESTION # 3: M/J 17 P11

16 Two cylindrical vessels are joined together and filled with water as shown.

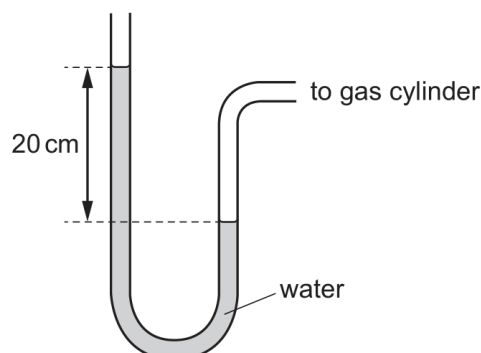


How does the pressure at point X compare to the pressure at points Y and Z?

	compared to Y	compared to Z
A	pressure at X is higher	pressure at X is lower
B	pressure at X is higher	pressure at X is the same
C	pressure at X is the same	pressure at X is lower
D	pressure at X is the same	pressure at X is the same

QUESTION # 4: M/J 17 P11

17 The pressure of a gas in a cylinder is measured using a water manometer.



The density of water is 1000 kg/m^3 and the gravitational field strength g is 10 N/kg .

What is the pressure, above atmospheric pressure, of the gas in the cylinder?

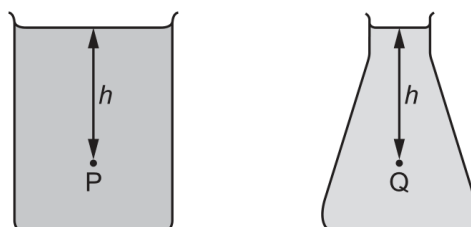
- A** 200 Pa **B** 2000 Pa **C** 20 000 Pa **D** 200 000 Pa

QUESTION # 5: M/J 17 P12

18 Two glass containers filled with different liquids are placed next to each other.

Point P is a distance h below the surface of the liquid in one container.

Point Q is a distance h below the surface of the liquid in the other container.



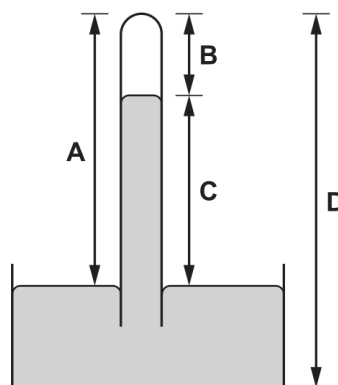
Why is the pressure at P different from the pressure at Q?

- A** The atmospheric pressure is different at P.
- B** The densities of the liquids are different.
- C** The gravitational field strength is different at P.
- D** The shapes of the containers are different.

QUESTION # 6: M/J 18 P11

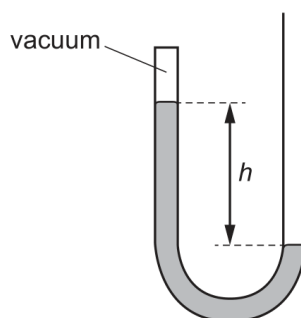
16 The diagram shows a simple mercury barometer.

Which height is a measure of the atmospheric pressure?



QUESTION # 7: M/J 19 P11

- 12 The diagram shows a manometer containing mercury that is sealed at one end.



What happens to the distance h when the manometer is taken higher up a mountain?

- A It decreases, because atmospheric pressure decreases with height.
- B It decreases, because atmospheric pressure increases with height.
- C It increases, because atmospheric pressure decreases with height.
- D It increases, because atmospheric pressure increases with height.

QUESTION # 8: M/J 19 P11

- 13 Some doctors measure blood pressure by using a mercury manometer. Blood pressure varies by 5.6 kPa as a heart beats.

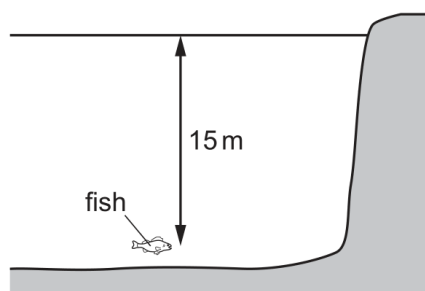
The density of mercury is $14\,000\text{ kg/m}^3$ and the gravitational field strength g is 10 N/kg .

What is the change in the height difference between the levels in the manometer during a heartbeat?

- A 40 mm B 80 mm C 400 mm D 800 mm

QUESTION # 9: M/J 20 P11

- 14 A fish is swimming 15 m below the surface of a lake, as shown.



The density of the water is 1000 kg/m^3 .

Atmospheric pressure is $100\,000 \text{ Pa}$.

The acceleration of free fall g is 10 m/s^2 .

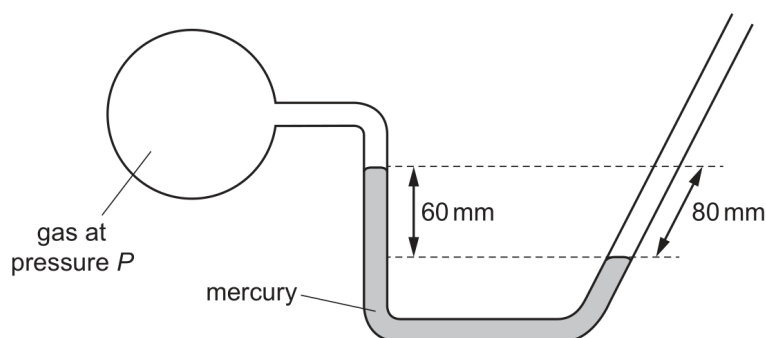
What is the total pressure on the fish?

- A** $50\,000 \text{ Pa}$ **B** $120\,000 \text{ Pa}$ **C** $150\,000 \text{ Pa}$ **D** $250\,000 \text{ Pa}$

QUESTION # 10: M/J 20 P11

- 15 The diagram shows a mercury manometer. The tube is open to the atmosphere on the right-hand side.

The left-hand side is connected to a container containing a gas at pressure P .



Atmospheric pressure on its own supports a column of mercury of height 756 mm .

Which height of column does pressure P on its own support?

- A** 676 mm of mercury
B 696 mm of mercury
C 816 mm of mercury
D 836 mm of mercury

QUESTION # 11: M/J 20 P12

14 An object is placed at different depths in liquids of different densities.

In which liquid and at what depth is the pressure on the object the greatest?

	<u>density of liquid</u> kg/m ³	depth / m
A	1000	4.0
B	1000	10
C	1200	4.0
D	1200	10

QUESTION # 12: O/N 16 P11

13 Oil of density $8.5 \times 10^2 \text{ kg/m}^3$ is stored in a large tank.

The gravitational field strength g is 10 N/kg .

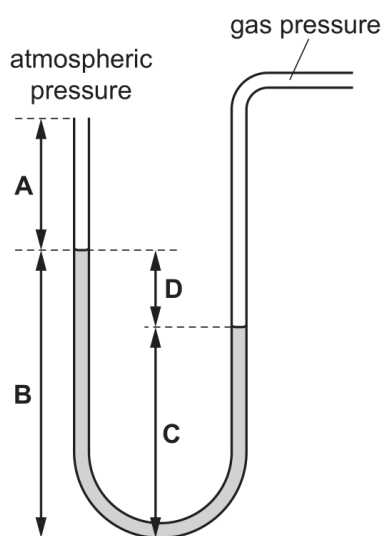
What is the pressure due to the oil 6.0 m below its surface?

- A** 51 Pa **B** 510 Pa **C** 5100 Pa **D** 51 000 Pa

QUESTION # 13: O/N 16 P12

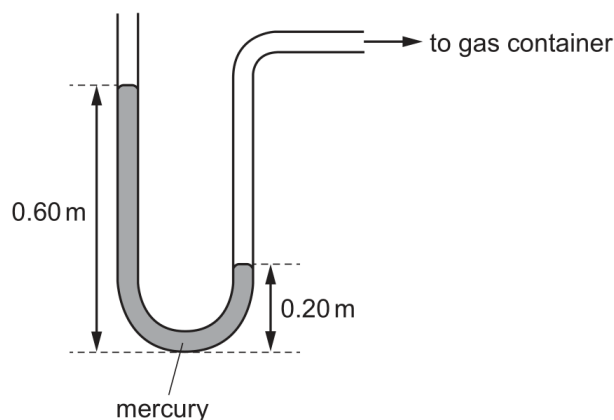
17 The pressure of the gas supply in the laboratory is measured using a manometer.

Which distance gives the pressure of the gas above atmospheric pressure?



QUESTION # 14: O/N 17 P11

- 8 The diagram shows a mercury manometer connected to a gas container.



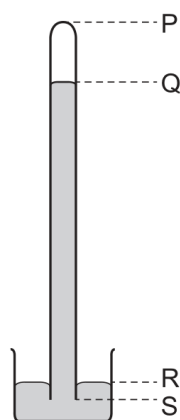
The density of mercury is $14\,000\text{ kg/m}^3$. The gravitational field strength g is 10 N/kg .

What is the pressure difference between the gas in the container and the atmosphere?

- A** 28 000 Pa **B** 42 000 Pa **C** 56 000 Pa **D** 84 000 Pa

QUESTION # 15: O/N 18 P11

- 11 A long tube, full of mercury, is inverted in a small dish of mercury.



The mercury level in the tube falls, leaving a vacuum at the top.

When the atmospheric pressure decreases, which length decreases?

- A** PQ **B** PS **C** QR **D** RS

QUESTION # 16: O/N 18 P12

13 Different liquids are poured into four different containers.

In which container does the liquid produce the greatest pressure at the bottom of the container?

	area of base / cm ²	density of liquid g/cm ³	depth of liquid / cm
A	10	1.3	50
B	20	0.80	80
C	40	1.0	60
D	50	0.92	75

QUESTION # 17: O/N 19 P11

15 The list gives the symbols for some physical quantities.

acceleration of free-fall g

atmospheric pressure P

density of water ρ

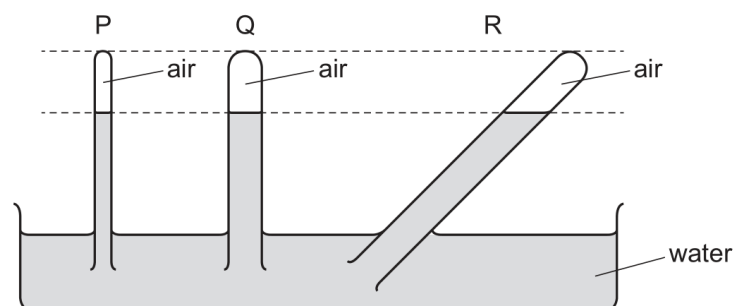
depth of water h

Which quantities from the list are used to calculate the total pressure at the bottom of a lake?

- A** g , h , P and ρ
- B** g , h and P only
- C** h , P and ρ only
- D** g , h and ρ only

QUESTION # 18: O/N 19 P12

12 The diagram shows three tubes P, Q and R. Each tube contains air trapped by a water column.

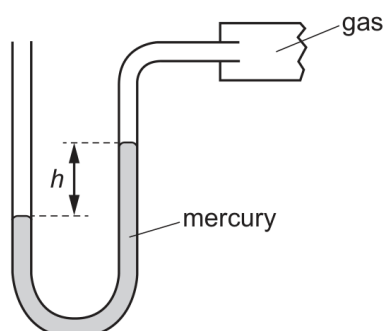


Which statement is correct?

- A The pressure of the trapped air is equal in tubes P, Q and R.
- B The pressure of the trapped air is greatest in tube Q.
- C The pressure of the trapped air is greatest in tube R.
- D The pressure of the trapped air is greatest in tube P.

QUESTION # 19: O/N 20 P11

13 A mercury manometer is used to measure the pressure of a gas.



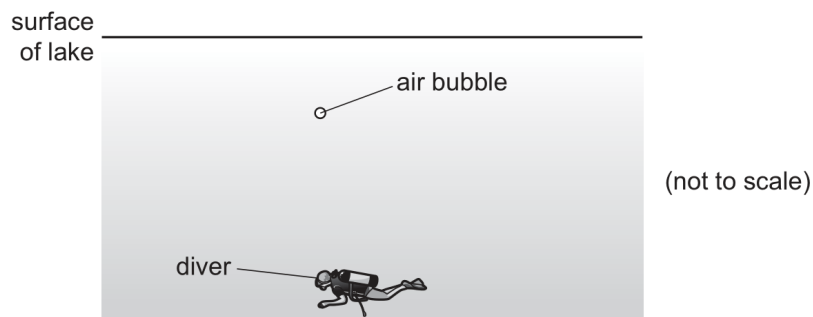
The pressure of the atmosphere is p_0 and the density of mercury is ρ .

What is the pressure of the gas?

- A $p_0 - h\rho g$
- B $p_0 + h\rho g$
- C p_0
- D $h\rho g$

QUESTION # 20: O/N 20 P12

- 12 The diagram shows a diver 20 m below the surface of a lake. The total pressure at this depth is $3.0 \times 10^5 \text{ Pa}$.



An air bubble has a volume of 0.60 cm^3 as it leaves the diver. It rises to the surface of the lake where the pressure is $1.0 \times 10^5 \text{ Pa}$. The temperature of the air in the bubble remains constant.

What is the volume of the air bubble at the surface of the lake?

- A** 0.20 cm^3 **B** 0.60 cm^3 **C** 1.8 cm^3 **D** 2.4 cm^3

Pressure in gases

QUESTION # 1: M/J 16 P11

- 16 Water of depth 10 m exerts a pressure equal to atmospheric pressure.

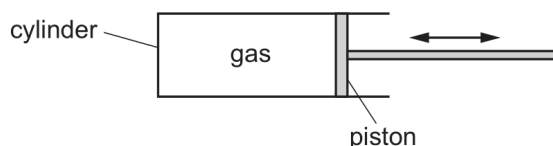
An air bubble rises to the surface of a lake which is 20 m deep. When the bubble reaches the surface, its volume is 6.0 cm^3 .

What is the volume of the air bubble at the bottom of the lake?

- A 2.0 cm^3 B 3.0 cm^3 C 12 cm^3 D 18 cm^3

QUESTION # 2: M/J 17 P12

- 20 A fixed mass of gas is enclosed in a cylinder with a movable piston.



The gas is initially at pressure p_1 and has a volume V_1 .

The temperature is kept constant. The piston is moved so that the pressure becomes p_2 and the volume becomes V_2 .

Which equation is correct?

- A $\frac{p_1}{V_1} = \frac{p_2}{V_2}$
- B $\frac{p_1}{p_2} = \frac{V_1}{V_2}$
- C $p_1 V_1 = p_2 V_2$
- D $p_1 V_2 = p_2 V_1$

QUESTION # 3: M/J 18 P12

- 18 A sealed packet containing air and a snack is purchased at an airport. The sealed packet is taken on board an aircraft. During the flight the packet becomes larger.

What causes the packet to become larger?

- A The density of the air inside the packet increases.
- B The mass of the packet increases.
- C The pressure of the air outside the packet decreases.
- D The volume of the air inside the packet decreases.

QUESTION # 4: M/J 19 P12

- 15 The pressure on the gas contained in a sealed syringe is slowly doubled. The volume of the gas halves.

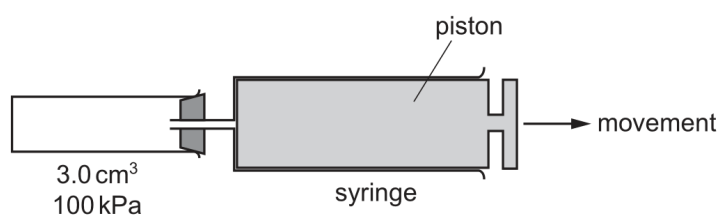
What **must** be true about the density and the temperature of the gas?

	density	temperature
A	decreases	increases
B	increases	decreases
C	increases	remains constant
D	remains constant	increases

QUESTION # 5: M/J 20 P12

- 15 A small vessel of volume 3.0 cm^3 contains air at a pressure of 100 kPa.

The small vessel is connected to a syringe. The piston is fully inserted into the syringe.



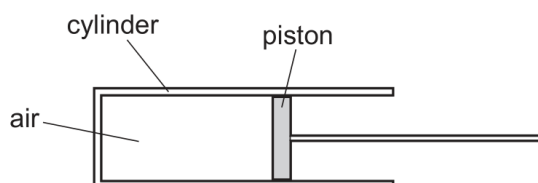
The piston is moved slowly to the right so that the air in the syringe has a volume of 12 cm^3 . The temperature of the air does not change.

What is the pressure of the air in the syringe?

- A 20 kPa B 25 kPa C 80 kPa D 100 kPa

QUESTION # 6: O/N 16 P11

- 14 Air is trapped in a cylinder by a piston.



The piston is pushed further into the cylinder.

How do the pressure and the volume of the air in the syringe change?

	pressure	volume
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

QUESTION # 7: O/N 16 P11

- 15 Which statement explains how a pressure is exerted by a gas on a container?

- A** Gas molecules collide with other gas molecules in the container.
- B** Gas molecules collide with the walls of the container.
- C** Gas molecules exert strong attractive forces on each other.
- D** Gas molecules exert strong repulsive forces on each other.

QUESTION # 8: O/N 17 P12

- 11 A gas syringe contains a fixed mass of air. The volume of the air is 240 cm^3 and it exerts a pressure of $5.0 \times 10^4\text{ Pa}$. The air is slowly compressed, keeping the temperature constant, until the pressure is $1.5 \times 10^5\text{ Pa}$.

What is the final volume of air?

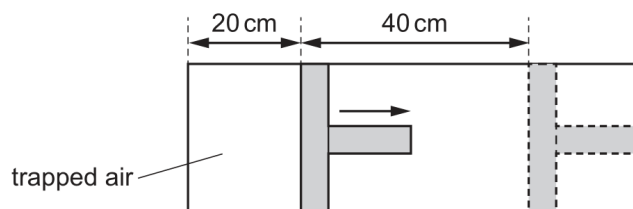
- A** 72 cm^3 **B** 80 cm^3 **C** 720 cm^3 **D** 800 cm^3

QUESTION # 9: O/N 18 P11

- 10** Air is trapped in a cylinder by a piston. The pressure of the air is p and the length of the air column is 20 cm.

The piston is moved outwards until the length of the air column has increased by 40 cm.

The temperature of the air remains constant.

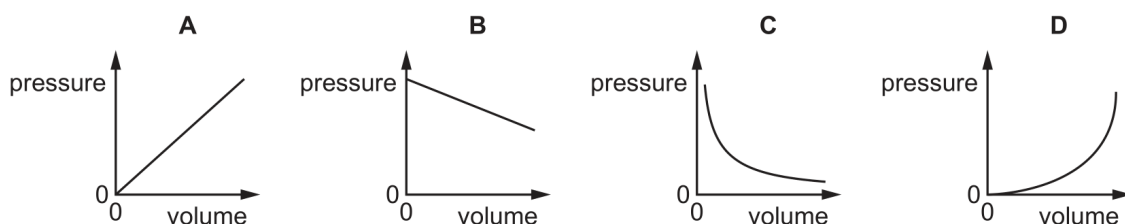


What is the new air pressure?

- A** $\frac{p}{2}$ **B** $\frac{p}{3}$ **C** $2p$ **D** $3p$

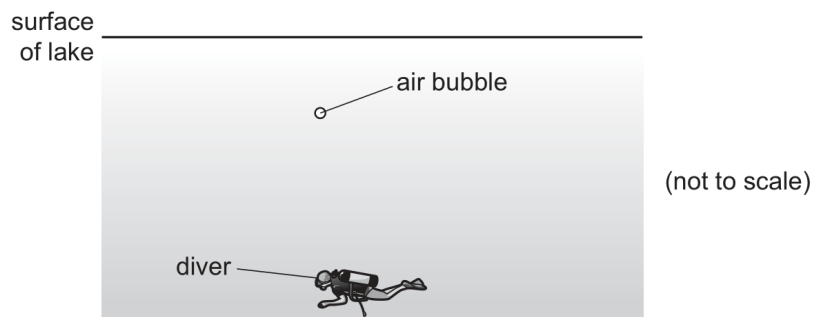
QUESTION # 10: O/N 19 P11

- 16** Which graph shows the relationship between the pressure and the volume of a fixed mass of gas at constant temperature?



QUESTION # 11: O/N 20 P12

- 12** The diagram shows a diver 20 m below the surface of a lake. The total pressure at this depth is $3.0 \times 10^5 \text{ Pa}$.



An air bubble has a volume of 0.60 cm^3 as it leaves the diver. It rises to the surface of the lake where the pressure is $1.0 \times 10^5 \text{ Pa}$. The temperature of the air in the bubble remains constant.

What is the volume of the air bubble at the surface of the lake?

- A** 0.20 cm^3 **B** 0.60 cm^3 **C** 1.8 cm^3 **D** 2.4 cm^3