



2026 Sec 4 Physics Pressure Assignment 9 A09 Answers

Note:

- Always state the formula or equation used!
- Show all working steps in calculation or reasoning.

1

(a) Pressure = $F / A = 50 \times 10 / (1.2^2) = 347 \text{ Pa}$

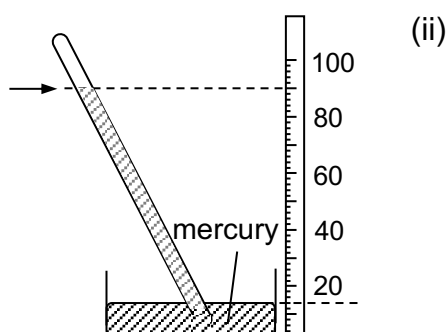
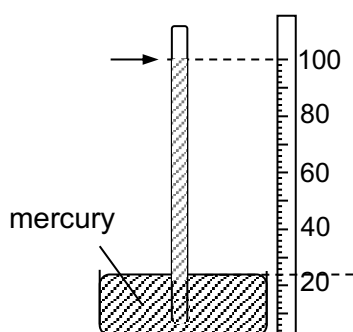
(b) Pressure = $F / A = 2.0 / (150 \times 10^{-4}) = 133 \text{ Pa}$

(c) For the box to accelerate to the right, the normal contact force by the man on the box is now greater than the frictional force. Since normal contact force increases while the contact area remains the same, the pressure increases.

Note: Do not state that there is an “additional push force” or “extra force”.

- 2 (a) (i) $(90 \text{ cm} - 14 \text{ cm}) \text{ Hg} = 76 \text{ cm Hg}$
 (ii) $(90 \text{ cm} - 40 \text{ cm}) \text{ Hg} = 50 \text{ cm Hg}$

(b) (i)



- 3 (a) $P = 75.0 \text{ cm Hg}$

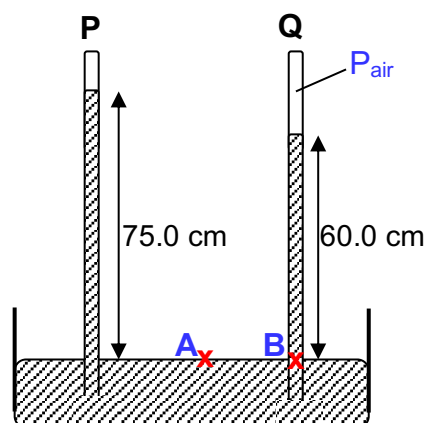
$$P = h\rho g = 0.750 \text{ m} \times 13600 \text{ kg m}^{-3} \times 10 \text{ N kg}^{-1} = 1.02 \times 10^5 \text{ Pa}$$

Note:

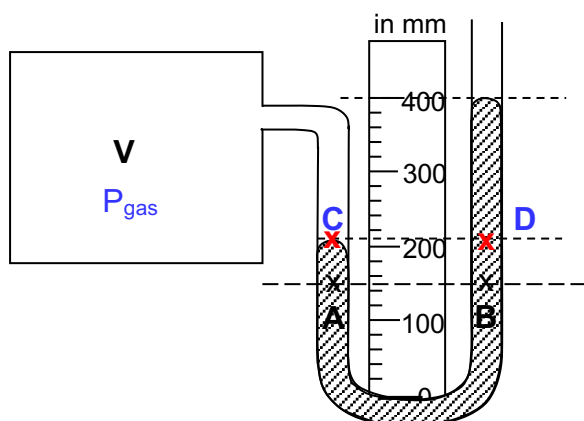
- tube P is like a normal mercury barometer, the space at upper end is a vacuum ($P = 0$)
- tube Q is like a faulty barometer, with air trapped at the upper end space (P_{air})
- Consider two points **A** & **B** at the same level of the mercury in the container which are at the same pressure.

$$\begin{aligned} \text{(b)} \quad P_A &= P_B \\ 75.0 \text{ cm Hg} &= P_{\text{air}} + 60.0 \text{ cm Hg} \\ P_{\text{air}} &= 15.0 \text{ cm Hg} \end{aligned}$$

$$\begin{aligned} P_{\text{air}} &= h \rho_{\text{Hg}} g \\ &= 0.150 \text{ m} \times 13600 \text{ kg m}^{-3} \times 10 \text{ N kg}^{-1} \\ &= 2.04 \times 10^4 \text{ Pa} \end{aligned}$$



4



(a)

Note:

- Consider two points **C** & **D** at the same level of the mercury in the manometer which are at the same pressure (choose the lower of the 2 levels).

$$P_C = P_D$$

$$P_{\text{gas}} = P_{\text{atm}} + (40 - 21) \text{ cm Hg}$$

$$= 75 \text{ cm Hg} + (40 - 21) \text{ cm Hg} = 94 \text{ cm Hg}$$

- (b) $400 - 250 \text{ mm} = 150 \text{ mm}$ mark
refer to diagram for points A and B

5 (a) $P_A = 76 \text{ cm Hg}$

(b)

Note:

- Consider a point **C** (label this point) at the same level of the mercury as point **B** so both points are at the same pressure.

$$P_B = 76 + 22 = 98 \text{ cm Hg}$$

- (c) Left tube level: $(42 + 5) \text{ cm mark} = 47 \text{ cm mark}$
Right tube level: $(20 - 5) \text{ cm mark} = 15 \text{ cm mark}$

(d) (i) **32 cm mark**

- (ii) Since the gas pressure remains constant, the excess pressure remains constant i.e. 22 cm Hg. Since the **excess pressure is directly proportional to the height difference**, the height difference between the left and right arm remains at 22 cm.

