

Physics Year 11

Homework 08

Revision on Density and Pressure

Q: 1, 2 and 5

1. a) i.

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

ii. $p = \frac{F}{A}$ so $F = p \times A = 270 \times 10^3 \text{ Pa} \times 0.016 \text{ m}^2 = \mathbf{4320 \text{ N}}$

b) The air particles are moving randomly inside the tyre and collide with each other as well as the walls of the tyre. As they hit the tyre they exert a force which in turn can be expressed per unit of area hence pressure.

c) As temperature is rising within the air of the tyre, the molecules receive this thermal energy and turn it to increase of their kinetic energy. More kinetic energy means more collisions, more force so more pressure in the tyre.

2. a) i. $\text{density} = \frac{\text{mass}}{\text{volume}}$

ii. $\rho_{\text{brass}} = \frac{138 \text{ g}}{16.3 \text{ cm}^3} = \mathbf{8.47 \text{ g/cm}^3}$ OR $\mathbf{847 \text{ kg/m}^3}$.

b) **A: incorrect and too small results.**

5. a) See Question 1 b).

b) i. and ii. See Question 1 c).

c) We know by Boyle's Law that:

$$p_1 V_1 = p_2 V_2$$

if the air within the can was released to atmospheric pressure then we have:

$$5 \times \cancel{p_{\text{atm}}} 400 \text{ cm}^3 = \cancel{p_{\text{atm}}} V_2 \quad (\text{where } p_{\text{atm}} = 10^5 \text{ Pa})$$

$$\text{So } V_2 = \mathbf{2000 \text{ cm}^3}.$$