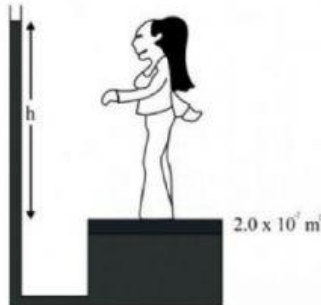
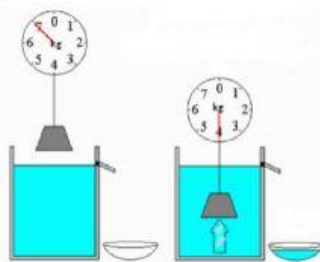


19. In the diagram below a person of mass 65 kg is standing on a platform over the piston of area $2.0 \times 10^{-2} \text{ m}^2$. What height of water, h will just support her? Assume that the density of water is 1000 kg m^{-3} .



20. From the figure below, find the buoyant force acting on the object.



$$F_B = W_1 - W_2$$

$$\text{Mass} = \quad \text{kg}$$

$$= \quad \text{kg}$$

$$\therefore F_B = \quad \times \quad \text{N}$$

21. The volume of a 0.75 kg sealed packet is $3.5 \times 10^{-4} \text{ m}^3$. If the density of water is 1000 kg m^{-3} ,

- Will the packet float or sink in water?
- Find the volume of the water displaced by this packet.
- Find the buoyant force
- Find the mass of water displaced by this packet.

$$m = \quad \text{kg}$$

$$V = 3.5 \times 10^{-4} \text{ m}^3 @$$

$$= \quad \text{m}^3$$

Answers

$$i) \rho = \quad$$

$$= \quad$$

$$= \quad \text{kg m}^{-3}$$

So the packet will

$$ii) V_{\text{water}} = V_{\text{obj}}$$

$$= \quad \text{m}^3$$

$$iii) F_B = \rho_w V_w g$$

$$= \quad \times \quad \times$$

$$= \quad \text{N}$$

$$iv) \rho = \quad$$

$$m = V \rho$$

$$= \quad \times$$

$$= \quad \text{kg}$$

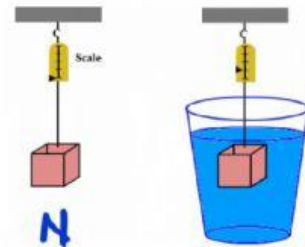
22. A stone weight 160N. When it is fully immersed in the liquid A, its apparent weight is 115N. Calculate the density of the liquid A if the volume of the liquid A displaced by the stone is 3640cm³.

$$\begin{aligned}
 W_1 &= N \\
 W_2 &= N \\
 V &= \text{cm}^3 \times \frac{\text{m}^3}{1000 \text{ cm}^3} \\
 &= \text{m}^3 \\
 F_B &= W_1 - W_2 = \rho V g \\
 &= \rho \times \text{m}^3 \times 10 \\
 &= \rho \times 0.0364 \\
 \therefore \rho &= \text{kg m}^{-3}
 \end{aligned}$$

23. An object of mass 0.2kg sinks in cooking oil of density 0.92gcm⁻³. When the object fully immersed in the oil, it has been apparent weight of 0.94N. Calculate its density.

$$\begin{aligned}
 m &= 0.2 \text{ kg} \\
 W_1 &= m \times g \\
 &= 0.2 \times 10 \\
 &= 2 \text{ N} \\
 \rho_{\text{oil}} &= 0.92 \text{ g cm}^{-3} \\
 &= 0.92 \times \frac{\text{kg}}{1000} \times \frac{\text{m}^3}{1000 \text{ cm}^3} \\
 &= 920 \text{ kg m}^{-3} \\
 W_2 &= N \\
 F_B &= W_1 - W_2 \\
 &= 2 - 0.94 \\
 &= 1.06 \text{ N} \\
 F_B &= \rho_{\text{oil}} \cdot V_{\text{oil}} \cdot g \\
 &= 920 \times V_{\text{oil}} \times 10 \\
 V_{\text{oil}} &= \frac{1.06}{9200} \text{ m}^3 \\
 V_{\text{obj}} &= V_{\text{oil}} \\
 \rho_{\text{obj}} &= \frac{m}{V} = \frac{0.2}{\frac{1.06}{9200}} = 1720 \text{ kg m}^{-3}
 \end{aligned}$$

24. Figure shows the weight of block W in the air is 6N. The block is immersed in a beaker of water and its weight becomes X N. Given that the density of block is 2x10³ kgm⁻³. Find the value of X.



$$\begin{aligned}
 W_1 &= 6 \text{ N} \\
 W_2 &= X \\
 \rho_{\text{block}} &= 2 \times 10^3 \text{ kg m}^{-3} \\
 &= 2000 \text{ kg m}^{-3} \\
 \rho_{\text{water}} &= 1000 \text{ kg m}^{-3} \\
 V_{\text{water}} &= V_{\text{block}} \text{ (because the block fully immersed in water)} \\
 W_{\text{block}} &= mg \\
 &= m \times 10 \\
 m_{\text{block}} &= \frac{W_1}{g} = \frac{6}{10} = 0.6 \text{ kg} \\
 V_{\text{block}} &= \frac{m}{\rho} = \frac{0.6}{2000} = 0.0003 \text{ m}^3 \\
 F_B &= \rho_{\text{water}} V_{\text{water}} g \\
 &= 1000 \times 0.0003 \times 10 \\
 &= 3 \text{ N} \\
 F_B &= W_1 - W_2 \\
 &= 6 - X \\
 \text{So } X &= 6 - 3 = 3 \text{ N}
 \end{aligned}$$