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Solution 59

(a) Those substances which can flow easily are called fluids. All the liquid and gases are fluids, like water, air etc.

(b) Archimedes' Principle :

When an object is wholly (or partially) immersed in a liquid, it experiences a buoyant force (or upthrust) which is equal to the weight of liquid displaced by the object.

Buoyant force on an object = weight of liquid displaced by that object

(c) If the buoyant force exerted by the liquid is less than the weight of the object, the object will sink in the liquid. If the buoyant force exerted by the liquid is equal to or greater than the weight of the object, the object will float in the liquid.

Solution 60

(a) A floating boat displaces water equal to its own weight. This displaced water exerts buoyant force to balance the weight of boat and keep it afloat.

(b) (i) Mass = 96 g

Volume =  $12\text{cm}^3$

$$\text{Density of substance} = \frac{\text{mass of substance}}{\text{volume of substance}}$$

$$\text{Density of substance} = \frac{96}{12} = 8\text{g/cm}^3$$

(ii) Mass =  $96 \times 10^{-3}\text{kg}$

Volume =  $12 \times 10^{-6}\text{m}^3$

$$\text{Density of substance} = \frac{\text{mass of substance}}{\text{volume of substance}}$$

$$\text{Density of substance} = \frac{96 \times 10^{-3}}{12 \times 10^{-6}} = 8 \times 10^3\text{kg/m}^3$$

Solution 61

Weight of elephant = 40000N

Area of one foot =  $1000\text{cm}^2 = 1000 \times 10^{-4}\text{m}^2$

Weight of girl = 400N

Area of heel of girl =  $1\text{cm}^2 = 1 \times 10^{-4}\text{m}^2$

(a) Elephant has a larger weight of 40000N, therefore, elephant exerts a larger force on the ground. Elephant exerts a larger force on the ground by 40000N - 400 N = 39600N.

(b) Weight of elephant = 40000N

Area of one foot =  $1000\text{cm}^2 = 1000 \times 10^{-4}\text{m}^2$

Weight of elephant=40000N

Area of one foot =1000 cm<sup>2</sup>= 1000 x 10<sup>-4</sup>m<sup>2</sup>

Weight of girl=400N

Area of heel of girl =1 cm<sup>2</sup>=1 x 10<sup>-4</sup>m<sup>2</sup>

(a) Elephant has a larger weight of 40000N, therefore, elephant exerts a larger force on the ground. Elephant exerts a larger force on the ground by 40000N - 400 N=39600N.

(b) Weight of elephant = 40000N

Area of one foot =1000cm<sup>2</sup>= 1000 x 10<sup>-4</sup>m<sup>2</sup>

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

$$\text{Pressure} = \frac{40000}{1000 \times 10^{-4}} = 400000 \text{ N/m}^2$$

(c) Weight of the girl = 400N

Area of heel of girl = 1 cm<sup>2</sup> = 1 x 10<sup>-4</sup>m<sup>2</sup>

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

$$\text{Pressure} = \frac{400}{1 \times 10^{-4}} = 4000000 \text{ N/m}^2$$

(d) Girl exerts a larger pressure on the ground.

(e)

$$\begin{aligned} \text{Ratio} &= \frac{\text{Pressure exerted by the girl}}{\text{Pressure exerted by the elephant}} \\ &= \frac{4000000}{400000} = \frac{10}{1} \end{aligned}$$

The pressure exerted by girl is 10 times greater than that exerted by the elephant.

\*\*\*\*\* END \*\*\*\*\*