Question 10.

A cubical tank of side 1 m is filled with 800 kg of a liquid. Find: (i) the volume of tank, (ii) the density of liquid in kg m^{-3}.

Answer:

(i) Volume of a cube = side × side × side

side = 1 m

$\therefore$ volume = 1 m × 1 m × 1 m = 1 m^3

(ii) Density of liquid in kg m^{-3} = $\frac{\text{Mass (M)}}{\text{Volume (V)}}$

Mass = 800 kg

Volume = 1 m^3

$\therefore$ Density = $\frac{800}{1\ m^3}$ kg = 800 kg m^{-3}

Question 11.

A block of iron has dimensions 2 m × 0.5 m × 0.25 m. The density of iron is 7.8 g cm^{-3}. Find the mass of block.

Answer:

Given, l = 2m

b = 0.5 m

$h = 0.25$ m

Density of iron = 7.8 g cm^{-3} = 7.8 × 1000 kg m^{-3} = 7800 kg m^{-3}

Volume of block = $l \times b \times h$

$= 2 \times 0.5 \times 0.25 = 0.25\ m^3$

From relation $d = \frac{M}{V}$

$\therefore$ Mass of iron block $M = V \times d$

$= 0.25 \times 7800$ kg m^{-3}

$= 1950$ kg

Question 12.

The mass of a lead piece is 115 g. When it is immersed into a measuring cylinder, the water level rises from 20 ml mark to 30 ml mark.

Find:

(i) the volume of the lead piece,

(ii) the density of the lead in kg m^{-3}.

Answer:

Ans. Given, $M = 115$ g

$V_1 = 20$ ml, $V_2 = 30$ ml

(i) Volume of lead piece $V = V_2 - V_1$

$= 30 \text{ ml} - 20 \text{ ml}$

$= 10 \text{ ml or } 10 \text{ cm}^3 \; [\because 1 \text{ ml} = 1 \text{ cm}^3]$

(ii) Density of lead piece $d = \frac{M}{V}$

$= \frac{115}{10 \text{ cm}^3} = 11.5 \text{ g cm}^{-3}$

(since. $1 \text{ g cm}^{-3} = 1000 \text{ kg}^{-3}$)

$= 11.5 \times 1000 = 11500 \text{ kg m}^{-3}$

Question 13.

The density of copper is 8.9 g cm^{-3}. What will be its density in kg m^{-3} ?

Answer:

Density of copper $d = 8.9 \text{ g cm}^{-3}$

$= 8.9 \times 1000 \text{ kg m}^{-3}$

$[\because 1 \text{ g cm}^{-3} = 1000 \text{ kg m}^{-3}]$

$= 8900 \text{ kg m}^{-3}$

Question 14.

A car travels a distance of 15 km in 20 minute. Find the speed of the car in (i) km h^{-1}, (ii) m s^{-1}.

Answer:

Distance travelled by car =15 km

Time taken = 20 minutes

(i) Speed of car in km h^{-1}

Convert 20 minutes to hour

$$1 \text{ minute} = \frac{1}{60} \text{ hour}$$

$$\therefore \quad 20 \text{ minutes} = \frac{1 \times 20}{60} = \frac{1}{3} \text{ hour}$$

$$\text{Speed of car} = \frac{\text{Distance}}{\text{Time taken}}$$

$$= \frac{15 \text{ km}}{\frac{1}{3} \text{ h}}$$

$$= 15 \text{ km} \times 3 \text{ h}^{-1} = 45 \text{ km h}^{-1} = 45 \text{ km h}^{-1}$$

(ii) Speed of car in m s^{-1}

Convert 15 km into metres

1 km = 1000 m

15 km = 1000 × 15 = 15000 m ...(i)

Convert minutes into seconds

1 minutes = 60 sec.

20 minutes = 60 × 20 = 1200 sec ...(ii)

$$\text{Speed of car} = \frac{15000 \text{ m}}{1200 \text{ sec}}$$

$$= 12.5 \text{ m s}^{-1}$$

Question 15.

How long a train will take to travel a distance of 200 km with a speed of 60 km h^{-1} ?

Answer:

Distance covered by train = 200 km

Speed of train = 60 km h^{-1}

$$\text{We know speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\Rightarrow \quad 60 = \frac{200}{\text{Time}}$$

$$\text{Time} = \frac{200}{60} = \frac{20}{6} = \frac{10}{3} \text{ hours}$$

$$= 3\frac{1}{3} \text{ hours} = 3 \text{ h} + \frac{1}{3} \text{ hours}$$

$$= 3 \text{ h} + \frac{1}{3} \times 60 \text{ min}$$

$$= 3 \text{ h} + 20 \text{ min}$$

$$= 3\text{h } 20 \text{ min}$$

Question 16.

A boy travels with a speed of 10 m s^{-1} for 30 minute. How much distance does he travel ?

Answer:

Speed of boy = 10 m s^{-1}

Time taken = 30 minutes

speed = distance travelled / time taken

Distance travelled = Speed × Time taken

Convert 30 minutes to seconds

1 minute = 60 sec

30 minute 60 × 30 = 1800 seconds

Putting the value of speed and time we get

Distance travelled = 10 ms^{-1} × (1800 sec) = 18000 m

= 18000 metre or 18 km Ans.

Question 17.

Express 36 km h^{-1} in m s^{-1}

Answer:

$$36 \text{ km h}^{-1} = \frac{36 \times 1000 \text{ m}}{60 \times 60}$$

$$= 10 \text{ m s}^{-1}$$

Question 18.

Express 15 m s^{-1} in km h^{-1}.

Answer:

$$1 \text{ metre} = \frac{1}{1000} \text{ km}$$

$$15 \text{ metre} = \frac{15}{1000} \text{ km}$$

$$1 \text{ second} = \frac{1}{3600} \text{ hr}$$

$$\text{Here, Distance} = \frac{15}{1000} \text{ km}$$

$$\text{Time taken} = \frac{1}{3600} \text{ hr.}$$

$$\text{Speed} = \frac{\text{Distance}}{\text{Time taken}}$$

$$= \frac{\frac{15}{1000}}{\frac{1}{3600}} = \frac{15}{1000} \times \frac{3600}{1}$$

$$= 54 \text{ km h}^{-1}$$