



## C. Numericals

### Question 1.

A car covers a distance of 160 km between two cities in 4 h. What is the average speed of the car ?

#### Answer:

Distance = 160 km

Time taken = 4h

Speed = ?

Speed = Distance covered / Time taken

= 160km / 4h = 40 km h<sup>-1</sup>

### Question 2.

A train travels a distance of 300 km with an average speed of 60 km h<sup>-1</sup>. How much time does it take to cover the distance?

#### Answer:

Speed = 60 km h<sup>-1</sup>

Distance covered = 300 km

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

$$\therefore \text{Time taken} = \frac{\text{Distance covered}}{\text{speed}}$$

$$= \frac{300 \text{ km}}{60 \text{ km h}^{-1}} = 5\text{h}$$

### Question 3.

A boy travels with an average speed of 10 m s<sup>-1</sup> for 20 min. How much distance does he travel ?

#### Answer:

Average speed of boy = 10 m s<sup>-1</sup>

Time taken = 20 min

Distance travelled = Speed × Time taken

Convert minutes into seconds

1 minute = 60 sec.

20 minutes = 20 × 60 = 1200 sec.

Distance travelled = 10 m s<sup>-1</sup> × 1200 sec.

= 12000 m Or 12 km

**Question 4.**

A boy walks a distance 30 m in 1 minute and another 30 m in 1.5 minute. Describe the type of motion of the boy and find his average speed in  $\text{m s}^{-1}$ .

**Answer:**

As the speed does not remain constant throughout the journey the motion is non-uniform

Total distance travelled in going and coming back

$$d = 30 \text{ m} + 30 \text{ m} = 60 \text{ m}$$

Total time taken in going and coming back

$$\begin{aligned} t &= 1 \text{ min} + 1.5 \text{ min} = 2.5 \text{ min} \\ &= 2.5 \times 60 \text{ s} = 150 \text{ s} \end{aligned}$$

$$\begin{aligned} \text{Average speed} &= \frac{\text{Total distance travelled}}{\text{Total time of travel}} \\ &= \frac{60 \text{ m}}{150 \text{ s}} = 0.4 \text{ m s}^{-1} \end{aligned}$$

**Question 5.**

A cyclist travels a distance of 1 km in the first hour, 0.5 km in the second hour and 0.3 km in the third hour.

Find the average speed of the cyclist in

(i)  $\text{km h}^{-1}$ , (ii)  $\text{m s}^{-1}$ .

**Answer:**

(a) Distance travelled in first hour = 1 km

Distance travelled in second hour = 0.5 km

Distance travelled in third hour = 0.3 km

Total time taken = 3 hr

Total distance travelled = 1 + 0.5 + 0.3 = 1.8 km

(i) Average speed in  $\text{km h}^{-1}$

$$\text{Speed} = \frac{\text{Distance}}{\text{Time taken}} = \frac{1.8}{3} = 0.6 \text{ km h}^{-1}$$

Average speed in  $\text{m s}^{-1}$

1 km = 1000 m

1.8 km = 1.8 × 1000 m

= 1800 m

1 hour = 3600 seconds

3 hour = 3600 × 3 = 10800 sec.

$$\begin{aligned} \text{Average speed} &= \frac{D}{T} \\ &= \frac{1800}{10800} = 0.167 \text{ m s}^{-1} \end{aligned}$$

### Question 6.

A car travels with speed  $30 \text{ km h}^{-1}$  for 30 minute and then with speed  $40 \text{ km h}^{-1}$  for one hour. Find :

- (a) the total distance travelled by the car
- (b) the total time of travel, and
- (c) the average speed of car

### Answer:

Speed of car for first 30 minutes =  $30 \text{ km h}^{-1}$

Speed of car for next 1 hour =  $40 \text{ km h}^{-1}$

- (a) Total distance travelled by the car

$$\text{Ist case, Speed} = \frac{\text{Distance}}{\text{Time}} \Rightarrow \text{Distance} = \text{Speed} \times \text{Time}$$

$$(\because 30 \text{ minutes} = 0.5 \text{ hours})$$

$$\begin{aligned} \text{Distance} &= 30 \times 0.5 \\ &= 15 \text{ km} \quad \dots(\text{i}) \end{aligned}$$

$$\text{IInd case Speed} = \frac{\text{Distance}}{\text{Time}} \Rightarrow \text{Distance} = \text{Speed} \times \text{Time}$$

$$\begin{aligned} \text{Distance} &= 40 \text{ km h}^{-1} \times 1 \text{ hr} \\ &= 40 \text{ km} \quad \dots(\text{ii}) \end{aligned}$$

Adding (i) and (ii)

$$\text{Total Distance} = 15 \text{ km} + 40 \text{ km} = 55 \text{ km}$$

(b) Total time of travel =  $0.5 \text{ hr} + 1.0 \text{ hrs} = 1.5 \text{ hr}$

(c) Average speed =  $\frac{\text{Total distance travelled}}{\text{Total time taken}}$

$$= \frac{55 \text{ km}}{1.5 \text{ hr}} \quad [\text{from above (a) and (b)}]$$

$$= 36.67 \text{ km h}^{-1}$$

**Question 7.**

On earth the weight of a body of mass 1.0 kg is 10 N. What will be the weight of a boy of mass 37 kg in (a) kgf (b) N ?

**Answer:**

Weight of a body of mass 1.0 kg body = 10 N

(a) Weight of a boy of mass = 37 kg

(b) Weight of a boy of 37 kg in newton will be 1 kgf = 10N

$$\therefore 37 \text{ kgf} = 37 \times 10 \text{ N}$$

$$= 370 \text{ N}$$

**Question 8.**

The weight of a body of mass 6.0 kg on moon is 10 N. If a boy of mass 30 kg goes from earth to the moon surface, what will be his (a) mass, (b) weight ?

**Answer:**

(a) Mass remains same it does not change

So mass of boy 30 kg on earth = 30 kg on moon surface

(b) Weight of boy on moon becomes 1 / 6

$$\therefore 30 \text{ kg boy will weight } 30 \times 1/6 = 5\text{kg}$$

$$1 \text{ kg} = 10 \text{ N} \Rightarrow 5 \times 10 \text{ N} = 50 \text{ N}$$

$$\therefore \text{Weight of boy on moon surface} = 50 \text{ N}$$