NCERT QUESTIONS WITH SOLUTIONS

1. Calculate the speed of a car that travels 150 metres in 10 seconds. Express your answer in km/h.

Solution

A car travels 150 m in 10 s.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{150}{10} = 15 \text{ m/s}.$$

Convert to km/h: multiply by 3.6

$15 \times 3.6 = 54$ km/h.

2. A runner completes 400 metres in 50 seconds. Another runner completes the same distance in 45 seconds. Who has a greater speed and by how much?

Solution

Distance = 400 m for both.

Runner A: time = 50 s $\rightarrow V_A = 400 / 50$

$= 8.0$ m/s

$= 8.0 \times 3.6 = 28.8$ km/h.

Runner B: time = 45 s $\rightarrow V_B = \frac{400}{45} \approx$

8.888 m/s = 8.888 × 3.6 = 32.0 km/h.

Who is faster? Runner B is faster.

By how much? $V_B - V_A \approx 0.888$ m/s or 32.0−28.8 = 3.2 km/h

3. A train travels at a speed of 25 m/s and covers a distance of 360 km. How much time does it take?

Solution

Speed = 25 m/s.

Distance = 360 km = 360000 m.

$$\text{Time} = \frac{360000}{25} = 14400 \text{ s}$$

$$= \frac{14400}{3600} = 4 \text{ h}.$$

4. A train travels 180 km in 3 h. Find its speed in:

(i) km/h

(ii) m/s

(iii) What distance will it travel in 4h if it maintains the same speed throughout the journey?

Solution

Train covers 180 km in 3 h.

(i) Speed in km/h: 180/3 = 60 km/h.

(ii) Convert to m/s: $60 \times \frac{1000}{3600}$

$$= 60 \times \frac{5}{18} = \frac{50}{3} \approx 16.67 \text{ m/s}.$$

(iii) Distance in 4 h at same speed:

60 km/h × 4 h = 240 km.

5. The fastest galloping horse can reach the speed of approximately 18 m/s. How does this compare to the speed of a train moving at 72 km/h?

Solution

Speed of horse = 18 m/s

$$\text{Speed of train} = 72 \text{ km/h} = 72 \times \frac{5}{18}$$

= 20 m/s

The train is faster by 2 m/s than the fastest galloping horse.

6. Distinguish between uniform and non-uniform motion using the example of a car moving on a straight highway with no traffic and a car moving in city traffic.

Solution

Uniform motion: object covers equal distances in equal intervals of time (speed constant).

Example: A car cruising on a straight highway at fixed cruise speed with no traffic.

Non-uniform motion: object covers unequal distances in equal intervals of time (speed changes).

Example: A car in city traffic (stopping, starting, slowing), or a bicycle going up and down a hill.

7. Data for an object covering distances in different intervals of time are given in the following table. If the object is in uniform motion, fill in the gaps in the table.

Time (s)	0	10	20	30		50	70
Distance (m)	0	8		24	32	40	56

Solution

Time (s)	0	10	20	30	40	50	70
Distance (m)	0	8	16	24	32	40	56

This corresponds to a constant speed of 8 m every 10 s → 0.8 m/s.

8. A car covers 60 km in the first hour, 70 km in the second hour, and 50 km in the third hour. Is the motion uniform?

Solution

Car covers 60 km (first hour), 70 km (second hour), 50 km (third hour).

No — because equal time intervals (each 1 h) do not have equal distances (60, 70, 50).

9. Which type of motion is more common in daily life—uniform or non-uniform? Provide three examples from your experience to support your answer.

Solution

Non-uniform motion: Here the object covers unequal distances in equal intervals of time (speed changes).

Three examples: walking in a crowd (speed changes), cars in city traffic (stop-and-go), a cyclist pedaling up and down slopes (speed varies).

10. Data for the motion of an object are given in the following table. State whether the speed of the object is uniform or non-uniform. Find the average speed.

Time interval (s)	Distance (m)
0-10	6 – 0 = 6
10-20	10 – 6 = 4
20-30	16 – 10 = 6
30-40	21 – 16 = 5
40-50	29 – 21 = 8
50-60	35 – 29 = 6
60-70	42 – 35 = 7
70-80	45 – 42 = 3
80-90	55 – 45 = 10
90-100	60 – 55 = 5

Solution

The speeds vary from interval to interval → non-uniform motion.

Average speed: total distance / total time = 60 m/100 s = 0.6 m/s.

11. A vehicle moves along a straight line and covers a distance of 2 km. In the first 500 m, it moves with a speed of 10 m/s and in the next 500 m, it moves with a speed of 5 m/s. With what speed should it move the remaining distance so that the journey is complete in 200 s? What is the average speed of the vehicle for the entire journey?

Solution

Total distance = 2 km = 2000 m.

First 500 m at 10 m/s → time $t_1 = \frac{500}{10}$

= 50 s.

Next 500 m at 5 m/s → time $t_2 = \frac{500}{5}$

= 100 s.

So, time used so far = 50+100 = 150 s.

Total allowed time = 200 s →

Remaining time for the last 2000−1000 = 1000 m is 200 – 150 = 50 s.

Required speed for remaining distance

$= \frac{1000}{50} = 20$ m/s