

CHAPTER

16

SPEED, DISTANCE AND TIME

Speed

Speed is defined as the distance covered per unit time. It is the rate at which the distance is covered. Generally, we measured the speed in km/h.

(i) To convert speed from km/h to m/s multiply the speed by $\frac{5}{18}$.

(ii) To convert speed from m/s to km/h multiply the speed by $\frac{18}{5}$.

Example 1. Convert 18 km/h into m/s.

- (1) 6 m/s (2) 18 m/s
(3) 5 m/s (4) 8 m/s

Sol. (3) $18 \text{ km/h} = 18 \times \frac{5}{18} \text{ m/s} = 5 \text{ m/s}$

Example 2. Convert 10 m/s into km/h.

- (1) 36 km/h (2) 33 km/h (3) 13 km/h (4) 8 km/h

Sol. (1) $10 \text{ m/s} = 10 \times \frac{18}{5} \text{ km/h} = 36 \text{ km/h}$

Time

The duration in hours, minutes or seconds spent to cover a certain distance is called the **time**.

Distance

The length of the path travelled by any object or a person between two places is known as **distance**.

Relation between Speed, Time and Distance

The speed of a moving body is the distance travelled by it in unit time.

$$\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}} \quad \text{or} \quad \text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

or Distance = Speed \times Time

- Units of speed, time and distance should be in the same metric system.

Example 3. A car travels at the speed of 85 km/h and reaches its destination in 5 h. What is distance covered by the car?

- (1) 425 km (2) 550 km (3) 452 km (4) 450 km

Sol. (1) Required distance = Speed \times time
 $= 85 \times 5 = 425 \text{ km}$

Example 4. A car covers a distance of 816 km in 12 h. What is the speed of the car?

- (1) 78 km/h (2) 68 km/h (3) 62 km/h (4) 75 km/h

Sol. (2) Speed of the car

$$= \frac{\text{Distance covered}}{\text{Time taken}} = \frac{816}{12} = 68 \text{ km/h}$$

Average Speed

The ratio of total distance covered to the total time of journey is said to be average speed.

$$\text{Average speed} = \frac{\text{Total distance covered}}{\text{Total time of journey}}$$

- (i) If a person covers a same distance at a speed of a km/h and comes back same distance at a speed of b km/h, then average speed

$$= \frac{2ab}{a+b}$$

Example 5. Deepak covers a certain distance by car driving at 25 km/h and he returns back to the starting point riding on a scooter by 15 km/h. Find the average speed for the whole journey.

- (1) 16 km/h (2) 18.75 km/h
(3) 20 km/h (4) 24.75 km/h

Sol. (2) Here,

$$a = 25 \text{ km/h, } b = 15 \text{ km/h}$$

$$= \frac{2 \times 25 \times 15}{25 + 15} = \frac{50 \times 15}{40} = 18.75 \text{ km/h}$$

$$\therefore \text{Average speed} = \frac{2ab}{a+b}$$

Alternate Method

Let the distance covered from one side = x km

$$\text{The time taken with 25 km/h} = \frac{x}{25}$$

$$\text{The time taken with 15 km/h} = \frac{x}{15}$$

$$\begin{aligned} \text{Average speed} &= \frac{\text{Total distance}}{\text{Total time taken}} \\ &= \frac{x+x}{\frac{x}{25} + \frac{x}{15}} = \frac{2x}{\frac{3x+5x}{75}} \\ &= \frac{2x \times 75}{8x} = 18.75 \text{ km/h} \end{aligned}$$

Problems Related to Train

- If a train of length ' l ' passes a pole, it travels a distance equal to its own length, i.e., l .
- If a train passes a stationary object (bridge, platform etc.) having some length, then the distance covered by train is equal to the sum of the length of train and that particular stationary object which it is passing.

Relative Speed

- If two bodies are moving in the same direction at x km/h and y km/h, where ($x > y$), then their relative speed is given by $(x - y)$ km/h.
- If two bodies are moving in opposite direction at x km/h and y km/h, then their relative speed is given by $(x + y)$ km/h.
- If the ratio of speed of A and B is $x:y$, then the ratio of time taken by them to cover the same distance is given by $\frac{1}{x} : \frac{1}{y}$ i.e. $y:x$.

Example 6. A 360 m long train crosses a signal post in 18 s. What is the speed (in km/h) of the train?

- (1) 26 (2) 66 (3) 27 (4) 72

Sol. (4) When a train crosses a signal post it travels its own length.

$$\begin{aligned} \therefore \text{Speed} &= \frac{360}{18} = 20 \text{ m/s} \\ &= \left(20 \times \frac{18}{5}\right) = 72 \text{ km/h} \end{aligned}$$

Entrance Corner

1. If a man travels at a speed of 30 km/h, he reaches his destination 10 min late and if he travels at a speed of 42 km/h, he reaches his destination 10 min early. The distance travelled is [JNV 2019]

- (1) 36 km (2) 35 km
(3) 40 km (4) 42 km

2. A passenger train, running at a speed of 80 km/h leaves a railway station 6h after a goods train leaves and overtakes it in 4 h. What is the speed of the goods train? [JNV 2019]

- (1) 32 km/h (2) 48 km/h
(3) 60 km/h (4) 50 km/h

3. A person covered $47\frac{1}{2}$ km in one day. If he covered $29\frac{1}{3}$ km by scooter, $8\frac{5}{6}$ km by bicycle and rest of the distance on foot. Find the distance covered on foot? [JNV 2018]

- (1) $8\frac{1}{3}$ (2) $10\frac{1}{3}$
(3) $9\frac{1}{3}$ (4) $12\frac{2}{3}$

4. A train is running at a uniform speed of 75 km/h. How much time does it take to cover a distance of 350 km? [JNV 2017, 2009]

- (1) 4 h (2) 5 h
(3) 4 h 30 min (4) 4 h 40 min

5. $\frac{1}{3}$ of a certain journey is covered at the rate of 25 km/h, $\frac{1}{4}$ at the rate of 30 km/h and the rest of 50 km/h. What is the average speed for the whole journey? [JNV 2017, 2009]
 (1) 30 km/h (2) 33 km/h
 (3) $33\frac{1}{3}$ km/h (4) 32 km/h
6. In a race of 1 km, A defeats B by 36 m or 18 s. How much time (in sec) did A take to complete the full distance? [JNV 2016]
 (1) 500 (2) 582 (3) 460 (4) 482
7. Two persons walk each other 7:30 am. If their speed are 4 km/h and 6 km/h and initially their distance is 25 km, then in what time they will meet to each other? [JNV 2015]
 (1) 8:30 am (2) 9:30 am
 (3) 10:00 am (4) 10:30 am
8. A bus covers 400 km in 8 h, the average speed of bus is [JNV 2015]
 (1) 30 km/h (2) 50 km/h
 (3) $50\frac{1}{2}$ km/h (4) 60 km/h
9. A man crosses a 600 m long bridge in 5 min speed of man (in km/h) will be [JNV 2014]
 (1) 3.6 (2) 7.2
 (3) 8.4 (4) 9.6
10. A train running with 54 km/h. What is the time taken by train to cross the 90 m platform? [JNV 2013]
 (1) 10 s (2) 8 s (3) 6 s (4) 5 s
11. A man takes 3 days to walk 45 km, in how many days will be walk 75 km? [JNV 2012]
 (1) 20 (2) 25 (3) 5 (4) 15
12. Convert 360 km/h into m/s. [JNV 2012]
 (1) 120 m/s (2) 100 m/s (3) 96 m/s (4) 110 m/s
13. Convert 36 km/h into m/s. [JNV 2000]
 (1) 8 m/s (2) 9 m/s (3) 10 m/s (4) 11 m/s
14. Change 60 m/s into km/h. [JNV 2000]
 (1) 216 km/h (2) 218 km/h
 (3) 219 km/h (4) 220 km/h
15. Find the distance covered by a man walking for 12 min of a speed of 3.5 km/h. [JNV 1999]
 (1) 850 m (2) 800 m (3) 750 m (4) 700 m
16. Find the time taken to cover a distance of 124 km by a train moving at 45 km/h. [JNV 1999]
 (1) 2 h 45 min (2) 2 h 50 min
 (3) 2 h 55 min (4) 2 h 57 min
17. A 270 m long goods train is running at 40.5 km/h. How much time will it take to cross a tree? [JNV 1999]
 (1) 10 s (2) 11 s (3) 24 s (4) 13 s
18. Find the distance covered by a car moving at 20 m/s for 3 h. [JNV 1998]
 (1) 220 km (2) 218 km (3) 216 km (4) 230 km
19. Find the time taken to cover a distance 0.9 km by a bullock cart moving at 0.25 m/s. [JNV 1998]
 (1) 1 h (2) 2 h
 (3) 3 h (4) 4 h
20. A trains runs at 45 km/h. How far does it go in 6s? [JNV 1997]
 (1) 50 m (2) 55 m (3) 56 m (4) 75 m
21. Change 72 km/h into m/s. [JNV 1997]
 (1) 20 m/s (2) 22 m/s (3) 24 m/s (4) 26 m/s
22. Change 15 m/s into km/h. [JNV 1997]
 (1) 52 km/h (2) 54 km/h
 (3) 56 km/h (4) 58 km/h
23. A train 315 long is running at 54 km/h. How much time will it takes to cross a pole? [JNV 1996]
 (1) 21 s (2) 22 s (3) 24 s (4) 26 s
24. The speed of a train is 5 m/s. What is its speed (in km/h)? [JNV 1996]
 (1) 16 (2) 17 (3) 18 (4) 20
25. A bullet is fired at a distance of 3.32 km away from Ajay. He hears the sound 10 s later. Find the speed of the sound. [JNV 1995]
 (1) 330 m/s (2) 332 m/s
 (3) 334 m/s (4) 335 m/s

Answers

1. (2)	2. (1)	3. (3)	4. (4)	5. (3)	6. (4)	7. (3)	8. (2)	9. (2)	10. (3)
11. (3)	12. (2)	13. (3)	14. (1)	15. (4)	16. (1)	17. (3)	18. (3)	19. (1)	20. (4)
21. (1)	22. (2)	23. (1)	24. (3)	25. (2)					

Hints and Solutions

1. According to the question, speed = 30 km/h,

$$\text{time} = \left(t + \frac{10}{60}\right) \text{h} = \left(t + \frac{1}{6}\right) \text{h}$$

$$\text{By using, Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance (S)} = 30 \times \left(t + \frac{1}{6}\right) \quad \dots(i)$$

According to the question,

Speed = 42 km/h

$$\text{Time} = \left(t - \frac{10}{60}\right) \text{h} = \left(t - \frac{1}{6}\right) \text{h}$$

$$\Rightarrow \text{Distance (S)} = 42 \times \left(t - \frac{1}{6}\right) \quad \dots(ii)$$

From Eqs. (i) and (ii),

$$\text{Distance (S)} = 30 \left(t + \frac{1}{6}\right) = 42 \times \left(t - \frac{1}{6}\right)$$

$$\Rightarrow 5 \left(t + \frac{1}{6}\right) = 7 \left(t - \frac{1}{6}\right)$$

$$\Rightarrow 5t + \frac{5}{6} = 7t - \frac{7}{6}$$

$$\Rightarrow 2t = \frac{12}{6}$$

$$\therefore t = 1 \text{ h}$$

$$\text{Hence, distance (S)} = 30 \left(t + \frac{1}{6}\right)$$

$$= 30 \left(1 + \frac{1}{6}\right) = 30 \times \frac{7}{6} = 35 \text{ km}$$

2. According to the question,

Speed of passenger train = 80 km/h

Time taken by passenger train = 4 h

Let, speed of goods train = v

Time taken by goods train = 6 + 4 = 10 h

\therefore Distance covered by both the trains is same.

$$\text{Now, by using, Speed} = \frac{\text{Distance}}{\text{Time}}$$

Distance = Speed \times Time

$$\text{Distance} = 80 \times 4 = v \times 10 \Rightarrow v = 32 \text{ km/h}$$

3. Total distance = $47\frac{1}{2} \text{ km} = \frac{95}{2} \text{ km}$

$$\text{Distance covered by scooter} = 29\frac{1}{3} \text{ km} = \frac{88}{3} \text{ km}$$

$$\text{Distance covered by bicycle} = 8\frac{5}{6} = \frac{53}{6} \text{ km}$$

$$\text{Now, distance covered on foot} = \frac{95}{2} - \frac{88}{3} - \frac{53}{6}$$

$$= \frac{95}{2} - \frac{88}{3} - \frac{53}{6} = \frac{285 - 176 - 53}{6} = \frac{56}{6} \\ = \frac{28}{3} \text{ km} = 9\frac{1}{3} \text{ km}$$

$$4. \therefore \text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\therefore \text{Time} = \frac{350}{75} = \frac{14}{3} = 4\frac{2}{3} \text{ h} = 4 \text{ h } 40 \text{ min}$$

5. Let the total journey be x km.

Then, $\frac{x}{3}$ is covered at 25 km/h, $\frac{x}{4}$ is at 30 km/h.

$$\text{Rest of the distance} = x - \frac{x}{3} - \frac{x}{4} \\ = \frac{12x - 4x - 3x}{12} = \frac{5x}{12}$$

which cover in the speed of 50 km/h.

$$\therefore \text{Total time of journey} = \frac{x}{75} + \frac{x}{120} + \frac{5x}{12 \times 50} \\ = \frac{8x + 5x + 5x}{600}$$

$$= \frac{18x}{600} = \frac{3x}{100} \text{ h}$$

$$\therefore \text{Average speed} = \frac{x}{\frac{3x}{100}} = \frac{100}{3} = 33\frac{1}{3} \text{ km/h}$$

6. B, runs 36 m in 18 s

$$B \text{ will run } 1000 \text{ m in} = \frac{18}{36} \times 1000 \text{ s} = 500 \text{ s}$$

$$\text{So, taken time by A for complete the race} \\ = 500 - 18 = 482 \text{ s.}$$

7. Relative speed = 4 + 6 = 10 km/h

$$\therefore \text{Time taken to cover } 25 \text{ km distance} = \frac{25}{10} \\ = 2 \text{ h } 30 \text{ min}$$

$$\therefore \text{Required time} = 7:30 + 2:30 = 10:00 \text{ am}$$

8. Average speed of the bus = $\frac{400}{8} = 50 \text{ km/h}$

9. Total distance = 600 m = 0.6 km

$$\text{Time} = 5 \text{ min} = \frac{5}{60} \text{ h}$$

$$\therefore \text{Required speed} = \frac{\text{Distance}}{\text{Time}} = \frac{0.6}{\frac{5}{60}} = 7.2 \text{ km/h}$$

10. Speed of the train = 54 km/h = $54 \times \frac{5}{18} \text{ m/s}$
= 15 m/s

Length of the platform = 90 m

$$\text{Hence, required time} = \frac{90}{15} = 6 \text{ s}$$

11. Man's per day walk = $\frac{45}{3} = 15$ km
 \therefore Required number of days to walk 75 km
 $= \frac{75}{15} = 5$ days
12. $360 \text{ km/h} = 360 \times \frac{5}{18} \text{ m/s} = 100 \text{ m/s}$
13. $36 \text{ km/h} = 36 \times 1000 \text{ m} / 60 \times 60 \text{ s}$
 $= \frac{36 \times 1000}{60 \times 60} = 36 \times \frac{5}{18} \text{ m/s} = 10 \text{ m/s}$
14. $60 \text{ m/s} = 60 \times \frac{18}{5} \text{ km/h} = 12 \times 18 = 216 \text{ km/h}$
15. Distance = Speed \times Time
 $= 3.5 \times \frac{12}{60} = \frac{7}{10} \text{ km} = \frac{7}{10} \times 1000 \text{ m}$
 $= 700 \text{ m}$ [12 min = $\frac{12}{60}$ h]
16. Time = $\frac{\text{Distance}}{\text{Speed}} = \frac{124}{45} \text{ h} = 2 \text{ h } 45 \text{ min (approx.)}$
17. Speed of the train = 40.5 km/h
 $= \left(40.5 \times \frac{5}{18}\right) \text{ m/s} = \frac{45}{4} \text{ m/s}$
Length of the train = 270 m
 \therefore Time taken by the train = $\frac{\text{Distance}}{\text{Speed}}$
 $= \left(\frac{270}{45/4}\right) = 24 \text{ s}$
18. Speed = $20 \text{ m/s} = \left(20 \times \frac{18}{5}\right) \text{ km/h} = 72 \text{ km/h}$
Time = 3 h
Distance = Speed \times Time = $72 \times 3 = 216 \text{ km}$
19. Speed = $0.25 \text{ m/s} = \left(0.25 \times \frac{18}{5}\right) \text{ km/h}$
 $= 0.9 \text{ km/h}$ and distance = 0.9 km
Time = $\frac{\text{Distance}}{\text{Speed}} = \frac{0.9}{0.9} = 1 \text{ h}$
20. Speed = $45 \text{ km/h} = \left(45 \times \frac{5}{18}\right) \text{ m/s}$
 $= \frac{25}{2} \text{ m/s}$
Time = 6 s
 \therefore Distance = Speed \times Time
 $= \frac{25}{2} \times 6 = 75 \text{ m}$
21. $72 \text{ km/h} = \left(72 \times \frac{5}{18}\right) \text{ m/s} = 20 \text{ m/s}$
22. $15 \text{ m/s} = \left(15 \times \frac{18}{5}\right) \text{ km/h} = 54 \text{ km/h}$
23. Speed = $54 \text{ km/h} = \left(54 \times \frac{5}{18}\right) \text{ m/s} = 15 \text{ m/s}$
Length of the train = 315 m
 \therefore Time = $\frac{\text{Distance}}{\text{Speed}} = \frac{315}{15} = 21 \text{ s}$
24. Speed = $5 \text{ m/s} = \left(5 \times \frac{18}{5}\right) \text{ km/h} = 18 \text{ km/h}$
25. Distance covered = 3.32 km
 $= (3.32 \times 1000) \text{ m}$
 $= 3320 \text{ m}$
Time taken = 10 s
Now, Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{3320}{10} \text{ m/s} = 332 \text{ m/s}$

Practice Exercise

- Speed of 1 km/h is equal to
(1) $\frac{60}{1000} \text{ m/s}$ (2) $\frac{3600}{1000} \text{ m/s}$
(3) $\frac{1000}{3600} \text{ m/s}$ (4) $\frac{1000}{60} \text{ m/s}$
- A train covers a distance of 300 km in 5 h , then the speed of train is
(1) 10 km/h (2) 20 km/h
(3) 60 km/h (4) 70 km/h
- Ram covers the distance of 154 km in 2 h by car, then the speed of car is
(1) 77 km/h (2) 72 km/h
(3) 74 km/h (4) 70 km/h
- A car covers the first 35 km of its journey in 45 min and covers the remaining 69 km in 75 min . What is the average speed of the car?
(1) 42 km/h (2) 50 km/h (3) 52 km/h (4) 60 km/h
- A student rides on bicycle at 8 km/h and reaches his school 2.5 min late. The next day he increases his speed to 10 km/h and reaches school 5 min early. How far is the school from his house?
(1) $\frac{5}{8} \text{ km}$ (2) 8 km
(3) 5 km (4) 10 km

6. With a uniform speed, a car covers the distance in 8 h. Had the speed been increased by 4 km/h, the same distance could have been covered in $7\frac{1}{2}$ h. What is the distance covered?
 (1) 640 km
 (2) 480 km
 (3) 420 km
 (4) Cannot be determined
7. A car is running from A to B at a speed of 40 km/h. It covered half of the total distance in 2 h. Then, distance between A and B is
 (1) 40 km (2) 80 km
 (3) 120 km (4) 160 km
8. A person covered a distance of 180 km in 3 h by a car. How much additional time will he require to cover a further distance of 120 km at the same speed?
 (1) $1\frac{1}{2}$ h (2) 2 h
 (3) $2\frac{1}{2}$ h (4) $2\frac{1}{4}$ h
9. If a cyclist covers a distance of 50 km in 5 h. Then, his average speed is
 (1) 250 km/h (2) 50 km/h
 (3) 10 km/h (4) 5 km/h
10. A bus is running at a speed of 60 km/h. The distance covered by that bus in 4 h and 30 min will be
 (1) 30 km (2) 240 km
 (3) 270 km (4) 200 km
11. A bus started from town A to town B at a speed of 50 km/h. It covered one-third of the total distance in 6 h. The distance between A and B is
 (1) 150 km (2) 300 km
 (3) 600 km (4) 900 km
12. A bus covers 60 km in 2 h. In 30 min it will cover
 (1) 2 km (2) 7.5 km (3) 15 km (4) 30 km
13. A cyclist covers the distance of 1.2 km in 3 min, the speed of the cyclist is
 (1) 24 km/h (2) 24 m/h
 (3) 24 m/s (4) 26 km/h
14. A train covers a distance of 3 km in 2 min. How much distance will it cover in 6 h?
 (1) 180 km (2) 240 km
 (3) 540 km (4) 1080 km
15. A train starts at 10:50 am from New Delhi at a speed of 80 km/h, then at what time will it cover the distance of 120 km?
 (1) 11 : 50 am (2) 12 : 50 pm
 (3) 12 : 20 pm (4) 1 : 50 pm
16. A train is 200 m long. If it cross an electric pole in 10 s, then its speed is
 (1) 72 km/h (2) 27 km/h
 (3) 35 km/h (4) 52 km/h
17. A train is 125 m long. If the train takes 30 s to cross a tree by the railway line, then the speed of the train is
 (1) 14 km/h (2) 15 km/h
 (3) 16 km/h (4) 12 km/h
18. A 250 m long train crosses a pole in 15 s. What is its speed (in km/h)?
 (1) 90 (2) 45
 (3) 70 (4) 60
19. A train running at the speed of 90 km/h crosses a 250 m long platform in 22 s. What is the length of the train?
 (1) 280 m (2) 260 m
 (3) 250 m (4) 300 m
20. A train travelling with a speed 60 km/h catches another train travelling in the same direction and then leaves it 120 m behind in 18s. The speed of the second train is
 (1) 26 km/h
 (2) 35 km/h
 (3) 36 km/h
 (4) 63 km/h

Answers

1. (3)	2. (3)	3. (1)	4. (3)	5. (3)	6. (2)	7. (4)	8. (2)	9. (3)	10. (3)
11. (4)	12. (3)	13. (2)	14. (3)	15. (3)	16. (1)	17. (2)	18. (4)	19. (4)	20. (3)

Hints and Solutions

1. $1 \text{ km/h} = \frac{1000 \text{ m}}{60 \times 60 \text{ s}} = \frac{1000}{3600} \text{ m/s}$

2. $\text{Speed} = \frac{300}{5} \text{ km/h} = 60 \text{ km/h}$

3. $\text{Speed of car} = \frac{\text{Distance}}{\text{Time}} = \frac{154}{2} \text{ km/h} = 77 \text{ km/h}$

4. $\text{Total distance} = 35 + 69 = 104 \text{ km}$

$\text{Total time} = 45 + 75 = 120 \text{ min} = 2 \text{ h}$

$\therefore \text{Average speed} = \frac{104}{2} = 52 \text{ km/h}$

5. Let $x \text{ km}$ be the required distance.

$\text{Difference in time} = 2.5 + 5 = 7.5 \text{ min}$

$= \frac{7.5}{60} \text{ h} = \frac{1}{8} \text{ h}$

Now, $\frac{5x - 4x}{40} = \frac{1}{8} \Rightarrow x = \frac{40}{8} = 5 \text{ km}$

6. Let the distance be $x \text{ km}$ and original speed of the car be $y \text{ km/h}$.

Case I $\frac{x}{y} = 8 \Rightarrow x = 8y \quad \dots(i)$

Case II $\frac{x}{y + 4} = \frac{15}{2}$

$\Rightarrow \frac{8y}{y + 4} = \frac{15}{2} \quad [\text{From Eq. (i)}]$

$\Rightarrow 16y = 15y + 60 \Rightarrow y = 60$

\therefore From Eq. (i), we get

$x = 8 \times 60 = 480$

\therefore Required distance = 480 km

7. Speed of the car = 40 km/h

In 2 h it will cover = $40 \times 2 = 80 \text{ km}$

Given, 80 km = $\frac{1}{2}$ of the total distance

\therefore Total distance between A to B = $80 \times \frac{2}{1} = 160 \text{ km}$

8. In 3 h, he covers = 180 km

$\therefore \text{Speed} = \frac{180}{3} = 60 \text{ km/h}$

New distance (additional) = 120 km

$\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{120}{60} = 2 \text{ h}$

9. $\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$

$= \frac{50 \text{ km}}{5 \text{ h}} = 10 \text{ km/h}$

10. $\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}}$

$\text{Speed} = 60 \text{ km/h}$

$\text{Time} = 4 \text{ h } 30 \text{ min} = 4.5 \text{ h}$

$\therefore \text{Distance} = \text{Speed} \times \text{Time}$
 $= 60 \times 4.5 = 270 \text{ km}$

11. $\text{Speed} = 50 \text{ km/h}$

It covered in 6 h = $50 \times 6 = 300 \text{ km}$

$\text{Total distance} = x$

Now, $\frac{x}{3} = 300$

$\therefore x = 300 \times 3 = 900 \text{ km}$

12. $\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}}$

$\therefore \text{Speed} = \frac{60}{2} = 30 \text{ km/h}$

\therefore Distance covered in 30 min or $\frac{1}{2} \text{ h}$

$= \text{Speed} \times \text{Time} = 30 \times \frac{1}{2} = 15 \text{ km}$

14. In 2 min it covers = 3 km

In 1 h or 60 min it covers = $\frac{3}{2} \times 60 = 90 \text{ km}$

In 6 h it covers = $90 \times 6 = 540 \text{ km}$

16. Distance travel by the train = 200 m

$\text{Time} = 10 \text{ s}$

$\therefore \text{Speed} = \frac{200}{10} = 20 \text{ m/s} = 20 \times \frac{18}{5} = 72 \text{ km/h}$

17. $\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{125}{30} = 4.17$

$= 4.16 \text{ m/s} = 4.17 \times \frac{18}{5} = 15 \text{ km/h (approx.)}$

18. $\text{Speed of train} = \frac{250}{15} = \frac{50}{3} \text{ m/s}$

$= \frac{50}{3} \times \frac{18}{5} \text{ km/h} = 60 \text{ km/h}$

19. $90 \text{ km/h} = 90 \times \frac{5}{18} = 25 \text{ m/s}$

Distance travelled by train in 22 s

$= 22 \times 25 = 550 \text{ m}$

\therefore Length of the train

$= 550 - 250 = 300 \text{ m}$

20. Let speed of another train = $x \text{ km/h}$

$\therefore (60 - x) = \frac{120}{18} \times \frac{18}{5}$

$\Rightarrow 60 - x = 24$

$\therefore x = 60 - 24 = 36 \text{ km/h}$

Self Practice

1. 72 km/h can be written as
 (1) 20 m/s (2) 36 m/s (3) 10 m/s (4) 24 m/s
2. 63 km/h can be expressed into m/s as
 (1) 17.5 m/s (2) 16.5 m/s (3) 16 m/s (4) 17 m/s
3. 12.5 m/s can be expressed into km/h as
 (1) 40 km/h (2) 45 km/h (3) 50 km/h (4) 55 km/h
4. A car completes a journey in 6 h with a speed of 50 km/h. At what speed must it travel to complete the journey in 5 h?
 (1) 60 km/h (2) 55 km/h (3) 45 km/h (4) 61 km/h
5. A train passes a telegraph post in 40 s moving at a rate of 36 km/h. Then, the length of the train is
 (1) 400 m (2) 500 m (3) 450 m (4) 395 m
6. A cyclist covers 12 km in 1 h . What is his speed?
 (1) 100 m/min (2) 2000 m/min (3) 200 m/min (4) 300 m/min
7. An autorickshaw goes with a speed of 14 km/h. How much distance will it go in 2 h 15 min?
 (1) 31.5 km (2) 30.5 km (3) 32.5 km (4) 32 km
8. Manu runs at a speed of 2 m/s in a 5 km race. How much time will she take to complete the race?
 (1) 41 min 40 s (2) 40 min (3) 41 min (4) 42 min 40 s
9. An aircraft flies 8 km/min. What is its speed?
 (1) 408 km/h (2) 480 km/h (3) 460 km/h (4) 406 km/h
10. A train is running at 36 km/h. If it crosses a pole in 25 s. Its length is
 (1) 240 m (2) 250 m (3) 200 m (4) 300 m
11. How much time will a train 60 m long, take to cross a bridge 40 m long, if it is running at a speed of 20 m/s?
 (1) 10 s (2) 8 s (3) 4 s (4) 5 s
12. A car is travelling at a speed of 50 km/h. How much distance will it cover in 12 min?
 (1) 12 km (2) 6 km (3) 10 km (4) 8 km
13. A train is 180 m long. If it runs at a speed of 90 km/h, how long will it take to pass an electric pole?
 (1) 0.002 h (2) 0.003 h (3) 0.004 h (4) 0.02 h
14. A train 100 m in length is running at a speed of 72 km/h. What is the time taken by the train to cross a bridge of length 525 m?
 (1) 0.087 h (2) 0.0087 h (3) 0.75 h (4) 0.075 h

Answers

1. (1)	2. (1)	3. (2)	4. (1)	5. (1)	6. (3)	7. (1)	8. (1)	9. (2)	10. (2)
11. (4)	12. (3)	13. (1)	14. (2)						