

Given that time taken to cross each other = 25 sec

$$\therefore 25 = \frac{130 + x}{10} \Rightarrow 130 + x = 250 \Rightarrow x = 120.$$

Hence, the length of the second train = 120 m.

Example 6. A train is running at $\frac{7}{11}$ of its own speed due to fog and reached a place in 44 hours. What was the original time taken by the train if it runs at its own speed?

Solution. Let the original speed of the train be x km/h, then

speed of the train due to fog = $\frac{7}{11}x$ km/h and time taken = 44 hours.

$$\text{So, distance} = \text{speed} \times \text{time} = \left(\frac{7}{11}x \times 44\right) \text{ km} = 28x \text{ km}.$$

$$\therefore \text{Original time} = \frac{\text{Distance}}{\text{Original speed}} = \frac{28x}{x} \text{ hours} = 28 \text{ hours}.$$

Example 7. (i) The signal poles on a railroad are placed 100 m apart, how many poles will be passed by a train in 8 hours if the speed of the train is 45 km/h.

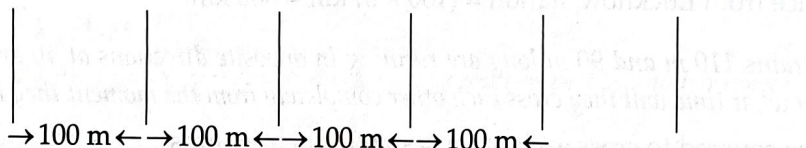
(ii) If 7201 poles are to be installed within two stations at equal distance covering distance of 360 km. Find out the distance between two consecutive poles.

Solution. (i) Given speed of the train = 45 km/h
and time taken = 8 hours.

$$\begin{aligned} \text{So, distance covered} &= \text{speed} \times \text{time} \\ &= (45 \times 8) \text{ km} = 360 \text{ km} \\ &= (360 \times 1000) \text{ m} = 360000 \text{ m}. \end{aligned}$$

Given distance between two consecutive poles = 100 m

$$\text{So, number of poles} = \frac{360000}{100} + 1 = 3601$$



(Since, there are 4 + 1 poles in a distance of 400 m (see figure above))

So, 3601 poles will be passed by the train in 8 hours.

(ii) Distance = 360 km = (360 × 1000) m = 360000 m.

Let the distance between two consecutive poles be x m, then

$$7201 = \frac{360000}{x} + 1 \Rightarrow 7200 = \frac{360000}{x}$$

$$\Rightarrow x = \frac{360000}{7200} \Rightarrow x = 50 \text{ m}.$$

Hence, distance between two consecutive poles is 50 m.



EXERCISE 3.5

1. A person crosses a bridge 900 m long in 3 minutes. Find his speed in km/h and m/s.
2. Rishabh walks at 6 km/h and reaches his school in 1 hour 30 minutes. How far is his school?
3. Archi rides at 20 km/h to her office, which is 15 km away. How long will she take to reach the office?

4. A man covers $\frac{1}{3}$ rd of his journey at 15 km/h and the remaining at 20 km/h. If he takes 10 hours to complete his journey, find the length of his journey.
5. Harpreet covered a certain distance at 5 km/h in 4 hours 12 minutes. Find the time required to cover the same distance at the speed of 7 km/h.
6. A boy leaves for his school at 7 : 00 a.m. He spends 6 hours 30 minutes in the school and comes back at 3 : 00 p.m. on the same day. If he walks at constant speed of 4 km/h, find how far is his school.
7. Walking at $\frac{3}{4}$ th of his usual speed, a man is 1 hour late. Find his usual travel time.
8. Pulkit walks at $\frac{5}{4}$ th of his usual speed and reaches 20 minutes early. Find his usual time of journey.
9. A car is running at $\frac{5}{7}$ th of his actual speed, covers a distance of 45 km in 2 hours 20 minutes. Find the actual speed of car.
10. Rohit covers a distance of 30 km in 6 hours. He travelled partly on foot at 3 km/h and partly on bicycle at 9 km/h. What is the distance travelled on bicycle?
11. A man covered a certain distance at some speed. If he had moved 5 km/h faster, he would have taken 1 hour less. If he had moved 3 km/h slower, he would have taken 1 hour more. What is the distance in km?

Hint. Let the distance be d km and actual speed be x km/h

$$\text{then } \frac{d}{x} - \frac{d}{x+5} = 1 \quad \dots(i)$$

$$\text{and } \frac{d}{x-3} - \frac{d}{x} = 1 \quad \dots(ii)$$

$$\text{From (i) and (ii), } \frac{d}{x} - \frac{d}{x+5} = \frac{d}{x-3} - \frac{d}{x} \Rightarrow x = 15 \text{ km/h}$$

$$\text{Using (i), } \frac{d}{15} - \frac{d}{20} = 1 \Rightarrow d = 60 \text{ km}$$

12. In covering a distance of 40 km Sachin takes 3 hours more than Utkarsh. If Sachin doubles his speed then he would take 1 hour less than Utkarsh. Find their speeds.

Hint. Let Sachin's speed be S_1 km/h and Utkarsh's speed be S_2 km/h, then

$$\frac{40}{S_1} - \frac{40}{S_2} = 3 \quad \dots(i)$$

$$\text{and } \frac{40}{S_2} - \frac{40}{2S_1} = 1 \quad \dots(ii)$$

$$\text{Adding (i) and (ii), we get } \frac{40}{S_1} - \frac{40}{2S_1} = 4 \Rightarrow S_1 = 5 \text{ km/h}$$

$$\text{Using (i), we get } \frac{40}{5} - \frac{40}{S_2} = 3 \Rightarrow S_2 = 8 \text{ km/h}$$

13. A train travels 25% faster than a car. Both travels between A and B which are 120 km apart. Both start from A at the same time and reach the point B at the same time. However, train lost about 18 minutes while stopping at the stations. Find the speeds of the train and the car.
14. A person has to cover a distance of 8 km in 45 minutes. He covers half of the distance in two third of the total time. What should be his speed to cover the remaining distance in time.
15. A car travels first 180 km at 80 km/h and next 180 km at 70 km/h. Find its average speed.

16. Manish goes to office from his house at a speed of 3 km/h and returns back to his house at 2 km/h. If he takes 50 minutes in going to office and return back to his house, find the distance between his house and office.
17. A person travels from A to B at 56 km/h and returns back from B to A by decreasing his speed by 25%. Find his average speed.
18. A man rides at 40 km/h for first 3 hours and at 60 km/h for the next 3 hours. Find his average speed.
19. The distance between two stations X and Y is 520 km. A train starts from X at 9 : 00 a.m. travels towards Y at 70 km/h. Another train starts from Y at 10 : 00 a.m. travels towards X at 80 km/h. At what time will the trains meet?
20. Two persons start from the same place riding in the same direction at 20 km/h and 15 km/h respectively. After how many hours will they be 30 km apart?
21. A goods train runs at the speed of 72 km/h crosses a platform 120 m long in 15 seconds. Find the length of the goods train.
22. Two trains running at 48 km/h and 54 km/h in the same direction. The length of second train is 120 m and time taken by them to cross each other is 150 seconds from the time they meet. Find the length of the first train.
23. Two trains of length 140 m and 110 m are running in opposite directions. They cross each other in 6 seconds. If the speed of first train is 80 km/h, find the speed of second train.
24. A train 150 m long is running at a speed of 120 km/h. A man standing on the roof of the train runs from one end of the train to the other end at 10 km/h in opposite direction. Find the time taken by man to reach the other end.
25. Two trains 130 m and 110 m in lengths move in the same direction at the same time. The faster train completely overtakes the slower train in 15 seconds. If the slower train moves at half of its speed, the overtaking would take 10 seconds. Find the speed of two trains in m/s.

Hint. Let the speed of faster train be x m/s and the speed of slower train be y m/s.

The distance covered to cross each other = $(130 + 110)$ m = 240 m

Case 1. Relative speed = $x - y$.

$$\text{So } x - y = \frac{240}{15} \Rightarrow x - y = 16 \quad \dots(i)$$

Case 2. Relative speed = $x - \frac{y}{2}$.

$$\text{So } x - \frac{y}{2} = \frac{240}{10} \Rightarrow x - \frac{y}{2} = 24 \quad \dots(ii)$$

Solving (i) and (ii), we have $x = 32$ and $y = 16$.

Answers

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|---|--------------------|----------------|----------------------|
| 1. 18 km/h; 5 m/s | 2. 9 km | 3. 45 minutes | 4. 180 km |
| 5. 3 hours | 6. 3 km | 7. 3 hours | 8. 1 hour 40 minutes |
| 9. 27 km/h | 10. 18 km | 11. 60 km | |
| 12. Sachin's speed 5 km/h; Utkarsh's speed 8 km/h | | | |
| 13. Train 100 km/h, car 80 km/h | 14. 16 km/h | 15. 74.67 km/h | |
| 16. 1 km | 17. 48 km/h | 18. 50 km/h | 19. 1 : 00 p.m. |
| 20. 6 hours | 21. 180 m | 22. 130 m | 23. 70 km/h |
| 24. 54 seconds | 25. 32 m/s, 16 m/s | | |