

Important Formulae

1. $Speed = \frac{Distance}{Time}$

2. $Time = \frac{Distance}{Speed}$

3. $Distance = Speed \times Time$

4. If the speed of a body is changed in the ratio a:b, the time taken changes in the ratio b:a.

5. If a certain distance is covered at xkm/hr and the same distance is covered at y km/hr then the average speed during the whole journey is $\frac{2xy}{x+y}$ km/hr

6. To convert a speed in km.per hour to metres per second, multiply it by $\frac{5}{18}$

7. To convert a speed in metres per second to km per hour, multiply it by $\frac{18}{5}$

8. To convert a speed in km.per hour to metres per second, multiply it by $\frac{5}{18}$

Solved Examples

1. A and B are two cities. A man travels from A to B at a speed of 15 km/hr. and returns back at the rate of 10km/hr. Find his average speed for the whole journey.

Ans : Average speed = $\frac{2 \times 15 \times 10}{10 + 15} = 12 \text{ km/hr}$

2. Two men starting from the same place walk at the rate of 10km/hr and 8 km/hr respectively. How many km. will they be apart

at the end of $3\frac{1}{2}$ hrs, if

i) they walk in opposite directions.

and ii) they walk in the same direction

Ans : i) If they walk in opposite directions, they will be $8+10 = 18$ km apart in one hour.

\therefore in $3\frac{1}{2}$ hrs, they will be

$18 \times \frac{7}{2} = 63$ km. apart.

ii) If they walk in the same direction, their they are $10-8=2$ km. apart in one hour.

\therefore in $3\frac{1}{2}$ hrs, they will be $2 \times \frac{7}{2} = 7$ km apart.

3. A train travelling 25 km/hr leaves Delhi at 9 am and another train travelling 35 km/hr starts at 2 pm in the same direction. How many km. from Delhi will they be together.

Ans: Let the two trains be together xhrs after 9 am.

Distance travelled by the first train = $25 \times x$ km

Distance travelled by the second train

= $35 (\times 5)$ km

ie $25x = 35 (\times 5) \Rightarrow x = 17.5$ hrs.

Required distance = $25 \times 17.5 = 437.5$ km.

Short cut:

Required distance =

$\frac{\text{Product of speed}}{\text{Difference of speed}} \times \text{Difference in time}$

= $\frac{25 \times 35 \times 5}{35 - 25} = \frac{25 \times 35 \times 5}{10} = 437.5 \text{ km}$

4. Two towns P and Q are 110 km. apart. A motorcycle rider starts from P towards Q at 8 am at a speed of 20 km/hr. Another motor cycle rider starts from Q towards P at 9 am at a speed of 25 km/hr. Find when will they cross each other.

Ans : - Suppose they meet x hours after 8 am

$$\text{Then } 20x + (x) 25 = 110 \Rightarrow x = 3 \text{ hrs.}$$

\therefore two riders meet at $8+3 = 11$ am.

5. A boy goes to school at a speed of 3km/hr and returns to the village at a speed of 2km/hr. If he takes 5 hrs in all, what is the distance between the village and the school.

Ans:- Let x km be the distance between the village and the school.

$$\text{Then } \frac{x}{3} + \frac{x}{2} = 5 \Rightarrow x = 6 \text{ km}$$

6. Joshy travels at the rate of 3km/hr and he reaches his office 15 mts late. If he travels at the rate of 4km/hr. he reaches 15 mts earlier. The distance Joshy has to travel is

Ans: Let x km be the distance that Joshy has to travel.

$$\text{Then } \frac{x}{3} - \frac{x}{4} = \left(\frac{15 + 15}{60} \right)$$

$$\Rightarrow x = 6 \text{ km}$$

7. By walking at $\frac{3}{4}$ of his usual speed a man reaches his office 20 mts later than usual time. His usual time is

Ans : New Speed = $\frac{3}{4}$ usual speed

$$\text{New time} = \frac{4}{3} \text{ usual time}$$

$$= \text{usual time} + 20 \text{ mts}$$

$$\text{ie } \frac{4}{3} \text{ usual time} - \text{usual time} = 20 \text{ mts}$$

$$\frac{1}{3} \text{ usual time} = 20 \text{ mts}$$

$$\therefore \text{usual time} = 3 \times 20 = 60 \text{ mts}$$

PRACTICE TEST

1. A man crosses a street 600m long in 5 minutes. What is his speed in Kilometres per hours?

1) 9km/hr. 2) 7km/hr.

3) 9.6 km/hr. 4) 7.2 km/hr.

2. A man goes to a place at the rate of 13 km/hr. He comes back on a bicycle at 7 km/hr. His average speed for the entire journey is:

1) 5 km/hr. 2) 6.5 km/hr.

3) 8.2 km/hr. 4) 9.1 km/hr.

3. A person walks at 5 kmph. and reaches his destination 10 minutes late. If he increases his speed by 1 kmph., he would have reached 15 minutes earlier. The distance he travelled from his house is

1) 10 km. 2) 5.5 km

3) 12.5 km. 4) 10.5 km

4. A and B start from the same place in opposite directions with 25 kmph. and 30 kmph. respectively. In what time will they be 110 km apart?

1) 2 hrs 5 min. 2) 5 hours

3) 3 hrs. 20 min. 4) 2 hours

5. A motor cyclist travels for 10 hours, the first half at 21 km/hr. and the other half at 24 km/hr. Find the distance travelled.

1) 225 km 2) 224 km

3) 200 km 4) 324 km

6. Two towns A and B are 160 km apart. A bus starts from A to B at 7 A.M at a speed of 50 kmph. Another bus starts from B to A at 8 A.M at a speed of 60 kmph. The time of their meeting is:

1) 9 A.M. 2) 9.30 A.M

3) 10. A.M. 4) 8.30 A.M.

7. Two trains start at the same time from places A and B and proceed towards each other at 72 km/hr. and 60 km/hr. respectively. At

the time of their meeting, one train has travelled 48 km more than the other. Then the distance between A and B is

- 1) 132 km. 2) 704 km
3) 470 km 4) 528 km

8. Two men start together to walk a certain distance at 3.75 km./hr. and 3 km./hr. respectively. The former arrives 30 mts before the latter. Find the distance they walked.

- 1) 7.5 km 2) 10 km
3) 12.5 km 4) 15 km

9. A car went 52 km in the first hour, 60 km in the second hour and 54 km in the third hour. There was trouble in the fourth hour with the result that its speed was 26 km. Its average speed was

- 1) 51 km/hr 2) 57 km/hr
3) 45 km/hr 4) 48 km/hr

10. Travelling at a uniform speed, a car covers a distance of 6 km. in 4 mts. what is the speed of the car in km.hr?

- 1) 90 2) 40 3) 24 4) 60

11. A car completes a journey in 11 hrs. It covers the first half of the journey at the rate of 50 km/hr. and the second half at the rate of 60 km/hr. The distance of total journey is

- 1) 605 km 2) 300 km
3) 500 km 4) 600 km

12. A student walks from his house @5 km/hr. and thus reaches the school 10 mts late. If his speed had been 6 km/hr. he would have reached 15 mts earlier. Then the distance of the school from his house is

- 1) $\frac{5}{2}$ km 2) $\frac{5}{22}$ km
3) $\frac{25}{2}$ km 4) $\frac{25}{22}$ km

13. Two trains start from stations A and B and travel towards each other at a speed of 50 km/hr. and 60 km/hr. respectively. At the

time of their meeting the second train has travelled 120 km more than the first. The distance between A and B is

- 1) 990 km 2) 1,200 km
3) 1,320 km 4) 1,440 km

14. A walks at 4 km an hour, and 4 hrs after his start, B bicycles after him at 10 km an hour. Find out how far from the start does B catch up with A.

- 1) 16.7 km 2) 18.6 km
3) 21.5 km 4) 26.7 km

15. Mohan rides a cycle at 8 km/hr. After every 10 km he rests for 20 mts. He will cover 40 km in

- 1) 5 hrs 2) 5 hrs 20 mts
3) 6 hrs 4) 6 hrs 20 mts

16. If a man reduces his speed to $\frac{2}{3}$, he takes 1 hr more to walk a certain distance. The time (in hours) to cover the distance with his normal speed is

- 1) 2 2) 1
3) 3 4) 1.5

17. Sound travels at 330 m a second. How many kilometres away is a thunder cloud when its sound follows the flash after 10 seconds?

- 1) 3.3 2) 33
3) 0.33 4) 3.33

18. Car A moves 175 km in 8 hrs whereas car B moves 189 km in 12 hrs. The ratio between the speed of car A and car B is

- 1) 3:2 2) 4:3
3) 5:4 4) 25:18

19. If a boy walks from his house to the school @ 4 km/hr. he reaches the school 10 mts earlier than the school time. However, if he walks @ 3 km/hr, he reaches 10 mts late. The distance of school from his house is

- 1) 6 km 2) 4.5 km
3) 4 km 4) 3 km

20. A man walks a certain distance at 8 km/hr. and returns at 6 km/hr. If the total time taken by him is $3\frac{1}{2}$ hrs, the total distance walked is

- 1) 28 km 2) 24 km
3) 14 km 4) 16 km

21. A cart runs at the rate of 4 km/hr. during the first 10 km and 9 km/hr. during the second 10 km. The average speed of the cart in km/hr. is

- 1) 5.0 2) 5.5 3) 6.0 4) 6.5

22. A car starting from airport reaches the bus station in 45 mts with an average speed of 40 km/hr. If the speed of the car is increased by 10 km/hr. how much less time will

the car take to cover the distance?

- 1) 19 mts 2) 10 mts
3) 9 mts 4) 24 mts

23. A thief steals a car at 1.30 pm and drives it at 40 km/hr. The theft is discovered at 2 pm and the owner sets off in another car at 50 km/hr. He will overtake the thief at

- 1) 3.30 pm 2) 4 pm
3) 4.30 pm 4) 6 pm

24. A car covers a distance of 715 km at a constant speed. If the speed of the car had been 10 km/hr. more, then it would have taken 2 hrs. less to cover the same distance. What was the original speed of the car in km/hr?

- 1) 45 2) 50
3) 55 4) 65

ANSWERS TO PRACTICE TEST

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