

# Speed, Time and Distance

## Important Facts & Formulae

### 1. Speed, Time and Distance:

$$\text{Speed} = \left( \frac{\text{Distance}}{\text{Time}} \right), \text{Time} = \left( \frac{\text{Distance}}{\text{Speed}} \right),$$

### 2. Distance = (Speed x Time).

### 3. km/hr to m/sec conversion:

$$x \text{ km/hr} = \left( x \times \frac{5}{18} \right) \text{ m/sec.}$$

### 4. m/sec to km/hr conversion:

$$x \text{ m/sec} = \left( x \times \frac{18}{5} \right) \text{ km/hr.}$$

### 5. If the ratio of the speeds of A and B is $a : b$ . Then, the times taken by them to cover the same distance is

$$\frac{1}{a} : \frac{1}{b} \text{ or } b : a$$

### 6. Suppose a man covers a certain distance at $x$ km/hr and an equal distance at $y$ km/hr. Then,

the average speed during the whole journey is

Time taken by a train of length  $l$  metres to pass a pole or standing man or a signal post is equal to the time taken by the train to cover  $l$  metres.

Time taken by a train of length  $l$  metres to pass a stationary object of length  $b$  metres is the time taken by the train to cover  $(l + b)$  metres. travel in this entire 4 hours. Suppose two trains or two objects bodies are moving in the same direction at  $u$  m/s and  $v$  m/s, where  $u > v$ , then their relative speed is  $= (u - v)$  m/s.

Suppose two trains or two objects bodies are moving in opposite directions at  $u$  m/s and  $v$  m/s, then their relative speed is  $= (u + v)$  m/s.

The time taken by the trains to cross each other =	$(a + b)$	sec.
	$(u + v)$	

If two trains of length  $a$  metres and  $b$  metres are moving in opposite directions at  $u$  m/s and  $v$  m/s, then:

If two trains of length  $a$  metres and  $b$  metres are moving in the same direction at  $u$  m/s and  $v$  m/s, then:

The time taken by the faster train to cross the slower train =	$(a + b)$	sec.
	$(u - v)$	

Q1. A person crosses a 600 m long street in 5 minutes. What is his speed in km per hour?

Q2. An aeroplane covers a certain distance at a speed of 240 kmph in 5 hours. To cover the same distance in  $1\frac{2}{3}$  hours, it must travel at a speed of:

Q.3. In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. Calculate the duration of the flight.

Q4. Robert is travelling on his cycle and has calculated to reach point A at 2 P.M. if he travels at 10 km/hr. But he will reach there at 12 noon if he travels at 15 km/hr. At what speed must he travel to reach A at 1 P.M.?

Q5. The ratio between the speeds of two trains is 7 : 8. If the second train runs 400 km in 4 hours, then the speed of the first train is:

Q6. A train can travel 50% faster than a car. Both start from point A at the same time and reach point B 75 kms away from A at the same time. On the way, however, the train lost about 12.5 minutes while stopping at the stations. The speed of the car is:

Q7. The speeds of the three trains are in the ratio of 2:3:4. Find the ratio of the time taken by the trains to travel the same distance.

Q8. A man complete a journey in 10 hours. He travels first half of the journey at the rate of 21 km/hr and second half at the rate of 24 km/hr. Find the total journey in km

Q9. A train travels at an average of 50 miles per hour for two and a half hours and then travels at a speed of 70 miles per hour for one and half hours. How far did the train .

Q10. In covering a distance of 30 km, Abhay takes 2 hours more than Sameer. If Abhay doubles his speed, then he would take 1 hour less than Sameer. Abhay's speed is:

Q11. Robert is travelling on his cycle and has calculated to reach point A at 2 P.M. if he travels at 10 kmph, he will reach there at 12 noon if he travels at 15 kmph. At what speed must he travel to reach A at 1 P.M.?

Q.12 A train running at the speed of 60 km/hr crosses a pole in 9 seconds. What is the length of the train?

Q13. A train 125 m long passes a man, running at 5 km/hr in the same direction in which the train is going, in 10 seconds. The speed of the train is

Q14. A train 800 metres long is running at a speed of 78 km/hr. If it crosses a tunnel in 1 minute, then the length of the tunnel (in meters) is:

Q15. The length of the bridge, which a train 130 metres long and travelling at 45 km/hr can cross in 30 seconds, is:

Q16. Two trains running in opposite directions cross a man standing on the platform in 27 seconds and 17 seconds respectively and they cross each other in 23 seconds. The ratio of their speeds is:

### Explanation:

Let the speeds of the two trains be  $x$  m/sec and  $y$  m/sec respectively.

Then, length of the first train =  $27x$  metres,

and length of the second train =  $17y$  metres.

$$\therefore \frac{27x + 17y}{x + y} = 23$$

$$\Rightarrow 27x + 17y = 23x + 23y$$

$$\Rightarrow 4x = 6y$$

$$\Rightarrow \frac{x}{y} = \frac{3}{2}$$

Q17. Two trains of equal length are running on parallel lines in the same direction at 46 km/hr and 36 km/hr. The faster train passes the slower train in 36 seconds. The length of each train is:

Q18. A train travelling at 48 kmph completely crosses another train having half its length and travelling in opposite direction at 42 kmph, in 12 seconds. It also passes a railway platform in 45 seconds. The length of the platform is

Q19. Two trains are moving in opposite directions @ 60 km/hr and 90 km/hr. Their lengths are 1.10 km and 0.9 km respectively.

- The time taken by the slower train to cross the faster train in seconds is:
- The time taken by the faster train to cross the slower train in seconds is:

Q20. A 270 metres long train running at the speed of 120 kmph crosses another train running in opposite direction at the speed of 80 kmph in 9 seconds. What is the length of the other train?

Q21. Two trains, each 100 m long, moving in opposite directions, cross each other in 8 seconds. If one is moving twice as fast the other, then the speed of the faster train is:

Q22. The length of the train and platform are equal. If with the speed of 90 kmph the train crosses the platform in one minute, then what is the length of the train?

Q23. Two trains are running at 40 km/hr and 20 km/hr respectively in the same direction. Fast train completely passes a man sitting in the slower train in 5 seconds. What is the length of the fast train?

Q24. A train overtakes two persons who are walking in the same direction in which the train is going, at the rate of 2 kmph and 4 kmph and passes them completely in 9 and 10 seconds respectively. The length of the train is:

Q25. Train 'A' leaves Mumbai Central for Lucknow at 11 am, running at the speed of 60 kmph. Train 'B' leaves Mumbai Central for Lucknow by the same route at 2 pm

on the same day, running at the speed of 72 kmph. At what time will the two trains meet each other?

- Stream:** It implies that the water in the river is moving or flowing.
- Upstream:** Going against the flow of the river.
- Downstream:** Going with the flow of the river.
- Still water:** It implies that the speed of water is zero (generally, in a lake).

When we move upstream, our speed gets deducted from the speed of the stream. Similarly when we move downstream our speed gets added.

Let the speed of a boat in still water be  $A$  km/hr and the speed of the stream (or current) be  $B$  km/hr, then

- Speed of boat with the stream =  $(A + B)$  km/hr
- Speed of boat against the stream =  $(A - B)$  km/hr
- Speed of boat in still water is:

$$A = \frac{(A+B) + (A-B)}{2} = \frac{\text{Upstream} + \text{Downstream}}{2}$$

- Speed of the stream or current is:

$$B = \frac{(A+B) - (A-B)}{2} = \frac{\text{Downstream} - \text{Upstream}}{2}$$

Q26. A boat is rowed down a river 28 km in 4 hours and up a river 12 km in 6 hours. Find the speed of the boat and the river.

Q27. A boat travels upstream from B to A and downstream from A to B in 3 hours. If the speed of the boat in still water is 9 km/hr and the speed of the current is 3 km/hr, the distance between A and B is

Q28. A man can row 4.5 km/hr in still water and he finds that it takes him twice as long to row up as to row down the river. Find the rate of the stream

Q29. The speed of a boat in still water is 4 km/hr and the speed of current is 2 km/hr. If the time taken to reach a certain distance upstream is 9 hours, the time it will take to go to same distance downstream is

Q30. A man makes his upward journey at 16 km/h and downward journey at 28 km/h. What is his average speed?

Q31. Twice the speed of a boat downstream is equal to thrice the speed upstream. The ratio of its speed in still water to its speed in current is:

Q32. A boat covers a distance of 30 km downstream in 2 hours while it takes 6 hours to cover the same distance upstream. If the speed of the current is half of the speed of the boat then what is the speed of the boat in km per hour?

Q33. Two boats, travelling at 5 and 10 kms per hour, head directly towards each other. They begin at a distance 20 kms from each other. How far apart are they (in kms) one minute before they collide?

Q34. A boat takes 90 minutes less to travel 36 miles downstream than to travel the same distance upstream. If the speed of the boat in still water is 10 mph, the speed of the stream is :

Q35. A man wishes to cross a river perpendicularly. In still water, he takes 4 minutes to cross the river, but in flowing river he takes 5 minutes. If the river is 100 metres wide, then the velocity of the flowing water of the river is:

