TIME, DISTANCE AND SPEED

**Definition**

| **Speed:** | It is defined as the rate of travel to cover a certain distance. It is generally expressed in m/s, km/hr etc. |
| **Time:** | It is defined as the duration for which travelling has been done to cover a certain distance. It is generally expressed in seconds, hours etc. |
| **Distance:** | It is defined as the length of path for which travelling has been done. It is generally expressed in metre, kilometre etc. |

**Speed** = \( \frac{\text{Distance}}{\text{Time}} \)

**Unit Conversions**

1) **km/hr to m/s**

\[ X \text{ km/hr} = (X \times \frac{5}{18}) \text{ m/sec} \]

**Q-1.** Convert 54 km/hr into m/sec.

**Solution:**

\[54 \text{ km/hr} = 54 \times \frac{5}{18} = 15 \text{ m/sec}\]

2) **m/s to km/hr**

\[ X \text{ m/Sec} = (X \times \frac{18}{5}) \text{ Km/hr} \]

**Q2.** A car goes 20 meters in a second. Find its speed in km/hr.

**Solution:**

\[20 \text{ m/sec} = 20 \times \frac{18}{5} = 72 \text{ km/hr}\]
Ratios of Speed, Distance and/or Time

If the ratio of the speeds of A and B is a : b, then the ratio of the times take by them to cover the same distance will be \( \frac{1}{a} : \frac{1}{b} \) or b : a.

Q-3. The speed of three cars is in the ratio 5: 4: 6. The ratio between the time taken by them to travel the same distance is

Solution:
Ratio of time taken = \( \frac{1}{5} : \frac{1}{4} : \frac{1}{6} = 12 : 15 : 10 \)

Average Speed

Average speed = \( \frac{\text{Total distance}}{\text{Total time}} \)

Q4. A truck covers a distance of 1200 km in 40 hours. What is the average speed of the truck?
Solution:
Average speed = Total distance travelled/Total time taken
⇒ Average speed = 1200/40
∴ Average speed = 30 km/hr.

Q5. A man travelled 12 km at a speed of 4 km/h and further 10 km at a speed of 5 km/hr. What was his average speed?
Solution:
Total time taken = Time taken at a speed of 4 km/h + Time taken at a speed of 5 km/h
⇒ 12/4 + 10/5 = 5 hours [∵ Time = Distance/Speed] Average speed = Total distance/Total time
⇒ (12 + 10)/5 = 22/5 = 4.4 km/h

Q6. Rahul goes Delhi to Pune at a speed of 50 km/h and comes back at a speed of 75 km/h. Find his average speed of the journey.
Solution:
As, distance is same both cases
⇒ Required average speed = \( \frac{2 \times 50 \times 75}{50 + 75} = 7500/125 = 60 \) km/hr.
Practice Questions:

Q1. The speeds of the Shaan and Rohan are 50 km/h and 30 km/h respectively. Initially Shaan is at a place N and Rohan is at a place M. The distance between M and N is 710 km. Shaan started his journey 3 hours earlier than Rohan to meet each other. If they meet each other at a place R somewhere between M and N. then the distance between R and N is
A) 210 km
B) 500 km
C) 430 km
D) 620 km
E) None of these

Ans: (B) 500km

Q2. The distance between two places A and B is 370 km. The 1st car departs from place A to B, at a speed of 80 kmph at 10 am and the 2nd car departs from place B to A at a speed of 50 kmph at 1 pm. At what time both cars meet each other?
A) 2: 30 pm
B) 2: 00 pm
C) 2: 10 pm
D) 2: 20 pm
E) None of these

Ans: (B) 2:00pm

Q3. A man takes 5 hours 45 minutes to walk to a certain place and ride back. He would have saved 2 hours had he ridden both ways. The time he would take to walk both ways is
A) 3 hours 45 minutes
B) 7 hours 30 minutes
C) 7 hours 45 minutes
D) 11 hours 45 minutes
E) None of these

Ans: (C) 7 hours 45 minutes
Q4. A and B start at the same time with speeds of 40 km/hr and 50 km/hr respectively. If in
covering the journey A takes 15 minutes longer than B, the total distance of the journey is
A) 46 km
B) 48 km
C) 50 km
D) 52 km
E) None of these

Ans: (C) 50km

Q5. A cyclist covers a distance of 750 m in 2 min 30 sec. What is the speed in km /hr of the
cyclist?
A) 12 km/hr
B) 15 km/hr
C) 18 km / hr
D) 20 km / hr

Ans: (C) 18km/hr

Q6. A Jackal takes 4 leaps for every 5 leaps of goat but 3 leaps of a Jackal are equal to 4 leaps
of the goat. compare their speeds
A) 12: 10
B) 7: 5
C) 1: 4
D) 16: 15

Ans: (D) 16:15