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 $= \dfrac{Distance}{Time}$

Unit Conversions

1) km/hr to m/s

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

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

Solution:

54 km/hr=54 × 5/18 =15 m/sec

2) m/s to km/hr

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

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

Solution:
20 m/sec = 20 × 18/5 = 72 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 = ⅕: ¼: ⅙ = 12: 15: 10

Average Speed

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total Time}}$$

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 = (2 × 50 × 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