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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.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Unit Conversions

1) km/hr to m/s

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

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

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

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

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

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 = $(2 \times 50 \times 75) / (50 + 75) = 7500/125 = 60$ 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



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