Today's topic is about speed, distance and time. All your doubts will get cleared related to this topic at the end of this blog. So let's start and learn.

Suppose you go to college on the bike which is 5 km away from your home. You might have heard from your mom/dad that you should drive slowly or shouldn't increase your speed after a certain point. You might now be clear the speed is the rate of change of distance with respect to time.

Speed(v) = Distance(d) / Time(t) (always remember this formula)

This is the most important formula of this complete topic, we can derive some formula by rearranging this formula.

Distance(d) = Speed(v) × Time(t)

Time(t) = Distance(d) / Speed(v)

E.g. A bike crosses a bridge with a speed of 108 km/h. What will be the length of the bridge, if the bike takes 8 h to cross the bridge? Sol: As we know by our formula of distance d = v × t ⇒ d = 108 × 8 = 864 km (Ans.)

A very easy one, let's try to make this bit complicated.

E.g. A bike crosses a bridge with a speed of 40 m/s. What will be the length of the bridge, if the bike takes 8 hours to cross the bridge?

TIP: To convert speed from km/h to m/s simply multiply it with "5/18" and when converting m/s to km/h multiply the speed with "18/5".

Easy to remember? It saves plenty of time during the exam. Let's get back to our question.

Sol: v = 40 m/s or 40 × 18/5 = 144 km/h Now from the formula, d = v × t ⇒ d = 144 × 8 = 1152 km (Ans.)

Average speed

When a body travels with different speeds for different durations, then the average speed of that body for the complete journey is defined as the total distance covered by the body divided by the total time taken to cover the distance.

Average speed = total distance / total time

[**Note:** Average speed is not the 'average' of speeds. It's total distance covered versus total time taken]

Let's take an example to understand this concept really well.

E.g. A person covers a distance of 20 km by bus in 35 min. After deboarding the bus, he took a rest for 20 min and covered another 10 km by taxi in 20 min. Find his average speed for the whole journey. Sol: Let's make this one very easy; we want to find out average speed, we require two things: total distance and total time taken. Total distance = 20 + 10 = 30 km Total time = 35 + 20 + 20 = 75 min or 75/60 hours or 5/4 hours. Average speed = total distance / total time ⇒ 30/(5/4) = 24 km/h (Ans.)

Important Formula: When a certain distance is covered at speed A and the same distance is covered at speed B, then the average speed during the whole journey is given by

$$\Rightarrow 2AB / (A + B)$$

Note: Average speed is not the average of the speeds.

Let's take a simple example to learn this point very well.

E.g. Shantanu covers a certain distance by a car driving at 35 km/h and he returns back to the starting point riding on a scooter with a speed of 25 km/h. Find the average speed for the whole journey. Sol: Let the values of 'A' and 'B' be, A = 35 km/h & B = 25 km/h Average speed = 2AB / (A + B) $\Rightarrow 2 \times 35 \times 25/(25 + 35) \Rightarrow 1750/60 = 29.16$ km/h (Ans.)

This was a very important concept to know but questions wouldn't be asked directly, there would be the use of the concept of average speed so it's necessary for you to be comfortable with this.

E.g. A man is walking at a speed of 10 km/h. After every kilometer he takes a rest for 5 minutes, how much time would he take to cover a distance of 5 km? Sol: Let's break time taken in two parts Time taken = time during rest + walking time, The time during rest = no. of times he took rest × 5 For 5km he would take rest for 4 times Time during rest = 4 × 5 = 20 min Walking time = 5/10 = 0.5 h or 30 min Total time = 30 + 20 = 50 min. (Ans.)

Let's take an example: If a train passes a stationary object (bridge, platform, etc.) having some length, then the distance covered by the train is equal to the sum of the length of the trains and that particular stationary object which it is passing. Too much theory huh? Let's take an example.

E.g. Carry was driving a car at a speed of 5 m/s whose length is 4 m. Find the time required by Carry's car to cross the 6 m long shop? Sol: Total distance = length of Carry's car + length of shop $\Rightarrow 4 + 6 = 10m$ Speed = 5 m/s $\Rightarrow T = d/v = 10/5 = 2s$ (Ans.)

This was all about this topic. Hope all your problems are clear. Practice hard and stay connected with us.