Time, Speed, Distance

On the surface this chapter appears complicated, but if you think about it, this entire chapter runs on one formula, and I'm sure you all are well aware of that.

It is,

Speed = DIstance/ Time **(Speed Equals to Distance divided by Time)**

Remember, If the Distance is in **Kilometers**, then the time is ideally in **hours,** and then the unit of the speed becomes **Kilometers Per Hour.**

If the Distance is in **meters**, then the time is ideally in **seconds**, and then the unit of the speed becomes **meters per second**.

Remember, your first task is to ensure that the units are consistent. Either kilometers, hours and km/h, or meters, seconds and m/s.

Now, there's a crucial short cut trick to remember

In order to convert speed from km/h to m/s, you can multiply the given speed with 5/18 (Five DIVIDED BY EIGHTEEN)

In order to convert speed from m/s to km/h, you can multiply the given speed with 18/5 (EIGHTEEN DIVIDED BY FIVE)

Motion in a Straight Line

See, the question in this chapter is usually application based. For instance, when two bodies are moving together. When movement of two bodies are considered, there can only be two scenarios, right.

Either, they will be moving in the same direction, or they will be moving in the opposite direction.

(Remember, the basic formula of Speed = Distance/ Time remains the same, and we will always apply that)

Let's understand both cases one by one, Shall We?

Case 1: When two bodies move in the same direction, their relative speed is S ONE MINUS S TWO (S1 - S2)

Case 2: When two bodies move in the opposite direction, their relative speed is S ONE PLUS S TWO (S1 + S2)

Apart from the direct questions based on the above scenarios, applications based questions are also a regular sight in the Aptitude Round. Let's understand them one by one so you are familiar with any situation the questions might throw at you.

Applications of Time, Speed Distance

1. **Circular Motion**

Let's take a scenario where two people are running in a circular park. Assume the speed of one person is x and that of the other is y.

If they move in opposite direction, Relative speed = (x + y) [RELATIVE SPEED IS EQUAL TO X PLUS Y]

Remember, the distance covered to complete one round here will be the circumference of the circle.

So,

Time interval between meetings = Circumference / (x + y) [Time interval between meetings IS EQUAL TO CIRCUMFERENCE DIVIDED BY X PLUS Y]

Similarly, if they are moving in same directions, Relative Speed = (x-y) [RELATIVE SPEED IS EQUAL TO X MINUS Y]

So,

Time Interval between meetings = Circumference / (x-y) [Time interval between meetings IS EQUAL TO CIRCUMFERENCE DIVIDED BY X PLUS Y]

2. **Distance Traveled when a Train Crosses an Object**

A train is said to have completely crossed an object, when its tail end bogey has come in line with the object.

In case the object has no length (instances when a train crosses a tree, a car, a man, an electric pole, etc.), **the train would have to travel a 'distance equal to its own length' in order to cross the object.**

However, in cases where the **train passes an object where the length of the object cannot be neglected, the distance traveled by the train would be, "Length of train + Length of the object"**

Also remember, if objects are moving in opposite direction, speed = (x+y) [SPEED IS EQUAL TO X PLUS Y]

But, if they are moving in the same direction, speed = (x-y) [SPEED IS EQUAL TO X MINUS Y]

[Assume the speed of one train is x and that of the other is y]

3. **Boats and Streams**

Speed Downstream = (x+y) **(Speed Downstream equals to x plus y)**

Speed Upstream = (x-y) **(Speed Upstream equals to x minus y**

Where, x =(equals to) speed of boat in still water, and
y =(equals to) speed of the stream

Again, the basic formula of Speed = Distance/Time remains the same (**Speed equals to distance**)

Practice Sheets

Q.1 An airplane 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

A. 300
B. 360
C. 600
D. 720

Q.2 If a person walks at 14 km/hr instead of 10 km/hr, he would have walked 20 km more. The actual distance traveled by him is:

A. 50
B. 56
C. 70
D. 80
E. 60

Q.3 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

A. 120 kmph
B. 250 kmph
C. 130 kmph
D. 100 kmph

Q.4 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. The duration of the flight is:

_____

Q.5 The speed of a boat is 13 km/hr in still water. If the speed of the stream is 4 km/hr, what will be the time taken by the person to go 68 km downstream?

A. 2.5 hours
B. 3 hours
C. 4 hours
D. 3.5 hours

Q.6 A woman can row upstream at 16 km/hr and downstream at 26 km/hr. What is the speed of the stream?

1. 5 km/hr
2. 2 km/hr
3. 4.5 km/hr
4. 21 km/hr
5. 12 km/hr

Q.7 A motorboat, whose speed is 15 km/hr in still water goes 30 km downstream and comes back in a total of 4 hours 30 minutes. The speed of the stream (in km/hr) is:

A. 4 kmph
B. 5 kmph
C. 6 kmph
D. 10 kmph

Q.8 In one hour, a boat goes 11 km/hr along the stream and 5 km/hr against the stream. The speed of the boat in still water (in km/hr) is:

A. 3 kmph

B. 5 kmph
C. 8 kmph
D. 9 kmph

Q.9 Walking ¾ his normal speed, Abhishek is 16 minutes late in reaching his office. The usual time taken by him to cover the distance between his home and office is

A. 48 mins
B. 60 mins
C. 42 mins
D. 62 mins

Q. 10 Two trains for Mumbai leave Delhi nat 6:00 a.m. and 6:45 a.m and travel at 100 kmph and 136 kmph respectively. How many kilometers from Delhi will the trains be together?

A. 262. 4 km
B. 283.33 km
C. 260 km
D. 275 km

Q.11 A railway passenger counts the telegraph poles on the railroad as he passes them. The telegraph poles are at a distance of 50 meters. What will be his count in 4 hours, if the speed of the train is 45 kmph.

A. 600
B. 2500
C. 3600
D. 5000

Q. 12 A and B are running on a circular track of length 500 m. Speed of A is 20 m/s and the speed of B is 10m/s. They start from the same point at the same time in the same direction. After how much time will they meet again for the first time ?

A. 40 s
B. 50 s
C. 60 s
D. None

Q. 13 A and B are running on a circular track of length 500 m. Speed of A is 30 m/s and that of B is 20 m/s. They start from the same point at the same time in the same direction. After how much time will they meet again for the third time?

A. 400 s
B. 150 s
C. 160 s
D. None