



Speed, Distance & Time

Questions PDF

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In this Maths PDF, we will discuss the basic concepts and short tricks of an important topic i.e. Speed, Distance and Time To help you score well, we are here providing you with the basic concepts & tricks of how to solve Speed, Distance & Time questions.

What is Speed, Distance and Time?

Speed:

Speed is simply defined as the distance covered per unit time. Mathematically, it is defined as :

- **Speed** = Distance Travelled / Time Taken
- Formula of Time in terms of distance and Speed: **Time** = Distance/ Speed
- Formula of Distance in terms of Speed and Time: **Distance** = (Speed X Time)
- It is very important to know the importance of unit while solving these kinds of problem.

SI Unit for Speed: Meter per second

SI Unit for Distance: Meter

SI Unit for Time: Second

All the formulas of speed, time and distance are interrelated. One needs to connect the information given in the problems wisely and this can be done easily with a good practice. Let us now discuss the various types of Speed, Distance & Time questions.

TYPE 1

Now, we will discuss the most frequently used concept in this chapter i.e. questions based on the unit conversion. So, in order to learn this concept, we need to know how these questions are framed in the question paper.

Question: A train runs at X km/hr and it takes 18 seconds to pass a pole. The length of the train is 180m. Find the speed of the train in km/hr.

Solution:

Speed = distance /Time

Therefore,

$$S = 180\text{m}/18\text{s} = 10\text{m/s}$$

Now we need the answer in km/hr and for that, we will multiply the given speed with (18/5) in order to get the answer in km/h

$$\text{Therefore, } S = 10 \times (18/5) = 36\text{km/h.}$$

So here the trick for the same is :

- **Convert metre per second (m/sec) to km per hr (km/h)**
For converting (meter per second) to (kilometer per hour) we use following formula $s \text{ m/sec} = S \times (18/5) \text{ km/h}$
- **Convert km per hr (km/h) to metre per second (m/sec)**
For converting kph (kilometre per hour) to mps (meter per second) we use following formula $S \text{ km/hr} = (s \times 5/18) \text{ m/sec}$

Question: A boy covers a distance of 600m in 2min 30sec. What will be the speed in km/hr?

Solution:

Speed = Distance / Time = Distance covered = 600m, Time taken = 2min 30sec = 150sec
Therefore, Speed = $600 / 150 = 4 \text{ m/sec} = 4\text{m/sec} = (4 \times 18/5) \text{ km/hr} = 14.4 \text{ km/hr}$

Type 2

Considering 2 objects A and B having the speed x, y.

- If the ratio of the speeds of A and B is x:y, then the ratio of the times taken by then to cover the same distance is: **1/x:1/y or y:x**

Question: The ratio of the speed of a bike and a motor is 4:5 then what will be the ratio for the time taken by both the vehicles for the same destination?

Solution:

As the destination is the same so distance will be same for both Car and bike.

Let the Distance be d

And the speeds for both the vehicles be 4s and 5s

$$\text{Now, } t_1 = d/4s \text{ --- (1)}$$

$$t_2 = d/5s \text{ --- (2)}$$

$$\text{so, } t_1/t_2 = 5/4 = 5:4$$

Type 3

- Average Speed is another very important concept. It is defined as:

Average Speed = Total Distance Travelled / Total Time Taken

Question: Dewansh travels 320 kms at 64 km/hr and returns at 80 km/hr. Calculate the average speed of Dewansh?

Solution:

We know that speed = Distance/ time taken

$$\Rightarrow \therefore \text{Total time taken} = 320/64 + 320/80 = 9$$

$$\Rightarrow \text{Average Speed} = (320 + 320)/9$$

$$\Rightarrow \text{Average speed} = 71.11 \text{ km/hr}$$

Question: A car moving with a uniform speed of 50km/h covers half the distance with this speed. Half of the time of the remaining distance is covered with speed 35km/h and the other half time at 10km/h. If the total distance travelled is 90 km then What was the car's average speed (approximately) during his entire journey?



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Solution:

Half of total distance = 45km, Speed = 50km/h
Time taken = $45\text{km}/50 = 0.9 \text{ hr} = 0.9 \times 60 = 54$ minutes

Let time taken for remaining 45 km be T

And, distance via speed 10km/hr by D

Then, $ATQ, T/2 = (45 - D) / 35 \dots(1)$

And, $T/2 = (D) / 10 \dots(2)$

Equating equations 1 & 2,

$(45 - D) / 35 = (D) / 10$

$10(45 - D) = 35D$

$45D = 450$ or,

$D = 10 \text{ km}, T = 2 \text{ hour}$

Total time = $2 + .9 = 2.9 \text{ hour}$

Average speed = $90/2.9 = 31\text{km/hr}$

Type 4

- Suppose a Person covers a certain distance at **x km/hr** and an equal distance at **y km/hr**.

Then, the average speed for the complete

Journey: $2xy/(x + y)$

Question: A train goes from Ballygunge to Sealdah at an average speed of 20 km/hour and comes back at an average speed of 30 km/hour. The average speed of the train for the whole journey is?

Solution:

Let x and y be the average speed for the same distance in two different times.

Then, average speed = $(2xy)/(x + y)$

A train goes from Ballygunge to Sealdah at an average speed of 20 km/hour and comes back at an average speed of 30 km/hour.

The average speed of train = $(2 \times 20 \times 30)/(20 + 30) = 24 \text{ km/hr}$

Question: A boy goes to school at a speed of 3 km per hr and returns to the village at a speed of 2 km per hr. If he takes 5 hrs in all, what is the distance between the village and the school?

Solution:

Let the required distance be x km.

Then time taken during the first journey = $x/3 \text{ hr}$.

and time taken during the second journey = $x/2 \text{ hr}$.

$x/3 + x/2 = 5 \Rightarrow (2x + 3x) / 6 = 5$

$\Rightarrow 5x = 30$.

$\Rightarrow x = 6$

Required distance = 6 km.

Type 5

- In this type, we will discuss the formulas related to Train problems which are most common in the competitive exams.

Let the length of the train is X m and Speed of the train is S m/s then the Time Taken to cross a pole or man standing or a signal post will be: **$t = X/S$**

Question: A train takes 10 seconds to cross a pole and 20 seconds to cross a platform of length 200m. What is the length of the train?

Solution:

Let the length of the train be x meter and speed be y m/sec

Therefore, time taken to cross the pole = $x/y \text{ sec}$

and time taken to cross the platform = (Length of train + Length of platform) / speed of the train

Therefore $x/y = 10$

And, $(x+200) / y = 20$

$\Rightarrow 10y + 200 = 20y$

\therefore speed of the train, $y = 20 \text{ m/sec}$

And length of train = $x = 10y = 200\text{m}$

Question: Train B and C while travelling in opposite direction crosses each other in 10 seconds while the time taken by train C to cross a standing pole is 7 seconds and the length of train B and train C are 180m and 140m respectively then find the time taken by train B to cover the distance of 1728 km?

Solution:

Speed of train C = $140/7 = 20\text{m/s}$

Let the speed of train B be x m/s

So,

Time taken to cross each other = (Length of train B + length of train C) / Speed of train B relative to train C

$10 = (180+140)/(x+20)$

$10x+200 = 320$

$10x = 120$

$x = 12\text{m/s}$

Speed of train B in kmph = $12 \times 18/5 = 43.2 \text{ kmph}$

Time taken by train B to cover the distance = $1728/43.2 = 40 \text{ hours}$

Question: A 180 m long train crosses another 270m long train running in the opposite direction in 10.8 seconds. If the shorter train crosses a pole in 12 seconds, what is the speed of longer train?

Solution:

Speed of shorter train = $180/12 = 15\text{m/sec}$

$(15 + x) = (180+270)/10.8$ where

X = speed of longer train = $15 + x = 4500/108$

$X = (4500/108) - 15$

$X = (2880/108) \times (18/5) = 96 \text{ kmph}$



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