

## Speed, Time & Distance For Quantitative Aptitude

Speed Time & Distance is one of the most common quantitative aptitude topics which is asked in the Government exams (<https://byjus.com/govt-exams/>). This is one of those topics which candidates are familiar with even before they start their competitive exam preparation.

The concept of Speed, Time, Distance remains the same, however, the type of questions asked in the examinations may have a different variety.

Mostly, 1-2 word problems asked are based on Speed, Time, and Distance but candidates must also keep themselves ready to have questions in data sufficiency and data interpretation based on TDS (Time, Distance and Speed) topic.

Hence, to help you prepare well and cope up with the tough competition, we bring to you the concepts, formulas, and rules for Speed, Distance and Time topic. Further in the article, you will get the tricks for Speed, Distance and Time and a few sample questions as well.

**Speed, Time, Distance Rules PDF:-** [Download PDF Here](#)

Candidates can check the detailed syllabus for the quantitative aptitude (<https://byjus.com/govt-exams/quantitative-aptitude/>) section along with the list of exams that include this subject as a part of its syllabus.

***Improve speed and accuracy to solve Quantitative Aptitude Questions of Government Exams! Take help from the following links-***

- ***Government Exam Previous Year Question Papers [with Solutions]*** (<https://byjus.com/govt-exams/govt-exam-question-papers-with-answers-pdf/>)
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## Speed, Time & Distance – Introduction & Concept

Speed Distance Time is one of the most popular and important topics in the Mathematics or Quants section of any competitive exam. The concept of Speed, Time and Distance is used extensively for questions relating to different types of motion, circular motion, boats and streams, races, clocks, etc. It also covers the inter-relationship between the factors speed, time, and distance.



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Relationship Between Speed, Time & Distance

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1. **Speed = Distance/Time** – This tells us how slow or fast an object moves. It describes the distance travelled divided by the time taken to cover the distance.
2. Speed is directly Proportional to Distance and Inversely proportional to Time, Hence,
3. **Distance = Speed X Time**, and
4. **Time = Distance / Speed**, as the speed increases the time taken will decrease and vice versa.

Using these formulas any basic problems can be solved, however, the correct usage of units is also an important thing to consider while using formulas.

## Units of Speed Time & Distance

Each Speed, Distance and Time can be expressed in different units:

**Time:** seconds(s), minutes (min), hours (hr)

**Distance:** (meters (m), kilometers (km), miles, feet

**Speed:** m/s, km/hr

So if Distance = km and Time = hr, then as Speed = Distance/ Time; the units of Speed will be km/ hr.

Now that the units of Speed, Time and Distance is clear, let us understand the conversions related to these.

Interested aspirants can also check the links given below and strengthen their preparation for the quantitative aptitude section:

Data Sufficiency ( <a href="https://byjus.com/govt-exams/data-sufficiency-competitive-exams/">https://byjus.com/govt-exams/data-sufficiency-competitive-exams/</a> )	Data Interpretation ( <a href="https://byjus.com/bank-exam/prepare-data-interpretation-for-bank-exams/">https://byjus.com/bank-exam/prepare-data-interpretation-for-bank-exams/</a> )	Quadratic Equations ( <a href="https://byjus.com/bank-exam/tips-to-solve-quadratic-equation/">https://byjus.com/bank-exam/tips-to-solve-quadratic-equation/</a> )
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## Speed, Time & Distance Conversions

- To convert from km / hour to m / sec, we multiply by 5 / 18. So, 1 km / hour = 5 / 18 m / sec
- To convert from m / sec to km / hour, we multiply by 18 / 5. So, 1 m / sec = 18 / 5 km / hour = 3.6 km / hour
- Similarly, 1 km/hr = 5/8 miles/hour
- 1 yard = 3 feet
- 1 kilometer= 1000 meters = 0.6214 mile
- 1 mile= 1.609 kilometer



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- 1 hour = 60 minutes =  $60 \times 60$  seconds = 3600 seconds
- 1 mile = 1760 yards
- 1 yard = 3 feet
- 1 mile = 5280 feet
- 1 mph =  $(1 \times 1760) / (1 \times 3600) = 22/45$  yards/sec
- 1 mph =  $(1 \times 5280) / (1 \times 3600) = 22/15$  ft/sec
- For a certain distance, if the ratio of speeds is  $a : b$ , then the ratio of times taken to cover the distance would be  $b : a$  and vice versa.

## Application of Speed, Time & Distance

Given below are a few subheads under the Speed, Time and Distance topics that tell us the basis of the variety of questions asked in the examination.

### 1. Average Speed

**Average Speed = (Total distance traveled)/(Total time taken)**

**Case 1** – When the distance is constant: **Average speed =  $\frac{2xy}{x+y}$** ; Where,  $x$  and  $y$  are the two speeds at which the same distance has been covered.

**Case 2** – When the time taken is constant: **Average speed =  $\frac{(x + y)}{2}$** ; Where,  $x$  and  $y$  are the two speeds at which we traveled for the same time.

#### Examples:

**Q1.** A person travels from one place to another at 30 km/hr and returns at 120 km/hr. If the total time taken is 5 hours, then find the Distance.

#### Solutions:

Here the Distance is constant, so the Time taken will be inversely proportional to the Speed. Ratio of Speed is given as 30:120, i.e. 1:4

So the ratio of Time taken will be 4:1.

Total Time taken = 5 hours; Time taken while going is 4 hours and returning is 1 hour.

Hence, Distance =  $30 \times 4 = 120$  km

**Q.2.** Traveling at  $\frac{3}{4}$ th of the original Speed a train is 10 minutes late. Find the usual Time taken by the train to complete the journey?

#### Solutions:

Let the usual Speed be  $S_1$  and usual Time be  $T_1$ . As the Distance to be covered in both the cases is same, the ratio of usual Time to the Time taken when he is late will be the inverse of the usual Speed and the Speed when he is late

If the Speed is  $S_2 = \frac{3}{4}S_1$  then the Time taken  $T_2 = 10 \Rightarrow T_1 = 30$  minutes.

Candidates preparing for competitive exams can go through the following links for assistance:



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## 2. Inverse Proportionality of Speed & Time

Speed is inversely proportional to Time when the Distance is constant. S is inversely proportional to  $1/T$  when D is constant. If the Speeds are in the ratio  $m:n$  then the Time taken will be in the ratio  $n:m$ .

There are two methods to solve questions:

- Using Inverse Proportionality
- Using Constant Product Rule

### Example:

**Q1.** After traveling 50km, a train is meeting with an accident and travels at  $(3/4)$ th of the usual Speed and reaches 45 min late. Had the accident happened 10km further on it would have reached 35 min late. Find the usual Speed?

### Solutions:

#### Using Inverse Proportionality Method

Here there are 2 cases

Case 1: accident happens at 50 km

Case 2: accident happens at 60 km

Difference between two cases is only for the 10 kms between 50 and 60. The time difference of 10 minutes is only due to these 10 kms.

In case 1, 10 kms between 50 and 60 is covered at  $(3/4)^{\text{th}}$  Speed.

In case 2, 10 kms between 50 and 60 is covered at usual Speed.

So the usual Time "t" taken to cover 10 kms, can be found out as below.  $4/3 t - t = 10 \text{ mins}$   
 $\Rightarrow t = 30 \text{ mins}$ ,  $d = 10 \text{ kms}$

so usual Speed =  $10/30 \text{ min} = 10/0.5 = 20 \text{ km/hr}$

#### Using Constant Product Rule Method

Let the actual Time taken be T



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There is a  $(1/4)$ th decrease in Speed, this will result in a  $(1/3)$ rd increase in Time taken as Speed and Time are inversely proportional

(A  $1/x$  increase in one of the parameters will result in a  $1/(x+1)$  decrease in the other parameter if the parameters are inversely proportional) The delay due to this decrease is 10 minutes

Thus  $1/3 T = 10$  and  $T = 30$  minutes or  $1/2$  hour

Also, Distance = 10 km

Thus Speed = 20 kmph



(<https://byjus.com/govt-exams/>)

### 3. Meeting Point Questions

If two people travel from two points A and B towards each other, and they meet at point P. The total Distance covered by them on the meeting will be AB. The Time taken by both of them to meet will be the same. As the Time is constant, Distances AP and BP will be in the ratio of their Speed. Say that the Distance between A and B is d.

If two people are walking towards each other from A and B, When they meet for the first Time, they together cover a Distance “d” When they meet for the second Time, they together cover a Distance “3d” When they meet for the third Time, they together cover a Distance of “5d” .....

#### Example:

**Q1.** Amit and Aman have to travel from Delhi to Jaipur in their respective cars. Amit is driving at 60 kmph while Aman is driving at 90 kmph. Find the Time taken by Aman to reach Jaipur if Amit takes 9 hrs.

#### Solutions:

As the Distance covered is constant in both cases, the Time taken will be inversely proportional to the Speed. In the problem, Speed of Amit and Aman is in ratio 60: 90 or 2:3.

So the ratio of the Time taken by Amit to that taken by Aman will be in the ratio 3:2. So if Amit takes 9 hrs, Aman will take 6 hrs.

Candidates can go through a few other quantitative aptitude related links are given below to excel in the upcoming Government exams:

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## Sample Questions on Speed, Time & Distance

All the hard work can go in vain if the candidate does not solve questions based on Speed, time and distance on a regular basis and try using the different formulas to solve each question in an even shorter time span.

Hence, discussed below are a few sample questions on Speed, Time and Distance to give an idea as to what type of questions are asked in the competitive exam and what format and pattern are used for the same.

**Q.1.** A man travels from his home to office at 4km/hr and reaches his office 20 min late. If the Speed had been 6 km/hr he would have reached 10 min early. Find the distance from his home to office?

1. 8 km
2. 12 km
3. 6 km
4. 9 km

**Answer (3) 6 km**

**Solutions:**

Let the Distance between home and office =d Suppose he reaches the office on Time, the Time taken = x minutes

**Case 1:** When he reaches office 20 minutes late,

Time taken = x+20

**Case 2:** when he reaches office 10 minutes early,

Time taken = x-10 As the Distance traveled is the same, the ratio of Speed in case 1 to the Speed in case 2 will be the inverse of the Time taken in both cases Ratio of Speed in both cases = 4:6 = 2:3 Ratio of Time in both cases = 3:2 Therefore  $(x+20)/(x-10)=3/2$   $2x+40 = 3x-30$   $x= 70$  minutes Taking case 1,  $4= d/(90/60) \Rightarrow d= 360/60 = 6$  km

**Q.2.** Ram can row a boat in still water at 10 kmph. He decides to go boating in a river. To row upstream he takes 2 hours and to row downstream he takes  $1\frac{1}{2}$  hours. Find the Speed of the river.

1.  $10/7$  kmph
2.  $11/5$  kmph
3.  $9/7$  kmph
4.  $13/5$  kmph

**Answer (1)  $10/7$  kmph**



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**Solutions:**

Suppose the Speed of the river is 'y' kmph.

While rowing upstream he takes 2 hrs and while rowing downstream he takes  $1\frac{1}{2}$  hours.

As the Distance covered is constant the ratio of the net Speeds of the boat while going upstream and downstream will be the inverse of the ratio of the Time taken.

Ratio of Time taken (downstream: upstream) =  $1.5/2 = 3/4$

So the ratio of Speed of boat (downstream: upstream) =  $4/3$

Speed downstream:  $10 + y$  Speed upstream :  $10 - y$

$(10+y)/(10-y) = 4/3$

$30+3y=40-4y$ . Thus,  $7y=10$  &  $Y=10/7$

Speed of river =  $10/7$  kmph

**Q.3.** Ram and Shyam are standing at two ends of a room with a width of 30 m. They start walking towards each other along the width of the room with a Speed of 2 m/s and 1 m/s respectively. Find the total distance travelled by Ram when he meets Shyam for the third time.

1. 110 m
2. 112 m
3. 120 m
4. 100 m

**Answer (4) 100 m**

**Solution:**

When Ram meets Shyam for the third time, they together would have covered a Distance of  $5d$ , i.e  $5 \times 30\text{m} = 150\text{ m}$ .

The ratio of Speed of Ram and Shyam =  $2:1$ , so the total distance travelled by them will also be in the ratio  $2:1$  as the Time taken is constant.

So the Distance travelled by Ram will be  $2/3 \times 150 = 100\text{ m}$

**Q.4.** A man decided to cover a distance of 6 km in 84 minutes. He decided to cover two thirds of the distance at 4 km / hr and the remaining at some different speed. Find the speed after the two third distance has been covered.

1. 5 kmph
2. 7 kmph
3. 9 kmph
4. 3 kmph

**Answer (1) 5 kmph**

**Solution:**

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We are given that two thirds of the 6 km was covered at 4 km / hr i.e. 4 km distance was covered at 4 km / hr. Time taken to cover 4 km =  $4 \text{ km} / 4 \text{ km / hr} = 1 \text{ hr} = 60 \text{ minutes}$

Time left =  $84 - 60 = 24 \text{ minutes}$

Now, the man has to cover remaining 2 km in 24 minutes or  $24 / 60 = 0.4 \text{ hours}$

Speed required for remaining 2 km =  $2 \text{ km} / 0.4 \text{ hr} = 5 \text{ km / hr}$

**Q.5.** While going to office, Ramesh travels at a speed of 30 kmph and on his way back, he travels at a speed of 45 kmph. What is his average speed of the whole journey?

1. 45 kmph
2. 36 kmph
3. 32 kmph
4. 42 kmph

**Answer (2) 36 kmph**

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Average speed =  $2ab / (a+b)$ ; (where a and b are two

Speed =  $2 \times 45 \times 30 / 45 + 30$ , solving this we get

Speed & Distance Rules and Sample Questions from

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Speed and Distance Questions and Answers

(<https://byjus.com/speed-distance-questions-answers-pdf/>) at the given

link to practice well and understand the concept better. Also, analyse the previous year's papers to know more about the pattern of questions asked.

<https://byjus.com/ssc-exams/>

## Tricks For Speed, Time & Distance

Now, time speed and distance is something that we come across each day, but we don't really think about the relationship until we take an actual test. If you went to your office at 4km/hr you will reach 20 mins late, if you are at 6km/hr then you will reach 10 mins early.

### Government Exam Updates

Isn't that simple? But competitive exams manage to perplex us by converting the

Upcoming SSC Exams (<https://byjus.com/ssc-exams/>) Kilometres to meters or centimetres and hours to seconds and milliseconds.

Let's have a look at the easiest method to solve speed, time and distance. Check out the video to know how to solve time speed distance questions easily.

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