Relationship Between Speed, Time and Distance

Distance = Speed x Time ($D=S\times T$)

Speed = Distance/Time ($S=\frac{D}{T}$)

Time = Distance / Speed ($T=\frac{D}{S}$)

The conversion of speed, time and distance into various units is given below:

To convert a given data from km/hour to m/sec, we multiply by 5/18. As 1 km/hour = 5/18 m/sec.

To convert a given data m/sec to km/hour, we multiply by 18/5. As 1 m/sec = 18/5 km/hour = 3.6 km/hour.

In terms of formula, we can list it as:

x km/hr=$x\times \frac{5}{18}$m/sec

x m/sec =$x\times \frac{18}{5}$km/hr

Similarly, some other conversions are given below:

1 km/hr = 5/8 miles/hour

1 yard = 3 feet

1 kilometer= 1000 meters

1 mile= 1.609 kilometer

1 hour= 60 minutes= 3600 seconds

1 mile = 1760 yards

1 yard = 3 feet

1 mile = 5280 feet

Applications of Speed, Time and Distance

Some of the major applications of speed, time and distance are given below:

Average Speed: The average speed is determined by the formula = (Total distance travelled)/(Total time taken)

Average speed=$d_1+d_2+d_3\cdots d_n/t_1+t_2+t_3\cdots t_n$

Sample 1 – When the distance travelled is constant and two speed is given then:

Average speed = 2xy/x+y

where x and y are the two speeds at which the corresponding distance has been reached.

Sample 2 – When the time taken is constant average speed is calculated by the formula:

Average speed =(x+y)/2

where x and y are the two speeds at which we covered the distance for an identical time.

Example: An individual drives from one place to another at 40 km/hr and returns at 160 km/hr. If the complete time needed is 5 hours, then obtain the distance.

Solutions: Here the distance is fixed, so the time taken will be inversely proportional to the speed. The ratio of speed is given as 40:160, i.e. 1:4.

Therefore the ratio of time taken will be 4:1.

Total time is practised = 5 hours; therefore the time taken while travelling is 4 hours and returning is 1 hour.

Hence, distance = 40x 4 = 160 km.

If the first part of any given distance is covered at a rate of v1 in time t1 and the second part of the distance is covered at a rate v2 in time t2 then the average speed is given by the formula:

Average speed = $(v_1t_1+v_2t_2)/t_1+t_2$

Relative Speed: As the name suggests the idea is about the relative speed between two or more things. The basic concept of relative speed is that the speed gets combined in the case of objects moving in the opposite direction to one another and the speed gets subtracted for the case when objects are moving in an identical direction.

For example, if two passenger trains are moving in the opposite direction with a speed of X km per hour and Y kilometre per hour respectively. Then their relative speed is given by the formula:

Relative speed = X + Y

On the other hand, if the two trains are travelling in the same direction with the speed of X km per hour and Y kilometre per hour respectively. Then their relative speed is given by the formula:

Relative speed = X -Y

For the first case time taken by the train in passing each other is given by the formula:

Relative speed = X + Y

Time taken=$\frac{L1+L2}{X+Y}$

For the second case, the time taken by the trains in crossing each other is given by the formula:

Relative speed = X -Y

Time taken= $\frac{L1+L2}{X-Y}$

Here L_1, L_2 are the lengths of the trains respectively.

01) A certain 90-mile trip took 2 hours. Exactly 1/3 of the distance traveled was by rail, and this part of the trip took 1/5 of the travel time. What was the average rate, in miles per hour, of the rail portion of the trip?

A) 12 mph B) 30 mph C) 45 mph D) 60 mph E) 75 mph

02) A bus uses one liter of diesel to travel 15 km. After an engine tune-up, the bus travels 15% farther on one liter. How many liters of diesel (to the nearest tenth) will it take for the bus to travel 150 km. after a tune-up?

A) 8.5 B) 8.7 C) 8.9 D) 9.0 E) 10.0

03) A man started at 8 am from his home, walked at the rate of 3 km/hr and reached his office 45 minutes late. The next day, he started at the same time and walked at the rate of 5 km/hr and reached his office 15 minutes earlier than the scheduled time. What was the distance between his office and home?

A) 6 km B) 7.5 km C) 9 km D) 12 km E) none of these

04) Mr. X and Mr. Y started from point A and reached point B in 10 minutes and 9 minutes respectively. If the traveling speed of Mr. X was 2 km/hr less than that of Mr.Y, what was the distance between A and B in kms?

A) 6 B) 4.5 C) 4 D) 3 E) none of these

05) A man had traveled 1/3 of the total distance of his trip when his car broke down. He finished the journey on foot, spending twenty times as long walking as he had spent driving. How many times faster was his driving speed than his walking speed?

A) 10 B) 12 C) 15 D) 20 E) none of these

06) An Uber X car charges Tk 40 as base fare, Tk 3.6 for each 0.2 of a kilometer and Tk 180/ hour as the travelling time charge. What will be the fare for a 6 kilometer trip if the travelling time is 110 minutes?

A) 230 B) 340 C) 460 D) 478 E) None of these

07) Two trains going from A to B in parallel tracks are moving with speeds 50 km/hr and 30 km/hr respectively. The faster train crosses a man sitting in the slower train in 18 seconds. What is the length of the faster train?

A) 170 m B) 150 m C) 120 m D) 100 m E) None of these

08) Arif starts from A at 10 a.m. towards B at 100 kmph. Babu starts from A at 10:10 a.m. towards B at 120 kmph. Babu reached B 10 minutes before Arif. Calculate the distance between A and B.

A) 100 km B) 200 km C) 240 km D) 300 km E) None of these

09) If a man walks 14 kilometers/hour instead of 10 kilometers/hour, he would have walked 20 kilometers more. The actual distance travelled by him is:

A) 12 km B) 50 km C) 72 km D) 20 km E) None of these

10) An aeroplané flies twice as fast as a train which covers 60 miles in 80 minutes. What distance will the aeroplane cover in 20 minutes? (একটি

এরোপ্লেন ট্রেনের দ্বিগুন গতিতে চলে। ট্রেনটি ৮০ মিনিটে ৬০ মাইল গেলে এরোপ্লেনটি ২০ মিনেটে কত টুকু পথ অতিক্রম করবে?)

A) 30 miles B) 35 miles C) 40 miles D) 50 miles E) None of these

11) The mileage of a motorbike A and a motorbike B is 42 km per litre and 52 km per litre respectively. Motorbike A covered 294 km and motorbike B covered 208 km. If the cost of 1 litre of petrol is Tk. 48, how much amount would be spent on petrol to cover the total distance by both the motor bikes together? (প্রতি লিটার জ্বালানী তেলে বাইক A ও B যথাক্রমে ৪২ ও ৫২ কি.মি. পথ যেতে পারে। যদি বাইক A,২৯৪ কি.মি. এবং বাইক B ২০৮ কি.মি. পথ যায় এবং প্রতি লিটার জ্বালানীর দাম ৪৮ টাকা হয়, তাহলে বাইক দুটি যে পথ অতিক্রম করে তার জন্য মোট কত টাকা খরচ হবে?)

A) Tk. 480 B) Tk. 528 C) Tk. 576

D) Cannot be determined E) None of these

12) Two guns were fired from the same place at an interval of 8sec, A person approaching the place observes that 5 minutes 52 seconds have elapsed between the hearing of the sound of the two guns. If the velocity of the sound is 330 m/sec, the man was approaching the place at what speed (in km/hr)? (একই জায়গা থেকে দুটি বন্দুক থেকে ৮ সেকেন্ডে বিরতিতে দুটি গুলি ছোড়া হল। ঐ স্থানের দিকে অগ্রসরমান একজন ব্যক্তি লক্ষ্য করলেন দুটি গুলির শব্দের মধ্যবর্তী সময়ের ব্যবধান ৫ মিনিট ৫২ সেকেন্ড। বাতাসে শব্দের বেগ ৩৩০ m/s হলে ঐ ব্যক্তি কত গতিতে অগ্রসর হচ্ছিলেন?)

A) 24 B) 27 C) 30 D) 36 E) None of these

13) A man rows to a place 48 km distant and back in 14 hours. He finds that he can row 4 km with the stream in the same time as 3 km against the stream. The rate of the stream is: (একজন লোক ১৪ ঘন্টায় ৪৮ যেয়ে ফিরে আসে। সে, স্রোতের অনুকূলে যে সময়ে ৪ কিমি যায় একই সময়ে স্রোতের প্রতিকূলে ৩ কিমি যেতে পারে। স্রোতের গতিবেগ বের করুন।)

A) 1 km/hr B) 1.5 km/hr C) 1.8 km/hr

D) 3.5 km/hr E) None of these

14) Train Green Arrow leaves Station A for Station B everyday at 7 PM. On a certain day, it was delayed by 2 hours. To cover up the time, it increased its average speed by 20% but still arrived at station B 1 hour later than the schedule. What is the usual duration of the train's journey from station A to Station B?

A) 6 hours B) 6.5 hours C) 8 hours D) 8.5 hours E) None of these

15) In a race of 500m race, Rabib beats Zafar by 40 seconds and beats Abrar by 125m, if Zafar and Abrar run a 500 m race, Zafar beats Abrar by 40 seconds . What is the time taken (in seconds) by Zafar to run the race?

A) 160 B) 240 C) 280 D) 320 E) 330

16) An aeroplane first flew with a speed of 440 kmph and covered a certain distance. It still had to cover 770 km less than what it had already covered, but it flew with a speed of 660 kmph. The average speed for the entire flight was 500 kmph. Find the total distance covered.

A) 1375 km B) 2750 km C) 3250 km D) 4400 km E) None of these

17) Rajib and Rakib are travelling from point A to B, Which are 400km apart, travelling at a certain speed Rajib takes one hour more than Rakib to reach point B. if Rajib doubles his speed he will take 1 hour 30 mins less than Rakib to reach point B. At what speed was Rajib driving from point A to B?

(in kmph)

A) 90 kmph B) 70 kmph C) 160 kmph D) 80 kmph E) None of these

18) A man went downstream for 28 km in a motor boat and immediately returned. It took the man twice as long to make the return trip. If the speed of the river flow were twice as high, the trip downstream and back would take 672 minutes. Find the speed of the boat in still water and the speed of the river flow.

A) 9 kmph & 3 kmph B) 12 kmph & 6 kmph C) 7 kmph & 5 kmph

D) 16 kmph & 8 kmph E) 16kmph & 4 kmph

01. E	02. B	03. B	04. D	05. A	06. D	07. D	08. B	09. B	10. A
11. B	12. B	13. A	14.A	15.C	16.B	17.D	18.A		

Written Sample

1) A man started at 8 am from his home, walked at the rate of 3 km/hr and reached his office 45 minutes late. The next day, he started at the same time and walked at the rate of 5 km/hr and reached his office 15 minutes earlier than the scheduled time. What was the distance between his office and home?

2) The mileage of a motorbike A and a motorbike B is 42 km per litre and 52 km per litre respectively. Motorbike A covered 294 km and motorbike B covered 208 km. If the cost of 1 litre of petrol is Tk. 48, how much amount would be spent on petrol to cover the total distance by both the motor bikes together?

3) Train Green Arrow leaves Station A for Station B everyday at 7 PM. On a certain day, it was delayed by 2 hours. To cover up the time, it increased its average speed by 20% but still arrived at station B 1 hour later than the schedule. What is the usual duration of the train's journey from station A to Station B?

4) An aeroplane first flew with a speed of 440 kmph and covered a certain distance. It still had to cover 770 km less than what it had already covered, but it flew with a speed of 660 kmph. The average speed for the entire flight was 500 kmph. Find the total distance covered.

5) Rajib and Rakib are travelling from point A to B, Which are 400km apart, travelling at a certain speed Rajib takes one hour more than Rakib to reach point B. if Rajib doubles his speed he will take 1 hour 30 mins less than Rakib to reach point B. At what speed was Rajib driving from point A to B?

(in kmph)

6) Man went downstream for 28 km in a motor boat and immediately returned. It took the man twice as long to make the return trip. If the speed of the river flow were twice as high, the trip downstream and back would take 672 minutes. Find the speed of the boat in still water and the speed of the river flow.