11. Speed, Distance & Time

Important formulae and facts of Time and Distance

Speed is a very basic concept in motion which is all about how fast or slow any object moves. We define speed as distance divided by time.
Distance is directly proportional to Velocity when time is constant.

- Speed Distance Time formula mathematically written as:- **Speed** = distance/time

Formula of Time :-time = distance/ Speed
So Formula of time is, time is equal to distance upon speed.

- **Formula of Distance:-Distance** = (Speed * Time)

Distance = Rate x Time

- To find rate, divide through on both sides by *time:*

Rate = Distance/Time

- ***Rate* is distance** (given in units such as miles, feet, kilometers, meters, etc.) divided by time (hours, minutes, seconds, etc.). Rate can always be written as a fraction that has distance units in the numerator and time units in the denominator, e.g., 25 miles/1 hour.

So distance is simply speed into time.
Note: All three formulae that formula of speed, formula of time and formula of distance are interrelated.

- **Convert from kph (km/h) to mps(m/sec)**
  For converting kph(kilometre per hour) to mps(meter per second) we use following formula

x km/hr=(x∗5/18) ***m/sec***

- **Convert from mps(m/sec) to kph(km/h)**
  For converting mps**(meter per second)** to kph**(kilometre per hour)** we use following formula

x **m/*sec***= X *(18/5) ***km/h***

- If the ratio of the speeds of A and B is a : b, then the ratio of the times taken by then to cover the same distance is :**1/a : 1/b or b : a**
- Suppose a man covers a certain distance at x km/hr and an equal distance at y km/hr. Then, the average speed during the whole journey is :- **2xy/(x + y)**

- Relation between time, distance and speed: Speed is distance covered by a moving object in unit time: **Speed= Distance covered/ Time Taken**

Rule : 1: Ratio of the varying components when other is constant: Consider 2 objects *A* and *B* having speed Sa, Sb.
Let the distance travelled by them are Da and Db respectively and time taken to cover these distances be Ta and Tb respectively.
Let's see the relation between time, distance and speed when one of them is kept constant

1. When speed is constant distance covered by the object is directly proportional to the time taken.
   ie; **If Sa=Sb** then **Da/Db = Ta/Tb**
2. When time is constant speed is directly proportional to the distance travelled. ie; **If Ta=Tb** then **Sa/Sb=Da/Db**
3. When distance is constant speed is inversely proportional to the time taken ie if speed increases then time taken to cover the distance decreases. ie; If **Da=Db** then **Sa/Sb= Tb/Ta**

Rule 2: We know that when distance travelled is constant, speed of the object is inversely proportional to time taken

1. If the speeds given are in Harmonic progression or HP then the corresponding time taken will be in Arithmetic progression or AP
2. If the speeds given are in AP then the corresponding time taken is in HP

Distance Constant

- If distance travelled for each part of the journey, ie d1=d2=d3=…=dn=d, then average speed of the object is Harmonic Mean of speeds.
  Let each distance be covered with speeds s1,s2,…sn in t1,t2,…tn times respectively.
  Then t1 =d/s1
  t2 = d/s2
  tn =d/sn

then, Average Speed= [(d + d + d+ … ntimes)]/ [d/s1 + d/s2+ d/s3+ … d/sn

Average Speed= (n)/[(1/s1 + 1/s2+ …. 1/sn)]

Time Constant

- If time taken to travel each part of the journey, ie t1=t2=t3=…tn=t, then average speed of the object is Arithmetic

Let distance of parts of the journey be d1,d2,d3,…dn and let them be covered with speed s1,s2,s3,…sn respectively.
Then d1=s1 t , d2=s2t, d3=s3t, … dn=snt
then , Average Speed= [(s1/t+ s2/t+ …. sn/t)/(t + t+ … ntimes)]

Average Speed=(s1+ s2+s3+ … + sn)/n

Relative Speed

- If two objects are moving in same direction with speeds *a* and *b* then their relative speed is **|a-b|**
- If two objects are moving is opposite direction with speeds *a* and *b* then their relative speed is **(a+b)**

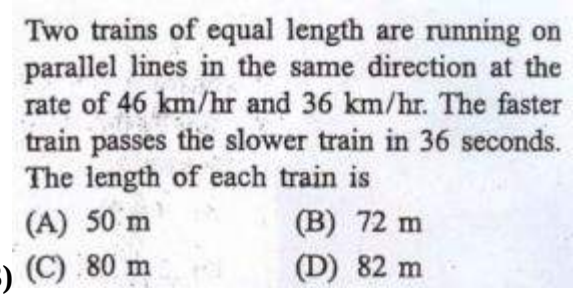
Time and distance is a very easy topic and has limited variety of questions. I will take up questions from each variety and will solve them with shortest method possible.

Q. 1) A man travelled a distance of 80 km in 7 hrs partly on foot at the rate of 8 km per hour and partly on bicycle at 16 km per hour. The distance travelled on the foot is
(A) 32 km (B) 48 km
(C) 36 km (D) 44 km

Let the distance travelled on foot be X km. Then distance travelled on bicycle will be Rs. (80 - X)
X/8 + (80 - X)/16 = 7
After forming this equation, don't solve it for X. Just observe, X/8 denotes that X is a multiple of 8 (although you can't be 100% sure, but SSC generally likes whole numbers). That means answer is either 32 km or 48 km. Put X = 32 km in the equation and check if it satisfies the equation. It does!
Answer : (A)

Q. 2) A train 300 m long is running with a speed of 54 km/hr. In what time will it cross a telephone pole ?
(A) 20 sec (B) 15 sec
(C) 17 sec (D) 18 sec

This is a commonly asked question. Just remember -
Time taken to cross a telephone pole = Time taken by the train to cover a distance equal to its length
Speed = 54 km/hr = 54 * 5/18 m/sec = 15 m/sec
Time taken by the train to cover a distance equal to its length = 300/15 = 20 sec
Answer : (A)


Two trains of equal length are running on parallel lines in the same direction at the rate of 46 km/hr and 36 km/hr. The faster train passes the slower train in 36 seconds. The length of each train is

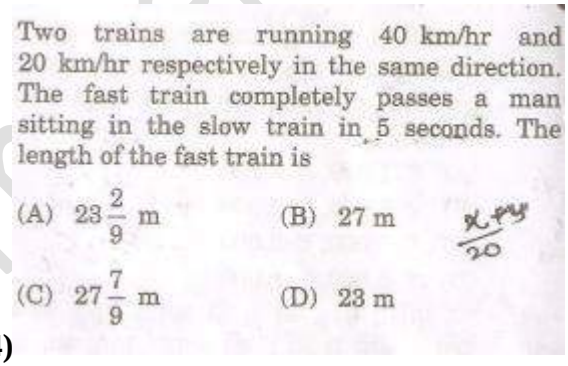
(A) 50 m (B) 72 m

(C) 80 m (D) 82 m

Q. 3)

If two objects A and B are moving at a given speed and we are asked "when will A overtake B" or "When will the police catch the thief", we use the concept of **Relative Velocity**. It's very simple

When the objects are moving in opposite direction, Relative velocity = Speed of A + Speed of B
When the objects are moving in the same direction, Relative velocity = Speed of A - Speed of B
Let the length of each train be L metres.
Here, the trains are moving in the same direction, hence relative velocity = Speed of train A - Speed of Train B = 10 km/hr = 10 * 5/18 m/sec = 25/9 m/sec
We know, Distance = Speed * Time
Here, Distance = Sum of the length of both the trains, i.e., 2L
Speed = Relative velocity
Time = Time taken by the faster train to overtake the slower train
So, 2L = 36 * 25/9
L = 50 m
Answer : (A)


Two trains are running 40 km/hr and 20 km/hr respectively in the same direction. The fast train completely passes a man sitting in the slow train in 5 seconds. The length of the fast train is

(A) $23\frac{2}{9}$ m (B) 27 m

(C) $27\frac{7}{9}$ m (D) 23 m

Q. 4)

This question is similar to Q. No. 2. We just have to replace the Speed of the train, with Relative Velocity.
Let the length of the fast train be L.
Trains are running in the same direction, hence Relative Velocity = 40 - 20 = 20 km/hr = 50/9 m/sec
L = 50/9 * 5 = 250/9 metres
Answer : (C)

Q. 5) A and B are 20 km apart. A can walk at an average speed of 4 km/hour and B at 6 km/hr. If they start walking towards each other at 7 a.m., when they will meet ?

(A) 8.00 a.m. (B) 8.30 a.m.
(C) 9.00 a.m. (D) 10.00 a.m.

You can solve such questions with two methods -

Method 1 (Relative Velocity)

Relative velocity of A and B = 6 + 4 = 10 km/hr
They have to cover a distance to 20 km.
Hence they will meet in 20/10 = 2 hours
So if they start at 7 a.m., they will meet at 9:00 a.m.
Answer : (C)

Method 2 (Equate the distance)

Let A and B after t hours
Then distance covered by A in t hours + Distance covered by B in t hours = 20
t*4 + t*6 = 20
or t = 2 hours

Q. 6) A train leaves a station A at 7 am and reaches another station B at 11 am. Another train leaves B at 8 am and reaches A at 11.30 am. The two trains cross one another at

(A) 8.36 am (B) 8.56 am
(C) 9.00 am (D) 9.24 am

This question is similar to the above question. But it has a twist! The two trains are not moving at the same time. First train is starting at 7 am, while second train is starting at 8 am.

Method 1 (Relative Velocity)

Remember! To apply the relative velocity formula in such questions, we will first have to make the trains move at the same time. How?
Let the distance between the trains be X km
The first train takes 4 hours (7 am to 11 am) to move from A to B
Hence speed of the first train = X/4
The second train takes 3.5 hours (8 am to 11:30 am) to move from B to A
Hence speed of the second train = X/3.5
From 7 am to 8 am (1 hour), only the first train is moving. Distance travelled by the first train in 1 hour = X/4 * 1 = X/4
Distance left between the two trains = X - X/4 = (3/4)X
Relative velocity of the trains = X/4 + X/3.5
Time taken by the trains to cross one another = (Distance between them) / (Relative velocity)
= (3/4)X / (X/4 + X/3.5)

= 1.40 hours
= 1 hour 24 minutes
So the trains will cross one another at 8 am + 1 hr 24 min = 9 : 24 am
Answer (D)

Method 2 (Equate the distance)
Let the trains cross each other in t hours
First train starts early, so it will travel for complete t hours. But second train starts 1 hour after the first train, so it will travel for (t - 1) hours
Distance travelled by first train in t hours + Distance travelled by second train in (t - 1) hours = X
X/4 * t + X/3.5 * (t - 1) = X
t = 2.4 hours = 2 hours 24 minutes
But this time will be added to 7 a.m.
So, Answer = 7 a.m. + 2 hours 24 minutes = 9:24 a.m.

Q. 7) A thief steals a car at 1.30 p.m. and drives it off at 40 km/hr. The theft is discovered at 2 p.m. and the owner sets off in another car at 50 km/hr. He will overtake the thief at

(A) 4 p.m. (B) 4.30 p.m.
(C) 6 p.m. (D) 5 p.m.

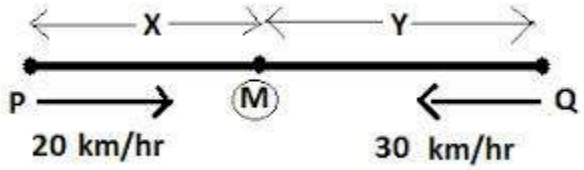
This question is similar to the above question.
Chor-Sipahi questions are best tackled with Relative Velocity.
Relative Velocity of the Thief and the Owner = 50 - 40 = 10 km/hr
Distance travelled by the thief in half an hour (from 1:30 p.m. to 2 p.m.) = 0.5 * 40 = 20 km
Now the distance between the owner and the thief is 20 km.
So time taken to catch the thief = Distance between them / Relative velocity = 20/10 = 2 hours
He will catch the thief at 2 p.m. + 2 hours = 4 p.m.
Answer : (A)

Q. 8) P and Q starting simultaneously from two different places proceed towards each other at a speed of 20 km/hour and 30 km/hour respectively. By the time they meet each other, Q has covered 36 km more than P. The distance (in km.) between the two places is

(A) 180 (B) 108
(C) 144 (D) 162

Method 1 (Relative velocity)
Let P and Q meet in t hours
Distance travelled by P in t hours = 20t (because the speed of P is 20 km/hr)
Distance travelled by Q in t hours = 30t (because the speed of Q is 30 km/hr)
Given, 30t - 20t = 36 km
or t = 3.6 hours
So P and Q meet after 3.6 hours
Relative velocity of P and Q = 20 + 30 = 50 km/hr
Distance between the two places = Time taken by P and Q to meet * Relative velocity = 50 * 3.6 = 180 km
Answer : (A)

Method 2



Let P and Q meet at point M. P has to travel X km to reach M and Q has to travel Y km.
Time taken by P to reach M = Time taken by Q to reach M
X/20 = Y/30
X/Y = 2/3
Given, Y - X = 36 km
Divide the whole equation with Y
1 - X/Y = 36/Y
1 - 2/3 = 36/Y [Put X/Y = 2/3]
Y = 108 km
Hence X = Y - 36 = 72 km
Distance between the two places = X + Y = 108 + 72 km = 180 km
Answer : (A)

Q. 1) 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

(A) 27 km/hr (B) 26 km/hr
(C) 25 km/hr (D) 24 km/hr

Apply the direct formula
Average speed for the complete journey = 2XY/(X + Y) = 2*20*30/50 = 24 km/hr
Answer : (D)

Q. 2)

On a journey across Mumbai, a taxi averages 20 m.p.h. for 70% of the distance, 25 m.p.h. for 10% of the distance and 8 m.p.h. for the remainder. Then the average speed of the whole journey is

(A) 15·925 m.p.h. (B) 15·25 m.p.h.

(C) 15 m.p.h. (D) 15·625 m.p.h.

Let the total distance be 100 km
Average Speed = Total Distance/Total Time
Total time = 70/20 + 10/25 + 20/8 = 3.5 + 0.4 + 2.5 = 6.4
Average Speed = 100/6.4 = 15.625 m.p.h

Q. 3)

If a boy walks from his house to school at the rate of 4 km per hour, he reaches the school 10 minutes earlier than the scheduled time. However, if he walks at the rate of 3 km per hour, he reaches 10 minutes late. Find the distance of his school from his house.

(A) 5 km (B) 4 km

(C) 6 km (D) 4·5 km

This is again a very frequently asked question. Let the distance of his school be X km.
(Time taken to reach the school at 3 km/hr) - (Time taken to reach the school at 4 km/hr) = (10 + 10) minutes or 1/3 hours
X/3 - X/4 = 1/3
Hence X = 4 km
Answer : (B)
Direct Formula
Distance = S1*S2/(S1 - S2) * Time difference
S1 = 4 km/hr, S2 = 3 km/hr, Time Difference = 10 - (-10) = 20 minutes or 1/3 hours
Distance = 4*3/(4-3) * 1/3 = 4 km
Note: In the above formula, while calculating the time difference, "late" time is written with negative sign.

Q. 4)

Two runners cover the same distance at the rate of 15 km and 16 km per hour respectively. Find the distance travelled when one takes 32 minutes longer than the other.

(A) 128 km (B) 64 km

(C) 96 km (D) 108 km

Method 1
Let time taken by second runner = t. So time taken by first runner = t + 32/60 = t + 8/15
Since distance is constant, hence speed and time are inversely proportional
S2/S1 = T1/T2
16/15 = (t + 8/15)/t
16/15 = 1 + 8/15t
1/15 = 8/15t
t = 8 hours
So second runner takes 8 hours to cover the distance with a speed of 16 km/hr
Hence distance = 8*16 = 128 km

Method 2
Let the distance be X km. Then,
X/15 - X/16 = 32/60
Solve for X
X = 128 km
Answer: (A)

Method 3 (Direct formula)-
In such questions you can use the same formula you used for Q. (3)
Distance = S1*S2/(S1 - S2) * Time difference
Distance = 16*15/(16 - 15) * (32/60) = 16 * 15 * 32/60 = 128 km

Q. 5) A man rows down a river 15 km in 3 hrs. with the stream and returns in $7\frac{1}{2}$ hrs. The rate at which he rows in still water is
(A) 2·5 km/hr (B) 1·5 km/hr
(C) 3·5 km/hr (D) 4·5 km/hr

A man rows down a river 15 km in 3 hrs.
Hence, Downstream Speed(v) = 15/3 = 5 km/hr
Similarly, Upstream Speed(u) = 15/7.5 = 2 km/hr
v = Rate in still water + Rate of stream
u = Rate in still water - Rate of stream
Add the above 2 equations-
Rate in still water = (v + u)/2 = (5 + 2)/2 = 3.5 km/hr
Answer: (C)

Q. 6) A man rows upstream 36 km and downstream 48 km taking 6 hours each time. The speed of the current is
(A) 2 km/hour (B) 1.5 km/hour
(C) 0.5 km/hour (D) 1 km/hour

We have in the above question-
Speed of the current = (v - u)/2
u = 36/6 = 6 km/hr
v = 48/6 = 8 km/hr
Speed of the current = (8 - 6)/2 = 1 km/hr
Answer: (D)

Q. 7) A boat takes half time in moving a certain distance downstream than upstream. The ratio of the speed of the boat in still water and that of the current is
(A) 1:2 (B) 3:1 (C) 2:1 (D) 4:3

Let the distance be X km. Let he takes 't' time downstream, then he will take '2t' time upstream.
Downstream speed(v) = X/t
Upstream speed(u) = X/2t
Speed of the boat in still water/Speed of the current = (v + u)/(v - u) = (X/t + X/2t)/(X/t - X/2t)
= 3/2 : 1/2
= 3 : 1
Answer : (B)

Direct formula-

A man rows a certain distance downstream in t_1 hours and returns the same distance upstream in t_2 hours. If the speed of the stream is y km/hr, then the speed of the man in still water

$$= y\left(\frac{t_2 + t_1}{t_2 - t_1}\right) \text{ km/hr}$$

So, Speed of the boat in still water/Speed of the current = (2t + t)/(2t - t) = 3 : 1

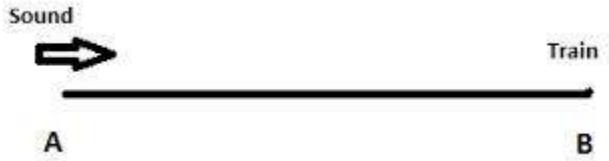
Q. 8) A boat goes 24 km upstream and 28 km downstream in 6 hours. It goes 30 km upstream and 21 km downstream in 6 hours and 30 minutes. The speed of the boat in still water is
(A) 8 km/hr (B) 9 km/hr
(C) 12 km/hr (D) 10 km/hr

Given,
$24/u + 28/v = 6$ or $12/u + 14/v = 3$ ... (1)
$30/u + 21/v = 6.5$ ... (2)
The best way to solve (1) and (2) is by eliminating a variable.
Multiply equation (1) by 3
$36/u + 42/v = 9$ ... (3)
Multiply equation (2) by 2
$60/u + 42/v = 13$ ... (4)
Subtract equation (3) from (4)
$24/u = 4$
$u = 6$ km/hr
Put $u = 6$ in equation (1)
$v = 14$ km/hr
Speed of the boat in still water = $(u + v)/2 = (6 + 14)/2 = 10$ km/hr
Answer: (D)

Q. 9) Two guns were fired from the same place at an interval of 13 minutes but a person in a train approaching the place hears the second shot 12 mins 30 seconds after the first. Find the speed of the train(approx) supposing that sound travels at 330 m/s.
A. 40 B. 47 C. 55 D. 60

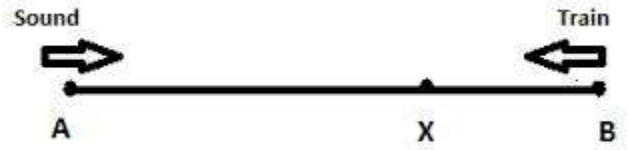
Distance travelled by sound in 30 sec = Distance travelled by train in 12 min 30 sec
Let the speed of the train be X m/sec
Distance travelled by sound in 30 sec = 330*30 metres
Distance travelled by train in 12 min 30 sec (750 sec) = X*750
330*30 = X*750
X = 13.2 m/sec = 13.2 * 18/5 km/hr = 47.52 km/hr
Answer: 47 km/hr

Explanation
When you hear the gun shot, that means the sound has travelled to your ears.
First consider a simple scenario when the train is not moving. When the two shots are fired from A, a person sitting in the train will hear them at an interval of 13 minutes only. The sound travels the distance from A to B.



Now let us consider the scenario when the train is moving from B to A. When the first shot is fired, the sound will travel from A to B and the person sitting inside the train will hear it instantly. Now when the second shot is fired after 13 minutes, the sound would not have to travel

from A to B, because the person sitting inside the train is not at B any more. He has moved from position B to X. Hence the sound only needs to travel from A to X.



Hence in this case, the person is hearing the shot after 12 minutes 30 seconds. Instead of travelling for 13 minutes (from A to B), now the sound is travelling only for 12 min 30 sec (from A to X). Hence we can say,
AB = Distance travelled by sound in 13 minutes
AX = Distance travelled by sound in 12 minutes 30 seconds
XB = Distance travelled by sound in 30 seconds ... (1)
After 12 minutes 30 seconds, the sound moves from A to X and also the train moves from B to X.
BX = Distance travelled by train in 12 minutes 30 seconds ... (2)
Hence from (1) and (2) we can say-
Distance travelled by sound in 30 sec = Distance travelled by train in 12 min 30 sec

Q. 10) Two guns were fired from the same place at an interval of 10 minutes and 30 seconds, but a person in a train approaching the place hears second shot 10 minutes after the first. The speed of train (in km/hr), supposing that sound travels at 330m/s is:
A. 19.8 B. 58.6 C. 59.4 D. 111.8

Distance travelled by sound in 30 sec = Distance travelled by train in 10 minutes (600 sec)
330*30 = X*600
X = 16.5 m/sec or 59.4 km/hr
Answer: (C)

Some Question on Above formulas

Ques 1:– A man covers a distance of 600m in 2min 30sec. What will be the speed in km/hr?
Sol:: Speed =Distance / Time
=Distance covered = 600m, Time taken = 2min 30sec = 150sec
Therefore, Speed= 600 / 150 = 4 m/sec
= 4m/sec = (4*18/5) km/hr = 14.4 km/ hr.

Ques 2:– A car travels along four sides of a square at speeds of 200, 400, 600 and 800 km/hr. Find average speed.?
Sol: Let x km be the side of square and y km/hr be average speed
Using basic formula, Time = Total Distance / Average Speed
x/200 + x/400 + x/600 + x/800= 4x/y

=25x/ 2400 = 4x/ y
= y= 384
Average speed = 384 km/hr

Ques 3: A motor car does a journey in 10 hrs, the first half at 21 kmph and the second half at 24kmph. Find the distance?
Sol:

Distance = (2 x 10 x 21 x 24) / (21+24)
= 10080 / 45
= 224 km.

Ques 4:A boy goes to school at a speed of 3 kmph and returns to the village at a speed of 2 kmph. If he takes 5 hrs in all, what is the distance between the village and the school?

Sol : Let the required distance be x km.
Then time taken during the first journey = x/3 hr.
and time taken during the second journey = x/2 hr.
x/3 + x/2 = 5 => (2x + 3x) / 6 = 5
=> 5x = 30.
=> x = 6
Required distance = 6 km.

Ques 5: Walking ¾ of his speed, a person is 10 min late to his office. Find his usual time to cover the distance?
Sol : Usual time = Late time / {1/ (3/4) – 1)
= 10 / (4/3 -1)
= 10 / (1/3)
= 30 minutes.

We hope that the post would have cleared all your doubts related to the topic.

Most Important Questions with Short Tricks on Time, Speed and Distance

Question 1: **A train running at 25 km/hr takes 18 seconds to pass a platform. Next, it takes 12 seconds to pass a man walking at 5 km/hr in the opposite direction. Find the sum of the length of the train and that of the platform.**

(1) 125 m

(2) 135 m

(3) 145 m

(4) 155 m

Solution:

Speed of train = 25 km./hr.

$$= 25 \times \frac{5}{18} = \frac{125}{18}\ m/\sec$$

Distance traveled in 18 secs at this speed

Where D = L . $_{\text{train}}$ + L . $_{\text{platform}}$

$$= \frac{125}{18} \times 18 = 125\ m$$

length of train + length of platform = 125 m.

Short Trick:

Speed in m/sec. $= 25 \times \frac{5}{18}$

$$= \frac{125}{18}\ m/\sec$$

$$S = \frac{D}{T} \Rightarrow \frac{125}{18} = \frac{L_T + L_p}{18}$$

Sum of length of train & Platform $= \frac{125}{18} \times 18 = 125m.$

Question 2: **Two trains for Delhi leave Jaipur at 8.30 a.m. and 9.00 a.m. and travel at 60 km/hr and 75 km/hr respectively. How many km. away from Jaipur will the two trains meet.**

(1) 125 km

(2) 150 km

(3) 175 km

(4) 200 km

Solution:

Distance covered by 1st train in 30 min. = 30 kms. (as speed per hrs. 60)

Time taken by 2nd train to cover 30 kms. = 2 hrs. (as it travels 15 km. per hr. more than 1st train. Hence takes 2 hrs. to cover 30 km. that 1st train has already covered)

Dist. covered = (60 x 2.5 hr.) or (75 x 2 hrs.) = **150 km.**

Short Trick:

Required distance = (9.00 – 8.30) x $\left(\frac{60\times 75}{75-60}\right)=\frac{1}{2}\left(\frac{60\times 75}{15}\right)=150\ km$

Question 3: **Two places P and Q are 162 km apart. A train leaves P for Q and at the same time another train leaves Q for P. Both the trains meet 6 hrs after they start moving. If the train travelling from P to Q travels 8 km/hr faster than the other train, find the speed of the two trains.**

(1) 17.5 km/hr, 9.5 km/hr

(2) 19.5 km/hr, 11.5 km/hr

(3) 21.5 km/hr, 13.5 km/hr

(4) Can't be determined

Solution:

Suppose the speeds of the two trains are p km/hr and q km/hr respectively. Thus

and p – q = 8 …… (ii)

(i) + (ii) implies that

$p+q=\frac{162}{6}=27.....(i)$

2p = 35 p = 17.5 km/hr

and (i) – (ii) implies that

2q = 19 q = 9.5 km/hr

Short Trick:

Take speed = $p+q=\frac{162}{6}=27.....(i)$

(x) + (x + 8) = 27 (as given diff. in speed = 8 kms./hr.)

9.5 & 17.5

Question 4: **A train running at a speed of 60 kmph crosses a platform double its length in 32.4 seconds. What is the length of the platform?**

(1) 180 metres

(2) 240 metres

(3) 360 metres

(4) 90 metres

Solution:

Let the length of the train be x m

length of the platform = 2x m

Total distance covered by the train = (2x + x =) 3x m

Now, according to the question

$$S = \frac{D}{T} \Rightarrow \frac{125}{18} = \frac{L_T + L_p}{18}$$

or, $$x = 60 \times \frac{5}{18} \times \frac{324}{10 \times 3} = 180\ m$$

Short Trick:

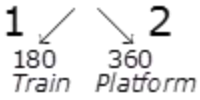
Speed in m/sec $$= 60 \times \frac{5}{18}$$

$$= \frac{50}{3} m / \sec$$

Distance covered $$= \frac{50}{3} \times 32.4 = 540$$

Total length

540



(as the length of platform is double of the train)

Question 5: **A train travels at the speed of 65 kms/hr and halts at 8 junctions for a certain time. It covers a distance of 1300 kms in 1 day (24 hours). How long does the train stop at each junction, if it halts for the same period of time at all the junctions?**

(1) 30 minutes

(2) 20 minutes

(3) 60 minutes

(4) 40 minutes

Solution:

Speed = 65 kmph

Distance = 1300 kms

Time taken $= \frac{1300}{65} = 20\ hours$

Clearly, 4 hours are spent at 8 junctions in stoppages as one full day was taken for the journey to be completed.

Required time = 4 x 60 = 240 min. and at each junction the halt is of $= \frac{240}{8} = 30 \min$

Short Trick:

Time to cover 1300 km=D/S = 1300/65= 20 hrs

Break = 24 hrs. – 20 hrs. = 4 hrs.

Break at each junction $= \frac{4}{8} = \frac{1}{2} hr.$ = 30 min