

# ***TIME & DISTANCE***

## ***SHORT TRICKS &***

## ***QUESTIONS WITH***

## ***SOLUTIONS***

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Time, Speed and Distance (TSD) is one of the most frequently occurring topics in quantitative aptitude section of many competitive exams. Competitive exams are all about time. If you manage your time well then you can get success in those exams. Here Time and Distance shortcuts are explained with examples which would surely help you to do the problems with speed and accuracy.

### #1: Basic Concepts of Time, Speed and Distance

Speed = Distance/Time

Time = Distance/Speed

Distance = Speed x Time

To convert km/hr to m/sec

$x \text{ km/hr} \Rightarrow x * (5/18) \text{ m/sec}$

To convert m/sec to km/hr

$y \text{ m/sec} = y * (18/5) \text{ km/hr}$

If the ratios of the speeds of A and B is  $a : b$ , then the ratio of the times taken to cover the same distance is  $(1/a) : (1/b)$  or  $b : a$

### #2: Finding out the Average Speed when Equal Distances are covered at Different Speeds

Lot of us make mistakes in calculation of average speed when the same distance is covered at different speeds. We simply take the average of the given speeds. However, that gives absolutely wrong answer. So now get ready to find out what will give you the correct solution.

**Theorem:** If a certain distance is covered at  $x \text{ km/hr}$  and the same distance is covered at  $y \text{ km/hr}$ , then

**Average speed** =  $[2xy/(x+y)] \text{ km/hr}$

This is basically harmonic mean of the two speeds, i.e.  $2/(1/x + 1/y)$

**Example** – If a car travels at  $40 \text{ km/hr}$  on a trip and at  $60 \text{ km/hr}$  on return trip. What is its average speed for the entire trip?

First thing we should be careful is we shouldn't just average the 2 speeds. Overall average speed is not  $(S1+S2)/2$ . From the above direct formula the answer will be

**Solution:**  $(2 \times 40 \times 60)/(40+60) = 48 \text{ km/hr}$

If we've to find the average of more than 2 speeds, average speed will be the harmonic mean of all such speeds

$N / (1/a + 1/b + 1/c + 1/d)$

Here  $N = 4$ , i.e. the number of variables (speeds in this case)

### #3: Finding out the Distance when Equal Distances Covered at Different Speeds and Total Journey Time is given

**Theorem:** A person goes to a destination at a speed of  $S1 \text{ km/hr}$  and returns to his place at a speed of  $S2 \text{ km/hr}$ , if he takes  $T$  hours, then

**One way distance** = Total time taken x (Product of two speeds) / (Addition of two speeds)

$= T * \{S1 * S2 / (S1 + S2)\}$

**Example:** A boy goes to school at a speed of  $3 \text{ km/hr}$  and returns to village at  $2 \text{ km/hr}$ . If he takes 5 hours, what is the distance between the school and the village?

**Solution:** Distance between school and village is  $5 * (3 * 2) / (3 + 2) = 6 \text{ km}$

**#4.1: Finding out the Distance when Equal Distances Covered at Different Speeds**

**Theorem:** A person goes to a destination at a speed of  $S_1$  km/hr and returns to his place at a speed of  $S_2$  km/hr, if he takes  $T_1$  and  $T_2$  hours respectively, then

**One way distance** = Total time taken  $\times$  (Product of two speeds) / (Addition of two speeds)

$$= (T_1 + T_2) \times \{S_1 \times S_2 / (S_1 + S_2)\}$$

**#4.2: Shortcut for "Early and Late to Office" Type Problems**

The same shortcut used above can be used in these type of problems. Here you go –

**Theorem:** A person covers a certain distance having an average speed of  $x$  km/hr, he is late by  $x_1$  hours but with a speed of  $y$  km/hr, he reaches his destination  $y_1$  hours earlier, hence

**Required distance** = Product of two speeds  $\times$  Difference between arrival times / Difference of two speeds

**Example:** A man covers a certain distance between his house and office on bike. Having an average speed of 30 km/hr, he is late by 10 minutes. However, with a speed of 40 km/hr, he reaches his office 5 minutes earlier. Find the distance between his house and office?

In the above case, the required distance =  $(30 \times 40) \times 0.25 / (40 - 30) = 30$  km

Please note:  $10 + 5 = 15$  minutes =  $15/60$  hours = 0.25 hours

Now since you know few time, speed and distance shortcuts, let's try this time and speed puzzle

**#5: Finding Speed or Time Required after Crossing Each Other**

**Theorem:** If two persons or trains A and B start their journey at the same time from two points P and Q towards each other and after crossing each other they take  $a$  and  $b$  hours in reaching Q and P respectively, then

$$\frac{A' \text{ Speed}}{B' \text{ Speed}} = \frac{\sqrt{b}}{\sqrt{a}}$$

Using this relationship you can find out the missing variables which can be either speed or time. Once these are known you can easily find the distance.

**Example:** Two, trains, one from Howrah to Patna and the other from Patna to Howrah, start simultaneously. After they meet, the trains reach their destinations after 9 hours and 16 hours respectively. The ratio of their speeds is:

**Solution:** using the above relationship, the ratio of their speed is  $\sqrt{16}/\sqrt{9} = 4/3$  or 4:3

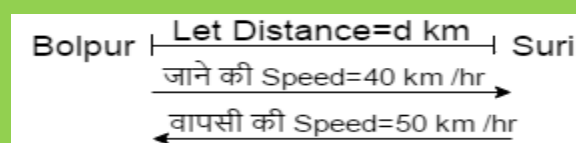
**Time And Distance Concepts**

(Q1) Sriya with her family travelled from Bolpur to Suri by car at a speed of 40 km/hr and returned to Bolpur at a speed of 50 km/hr. The average speed for the whole journey is.

श्रेया ने अपने परिवार के साथ बोलपुर से सूरी तक की यात्रा कार से 40 km/hr की गति से की और बोलपुर की वापसी यात्रा 50 km/hr की गति से की पूरी यात्रा की/ पूरी यात्रा की औसत गति कितनी है?

- (a)  $44\frac{4}{9}$  km/h (b) 45 km/h (c)  $45\frac{1}{2}$  km/h (d) 44.78 km/h

**Solution:- Method-1**



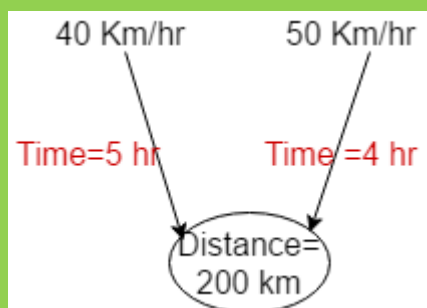
$$\begin{aligned}
 \text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\
 &= \frac{d + d}{\frac{d}{40} + \frac{d}{50}} \left[ \because \text{Time} = \frac{\text{Distance}}{\text{Speed}} \right] \\
 &= \frac{2d}{\frac{5d + 4d}{200}} = \frac{400}{9} = 44\frac{4}{9} \text{ km/hr Ans.}
 \end{aligned}$$

[Note : Total Distance means जाने में तय की गई दूरी + आने में तय की गई दूरी इसलिए  $d + d$  किया गया है]

Method-2

$$\begin{aligned}
 \text{Average Speed} &= \frac{2 \times S_1 \times S_2}{S_1 + S_2} \\
 &= \frac{2 \times 40 \times 50}{40 + 50} = \frac{400}{9} \\
 &= 44\frac{4}{9} \text{ km/h Ans.}
 \end{aligned}$$

Method-3



[Note – L.C.M of 40, 50 = 200. यदि आपलोग 40, and 50 का L.C.M नहीं निकालना चाहते हैं तो आपलोग कोई भी नंबर Assume कर ले लेकिन Assume करते वक्त यह ध्यान रखना है कि वह Number divisible हो 40 और 50 से | Time = Distance/Speed so Time = 200/40 = 5 hr and Time = 200/50 = 4 hr]

$$\begin{aligned}
 \text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\
 &= \frac{2 \times 200}{9} = 44\frac{4}{9} \text{ km/hr Ans.}
 \end{aligned}$$

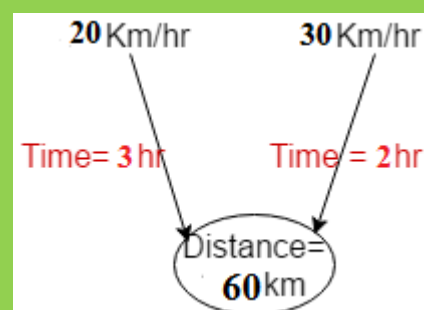
[Note: Total Distance means जाने में तय की गई दूरी + आने में तय की गई दूरी इसलिए 2 से गुणा किया गया है | Exam में आपलोग हमेशा Method-3 ही prefer करें]

(Q2) A train runs from Howrah to Bandel at an average speed of 20 km/hr and returns at an average speed of 30 km/hr. The average speed (in km/hr) of the train in the whole journey is.

एक रेलगाड़ी हावड़ा से बंडेल तक 20 km/hr की औसत गति से चलती है और 30 km/hr की औसत गति से वापस आती है तो उस रेलगाड़ी की पूरी यात्रा की औसत गति कितनी है?

(a) 20 km/hr    (b) 22.5 km/hr    (c) 24 km/hr    (d) 25 km/hr

Solution:



$$\begin{aligned}
 \text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\
 &= \frac{2 \times 60}{5} = 24 \text{ km/hr Ans.}
 \end{aligned}$$

(Q3) A man travels a distance of 24 km at 60 km/hr. Another distance of 24 km at 40 km/hr. His average speed for the whole journey is.

एक व्यक्ति 24 km की यात्रा 60 km/hr की चाल से तथा एक अन्य 24 km की यात्रा 40 km/hr की चाल से करता है तो उसकी पूरी यात्रा की औसत चाल कितनी है?

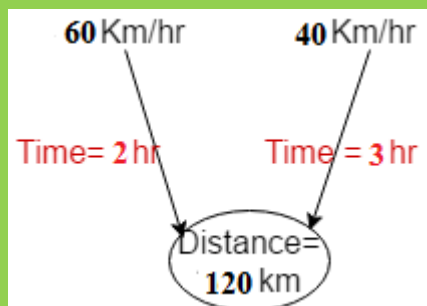
(a) 48 km/hr    (b) 60 km/hr    (c) 45 km/hr    (d) 50 km/hr

Solution: Method-1



$$\begin{aligned} \text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\ &= \frac{24+24}{\frac{24}{60} + \frac{24}{40}} = \frac{48}{\frac{48+72}{120}} \\ &= 48 \text{ km/hr Ans.} \end{aligned}$$

Method-2



$$\begin{aligned} \text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\ &= \frac{2 \times 120}{5} = 48 \text{ km/hr Ans.} \end{aligned}$$

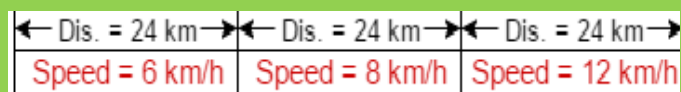
(Q4) A man travels a distance of 24km at 6 km/hr. Another distance of 24km at 8 km/hr and a third distance of 24km at 12 km/hr. His average speed for the whole journey is.

एक आदमी 24km की दूरी 6 km/hr की चाल से, एक अन्य 24km की दूरी 8km/hr की चाल से तथा एक तीसरी 24km की दूरी है 12km/hr की चाल से तय करता है। पूरी यात्रा के लिए उसकी औसत चाल है।

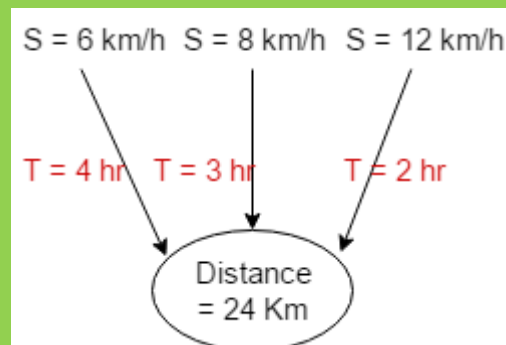
(a) 8 km/hr (b) 9 km/hr (c) 8.75 km/hr (d) 10 km/hr

Solution:

Fig.-1



[Note: Fig.-1 only for Concept]



$$\begin{aligned} \text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\ &= \frac{3 \times 24}{9} = 8 \text{ km/hr Ans.} \end{aligned}$$

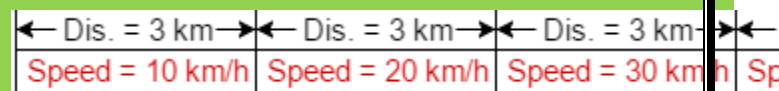
(Q5) A person travels four equal distances of 3km each at a speed of 10 km/hr, 20 km/hr, 30 km/hr and 60 km/hr respectively. Find his average speed for the whole journey is.

एक व्यक्ति 3km की चार समान दूरियों को क्रमशः 10 km/hr, 20 km/hr, 30 km/hr और 60 km/hr की गति से तय करता है तो उसकी पूरी यात्रा की औसत चाल कितनी है?

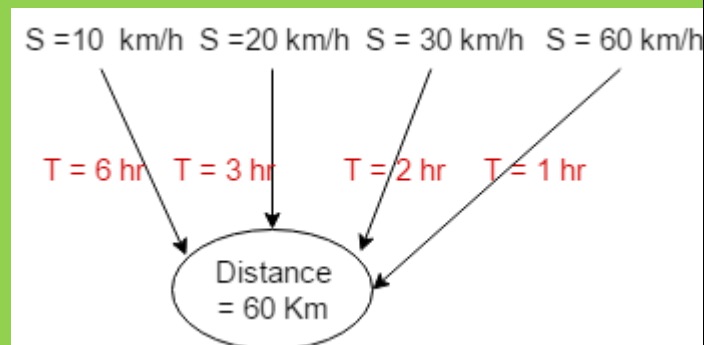
(a) 18 km/hr (b) 25 km/hr (c) 21 km/hr (d) 20 km/hr

Solution:

Fig.-1



[Note: Fig.-1 only for Concept]



$$\begin{aligned}\text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\ &= \frac{4 \times 60}{12} = 20 \text{ km/hr Ans.}\end{aligned}$$

(Q1) A boy rides his bicycle 10 km at an average speed of 12 km/hr and again Travels 12 km at an average speed of 10 km/hr. his average speed for the entire trip is approximately.

एक लड़का अपने साइकिल से 10 km की दूरी 12 km/hr की गति से तय करता है तथा फिर 12 km की दूरी 10 km/hr की गति से तय करता है। पूरी यात्रा में उसकी औसत गति लगभग कितनी है?

- (a) 10.4 km/hr (b) 10.8 km/hr (c) 11 km/hr (d) 12.2 km/hr

Solution:

← Dis. = 10 km →	← Dis. = 12 km →
Speed = 12 km/hr	Speed = 10 km/hr

$$\begin{aligned}\text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\ &= \frac{10 + 12}{\frac{10}{12} + \frac{12}{10}} = \frac{22}{\frac{50 + 72}{60}} \\ &= 10.8 \text{ km/hr Ans.}\end{aligned}$$

(Q2) A man completes 30 km of a journey at the speed of 6 km/hr and the remaining 40 km of the journey in 5 hours. His average speed for the whole journey is.

एक व्यक्ति 30 किलोमीटर की एक यात्रा को 6 km/hr की चाल से तथा शेष 40 किलोमीटर की यात्रा को 5 घंटे में पूरा करता है पूरी यात्रा के लिए उसकी औसत चाल क्या है?

- (a) 7 km/hr (b) 7.25 km/hr (c) 8 km/hr (d) 7.5 km/hr

Solution:

← Dis. = 30 km →	← Dis. = 40 km →
Speed = 6 km/hr	Time = 5 hr

$$\begin{aligned}\text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\ &= \frac{30 + 40}{\frac{30}{6} + 5} = \frac{70}{10} \\ &= 7 \text{ km/hr Ans.}\end{aligned}$$

(Q3) One-third of a certain journey is covered at a rate of 40 km/hr one-fourth at the rate of 30 km/hr and the rest at 25 km/hr. The average speed for the whole journey is.

एक निश्चित दूरी का 1/3 भाग 40 km/hr की चाल से, 1/4 भाग 30 km/hr की चाल से और शेष 25 km/hr की चाल से तय करती है तो पूरी यात्रा की औसत चाल क्या है?

- (a) 35 km/hr (b) 33 km/hr (c) 30 km/hr (d) 34 km/hr

Solution:

[Concept- अगर Mathematics के किसी भी question में fraction आए और आप को assume करना पड़े तो ये हमेशा ध्यान रखिएगा कि denominator का L.C.M, Assume किए हुए Number में जरूर हो। इस question में denominator 3 and 4 है जिसका L.C.M 12 होता है तो अब आप 12 का multiple कुछ भी Assume कर सकते हैं। Note: अगर आपको calculation easy करना है तो इस question में speed 2 digit में दिया हुआ है तो आप Distance को 3 digit में assume कर ले।]

Let distance = 120 km

Now,  $120 \times \frac{1}{3} = 40 \text{ km}$ ,  $120 \times \frac{1}{4} = 30 \text{ km}$

Rest =  $120 - 70 = 50 \text{ km}$

← Dis. = 40 km →	← Dis. = 30 km →	← Dis. = 50 km →
Speed = 40 km/hr	Speed = 30 km/hr	Speed = 25 km/hr

$$\begin{aligned}\text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\ &= \frac{120}{\frac{40}{40} + \frac{30}{30} + \frac{50}{25}} = \frac{120}{4} \\ &= 30 \text{ km/hr Ans.}\end{aligned}$$

(Q4) A person covers 40% distance at a speed of 40 km/hr and 30% distance at a speed of 30 km/hr and the rest distance at a speed of 15 km/hr. Find his average



speed in the whole journey.

एक व्यक्ति 40% की दूरी को 40 km/hr की गति से तय करता है और 30% की दूरी को 30 km/hr की गति से तय करता है और शेष दूरी को 15 km/hr की गति से तय करता है तो पूरी यात्रा में उसकी औसत गति क्या है?

(a) 22 km/hr (b) 28 km/hr (c) 25 km/hr (d) 30 km/hr

**Solution:**

Let Distance = 100 km

100 का 40% = 40 km, 100 का 30% = 30 km

Rest = 100 - 70 = 30 km

← Dis. = 40 km →	← Dis. = 30 km →	← Dis. = 30 km →
Speed = 40 km/hr	Speed = 30 km/hr	Speed = 15 km/hr

$$\begin{aligned} \text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total Time}} \\ &= \frac{100}{\frac{40}{40} + \frac{30}{30} + \frac{30}{15}} = \frac{100}{4} \\ &= 25 \text{ km/hr Ans.} \end{aligned}$$

(Q1) A boy goes to his school from his house at a speed of 3 km/hr and returns at a speed of 2 km/hr. if he takes 5 hours in going and coming, then the distance between his house and school is?

एक लड़का अपने घर से स्कूल 3 km/hr की चाल से जाता है तथा वापिस की 2 km/hr चाल से लौटता है। यदि आने-जाने में वह कुल 5 घंटे का समय लेता है, तो स्कूल और उसके घर के बीच की दूरी है?

(a) 6 km (b) 5.5 km (c) 5 km (d) 6.5 km

**Solution: Method-1**

House	← Let Distance = x km →	School
	जाने की Speed = 3 km/hr	
	वापस आने की Speed = 2 km/hr	

[Time = Distance/Speed]

Then,

$$\begin{aligned} \frac{x}{3} + \frac{x}{2} &= 5 \\ \Rightarrow \frac{2x+3x}{6} &= 5 \\ \therefore x &= 6 \text{ km Ans.} \end{aligned}$$

**Method-2**

$$\begin{aligned} D &= \frac{s_1 \times s_2}{s_1 + s_2} \times [\text{Total Time}] \\ &= \frac{3 \times 2}{3 + 2} \times 5 \\ &= 6 \text{ km Ans.} \end{aligned}$$

(Q2) A man travelled A certain distance by train at the rate of 25 km/hr and walked back at the rate of 4 km/hr. if the whole journey took 5 hours 48 minutes, the distance was.

किसी व्यक्ति ने 25 km/hr की चाल से चलने वाली रेलगाड़ी द्वारा एक दूरी तय की तथा वही दूरी वापसी में 4 km/hr की चाल से पैदल चलकर तय की। यदि आने-जाने में उसे कुल समय 5 घंटे 48 मिनट लगे हो, तो दूरी थी।

(a) 25 km (2) 30 km (3) 20 km (4) 15 km

**Solution: Method-1**

A	← Let Distance = x km →	B
	जाने की Speed = 25 km/hr	
	वापस आने की Speed = 4 km/hr	

[Time = Distance/Speed]

Then,

$$\begin{aligned} \frac{x}{25} + \frac{x}{4} &= \frac{29}{5} \\ \Rightarrow \frac{4x+25x}{100} &= \frac{29}{5} \\ \therefore x &= 20 \text{ km Ans.} \end{aligned}$$

[Note: Time = 5 hr 48 minutes = 5 × (48/60) hour = 29/5 hour]

**Method-2**



$$D = \frac{s_1 \times s_2}{s_1 + s_2} \times [\text{Total Time}]$$

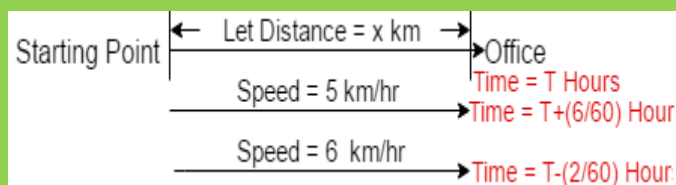
$$= \frac{25 \times 4}{25 + 4} \times \frac{29}{5}$$

$$= 20 \text{ km Ans.}$$

(Q1) Walking at a speed of 5 km/hr, a man reaches his office 6 minutes late. walking at 6 km/hr he reaches there 2 minutes early. The distance of his office is.  
5 km/hr की गति से चलने पर एक व्यक्ति अपने कार्यालय 6 मिनट देरी से पहुंचता है। यदि वह 6 km/hr की गति से चले तो वह 2 मिनट पहले पहुंच जाता है। तो, उसके कार्यालय की दूरी कितनी है?

(a) 3 km (b) 4 km (c) 3.5 km (d) 2 km

Solution: Method-1



Explan: [Let distance = d km. suppose इस d km की दूरी को एक निश्चित गति से तय करने में उस व्यक्ति को T hour लगता है। now, जब उस व्यक्ति की speed 5 km/hr रहता है तो वह 6 minutes late से पहुंचता है तो Time = (T + 6/60) hour लगेगा। [Note-6 minutes को hour में change किया गया है इसलिए 60 से divide किया गया है] Again जब उस व्यक्ति की speed 6 km/hr रहता है तो वह 2 minutes before से पहुंच जाता है तो Time = (T - 2/60) hour लगेगा।]

$$\text{Time Difference} = \left(T + \frac{6}{60}\right) - \left(T - \frac{2}{60}\right)$$

$$= T + \frac{6}{60} - T + \frac{2}{60}$$

$$= \frac{8}{60} \text{ hour}$$

Now,

$$\frac{x}{5} - \frac{x}{6} = \frac{8}{60}$$

$$\Rightarrow \frac{6x - 5x}{30} = \frac{8}{60}$$

$$\therefore x = 4 \text{ km Ans}$$

Method-2

[Note: Find Time difference

यदि एक बार late से पहुंचता हो तथा दूसरी बार पहले पहुंच जाता है तो Time difference = late(l) + before(b)

यदि दोनों बार late से पहुंचता हो तो Time difference = (l - l)

यदि दोनों बार पहले पहुंचता हो तो Time difference = (b - b)]

Time difference = 6 + 2 = 8 minutes = 8/60 hours

$$\text{Distance} = \frac{S_1 \times S_2}{S_1 \simeq S_2} \times (\text{Time Difference})$$

$$= \frac{5 \times 6}{5 \simeq 6} \times \frac{8}{60}$$

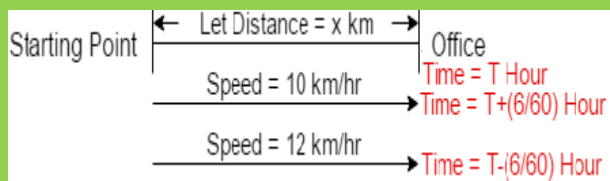
$$= 4 \text{ km Ans.}$$

(Q2) When a person cycled at 10 km/hr he arrived at his office 6 minutes late. He arrived 6 minutes early when he increased his speed by 2 km per hour. The distance of his office from the starting place is.

एक व्यक्ति 10 km/hr की गति से साइकिल चलाकर अपने कार्यालय 6 मिनट देरी से पहुंचा। जब उसने अपनी गति 2 km/hr और बढ़ा दी, तो वह 6 मिनट पहले पहुंच गया। उस व्यक्ति के कार्यालय और उसके आरंभिक स्थान के बीच की दूरी क्या है?

(a) 6 km (b) 7 km (c) 12 km (d) 16 km

Solution: Method-1



$$\begin{aligned}\text{Time Difference} &= \left(T + \frac{6}{60}\right) - \left(T - \frac{6}{60}\right) \\ &= T + \frac{6}{60} - T + \frac{6}{60} \\ &= \frac{12}{60} \text{ hour}\end{aligned}$$

Now,

$$\begin{aligned}\frac{x}{10} - \frac{x}{12} &= \frac{12}{60} \\ \Rightarrow \frac{6x - 5x}{60} &= \frac{12}{60} \\ \therefore x &= 12 \text{ km Ans}\end{aligned}$$

**Method-2**

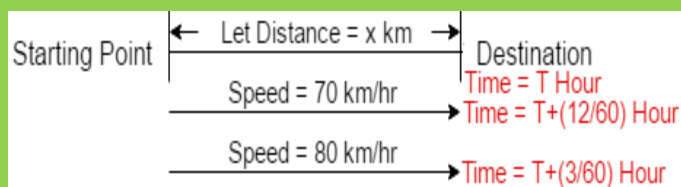
Time difference = 6+6=12 minutes = 12/60 hours

$$\begin{aligned}\text{Distance} &= \frac{S_1 \times S_2}{S_1 \simeq S_2} \times (\text{Time Difference}) \\ &= \frac{10 \times 12}{10 \simeq 12} \times \frac{12}{60} \\ &= 12 \text{ km Ans.}\end{aligned}$$

(Q3) If a train runs at 70 km/hr, it reaches its destination late by 12 minutes. But if it runs at 80 km/hr, it is late by 3 minutes. The correct time to cover the journey is.

यदि एक रेलगाड़ी 70 km/hr की गति से चलती है तो यह अपने गंतव्य तक 12 मिनट देरी से पहुंचती है। किंतु यदि यह 80 km/hr की गति से चलती है तो यह 3 मिनट देरी से पहुंचती है। यात्रा को तय करने का सही समय क्या है?

(a) 58 minutes (b) 2 hours (c) 1 hours (d) 59 minutes

**Solution: Method-1**

$$\begin{aligned}\text{Time Difference} &= \left(T + \frac{12}{60}\right) - \left(T + \frac{3}{60}\right) \\ &= T + \frac{12}{60} - T - \frac{3}{60} \\ &= \frac{9}{60} \text{ hour}\end{aligned}$$

Now,

$$\begin{aligned}\frac{x}{70} - \frac{x}{80} &= \frac{9}{60} \\ \Rightarrow \frac{80x - 70x}{70 \times 80} &= \frac{9}{60} \\ \therefore x &= 84 \text{ km}\end{aligned}$$

$$\text{Required Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$T + \frac{12}{60} = \frac{84}{70}$$

$$\therefore T = 1 \text{ Hour Ans.}$$

**Method-2**

दोनों बार late से पहुंचा so, Time difference = (1-1)

Time difference = 12-3=9 minutes = 9/60 hours

$$\begin{aligned}\text{Distance} &= \frac{S_1 \times S_2}{S_1 \simeq S_2} \times (\text{Time Difference}) \\ &= \frac{70 \times 80}{70 - 80} \times \frac{9}{60} \\ &= 84 \text{ km}\end{aligned}$$

$$\text{Required Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$T + \frac{12}{60} = \frac{84}{70}$$

$$\therefore T = 1 \text{ Hour Ans.}$$

(Q1) Aman when increasing his speed from 24 km/hr to 30 km/hr. He takes 1 hour less than the usual time to cover a certain distance. what is distance usually covered by Aman?

जब अमन अपनी चाल को 24 km/hr से बढ़ाकर 30km/hr कर लेता है तो वह एक निश्चित दूरी को तय करने में वास्तविक समय से एक घंटा कम समय लेता है तो अमन के द्वारा कितनी दूरी तय की गई?

- (a)120km (b)240km (c)400km (d)60 km

**Solution: Method-1**



$$S_1=24\text{km, then } T_1=\frac{d}{24} \text{ [usual time]}$$

$$S_2=30\text{km, then } T_2=\frac{d}{30}$$

According to Question,

$$T_1 - T_2 = 1$$

$$\Rightarrow \frac{d}{24} - \frac{d}{30} = 1$$

$$\Rightarrow \frac{5d-4d}{120} = 1$$

$$\therefore d=120 \text{ km Ans.}$$

**Method-2**

$$\begin{aligned} D &= \frac{S_1 \times S_2}{|S_1 - S_2|} \times [\text{Time difference}] \\ &= \frac{24 \times 30}{6} \times 1 \\ &= 120 \text{ km Ans.} \end{aligned}$$

(Q2)Mohan when increasing his speed from 30 km/hr to 40 km/hr. He takes 2 hours less than the usual time to cover a certain distance. what is distance usually covered by Mohan?

जब मोहन अपनी चाल को 30km/hr से बढ़ाकर 40km/hr कर लेता है तो वह एक निश्चित दूरी को तय करने में वास्तविक समय से 2 घंटे कम समय लेता है तो मोहन के द्वारा कितनी दूरी तय की गई?

- (a)120 km (b)160 km (c)240 km (d)300km

**Solution:**

$$\begin{aligned} D &= \frac{S_1 \times S_2}{|S_1 - S_2|} \times [\text{Time difference}] \\ &= \frac{30 \times 40}{10} \times 2 \\ &= 240 \text{ km Ans.} \end{aligned}$$

(Q1)A person covers a distance of 840 km with a constant speed when he increases a speed by 10 km/hr. He takes 2 hours less time find the original speed.

एक व्यक्ति 840 किलोमीटर की दूरी को किसी निश्चित गति से तय करता है जब वह अपनी गति को 10 किलोमीटर प्रति घंटा बढ़ा देता है तो वह 2 घंटे कम समय लेता है तो उसकी मूल गति क्या है?

- (a)50km/hr (b)60km/hr (c)90 km/hr (d)120 km/hr

**Solution:**

$$\begin{aligned} D &= \frac{S_1 \times S_2}{|S_1 - S_2|} \times [\text{Time difference}] \\ 840 &= \frac{X \times (X+10)}{10} \times 2 \\ \Rightarrow 4200 &= X \times (X+10) \end{aligned}$$

Take value of X from option

$x=60$

Then,

$$\Rightarrow 4200 = 60 \times (60+10)$$

$$\Rightarrow 4200 = 4200$$

Ans-60km/hr

(Q2)An aeroplane started its journey half hour late to cover a distance of 1500 km on time it increases its speed by 250 km/hr find its original speed.

कोई हवाई जहाज अपनी यात्रा आधे घंटे देरी से शुरू करता है 1500 किलोमीटर की दूरी को समय पर पूरा करने के लिए इसने अपनी गति को 250km/hr बढ़ा दिया तो उसकी मूल गति क्या है?

- (a)650km/hr (b)750 km/hr (c)600km/hr (d)700km/hr

**Solution:**

$$D = \frac{S_1 \times S_2}{|S_1 - S_2|} \times [\text{Time difference}]$$

$$1500 = \frac{X \times (X + 250)}{250} \times \frac{1}{2}$$

$$\Rightarrow 750000 = X \times (X + 250)$$

Take value of X from option

$x=750$

Then,

$$\Rightarrow 750000 = 750x(750+250)$$

$$\Rightarrow 750000 = 750000$$

Ans-750km/hr

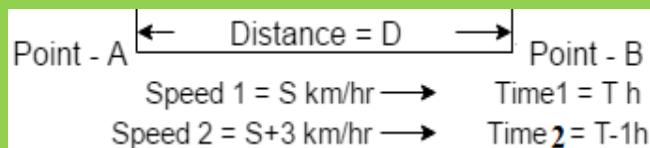
(Q1) A man walks a certain distance in certain time. if he had gone 3 km per hour faster, he would have taken 1 hour less than the scheduled time. if he had gone 2 km per hour slower, he would have been 1 hour longer on the road. The distance is.

एक व्यक्ति कुछ समय में कुछ दूरी तक चलता है। यदि वह 3 किलोमीटर प्रति घंटा तेज चला होता तो उसे निर्धारित समय से 1 घंटा कम लगता। यदि वह 2 किलोमीटर प्रति घंटा धीमे चला होता तो उसे सड़क पर एक घंटा अधिक लगता तो दूरी कितनी है?

(a) 60km (b) 45km (c) 65km (d) 80km

Solution:

Case-1

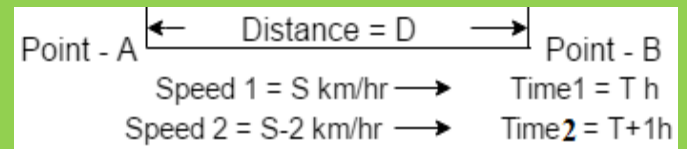


[Explanation: suppose उस व्यक्ति का speed S km/hr हैं जब उस व्यक्ति का speed S km/hr हैं तो Point-B तक जाने में suppose T hr लगता है। जब वह अपना speed S km/hr से बढ़ाकर S+3 km/hr कर लेता है तो Point-B तक जाने में Time=T-1 लेगा। Time Diff.=T-(T-1)=1,  $S_1-S_2=S-(S+3)=3$ ]

$$D = \frac{S \times (S+3)}{3} \times 1$$

$$\Rightarrow S \times (S+3) = 3D \text{ -(eqn-1)}$$

Case-2



$$D = \frac{S \times (S-2)}{2} \times 1$$

$$\Rightarrow S \times (S-2) = 2D \text{ -(eqn.-2)}$$

Dividing eqn.-1 by eqn.-2

$$\frac{S \times (S+3)}{S \times (S-2)} = \frac{3D}{2D}$$

$$S = 12 \text{ km/hr}$$

Put the value of S in Eqn.-1

$$12 \times (12+3) = 3D$$

$$\therefore D = 60 \text{ km Ans.}$$

Method-2

$$D = \frac{S_1 \times S_2}{|S_1 - S_2|} \times (\text{Time diff.})$$

Case-1	Case-2
$\frac{S \times (S+3)}{3} \times 1$	$= \frac{S \times (S-2)}{2} \times 1$
$\Rightarrow 2S+6 = 3S-6$	
$\Rightarrow S=12$	

Put the value of S in case-1

$$\frac{12 \times (12+3)}{3} \times 1 = D$$

$$D = 60 \text{ km Ans.}$$

(Q2) A car travels from P to Q at a constant speed. If its speed were increased by 10 km/hr it would have been taken one hour lesser to cover the distance. It would have taken further 45 minutes lesser if the speed was further increased by 10 km/hr. The distance between the two places is?

एक कार स्थान 'P' से 'Q' तक एक नियत गति से चलती है यदि इसकी गति 10 किलोमीटर प्रति घंटा बढ़ा दी जाए तो उसे यह दूरी तय करने में 1 घंटा कम लगता है यदि अब उसकी गति

पुनः 10 किलोमीटर घंटा और बढ़ा दी जाए तो उसे यह दूरी तय करने में अब 45 मिनट का समय और कम लगता है बताइए इन दोनों स्थानों के बीच की दूरी कितनी है?

(a) 540km (b) 420 km (c) 600km (d) 620km

**Solution:**

$$D = \frac{S_1 \times S_2}{|S_1 - S_2|} \times (\text{Time diff.})$$

$$\begin{array}{l} \text{Case-1} \quad \quad \quad \text{Case-2} \\ \frac{S \times (S+10)}{10} \times 1 = \frac{S \times (S+20)}{20} \times \frac{7}{4} \quad [\because \text{Time diff.} = 1\text{h}45\text{min}] \\ \Rightarrow 8S+80 = 7S+140 \quad \quad \quad 1\frac{45}{60} = \frac{7}{4} \\ \Rightarrow S = 60\text{km/hr} \end{array}$$

Put the value of S in case-1

$$\frac{60 \times (60+10)}{10} \times 1 = D$$

$$D = 420\text{km Ans.}$$

(Q1) Walking at  $\frac{3}{4}$  of his usual speed, a man covers a certain distance in 2 hours more than the time he takes to cover the distance at his usual Speed. The time taken by him to cover the distance with his usual speed is.

कोई व्यक्ति अपनी सामान्य चाल की  $\frac{3}{4}$  चाल से चलने पर, अपनी सामान्य चाल से लगने वाले समय की तुलना में 2 घंटे अधिक समय लेता है उसे सामान्य चाल से चलने पर कुल कितना समय लगेगा?

(a) 5 hours (b) 7 hours (c) 6 hours (d) 5.5 hours

**Solution:**

$$\begin{array}{l} \text{3} \leftarrow \text{New Speed} \\ \text{4} \leftarrow \text{Usual Speed} \\ D = \frac{S_1 \times S_2}{|S_1 - S_2|} [\text{Time Difference}] \\ = \frac{3 \times 4}{1} \times 2 = 24\text{Km} \end{array}$$

Now,

$$\text{Usual Time} = \frac{24}{4} = 6 \text{ hours Ans.}$$

**Method-2**

$$\begin{array}{l} \text{Speed} \quad \quad \quad \text{Time} \\ \frac{3}{4} \leftarrow \text{Usual speed} \quad \frac{4}{3} \leftarrow \text{Usual Time} \end{array} \quad \left. \begin{array}{l} \text{Time Diff.} = 1 \text{ unit} \end{array} \right\}$$

$$1 \text{ unit} = 2 \text{ hours}$$

$$3 \text{ unit} = 6 \text{ hours Ans.}$$

[Concept-अगर Distance Constant हो तो जो speed का ratio होता है उसका reciprocal time का ratio होता है क्योंकि speed और time एक-दूसरे का inversely proportional होता है। इसी concept को use करते हुए इस सवाल को solve किया गया है।]

(Q2) By walking at  $\frac{6}{7}$  of his usual speed, a man reaches his office 25 minutes later than his usual time. The usual time taken by him to reach his office is.

एक आदमी अपनी मूल गति की  $\frac{6}{7}$  चाल से चलने पर, अपना ऑफिस सामान्य समय से 25 मिनट देरी से पहुंचा तो उसका ऑफिस पहुंचने का सामान्य समय क्या है?

(a) 2 hours 30 minutes (b) 2 hours 10 minutes (c) 2 hours 15 minutes (d) 2 hours 25 minutes

$$\begin{array}{l} \text{6} \leftarrow \text{New Speed} \\ \text{7} \leftarrow \text{Usual Speed} \\ D = \frac{S_1 \times S_2}{|S_1 - S_2|} [\text{Time Difference}] \\ = \frac{6 \times 7}{1} \times \frac{25}{60} = \frac{35}{2} \text{ Km} \\ \text{Now,} \\ \text{Usual Time} = \frac{\frac{35}{2}}{7} = \frac{5}{2} \text{ hours} \\ = 2 \text{ hours } 30 \text{ minutes Ans.} \end{array}$$

**Method-2**

$$\begin{array}{l} \text{Speed} \quad \quad \quad \text{Time} \\ \frac{6}{7} \leftarrow \text{Usual Speed} \quad \frac{7}{6} \leftarrow \text{Usual Time} \end{array} \quad \left. \begin{array}{l} \text{Time Diff.} = 1 \text{ unit} \end{array} \right\}$$

$$1 \text{ unit} = 25 \text{ minutes}$$

$$6 \text{ unit} = 150 \text{ minutes} = 2 \text{ h } 30 \text{ min. Ans.}$$

### Concept Of Relative Speed

⇒ Suppose A and B are two objects and their speeds are respectively  $S_1$  and  $S_2$  moving in the same direction

A → Speed =  $S_1$

B → Speed =  $S_2$

Then,

Relative Speed =  $|S_1 - S_2|$

⇒ suppose A and B are two objects and their speeds are respectively  $S_1$  and  $S_2$  moving in opposite direction

A → Speed =  $S_1$

Speed =  $S_2$  ← B

Then,

Relative Speed =  $|S_1 + S_2|$

$$\text{Crossing Time}(T_c) = \frac{\text{Sum of lengths of two objects}}{\text{Relative Speed}}$$

$$X \text{ km/hr} \times \frac{5}{18} = \text{m/s}$$

$$X \text{ m/s} \times \frac{18}{5} = \text{Km/hr}$$

(Q1) A train 300 meters long is running at a speed of 54 km/hr. In what time will it cross a telephone pole?

एक 300 मीटर लंबी रेलगाड़ी 54 किलोमीटर प्रति घंटा की गति से चलते हुए एक टेलीफोन के खंभे को पार करने में कितना समय लेगी?

(a) 18 seconds (b) 17 seconds (c) 20 seconds (d) 15 seconds

Solution:

Given that,

Length of train ( $L_T$ ) = 300m

Length of Pole ( $L_P$ ) = 0 लेना है

Speed of Train = 54 km/hr

$$= 54 \times \frac{5}{18} = 15 \text{ m/sec.}$$

Speed of Pole = 0

Now,

$$\begin{aligned} \text{Crossing time}(T_c) &= \frac{\text{Sum of length of two objects}}{\text{Relative Speed}} \\ &= \frac{300 + 0}{15 + 0} \\ &= 20 \text{ sec Ans.} \end{aligned}$$

(Q2) A train traveling at a speed of 30 m/sec crosses a platform 600 meters long in 30 seconds. The length of the train is.

30 मीटर/सेकंड की चाल से चलती हुई एक रेलगाड़ी 600 मीटर

लंबे प्लेटफार्म को 30 सेकंड में पार करती है तो रेलगाड़ी की लंबाई है?

(a) 300 m (b) 120 m (c) 200 m (d) 150 m

Solution:

Given that,

Length of train ( $L_T$ ) = ?

Length of Platform ( $L_P$ ) = 600m

Speed of Train ( $S_T$ ) = 30 m/sec.

Speed of Platform = 0

Crossing time ( $T_C$ ) = 30 sec.

Now,

$$\begin{aligned} \text{Crossing time}(T_c) &= \frac{\text{Sum of length of two objects}}{\text{Relative Speed}} \\ 30 &= \frac{L_T + 600}{30 + 0} \\ L_T &= 300 \text{m Ans.} \end{aligned}$$

(Q3) A train 50 meters long passes a platform of length 100 meters in 10 seconds. The speed of the train in metre/second is.

50 मीटर लंबी एक रेलगाड़ी 100 मीटर लंबे एक प्लेटफार्म को 10 सेकंड में पार करती है। रेलगाड़ी की गति मीटर/सेकंड में है।  
(a) 10 (b) 50 (c) 20 (d) 15

Solution:

Given that,

Length of train ( $L_T$ ) = 50

Length of Platform ( $L_P$ ) = 100m

Speed of Train ( $S_T$ ) = ?

Crossing time ( $T_C$ ) = 10 sec.

Now,

$$\begin{aligned} \text{Crossing time}(T_c) &= \frac{\text{Sum of length of two objects}}{\text{Relative Speed}} \\ 10 &= \frac{50 + 100}{S_T + 0} \\ S_T &= 15 \text{ m/sec. Ans.} \end{aligned}$$

(Q4) Two trains of lengths 150 m and 180 m respectively are running in opposite directions on parallel tracks. If their speed is 50 km/hour and 58 km/hour respectively. In what time will they cross each other?

दो रेलगाड़ियां जिनकी लंबाई क्रमशः 150 मीटर और 180 मीटर



है समांतर ट्रैक पर विपरीत दिशा में चल रही है। यदि उनकी गति क्रमशः 50 किलोमीटर प्रति घंटा और 58 किलोमीटर प्रति घंटा हो, तो कितने समय में वह एक दूसरे को पार करेगी?  
(a) 15 sec. (b) 22 sec. (c) 11 sec. (d) 30 sec.

**Solution:**

Given that,  
Length of 1st Train( $L_T$ )=150m  
Length of 2nd Train( $L_P$ )=180m  
Speed of 1st Train( $S_T$ )=50km/hr  
Speed of 2nd Train( $S_P$ )=58km/hr  
Now,  
Relative speed=58+50=108km/hr  
 $108 \times \frac{5}{18} = 30 \text{ m/sec}$   
Crossing time( $T_C$ ) =  $\frac{\text{Sum of length of two objects}}{\text{Relative Speed}}$   
 $= \frac{150 + 180}{30}$   
 $= 11 \text{ sec. Ans.}$

(Q5) Two trains of equal length are running on parallel lines in the same direction at the rate of 46 km/hour and 36 km/hour. The faster train passes the slower train in 36 seconds the length of each train is.

समान लंबाई की दो रेलगाड़ियां समांतर लाइनों पर एक ही दिशा में क्रमशः 40 किलोमीटर प्रति घंटा और 36 किलोमीटर प्रति घंटा की दर से चल रही है। तेज चलने वाली ट्रेन धीमी ट्रेन से 36 सेकंड में आगे निकल जाती है प्रत्येक ट्रेन की लंबाई कितनी है?  
(a) 82 m (b) 80 m (c) 72 m (d) 50 m

**Solution:**

Given that,  
Length of each Train( $L_T$ )=Xm  
Speed of 1st Train( $S_T$ )=46km/hr  
Speed of 2nd Train( $S_P$ )=36km/hr  
Now,

Relative speed=46-36=10km/hr

$$10 \times \frac{5}{18} = \frac{25}{9} \text{ m/sec}$$

Crossing time( $T_C$ ) =  $\frac{\text{Sum of length of two objects}}{\text{Relative Speed}}$

$$36 = \frac{X + X}{\frac{25}{9}}$$

$$X = \frac{36 \times 25}{2 \times 9} = 50 \text{ m Ans.}$$

(Q1) A train passes a platform 110 m long in 40 seconds and a boy standing on the platform in 30 seconds. The length of the train is.

कोई रेलगाड़ी 110 मीटर लंबे किसी प्लेटफार्म को 40 सेकंड में तथा उस प्लेटफार्म पर खड़े एक लड़के को 30 सेकंड में पार करती है। रेलगाड़ी की लंबाई है।  
(a) 220 m (b) 110 m (c) 330 m (d) 100 m

**Solution:**

जब Train platform को पार करती है Then,

Crossing Time ( $T_C$ ) =  $\frac{\text{Sum of length of two objects}}{\text{Relative speed}}$

$$40 = \frac{L_T + 110}{S_T + 0}$$

Where  $L_T$ =Length Of Train And  $S_T$ =Speed Of Train

$$S_T = \frac{L_T + 110}{40}$$

जब Train लड़का को पार करती है Then,

$$T_C = \frac{L_T + L_{\text{Boy}}}{S_T + S_{\text{Boy}}}$$

$$30 = \frac{L_T + 0}{S_T + 0}$$

$$S_T = \frac{L_T}{30}$$

[Note: Train का Speed Same होगा]

So,

$$\frac{L_T + 110}{40} = \frac{L_T}{30} \Rightarrow 4L_T = 3L_T + 330$$

$$\therefore L_T = 330 \text{ m Ans.}$$



(Q2) A train passes two bridges of lengths 500 m and 250 m in 100 seconds and 60 seconds respectively. The length of the train is.

एक रेलगाड़ी 500 मीटर और 250 मीटर लंबे दो पुलों को क्रमशः 100 सेकंड और 60 सेकंड में पार करती है तो रेलगाड़ी की लंबाई है।

(a) 250 m (b) 125 m (c) 300 m (d) 175 m

**Solution:**

जब Train 1st bridge को पार करती है Then,

$$\text{Crossing Time } (T_C) = \frac{\text{Sum of length of two objects}}{\text{Relative speed}}$$

$$100 = \frac{L_T + 500}{S_T + 0}$$

$$S_T = \frac{L_T + 500}{100}$$

जब Train Second bridge को पार करती है Then,

$$T_C = \frac{L_T + 250}{S_T + 0}$$

$$60 = \frac{L_T + 250}{S_T}$$

$$S_T = \frac{L_T + 250}{60}$$

[Note: Train का Speed Same होगा]

So,

$$\frac{L_T + 500}{100} = \frac{L_T + 250}{60} \Rightarrow 10L_T + 2500 = 6L_T + 3000$$

$$\therefore L_T = 125 \text{ m Ans.}$$

(Q3) A train traveling at uniform speed crosses two bridges of lengths 300 m and 240 m in 21 seconds and 18 seconds respectively. The speed of the train is.

एक रेलगाड़ी 300 मीटर और 240 मीटर लंबे दो पुलों को क्रमशः 21 सेकंड और 18 सेकंड में पार कर जाती है तो रेलगाड़ी की गति क्या है?

(a) 60 km/hr (b) 72 km/hr (c) 68 km/hr (d) 65 km/hr

**Solution:**

जब Train 1st bridge को पार करती है Then,

$$T_C = \frac{L_T + 300}{S_T + 0}$$

$$21 = \frac{L_T + 300}{S_T}$$

$$\Rightarrow L_T + 300 = 21S_T$$

$$\Rightarrow L_T = 21S_T - 300$$

जब Train Second bridge को पार करती है then,

$$T_C = \frac{L_T + 240}{S_T + 0}$$

$$18 = \frac{L_T + 240}{S_T}$$

$$\Rightarrow L_T + 240 = 18S_T$$

$$\Rightarrow L_T = 18S_T - 240$$

[Note: Train का length same होगा]

So,

$$21S_T - 300 = 18S_T - 240$$

$$S_T = 20 \text{ m/sec.} = 20 \times \frac{18}{5} = 72 \text{ km/hr Ans.}$$

**Second Method:**

$$\text{Speed} = \frac{\text{Difference of length of platform}}{\text{Difference of time taken to cross platform}}$$

$$= \frac{(300 - 240) \text{ m}}{(21 - 18) \text{ sec.}}$$

$$= 20 \text{ m/sec} = 20 \times \frac{18}{5} = 72 \text{ km/h Ans.}$$

(Q1) A train passes two persons walking in the same direction at a speed of 3 km/hour and 5 km/hour respectively in 10 seconds and 11 seconds respectively. The speed of the train is.

एक रेलगाड़ी अपनी ही दिशा में क्रमशः 3 किलोमीटर प्रति घंटा तथा 5 किलोमीटर प्रति घंटा की गति से चलने वाले व्यक्तियों को पार करने में क्रमशः 10 सेकंड तथा 11 सेकंड का समय लेती है। रेलगाड़ी की गति बताएं।

(a) 25 km/hr (b) 27 km/hr (c) 24 km/hr (d) 30 km/hr

**Solution:**

Let the speed of train = x km/hr

Relative speed of 1st Person = (x-3) km/hr

Relative speed of 2nd Person = (x-5) km/hr

[Concept- जब कोई Train किसी Pole या व्यक्ति को पार करती है तो वह अपनी लंबाई के बराबर ही distance तय करती है ]]

Note: इस Question में एक ही Train दोनों व्यक्तियों को पार करती है so Train का length equal (i.e distance) होगा]

Now,

$$\begin{aligned} \text{Distance}_1 &= \text{Distance}_2 \\ (x-3) \times \frac{10}{60} \text{ hr} &= (x-5) \times \frac{11}{60} \text{ hr} \\ 10x - 30 &= 11x - 55 \\ x &= 25 \text{ km/hr Ans.} \end{aligned}$$

Method-2

When train crosses 1st person in the same direction then,

Relative speed of 1st Person =  $(x-3)$  km/hr

$$\begin{aligned} \text{Crossing Time}(T_c) &= \frac{\text{Sum of length of two objects}}{\text{Relative Speed}} \\ \frac{10}{60} \text{ hr} &= \frac{L_T + 0}{x-3} \quad \text{Where } 0 = \text{Length of 1st person} \\ L_T (\text{Length of train}) &= (x-3) \times \frac{10}{60} \end{aligned}$$

When train crosses 2nd person in same direction then,

Relative speed =  $(x-5)$  km/hr

Now,

$$\begin{aligned} T_c &= \frac{L_T + 0}{(x-5)} \quad \text{Where } 0 = \text{Length of 2nd person} \\ \frac{11}{60} \text{ hr} &= \frac{L_T}{x-5} \\ L_T &= (x-5) \times \frac{11}{60} \end{aligned}$$

[Note: इस Question में एक ही Train दोनों व्यक्तियों को पार करती है so Train का length equal होगा]

Now,

$$\Rightarrow (x-3) \times 10/60 = (x-5) \times 11/60$$

$$\Rightarrow 10x - 30 = 11x - 55$$

$$x = 25 \text{ km/hr Ans.}$$

Method-3

$$\begin{aligned} 3 \text{ km/hr} \times \frac{10}{60} \text{ hr} &= \frac{30}{60} \text{ km} \\ 5 \text{ km/hr} \times \frac{11}{60} \text{ hr} &= \frac{55}{60} \text{ km} \\ \hline &= \frac{1}{60} \text{ hr} = \frac{25}{60} \text{ km} \\ \text{Speed} &= \frac{25}{1} = 25 \text{ km/hr Ans.} \end{aligned}$$

(Q2) A train passes two persons walking in opposite direction at a speed of 5 m/second and 10 m/second respectively in 6 seconds and 5 seconds respectively. Find the length of the train is.

एक रेलगाड़ी अपनी विपरीत दिशा में क्रमशः 5 मीटर प्रति सेकंड तथा 10 मीटर प्रति सेकंड की गति से चलने वाले व्यक्तियों को पार करने में क्रमशः 6 सेकंड और 5 सेकंड का समय लेती है। रेलगाड़ी की लंबाई बताएं।

(a) 140 metres (b) 150 metres (c) 180 metres (d) 160 metres

Solution:

Let the speed of train =  $x$  m/sec

Relative speed of 1st Person =  $(x+5)$  m/sec

Relative speed of 2nd Person =  $(x+10)$  m/sec

[Concept- जब कोई Train किसी Pole या व्यक्ति को पार करती है तो वह अपनी लंबाई के बराबर ही distance तय करती है ]]

[Note: इस Question में एक ही Train दोनों व्यक्तियों को पार करती है so Train का length equal (i.e distance) होगा]

Now,

$$\begin{aligned} \text{Distance}_1 &= \text{Distance}_2 \\ (x+5) \times 6 &= (x+10) \times 5 \\ 6x + 30 &= 5x + 50 \\ x &= 20 \text{ m/sec} \\ \text{Length of train} &= (20+5) \times 6 \\ &= 150 \text{ metre Ans.} \end{aligned}$$

Method-2

When train crosses 1st person in opposite direction then,

Relative speed of 1st Person =  $(x+5)$  m/sec

$$\text{Crossing Time}(T_c) = \frac{\text{Sum of length of two objects}}{\text{Relative Speed}}$$

$$6 = \frac{L_T + 0}{(x + 5)} \text{ where } 0 = \text{Length of 1st person}$$

$$L_T = 6x + 30 \Rightarrow x = \frac{L_T - 30}{6}$$

When train crosses 2nd person in opposite direction then,  
Relative Speed =  $(x + 10)$  m/sec.

Now,

$$T_c = \frac{L_T + 0}{(x + 10)} \text{ Where } 0 = \text{Length of 2nd person}$$

$$5 = \frac{L_T}{(x + 10)}$$

$$L_T = 5x + 50 \Rightarrow x = \frac{L_T - 50}{5}$$

[Note: इस Question में एक ही Train दोनों व्यक्तियों को पार करती है so Train का length equal होगा or speed भी equal होगा। इस question में train का length निकलना है तो हम लोग train के speed को equal कर लेंगे।]

Now,

$$\frac{L_T - 30}{6} = \frac{L_T - 50}{5}$$

$$\Rightarrow 6L_T - 300 = 5L_T - 150$$

$$L_T = 150 \text{ m Ans}$$

Method-3

$$\begin{array}{r} 5\text{m/sec} \times 6 \text{ sec} = 30 \text{ m} \\ 10\text{m/sec} \times 5 \text{ sec} = 50 \text{ m} \\ \hline 1 = 20 \\ \text{Speed} = \frac{20}{1} = 20 \text{ m/sec.} \end{array}$$

Relative speed =  $(x+5)$  m/sec =  $(20+5)=25$  m/sec.  
Length of train =  $25 \times 6 = 150 \text{ m}$

(Q3) A train passes two persons walking in the same direction at a speed of 4 km/hour and 5 km/hour respectively in 10 seconds and 12 seconds respectively. Find the length of the train.

एक रेलगाड़ी अपनी ही दिशा में क्रमशः 4 किलोमीटर प्रति घंटा तथा 5 किलोमीटर प्रति घंटा की गति से चलने वाले व्यक्तियों को पार करने में क्रमशः 10 सेकंड और 12 सेकंड का समय लेती

है। रेलगाड़ी की लंबाई बताएं।

(a) 50/3 meters (b) 60 meters (c) 30 meters (d) 25 meters

Solution:

[Note: Let the speed of train =  $x$  km/hr  
Relative speed of 1st Person =  $(x-4)$  km/hr  
Relative speed of 2nd Person =  $(x-5)$  km/hr]

$$\begin{array}{r} 4\text{km/hr} \times \frac{10}{60} \text{ hr} = \frac{40}{60} \text{ km} \\ 5\text{km/hr} \times \frac{12}{60} \text{ hr} = \frac{60}{60} \text{ km} \\ \hline \frac{2}{60} \text{ hr} = \frac{20}{60} \text{ km} \\ \text{Speed} = \frac{20}{2} = 10 \text{ km/hr Ans.} \end{array}$$

Relative speed =  $(x-4)$  Km/hr =  $(10-4)=6$  km/hr =  $6 \times (5/18) = 5/3$  m/sec.  
The length of train =  $(5/3) \times 10 = 50/3 \text{ m Ans.}$

(Q1) The speed of Two trains in the ratio 3:4 and moving on parallel tracks but in opposite directions. If both crosses a pole in 3 seconds then in how much time they will cross each other.

दो रेलगाड़ियां जिनकी चाल 3:4 के अनुपात में हैं, समांतर परियों पर विपरीत दिशाओं में जा रही हैं। यदि प्रत्येक रेलगाड़ी एक खंभे को पार करने में 3 सेकंड ले तो वे कितने समय में एक दूसरे को पार करेंगी?

(a) 3 sec. (b) 5 sec. (c) 7 sec. (d) 8 sec.

Solution:

Distance traveled by 1st train =  $3 \times 3 = 9$  m (i.e Length of train because जब कोई Train किसी Pole या व्यक्ति को पार करती है तो वह अपनी लंबाई के बराबर ही distance तय करती है।)

Distance traveled by 2nd train =  $3 \times 4 = 12$  m

[Note: जब कोई Train किसी Platform, bridge और Train को पार करती है तो वह अपनी लंबाई के साथ-साथ उस Platform, bridge और Train की लंबाई के बराबर Distance तय करती है।]

Total distance =  $9 + 12 = 21 \text{ m}$

Relative Speed =  $4 + 3 = 7$  m/sec  
 Crossing Time =  $21/7 = 3$  sec. Ans

(Q2) The speed of Two trains in the ratio 7:9 and moving on parallel tracks but in same directions. If both crosses a pole in 4 seconds and 6 seconds then in how much time they will cross each other.

दो रेलगाड़ियां जिनकी चाल 7:9 के अनुपात में हैं, समांतर परियों पर एक ही दिशा में जा रही हैं यदि प्रत्येक रेलगाड़ी एक खंबे को पार करने में 4 sec. तथा 6 sec ले तो वे कितने समय में एक दूसरे को पार करेगी?

(a) 37 sec. (b) 36 sec. (c) 41 sec. (d) 43 sec.

Solution:

Distance traveled by 1st train =  $7 \times 4 = 28$  m (i.e Length of train because जब कोई Train किसी Pole या व्यक्ति को पार करती है तो वह अपनी लंबाई के बराबर ही distance तय करती है।)

Distance traveled by 2nd train =  $9 \times 6 = 54$  m

[Note: जब कोई Train किसी Platform, bridge और Train को पार करती है तो वह अपनी लंबाई के साथ-साथ उस Platform, bridge और Train की लंबाई के बराबर Distance तय करती है।]

Total distance =  $28 + 54 = 82$  m

Relative Speed =  $9 - 7 = 2$  m/sec

Crossing Time =  $82/2 = 41$  sec. Ans

(Q1) Two trains of equal length take 10 seconds and 15 seconds respectively to cross a Telephone pole. If the length of each train is 120 m. In what time will they cross Each Other traveling in opposite direction?

समान लंबाई वाली दो रेलगाड़ियां एक टेलीफोन खंबे को क्रमशः 10 सेकंड तथा 15 सेकंड में पार करती हैं। यदि प्रत्येक रेलगाड़ी की लंबाई 120 मीटर हो, तो विपरीत दिशाओं में चलते हुए वे एक-दूसरे को कितने समय में पार करेगी?

(a) 10 sec. (b) 12 sec. (c) 16 sec. (d) 15 sec.

Solution:

Distance traveled by 1st train = 120 m (i.e Length of train because जब कोई Train किसी Pole या व्यक्ति को पार करती है तो वह अपनी लंबाई के बराबर ही distance तय करती है।)

Distance traveled by 2nd train = 120 m

Speed of 1st Train =  $120/10 = 12$  m/sec.

The speed of 2nd Train =  $120/15 = 8$  m/sec.

Relative speed in opposite direction =  $12 + 8 = 20$  m/sec

Total distance =  $120 + 120 = 240$  m  
 Crossing time =  $240/20 = 12$  sec. Ans.

(Q2) Two trains running in opposite direction Cross a man standing on the platform in 27 seconds and 17 seconds respectively and they cross each other in 23 seconds. The ratio of their speeds is.

दो रेलगाड़ियां विपरीत दिशाओं में चलती हुई प्लेटफार्म पर खड़े हुए एक व्यक्ति को क्रमशः 27 सेकंड तथा 17 सेकंड में पार करती हैं जबकि दोनों trains एक दूसरे को 23 सेकंड में पार करती हैं। तो दोनों रेलगाड़ियों की गति का अनुपात क्या है?

(a) 4:3 (b) 2:3 (c) 3:2 (d) 6:4

Solution:

Let the speed of 1st train =  $x$  m/sec.

The speed of 2nd train =  $y$  m/sec.

Relative speed =  $(x + y)$  m/sec.

Distance (i.e Length of 1st Train) traveled by 1st train =  $27x$

Distance (i.e Length of 2nd Train) traveled by 2nd train =  $17y$

$$\begin{aligned} \text{Crossing Time} &= \frac{\text{Sum of length of Two Objects}}{\text{Relative Speed}} \\ 23 &= \frac{27x + 17y}{x + y} \\ \Rightarrow 27x + 17y &= 23x + 23y \\ \Rightarrow 4x &= 6y \\ \Rightarrow \frac{x}{y} &= \frac{6}{4} \\ x : y &= 3 : 2 \text{ Ans.} \end{aligned}$$

By Allegation Method:

$$\begin{array}{ccc} 27 & & 17 \\ & \searrow & \nearrow \\ & 23 & \\ & \nearrow & \searrow \\ 6 & : & 4 \\ 3 & : & 2 \text{ Ans.} \end{array}$$

(Q1) The ratio of the length of two trains 4:3 and the ratio of their speeds are 6:5. The ratio of time taken by them to cross a pole is.

दो रेलगाड़ियों की लंबाईयों का अनुपात 4:3 तथा उनकी चालों

का अनुपात 6:5 है। तो किसी खंभे को पार करने में उनके द्वारा लिया गया समय का अनुपात है?  
(a) 11:8 (b) 5:6 (c) 20:18 (d) 27:16

**Solution:**

Let the length of 1st and 2nd trains are respectively =  $4x, 3x$

Speed of 1st and 2nd trains are respectively =  $6y, 5y$

Time is taken by 1st train to cross the pole = Total distance/speed =  $4x/6y$

(Note: taken Total distance = Length of train because जब

कोई Train किसी Pole या व्यक्ति को पार करती है तो वह

अपनी लंबाई के बराबर ही distance तय करती है।)

Time is taken by 2nd train to cross the pole = Total distance/speed

$$= 3x/5y$$

Ratio of their time =  $(4x/6y):(3x/5y)$   
= 20:18 Ans.

**Method-2**

Ratio of Length = 4 : 3  
Ratio of Speeds = 6 : 5

The ratio of time to cross a pole = 20:18 Ans.

(Q2) The ratio of the length of two trains 5:3 and the ratio of their speed are 6:5. The ratio of time taken by them to cross a pole is.

दो रेलगाड़ियों की लंबाईयों का अनुपात 5:3 तथा उनकी चालों का अनुपात 6:5 है। तो किसी खंभे को पार करने में उनके द्वारा लिया गया समय का अनुपात है?

(a) 5:6 (b) 27:16 (c) 25:18 (d) 11:8

**Solution:**

Let the length of 1st and 2nd trains are respectively =  $5x, 3x$

Speed of 1st and 2nd trains are respectively =  $6y, 5y$

Time is taken by 1st train to cross the pole = Total distance/speed

$$= 5x/6y$$

(Note: taken Total distance = Length of train because जब

कोई Train किसी Pole या व्यक्ति को पार करती है तो वह

अपनी लंबाई के बराबर ही distance तय करती है।)

Time is taken by 2nd train to cross the pole = Total

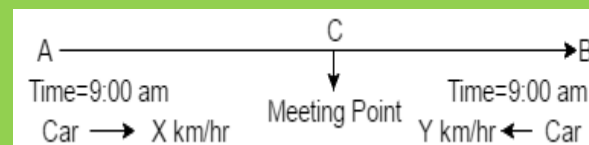
distance/speed  
=  $3x/5y$

Ratio of their time =  $(5x/6y):(3x/5y)$   
= 25:18 Ans.

**Method-2**

Ratio of Length = 5 : 3  
Ratio of Speeds = 6 : 5

The ratio of time to cross a pole = 25:18 Ans.



Suppose point A से एक कार X km/hr के speed से point B की ओर जा रहा है एवं point B से एक कार Y Km/hr की स्पीड से point A की ओर आ रहा है तो दोनों कार एक- दूसरे से कहीं ना कहीं आपस में मिलेंगे तो माना वह point C है जहां दोनों कार आपस में मिलेंगे।

Note: जहां पर दोनों car आपस में मिलेंगे मैं तो इस स्थिति में दोनों का Time same होगा i.e.  $T_A = T_B$  ऐसा तब होगा जब reference of time दिया होगा। Reference time से तात्पर्य है कि यदि point A से एक कार 9:00 बजे चली है तो point B से भी कार 9:00 बजे ही चली हो।

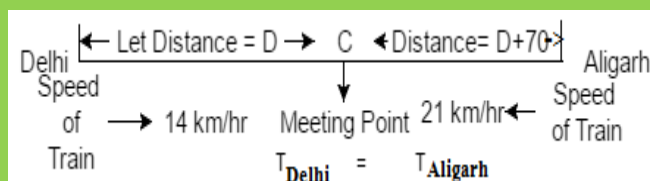
(Q) Two trains start at the same time from Aligarh and Delhi and proceed towards each other at the rate of 14 km and 21 km per hour respectively. When they meet, it is found that one train has traveled 70 kilometers more than the other. The distance between two stations is.

दो रेलगाड़ियां एक ही समय पर अलीगढ़ और दिल्ली से क्रमशः

14 किलोमीटर प्रति घंटा और 21 किलोमीटर प्रति घंटे की रफ्तार से एक दूसरे की ओर रवाना होती हैं जब वे एक दूसरे से मिलती हैं तो यह पता चलता है कि उनमें से एक गाड़ी ने दूसरी गाड़ी के अपेक्षा 70 किलोमीटर अधिक यात्रा की है तो दोनों स्टेशनों के बीच की दूरी क्या है?

(a) 300 km (b) 210 km (c) 350 km (d) 140 km

**Solution:**



[Exp- माना Delhi से जो Train Aligarh की तरफ जा रही है वह meeting point तक पहुंचने में D Km Distance तय की है and जो Train Aligarh से Delhi की ओर जा रही है वह Meeting Point तक पहुंचने में (D+70) Km Distance तय की है]

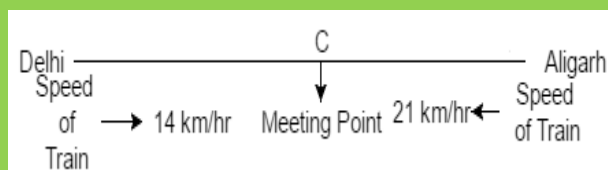
Now,

$$\begin{aligned} \frac{T_{\text{Delhi}}}{D} &= \frac{T_{\text{Aligarh}}}{D+70} \\ \frac{14}{3D} &= \frac{21}{2D+140} \\ D &= 140 \end{aligned}$$

Total distance between two stations =  $D + (D+70)$   
 $= 2D + 70$   
 $= 350 \text{ km}$

Ans.

**Second Method:**



Let the trains meet each other after x hr  
 so, distance traveled by 1st train in x hr =  $14x$   
 distance traveled by 2nd train in x hr =  $21x$   
 Distance between Delhi and Aligarh =  $14x + 21x = 35x$   
 now,

$$\begin{aligned} 21x - 14x &= 70 \\ x &= 10 \end{aligned}$$

so, they meet after 10 hr.

Distance between Delhi and Aligarh =  $35x$   
 $= 35 \times 10$   
 $= 350 \text{ Km}$

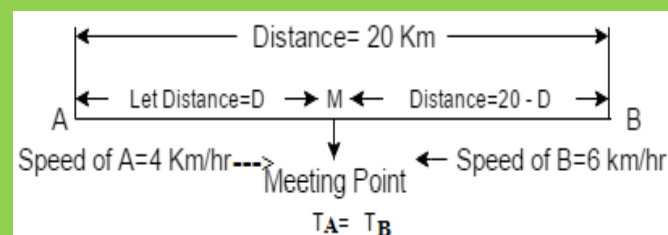
Ans.

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

A और B 20 किलोमीटर दूरी पर हैं। A 4 किलोमीटर प्रति घंटा और भी 6 किलोमीटर प्रति घंटा की गति से चल सकता है। यदि वह प्रातः 7:00 बजे एक दूसरे की ओर चलना शुरू करते हैं तो वह कब मिलेंगे?

(a) 9.00 a.m (b) 8.30 a.m (c) 10.00 a.m (d) 8.00 a.m

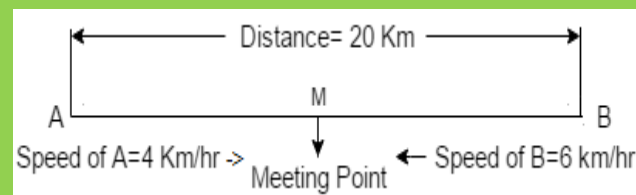
**Solution:**



$$\begin{aligned} \frac{T_A}{D} &= \frac{T_B}{20-D} \\ \frac{4}{6D} &= \frac{6}{80-4D} \\ 6D &= 80 - 4D \\ 10D &= 80 \\ D &= 8 \text{ Km} \end{aligned}$$

Put the value of D in any one  
 so,  $\frac{8}{4} = 2 \text{ hours}$   
 Meeting time = 7 am + 2 hr  
 $= 9:00 \text{ am Ans.}$

**Second method:**



Let they are meeting each other after x hr.  
 So, distance travelled by A in x hr =  $4x$   
 distance travelled by B in x hr =  $6x$   
 Now,

$$\begin{aligned} 4x + 6x &= 20 \\ x &= 2 \text{ hr} \end{aligned}$$

Meeting time = 7 am + 2 hr  
 $= 9:00 \text{ am Ans.}$

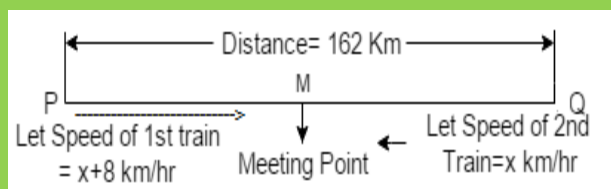


(3) Two places P and Q are 162 km apart. A train leaves P for Q and simultaneously another train leaves Q for P. They meet at the end of 6 hours. If the former train travels 8 km/hr faster than the other, then speed of the train from Q is.

दो स्थान P और Q एक दूसरे से 162 किलोमीटर की दूरी पर हैं। एक गाड़ी P से Q के लिए प्रस्थान करती है और उसी समय एक अन्य गाड़ी Q से P के लिए प्रस्थान करती है। 6 घंटे के अंत में वे दोनों गाड़ियां मिलती हैं। यदि पहली वाली गाड़ी दूसरी गाड़ी से 8 किलोमीटर प्रति घंटे तेज चलती है, तो Q से चलने वाली गाड़ी की गति क्या है?

- (a)  $10\frac{5}{6}$  Km/hr (b)  $9\frac{1}{2}$  Km/hr (c)  $12\frac{5}{6}$  Km/hr (d)  $8\frac{1}{2}$  Km/hr

**Solution:**



According to the question,

The train meet each other after 6 hours

So, distance travelled by 1st train in 6 hours =  $(x+8) \times 6$  Km

distance travelled by 2nd train in 6 hrs =  $x \times 6$  Km

Now,

$$(x+8) \times 6 + 6x = 162$$

$$6x + 48 + 6x = 162$$

$$x = 19/2 = 9\frac{1}{2} \text{ Ans.}$$

(4) A train A start from Delhi at 4 p.m. and reaches Ghaziabad at 5 p.m. While another train B start from Ghaziabad at 4 p.m. and reaches Delhi at 5:30 P.M. The two trains will cross each other at?

एक ट्रेन A शाम 4:00 बजे दिल्ली से चलती है तथा गाजियाबाद शाम 5:00 बजे पहुंचती है। जबकि दूसरी ट्रेन B शाम 4:00 बजे गाजियाबाद से चलती है एवं दिल्ली 5:30 बजे पहुंचती है। दोनों ट्रेन एक-दूसरे को कितने समय में पार करेगी?

- (a) 4:40 pm (b) 4:45 pm (c) 4:36 pm (d) 4:30 pm

**Solution:**

Let the distance between Delhi and Gaziabad = d km

$$\text{Speed of 1st train} = \frac{d}{1} = d \text{ km/hr}$$

$$\text{Speed of 2nd train} = \frac{d}{1\frac{1}{2}} = \frac{2d}{3} \text{ Km/hr}$$

Let the trains meet each other after x hours

So, distance travelled by 1st train in x hour = dx km

$$\text{Distance travelled by 2nd train in x hour} = \frac{2dx}{3} \text{ Km}$$

Now,

$$dx + \frac{2dx}{3} = d \text{ Km}$$

$$\frac{5dx}{3} = d \text{ km}$$

$$x = \frac{3}{5} = 0.6 \text{ hr} = 36 \text{ min.}$$

Meeting time = 4 pm + 36 min = 4:36 pm Ans.

**Second Method:**

Time taken by A ( $T_1$ ) = 1 hr

Time taken by B ( $T_2$ ) =  $\frac{3}{2}$  hr

$$\therefore \text{Meeting time} = \frac{T_1 \times T_2}{T_1 + T_2}$$

$$= \frac{1 \times \frac{3}{2}}{1 + \frac{3}{2}}$$

$$= \frac{3}{5} \text{ hr} = 36 \text{ min.}$$

Meeting time = 4:00 pm + 36 min = 4:36 pm Ans.

(5) Two trains A and B start from Howrah to Patna and from Patna to Howrah respectively. After passing Each Other they take 4 hours 48 minutes and 3 hours 20 minutes to reach Patna and Howrah respectively if A is moving at 45 km per hour, the speed of B is.

दो रेलगाड़ियां A और B हावड़ा और पटना से क्रमशः पटना और हावड़ा के लिए एक ही समय पर चलना आरंभ करती हैं। एक-दूसरे के सामने से गुजरने के बाद वे 4 घंटे 48 मिनट और 3 घंटे 20 मिनट क्रमशः पटना और हावड़ा पहुंचने के लिए लेती हैं। यदि



हावड़ा से चलने वाली गाड़ी 45 किलोमीटर प्रति घंटा की गति से चल रही है तो दूसरी गाड़ी की गति क्या है?  
(a) 64.8 km/hr (b) 45 km/hr (c) 60 km/hr (d) 54 km/hr

**Solution:**

$$T_A = 4 \text{ hrs } 48 \text{ min} = \frac{24}{5} \text{ hr}$$

$$T_B = 3 \text{ hrs } 20 \text{ min} = \frac{10}{3} \text{ hr}$$

Now,

$$\frac{S_A}{S_B} = \sqrt{\frac{T_B}{T_A}}$$

$$\frac{45}{S_B} = \sqrt{\frac{\frac{10}{3}}{\frac{24}{5}}}$$

$$\frac{45}{S_B} = \frac{5}{6}$$

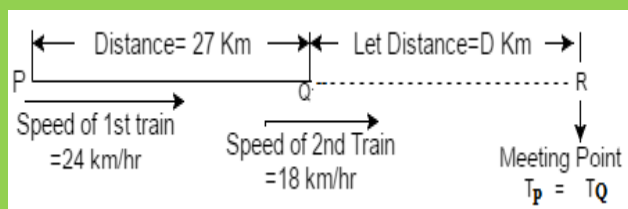
$$S_B = 54 \text{ Km/hr Ans.}$$

(1) P and Q are 27 km away. Two trains with speed of 24 km/hr and 18 km/hr respectively start simultaneously from P and Q and travel in the same direction. They meet at a point R beyond Q. Distance QR is.

P तथा Q, 27 किलोमीटर की दूरी पर है। दो रेलगाड़ियां क्रमशः 24 किलोमीटर प्रति घंटा तथा 18 किलोमीटर प्रति घंटा की गति से एक साथ P तथा Q से चलती हैं और एक ही दिशा में यात्रा करती हैं। तदनुसार, यदि वे Q से आगे एक बिंदु R पर मिलती हों तो QR की दूरी कितनी है?

(a) 48 km (2) 81 km (c) 36 km (d) 126 km

**Solution:**



$$T_P = T_Q$$

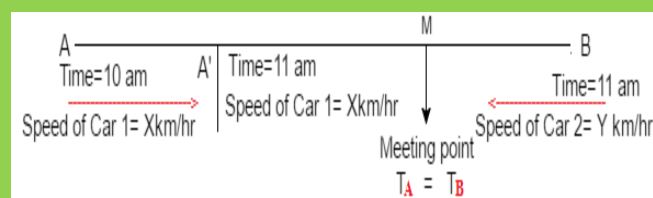
$$\frac{27+D}{24} = \frac{D}{18}$$

$$24D = (27 \times 18) + 18D$$

$$6D = 27 \times 18$$

$$D = 81 \text{ Km Ans.}$$

**Time And Distance: Meeting Point Concept for Competitive Exams Type-6.2**



Suppose Train A 10 am में चली हो तथा Train B 11 am में चली हो ऐसी स्थिति में meeting point निकालने के लिए दोनों Train का Reference of Time same करना होगा। Train A 1 hour तक अकेली चलेगी फिर वह Point A' पर 11:00 बजे पहुंचेगी। इस तरह अब दोनों Train का Reference of time same हो गया।

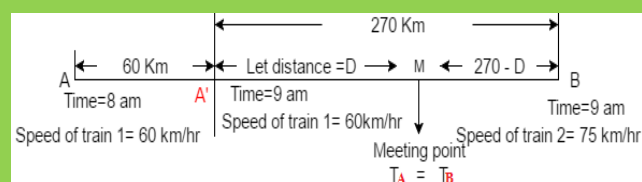
Now,  $T_A = T_B$

(1) The distance between two cities A and B is 330 km. A train starts from A at 8 a.m. and travels towards B at 60 km/hr. Another train starts from B at 9 a.m. and travels towards A at 75 km/hr. At what time do they meet.

दो नगरों A और B के बीच की दूरी 330 किलोमीटर है। एक रेलगाड़ी, A से B की ओर प्रातः 8:00 बजे 60 किलोमीटर प्रति घंटा की गति से चलती है और एक दूसरी रेलगाड़ी B से A ओर प्रातः 9:00 बजे, 75 किलोमीटर प्रति घंटा की गति से चलती है। वे दोनों कितने बजे मिलेंगी।

(a) 11:30 am (b) 10 am (c) 10:30 am (d) 11 am

**Solution:**



$$\begin{aligned}
 T_A &= T_B \\
 \frac{D}{60} &= \frac{270 - D}{75} \\
 75D &= (270 \times 60) - 60D \\
 135D &= 270 \times 60 \\
 D &= 120 \text{ Km} \\
 \text{Put the value of } D &\text{ in anyone} \\
 \text{Now, } \frac{120}{60} &= 2 \text{ hr} \\
 \text{Meeting time} &= 9:00 \text{ am} + 2 \text{ hr} \\
 &= 11:00 \text{ am Ans.}
 \end{aligned}$$

(2) A train leaves a station A at 7 a.m. and reaches another station B at 11 a.m. another train leaves B at 8 a.m. and reaches A at 11:30 a.m. The two trains cross one another at.

एक रेलगाड़ी स्टेशन A से प्रातः 7:00 बजे रवाना होती है और दूसरे स्टेशन B पर प्रातः 11:00 बजे पहुंच जाती है। एक दूसरी रेलगाड़ी स्टेशन B से प्रातः 8:00 बजे रवाना होती है और प्रातः 11:30 बजे स्टेशन A पर पहुंच जाती है। दोनों रेलगाड़ी कितने बजे एक-दूसरे को पार करेगी?

(a) 9:00 am (b) 9:24 am (c) 8:56 am (d) 8:36 am

**Solution:**

Let distance Travelled by 1st train in 4 hr = 1 km

Distance travelled by 1st train in 1 hr =  $\frac{1}{4}$  Km

Remaining distance =  $\frac{3}{4}$  Km

Meeting time = Remaining distance  $\times \frac{T_1 \times T_2}{T_1 + T_2}$

$$\begin{aligned}
 &= \frac{3}{4} \times \frac{4 \times \frac{7}{2}}{4 + \frac{7}{2}} = \frac{7}{5} \text{ hour} = 1 \frac{2}{5} \text{ hours} \\
 &= 1 \text{ hr } 24 \text{ min.}
 \end{aligned}$$

Meeting time = 8 am + 1 hr 24 min = 9:24 am Ans.

## Time Speed & Distance Questions

Q1. A man covers  $X$  km in  $t$  hours at  $S$  km/hr; another man covers  $X/2$  km in  $2t$  hours at  $R$  km/hr. Then the ratio  $S:R$  equals

- a) 4:1
- b) 2:1
- c) 1:4
- d) 1:2

Q2. If a cyclist starts at 7 km/hr and he increases his speed in every 3 hours by 1 km/hr then the time taken by the cyclist to cover 113 km is:

- a)  $27\frac{1}{2}$  hours
- b)  $20\frac{1}{3}$  hours
- c) 12 hours
- d) 13 hours

Q3. A bike rider starts at 60 km/hr and he increases his speed in every 2 hours by 3 km/hr. Then the maximum distance covered by him in 24 hours is:

- a) 1000km
- b) 918km
- c) 899 km
- d) none of these

Q4. A car starts at 10 am with a speed of 50 km/hr. Due to the problem in engine it reduces its speed as 10 km/hr for every 2 hours. After 11 am, the time taken to covers 10 km is:

- a) 12 minutes and 10 seconds
- b) 15 minutes and 09 seconds
- c) 13 minutes and 20 seconds
- d) none of these

Q5. A person crosses a 600 m long street in 5 minutes. What is his speed in km per hour?

- a) 3.6
- b) 7.2
- c) 8.4
- d) 10

Q6. If a person walks at 14 km/hr instead of 10 km/hr, he would have walked 20 km more. The actual distance travelled by him is:

- a) 50km
- b) 56km
- c) 70km
- d) 80km

Q7. 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) 100kmph
- b) 110kmph
- c) 120kmph
- d) 130kmph

Q8. Excluding stoppages, the speed of a bus is 54 kmph and including stoppages, it is 45 kmph. For how many minutes does the bus stop per hour?

- a) 9
- b) 10
- c) 12
- d) 20

Q9. An aeroplane 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) 300kmph
- b) 360kmph
- c) 600kmph
- d) 720kmph

**Q10.** A person travels equal distances with speed of 3 km/hr, 4 km/hr and 5 km/hr and takes a total of 47 minutes. Find the total distance

- a) 3 km
- b) 4 km
- c) 6 km
- d) 9 km

**Q11.** 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:

- a) 1 hour
- b) 2 hours
- c) 3 hours
- d) 4 hours

**Q12.** A man complete a journey in 10 hours. He travels first half of the journey at the rate of 21 km/hr and second half at the rate of 24 km/hr. Find the total journey in km.

- a) 220 km
- b) 224 km
- c) 230 km
- d) 234 km

**Q13.** The ratio between the speeds of two trains is 7 : 8. If the second train runs 400 km in 4 hours, then the speed of the first train is:

- a) 70 km/hr
- b) 75 km/hr
- c) 84 km/hr
- d) 87.5 km/hr

**Q14.** A man on tour travels first 160 km at 64 km/hr and the next 160 km at 80 km/hr. The average speed for the first 320 km of the tour is:

- a) 35.55 km/hr
- b) 36 km/hr
- c) 71.11 km.hr
- d) 71 km/hr

**Q15.** A car travelling with  $\frac{5}{7}$  of its actual speed covers 42 km in 1 hr 40 min 48 sec. Find the actual speed of the car

- a)  $17\frac{7}{6}$  km/hr
- b) 25 km/hr
- c) 30 km/hr
- d) 35 km/hr

**Q16.** A thief is noticed by a policeman from a distance of 200 m. The thief starts running and the policeman chases him. The thief and the policeman run at the rate of 10 km and 11 km per hour respectively. What is the distance between them after 6 minutes?

- a) 50 meter
- b) 100 meter
- c) 110 meter
- d) None of above

**Q17.** Ram and Sham are running a race, Ram runs 25% faster than Sham and is able to allow Sham a lead of 7 meters to end a race in dead heat. Find the distance of the race.

- a) 32 meters
- b) 35 meters
- c) 39 meters
- d) 40.5 meters

*Q18. How long will a boy take to run round a square field of side 35 metres, if he runs at the rate of 9 km/hr ?*

- a) 50 sec
- b) 52 sec
- c) 54 sec
- d) 56 sec

*Q19. The ratio between the speeds of two trains is 7 : 8. If the second train runs 400 kms in 4 hours, then the speed of the first train is :*

- a) 70 km/hr
- b) 75 km/hr
- c) 84 km/hr
- d) 87.5 km/hr

*Q20. A truck covers a distance of 550 metres in 1 minute whereas a bus covers a distance of 33 kms in 45 minutes. The ratio of their speeds is :*

- a) 3:4
- b) 4:3
- c) 3:5
- d) 50:3

## Solution

### Q1 Option A

Distance covered by 1st man at  $S$  km/hr =  $X$  km

Time taken by him =  $t$  hours.

Therefore, Speed =  $S = X/t$  km/hr.

Distance covered by 2nd man at  $R$  km/hr =  $X/2$  km

Time taken by him =  $2t$  hours.

Therefore, Speed =  $R = (X/2)/2t$  km/hr =  $X/4t$  km/hr.

Required ratio =  $S:R = X/t : X/4t = 1 : 1/4 = 4:1$ .

### Q2. Option D

Initial speed of the cyclist = 7km/hr.

Distance covered in 1st 3 hours =  $7 \times 3 = 21$  km.

After increasing, 1km/hr for every 3 hours period,

Distance covered in 2nd 3 hours period =  $8 \times 3 = 24$  km.

Distance covered in 3rd 3 hours period =  $9 \times 3 = 27$  km.

Distance covered in 4th 3 hours period =  $10 \times 3 = 30$  km.

Total distance covered =  $21 + 24 + 27 + 30 = 102$  km.

Remaining km to cover =  $113 - 102 = 11$  km.

Speed in 5th 3 hours period = 11 km/hr.

Time to cover 11 km at 11km/hr =  $11/11$  hours = 1 hour.

Now, the total time taken by him for 113 km =  $(3 + 3 + 3 + 3 + 1) = 13$  hours.

### Q3. Option B

Speed of the rider = 60km/hr.

Distance covered in 1st 2 hours = 60 km.

He increased his speed in every 2 hours by 3 km/hr.

Distance covered in every 2 hours will be, 60, 63, 66,... upto 12 terms.(for 24 hours).

The above series is an A.P series;

Sum of first  $n$  terms =  $(n/2)(2a+(n-1)d)$

Here,  $a = 60$ ,  $d = 3$  and  $n = 12$ .

Sum of first 12 terms =  $(12/2)(2(60)+(11)3) = 6(120 + 33) = 6(153) = 918$ .

Hence, he covers 918 km in 24 hours.

### Q4. Option C

Initial speed of the car = 50km/hr

Due to engine problem, speed is reduced to 10km for every 2 hours(i.e., 5 km per hour).

Speed of the car at 11 am =  $(50 - 5) = 45$ km/hr

Time to cover 10 km at 45 km/hr =

distance/speed =  $10/45$  hours. =  $2/9$  hours

=  $2/9 \times 60$  minutes =  $40/3$  minutes = 13 minutes +  $1/3$  minutes

= 13 minutes +  $1/3 \times 60$  seconds

= 13 minutes and 20 seconds.

### Q5 Option B

$$\text{Speed} = \left( \frac{600}{5 \times 60} \right) \text{m/sec.}$$

$$= 2 \text{ m/sec.}$$

Converting m/sec to km/hr

$$= \left( 2 \times \frac{18}{5} \right) \text{km/hr}$$

$$= 7.2 \text{ km/hr.}$$

### Q6 Option A



Let the actual distance travelled be  $x$  km.

$$\text{Then, } \frac{x}{10} = \frac{x+20}{14}$$

$$\Rightarrow 14x = 10x + 200$$

$$\Rightarrow 4x = 200$$

$$\Rightarrow x = 50 \text{ km.}$$

**Q7 Option C**

Let speed of the car be  $x$  kmph.

$$\text{Then, speed of the train} = \frac{150}{100}x = \left(\frac{3}{2}x\right) \text{ kmph.}$$

$$\therefore \frac{75}{x} - \frac{75}{(3/2)x} = \frac{125}{10 \times 60}$$

$$\Rightarrow \frac{75}{x} - \frac{50}{x} = \frac{5}{24}$$

$$\Rightarrow x = \left(\frac{25 \times 24}{5}\right) = 120 \text{ kmph.}$$

**Q8 Option B**

Due to stoppages, it covers 9 km less.

$$\text{Time taken to cover 9 km} = \left(\frac{9}{54} \times 60\right) \text{ min} = 10 \text{ min.}$$

**Q9 Option D**

$$\text{Distance} = (240 \times 5) = 1200 \text{ km.}$$

$$\text{Speed} = \text{Distance/Time}$$

$$\text{Speed} = 1200/(5/3) \text{ km/hr. [We can write } 1\frac{2}{3} \text{ hours as } 5/3 \text{ hours]}$$

$$\therefore \text{Required speed} = \left(1200 \times \frac{3}{5}\right) \text{ km/hr} = 720 \text{ km/hr.}$$

**Q10 Option A**

Let the distance be  $3x$  km

Then

$$\frac{x}{3} + \frac{x}{4} + \frac{x}{5} = \frac{47}{60}$$

$$\frac{47x}{60} = \frac{47}{60}$$

$$x = 1$$

$$\text{So total distance} = 3 \times 1 = 3 \text{ km}$$

**Q11 Option A**

Let the duration of the flight be  $x$  hours.

$$\text{Then, } \frac{600}{x} - \frac{600}{x + (1/2)} = 200$$

$$\Rightarrow \frac{600}{x} - \frac{1200}{2x+1} = 200$$

$$\Rightarrow x(2x+1) = 3$$

$$\Rightarrow 2x^2 + x - 3 = 0$$

$$\Rightarrow (2x+3)(x-1) = 0$$

$$\Rightarrow x = 1 \text{ hr. [neglecting the -ve value of } x]$$

**Q12 Option B**

$$\frac{(1/2)x}{21} + \frac{(1/2)x}{24} = 10$$

$$\Rightarrow \frac{x}{21} + \frac{x}{24} = 20$$

$$\Rightarrow 15x = 168 \times 20$$

$$\Rightarrow x = \left(\frac{168 \times 20}{15}\right) = 224 \text{ km.}$$

**Q13 Option D**

Let the speed of two trains be  $7x$  and  $8x$  km/hr.

$$\text{Then, } 8x = \left(\frac{400}{4}\right) = 100$$

$$\Rightarrow x = \left(\frac{100}{8}\right) = 12.5$$

$$\therefore \text{Speed of first train} = (7 \times 12.5) \text{ km/hr} = 87.5 \text{ km/hr.}$$

**Q14 Option C**

$$\text{Total time taken} = \left(\frac{160}{64} + \frac{160}{80}\right) \text{ hrs.} = \frac{9}{2} \text{ hrs.}$$

$$\therefore \text{Average speed} = \left(320 \times \frac{2}{9}\right) \text{ km/hr} = 71.11 \text{ km/hr.}$$



**Q15 Option D**

$$\text{Time taken} = 1 \text{ hr } 40 \text{ min } 48 \text{ sec} = 1 \text{ hr } 40\frac{4}{5} \text{ min} = 1\frac{51}{75} \text{ hrs} = \frac{126}{75} \text{ hrs.}$$

Let the actual speed be  $x$  km/hr.

$$\text{Then, } \frac{5}{7}x \times \frac{126}{75} = 42$$

$$\Rightarrow x = \left( \frac{42 \times 7 \times 75}{5 \times 126} \right) = 35 \text{ km/hr.}$$

**Q16 Option B**

Relative speed of the thief and policeman =  $(11 - 10) \text{ km/hr} = 1 \text{ km/hr}$

Distance covered in 6 minutes =  $\frac{1}{60} \times 6 = \frac{1}{10} = 100 \text{ metres}$

So distance between them after 6 minutes =  $200 - 100 = 100 \text{ meters}$

**Q17. Option B**

Important to Note first - Dead Head means - run or finish a race at exactly level or at same time.

From question it is clear that Ram runs faster than Sham by 25%,

So if Sham runs 100 meter in a given time then Ram will run 125 meter in that time.

So if Sham runs 4 meter then Ram will run 5 meter in given time (divide both by 25)

$\Rightarrow$  Ram can give Sham a lead of 1 meter in 5 meter race to finish race in dead heat.

Ratio of length of start given : length of race  $\therefore$  1 : 5

As per question, start was given of 7 meter, So, Length of race was  $7 \times 5 = 35$ .

**Q18. Option D**

$$\text{Speed} = 9 \text{ km/hr} = \left( 9 \times \frac{5}{18} \right) \text{ m/sec} = \frac{5}{2} \text{ m/sec}$$

$$\text{Distance} = (35 \times 4) = 140 \text{ m}$$

$$\text{Therefore, time taken} = \left( 140 \times \frac{2}{5} \right) = 56 \text{ sec}$$

**Q19 Option D**

Let the speeds of two trains be  $7x$  and  $8x$  km / hr.

$$\text{Then, } 8x = \frac{400}{4} = 100$$

$$\Rightarrow x = \left( \frac{100}{8} \right) = 12.5.$$

$$\text{Speed of first train} = (7 \times 12.5) \text{ km / hr} = 87.5 \text{ km / hr.}$$

**Q20. Option A**

$$\text{Ratio of speeds} = \left( \frac{550}{60} \times \frac{18}{5} \right) : \left( \frac{33}{45} \times 60 \right) =$$

$$33:44 = 3:4$$

## Time Speed & Distance

### Questions Set 2

1. A person covers a certain distance through car. Had he moved 8km faster, he can reach the place 25 minutes earlier. If he had moved the 4 km slower, he will reach the same place 25 minutes later. What is the speed of car?

- (a) 20kmph
- (b) 12kmph
- (c) 16kmph
- (d) 24kmph
- (e) None of these

2. Kannan covers the distance from his home to his office by bike. He travelled at a speed of 15kmph; he reached the office late by 40 minutes. So he increased the speed by 3 kmph, he reached the office late by 30 minutes. Find the distance between the home and his office?

- (a) 20km
- (b) 21km
- (c) 18km
- (d) 15km
- (e) None of these

3. If train, 75% of its usual speed, crosses the platform which is in the length of 450 m, in 18 seconds and train crosses the pole with its usual speed in 12sec. What is the time taken by the train to cross tunnel which is in the length of 500m at a speed of 18kmph?

- (a) 3 minutes
- (b) 3 hr 25 minutes
- (c) 2 hr 15 minutes
- (d) 3 hr 45 minutes
- (e) None of these

4. A man can cover the distance of 60km in 6hrs. He covers some distance by foot at the average speed of 6kmph and the remaining

distance by bicycle at the average speed of 12kmph, What distance would he travel on foot?

- (a) 48km
- (b) 20km
- (c) 36km
- (d) 24km
- (e) None of these

5. A train leaves from Coimbatore at 7.00a.m to Ahmadabad at 11.00a.m. Another train starts from Ahmadabad at 9.00 am reaches to Chennai 12 noon. At what time the two trains cross each other(approx)?

- (a) 9.45am
- (b) 10.30am
- (c) 9.51am
- (d) 10am
- (e) None of these

6. Train A crosses the pole in 45 seconds and Train B crosses the same pole in 1min 10 seconds. The train A length is  $\frac{2}{5}$  of length of train B. What is the ratio of Speed of Train B to Train A?

- (a) 28:45
- (b) 45:28
- (c) 9:14
- (d) 14:9
- (e) None of these

7. A truck covers distance of 294km at a certain speed in 7hrs. How much time does car takes? If the car travelled 14km/hr more than that of the speed of the truck to cover a distance and also the car travelled 16km more than that of truck?

- (a) 5 hr 45 min
- (b) 4hr 12 min
- (c) 5hr 32 min
- (d) 6hrs
- (e) None of these

8. Two cars A and B, started simultaneously from the same point in opposite directions, car A towards west and car B moves towards East.

If speed of car B is 45kmph and after 35 minutes they were 65.5 km apart, what is the speed of car A?(in Kmph)

- (a) 65.65kmph
- (b) 67.28kmph
- (c) 75kmph
- (d) 71.23kmph
- (e) None of these

9. Two persons P and R travel from A to B, a distance of 78km at 16kmph and 10kmph respectively. R reaches B and returns immediately and meets P at C. Then, Find the distance from A to C.

- (a) 85km
- (b) 96km
- (c) 108km
- (d) 104km
- (e) None of these

10. An Express train travelled at an average speed of 150kmph, which was stopped for 6min after every 75km. A Local train travelled at a speed of 75 kmph, which was stopped for 2 minutes for every 37.5km. If both the trains started their travel at the same time, how much km does the local train travels while the express train reached 900km?

- (a) 470.25km
- (b) 520.5km
- (c) 506.25km
- (d) 474.35km
- (e) None of these

11. A person covers 480km in 8 hrs. He covers some distance by car at the average speed of 40 km/hr and the remaining distance by train at the average speed of 70 km/hr. Find the distance covered by the car?

- a) 200 km
- b) 250km
- c) 170km
- d) 160km

e) None of these

12. A truck starts running at the speed of 48 km/hr. If the speed of the truck increases 6 km at the end of every hour then what will be the distance covered at the end of 12 hrs from the start of the Journey?

- a) 600km
- b) 550km
- c) 972 km
- d) 700km
- e) None of these

13. A person travels from A to B at the speed of 50 km/hr and returns by increasing his speed by 40%. What is the average speed of both the trips?

- a)  $58\frac{1}{3}$  hr
- b) 50 hr
- c)  $55\frac{2}{3}$  hr
- d) 52 hr
- e) None of these

14. Moni left for Bangalore from Chennai at 9.30 am. She travelled at the speed of 60 km/hr for 2 hrs 15 mins. After she reduced the speed to 40 km/hr. If the distance between the 2 cities is 285 km, at what time did moni reach Bangalore?

- a) 2.30 pm
- b) 3.30 pm
- c) 4 pm
- d) 2 pm
- e) None of these

15. A man takes 8 hours 25 minutes in walking to certain place and riding back. He would have take 2 hours less by riding both ways. What would be the time he would take to walk both ways?

- a) 8 hr 25 min
- b) 7 hr 15 min
- c) c) 9 hrs 10 min
- d) 8 hr 15 min

e) E) None of these

16. Ragu drove at the speed of 60 km/hr from home to a resort. Returning over the same route, he got stuck in traffic and took an hour longer, also he could drive only at the speed of 50 km/hr. How many kilometers did he drive each way?

- a) 300 km
- b) 450 km
- c) 425 km
- d) 325 km
- e) None of these

17. The respective ratio between the speeds of a bus, a car and jeep is 2:3:5. The speed of jeep is 250 percent of the speed of the bus which covers 480 km in 12 hours. What is the average speed of car and jeep together?

- a) 75 km/hr
- b) 80 km/hr
- c) 76 km/hr
- d) 72 km/hr
- e) None of these

18. The ratio between the speed of a train and a car is 18:13 respectively. Also, a bus covered a distance of 480 kms in 12 hours. The speed of the bus is five-ninth the speed of the train. How much distance will the car cover in 5 hours?

- a) 260 km
- b) 270 km
- c) c) 290 km
- d) d) 320 km
- e) E) None of these

19. The speeds of Raj and Ragu are 30 km/hr and 40 km/hr respectively. Initially Ragu is at a place L and Raj is at a place M. The distance between L and M is 650 km. Raj started his journey 3 hours earlier than Ragu to meet each other. If they meet each other at a place P somewhere between L and M, then the distance between P and M is?

- a) 310 km
- b) 330 km
- c) c) 350 km
- d) d) 325 km
- e) E) None of these

20. The distance between the two stations Chennai and Bangalore is 400 km. A train starts at 5 pm from Chennai towards Bangalore at an average speed of 50 km/hr. Another train starts from Bangalore at 5.15 pm and moves towards Chennai at an average speed of 80 km/hr. How far from Chennai will they meet and at what time?

- a) 161 km, 9 pm
- b) 120 km, 7.13 pm
- c) 171 km, 8.13 pm
- d) 148.33 km, 8.13 pm
- e) None of these

## Solution

### Q1. Option C

Differences in Time taken for both movements are same here. So,

Speed =  $2 * (\text{increased speed}) * (\text{decreased speed}) / \text{difference in speed}$

$$= 2 * 8 * 4 / 8 - 4$$

$$= 2 * 8 * 4 / 4$$

$$= 16 \text{ kmph}$$

### Q2. Option D

Difference in time taken =  $40 - 30 = 10 \text{ min} =$

$$10/60 = 1/6 \text{ hr}$$

Speed during the next journey =  $15 + 3 = 18 \text{ kmph}$

So time taken,  $x/15 - x/18 = 1/6$

$$3x / (15 * 18) = 1/6$$

$$X / (5 * 18) = 1/6$$

$$x = (18 * 5) / 6$$

$$\text{Distance (X)} = 15 \text{ km}$$

### Q3 Option C

Let assume the usual speed of the train X kmph

Then, 75% of usual speed =  $75 * x / 100 = 3x/4$

Now,  $L/x = 12$

$$L = 12x$$

Again,  $(L + 450) / (3x/4) = 18$

$$12x + 450 = 18 * (3x/4)$$

$$450 + 12x = 27x/2$$

$$450 + 12x = 13.5x$$

$$1.5x = 450$$

$$X = 450 / 1.5 = 675 \text{ m}$$

$$\text{Speed} = 18 * (5/18) = 5 \text{ m/s;}$$

$$\text{Time taken} = \text{Distance} / \text{Speed} = 675/5 = 135$$

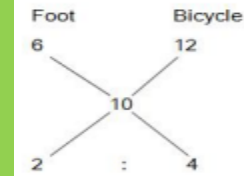
Seconds

$$\Rightarrow 135/60 \text{ min} = 2 \text{ hr } 15 \text{ min}$$

### Q4. Option B

A man can cover the distance of 60km in 6hrs

$$\text{Speed} = 60/6 = 10 \text{ km/hr}$$



$$\Rightarrow 1:2$$

The distance travelled by foot is,

$$\Rightarrow 60 * (1/3) = 20 \text{ km}$$

### Q5 Option C

Let the distance between Coimbatore and Ahmadabad be X

Speed of first train =  $x/4 \text{ km/h}$

Speed of second train =  $x/3 \text{ km/h}$

Let they meet y hrs after 7.00am

Then, according to the question,

$$X/4 * y + x/3 * (y-2) = X$$

$$Y/4 + (y-2)/3 = 1$$

$$3y + 4(y-2) = 12$$

$$3y + 4y - 8 = 12$$

$$7y = 20$$

$$Y = 20/7$$

$$Y = 2 \text{ hrs } 51 \text{ min } 25 \text{ sec}$$

$$\text{Two trains cross each other} = 7 + 2.51 = 9.51 \text{ am (approx)}$$

### Q6 Option A

Let the length of train B be X m.

Then, length train A =  $2X/5$

Now the speed of train B to that of train A =

$$(X/70) : (2X/5 / 45)$$

$$= (70/x) * (2x/225)$$

$$= 140 : 225 = 28 : 45$$

### Q7 Option C

Speed of the truck =  $D/T = 294/7 = 42 \text{ km/hr}$

Now, Speed of car = (Speed of truck + 14) km/hr

$$= 42 + 14 = 56 \text{ km/hr}$$

Distance of car =  $294 + 16 = 310$  km

Time Taken =  $310/56 = 5$  hr 32 min

Q8 Option B

Relative speed =  $(65.5/35) * 60 = 786/7$  kmph

Speed of A =  $786/7 - 45 = 471/7 = 67.28$  kmph

Q9 Option B

$D=78$  km;  $a=16$  kmph,  $b=10$  kmph

According to the formula,

Distance travelled by

$R = AC = 2D * (a/a+b)$

$= 2 * 78 * (16/(10+16))$

$= 2 * 78 * (16/26)$

$= 2 * 78 * (8/13) = 96$  km

Q10 Option C

Express:

Time taken to cover 75 km (including stoppage)

$= 30$  min +  $6$  min =  $36$  min

Time taken to cover the total distance by

Express =  $(36/75 * 825) + 36$  min =  $432$  min

Local Train:

Time taken to cover 37.5 km (including

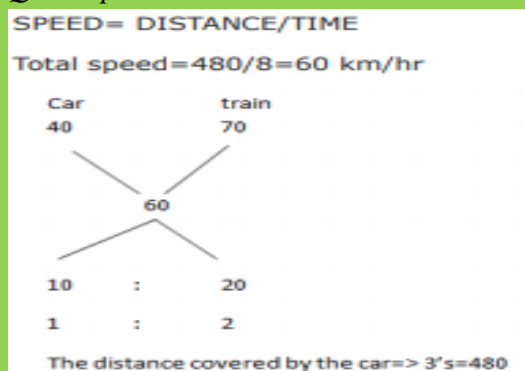
stoppage) =  $30$  min +  $2$  min =  $32$  min

In 32 min, distance covered = 37.5 km

Required total distance =  $432 * (37.5/32) =$

506.25 km

Q11. Option D



Q12. Option C

$48 + 54 + 60 + \dots 114$

$N=12, d=6, a=48$  (1 no)

$T_n = a + (n-1)d = 48 + (11 * 6) = 114$  (last no)

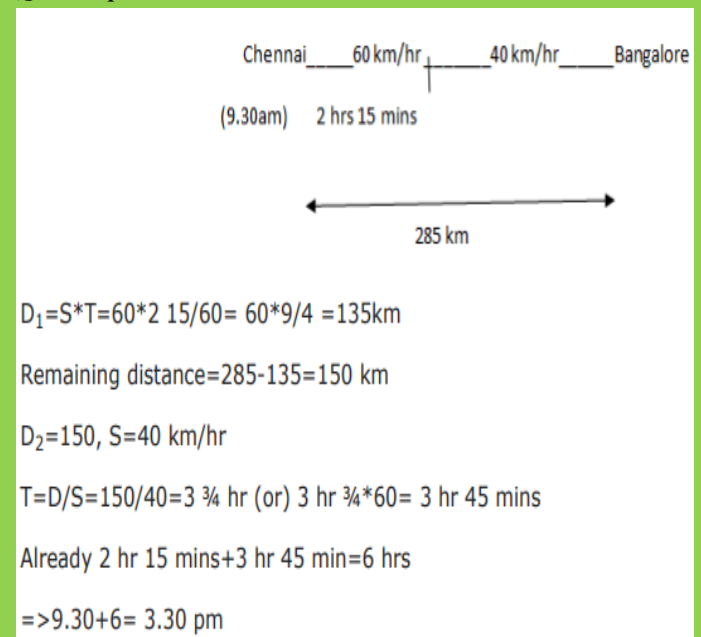
Total distance =  $12(48 + 114)/2$

$\Rightarrow 972$  km

Q13. Option A

Average speed =  $2xy/(x+y) = 2 * 50 * 70/120 = 58 \frac{1}{3}$  km/hr

Q14. Option B



Q15 Option E

$W + R = 8$  hr 25 min

$2R = 6$  hr 25 min

$R = 3$  hr 25/2 min

$W = 8$  hr 25 min -  $3$  hr 25/2 min

$\Rightarrow 5$  hr 25/2 min \* 2

$\Rightarrow 10$  hr 25 min

Q16 Option E

If Ragu travelled 60 km/hr, he may reach the resort at 10 am, In the same way if he travelled 50 km/hr, he may reach the resort at 11 am. The difference is 1 hour.

$x/60 - x/50 = 1$

$10x/(60 * 50) = 1$

$$X=300 \text{ km}$$

**Q17 Option B**

The speed ratio is,

Bus car jeep

$$2 : 3 : 5$$

$$\text{Bus's speed} = 480/12 = 40 \text{ km/hr}$$

$$2's = 40$$

$$1's = 20$$

We substituting this, we get

$$\text{Car's speed} = 60, \text{ Jeep's speed} = 100 \text{ km/hr}$$

$$\text{Average speed of car and Jeep} = 160/2 = 80 \text{ km/hr}$$

**Q18 Option A**

The speed of train and Car is,

Train car

$$18 : 13$$

$$18x \ 13x$$

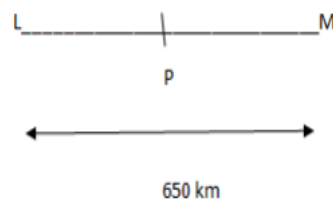
$$\text{Bus's speed} = 480/12 = 40 \text{ km/hr}$$

$$\text{Speed of Bus} = 5/9 * \text{train} = 5/9 * 18x = 10x$$

$$\text{Car's speed} = 13 * 4 = 52 \text{ km/hr}, t = 5 \text{ hr}$$

$$\text{Distance} = s * t = 52 * 5 = 260 \text{ km}$$

**Q19 Option B**



$$\text{Raj Covers distance in 3 hrs} = 3 * 30 = 90 \text{ km}$$

$$\text{Remaining distance} = 650 - 90 = 560 \text{ km}$$

$$\text{Relative speed} = 30 + 40 = 70 \text{ km/hr}$$

$$S = D/T = 560/70 = 8 \text{ hrs}$$

$$\text{Raj covers total distance in } (8 + 3 = 11 \text{ hrs})$$

$$\text{The distance between p and m is } 11 * 30 = 330 \text{ km}$$

**Q20. Option D**

Travels between 5 pm and 5.15 pm

The difference is = 15 mins

$$\text{So, } 50 * 15/60 = 12.5 \text{ km}$$

$$\text{Remaining Distance} = 400 - 12.5 = 387.5 \text{ km}$$

$$\text{Relative speed} = 50 + 80 = 130 \text{ km/hr}$$

$$\text{They meet after} = 387.5 / (80 + 50) = 387.5 / 130 = 2 \text{ hrs } 58 \text{ min (approx)}$$

$$\text{Hence they meet at } 5.15 + 2.58 = 8.13 \text{ pm}$$

$$\text{Meeting distance} = 100 + 48.33 = 148.33 \text{ km}$$