Class Test on Lecture Sheet 6

1. If 20% A = 30% of B = $\frac{1}{6}$ of C, Then $A: B: C$ is?

   A. 2: 3: 16 B. 3: 2: 16 C. 10: 15: 18 D. 15: 10: 18 E. None of these

   সমাধান: Here, 20% of A = 30% of B = $\frac{C}{6}$

   Let, $\frac{20A}{100} = \frac{30B}{100} = \frac{C}{6} = K$

   $\Rightarrow A = 5K, B = \frac{10K}{3}, C = 6K$

   $\Rightarrow A: B: C = 15K: 10K: 18K = 15: 10: 18$

   Answer: D. 15: 10: 18

2. Solution y is 40 percent sugar by volume an solution x is 20 percent sugar by volume. How many gallons of solution x must be added to 150 gallons of solution y to create a solution that is 25 percent sugar by volume? [City Bank (MTO) 2018]

   A. 37.5 gallon B. 75 gallon C. 150 gallon D. 240 gallon E. 450 gallon

   সমাধান: Solution X = 20% sugar

   Solution Y = 40% sugar

   We're told to mix a certain amount of solution X with 150 gallons of solution Y to get a 25% sugar:

   X = number of gallons of solution X

   $\frac{(0.2)(X)+(0.4)(150)}{X+150} = 0.25$

   $\Rightarrow 0.2X + 60 = 0.25X + 37.5$

   $\Rightarrow 22.5 = 0.05X$

   $\Rightarrow 450 = X$

   $\therefore X = 450$ (Answer. E)

3. A jar contains white, red and green marbles in the ratios 2: 3: 5. Six more green marbles are added to the jars and then the ratio becomes 2: 3: 7. How many white marbles are there in the jar?

   A. 4 B. 5 C. 6 D. 7 E. 9

   সমাধান: Let, initiallay white marbles = 2x, red marbles = 3x & green marbles = 5x

   After adding six green marbles, total no. of green marbles = $5x + 6$

   New, ratio = 2: 3: 7

   So, $\frac{white}{green} = \frac{2x}{5x+6} = \frac{2}{7}$

   $\Rightarrow 14x = 10x + 12$

   $\Rightarrow 4x = 12$

   $\Rightarrow x = 3$

   So, total white marbles in the jar = $2x = 2 \times 3 = 6$

   Answer: C. 6

4. If a carton containing a dozen mirrors, is dropped, which of the following cannot be the ratio of broken mirror to unbroken minors? [DBBL (Jr. Channel Officer)-2023]

   A. 2:1 B. 3:1 C. 3:2 D. 7:5 E. None

   সমাধান: For dividing 12 into two whole numbers, the sum of the ratios must be a factor of 12. So they cannot be in the ratio 3:2.

5. Tazul and Sadib started a venture investing USD 85000 and USD 15000 respectively. In what ratio the profit earned after 2 years be divided between Tazuls and Sadib?

   A. 3:17 B. 5:3 C. 3:4 D. 17:3 E. 17:5

   সমাধান: Here, investment ratio = $85000: 15000 = 85: 15 + 17: 3$ of Tazul & Sadib

   Profit will be divided in accordance with the investment.

   So, the profit ratio will be = 17: 3

   Answer: D. 17:3

6. A jar was full with honey. A person used to draw out 20% of the honey from the jar and replaced it with sugar solution. He has repeated the same process 4 times and thus there was only 512 gm of honey left in the jar, the rest part of the jar was filled with the sugar solution. The initial amount of honey in the jar was filled with the sugar solution. The initial amount of honey in the jar was:

A. 1.25 kg B. 1 kg C. 1.5 kg D. 1.52 kg E. 2.52 kg

সমাধান: Let the initial amount of honey in the jar was K, then

$512 = K\left(1 - \frac{1}{5}\right)^4$ [$\because 20\% = \frac{20}{100} = \frac{1}{5}$]

$512 = K\left(\frac{4}{5}\right)^4$

Therefore, K = 1250

Hence initially the honey in the jar = 1.25 kg (Answer)

7. In what ratio must a person mix three kinds of tea costing tk. 60/kg, tk. 75/kg, tk. 100/kg so that the resultant mixture when sold at tk. 96/kg yields a profit of 20%?

A. 1: 2: 4 B. 3: 7: 6 C. 1: 4: 2 D. 1: 4: 3 E. 1: 4: 4

সমাধান: As the profit is 20% after selling at tk. 96/kg

So, the cost price = $\frac{96}{1.2} = 80$

Now, options check:

A. 1: 2: 4

So, cost price of the mixture = $\frac{60\times1+75\times2+100\times4}{1+2+4} = \$87.14$/kg

B. 3: 7: 6

So, cost price of the mixture = $\frac{60\times3+75\times7+100\times6}{3+7+6} = \$81.56$/kg

C. 1: 4: 2

So, cost price of the mixture = $\frac{60\times1+75\times4+100\times2}{1+4+2} = \$80.00$/kg

As, we have already found the exact ratio, no. need to check option D or E.

Answer: C. 1: 4: 2

8. In 10 years, A will be twice as old as B was 10 years ago. If A is now 9 years older than B, then the present age of B is- [BB Officer 2022]

A. 19 years B. 29 years C. 39 years D. 49 years

সমাধান: Let, Present age of B = x

From the 1st condition,

$A + 10 = 2(x - 10) \dots\dots\dots (i)$

& from the 2nd condition,

$A = x + 9$

From (i), we get,

$A + 10 = 2x - 20$

$\Rightarrow x + 9 + 10 = 2x - 20$

$\Rightarrow x = 39$

Answer: C. 39 years

9. Rahims present age is two-fifth of the age of his brother. After 8 years Raihan will be one-half of the age of his brother. How old is the brother at present?

A. 32 years B. 34 years C. 44 years D. 40 years E. 48 years

সমাধান: Let, Rahim's present age = R and

Brother's present age = B

Then, $R = \frac{2B}{5} \dots\dots\dots\dots\dots (i)$

& $R + 8 = \frac{B+8}{2} \dots\dots\dots\dots\dots (ii)$

$\Rightarrow \frac{2B}{5} + 8 = \frac{B+8}{2}$ [From (i)]

$\Rightarrow \frac{2B+40}{5} = \frac{B+8}{2}$

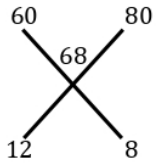
$\Rightarrow 5B + 40 = 4B + 80$
$\Rightarrow B = 40$
Answer: D. 40 years.

10. A container whose capacity is 60 litre contains milk and water in the ratio 3:2. How much quantity of the mixture should be replaced with pure milk, so that in the final mixture, ratio of milk to water is 7:3?
A. 25 B. 56 C. 15 D. 40
সমাধান: 'Question'-এ 60 লিটার হবে।
60 L এ, milk = $60 \times \frac{3}{5} = 36$ L
So, water = 24 L
Let, 'R' litres of the mixture was replaced with pure milk.
Now, 'R' litre G milk = $R \times \frac{3}{5} = \frac{3R}{5}$
প্রশ্নমতে, $\frac{36-\frac{3R}{5}+R}{24-\frac{2R}{5}} = \frac{7}{3}$
$\Rightarrow \frac{36+\frac{2R}{5}}{24-\frac{2R}{5}} = \frac{7}{3}$
$\Rightarrow \frac{60}{12+\frac{4R}{5}} = \frac{10}{4}$ [যোজন-বিয়োজন]
$\Rightarrow \frac{60}{\frac{60+4R}{5}} = \frac{5}{2}$
$\Rightarrow 300 \times 2 = 5(60 + 4R)$
$\Rightarrow 20R = 300$
$\Rightarrow R = 15$
উত্তর: C. 15

Practice Math

1. To cover a distance of 30 km, Joynul takes 2 hour more than Rony. If Joynul doubles his speed, he would take 1 hour less than Rony. What is the speed of Joynul? [৪২তম বিসিএস]
A. 4 km/hr B. 5 km/hr C. 6 km/hr D. 7.5 km/hr
সমাধান: ধরি, জয়নুলের বেগ = x কি.মি./ঘণ্টা
∴ রনির বেগ = y কি.মি./ঘণ্টা
প্রশ্নমতে, $\frac{30}{x} - \frac{30}{y} = 2 \ \ldots\ldots\ldots\ldots\ldots (i)$
ও $\frac{30}{y} - \frac{30}{2x} = 1 \ \ldots\ldots\ldots\ldots\ldots (ii)$
(i) + (ii)
$\frac{30}{x} - \frac{30}{2x} = 3$
$\Rightarrow \frac{30}{x} - \frac{15}{x} = 3$
$\Rightarrow \frac{30-15}{x} = 3$
$\Rightarrow \frac{15}{x} = 3$
$\Rightarrow 3x = 15$
$\Rightarrow x = 5$

2. Jamal covered a distance of 340 miles between city A and city B taking a total of 5 hours. If part of the distance was covered at 60 miles per hour speed and the balance at 80 miles per hour speed, how many hours did he travel at 60 miles per hour? [Titas Gas Field (Asst. Manager)-21]
A. 2 B. 2.5 C. 3 D. None of these
সমাধান: গড় বেগ = $\frac{340}{5} = 68$ mph



∴ অনুপাত = $12:8 = 3:2$

∴ 60 mph এ 3 ঘণ্টা যায় $\left[\left(\frac{3}{3+2} \times 5\right) = 3\right]$

বিকল্প সমাধান: ধরি 60 mph এ যায় t ঘন্টা

∴ 80 mph এ যায় $(5 - t)$ ঘণ্টা

∴ প্রশ্নমতে,

$60t + 80(5 - t) = 340$ [সরণ = বেগ × সময়]

$\Rightarrow 60t + 400 - 80t = 340$

$\Rightarrow -20t = -60$

$\Rightarrow t = 3$ h

3. A man traveled from the village to the post-office at the rate of 25 kmph and walked back at the rate of 4 kmph. If the whole journey took 5 hrs 48 minutes, find the distance of the post-office from the village?

A. 40 km B. 30 km C. 20 km D. 10 km

সমাধান: Let, the distance of the post-office from the village = 's' km

Now, for the first condition, $s = v \times t_1 = 25t_1$

Similarly, for the second condition, $s = v \times t_2 = 4\left(\frac{29}{5} - t_1\right)$ [$t_1+t_2 = 5\frac{48}{60} = \frac{29}{5}$]

So, $25t_1 = 4\left(\frac{29}{5} - t_1\right)$

$\Rightarrow 29t_1 = 4 \times \frac{29}{5}$

$\Rightarrow t_1 = \frac{4}{5}$

Thus, $s = 25t_1 = 25 \times \frac{4}{5} = 20$ km

Answer: C. 20 km

4. A man travelled a distance of 61 km in 9 hours. He travelled partly on foot at 4 km/hr and partly on bicycle and 9 km/hr. What is the distance (in km) travelled on foot?

A. 10 B. 12 C. 14 D. 16

সমাধান: ধরি, হেঁটে যায় = x

বাইসাইকেল যায় = $(61 - x)$ কি.মি.

আমরা জানি,

সময় = সরণ ÷ বেগ

$\therefore \frac{x}{4} + \frac{61-x}{9} = 9$

$\Rightarrow \frac{9x+244-4x}{36} = 9$

$\Rightarrow 5x + 244 = 324$

$\Rightarrow 5x = 80$

$\Rightarrow x = 16$

5. In a kilometer race, A beats B by 100 m and B beats C by 150 m. In the same race, by how many meters does A beat C?

A. 235 m B. 225 m C. 240 m D. 250 m

সমাধান: In a kilometer race, when A completes 1000 m, B completes $(1000-100) = 900$ m

Similarly, when B completes 1000 m, C completes $(1000-150) = 850$ m

Now, when B completes 1000 m, C completes = 850 m

So, when B completes 900 m, C completes = 765 m

So, A beats C by $(1000-765)$ or, 235 m

Answer: 235 m

6. Fahim and Rishad both started at the same time from point A to point B at speeds of 52 kmph and 39 kmph respectively on the same road. As soon as Fahim reaches point B, he turns back, starts toward point A on the same road, and meets Rishad on the way. How far from point B to the two of them meet, if the distance between the points is 70 km?

A. 20 B. 30 C. 10 D. 25

সমাধান: Let, they meet 'x' km away from point B

As the speed of Fahim & Rishad are 52 kmph & 39 kmph respectively.

So, according to the condition,

$\frac{70+x}{52} = \frac{70-x}{39}$ [total distance = 70 km between A & B]

$\Rightarrow \frac{70+x}{4} = \frac{70-x}{3}$

$\Rightarrow 210 + 3x = 280 - 4x$

$\Rightarrow 7x = 70$

$\Rightarrow x = 10$

উত্তর: C. 10

7. If Jasfan and Jafran start their journey from a to b. Their speeds are 5 and 3 respectively strating their journey together, as soon as jasfan reach point b, he turns back starts toward point a and meet jafran on the way. How far the point B from the point where the two of them meet, if distance a to b is 32 km? [IBA MBA, Dec' 2022]

A. 6 B. 8 C. 4 D. 10 E. None of these

সমাধান: Let, two of them meet 'x' km from B

Then, according to the given condition,

$\frac{32+x}{5} = \frac{32-x}{3}$

$\Rightarrow 96 + 3x = 160 - 5x$

$\Rightarrow 8x = 64$

$\Rightarrow x = 8$

উত্তর: B. 8

8. A culprit was spotted by a police man from a distance of 250 meter. When the policeman started running forwards the culprit at a speed of 10 km/hr the culprit also fled. If his speed was 8 km/hr, find how far the culprit had run before he was over powered?

A. 1.5 km B. 15 km C. 2.5 km D. 2 km E. None of these

সমাধান: Let, culprit was overpowered after 'x' hours of spotting.

Then, according to the given condition, $8x + \frac{250}{1000} = 10x$

$\Rightarrow 2x = \frac{1}{4}$

$\Rightarrow x = \frac{1}{8}$

So, the culprit ran = $8x = 8 \times \frac{1}{8} = 1$ km

উত্তর: E. None of these

9. Asif riding his bike at 24 km/h reaches his office 5 minutes late. If he would have reached the office 4 minutes earlier than the scheduled time by travelling 25% faster, how far is his office from his house in kms? [IBA BBA 16-17]

A. 18 B. 24 C. 36 D. 40 E. None of these

সমাধান: When Asif reaches late,

$s = 24\left(t + \frac{5}{60}\right)$ ... ...(i)

& when Asif reaches early,

$s = 30\left(t - \frac{4}{60}\right)$ ... ...(ii) $[24 \times 125\% = 30]$

From (i) & (ii), we get,

$24t + 2 = 30t - 2$

$\Rightarrow 6t = 4$

$\Rightarrow t = \frac{2}{3}$

So, from (i), we get, s = $24\left(\frac{2}{3}+\frac{5}{60}\right) = 16 + 2 = 18$ km

উত্তর: A. 18

10. Two boats on the opposite shores of a river start moving towards each other. When they pass each other they are 750 yards from one shoreline. They each continue to the opposite shore, immediately turn around and start back. When they meet again they are 250 yards from the other shoreline. Each boat maintains a constant speed throughout. How wide is the river? [IBA BBA 13-14]

A. 2400 yards B. 3000 yards C. 2000 yards D. 4000 yards E. None of these

সমাধান: Let, the width of the river = x

For the 1st condition,

$750 = v_1 \times t_1$ (boat-1)

& $x - 750 = v_2 \times t_2$ (boat-2)

In the passing point, $t_1 = t_2 \Rightarrow \frac{750}{v_1} = \frac{x-750}{v_2} \Rightarrow \frac{v_1}{v_2} = \frac{750}{x-750}$ ... ...(i)

Again, for the 2nd condition, similarly,

$\frac{x+250}{v_1} = \frac{2x-250}{v_2}$

$\Rightarrow \frac{v_1}{v_2} = \frac{x+250}{2x-250}$ ... ...(ii)

So, from (i) & (ii), we get,

$\frac{750}{x-750} = \frac{x+250}{2x-250}$

$\Rightarrow \frac{750+x-750}{750-x+750} = \frac{x+250+2x-250}{x+250-2x+250}$

$\Rightarrow \frac{x}{1500-x} = \frac{3x}{500-x}$

$\Rightarrow 500 - x = 4500 - 3x$

$\Rightarrow 2x = 4000$

$\Rightarrow x = 2000$ yards

উত্তর: C. 2000 yards

11. Shawkot drove at a speed of 60 km/h for 8 hours. For how many hours should he now drive at a speed of 80 km/h for the overall average speed to become 72 km/h?

A. 8 B. 12 C. 10 D. 15

সমাধান: Let, Shawkot needs to drive for 'x' additional hours

The, for the overall average speed to become 72 km/h,

$\frac{total\ distance\ covered}{total\ time} = 72$

$\Rightarrow \frac{60\times8+80x}{8+x} = 72$

$\Rightarrow 576 + 72x = 80x + 480$

$\Rightarrow 8x = 96$

$\Rightarrow$ x = 12

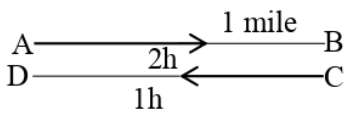
উত্তর: B. 12

12. A delivery cart went from Candle Ford to Lark Rise and black at an average speed of $\frac{2}{3}$ miles per hours. If the distance from Candle Ford to Lard Rise is 1 mile, and the trip back took half as much time as the trip there, what was the average speed of the delivery cart on the way to Lark Rise?

[উত্তরা ব্যাংক (প্রবেশনারি অফিসার) ২০২১, বাংলাদেশ পেট্রোলিয়াম ইনস্টিটিউট (সহকারী পরিচালক) ২০২০]

A. $\frac{1}{3}$ B. $\frac{3}{4}$ C. $\frac{1}{2}$ D. $\frac{2}{3}$

সমাধান:



Average speed $\frac{2}{3}$ miles per hours; Distance go and back = 2 miles and time = 3 hours.
It takes time to go 2 hours and It takes time to get back 1 hours. jdd
So, The average speed of the delivery cart on the way to lark Rise $\frac{\text{Distance}}{\text{Time}} = \frac{1}{2}$

বিকল্প সমাধান: মনে করি, ফিরে আসার সময় = x
∴ যাওয়ার সময় = 2x [∵ যাওয়ার সময় দ্বিগুণ সময় লাগে]
প্রশ্নমতে, $\frac{1+1}{2x+x} = \frac{2}{3}$ [গড়বেগ = মোট দূরত্ব ÷ মোট সময়]
$\Rightarrow \frac{2}{3x} = \frac{2}{3}$
$\Rightarrow x = 1$
∴ যাওয়ার সময় গড়বেগ = দূরত্ব ÷ সময় = $\frac{1}{2\times1} = \frac{1}{2}$ মাইল প্রতি ঘণ্টা

13. A car average as 25 miles per gallon of gasoline when driven in the city and 40 miles per gallon when driven on the highway. According to these rates, which of the following is closest to the number of miles per gallon that the car average when it is driven 10 miles in the city and then 50 miles on the highway?
A. 64 B. 36 C. 12 D. 29 E. None of these
সমাধান: Here, total covered distance = 10 + 50 = 60 miles
Again, total Gasoline used for the covered distance = $\frac{10}{25} + \frac{50}{40} = \frac{2}{5} + \frac{5}{4} = \frac{33}{20}$
So, number of miles per gallon = $\frac{60}{\frac{33}{20}} = \frac{1200}{33} = 36.36$
উত্তর: B. 36

14. A motorist travels to a place 150 km away at an average speed of 50 km and returns at 30 km per hour. What is his average speed for the whole journey in km per hour?
A. 35 B. 37 C. 37.5 D. 40 E. 42.5
সমাধান: Here, total distance covered = $150 + 150 = 300$ km
Again, total time needed for the covered distance = $\frac{150}{50} + \frac{150}{30} = (3 + 5)$ hrs = 8 hrs
So, Average speed = $\frac{300}{8} = 37.5$ km/h
উত্তর: C. 37.5

15. দু'টি বাইক একে অপরের দিকে 300 কি.মি. দূর থেকে যাত্রা শুরু করে। তারা যদি একটি গন্তব্য থেকে 130 কি.মি. দূরে একজন অপর জনকে অতিক্রম করে তবে তাদের বেগের অনুপাত কত? [বাখরাবাদ গ্যাস ফিল্ড লি:- সহকারী ব্যবস্থাপক (জেনারেল)-2021]
Two bikes start at the same time from two destination 300 km apart and travel towards each other. If they cross each other at a distance of 130 km from one of the destinations, what is the ratio of their speeds?
A. 17: 13 B. 7: 3 C. 1: 3 D. 2: 3
সমাধান: ধরি, প্রথম ট্রেনের বেগ x ও
দ্বিতীয় ট্রেনের বেগ y
যেহেতু দু'টি ট্রেনের সময় একই, তাই তাদের বেগ হবে তাদের অতিক্রান্ত দূরত্বের সমানুপাতিক।
∴ $x: y = 170: 130$
$= 17: 13$

16. Train sonar Bangla running at the speed of 60 km/hr crosses a 200 metre long platform in 27 seconds. What is the length of the train?
A. 200 metres B. 240 metres C. 250 metres D. 450 metres
সমাধান: আমরা জানি, $s = vt$
$\Rightarrow L + 200 = 60 \times \frac{5}{18} \times 27$ [ধরি, ট্রেনের দৈর্ঘ্য = Lm]
$\Rightarrow L + 200 = 450$
$\Rightarrow L = 250$ m
উত্তর: C. 250 metres

17. A train travelling at a speed of 75 mph enters a tunnel $3\frac{1}{2}$ miles long. The train is $\frac{1}{4}$ miles long. How long does it take for the train to pass through the tunnel from the moment the front enters to the moment the near emerges?

A. 2.5 min B. 3 min C. 3.2 min D. 3.5 min

সমাধান: আমরা জানি, $s = vt$

$\Rightarrow t = \frac{s}{v} = \frac{\frac{7}{2}+\frac{1}{4}}{75}$

$\Rightarrow t = \frac{15}{4\times75} = \frac{1}{20}$ h

অর্থাৎ, $t = \frac{1}{20} \times 60$ min = 3 min

উত্তর: B. 3 min

18. In a race, the speeds of A and B are in the ratio of 3:4. A takes 30 minutes more than B takes to reach the destination. What is the time taken by A to reach the destination in hours? [IBA MBA Dec'2017]

A. 1 B. 1.5 C. 2 D. 3 E. None of these

সমাধান: Here, the speed ratio A & B = 3:4

So, the required time ratio of A & B = A_t: B_t = 4:3

So, $\frac{A_t}{B_t} = \frac{4}{3}$

$\Rightarrow \frac{A_t}{A_t-30} = \frac{4}{3}$ [$B_t = A_t - 30$]

$\Rightarrow 4A_t - 120 = 3A_t$

$\Rightarrow A_t = 120$ min = 2 hrs

উত্তর: C. 2

19. In a swimming competition, Saju beat Sajib by 60 seconds. If the rate of Saju's swimming is 69 meters/ minute and that of Sajib's 66 meters/minutes, how long has it taken Sajib to complete the competition? [IBA MBA June 2018]

A. 20 min B. 21 min C. 22 min D. 23 min E. None of these

সমাধান: Let, the total distance = x

The, according to the given condition,

$\frac{x}{66} - \frac{x}{69} = \frac{60}{60} = 1$ [60 second = 1 min]

$\Rightarrow \frac{69x-66x}{69\times66} = 1$

$\Rightarrow 3x = 69 \times 66$

$\Rightarrow x = 69 \times 22$

So, time required for Sajib to complete the competition = $\frac{x}{66} = \frac{69\times22}{66} = 23$ min

উত্তর: D. 23 min

20. The distance between two stations, Dhaka and Chittagong is 450 km. A train starts at 4 pm from Dhaka and moves towards Chittagong at an average speed of 60 km. Another train starts from Chittagong at 3.20 pm and moves towards Dhaka at an average speed of 80 km. How far from Dhaka will the two trains meet? and find out the time they will meet?

A. 120 B. 140 C. 145 D. 170 E. 220

সমাধান: Let, the two trains meet after 'x' hours of departure of the train from Dhaka at 4 pm.

Then, $60x + 80\left(x + \frac{40}{60}\right) = 450$ [2nd train starts at 3:20 pm]

$\Rightarrow 140x = 450 - \frac{160}{3}$

$\Rightarrow 140x = \frac{1190}{3}$

$\Rightarrow x = \frac{1190}{140\times3} = 2.833 \approx 2$ hrs 50 min

Now, distance covered in 2.833 hrs = $60x = 60 \times 2.833 \approx 170$ km

উত্তর: D. 170

21. Two train fast and slow are going from city A to city B at the same time. When the fast train has covered $\frac{2}{3}$ of the distance, the slow train is 180 km away from city B, when the fast has arrived in city B, the slow train has covered $\frac{6}{7}$ of the distance. How long is the distance between A and B?

A. 210 km B. 315 km C. 420 km D. 490 km E. 560 km

সমাধান: Let, the distance between A & B = x

Then, from the 1st condition, we get, $\frac{2x}{3} = F \times t_1$ (speed of Fast Train = F)

$\Rightarrow t_1 = \frac{2x}{3F}$

At time t_1, slow train is 180 km away from city B,

So, $x = 180 = s \times t_1$ (speed of slow train = s)

$\Rightarrow x - 180 = s \times \frac{2x}{3F}$ ... ...(i)

Again, from the 2nd condition,

x = Ft [Fast train has arrived]

& for slow train,

$\frac{6x}{7} = s \times t$

$\Rightarrow \frac{6x}{7} = s \times \frac{x}{F}$ [$t = \frac{x}{F}$]

$\Rightarrow 7s = 6F$

$\Rightarrow s = \frac{6F}{F}$

Now, from equation (i), we get,

$x - 180 = s \times \frac{2x}{3F}$

$\Rightarrow x - 180 = \frac{6F}{7} \times \frac{2x}{3F} = \frac{4x}{7}$

$\Rightarrow 7x - 180 \times 7 = 4x$

$\Rightarrow 3x = 180 \times 7$

$\Rightarrow x = 420$ km

22. Arif starts walking from his home at 10 am for station A at 4 km per hour. At 1 pm his brother leaves for the same destination at 20 km per hour. At what time will his brother meet?

A. 1:45 pm B. 2:00 pm C. 2:15 pm D. 2:30 pm E. None of these

সমাধান: Let, total distance covered by Asif in 't' hours = s

So, s = 4t

& total distance covered by his brother in $(t - 3)$ hours = s

So, $s = 20(t - 3)$ [His brother leaves (1pm - 10am) or, 3 hours later]

Thus, we get, $4t = 20t - 60$

$\Rightarrow 16t = 60$

$\Rightarrow t = \frac{60}{16} = \frac{15}{4}$

So, they will meet after 't' hours of Arif's departure or at 10 am + $\frac{15}{4}$ = 10 am + 3.75 hrs = 10 am + 3 hrs 45 min = 1:45 pm

উত্তর: A. 1:45 pm

23. The distance between Dhaka and Chittagong is 460 km. A train starts at 5pm from Dhaka and moves toward Chittagong at an average speed of 60 km/hr. Another train starts from Chittagong at 4:30pm and moves toward Dhaka at an average speed of 80 km/hr. At what time these two trains will meet?

A. 7:10 pm B. 7:30 pm C. 7:50 pm D. 8:00 pm

সমাধান: Let, these two trains meet after 'x' hours of departure of the train from Dhaka at 5 pm

The, $60 \times x + 80\left(x + \frac{1}{2}\right) = 460$ [2nd train starts at 4:30 pm]

$\Rightarrow 60x + 80x + 40 = 460$

$\Rightarrow 140x = 420$

$\Rightarrow x = 3$

So, two trains meet after 3 hrs of the departure of the train from Dhaka.

So, they meet at 5 pm + 3 hrs = 8 pm
উত্তর: D. 8:00 pm

24. Two trains of equal length are running on parallel lines in the same direction at 46 km/hr. and 36 km/hr. The faster train passes the slower train in 36 seconds. The length of each train is-
A. 40 m B. 45 m C. 50 m D. 55 m
সমাধান: As the two trains are running on parallel lines in the same direction,
So, $s = (v_1 - v_2) \times t$
$\Rightarrow L \times L = (46 - 36) \times \frac{5}{18} \times 36$ [Let, length of each train = L]
$\Rightarrow 2L = 10 \times \frac{5}{18} \times 36 = 100$
$\Rightarrow L = 50$
উত্তর: C. 50 m

25. Two trains of lengths 120 m and 90 m are running with speeds of 80 km/hr and 55 km/hr respectively towards each other on parallel lines. If they are 90 m apart, after how many seconds they will cross each other?
A. 5.6 sec. B. 7.2 sec. C. 8 sec. D. 9 sec.
সমাধান: এখানে, যেহেতু ট্রেন দুইটি পরস্পরের দিকে এগিয়ে আসছে,
সেহেতু, $s = (v_1 - v_2) \times t$ এখানে, S = length of both train + distance between them
$\Rightarrow 120 + 90 + 90 = (80 + 55) \times \frac{5}{18} \times t$
$\Rightarrow 300 = 135 \times \frac{5}{18} \times t$
$\Rightarrow t = \frac{300 \times 18}{135 \times 5} = 8$ sec
উত্তর: C. 8 sec.

26. Two stations P and Q are 110 km apart on a straight track. One train starts from P at 7 am and travel toward Q at 20 kmph. Another train starts from Q at 8 am and travel toward P at a speed of 25 kmph. What time will they meet?
A. 8 am B. 10 am C. 12 am D. 11 am
সমাধান: Let, they meet after 'x' hours of the departure of 1st train at 7 am.
Then, $20 \times x + 25 \times (x - 1) = 110$
$\Rightarrow 20x + 25x - 25 = 110$
$\Rightarrow 45x = 135$
$\Rightarrow x = 3$
So, they meet at 7 am + 3 hrs = 10 am
উত্তর: B. 10 am

27. The time taken by a train 180 m long, travelling at 42 kmph, in passing a person walking in the same direction at 6 kmph, will be-
A. 18 sec. B. 21 sec. C. 24 sec. D. 25 sec.
সমাধান: As the person is walking in the same direction.
So, $s = (v_1 - v_2) \times t$
$\Rightarrow 180 = (42 - 6) \times \frac{5}{18} \times t$
$\Rightarrow t = \frac{180 \times 18}{36 \times 5} = 18$ sec
উত্তর: A. 18 sec.

28. Two trains A and B start running together from the same point in the same direction, at the speeds of 60 kmph and 72 kmph respectively. If the length of each of the trains is 240 metres, how long will it take for train B to cross train A?
A. 1 min 12 sec B. 1 min 24 sec C. 2 min 12 sec D. 2 min 24 sec
সমাধান: Here, both the train are running in the same direction,
So, $s = (v_2 - v_1) \times t$

$\Rightarrow 240 + 240 = (72 - 60) \times \frac{5}{18} \times t$

$\Rightarrow 480 = 12 \times \frac{5}{18} \times t$

$\Rightarrow t = \frac{480 \times 18}{12 \times 5}$ = 144 sec. = 2 min 24 sec.

উত্তর: D. 2 min 24 sec

29. Train Karnafuli starts from Chittagong at 6 am and reaches Dhaka at 4 pm. Train Paharika starts from Dhaka at 7 am and reaches Chittagong at 7:30 pm. At what time will the train cross each other's?

[IBA MBA June 2018]

A. 11 am B. 11:40 am C. 12 pm D. 12:45 pm E. None of these

সমাধান: Let, the distance between Dhaka and Chittagong = x

Now, Distance covered by the Train Karnafuli in 10 hrs + Distance covered by the Train Paharika in 12.5 hrs = Total distance

$\Rightarrow \frac{x}{10} \times t + \frac{x}{12.5}(t - 1)$ = x [Let, they meet after 't' hrs of the department Karnafuli Train]

$\Rightarrow \frac{t}{10} + \frac{t-1}{12.5} = 1$

$\Rightarrow \frac{t-1}{12.5} = \frac{10-t}{10}$

$\Rightarrow 10t - 10 = 125 - 12.5t$

$\Rightarrow 22.5t = 135$

$\Rightarrow t = 6$

So, they will cross/meet at 6 am + 6 hrs = 12 pm

উত্তর: C. 12 pm

30. A train is travelling at 48 kmph. It crosses another train having half of its length, travelling in a opposite direction at 42 kmph in 12 seconds. It also passes a railway platform in 45 seconds. What is the length of the platform?

A. 200 meter B. 250 meter C. 400 meter D. 450 meter E. 300 meter

সমাধান: Let, the length of the platform = P & length of the first train = L

For the 1st condition,

$L + \frac{L}{2} = (48+42) \times \frac{5}{18} \times 12$

$\Rightarrow \frac{3L}{2} = 90 \times \frac{5}{18} \times 12$

$\Rightarrow L = 200$

Again, when passing the railway platform,

$L + P = 48 \times \frac{5}{18} \times 45$

$\Rightarrow 200 + P = 600$

$\Rightarrow P = 400$ m

উত্তর: C. 400 meter

Home Task Math

31. In a 100 m race, A covers the distance in 36 seconds and B in 45 seconds. In this race A beats B by-

[PKB (SEO) 2014]

A. 20 m B. 25 m C. 22.5 m D. 9 m E. None of these

সমাধান: In 100 m race, A covers the distance in 36 seconds and B in 45 seconds.

Clearly, A beats B by $(45 - 36) = 9$ seconds

Spedd of B = $\frac{distance}{time} = \frac{100}{45}$ m/s

Distance covered by B in 9 seconds.

= Speed × Time

= $\frac{100}{45} \times 9$

= 20 meters

∴ A beats B by 20 meters. (Answer)

32. A car travelling at a certain constant speed takes 2 second longer to travel 1 km than it would take to travel 1 km at 75 km/hr. At what speed, in km/hr is the car travelling? [IBA MBA June 2016]

A. 60 B. 62 C. 70 D. 72 E. None of these

সমাধান: ধরি, গাড়িটির গতি = v কিলোমিটার/ঘন্টা

প্রশ্নেবলা আছে গাড়িটি 1 কিলোমিটার দূরত্ব 75 কি.মি./ ঘণ্টায় না গিয়ে যদি v কি.মি./ ঘণ্টা গতিতে যায় তাহলে 2 সেকেন্ড বেশি সময় লাগে পৌঁছাতে। অর্থাৎ,

$\frac{1}{v}-\frac{1}{75}=\frac{2}{60\times60}\Rightarrow\frac{1}{v}=\frac{1}{1800}+\frac{1}{75}=\frac{1875}{1800\times75}\Rightarrow v=\frac{1800\times75}{1875}=72$

33. A person covers a certain distance at a certain speed. If he decreases his speed by 20%, then he takes 10 minutes more to cover the distance. Find the time taken by him to cover the distance at original speed. [IBA MBA June'15]

A. 64 B. 60 C. 48 D. 40 E. None of these

সমাধান: ধরি, লোকটির গতি = v

20% কমলে গতি হয় = $v\times\frac{(100-20)}{100}=\frac{80v}{100}=0.8v$

এবং পূর্বে যদি একই দূরত্ব পার হতে লোকটির t মিনিট সময় লাগে তাহলে গতি কমার পর লাগবে $(t+10)$ মিনিট।

সুতরাং, দূরত্ব (s) = গতি (v) × সময় (t) - সূত্র থেকে পাওয়া যায়,

$s=vt$ এবং $s=0.8v\times(t+10)$

$\therefore vt=0.8v(t+10)\Rightarrow t=0.8(t+10)\Rightarrow t=0.8t+8\Rightarrow 0.2t=8\ \ t=\frac{8}{0.2}=40$

34. A ferry can travel twice as fast when empty as when it is full. If travels 20 mile with full load, spends 1 hour for unloading and returns to its original port empty. It took 11 hours to complete the journey. What is the speed when the ferry is empty?

A. 5 B. 6 C. 6.5 D. 5.5 E. 8

সমাধান: Let, the speed of ferry be 'x' when it is full. So, it is '2x' when it is empty.

We know, time = $\frac{distance}{speed}$

$\Rightarrow$ time = $\frac{20}{2x}+1+\frac{20}{x}=11$

So, x = 3

$\therefore$ 2x = 6 (Answer)

35. Karim traveled 60 miles from Dhaka to Gazipur at a certain speed. if his speed per hours 2 miles faster, he would need 1 hours less to reach Gazipur. What was his install speed? [বাংলাদেশ সেতু কর্তৃপক্ষ (সহ: পরি:)-২০]

A. 8 miles per hours B. 10 miles per hours C. 12 miles per hours D. 15 miles per hours

সমাধান: Let, Initial speed $= x$

and after speed $= x+2$

According to the question,

$\frac{60}{x}-\frac{60}{x+2}=1$

$\Rightarrow\frac{60x+120-60x}{x(x+2)}=1$

$\Rightarrow x^2+2x=120$

$\Rightarrow x^2+2x-120=0$

$\Rightarrow x^2+12x-10x-120=0$

$\Rightarrow x(x+12)-10(x+12)=0$

$\Rightarrow (x+12)(x-10)=0$

is $x+12\neq0$ or $x-10=0$

$\therefore x=10$ Miles/hours

36. An ambulance travels 10 miles at a speed of 75 miles per hour. How fast must the ambulance travel on the return trip if the round-trip travel time is to be 20 minutes? [Marcantile Bank Ltd (MTO) 13]

A. 50 mph B. 55 mph C. 60 mph D. 65 mph

সমাধান: উভয় পথে একই দূরত্বে যাবে।

প্রথমে, সময় = $\frac{\text{দূরত্ব}}{\text{বেগ}}=\frac{10}{75}$ ঘণ্টা = $\frac{10\times60}{75}$ মিনিট = 8 মিনিট

∵ Round trip অর্থাৎ যেতে আসতে মোট সময় দরকার 20 মিনিট, সুতরাং 8 মিনিট যাওয়ার পথে ব্যয় হলে-
আসার সময় = $20 - 8 = 12$ মিনিট

∴ বেগ = $\frac{\text{দূরত্ব}}{\text{সময়}} = \frac{10}{12}$ মাইল/মিনিট = $\frac{10}{\frac{12}{60}}$ মাইল/ঘণ্টা = $\frac{10\times60}{12}$ মাইল/ঘণ্টা = 50 মাইল/ঘণ্টা (উত্তর)

37. In a 200 meters race A beats B by 35 m or 7 seconds. A's time over the course- [Janata Bank (AEO) '15]
A. 33 sec B. 40 sec C. 47 sec D. None of these
সমাধান: B runs 35 m in 7 sec.
∴ B covers 200 m in $\left(\frac{7}{35}\times 200\right) = 40$ sec.
B's time over the course = 40 sec.
∴ A's time over the course $(40 - 7)$ sec = 33 sec. (Answer)

38. The distance between two cities is 185 miles. If a bus takes 2 hours to travel the first 85 miles, how long must the bus take to travel the last 100 miles in order to average 50 miles an hour for the entire trip? [24th BCS]
A. 100 min B. 102 min C. 117 min C. 140 min
সমাধান: We use the formula for rate: $\frac{Distance}{time} = rate$. We can let t = the time, in hours, it takes the bus dto travel the final 100 miles and create the equation:
$\frac{185}{(2+t)} = 50$
$\Rightarrow 185 = 100 + 50t$
$\Rightarrow 85 = 10t$
$\Rightarrow t = \frac{85}{50} = 1.7$
Therefore, it takes the bus 1.7 hours or $1.7 \times 60 = 102$ minutes (Answer)

39. In a picnic, Akib went P% at a rate 20km/hr and remaining at a rate of 30km/hr. What is his avg speed in km/h? [IBA MBA Dec' 2019]
A. $\frac{6000}{p+200}$ B. $\frac{6000}{2p+200}$ C. $\frac{\frac{p}{100}}{p+400}$ D. $\frac{100-p}{p+200}$ E. None of these
সমাধান: ধরি মোট দূরত্ব 100km.
∴ p km যায় 20 km/h বেগে
$(100 - p)$ km যায় km/h বেগে
pkm যেতে time লাগে $t_1 = \frac{p}{20} hrs$
$(100 - p)km$ যেতে time লাগে $t_2 = \frac{100-p}{30}$
Avg বেগ /velocity = $\frac{s}{t_1+t_2} = \frac{100}{\frac{p}{20}+\frac{(100-p)}{30}} = \frac{100}{\frac{3p+200-2p}{60}} = \frac{6000}{p+200}$ km/h

40. Anis drove at an average speed of 20 km/hr for some time and then at an average speed of 60 km/hr for the rest of the journey. If his average speed for the entire trip was 30 km/hr, for what fraction of the total time did he drive at 20 km/hr? [IBA MBA December 2015]
A. $\frac{4}{5}$ B. $\frac{3}{4}$ C. $\frac{2}{3}$ D. $\frac{1}{2}$ E. None of these
সমাধান: ধরি, পুরো ভ্রমণে সময় লাগে = t ঘণ্টা এবং 20 কিলোমিটার / ঘন্টা গতিতে সময় নেয় = x ঘন্টা
তাহলে 60 কিলোমিটার / ঘণ্টা গতিতে সময় নেয় = $(t - x)$ ঘন্টা
প্রশ্নমতে, $20 \times x + 60(t - x) = 30 \times t \Rightarrow 20x + 60t - 60x = 30t$
$\Rightarrow 30t = 40x \Rightarrow x = \frac{30}{40}t \Rightarrow x = \frac{3t}{4}$
অর্থাৎ 20 কিলোমিটার / ঘণ্টা গতিতে যায় = $\frac{3t}{4}$ ঘন্টা।
∴ $\frac{\text{20 কিলোমিটার/ঘন্টা গতিতে সময়}}{\text{মোট সময়}} = \frac{\frac{3t}{4}}{t} = \frac{3t}{4}\times\frac{1}{t} = \frac{3}{4}$
উত্তর ঃ B

41. A car goes 15 km on a gallon of octane when it is driven at 50 km/hr. When the car is driven 60 km/hr, it only goes 80% as far. How many gallons of octane are needed to travel 200 km if half the distance is travelled at 50 km/hr and the rest at 60 km/hr?

A. 15 B. 16.67 C. 10.60 D. 14 E. 50

সমাধান: প্রতিক্ষেত্রে গতি 50 কি.মি./ঘণ্টা

দ্বিতীয় ক্ষেত্রে গতি 60 কি.মি./ঘণ্টা

প্রতি গ্যালনে যায় $= 15 \times \frac{80}{100} = 12$ কি.মি.

50 কি.মি./ঘণ্টায়,

5 কি.মি. যায় $= 1$ গ্যালন অকটেনে

$\frac{200}{2} = 100$ কি.মি. যায় $= \frac{100}{15}$ গ্যালন

আবার, 60 কি.মি./ঘণ্টায়

12 কি.মি. যায় = গ্যালন অকটেনে

100 কি.মি. যায় $= \frac{100}{12}$ গ্যালনে

মোট যায় $= \frac{100}{15} + \frac{100}{12} = \frac{400+500}{60} = \frac{900}{60} = 15$ গ্যালন (উত্তর)

42. The speed of three cars are in the ratio 2:3:4. The ratio of the time taken by these cars to travel the same distance is- [Uttara Bank (Asst. Officer) 2017]

A. 2:3:4 B. 4:3:2 C. 6:4:3 D. 4:3:6

সমাধান: Speed is always inversely proportional to time, $s \propto \frac{1}{t}$

Therefore, the ratio of time taken $= \frac{1}{2} : \frac{1}{3} : \frac{1}{4}$

Taking thde L.C.M of 2, 3 and 4 $= 2^2 \times 3 = 12$

$= \frac{1}{2} \times 12 : \frac{1}{3} \times 12 : \frac{1}{4} \times 12$

$= 6 : 4 : 3$

Therefore, the ratio between the times taken by these cars to travel the same distance is $6 : 4 : 3$ (Answer)

43. A jogger running at 9 kmph alongside a railway track is 240 meters ahead of the engine of 120 metres long train running at 45 kmph in the same direction in how much time will the train pass the jogger? [IBA MBA June'17]

A. 3.6 sec B. 18 sec C. 36 sec D. 72 sec E. None of these

সমাধান: যেহেতু লোকটি ও ট্রেনটি একদিকে যাচ্ছে তাই তাদের আপেক্ষিক গতি,

$v = (45 - 9) = 36$ কি.মি./ ঘণ্টা $= 10$ মিটার/ সেকেন্ড

লোকটিকে অতিক্রম করতে ট্রেনটিকে মোট দূরত্ব পার করতে হবে = ট্রেনটির দৈর্ঘ্য + ট্রেন ও লোকটির মধ্যবর্তী দূরত্ব,

$\Rightarrow s = 120 + 240 = 360$ মিটার

আমরা জানি, $s = vt$ ∴ সময়, $t = \frac{s}{v} = \frac{360}{10} = 36$ সেকেন্ড।

উত্তর ঃ C

44. On a track for remote controlled racing cars, racing car A complete the track in 55 seconds, while racing car B complete it in 35 seconds. If they both start at the same time, after how many seconds will they be side by side again? [IBA MBA Dec' 2015]

A. 275 B. 325 C. 385 D. 425 E. None of these

সমাধান: car A ট্র্যাক ঘুরে আসতে পারে 55 সেকেন্ডে এবং car B ট্র্যাক ঘুরে আসতে পারে 35 সেকেন্ডে। যদি তারা একই সাথে রেস শুরু করে তাহলে তাদের আবার মিলিত হওয়ার সময় বের করার সহজ উপায় হরো তাদের ট্র্যাক ঘুরে আসার সময়ের ল,সা,গু বের করা।

$$\begin{array}{r|l} 5 & 55, 35 \\ \hline & 11, 7 \end{array}$$

∴ ল. সা. গু $= 5 \times 11 \times 7 = 385$ সেকেন্ড।

উত্তর ঃ C

45. Two cars are travelling on a highway in the same direction. If car A travelling at a rate of 55 mph is 18 miles ahead of car B, which is travelling at 45 mph, how much time will it take for car A to double the distance between itself and car B?
A. 1 hr 48 mins B. 3 hrs C. 3 hrs and 36 mis D. 4 hrs and 18 min E. 4 hrs
সমাধান: Here relative speed = $55 - 45 = 10$ mph
current distance = 18
target distance = 36
required extra distance = 18
It means we have to calculate how much time it will take to cover 18 miles with relative speed of 10 mph
$\therefore$ time = $\frac{18}{10} = 1.8$ hours = 1 hour 48 minutes (Answer)

46. P starts jogging from point X to point Y. 30 minutes later his friend R who jogs 1 km/hr slower than twice P's rate starts from the same point and follow the same path, if R overtakes P in 2 hour, how many kilometers will R have covered?
A. 2.2 km B. 3.3 km C. 4 km D. 6 km E. 9 km
সমাধান: Let, P's rate (miles/hour) = x
R's rate (miles/hour) = $2x - 1$
Since both are walking in the same direction, relative speed = $2x - 1 - x = x - 1$
Relative distance between them = distance covered by P in the initial half hour = $\frac{x}{2}$
$\frac{x}{2} = (x - 1)2$
$\Rightarrow x = 4x - 4$
$\Rightarrow x = \frac{4}{3}$ miles/hour
Distance covered by R in 2 hours = $\left(2 \times \frac{4}{3} - 1\right) \times 2 = \frac{10}{3} = 3.3$ km (Answer)

47. A train when moves at an average speed of 75 km/hr, reaches its destination on time. When its average speed becomes 50 km/hr, it takes 1 more hour to reach its destination. Find the length of the journey in km. [IBA MBA December 2017]
A. 150 B. 180 C. 200 D. 240 E. None of these
সমাধান: $(t_1 - t_2)$ সময়ের পার্থক্য = 1 ঘণ্টা
$(t_1 - t_2) = 1$ [ধরি, দূরত্ব = D]
$\Rightarrow \frac{D}{50} - \frac{D}{75} = 1 \Rightarrow \frac{25D}{75 \times 50} = 1 \Rightarrow D = 150$

48. Train Green Arrow leaves station A for station B everyday at 7 pm. On a certain day, it was delayed by 2 hours. To cover up the time it increased its average speed by 20% but still arrived at station B 1 hour later than the scheduled time. What is the usual duration of the train's journey from station A to station B? [IBA MBA June 2018]
A. 6 hours B. 6.5 hours C. 8 hours D. 8.5 hours E. None of these
সমাধান: ধরি, স্বাভাবিক বেগ v এবং সময় t, 2 ঘণ্টা দেরী করে রওনা দিলেও 20% বেগ বৃদ্ধি পেয়ে 1.2v বেগে গন্তব্যে পৌছাতে 1 ঘণ্টা দেরী করে।
প্রথম ক্ষেত্রে, দূরত্ব = vt
দ্বিতীয় ক্ষেত্রে, দূরত্ব = $1.2v(t - 2 + 1)$ [নোটঃ 2 ঘণ্টা দেরীতে রওনা দেয়ায় সময় লাগে $(t - 2)$ সময়, আবার 1 ঘণ্টা দেরীতে পৌছায় $(t - 2 + 1)$]
শর্তমতে, $vt = 1.2v(t - 1)$
$\Rightarrow t = 1.2(t - 1) \Rightarrow t = 1.2t - 1.2 \Rightarrow 1.2 = 0.2t \Rightarrow t = 6$ hours
উত্তর ঃ A

49. How long does a train 110 meters long running at the speed of 72 km/hr take to cross a bridge 132 meters in length?
A. 9.8 sec B. 12.1 sec C. 12.42 sec D. 14.3 sec E. 11.3 sec
সমাধান: ট্রেনের দৈর্ঘ্য = 110 মিটার

ট্রেনের বেগ = 72 কি.মি./ঘণ্টা = $72 \times \frac{5}{18}$ মিটার/সেকেন্ড = 20 মিটার/সেকেন্ড

ব্রিজের দৈর্ঘ্য = 132 মিটার

ব্রিজটি অতিক্রম করতে ট্রেনের সময় লাগবে = $\frac{110+132}{20} = \frac{242}{20} = 12.1$ সেকেন্ড (উত্তর)

50. A 50 meter long train passes over a bridge at the speed of 30 km/hr. If it taken 36 seconds to cross the bridge. What is the length of the bridge?

A. 200 meters B. 250 meters C. 300 meters D. 350 meters E. 240 meters

সমাধান: Given, Speed = 30 km/hr = $30 \times \frac{5}{18}$ m/s = $\frac{25}{3}$ m/s

Length of train = 50 m

Let, the length of bridge be x m

Distance covered by train = $(50 + x)$ m

Time taken = 36 s

The length of the bridge-

$50 + x = \frac{25}{3} \times 36$

$\Rightarrow 50 + x = 300$

$\Rightarrow x = 300 - 50 = 250$ m (Answer)

51. A man standing on a railway bridge which is 180 m long. He finds that a train crossed the bridge in 20 seconds and crosses him in 8 sec. Find the length of the train and its speed.

A. 5 m/s, 30 m B. 10 m/s, 100 m C. 15 m/s, 120 m D. 20 m/s, 300 m E. 25 m/s, 150 m

সমাধান: ধরি, ট্রেনের দৈর্ঘ্য x মিটার

এখানে, লোকটিকে 8 সেকেন্ডে অতিক্রম করা মানে হলো ট্রেনটি নিজের দৈর্ঘ্য অতিক্রম করা এবং ব্রিজটিকে 20 সেকেন্ডে অতিক্রম করা মানে নিজের দৈর্ঘ্যের সাথে সাথে ব্রিজের দৈর্ঘ্য অর্থাৎ $(x + 180)$ মিটার অতিক্রম করা।

প্রশ্নমতে,

$\frac{x}{8} = \frac{x+180}{20}$

$\Rightarrow 20x = 8x + 1440$

$\Rightarrow 20x - 8x = 140$

$\Rightarrow 12x = 1440$

$\Rightarrow x = \frac{1440}{12}$

$\therefore x = 120$

$\therefore$ ট্রেনের দৈর্ঘ্য 120 মিটার এবং ট্রেনের বেগ = $\frac{120}{8} = 15$ মিটার/সেকেন্ড (উত্তর)

52. A train travels from city A to city B. The average speed of the train is 60 miles/hr and it travels the first quarter of the trip at a speed of 90 km/hr. What is the speed of the train in the remaining trip?

A. 30 B. 45 C. 54 D. 72 E. 90

সমাধান: Total time = Time required in first quarter + Time required in the remaining journey

$\frac{d}{60} = \frac{d}{4\times90} + \frac{3d}{4\times s}$

$\Rightarrow s = \frac{90\times3}{5} = 54$ (Answer)

53. An express train travelled at an average speed of 100 km/hr stopping for 3 minute after every 75 km. How long did it take to reach its destination 600 km from the starting point? [BISIC Chief Auditor-2021]

A. 21 min. B. 23 min. C. 20 min. D. 18 min.

সমাধান: Tim to reach the destination = $\frac{600}{100} = 6$ hr.

Number of stopping place= $\frac{600}{75} - 1 = 7$

Tim of stopping = $7 \times 3 = 21$ min. (Answer)

54. A train travels 10 miles at a speed of 50 miles per hour. How fast must the train travel on the return trip if the round-trip travel time is 20 minutes? [বাংলাদেশ সেতু কর্তৃপক্ষের (সহকারী পরিচালক) ২০২০]

A. 55 miles/hours B. 60 miles/hours C. 65 miles/hours D. 75 miles/hours

সমাধান: Since it takes $\frac{10}{50} = \frac{1}{5}$ hours = 12 minutes

Travel 10 miles at speed of 50 mph

The return trip must take $= (20 - 12) = 8$ minutes $= \frac{8}{60}$ hours $= \frac{2}{15}$ hours

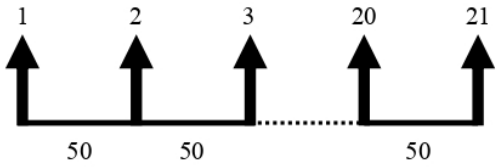
Therefore, the speed of the return trip must be $= \frac{10}{\frac{2}{15}} = 10 \times \frac{15}{2} = 75$ miles/hours (উত্তর: D)

55. একজন মানুষ লক্ষ্য করল সে ট্রেনে বসে 1 মিনিটে 21টি টেলিফোন পোস্ট গুণতে পারে। পোস্টগুলো একে অপর থেকে 50 মিটার দূরত্বে থাকলে ট্রেনটি কত বেগে যাচ্ছিল? [দি সিকিউরিটি প্রিন্টিং কর্পোরেশন (সহকারী ব্যবস্থাপক) 2021]

A man in a train notice that he can count 21 telephone post in one minute. If they are known to be 50 metres apart, then at what speed is train travelling?

A. 60 kmph B. 55 kmph C. 63 kmph D. 57 kmph

সমাধান:



অর্থাৎ 1 থেকে 21 পর্যন্ত পোস্টগুলোর মোট দূরত্ব $= 20 \times 50 = 1000$ মিটার $= 1$ কি.মি.

∴ ট্রেনটি 60 সেকেন্ডে যায় 1 কি.মি.

∴ 1 সেকেন্ডে যায় $\frac{1}{60}$ কি.মি.

∴ 3600 সেকেন্ডে যায় $\frac{3600}{60}$ কি.মি.

= 60 কি.মি./ঘণ্টা

[∵ 1 ঘন্টা = 3600 সেকেন্ড]

56. How long does a train 110 meters long running at the speed of 72 km/hr. take to cross a bridge 132 meters in length? [PKB Senior Officer 2014]

A. 9.8 sec B. 12.1 sec C. 12.42 sec D. 14.3 sec

সমাধান: ট্রেনের দৈর্ঘ্য = 110 m

ব্রিজের দৈর্ঘ্য = 132 m

ট্রেনের বেগ = 72 km/hr $= 72 \times \frac{5}{18}$ m/sec = 20 m/sec

আমরা জানি,

সময় $= \frac{\text{দূরত্ব}}{\text{বেগ}}$

$\Rightarrow$ সময় $= \frac{110+132}{20}$

$\Rightarrow$ সময় $= \frac{242}{20}$

∴ সময় = 12.1 sec. (উত্তর)

57. A train 800 meters long is running at a speed of 78 km/hr. If it crosses a tunnel in 1 minute, then the length of the tunnel (in meters) is- [Bangladesh Bank (Cash Officer) 2016]

A. 520 m B. 500 m C. 450 m D. 550 m

সমাধান: ধরি, টানেলের দৈর্ঘ্য x মিটার

এখানে টানেলটি অতিক্রম করতে হলে ট্রেনটিকে তার নিজের দৈর্ঘ্যও অতিক্রম করতে হবে

∴ সময় $= \frac{\text{ট্রেনের দৈর্ঘ্য+টানেলের দৈর্ঘ্য}}{\text{বেগ}}$

শর্তমতে,

$60 = \frac{(800+x)}{78 \times \frac{5}{18}}$

$\Rightarrow 60 = \frac{800+x}{\frac{65}{3}}$

$\Rightarrow 60 = \frac{(800+x)3}{65}$

$\Rightarrow 60 \times 65 = 2400 + 3x$
$\Rightarrow 3900 = 2400 + 3x$
$\Rightarrow x = \frac{3900+2400}{3}$
$\therefore x = 500$ মিটার (উত্তর)

58. A train takes 10 seconds to cross a pole and 20 seconds to cross a platform of length 200 m. What is the length of the train?
A. 400 m B. 600 m C. 200 m D. 800 m
সমাধান: ধরি, ট্রেনের দৈর্ঘ্য l এবং বেগ x
$\therefore$ প্রথম অবস্থায়, সময় $= \frac{\text{দূরত্ব}}{\text{বেগ}}$
$\Rightarrow 10 = \frac{l}{x} \ldots\ldots\ldots\ldots\ldots (i)$
দ্বিতীয় অবস্থায়,
$20 = \frac{l+200}{x} \ldots\ldots\ldots\ldots\ldots (ii)$
$(i) \div (ii)$ করে পাই,
$\frac{10}{20} = \frac{l}{x} \times \frac{x}{l+200}$
$\Rightarrow \frac{1}{2} = \frac{l}{l+200}$
$\Rightarrow l + 200 = 2l$
$\therefore l = 200$
$\therefore$ ট্রেনের দৈর্ঘ্য $l = 200$ (উত্তর)

59. A train 110 m long is running at 60 km/hr. In what time it will pass a man, running in the direction opposite to that of the train at 6 km/hr.? [Jamuna Bank Ltd (MTO) 2013]
A. 4 sec B. 10 sec C. 8 sec D. 6 sec
সমাধান: Speed of train relative to man = $(60 + 6)$ km/hr = 66 km/hr = $66 \times \frac{5}{18}$ m/sec = $\frac{55}{3}$ m/sec
$\therefore$ Train taken to pass the man = $110 \times \frac{3}{55}$ sec = 6 sec (Answer)

60. If a boat goes 7 km upstream in 42 minutes and the speed of the stream is 3kmph, then the speed of the baot in still water is- [Pallikarma Sohayak Foundation (AM) 2014]
A. 4.2 km/hr B. 9 km/hr C. 13 km/hr D. 21 km/hr
সমাধান: ধরি, speed of the boat in still water = B km/hr
তাহলে, upstream এর ক্ষেত্রে, $7 = (B - 3) \times \frac{42}{60}$ [42 min = $\frac{42}{60}$ hrs & $s = (u - v)t$ সূত্র হতে]
$\Rightarrow B - 3 = \frac{7\times60}{42} = 10$
$\therefore B = 13$ km/hr (উত্তর: C)

61. A man can row at the rate of 4 km/hr in still water. If the time taken to row a certain distance upstream is 3 times as much as to row the same distance downstream, find the speed of the current.
A. 1 B. 2 C. 3 D. 4
সমাধান: স্রোতের অনুকূলে, $s = (4 + x)t_1$ [x = স্রোতের বেগ]
এবং, স্রোতের প্রতিকূলে, $s = (4 - x)t_2$
এখন, $(4 + x)t_1 = (4 - x)t_2$
$\Rightarrow (4 + x)t_1 = (4 - x)3t_1$ [$\because$ upstream time, t_2 = 3 × downstream time = $3t_1$]
$\Rightarrow 4 + x = 12 - 3x$
$\Rightarrow 4x = 8$
$\therefore x = 2$
$\therefore$ Speed of the current = 2 km/hr (উত্তর: B)

62. Two trains running in opposite directions 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:
A. 2: 3 B. 1: 3 C. 3: 1 D. 3: 2 E. None of these

সমাধান: Let, the speeds of the two trains be x m/sec and y m.sec.
Then, length of the first train = 27x meters and second train = 17y meters.
$\therefore \frac{27x+17y}{x+y} = 23$
$\Rightarrow 27x + 17y = 23x + 23y$
$\Rightarrow 4x = 6y$
$\Rightarrow \frac{x}{y} = \frac{6}{4}$
$\therefore x: y = 3:2$ (Answer)

63. 180 meter and 120 meter mail train are running parallel in the opposite direction at the speed of 67 km/hr and 77 km/hr respectively. Find how long they take to cross each other?
A. $\frac{13}{2}$ seconds B. $\frac{15}{2}$ seconds C. $\frac{17}{3}$ seconds D. $\frac{19}{3}$ seconds E. None of these
সমাধান: Speed = Distance × Time
$\Rightarrow (67 + 77) \times \frac{5}{18} = \frac{180+120}{\text{Time}}$
$\Rightarrow$ Time = $\frac{15}{2}$ seconds (উত্তর: B)

64. Two strain are moving in opposite direction at 60 km/hr and 90 km/hr. Their lengths are 1.10 km and 0.9 km respectively. The time taken by the slower train to cross the faster train in seconds is-
A. 36 B. 45 C. 40 D. 48 E. 49
সমাধান: Relative speed = (60+90) km/hr = 150 km/hr = $150 \times \frac{5}{18}$ m/sec = $\frac{125}{3}$ m/sec
Distance covered by the slower train to cross the faster train = $(1.1 + 0.9)$ km = 2 km = 2000 m
The time taken by the slower train to cross the faster train in second = $\frac{distance}{speed} = \frac{2000}{\frac{125}{3}} = 16 \times 3 = 48$ seconds (Answer)

65. A train having a length of 270 metre is running at the speed of 120 kmph. If crosses another train running in opposite direction at the speed of 80 kmph in 9 seconds. What is the length of the other train?
A. 270 m B. 350 m C. 250 m D. 230 m E. 240 m
সমাধান: Relative speed = $(120 + 80)$ kmph = $\left(200 \times \frac{5}{18}\right)$ m/sec = $\frac{500}{9}$ m/sec
Let, the length of the other train be 'x' meter.
Then, $\frac{x+270}{9} = \frac{500}{9}$
$\Rightarrow x + 270 = 500$
$\therefore x = 230$ (Answer)

Written Math

1. Abul and Balam ran, at their respective constant rates, a race of 480 m. In the first heat, Abul gives Balam a head start of 48 m and beats him by $\frac{1}{10}^{\text{th}}$ of a minute. In the second heat, Abul gives Balam a head start of 144 m and is beaten by $\frac{1}{30}^{\text{th}}$ of a minute. What is Balam's speed in m/s? [Dutch Bangla Bank (PO)-2016]
Solution: In the first, Distance of Balam from Abul is 432 m
Now, if Abul takes 1 minute, then Balam takes $\left(t + \frac{1}{10}\right)$ minutes
In the second heat, Distance of Balam from Abul is 336 m
So, if Abul takes 1 minutes, then Balam takes = $\left(t - \frac{1}{30}\right)$ minutes
Therefore, to run $(432 - 336)$ = 96 m, Balam took time $\left(\frac{1}{30} + \frac{1}{10}\right)$ second
So, Speed of Balam = $\frac{96}{\frac{1}{30}+\frac{1}{10}}$ [$\because$ Velocity = $\frac{Distance}{Time}$]

$= \frac{96}{\frac{1+3}{30}}$

$= 96 \times \frac{30}{4}$

$= 720$ meter/minute

$= \frac{720}{60}$ meter/second

$= 12$ m/s

Answer: 12 m/s

2. Two trains running at the rate of 75 km and 60 km an hour respectively on parallel rails in opposite directions are observed to pass each other in 8 seconds and when they are running in the same direction at the same rates as before, a person sitting in the faster train observes that he passes the other in 33.5 seconds. Find the length of the trains?

সমাধান: Relative speed while running in opposite direction = (75+60) kmph = $\left(135 \times \frac{5}{18}\right)$ ms^{-1} = $\frac{75}{2}$ ms^{-1}

Again, relative speed while running in same direction = $(75 - 60)$ kmph = 15 kmph = $\left(15 \times \frac{5}{18}\right)$ ms^{-1}

= $\frac{25}{6}$ ms^{-1}

As we know, velocity = $\frac{distance}{time}$

distance = velocity × time

Lengths of the both trains = $\left(\frac{75}{2} \times 8\right) = 300$ meter

Now, as the faster train exceeds the slower train in the same direction in 33.5 seconds.

The length of the slower train = $\left(\frac{25}{6} \times 33.5\right) = 131.25$ meter

The length of the faster train = $300 - 131.25 = 168.75$ meter

∴ Faster train 168.75 meter and slower train 131.25 meter.

Answer: 168.75 m and 131.25 m

3. A train has a length of 150 metres. It is passing a man who is moving at 2 km/hr in the same direction of the train, in 3 seconds. Find out the speed of the train.

সমাধান: Given, Length of the train = 150 meters

Speed of the man = 2 km/hr

Time taken to cross the man = 3 seconds

Let, the speed of the train be v km/hr.

[When the train is crossing a stationary object, the distance covered is equal to the length of the train. When the train is crossing a moving object in the same direction, the relative speed between the train and the object is the difference in their speeds.]

So, the distance covered by the train in 3 seconds when crossing the man = $(150 + 2 \times 3)$ meters (as the man is also moving in the same direction)

Relative speed between the train and the man = $(v - 2)$ km/hr

We know that, Distance = Speed × Time

Therefore, $(150 + 2 \times 3) = (v - 2) \times \left(\frac{3}{3600}\right)$

Simplifying the above equation, we get:

$150.006 = (v - 2) \times \left(\frac{1}{1200}\right)$

$\Rightarrow 150.006 \times 1200 = v - 2$

$\Rightarrow v = 180.007$

Therefore, the speed of the train = 180.007 km/hr, which is approximately equal to 182 km/hr.

Answer: 182 km/hr

4. A train can travel 50% faster than a car. Both start from point A at the same time and reach point B, 75 km away from A at the same time. On the way however the train had lost about 12.5 minutes while stopping at the station. What is the speed of the car?

সমাধান: Speed of the train is 50% more than the speed of the car distance = 75 km

Time lost by the train = 12.5 min = $\frac{12.5}{60}$ hr

Let, the speed of the car be x kmph

Then, speed of the train = $\frac{150x}{100} = \frac{3x}{2}$ km/hr

According to the question,

$\frac{75}{2} - \frac{75}{\frac{3x}{2}} = \frac{125}{10\times60}$

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

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

$\Rightarrow \frac{25}{x} = \frac{5}{24}$

$\Rightarrow x = \frac{25\times24}{5}$

$\therefore x = 120$ km/hr

Answer: 120 km/hr

5. A train leaving Dhaka at 6 am reaches Mymensing at 10 am and another train leaving Mymensing at 7 am reaches Dhaka at 12 noon. At what time the two trains running in opposite direction should meet?

সমাধানঃ Let, after t hours of train A's start (6:00 am) they will meet, therefore train B will run for $(t-1)$ hour as it starts at 7:00 am.

Take distance = 100

So, first train's speed = $\frac{100}{4} = 25$ kmph

Second train's speed = $\frac{100}{5} = 20$ kmph

We can built the equation based on distance covered by both train.

$25 \times t + 20(t-1) = 100$

$\Rightarrow 45 \times t = 120$

$\Rightarrow t = \frac{120}{45}$

$\therefore t = \frac{8}{3}$

So, t hours = $\frac{8}{3}$ = 2 hrs 40 minutes

Therefore they will meet at (6 am + 2 hrs 40 min) = 8:40 am

Answer: 8:40 am

6. A train has a length of 150 meters. It is passing a man who is moving at 2 km/hour in the same direction of the train, in 3 seconds. Find out the speed of the train. [Bakhrabad Gas (AM) '21, Uttara Bank (PO) '21]

সমাধানঃ Let, the speed of the train be x km/hr

Given that, the speed of man 2 km/hr. Since, they are in same direction.

Relative speed = $(x-2)$ km/hr = $\frac{1000}{3600}(x-2)$ m/s = $\frac{5}{18}(x-2)$ m/s

According to the question, $3 \times \frac{5}{18}(x-2) = 150$ [$\because$ Distance = Speed × Time]

$\Rightarrow 5(x-2) = 150 \times 6$

$\Rightarrow 5x - 10 = 900$

$\Rightarrow 5x = 900 + 10$

$\Rightarrow 5x = 910$

$\Rightarrow x = \frac{910}{5}$

$\therefore x = 182$

$\therefore$ The speed of the train 182 km/hr

Answer: 182 km/hr.

7. A person running an 800 meter race averages 130 meters per minute for the first $\frac{3}{4}$ of the race. The average speed for the remainder of the race is 145 meters per minute. What is the person's average speed for the entire 800 meters rounded to the nearest whole number?

[Jibon Bima AM 20, Karnaphuli Gas Distribution Company Limited- AM (General) 2021]

সমাধান: $\frac{3}{4}^{\text{th}}$ of the race $= \frac{3}{4} \times 800 = 600$ meters

Time takes for 600 meters $= \frac{600}{130} = \frac{60}{13}$ minutes

Remaining distance $= (800 - 600)$ meters $= 200$ meters

Time taken for 200 meters $= \frac{200}{145}$ minutes

Average speed $= \frac{total\ distance}{total\ time}$

$$= \frac{800}{\frac{60}{13}+\frac{40}{29}}$$

$$= \frac{800}{\frac{1740+520}{377}}$$

$$= \frac{800}{\frac{2260}{377}}$$

$$= 800 \times \frac{377}{2260}$$

$= 133\frac{51}{113}$ meter/minutes or 133.33 meter/minutes

Answer: $\frac{133}{134}$ meter/minutes [প্রশ্নে whole number বা পূর্ণ সংখ্যায় বলা হয়েছে।]

8. Lisa gives her little brother Sam a 15 second (sec) head start in a 300 meter (m) race. During the race, Sam runs at an average speed of 5 m/sec and Lisa runs at an average speed of 8 m/sec, not including the head start. Since the time Lisa started running, what of the best approximates the number of seconds that had passed when Lisa caught up to Sam? [Uttara Bank (PO) 2021]

সমাধান: Let, they had passed when Lisa caught up to Sam after t sec.

Given that, Speed of Sam 5 m/sec

Speed of Lisa 8 m/sec

Sam stands 15 sec earlier

Therefore, Sam crosses $= 15 \times 5 = 75$m

According to the question,

$8t = 5t + 75$ [$\because$ Distance = Speed × Time]

$\Rightarrow 8t - 5t = 75$

$\Rightarrow 3t = 75$

$\Rightarrow t = \frac{75}{3}$

$\therefore t = 25$

So, they will meet after 25 sec.

Alternate approach: Let, Sam took x sec Lisa took $(x - 15)$ sec.

According to the question,

$8(x - 15) = 5x$

$\Rightarrow 8x - 120 = 5x$

$\Rightarrow 8x - 5x = 120$

$\Rightarrow 3x = 120$

$\Rightarrow x = \frac{120}{3}$

$\therefore x = 40$

Lisa caught up to Sam after $= (40 - 15) = 25$ sec.

Answer: 25 sec

9. Two rabbits starts running towards each other, one from A to B and another from B to A. They cross each other after one hour and the first rabbit reaches B, $\frac{5}{6}$ hour before the second rabbit reaches A. If the distance between A and B is 50 km. What is the speed of the slower rabbit? [BSC Combined SO (8 Banks FIs) 2018 (written)]

সমাধান: Let, the speed of slower rabbit and faster rabbit be x km/hr and y km/hr respectively.

ATQ, $x + y = \frac{50}{1}$

$\Rightarrow x + y = 50 \dots\dots\dots\dots\dots (i)$

Again, $\frac{50}{x} - \frac{5}{y} = \frac{5}{6} \ldots\ldots\ldots\ldots\ldots (ii)$
From (i) and (ii), we get,
$\frac{50}{x} - \frac{50}{50-x} = \frac{5}{6}$
$\Rightarrow 60(50 - x - x) = x(50 - x)$
$\Rightarrow 3000 - 120x = 50x - x^2$
$\Rightarrow x^2 - 170x + 3000 = 0$
$\Rightarrow (x - 150)(x - 20) = 0$
$\Rightarrow x = 20$ [$\because x = 150$ not possible]
$\therefore$ Speed of slower rabbit = 20 km/hr
Answer: 20 km/hr

10. Two train start from same point simultaneously and in the same direction. The first train travels at 40 km/hr and the speed of second train is 25% more than the speed of first train. 30 minutes later, a third train start from same point and in the same direction. It over takes the second train 90 minutes later than it ovartake the first train. What is the speed of the third train?

Solution: Here, Speed of second train = $40 \times \frac{5}{4} = 50$ km/hr
In 30 min, Covered by first train = $40 \times \frac{1}{2} = 20$ km
in 30 min, Covered by first second train = $50 \times \frac{1}{2} = 25$ km
Let, the speed of third train be 'x' km/hr
Relative speed with first train = $(x - 40)$ km/hr
Relative speed with seconds train = $(x - 50)$ km/hr
ATQ, $\frac{25}{x-40} - \frac{20}{x-50} = \frac{90}{60}$
$\Rightarrow 2 \times [25(x - 40) - 20(x - 50)] = 3 \times [(x - 50)(x - 40)]$
$\Rightarrow 2(25x - 1000 - 20x + 1000) = 3(x^2 - 90x + 2000)$
$\Rightarrow 10x = 3x^2 - 270x + 6000$
$\Rightarrow 3x^2 - 280x + 6000 = 0$
$\Rightarrow 3x^2 - 180x - 100x + 6000 = 0$
$\Rightarrow 3x(x - 60) - 100(x - 60) = 0$
$\Rightarrow (x - 60)(3x - 100) = 0$
Here, $x = 60$ and $x = 20$
But, $x \neq 20$, it is not speed of third train because the speed of third train is greater than other.
Therefore, the speed of third train 60 km/hr.
Answer: 60 km/hr