CAPSTONE

Math Lecture#07

পেট্রোবাংলা স্পেশাল কোর্স

Topic: Arithmetic

- ☑ Time, Distance & Speed
- ☑ Train & Boat

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Class Test on Lecture Sheet 6

Time: 10 minutes **Obtained Mark:** **Total Marks: 10**

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

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

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

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

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

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

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

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

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

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

সময়, দূরত্ব ও গতিবেগ (Time, Distance & Speed)

- অতিক্রান্ত দূরত্ব = সময়×বেগ $(s = vt)$
- বেগ = $\frac{\text{অতিক্রান্ত দূরত্ব}}{\text{সময়}}$ $\left(v = \frac{s}{t}\right)$
- সময় = $\frac{\text{অতিক্রান্ত দূরত্ব}}{\text{বেগ}}$ $\left(t = \frac{s}{v}\right)$
- 1 km/hr = $\frac{5}{18}$ m/s
- 1 m/s = $\frac{18}{5}$ km/hr

- একই দূরত্ব অতিক্রম করতে কোনো নির্দিষ্ট বেগে যে সময় লাগে, পরবর্তীতে কোনো বেগে তার থেকে কম বা বেশি সময় লাগলে- স্থানের দূরত্ব = উভয় গতিবেগের লসাগু × সময়ের পার্থক্য।

1. সাদিব ঘণ্টায় 5 কিলোমিটার বেগে হেঁটে A স্থান থেকে B গেল। তাজুল ঘণ্টায় 6 কিলোমিটার বেগে হেঁটে B হতে A বিন্দুতে তাজুলের অপেক্ষা $\frac{1}{2}$ ঘণ্টা কম সময়ে পৌছাল। A ও B স্থানের দূরত্ব কত?

   সমাধান: A হতে B এর দূরত্ব x হলে, ঘণ্টায় 5 কিলোমিটার বেগে A হতে B এ পৌছাতে সময় লাগবে $\frac{x}{5}$ ঘন্টা।

   ঘন্টায় 6 কিলোমিটার বেগে B হতে A-তে পৌঁছাতে সময় লাগবে= $\frac{x}{6}$ ঘণ্টা।

   শর্তমতে, $\frac{x}{5} - \frac{x}{6} = \frac{1}{2}$ বা, $\frac{6x-5x}{30} = \frac{1}{2}$ বা, $\frac{x}{30} = \frac{1}{2}$ বা, $x = \frac{30}{2} = 15$ কিলোমিটার

   শর্টকার্ট: নির্ণেয় দূরত্ব = 5 ও 6 এর লসাগু $\times \frac{1}{2} = 30 \times \frac{1}{2} = 15$ কিলোমিটার। (উত্তর)

- A বিন্দু হতে B বিন্দুতে x বেগে গিয়ে পুনরায় B হতে A বিন্দুতে y বেগে ফিরে আসলে গড় গতিবেগ = $\frac{2xy}{x+y}$
- n দূরত্ব x বেগে এবং পরবর্তী l দূরত্ব y বেগে অতিক্রম করলে গড় গতিবেগ = $\frac{xy(n+l)}{lx+ny}$

2. কিশোর স্রোতের অনুকূলে নৌকা বেঁয়ে ঘণ্টায় ৮ কিলোমিটার চলে কোনো স্থানে গেল এবং ঘণ্টায় ৬ কিলোমিটার বেগে স্রোতের প্রতিকূলে চলে যাত্রারম্ভের স্থানে ফিরে এল। যাত্রাপথে কিশোরের গড় গতিবেগ কত?

   সমাধান: স্রোতের অনুকূলে 1 কিলোমিটার যায় $\frac{1}{8}$ ঘন্টায় এবং স্রোতের প্রতিকূলে 1 কিলোমিটার যায় $\frac{1}{6}$ ঘণ্টায়।

   ∴ মোট অতিক্রান্ত দূরত্ব = $(1 + 1) = 2$ কিলোমিটার এবং মোট সময় = $\left(\frac{1}{8} + \frac{1}{6}\right) = \frac{3+4}{24} = \frac{7}{24}$ ঘণ্টা।

   $\frac{7}{24}$ ঘণ্টায় যায় 2 কিলোমিটার।

   1 " " $\frac{2}{\frac{7}{24}} = \frac{2\times24}{7} = \frac{48}{7}$ কিলোমিটার

   শর্টকার্ট: গড় গতিবেগ = $\frac{2\times8\times6}{8+6} = \frac{96}{14} = \frac{48}{7}$ কিলোমিটার/ঘণ্টা। (উত্তর)

3. 1টি গাড়ি ঘণ্টায় 30 কি.মি. বেগে 2 ঘণ্টা চলার পর পরবর্তী 6 ঘণ্টায় 54 কি.মি. অতিক্রম করে। সম্পূর্ণ পথে গাড়ির গড় গতিবেগ কত?

   সমাধান: গাড়িটি কর্তৃক প্রথম 2 ঘণ্টায় অতিক্রান্ত দূরত্ব = $(2 \times 30) = 60$ কিলোমিটার।

   ∴ মোট অতিক্রান্ত দূরত্ব = $(60 + 54) = 114$ কিলোমিটার এবং মোট সময় = $(2 + 6) = 8$ ঘণ্টা।

   ∴ গড় গতিবেগ = $\frac{144}{8} = 14\frac{1}{4}$ ঘণ্টা। (উত্তর)

4. তিনটি গাড়ির গতিবেগের অনুপাত 4: 5: 6 হলে একটি নির্দিষ্ট দূরত্ব অতিক্রম করার জন্য তাদের সময়ের অনুপাত কত হবে?

   (ক) 4: 5: 6 (খ) 6: 5: 4 (গ) 15: 12: 10 (ঘ) 12: 15: 10

   সমাধান: ধরি, অতিক্রান্ত দূরত্ব x মিটার।

   ∴ ১ম গাড়ির প্রয়োজনীয় সময় = $\frac{x}{4}$; ২য় গাড়ির প্রয়োজনীয় সময় = $\frac{x}{5}$; ৩য় গাড়ির প্রয়োজনীয় সময় = $\frac{x}{6}$

   ∴ সময়ের অনুপাত = $\frac{x}{4} : \frac{x}{5} : \frac{x}{6} = \frac{x}{4} \times 60 : \frac{x}{5} \times 60 : \frac{x}{6} \times 60 = 15x : 12x : 10x = 15 : 12 : 10$

   [ভগ্নাংশের অনুপাত থাকলে হরগুলোর লসাগু দ্বারা গুণ করলে পূর্ণসংখ্যা হবে।]

5. Tanvir runs a 30-mile course at a constant rate of 4 miles per hour. If Hamid runs the same track at a constant rate and completes the course in 90 fewer minutes, how fast did Hamid run?

   A. 4.5 miles per hour B. 5 miles per hour C. 5.5 miles per hour D. 6 miles per hour

   Solution: Time taken by Tanvir = $\frac{30}{4}$ = 7.5 hours

   If Hamid runs the same track at a constant, rate and completes the course in 90 fewer minutes

   ⇒ 1.5 hours less = 7.5 − 1.5 = 6 hours

   ∴ Speed of Hamid = $\frac{Distance}{time} = \frac{30}{6}$ = 5 mph (Ans: B)

ট্রেন (Train)

- একটি ট্রেন কোন খুঁটি, পিলার বা মানুষকে অতিক্রম করতে ট্রেনকে তার নিজের দৈর্ঘ্য অতিক্রম করতে হবে।
- নির্দিষ্ট দৈর্ঘ্যের রাস্তা বা সেতু বা প্ল্যাটফর্ম অতিক্রম করতে হলে ট্রেনের মোট অতিক্রান্ত দূরত্ব হবে ট্রেনের দৈর্ঘ্য ও সেতু/রাস্তা বা প্ল্যাটফর্মের দৈর্ঘ্যের যোগফলের সমান।
- দুটি ট্রেন পরস্পর বিপরীত দিকে চললে তাদের আপেক্ষিক বেগ হবে তাদের গতিবেগের সমষ্টির সমান।
- দুটি ট্রেনই একই দিকে চললে তাদের আপেক্ষিক বেগ হবে তাদের গতিবেগের বিয়োগফলের সমান।

6. একটি প্ল্যাটফর্মের দৈর্ঘ্য ২০০ মিটার। ২৫০ মিটার লম্বা একটি প্ল্যাটফর্মকে ৯ সেকেন্ডে অতিক্রম করলে ট্রেনের গতিবেগ কত?
   সমাধান: ট্রেনের অতিক্রান্ত দূরত্ব = প্ল্যাটফর্মের দৈর্ঘ্য + ট্রেনের দৈর্ঘ্য = $(200 + 250) = 450$ মিটার এবং সময় = 9 সেকেন্ডে।
   $\therefore$ ট্রেনের গতিবেগ = $\frac{450}{9} = 50$ মি/সে. (উত্তর)

7. ঘণ্টায় ৪৮ কিলোমিটার বেগে চলমান একটি ট্রেন ২২০ মিটার দৈর্ঘ্যের প্ল্যাটফর্মকে ৩০ সেকেন্ডে অতিক্রম করলে ট্রেনের দৈর্ঘ্য কত?
   সমাধান: ট্রেনের বেগ = 48 কিলোমিটার/ঘণ্টা = $48 \times \frac{5}{18} = \frac{120}{9}$ মিটার/সেকেন্ড এবং সময় = 30 সেকেন্ড।
   $\therefore$ ট্রেনের অতিক্রান্ত দূরত্ব = বেগ $\times$ সময় = $\frac{120}{9} \times 30 = 400$ মিটার।
   $\therefore$ ট্রেনের দৈর্ঘ্য + প্ল্যাটফর্মের দৈর্ঘ্য = ট্রেনের অতিক্রান্ত দূরত্ব
   ট্রেনের দৈর্ঘ্য $+ 220 = 400$
   ট্রেনের দৈর্ঘ্য = 180 মিটার। (উত্তর: 180 মিটার)

8. ১২০ মিটার ও ৮০ মিটার দীর্ঘ দুটি ট্রেন প্রতি ঘণ্টায় যথাক্রমে ১৮ কিলোমিটার ও ১২ কিলোমিটার বেগে চলছে। ট্রেন দুটি একই দিকে অগ্রসর হলে পরস্পরকে অতিক্রম করতে কত সময় লাগবে?
   সমাধান: ট্রেন দুটি মোট দৈর্ঘ্য = $(120 + 80) = 200$ মিটার।
   $\because$ ট্রেনদ্বয় পরস্পর একই দিকে চলে, তাদের আপেক্ষিক বেগ = $(18 - 12)$ = ৬ কি.মি./ঘণ্টা = $6 \times \frac{5}{18}$ মি./সে. = $\frac{5}{3}$ মি./সে.
   $\therefore$ সময় = $\frac{\text{দূরত্ব}}{\text{বেগ}} = \frac{200}{\frac{5}{3}} = \frac{200 \times 3}{5} = 120$ সেকেন্ড = ২ মিনিট। (উত্তর)

9. Train X is travelling at a constant speed of 30 miles per hour and Train Y is travelling at a constant speed of 40 miles per hour. If the two trains are travelling in the same direction along the same route but Train X is 25 miles ahead of Train Y, how many hours will it be until Train Y is 10 miles ahead of Train X?
   A. 1.5 B. 2.0 C. 2.5 D. 3.0 E. 3.5
   সমাধান: Train x is 25 miles ahead & we want to calculate the time by which Train y will be 10 miles ahead.
   So total distance to be covered by Y is = 25 + 10 = 35 miles
   Relative speed of Train y = $40 - 30$ = 10 miles per hour (Relative speed concept)
   Total time taken = Total distance $\div$ Speed = $\frac{35}{10}$ = 3.5 hrs. (উত্তর: E. 3.5 hrs.)

10. If two trains are 120 miles apart and are traveling toward each other at constant rate of 30 miles per hour and 40 miles per hour, respectively, how far apart will they be 1 hour before they meet?
    A. 10 B. 30 C. 40 D. 50 E. 70
    Solution: The combined rate of the two trains is 30+40 = 70 miles per hour. Therefore 1 hour before they meet the must be 70 miles apart (in the final 1 hour they will cover 70 miles to meet).
    Answer: E. 70

নৌকা ও স্রোত (Boat & Stream)

- স্থির পানিতে নৌকার গতিবেগ হলো প্রকৃত গতিবেগ। স্রোতের অনুকূলে বা প্রতিকূলে নৌকা যে গতিবেগে চলে, তাকে নৌকার কার্যকরী গতিবেগ বলা হয়।
- নৌকার প্রকৃত গতিবেগ v এবং স্রোতের বেগ u হলে, স্রোতের অনুকূলে নৌকার গতিবেগ = $v + u$ এবং
  স্রোতের প্রতিকূলে নৌকার গতিবেগ = $v - u$

স্রোতের অনুকূলে নৌকার বেগ a এবং স্রোতের প্রতিকূলে নৌকার বেগ b হলে, স্থির পানিতে নৌকার বেগ = $\frac{a+b}{2}$ এবং স্রোতের বেগ = $\frac{a-b}{2}$

11. একটি নৌকা স্রোতের অনুকূলে ঘণ্টায় যায় ১৫ কিলোমটির এবং স্রোতের প্রতিকূলে ঘণ্টায় যায় ৫ কিলোমিটার। স্রোতের বেগ কত?

সমাধান: শর্তমতে, নৌকার গতিবেগ + স্রোতের গতিবেগ = ১৫ কিলোমিটার/ ঘন্টা।

নৌকার গতিবেগ − স্রোতের গতিবেগ = ৫ কিলোমিটার/ঘণ্টা।

[বিয়োগ করে] ২ স্রোতের গতিবেগ = ১০ কিলোমিটার/ ঘণ্টা

∴ স্রোতের গতিবেগ = ৫ কিলোমিটার/ঘণ্টা (উত্তর: ৫ কি.মি./ঘণ্টা)

12. নৌকা ও স্রোতের বেগ যথাক্রমে ১ ঘণ্টায় ১২ কিলোমিটার ও ১৮ কিলোমিটার নদীপথে ২০ কিলোমিটার পথ একবার অতিক্রম করে ফিরে আসতে কত ঘণ্টা সময় লাগবে?

(ক) ৩ (খ) ৪ (গ) ৫ (ঘ) ৬

সমাধান: স্রোতের অনুকূলে নৌকার বেগ = $(12 + 8) = 20$ কি.মি./ঘণ্টা

২০ কিলোমিটার যেতে সময় লাগবে = $\frac{২০}{২০} = ১$ ঘণ্টা।

স্রোতের প্রতিকূলে নৌকার বেগ = $(১২ - ৮) = ৪$ কি.মি./ঘণ্টা

২০ কিলোমিটার ফিরে আসতে সময় লাগবে = $\frac{২০}{৪} = ৫$ ঘন্টা।

∴ মোট সময় = $(1 + 5) = 6$ ঘণ্টা (উত্তর: ঘ. ৬)

13. একটি নৌকার স্রোতের অনুকূলে 18 কিলোমিটার যেতে 4 ঘণ্টা সময় লাগে এবং স্রোতের প্রতিকূলে একই দূরত্ব অতিক্রম করতে 12 ঘণ্টা সময় লাগে। নৌকার প্রকৃত গতিবেগ ঘণ্টায় কত কিলোমিটার?

সমাধান: স্রোতের অনুকূলে বেগ $a = \frac{18}{4} = 4.5$ কিলোমিটার/ঘণ্টা

স্রোতের প্রতিকূলে বেগ, $b = \frac{18}{12} = \frac{3}{2} = 1.5$ কিলোমিটার/ঘণ্টা

∴ নৌকার প্রকৃত বেগ = $\frac{a+b}{2} = \frac{4.5+1.5}{2} = \frac{6}{2} = 3$ কিলোমিটার/ঘণ্টা (উত্তর: 3 কিলোমিটার/ঘণ্টা)

14. A speedboat, whose speed is 15 km/hr in still water goes 30 km downstream and comes back in a total of 4 hours 30 minutes. What is the speed of the stream in km/hr?

A. 2.5 km/hr B. 3.5 km/hr C. 4 km/hr D. 5 km/hr

Solution: Let, the speed of the stream be x km/hr.

Downstream Speed = $15 + x$

Upstream Speed = $15 - x$

So, $\frac{30}{15+x} + \frac{30}{15-x} = 4\frac{1}{2}$ [4 hours 30 minutes]

$\Rightarrow \frac{900}{225-x^2} = \frac{9}{2}$

$\Rightarrow 9x^2 = 225$

$\Rightarrow x^2 = 25$

$\therefore x = 5$ (Answer: D. 5 km/hr)

15. A man can row 50 km upstream and 72 km downstream in 9 hours. He can also row 70 km upstream and 90 km downstream in 12 hours. Find the rate of current.

A. 3 kmph B. 8 kmph C. 4 kmph D. None of these

Solution: Let x and y be the upstream and downstream speed respectively.

Hence, $\frac{50}{x} + \frac{72}{y} = 9$ and $\frac{70}{x} + \frac{90}{y} = 1$

Solving for x and y we get x = 10 km/hr and y = 18 km/hr

∴ Rate of current = $\frac{y-x}{2} = \frac{18-10}{2} = 4$ kmph. (Answer: C. 4 kmph)

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? [42nd BCS]
   A. 4 km/hr B. 5 km/hr C. 6 km/hr D. 7.5 km/hr

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

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

4. A man travelled a distance of 61 km in 9 hrs. 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? [Titas Gas Field (Asst. Manager)-21]
   A. 10 B. 12 C. 14 D. 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

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

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-22]
   A. 6 B. 8 C. 4 D. 10 E. None of these

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

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

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

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

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?
[Uttara Bank (PO)-2021, Petrobangla (AD)-20]
A. $\frac{1}{3}$ B. $\frac{3}{4}$ C. $\frac{1}{2}$ D. $\frac{2}{3}$

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

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

15. 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? [Bakhrabad Gas (AM)-21]
A. 17: 13 B. 7: 3 C. 1: 3 D. 2: 3

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

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

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

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

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

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

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

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

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

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.

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

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.

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

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

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

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

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

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

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

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 (সহঃ পরিঃ)-২০]

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

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

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

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

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

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

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

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

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

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

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

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 Dec-17]
A. 150 B. 180 C. 200 D. 240 E. None of these

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 18]
A. 6 hours B. 6.5 hours C. 8 hours D. 8.5 hours E. None of these

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

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

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

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

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.

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? [Bangladesh Bridge Authority (AD)-2020]
A. 55 miles/hours B. 60 miles/hours C. 65 miles/hours D. 75 miles/hours

55. 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? [The Security Printing Cor. (AM)-2021]
A. 60 kmph B. 55 kmph C. 63 kmph D. 57 kmph

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

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

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

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

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

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

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

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

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

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

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 $\frac{1}{10}^{th}$ of a minute. In the second heat, Abul gives Balam a head start of 144 m and is beaten by $\frac{1}{30}^{th}$ of a minute. What is Balam's speed in m/s?

   [Dutch Bangla Bank (PO)-2016]

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?

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.

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?

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?

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]

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]

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]

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)]

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?