Bank Job Lecture Sheet

Lecture 8

Lecture Contents

☑ **Speed-Distance**

Speed-Distance

(i) Normal Speed

Basic Discussion on Normal Speed

Speed (বেগ): একক সময়ে নির্দিষ্ট দিকে অতিক্রান্ত দূরত্বকে বেগ বলে। তাহলে দূরত্বকে সময় দিয়ে ভাগ করলে বেগ পাওয়া যায়।

অর্থাৎ Speed $= \frac{\text{Distance}}{\text{Time}}$, Or, Time $= \frac{\text{Distance}}{\text{Speed}}$, Or, Distance = Speed × Time.

Distance এর একক m, km, mile

Time এর একক sec, hr.

তাহলে Speed এর একক $\frac{m}{s}$, $\frac{km}{hr}$, $\frac{mile}{hr}$

লক্ষ্য করি, বড় এর সাথে বড় একক যাবে। যেমন: $\frac{km}{hr}$ বা $\frac{mile}{hr}$ ।

আবার ছোট এর সাথে ছোট একক যাবে। যেমন: $\frac{m}{s}$ ।

কখনও $\frac{km}{s}$ বা, $\frac{m}{min}$, $\frac{mile}{s}$ হবে না।

Lecture 8

Speed এর একক Conversion:

$\frac{km}{hr}$ থেকে $\frac{m}{s}$ করতে $\frac{5}{18}$ দিয়ে গুণ করবো।

E.g. $\rightarrow$ 36 km/hr = $36 \times \frac{5}{18}$ m/s = 10 m/s.

$\frac{m}{s}$ থেকে $\frac{km}{hr}$ করতে $\frac{18}{5}$ দিয়ে গুণ করবো।

Eg$\rightarrow$ 10 m/s = $10 \times \frac{18}{5}$ km/hr = 36 km/hr.

Teacher's Discussion

1. During a journey Mr. Kalam drove 'x' hours at a constant rate of 'y' miles per hour. How many miles did he go during the final 15 minutes of his drive? [UCB, MTO- 2021]

(A) $15y$ (B) $\frac{xy}{4}$ (C) $4xy$ (D) $\frac{y}{4}$ **Ans:** D

2. Mr James started his journey from Dhaka towards Chittagong. He drove for 'K' hours at a constant rate of 'D' miles per hour. How many miles did he go during the final 20 minutes of his drive? [Islami Bank, PO- 2017]

(A) 20D (B) $\left(\frac{D}{3}\right)$ (C) $\frac{3K}{D}$ (D) $\left(\frac{K}{3}\right)$ **Ans:** B

3. How many miles can a motorist travel from 9 : 55 am to 10 : 15 am at a speed of 40 miles per hour? [Combined 8 Banks Officer- 2022]

A. 13.33 B. 15 C. 20 D. 40 **Ans:** A

4. A car covers a distance of 200km in 2 hours 40 minutes where as a Jeep covers the same distance in 2 hours. What is the ratio of the speed? [IFIC Bank TSO- 2019**]**

A. 3 : 4 B. 4 : 3 C. 4 : 5 D. 5 : 4 **Ans:** A

5. Sujan traveled 114 miles in 2 hours. If she keeps going at the same rate, how long will it take her to go the remaining 285 miles of her trip? [Global Islami Bank, PO- 2022]

A. 5 hours B. 3 hours C. 7 hours D. 4 hours **Ans:** A

6. Which of the following trains is the fastest? [Combined 9 Banks Senior Officer- 2021]

(A) 25 m/sec (B) 1500 m/min (C) 90 km/hr (D) All three are equal **Ans:** A

7. A biker rode 45 miles in 180 minutes. What was his speed (mph) during this ride?

(A) 17 mph (B) 15 mph (C) 12 mph (D) 9 mph **Ans:** B

8. How many miles can a motor cyclist travel from 8:25am. to 9:55am. At a velocity of 80 miles per hour?

(A) 130 miles (B) 150 miles (C) 180 miles (D) 120 miles **Ans:** D

(ii) Average Speed

Basic Discussion on Average Speed:

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

E.g. → একজন ব্যক্তি শহর A থেকে x km/hr বেগে শহর B তে পৌঁছাল। আবার শহর B থেকে ঐ ব্যক্তিটি y km/hr বেগে শহর A-তে পৌঁছাল। তাহলে ব্যক্তিটির গড় বেগ কত?

Solution:

ধরি, A থেকে B শহরের দূরত্ব = D km

$$\text{A থেকে B শহরে যেতে সময়} = \frac{\text{দূরত্ব}}{\text{বেগ}} = \frac{D}{x}\ \text{hr}$$

$$\text{B থেকে A শহরে যেতে সময়} = \frac{\text{দূরত্ব}}{\text{বেগ}} = \frac{D}{y}\ \text{hr}$$

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}} = \frac{D+D}{\frac{D}{x}+\frac{D}{y}} = \frac{2D}{\frac{Dy+Dx}{xy}} = \frac{2Dxy}{D(x+y)} = \frac{2xy}{x+y}$$ **(Ans.)**

লক্ষ্যণীয়, Average Speed-এ যদি কখনও Same Distance, যাওয়ার বেগ এবং আসার বেগ দেওয়া থাকে, তাহলে এই Math কে Round Trip -এর Math বলব।

For Round Trip, Average Speed $= \frac{2xy}{x+y}$; Where, x = যাওয়ার বেগ, y = আসার বেগ।

Teacher's Discussion

1. A man travels from A to B at 20 km/hr. He makes the return journey at 30 km/hr. What was his avg speed?

(A) 20 (B) 22 (C) 23 (D) 24 **Ans:** D

2. A man travels for 2 hours at 30 miles an hour and he cover 60 miles in the next 3 hours. What is the average speed per hour for the entire trip? [Combined 8 Banks Officer- 2022]

A. 18 B. 24 C. 36 D. 45 **Ans:** B

3. A train travelled on an average speed of 45km per hour from Dhaka to Chittagong and returned to Dhaka from Chittagong on an average speed of 36km per hour. What was the average speed of the train over the whole journey? [Sadharon Bima Corporation Junior Officer- 2019]

A. 38km. 500m. B. 41km. 500m. C. 36km. 500m. D. 40km **Ans:** D

4. A car travels 330 miles in 6 hours. While the return trip takes 5 hours. What is the average speed in mile per hour for the entire trip? [IFIC Bank TSO- 2019**]**

A. 50 B. 55 C. 60 D. 65 **Ans:** C

5. Piash travels to Mogbazar from Uttara by car at a speed of 40 km per hour and returns to Uttara at a speed of 30 km per hour by an auto rickshaw. What is her average speed in the entire journey in km/hour?

(A) 35 (B) 34.3 (C) 37.5 (D) 35.3 **Ans:** B

6. A motorist travels to a place 150 km away at an average speed of 50 km and returns at 30 km per hour. His average speed for the whole journey in km per hour is:
(A) 35 (B) 37.5 (C) 40 (D) 48 **Ans:** B

7. A car travels 180 km from A to B at 60 kmh^{-1} & returned along the same route at 90 kmh^{-1}. Average speed of the round trip is:
(A) 72 (B) 36 (C) 180 (D) 30 **Ans:** A

8. A person travels from P to Q at a speed of 40 kmph and returns by increasing his speed by 50%. What is the average speed for both the trips?
(A) 36 kmph (B) 45 kmph (C) 48 kmph (D) 50 kmph **Ans:** C

(iii) Train

Basic Discussion on Train:

ট্রেনের গতিবেগ নিয়ে ব্যাংকসহ যেকোনো Competitive Exam-এ বিভিন্ন পর্যায়ে যে প্রশ্ন আসে তা মূলত চারটি বিষয়ে জানতে চাওয়া হয়। সেগুলো হলো–

1. Speed of a train (ট্রেনের বেগ)
2. Required time (নির্দিষ্ট দূরত্ব অতিক্রম করতে প্রয়োজনীয় সময়)
3. Length of a train (ট্রেনের দৈর্ঘ্য)
4. Relative Speed (আপেক্ষিক দূরত্ব)

Calculation of the speed of a train (ট্রেনের গতিবেগ নির্ণয়):

ট্রেনের গতিবেগ নির্ণয়ের জন্য মূলত দুইটি ধারা দেওয়া থাকে। প্রথম ক্ষেত্রে বলা থাকে সিগন্যাল পোস্ট/খুঁটি/স্থির ব্যক্তি/বিন্দুকে অতিক্রম করতে একটি সময় লাগে তাহলে তার গতিবেগ কত? দ্বিতীয় ক্ষেত্রে, একটি ট্রেনের কোন নির্দিষ্ট বস্তু যেমন- সেতু/সুড়ঙ্গ/ প্লাটফর্ম/অন্য দাঁড়ানো ট্রেনকে অতিক্রম করতে প্রয়োজনীয় সময় দেওয়া থাকে এবং তার গতিবেগ জানতে চাওয়া হয়।

প্রথম ক্ষেত্রে,

মনে রাখতে হবে, একটি সিগন্যাল পোস্ট/খুঁটি/স্থির ব্যক্তি/বিন্দুকে অতিক্রম করতে একটি ট্রেনকে শুধু তার দৈর্ঘ্যের সমান দূরত্ব অতিক্রম করতে হয়। যদি L একক দৈর্ঘ্য বিশিষ্ট একটি ট্রেনের একটি সিগন্যাল পোস্ট/খুঁটি/স্থির ব্যক্তি/বিন্দুকে অতিক্রম করতে T সেকেন্ড সময় লাগে তাহলে–

ট্রেনটি T সময়ে অতিক্রম করে L একক দূরত্ব

অতএব, প্রথম ক্ষেত্রে speed (গতিবেগ) = $\frac{L}{T}$ Or, sp = $\frac{L}{T}$

দ্বিতীয় ক্ষেত্রে,

মনে রাখতে হবে, একটি সেতু/সুড়ঙ্গ/প্লাটফর্ম/অন্য দাঁড়ানো ট্রেনকে অতিক্রম করতে একটি ট্রেনকে তার দৈর্ঘ্য এবং ঐ বস্তুটির দৈর্ঘ্যের সমষ্টির সমান দূরত্ব অতিক্রম করতে হয়। যদি L একক দৈর্ঘ্য বিশিষ্ট একটি ট্রেনের D একক দৈর্ঘ্য বিশিষ্ট একটি সেতু/সুড়ঙ্গ/ প্লাটফর্ম/ অন্য দাঁড়ানো ট্রেনকে অতিক্রম করতে T সেকেন্ড সময় লাগে তাহলে,

ট্রেনটি T সময়ে অতিক্রম করে L + D একক দূরত্ব

∴ ট্রেনটি একক সময়ে অতিক্রম করে $\frac{L+D}{T}$ একক দূরত্ব

অতএব, দ্বিতীয় ক্ষেত্রে speed (গতিবেগ) = $\frac{L+D}{T}$ Or, sp = $\frac{L+D}{T}$

Calculation of the Time (সময় নির্ণয়): উপরের আলোচনায় থাকা সূত্রটির ধারাবাহিকতা থেকেই সময় নির্ণয় করা যায় ।

সিগন্যাল পোস্ট/খুঁটি/স্থির ব্যক্তি/বিন্দুর ক্ষেত্রে: আমরা জানি, $Sp = \frac{L}{T}$, Or, $L = sp \times T$ Or, $T = \frac{L}{sp}$

সেতু/সুড়ঙ্গ/প্লাটফর্ম/অন্য দাঁড়ানো ট্রেনের ক্ষেত্রে: আমরা জানি, $Sp = \frac{L + D}{T}$ Or, $L + D = sp \times T$

Calculation of the Length (দৈর্ঘ্য নির্ণয়):

ট্রেনের দৈর্ঘ্যের ক্ষেত্রে: আমরা জানি, $Sp = \frac{L + D}{T}$ Or, $L + D = sp \times T$, Or, $L = Sp \times T - D$

সেতু/সুড়ঙ্গ/প্লাটফর্ম/অন্য দাঁড়ানো ট্রেনের ক্ষেত্রে:

আমরা জানি, $Sp = \frac{L + D}{T}$ Or, $L + D = sp \times T$, Or, $D = Sp \times T - L$

After Long Discussion we can say,

1. ট্রেন যখন ক্ষুদ্র বস্তুকে cross করে তখন ঐ ক্ষুদ্র বস্তুটির দৈর্ঘ্য ০ (শূন্য) ধরা হয় । এখানে ক্ষুদ্র বস্তু বলতে মানুষ, খুঁটি, বৈদ্যুতিক পিলার, গাছ ইত্যাদি বুঝায় ।
2. ট্রেন যখন স্থির বস্তুকে cross করে তখন ট্রেনটি তার নিজস্ব speed-এ cross করে ।
3. ট্রেন যখন গতিশীল বস্তুকে cross করে তখন ট্রেনটি Relative speed-এ cross করে ।
   (i) In same direction, Relative Speed = Train Speed – দ্বিতীয় বস্তুটির Speed ।
   (ii) In opposite direction, Relative Speed = Train Speed + দ্বিতীয় বস্তুটির Speed ।

Teacher's Discussion

1. An engine pulls four identical carriages. The engine is $\frac{2}{3}$ the legnth of a carriage and the total length of the train is 86.8 m. Find the length of the engine. [Combined 5 Banks Officer- 2022]

A. 12.4 m B. 12 m C. 11.5 m D. 13 m **Ans:** A

2. 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? [Bangladesh Bank AD- 2021]

A. 400m B. 600m C. 200m D. 800m **Ans:** C

3. A train 240m long passed a pole in 24 seconds. How long will it take to pass a platform 650m long? [Combined 9 Bank Senior Officer (General)-2023; Bangladesh Bank AD- 2018]

A. 65s B. 89s C. 100s D. 130s **Ans:** B

4. How many seconds will a 500-meter-long train take to cross a man walking with a speed of 3 km/hr in the direction of the moving train if the speed of the train is 63 km/hr? [Bangladesh Bank AD- 2016]

A. 25 B. 30 C. 40 D. 55 **Ans:** B

5. A 800 m 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 metres) is: [Bangladesh Bank Officer- 2016]

A. 360 B. 500 C. 540 D. 130 **Ans:** B

6. A train 150 meter long and running at a speed of 60km per hour takes 30 seconds to cross a bridge. What is the length of the bridge? [Sadharon Bima Corporation AM- 2019; Islami Bank PO- 2019]

A. 450 meter B. 500 meter C. 350 meter D. 650 meter **Ans:** C

7. **A jogger running at 9 km/hr alongside a railway track is 240 metres ahead of the engine of a 120 metres long train running at 45 km/hr in the same direction. In how much time will the train pass the jogger?** [Dutch Bangla Bank AO- 2017]
A. 3.6 sec B. 18 sec C. 36 sec D. 72 sec **Ans:** C

8. **A 60 meter long train passes a 240 meter long Railway Station in 10 seconds. How many seconds will it take to pass an electric pole?**
(A) 2 seconds (B) 2.5 seconds (C) 3 seconds (D) 3.5 seconds **Ans:** A

9. **A 55 meter long train passes a 220 meter long railway station in 10 seconds. How many seconds will it take to pass another train 110 meter long?**
(A) 2 (B) 2.5 (C) 4 (D) 6 **Ans:** D

10. **A 1 km long train traveling at a speed of 60 km/hour enters a tunnel 1 km of length. What time does the train take to come fully out of the tunnel?**
(A) 1 min (B) 2 min (C) 30 min (D) 60 min **Ans:** B

11. **A train 360 m long is running at a speed of 45 km/hour. In what time will it pass a bridge 140 m long?**
(A) 40 seconds (B) 42 seconds (C) 45 seconds (D) 48 seconds **Ans:** A

12. **A train 240 m long passed a pole in 24 seconds. How long will it take to pass a platform 650 m long?**
(A) 65 sec (B) 89 sec (C) 100 sec (D) 130 sec **Ans:** B

13. **A train 120-meter-long is traveling at a speed of 60 km/h. The time in which it will pass a passerby, walking at 6 km/h in the same direction is-**
(A) 8 sec (B) 6 sec (C) 3 sec (D) None of these **Ans:** A

14. **A train 125 *m* long passes a man, running at 5 km/hr in the same direction in which the train is going in 10 seconds. The speed of the train is:**
(A) 45 km/hr (B) 50 km/hr (C) 54 km/hr (D) 55 km/hr **Ans:** B

15. **A train running at the speed of 60 km/hr crosses a pole in 9 seconds. What is the length of the train?**
(A) 120 metres (B) 180 metres (C) 324 metres (D) 150 metres **Ans:** D

16. **The length of the bridge, which a train 130 metres long and travelling at 45 km/hr can cross in 30 seconds, is**
(A) 200 m (B) 225 m (C) 245 m (D) 250 m **Ans:** C

(iv) Boat & Stream

Basic Discussion on Boat:

নৌকার গতিবেগ নিয়ে ব্যাংকসহ যেকোনো Competitive Exam-এ বিভিন্ন পর্যায়ে যে প্রশ্ন আসে তা মূলত চারটি বিষয়ে জানতে চাওয়া হয়। সেগুলো হলো–

1. B = Speed of Boat = নৌকার বেগ।
2. C = Speed of Stream = Speed of Current = স্রোতের বেগ।
3. B + C = Speed of Downstream = Speed of Boat with Current = স্রোতের অনুকূলে বেগ।
4. B – C = Speed of Upstream = Speed of Boat against Current = স্রোতের প্রতিকূলে বেগ।

লক্ষ্যণীয়, স্থির পানিতে বেগ বলতে নৌকার বেগ বুঝায়। তাহলে, Speed of Still water = Speed of Boat = B

Rule: Speed = $\frac{\text{Distance}}{\text{Time}}$, Or, Time = $\frac{\text{Distance}}{\text{Speed}}$, Or, Distance = Speed × Time.

Teacher's Discussion

1. **A boat sailing against a stream of river takes 6 hours to travel 24 kms, while sailing with the stream it takes 4 hours to travel the same distance. What is the speed of the stream?** [Probashi Kallayan Bank Senior Officer- 2021]
   A. 2.5 km/hr B. 1.5 km/hr C. 1 km/hr D. 3 km/hr **Ans:** C
2. **A boat travels for three hours with a current of 3 mph and then returns the same distance against the current in four hours. What is the boat's speed?**
   (A) 12 mph (B) 15 mph (C) 18 mph (D) 21 mph **Ans:** D
3. **A man can row in favour of the current can go 96km in 12hrs & he can go the same distance in 48hrs against the current. What is the speed of the current per hour?**
   (A) 10kph (B) 8kph (C) 5kph (D) 3kph **Ans:** D
4. **A man can row at the rate of 4km/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) 15 km/hr (B) 6 km/hr (C) 20 km/hr (D) 2 km/hr **Ans:** D
5. **A man can row upstream at 8km/h and downstream at 13 km/h. The speed to the stream is:**
   (A) 2.5 km/hr (B) 4.2 km/hr (C) 5 km/hr (D) 10.5 km/hr **Ans:** A
6. **A boat running upstream takes 8 hours 48 minutes to cover a certain distance, while it takes 4 hours to cover the same distance running downstream. What is the ratio between the speed of the boat and speed of the water current respectively?**
   (A) 2 : 1 (B) 3 : 2 (C) 8 : 3 (D) Cannot be determined **Ans:** C
7. **If a man rows at the rate of 5 km/ph in still water and his rate against the current is 3.5 km/ph, then, the man's rate along the current is:**
   (A) 4.25 km/ph (B) 6 km/ph (C) 6.5 kmph (D) 8.5 kmph **Ans:** C
8. **A certain river has a current of 3 miles per hour. A boat takes twice as long to travel upstream between two points as it does to travel downstream between the same to points. What is the speed of the boat in still water**
   (A) 3 miles per hour (B) 6 miles per hour
   (C) 9 miles per hour (D) 12 miles per hour **Ans:** C
9. **In Dhanmondi Lake the current flows at 3 kilometers per hour. The boatmen takes twice as long to travel upstream between two points as it does to travel downstream between the same two points. In still water what is the speed of the boat?**
   (A) 3 miles per hour (B) 6 miles per hour
   (C) 9 miles per hour (D) 12 miles per hour **Ans:** C

Student's Drill

1. **A bus traveling at a speed of 50 km/hour, takes 3 hours to complete a distance. If it takes 4 hours to complete the same distance by your car, what is your speed?**
   (A) 24 km/hour (B) 40 km/hour (C) 37.5 km/hour (D) None of these **Ans:** C
2. **A man covered a distance of 180 km in 4 hours on a bike. How much distance will be covered on a bicycle in 8 hours if he rides the bicycle at one-sixth the speed of the bike.**
   (A) 54 km (B) 60 km (C) 72 km (D) 84 km **Ans:** B

3. **A train passes city X at 8:25 am and Y city at 11:05 am. The distance between cities X and Y is 320 miles. What is the average speed in miles per hour of the train?**

(A) 135 (B) 120 (C) 270 (D) 370 **Ans:** B

4. **The speeds of three cars are in the ratio 2 : 3 : 4. The ratio of the times taken by these cars to travel the same distance is-**

(A) 2 : 3 : 4 (B) 4 : 3 : 2 (C) 6 : 4 : 3 (D) 4 : 3 : 6 **Ans:** C

5. **How much longer is required to drive one mile at 60 miles/ hour than at 100 miles/hour?**

(A) 30 seconds (B) 40 seconds (C) 24 seconds (D) 25 seconds **Ans:** C

6. **A person travels three equal distances at a speed of x km/hr, y km/hr and z km/hr respectively. What is the average speed for the whole journey?**

(A) $\frac{xyz}{3(xy+yz+zx)}$ (B) $\frac{xyz}{(xy+yz+zx)}$ (C) $\frac{(xy+yz+zx)}{xyz}$ (D) $\frac{3xyz}{(xy+yz+zx)}$ **Ans:** D

7. **A car reached from A to B at an average speed of 20 kmh 1 & returned back along the same route at 24 kmh-1. If the entire trip took exactly 11 hr to complete non stop, Find AB = ?**

(A) 88.88 (B) 120 (C) 166.33 (D) 176 **Ans:** B

8. **Farzana travels 100 miles at 20 miles per hour, 60 miles at 30 miles per hour & 80 miles at 10 miles per hour. What is his average rate for the three trips?**

(A) 18 (B) 17 (C) 20 (D) 16 **Ans:** D

9. **Suzan travels the first 3 hrs of journey at 60 mph speed & the remaining 5 hrs at 24 mph speed. Find the average speed?**

(A) 42 (B) 36 (C) 37.5 (D) 42.5 **Ans:** C

10. **Afia ran from her house to school at an average speed of 6 miles per hour and returned along the same route at an average speed of 4 miles per hour. If it took her one hour in total to run to the school and come back, how many minutes did it take her to run from her house to school?**

(A) 16 (B) 18 (C) 20 (D) 24 **Ans:** D

11. **A ship leaves Sadarghat and travels to Fatulla at an average speed of 11km/hour. It returns by the same route at an average speed of 9 km/hour. What is its average speed for the round trip?**

(A) 9.9 km/hour (B) 10 km/hour (C) 10.9 km/hour (D) 12 km/hour **Ans:** A

12. **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) 1: 3 (B) 3:2 (C) 3:4 (D) None of these **Ans:** B

13. **A train passes a station platform in 36 seconds and a man standing on the platform in 20 seconds. If the speed of the train is 54 km/hr, what is the length of the platform?**

(A) 120 m (B) 240 m (C) 300 m (D) None of these **Ans:** B

14. **A train 240 m long passes a pole in 24 seconds. How long will it take to pass a platform 650 m long?**

(A) 65 sec (B) 89 sec (C) 100 sec (D) 150 sec **Ans:** B

15. **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) 50 m (B) 72 m (C) 80 m (D) 82 m **Ans:** A

16. **A train 360 m long is running at a speed of 45 km/hr. In what time will it pass a bridge 140 m long?**

(A) 40 sec (B) 42 sec (C) 45 sec (D) 48 sec **Ans:** A

17. **Two trains are moving in opposite directions 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) 48 (D) 49 **Ans:** C

18. **A jogger running at 9 kmph alongside a railway track in 240 metres ahead of the engine of a 120 metres long train running at 45 kmph in the same direction. In how much time will the train pass the jogger?**

(A) 3.6 sec (B) 18 sec (C) 36 sec (D) 72 sec **Ans:** C

19. **A 270 metres long train running at the speed of 120 km/ph crosses another train running in opposite direction at the speed of 80 km/ph in 9 seconds. What is the length of the other train?**

(A) 230 m (B) 240 m (C) 260 m (D) 320 m **Ans:** A

20. **A goods train runs at the speed of 72 km/ph and crosses a 250 m long platform in 26 seconds. What is the length of the goods train?**

(A) 230 m (B) 240 m (C) 260 m (D) 270 m **Ans:** D

21. **Two trains, each 100 m long, moving in opposite directions, cross each other in 8 seconds. If one is moving twice as fast the other, then the speed of the faster train is:**

(A) 30 km/hr (B) 45 km/hr (C) 60 km/hr (D) 75 km/hr **Ans:** C

22. **Two trains 140 m and 160 m long run at the speed of 60 km/hr and 40 km/hr respectively in opposite directions on parallel tracks. The time (in seconds) which they take to cross each other, is:**

(A) 9 (B) 9.6 (C) 10 (D) 10.8 **Ans:** D

23. **A train 110 metres long is running with a speed of 60 km/ph. In what time will it pass a man who is running at 6 km/ph in the direction opposite to that in which the train is going?**

(A) 5 sec (B) 6 sec (C) 7 sec (D) 10 sec **Ans:** C

24. **A train 800 metres 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:**

(A) 130 (B) 360 (C) 500 (D) 540 **Ans:** C

25. **A 300-metre-long train crosses a platform in 39 seconds while it crosses a signal pole in 18 seconds. What is the length of the platform?**

(A) 320 m (B) 350 m (C) 650 m (D) Data inadequate **Ans:** B

26. **A train speeds past a pole in 15 seconds and a platform 100 m long in 25 seconds. Its length is:**

(A) 50 m (B) 150 m (C) 200 m (D) Data inadequate **Ans:** B

27. **A train moves past a telegraph post and a bridge 264 m long in 8 seconds and 20 seconds respectively. What is the speed of the train?**

(A) 69.5 km/hr (B) 70 km/hr (C) 79 km/hr (D) 79.2 km/hr **Ans:** D

28. **Two trains are running at 40 km/hr and 20 km/hr respectively in the same direction. Fast train completely passes a man sitting in the slower train in 5 seconds. What is the length of the fast train?**

(A) 23 m (B) $23\frac{2}{9}$ m (C) $27\frac{7}{9}$ m (D) 29 m **Ans:** C

29. **A train overtakes two persons who are walking in the same direction in which the train is going, at the rate of 2 km/ph and 4 km/ph and passes them completely in 9 and 10 seconds respectively. The length of the train is:**

(A) 45 m (B) 50 m (C) 54 m (D) 72 m **Ans:** B

30. **A train overtakes two persons walking along a railway track. The first one walks at 4.5 km/hr. The other one walks at 5.4 km/hr. The train needs 8.4 and 8.5 seconds respectively to overtake them. What is the speed of the train if both the persons are walking in the same direction as the train?**

(A) 66 km/hr (B) 72 km/hr (C) 78 km/hr (D) 81 km/hr **Ans:** D

31. **A train travelling at 48 km/ph completely crosses another train having half its length and travelling in opposite direction at 42 km/ph, in 12 seconds. It also passes a railway platform in 45 seconds. The length of the platform is**

(A) 400 m (B) 450 m (C) 560 m (D) 600 m **Ans:** A

32. **Two stations A and B are 110 km apart on a straight line. One train starts from A at 7 a.m. and travels towards B at 20 km/ph. Another train starts from B at 8 a.m. and travels towards A at a speed of 25 km/ph. At what time will they meet?**

(A) 9 a.m. (B) 10 a.m. (C) 10.30 a.m. (D) 11 a.m. **Ans:** B

33. **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:**

(A) 2 : 3 (B) 4 : 3 (C) 6 : 17 (D) 9 : 16 **Ans:** B

34. **How many seconds will a 500-meter-long train take to cross a man walking with a speed of 3 km/hr in the direction of the moving train if the speed of the train is 63 km/hr**

(A) 25 seconds (B) 28 seconds (C) 30 seconds (D) 35 seconds **Ans:** C

35. **A train is running with a speed of 60 km/ph and its length is 100 metres. Calculate the time by which it will pass a man running opposite with speed of 6 km/ph**

(A) 2 second (B) 4 second (C) 6 second (D) 8 second **Ans:** C

36. **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 meter (B) 45 meter (C) 50 meter (D) 55-meter **Ans:** C

37. **A train speeds past a pole in 15 seconds and a platform 100-meter-long in 25 seconds. What is length of the train?**

(A) 140 meter (B) 145 meter (C) 150 meter (D) 155-meter **Ans:** C

38. **A train is 100-meter-long and is running at the speed of 30 km per hour, find the time it will take to pass a man standing at a crossing.**

(A) 10 seconds (B) 12 seconds (C) 14 seconds (D) 16 seconds **Ans:** B

Solution of Student's Drill

1. **Solution:**

SP = 50	3 hrs	
SP = ?	4 hrs	

Dis = 50 × 3 = 150

$SP = \frac{Dis}{Ti} = \frac{150}{4} = \frac{75}{2} = 37.5$ **(Ans.)**

2. **Solution:**

Bike	180 km	4 hrs
Cycle		

Dis = SP × Ti [$SP = \frac{180}{4} = 45$

$= Bike \times \frac{1}{6} \times 8$

$= 45 \times \frac{1}{6} \times 8 = 60$ **(Ans.)**

3. Solution:

X — Y

8:25 — 11:05

$SP = \frac{320}{\frac{160}{60}} = \frac{320 \times 60}{160} = 120$ **(Ans.)**

4. Solution:

	A	B	C
SP	2	3	4
Ti	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$
	6	4	3

Ans: 6 : 4 : 3

5. Solution:

SP = 60 — 1 mile — SP = 100

বেশি সময় $= \frac{1}{60} - \frac{1}{100} = \frac{5-3}{300} = \frac{2}{300}$ hrs.

$= \frac{2}{300} \times 60 \times 60 = 24$ sec **(Ans.)**

6. Solution:

D — D — D

sp = x — sr = y — sp = z

$\therefore$ Avg sp $= \frac{D + D + D}{\frac{D}{x} + \frac{D}{y} + \frac{D}{z}} = \frac{3D}{\frac{Dyz + Dxz + Dxy}{xyz}}$

$= \frac{3D}{\frac{D(xy + yz + zx)}{xyz}} = \frac{3D \times xyz}{D(xy + yz + zx)}$ **(Ans.)**

7. Solution:

SP = 20 →

(A) — (B)

SP = 24 ←

Avg Sp $= \frac{2 \times 20 \times 24}{44} = \frac{240}{11}$ km/hrs

Total Dis = Avg sp × Total Time

$= \frac{240}{11} \times 11 = 240$ km

$\therefore$ Distance (AB) $= \frac{240}{2} = 120$ km **(Ans.)**

8. Solution:

100 miles — 60 miles — 80 miles

sp = 20 — sp = 30 — sp = 10

Avg sp $= \frac{\text{Total Dis}}{\text{Total time}} = \frac{100 + 60 + 80}{\frac{100}{20} + \frac{60}{30} + \frac{80}{10}}$

$= \frac{250}{5 + 2 + 8} = \frac{240}{3} = 16$ **(Ans.)**

9. Solution:

Sp = 60 — Sp = 24

3 hrs — 5 hrs

Avg sp $= \frac{\text{Total Dis}}{\text{Total Ti}} = \frac{180 + 120}{3 + 5}$

$= \frac{300}{8} = 37.5$ **(Ans.)**

Dis = 60 × 3 = 180

24 × 5 = 120

10. Solution:

SP = 6 → — SP = 4 ←

House — School

Avg Sp $= \frac{2 \times 6 \times 4}{10} = 4.8$ mile/hrs

Total Dis = Avg sp × Total ti

= 4.8 × 1 = 4.8 miles

$\therefore$ Distance (house to school) $= \frac{4.8}{2} = 2.4$ miles

Time (house to school) $= \frac{2.8}{6} = \frac{24 \times 60}{6 \times 10}$

= 24 mins **(Ans.)**

11. Solution:

Avg sp $= \frac{2 \times 11 \times 9}{20} = \frac{99}{10} = 9.9$ km/hrs

12. Solution:

Let, sp of 1st train = x m/s & sp of 2nd train = y m/s

$\therefore x = \frac{Dis}{27}$; $y = \frac{Dis}{17}$

Dis = 27x]

$\therefore$ Dis = 17y

$\therefore$ R sp $= \frac{Dis}{Ti}$

In opposite direction,
R. sp = 60 + 90
= 150 km/hr

$\Rightarrow x + y = \frac{27x + 17y}{23}$

$\Rightarrow 23x + 23y = 27x + 17y$

$\Rightarrow 4x = 6y$

$\Rightarrow \frac{x}{y} = \frac{6}{4} = \frac{3}{2} = 3 : 2$ **(Ans.)**

13. Solution:

Let, length of train = x m & length of platform = y m

$sp = \frac{Dis}{ti}$ | $54 \times \frac{5}{18} = \frac{x + 0}{20}$

$\Rightarrow 54 \times \frac{5}{18} = \frac{x+y}{36}$ | $\Rightarrow x = 300$

$\Rightarrow x + y = 540$

$\Rightarrow y = 540 - 300 = 240$ m **(Ans.)**

14. Solution:

$sp = \frac{240 + 0}{24} = 10$ m/s

$Ti = \frac{Dis}{sp} = \frac{240 + 650}{10} = \frac{890}{10} = 89$ sec **(Ans.)**

15. Solution:

$sp = 46$, $sp = 36$, R. $sp = \frac{Dis}{Ti}$

$\Rightarrow 46 - 36 = \frac{x + x}{36}$

$\Rightarrow 10 \times \frac{5}{18} = \frac{2x}{36}$

$\Rightarrow 2x = 100 \Rightarrow x = 50$ **(Ans.)**

16. Solution:

$sp = \frac{Dis}{Ti}$

$\Rightarrow Ti = \frac{Dis}{sp} = \frac{360 + 140}{45 \times \frac{5}{18}}$

$= \frac{500 \times 18}{45 \times 5} = 40$ sec **(Ans.)**

17. Solution:

$Time = \frac{Distance}{R.\ sp}$

$= \frac{1.10 + 0.9}{150} = \frac{2}{150}$ hr

$= \frac{1}{150} \times 60 \times 60 = 48$ sec **(Ans.)**

18. Solution:

120 m, sp = 45 ⟶ ---------- 240 m ---------- ⟶ sp = 9

$\therefore Time = \frac{Dis}{R.\ sp}$

[In same direction, R. sp = 45 – 9 = 36 km/hr

$= \frac{120 + 240 + 0}{36 \times \frac{5}{18}} = \frac{360 \times 18}{36 \times 5} = 36$ sec **(Ans.)**

19. Solution:

Let, length of 2nd train = x m

In opposite direction, R. sp

= 120 + 80 = 200 km/hr

$sp = \frac{Dis}{Ti} \Rightarrow 200 \times \frac{5}{18} = \frac{270 + x}{9}$

$\therefore x = 230$ m **(Ans.)**

20. Solution:

Let, length of goods train = x m

$\therefore sp = \frac{Dis}{Ti} \Rightarrow 72 \times \frac{5}{18} = \frac{x + 250}{26}$

$\Rightarrow x + 250 = 40 \times 13$

$\Rightarrow x = 520 - 250 = 270$ **(Ans.)**

21. Solution:

Let, speed of 1st train = x m/s

$\therefore$ " " 2nd " = 2x m/s

In opposite direction R. sp = x + 2x = 3x m/s

$\therefore sp = \frac{Dis}{Time} \Rightarrow 3x = \frac{100 + 100}{8}$

$\Rightarrow x = \frac{200}{8 \times 3} \times \frac{18}{5} = 30$ km/hr

$\therefore$ Speed of 2nd train = 2x

$= 2 \times 30 = 60$ km/hr **(Ans.)**

22. Solution:

In opposite direction, R.sp = 60 + 40 = 100 km/hr

$\therefore Time = \frac{Dis}{Time} = \frac{140 + 160}{100 \times \frac{5}{18}}$

$= \frac{300 \times 18}{100 \times 5} = \frac{54}{5} = \frac{108}{10}$

$= 10.8$ sec **(Ans.)**

23. Solution:

In opposite direction, R. sp = 60 + 6 = 66

$\therefore Time = \frac{Dis}{sp} = \frac{110}{66 \times \frac{5}{18}}$

$= \frac{110 \times 18}{66 \times 5} = 6$ sec **(Ans.)**

24. Solution:

Let, length of tunnel = x m

$sp = \frac{Dis}{Time} = 78 \times \frac{5}{18}$

$= \frac{800 + x}{60}$ [1 min = 60 sec]

$\Rightarrow 800 + x = 26 \times 5 \times 10$

$\Rightarrow x = 1300 - 800 = 500$ **(Ans.)**

25. Solution:

Let, length of platform = x m

$\therefore sp = \frac{Dis}{Time}$ $sp = \frac{300 + 0}{18} = \frac{300}{18}$

$\Rightarrow \frac{300 + x}{39}$

$\therefore \frac{300 + x}{39} = \frac{300}{18} = 300 + x = 650$

$\therefore x = 350$ **(Ans.)**

26. Solution:

Let, length of train = x m

$sp = \frac{x + 100}{25}$; $sp = \frac{x + 0}{15}$

$\Rightarrow \frac{x + 100}{25} = \frac{x + 0}{15}$

$\Rightarrow 5x = 3x + 300$ $\Rightarrow 2x = 300$

$\therefore x = 150$ **(Ans.)**

27. Solution:

$sp = \frac{L_T + o}{8} = \frac{L_T + 264}{20}$

$\Rightarrow 5\ L_T = 2\ L_T + 528$

$\Rightarrow 3\ L_T = 528$ $\Rightarrow L_T = 176$

$\therefore$ Speed $= \frac{176}{8}$ m/s

$= \frac{176}{8} \times \frac{18}{5}$ km/hr

$= \frac{396}{5} = 79.2$ km/hr **(Ans.)**

28. Solution:

In same direction R. sp = 40 – 20 = 20 km/hr

$\therefore$ R. sp $= \frac{L_T + O}{5}$ $\Rightarrow 20 \times \frac{5}{18} = \frac{L_T}{5}$

$\Rightarrow L_T = 20 \times \frac{5}{18} \times 5 = \frac{250}{9} = 27\frac{7}{9}$ m **(Ans.)**

29. Solution:

Let, speed of train = x m/s

2 km/hr $= 2x \frac{5}{18} = \frac{5}{9}$ m/s

4 km/hr $= 4 \times \frac{5}{18} = \frac{10}{9}$ m/s

$x - \frac{5}{9} = \frac{L_T + 0}{9}$; $x - \frac{10}{9} = \frac{L_T + 0}{10}$

$\Rightarrow x = \frac{L_T}{9} + \frac{5}{9}$ $x = \frac{L_T}{10} + \frac{10}{9}$

$\therefore \frac{L_T}{9} + \frac{5}{9} = \frac{L_T}{10} + \frac{10}{9}$

$\Rightarrow \frac{L_T}{9} - \frac{L_T}{10} = \frac{10}{9} - \frac{5}{9}$

$\Rightarrow \frac{10L_T - 9L_T}{90} = \frac{5}{9}$ $\therefore L_T = 50$ **(Ans.)**

30. Solution:

Let, speed of train = x km/hr

$(x - 4.5) \frac{5}{18} = \frac{L_T + 0}{8.4}$

$\Rightarrow L_T = 8.4 \times \frac{5}{18} (x - 4.5)$

& $(x - 5.4) \frac{5}{18} = \frac{L_T + 0}{8.5}$

$\Rightarrow L_T = 8.5 \times \frac{5}{18} (x - 5.4)$

$\therefore \frac{8.4}{10} \times \frac{5}{18} (x - 4.5)$

$= \frac{8.5}{10} \times \frac{5}{18} (x - 5.4)$

$\Rightarrow 84x - 378 = 85x - 459$

$\Rightarrow x = 459 - 378$

$= 81$ km/hr **(Ans.)**

In same direction,
R. sp = 60 – 6
= 54 km/hr

31. Solution:

Let, length of 2nd train = x m

$\therefore$ " " 1st " = 2x m

$\therefore 90 \times \frac{5}{18} = \frac{x + 2x}{12}$; $48 \times \frac{5}{18} = \frac{200 + Lp}{45}$

$\Rightarrow 3x = 300$ $\Rightarrow 200 + Lp = 600$

$\Rightarrow x = 100$ $\Rightarrow Lp = 400$ **(Ans.)**

32. Solution:

sp = 20 sp = 25

110

A x hrs (x-1) hrs B

$\therefore$ 20x + 25 (x – 1) = 110
$\Rightarrow$ 20x + 25x – 25 = 110
$\Rightarrow$ 45x = 135
$\therefore$ x = 3
$\therefore$ Train meets 7 am + 3 hrs = 10 am **(Ans.)**

33. Solution:

Ti	9	16
Sp	$\frac{1}{9}$	$\frac{1}{16}$
	16	9
	$\sqrt{16}$	$\sqrt{9}$
	4	3

Ans: 4 : 3

34. Solution:
50 m
$\rightarrow$
sp = 63

$$\text{Time} = \frac{\text{Dis}}{\text{sp}} = \frac{500 + 0}{60 \times \frac{5}{18}}$$

$$= \frac{500 \times 18}{60 \times 5} = 30 \text{ sec } \textbf{(Ans.)}$$

35. Solution:
In opposite direction, R.sp = 60 + 6 = 66 km/hr

$$\text{Time} = \frac{\text{Dis}}{\text{R.sp}} = \frac{100 + 0}{66 \times \frac{5}{18}}$$

$$= \frac{100 \times 18}{66 \times 5} = \frac{60}{11} = 5.4 \approx 6 \text{ sec } \textbf{(Ans.)}$$

36. Solution:
Let, Length of each train = x m
In same direction, R. sp = 46 – 36 = 10 km/hr

$$\therefore \text{ sp} = \frac{\text{Dis}}{\text{Ti}} \Rightarrow 10 \times \frac{5}{18} = \frac{x + x}{36}$$

$\Rightarrow$ 2x = 100 $\Rightarrow$ x = 50 m **(Ans.)**

37. Solution:
Let, length of train = x m

$$\text{sp} = \frac{x + 100}{25} \text{ ; sp} = \frac{x + 0}{15}$$

$$\Rightarrow \frac{x + 100}{25} = \frac{x + 0}{15}$$

$\Rightarrow$ 5x = 3x + 300
$\Rightarrow$ 2x = 300 $\therefore$ x = 150 **(Ans.)**

38. Solution:

$$\text{Time} = \frac{\text{Dis}}{\text{sp}} = \frac{100 + 0}{30 \times \frac{5}{18}}$$

$$= \frac{100 \times 18}{30 \times 5} = 12 \text{ sec } \textbf{(Ans.)}$$

Home Practice

1. **If a boy takes as much time in running 10 min. A car takes in covering 25 m, the distance covered by the boy's during the time the car covers 1 km is?** [BUP (FBS): 2021-22]
A. 400 B. 40 C. 250 D. 650 **Ans:** A

2. **A person can travel from Dhaka to Faridpur in 5 different ways and then come back in any of these ways. How many different routes are possible for him to go to Faridpur and come back?** [BUP (FBS): 2020-21]
A. 10 B. 9 C. 25 D. 20 **Ans:** C

3. **A car averages 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 averages when it is driven 10 miles in the city and then 50 miles on the highway?** [BUP (FBS): 2020-21]
A. 64 B. 36 C. 12 D. 29 **Ans:** B

4. **A train passes city X at 8.25 am and city Y at 11.05 am. The distance between city X and Y is 320 miles. What is the average speed in miles per hour of the train?** [BUP (FBS): 2019-20]
A. 135 B. 120 C. 270 D. None of these **Ans:** B