AJ INSTITUTE OF ENGINEERING & TECHNOLOGY

DEPT. OF TRAINING & PLACEMENT

Test - 4

Train speed, Time & Distance

Wednesday 22nd May 2024

1. 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

Answer: Option **D:**

$$Speed = \left(60 \times \frac{5}{18}\right) m/sec = \left(\frac{50}{3}\right) m/sec.$$

Length of the train = (Speed x Time).

$$\therefore \ Length \ of \ the \ train = \left(\frac{50}{3} \times 9\right) m = \textbf{150m}.$$

2. 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

Answer: Option **B**

Speed of the train relative to man = $\left(\dfrac{125}{10}\right)$ m/sec

$= \left(\dfrac{25}{2}\right)$ m/sec.

$= \left(\dfrac{25}{2} \times \dfrac{18}{5}\right)$ km/hr

$= 45$ km/hr.

Let the speed of the train be x km/hr. Then, relative speed = $(x - 5)$ km/hr.

∴ $x - 5 = 45$ ⟹ $x = \textbf{50 km/hr.}$

3. 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

Answer: Option **C**

Speed = $\left(45 \times \dfrac{5}{18}\right)$ m/sec = $\left(\dfrac{25}{2}\right)$ m/sec.

Time = 30 sec.

Let the length of bridge be x metres.

Then, $\dfrac{130 + x}{30} = \dfrac{25}{2}$

⟹ $2(130 + x) = 750$

⟹ $x = \textbf{245 m.}$

4. 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

Answer: Option **B**

Let the speeds of the two trains be x m/sec and y m/sec respectively.
Then, length of the first train = $27x$ metres,
and length of the second train = $17y$ metres.

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

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

$$\Rightarrow 4x = 6y$$

$$\Rightarrow \frac{x}{y} = \frac{3}{2}.$$

5. 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

Answer: Option **B**

$$\text{Speed} = \left(54 \times \frac{5}{18}\right)\text{m/sec} = 15 \text{ m/sec}.$$

Length of the train = (15×20)m = 300 m.

Let the length of the platform be x metres.

Then, $\dfrac{x + 300}{36} = 15$

$$\Rightarrow x + 300 = 540$$

$$\Rightarrow x = \textbf{240 m.}$$

6. 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

$$\text{Speed} = \left(\frac{240}{24}\right) \text{m/sec} = 10 \text{ m/sec}.$$

$$\therefore \text{ Required time} = \left(\frac{240 + 650}{10}\right) \text{sec} = \textbf{89 sec.}$$

7. 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

Let the length of each train be x metres.
Then, distance covered = $2x$ metres.

Relative speed = (46 – 36) km/hr

$$= \left(10 \times \frac{5}{18}\right) \text{m/sec}$$

$$= \left(\frac{25}{9}\right) \text{m/sec}$$

$$\therefore \frac{2x}{36} = \frac{25}{9}$$

$$\Rightarrow 2x = 100$$

$$\Rightarrow x = \textbf{50}.$$

8. 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

Formula for converting from km/hr to m/s: $X \text{ km/hr} = \left(X \times \dfrac{5}{18}\right) \text{m/s.}$

Therefore, Speed = $\left(45 \times \dfrac{5}{18}\right) \text{m/sec} = \dfrac{25}{2}$ m/sec.

Total distance to be covered = (360 + 140) m = 500 m

Formula for finding Time = $\left(\dfrac{\text{Distance}}{\text{Speed}}\right)$

∴ Required time = $\left(\dfrac{500 \times 2}{25}\right) \text{sec}$ = 40 sec.

9. 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

Answer: Option **C**

Relative speed = (60+ 90) km/hr

$= \left(150 \times \dfrac{5}{18}\right) \text{m/sec}$

$= \left(\dfrac{125}{3}\right) \text{m/sec.}$

Distance covered = (1.10 + 0.9) km = 2 km = 2000 m.

Required time = $\left(2000 \times \dfrac{3}{125}\right) \text{sec}$ = 48 sec.

10. 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

Speed of train relative to jogger = (45 - 9) km/hr = 36 km/hr.

$$= \left(36 \times \frac{5}{18}\right)\text{m/sec}$$

= 10 m/sec.

Distance to be covered = (240 + 120) m = 360 m.

$$\therefore \text{ Time taken} = \left(\frac{360}{10}\right)_{\text{sec}} = 36 \text{ sec.}$$

11. A goods train runs at the speed of 72 kmph 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

$$\text{Speed} = \left(72 \times \frac{5}{18}\right)\text{m/sec} = 20 \text{ m/sec.}$$

Time = 26 sec.

Let the length of the train be x metres.

Then, $\dfrac{x + 250}{26} = 20$

$\Rightarrow x + 250 = 52 \Rightarrow x = \mathbf{270}.$

12. 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

Answer: Option **D**

Relative speed = (60 + 40) km/hr = $\left(100 \times \dfrac{5}{18}\right)$ m/sec = $\left(\dfrac{250}{9}\right)$ m/sec.

Distance covered in crossing each other = (140 + 160) m = 300 m.

Required time = $\left(300 \times \dfrac{9}{250}\right)$ sec = $\dfrac{54}{5}$ sec = **10.8 sec**.

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

A. 5 sec

B. 6 sec

C. 7 sec

D. 10 sec

Answer: Option **B**

Speed of train relative to man = (60 + 6) km/hr = 66 km/hr.

$= \left(66 \times \dfrac{5}{18}\right)$ m/sec

$= \left(\dfrac{55}{3}\right)$ m/sec.

∴ Time taken to pass the man = $\left(110 \times \dfrac{3}{55}\right)$ sec = **6 sec**.

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14. 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

Answer: Option **C**

Speed = $\left(78 \times \dfrac{5}{18}\right)$ m/sec = $\left(\dfrac{65}{3}\right)$ m/sec.

Time = 1 minute = 60 seconds.

Let the length of the tunnel be x metres.

Then, $\left(\dfrac{800 + x}{60}\right) = \dfrac{65}{3}$

⟹ 3(800 + x) = 3900

⟹ x = **500**.

15. 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

Answer: Option **B**

Let the length of the train be x metres and its speed by y m/sec.

Then, $\dfrac{x}{y} = 15$ $\implies$ $y = \dfrac{x}{15}$.

$\therefore$ $\dfrac{x + 100}{25} = \dfrac{x}{15}$

$\implies 15(x + 100) = 25x$

$\implies 15x + 1500 = 25x$

$\implies 1500 = 10x$

$\implies x = \mathbf{150\ m}$

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

A. 3.6

B. 7.2

C. 8.4

D. 10

Answer: Option Ⓑ

Explanation:

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

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

Converting m/sec to km/hr (see important formulas section)

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

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

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

A. 50 km

B. 56 km

C. 70 km

D. 80 km

Let the actual distance travelled be x km.

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

$\Rightarrow 14x = 10x + 200$

$\Rightarrow 4x = 200$

$\Rightarrow x = 50$ km.

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

A. 9

B. 10

C. 12

D. 20

Due to stoppages, it covers 9 km less.

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

19. In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. The duration of the flight is:

A. 1 hour

B. 2 hours

C. 3 hours

D. 4 hours

Answer: Option Ⓐ

Explanation:

Let the duration of the flight be x hours.

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

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

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

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

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

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

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

A. 220 km

B. 224 km

C. 230 km

D. 234 km

Answer: Option Ⓑ

Explanation:

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

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

$\Rightarrow 15x = 168 \times 20$

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

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

A. 70 km/hr

B. 75 km/hr

C. 84 km/hr

D. 87.5 km/hr

Answer: Option Ⓓ

Explanation:

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

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

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

∴ Speed of first train = (7×12.5) km/hr = 87.5 km/hr.

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

A. 35.55 km/hr

B. 36 km/hr

C. 71.11 km/hr

D. 71 km/hr

Answer: Option Ⓒ

Explanation:

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

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

23. In covering a distance of 30 km, Abhay takes 2 hours more than Sameer. If Abhay doubles his speed, then he would take 1 hour less than Sameer. Abhay's speed is:

A. 5 kmph

B. 6 kmph

C. 6.25 kmph

D. 7.5 kmph

Answer: Option Ⓐ

Explanation:

Let Abhay's speed be x km/hr.

Then, $\dfrac{30}{x} - \dfrac{30}{2x} = 3$

$\Rightarrow 6x = 30$

$\Rightarrow x = 5$ km/hr.

24. Robert is travelling on his cycle and has calculated to reach point A at 2 P.M. if he travels at 10 kmph, he will reach there at 12 noon if he travels at 15 kmph. At what speed must he travel to reach A at 1 P.M.?

A. 8 kmph

B. 11 kmph

C. 12 kmph

D. 14 kmph

Answer: Option ©

Explanation:

Let the distance travelled by x km.

Then, $\dfrac{x}{10} - \dfrac{x}{15} = 2$

$\Rightarrow 3x - 2x = 60$

$\Rightarrow x = 60$ km.

Time taken to travel 60 km at 10 km/hr = $\left(\dfrac{60}{10}\right)$ hrs = 6 hrs.

So, Robert started 6 hours before 2 P.M. *i.e.,* at 8 A.M.

$\therefore$ Required speed = $\left(\dfrac{60}{5}\right)$ kmph. = 12 kmph.

25. It takes eight hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the cars is:

A. 2 : 3

B. 3 : 2

C. 3 : 4

D. 4 : 3

Answer: Option ©

Explanation:

Let the speed of the train be x km/hr and that of the car be y km/hr.

Then, $\dfrac{120}{x} + \dfrac{480}{y} = 8 \quad \Rightarrow \dfrac{1}{x} + \dfrac{4}{y} = \dfrac{1}{15}$ ....(i)

And, $\dfrac{200}{x} + \dfrac{400}{y} = \dfrac{25}{3} \quad \Rightarrow \dfrac{1}{x} + \dfrac{2}{y} = \dfrac{1}{24}$ ....(ii)

Solving (i) and (ii), we get: $x = 60$ and $y = 80$.

$\therefore$ Ratio of speeds = 60 : 80 = 3 : 4.

26. A farmer travelled a distance of 61 km in 9 hours. He travelled partly on foot @ 4 km/hr and partly on bicycle @ 9 km/hr. The distance travelled on foot is:

A. 14 km

B. 15 km

C. 16 km

D. 17 km

Answer: Option Ⓒ

Explanation:

Let the distance travelled on foot be x km.

Then, distance travelled on bicycle = $(61 - x)$ km.

So, $\dfrac{x}{4} + \dfrac{(61 - x)}{9} = 9$

$\Rightarrow 9x + 4(61 - x) = 9 \times 36$

$\Rightarrow 5x = 80$

$\Rightarrow x = 16$ km.

27. How many seconds does Puja take to cover a distance of 500 m, if she runs at a speed of 30 km/hr?

A. 60 sec
B. 82 sec
C. 95 sec
D. 100 sec

Correct answer: (a)

Hint:

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

We see that the distance is given in **metres** while the speed is given in **km/hr** and the answer is asked in seconds.

So, convert km/hr into m/s by multiplying $\dfrac{5}{18}$ m/s to the given value of speed.

$$30 \,\frac{km}{hr} = 30 \times \frac{5}{18} = \frac{75}{9} \ \text{m/sec}$$

i.e. Place these values in the formula:

$$\text{Time} = 500 \times \frac{9}{75} = 60 \text{ sec}$$

28. A cyclist covers a distance of 800 meter in 4 minutes 20 seconds. What is the speed in km/hr of the cyclist?

A. 6.2 km/h
B. 8.4 km/hr
C. 11.05 km/hr
D. 16.07 km/hr

Correct answer: (c)

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

Hint: Convert minutes into seconds

Time=4 min 20 sec =260 sec

$$Speed = \frac{800}{260} = 3.07 \text{ m/sec}$$

Convert the speed from m/s to km/hr by multiplying with (5/18)

$$3.07 \times \frac{18}{5} \text{ km/hr} = 11.05 \text{ km/hr}$$

29. A man walking at the rate of 6 km/hr crosses a bridge in 15 minutes. The length of the bridge is _____.

A. 1000 m
B. 1250 m
C. 1500 m
D. 1800 m

Correct answer: (c)

Hint: To find the answer in meter, we will first convert distance from km/hour to meter/sec by multiplying it with 5/18 .Also, change 15 minutes to seconds by multiplying it with 60.

Distance = Speed x Time

1. Convert speed into m/sec:

$$6 \times \frac{5}{18} \text{ m/s} = 1.66 \text{ m/s}$$

2. Convert time from minutes into seconds = 15 x 60 s = 900 sec

3. Calculate : Distance = 1.66 x 900 = 1500 m

30. Two girls move in opposite directions, one from A to B and other from B to A. The girl from A reaches the destination in 16 hrs and girl from B reaches her destination in 25 hrs, after having met. If former's speed is 25 km/hr, what will be the speed of latter?

A. 10 km/hr
B. 12 km/hr
C. 16 km/hr
D. 20 km/hr

Correct answer: (d)

Hint: If two bodies A and B move from each other's starting point in opposite directions, they reach their destinations after having met, then their speeds S_a & S_b are given by,

$$\frac{S_a}{S_b} = \frac{\sqrt{t_b}}{\sqrt{t_a}}$$

where t is the time taken by them to cover the distance.

$$S_b \frac{(25 \times 4)}{5} = 20 \text{ km/hr}$$