Problems On Trains

Solution

1. Answer: (C)

In 60 minutes Rajdhani express can cover 80km. So the rest distance is 720 Km which will be jointly covered by both the trains.

Time Taken=720/(80+40)=6 Hours

Distance from Gwalior is 6×40=240 km.

2. Answer: (B)

Let the length of the train be x metre, and let the speed of the train be y km/h, then

x = (y + 6) (5/18) × 36

x = (y + 12) (5/18) × 30

Solving both equations we get y = 24 km/h and x = 300m

Hence, option b.

3. Answer: (C)

$\frac{S_2}{S_1} = \sqrt{\frac{\frac{24}{5}}{\frac{10}{3}}} = \sqrt{\frac{72}{50}}$

$\frac{S_2}{S_1} = \sqrt{\frac{36}{25}} = \frac{6}{5}$

$S_2 = \frac{45 \times 6}{5}$

= 54 km/hr

4. Answer: (B):

We know that,

Speed = Distance/Time

Speed of train A = (Length of train A + Length of platform)/time

Speed of train A = (140 + 180)/16 = 20m/s

Given,

Speed of train B ∶ Speed of train A = 3 ∶ 2

Speed of train B = (3 × 20)/2 = 30m/s

Speed of train B = Length of train B/15

Length of train B = 15 × 30 = 450 m

5. Answer: (E)

Length of first train ⇒ 245m

Length of platform = 490m

Speed of first train

$= \frac{245 + 490}{45} = \frac{735}{45} = \frac{49}{3} m/s$

Speed of 2nd train = $\frac{63 \times 5}{18} = \frac{35}{2} m/s$

Time required by then to cross each other when they cross in opposite direction

$= \frac{245 + 364}{\frac{49}{3} + \frac{35}{2}} = 18\ sec$

6. Answer: (B)

Let speed of train A be S

S × 18 = 360

S = 20 m/s

A : B = 4 : 5

A : B = 4 : 5

Speed of B = 25 m/s

Length of train B = 25 × 12 = 300 m

7. Answer: (C):

Let the length of train be 'Lt'

Speed of train = 'Vt'

Time taken = (length of train + length of pole) /speed of train

30 = (Lt + 300)/Vt – – – – (1)

⇒ Lt/Vt = 10

⇒ Lt = 10Vt

⇒ 30Vt = (10Vt + 300)

⇒ 20Vt = 300

⇒ Vt = 300/20 = 15

Put Vt = 15 in equation (1), we get,

30 = (Lt + 300)/15

⇒ 450 = Lt + 300

⇒ Lt = 150 m

∴ Length of train is 150 m

8. Answer: (D)

Let speed of train P = S_P

ATQ –

$S_P = \frac{175}{8.75} = 20 m/s$

Let speed of train Q = S_q

ATQ –

$20 + S_q = \frac{(175 + 225) \times 7}{60}$

$S_q = \frac{400 \times 7}{60} - 20$

$S_q = \frac{80}{3} m/s$

Relative speed if train P and Q running in same direction

$= \frac{80}{3} - 20$

$= \frac{20}{3} m/s$

Required time = $\frac{(175 + 225) \times 3}{20}$

= 60 sec

9. Answer: (B):

A 30 m long train crosses a person who is walking at a speed of 8 km/hr in the opposite direction in 8 seconds. The train passes another person in 3 seconds who was walking in the same direction as the first person.

Let, the speed of the train is x m/s

Speed of the 1st person is 8 km/hr

⇒ 8 × 5/18 m/s

⇒ 20/9 m/s

The man is walking in the opposite direction of the train.

⇒ The relative speed is (x + 20/9) m/s

⇒ (9x + 20)/9 m/s

Accordingly,

8 × (9x + 20)/9 = 30

⇒ 72x + 160 = 270

⇒ 72x = 110

⇒ x = 110/72

⇒ x = 55/36

Speed of the train is 55/36 m/s

The direction of the 2nd person is same as the 1st person, that means he is also in the opposite direction of the train

Let, the speed of the 2nd person is y m/s

Relative speed is (55/36 + y) m/s

Accordingly,

3 × (55/36 + y) = 30

⇒ 55/12 + 3y = 30

⇒ 3y = 30 – 55/12

⇒ 3y = 305/12

⇒ y = 305/36

Speed of the second person is 305/36 m/s

⇒ (305/36) × (18/5) km/hr [∵ 1 km = 1000 m and 1hr = 3600 secnd]

⇒ 30.5 km/hr

∴ The speed of the second person is 30.5 km/hr.

10. Answer: (A)

Lenth of plateform

$= 21 \times 19 - 216 = 183m$

Let n boxes are added

216 + 183 + 21n = 21 × 26

⇒ 21n = 147

⇒ n = 7

11. Answer: (C)

Therefore, speed of train = 1.5x km/h

Now, since the train stops for 12.5 minutes and therefore, both train and car reach the destination at

same time.

So, if the train had not stopped, it would have reached 12.5 mins earlier than car, which implies it takes

train to cover 12.5 mins less for the train to cover the same distance as car without stopping anywhere.

Therefore,

75/x - 75/1.5x = 12.5/60

75/x - 50/x = 5/24

25/x = 5/24

Therefore, x = 120

Speed of car = 120 km/h. Hence, option c.

12. Answer: (A)

80% of the distance = 1200km.

Total distance = 1500km.

Let the initial speed of the train be x km per hour.

Scheduled time = 1500/x hours.

Last 300kms are travelled at x+15 km per hour.

Thus 1500/x = 1200/x + 300/(x+15) +1.

=> x = 60 km per hour.

Hence, option a.

13. Answer: (C)

Ratio of distance covered by second train to that of first train = 1.25 : 1 = 5 : 4

Since time is same,

Ratio of their speeds is also 5 : 4

Speed of second train

$= 40 \times \frac{5}{4} = 50km/hr.$

Distance covered by first train till half an hour = 20 km.

Let, third train takes 't' hrs. to overtake first train.
And speed of third train be x km/hr.
Then, $\frac{20}{x-40} = t$ …….(i)
Distance covered by second train till half an hour = 25 km.
$\frac{25}{x-50} = t + \frac{3}{2}$ ……(ii)
$solving\ (i) and\ (ii)$
$x = 60 km/hr, t = 1$

14. Answer: (B)
Distance covered by third train
$= 60 \times \left(1 + \frac{3}{2}\right) km$
$= 60 \times \frac{5}{2}$
= 150 km.

15. Answer: (B)
Quantity I:
Time taken by the trains to meet for the first time = $\frac{Total\ Distance}{Relative\ Speed}$
$= \frac{360}{40+50}$
= 4 hours
Distance between point R and Q
= Distance travelled by train B in 4 hours
= 50 × 4
= 200 km
Quantity II:
Time taken by the train A to reach Q
$= \frac{360}{40} = 9\ hours$
Time taken by the train B to reach P = $\frac{360}{50}$
= 7.2 hours
So, at the time when train A reached Q, train B already travelled for 1.8 hours
(9 − 7.2 hours) of return journey.
Distance travelled by train B in 1.8 hours
= 1.8 × 50 = 90 km
Sum of distance travelled by both the trains to meet for the second time
= 360 − 90 = 270 km
Time taken by the trains to meet for the second time
= $\frac{Total\ Distance}{Relative\ Speed}$
= $\frac{270}{40+50}$
= 3 hours

16. Answer: (B)
Let's length of train is X meter and length of bridge and platform are 2L and L meter respectively
$Speed\ of\ train = 108 \times \frac{5}{18}$
= 30 m/s
When train passed the bridge
Distance covered = X + 2L
X + 2L = 540 …(i)
When train passes the platform
Distance covered = X + L
X + L = 450 …(ii)
From (i) and (ii)
L = 90 meter
X = 360 METER

17. Answer: (D)
Let length of faster train is 2l and slower train is I meter respectively.
ATQ,
$\frac{(42+63)5}{18} = \frac{2l+l}{15}$
$\frac{135 \times 5}{18} = \frac{3l}{15}$
l = 187.5
Let length of platform is X meter
$\frac{72 \times 5}{18} = \frac{187.5 \times 2 + X}{50}$
X = 100 – 375
X = 625 meter
Required = $\frac{187.5}{625} \times 100$
= 30 %

18. Answer: (A)
Let speed of train A = x km/hr
Let speed of train B = y km/hr
Meeting time = 10 hr.
Relative speed = $\frac{650}{10}$
= 65 km/hr = x + y
Let train A started after 4 hr 20 min.
In 8 hr distance covered by train A
And train B = 65 × 8 = 520 km
⇒ Train B covers 650 – 520 = 130 km in 4 hr 20 min

⇒ speed of train B = $\frac{130}{4\frac{1}{3}}$

= 30 km/hr

And, speed of train A = 65 – 30 = 35 km/hr

19. Answer: (C)

Let length of train X = 'x' m

And length of train Y = '2X' m

ATQ,

24 × t = x ….(i)

And, 30 × 2t = 2x + 60 ….(ii)

On solving (i) & (ii)

x = 120m

⇒ Length of train y = 240 m

20. Answer: (C)

Let length of train A be (x + 100)m

So, length of train B be x m

(2x + 150) = (54 + 81) × $\frac{5}{18}$ × 12m

= 135 × 5 × $\frac{2}{3}m$

= 450m

X = 150m

Length of train A = 250m

Length of train B = 150 m

(i) cannot be obtained because speed of Man is not given

(ii) can be obtained

$t = \frac{(250+175)}{81\times\frac{5}{18}} = \frac{425}{81} \times \frac{81}{5}$

$=> \frac{170}{9} sec$

(iii) it has already obtained

(iv) can't be obtained because no other Condition regarding C has been given

Hence only (ii) and (iii) can be find out.