Problems on Trains

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OnlineStudy4u

Placement for All.. All for Placement

This Video Completely covers "Problems on Trains" which is more than sufficient for all kind of placement Exams eg: TCS/WIPRO/AMCAT/ELITMUS/CoCubes and all other placement Exams.

Time and Distance: Pratik Shrivastava(10 years of industry experience and best Aptitude trainer)

Problems on Trains

Concept1 :

Distance = Speed * Time

D = S*T

-> Conversion of km/hr into m/s:

Km/hr --- 1 km =1000m and 1hr=3600sec

1000/3600 = 5/18

a) So km/hr can be converted into m/s multiplying by 5/18.

b) m/s can be converted to km/hr multiplying by 18/5.

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distance = speed x time

a|c

km/hr → 5/18 m/s

d: km/m

t: hr | min | s

s: km/hr | m/s

10 km/hr + 5 km/hr = 15 km/hr

[10 km/hr + 5 m/s] x

Problems on Trains

Concept2 :

Relative Speed:

If two train moving in same direction with a speed of S1 and S2 respectively.

Then the Relative speed will be = S1 – S2

Note : S for same and S for Subtraction.

If two train moving in opposite direction with a speed of S1 and S2 respectively.

Then the Relative speed will be = S1 + S2

Problems on Trains

Concept3 :

Distance:

If a train of length l1 crosses another train of length l2/ a bridge of length l2/a platform of lenth l2 then the total distance = l1 + l2.

If a train of length l crosses a person or a lamp post then total distance = l (because the length of the person or lamp post will be treated as 0 w.r.to train length)

Problems on Trains

Q1. A train moves with a speed of 108 kmph. Its speed in metre per second is ?

A) 10.8 B) 18

C) 30 D) 38.8

Solutions:

$\Rightarrow 108 \times \frac{5}{18} = 30 m/s$

$\frac{km}{hr} \Rightarrow \frac{1000m}{3600s}$

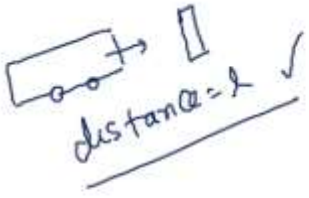
Problems on Trains

Q2. A train running at the speed of 40 km/hr crosses a signal pole in 9 seconds. Find the length of the train ?

A) 90 mts B) 150 mts

C) 120 mts D) 100 mts

Solutions:



Info

$S = 40 km/hr$

$t = 9 sec$

$d = l$

$\Rightarrow d = s \times t$

$l = 40 \frac{km}{hr} \times \frac{5}{18} \times 9 sec$

$\Rightarrow 100m$

Problems on Trains

Q3. 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

Solutions:

Info

$S = 60 km/hr$

$t = 9 sec$

$d = S \times t$

$d = 60 \times \frac{5}{18} \times 9$

$= 150 m$

Problems on Trains

Q4. Length of train is 170 meters and speed of train is 63 km/hour. This train can pass a bridge in 30 seconds, then find the length of the bridge.

A) 355 mts B) 325 mts

C) 365 mts D) 312 mts

Solutions:

Info

$\Rightarrow d = S \times t$

$(170 + l_b) = 63 \times \frac{5}{18} \times 30$

$\Rightarrow (170 + l_b) = \frac{21 \times 5 \times 10}{2} = 525$

21×25

500

25

525

$l_b = 525 - 170 = 355 m$

Problems on Trains

Q5. 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

Solutions:

$\Rightarrow d = S \times t$

$(130 + l_b) = 45 \times \frac{5}{18} \times 30$

$130 + l_b = 15 \times 25$

$= 15 \times (20 + 5)$

$= 300 + 75$

375

$l_b = 375 - 130$

$245 m$

Problems on Trains

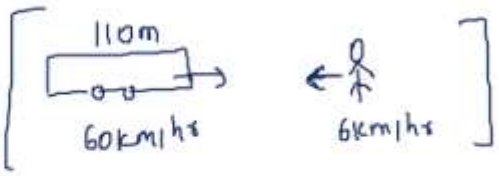
Q6. A train of length 110 meter is running at a speed of 60 kmph. In what time, it will pass a man who is running at 6 kmph in the direction opposite to that in which the train is going?

A) 10 B) 8

C) 6 D) 4

Solutions:

Info



$\Rightarrow d = s \times t$

$\Rightarrow 110\text{m} = (60+6)\frac{\text{km}}{\text{hr}} \times \frac{5}{18} \times t$

$\Rightarrow \frac{2}{10}\ 110 = \frac{11}{66} \times \frac{5}{3\cancel{18}} \times t$

$\Rightarrow t = 2 \times 3 = 6\text{sec}$

Relative Speed

- Same dir : Sub
- opposite : add

Problems on Trains

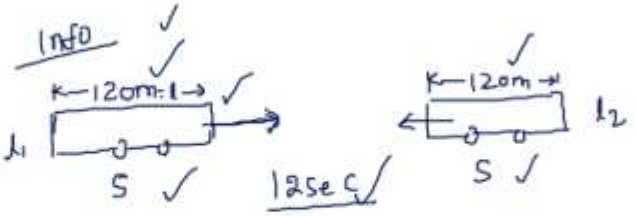
Q7. Two trains are running in opposite directions in the same speed. The length of each train is 120 meter. If they cross each other in 12 seconds, the speed of each train (in km/hr) is

A) 42 B) 36

C) 28 D) 20

Solutions:

Info



$\Rightarrow d = s \times t$

$(l_1 + l_2) = (S_1 + S_2) \times 12$

$240 = 2S \times 12$

$S = 10\ m/s \Rightarrow \frac{2}{10} \times \frac{18}{5} \Rightarrow 36\ km/hr$

Same = Sub

Opp = add

Problems on Trains

Q8. Two trains started at the same time, one from A to B and the other from B to A . If they arrived at B and A respectively 4 hours and 9 hours after they passed each other the ratio of the speeds of the two trains was

A) 2:1 B) 3:2

C) 4:3 D) 5:4

Standard

Solutions:

Note : If two trains (or bodies) start at the same time from points A and B towards each other and after crossing they take a and b sec in reaching B and A respectively, then:
(A's speed) : (B's speed) = (√b : √a)

Ratio of their speed $S_A : S_B = \sqrt{t_2} : \sqrt{t_1}$

$= \sqrt{9} : \sqrt{4}$

$= 3 : 2$

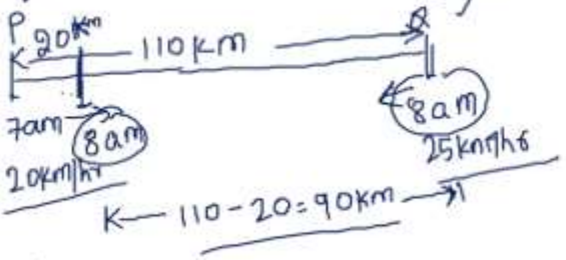
Problems on Trains

Q9. Two stations P and Q are 110 km apart on a straight track. One train starts from P at 7 a.m. and travels towards Q at 20 kmph. Another train starts from Q at 8 a.m. and travels towards P at a speed of 25 kmph. At what time will they meet?

A) 10.30 B) 10 am

C) 8.45 D) 9.30

Solutions:



20km/1hr ⇒ 1hr ⇒ 20km

$d = s \times t$

$\Rightarrow 90 = (20+25) \times t$

$90 = 45 \times t$

$t = \frac{90}{45} = 2hrs$

8am + 2hrs = 10am

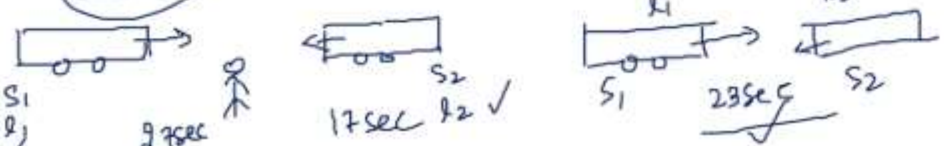
Problems on Trains

Q10. 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 : 2 B) 3 : 1

C) 4 : 7 D) 3 : 2

Solutions:



$\Rightarrow d = s \times t$ $\quad l_1 = s_1 \times 27$

$d = s \times t$ $\quad l_2 = s_2 \times 17$

$\Rightarrow d = s \times t$

$\Rightarrow (l_1 + l_2) = (s_1 + s_2) \times 23$

$\Rightarrow 27s_1 + 17s_2 = 23s_1 + 23s_2$

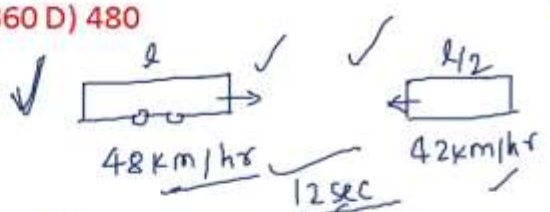
$\Rightarrow 4s_1 = 6s_2$

$\Rightarrow \frac{s_1}{s_2} = \frac{6}{4} = \frac{3}{2}$

Problems on Trains

Q11) A train is traveling at 48 kmph . It crosses another train having half of its length , traveling in 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) 500 B) 400m C) 360 D) 480



$l + \frac{l}{2} = \frac{3l}{2}$

Same = Sub

Opp = add

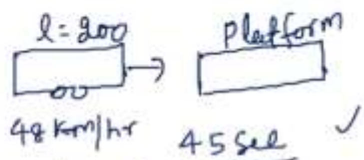
$d = s \times t$

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

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

$l = 200m$

$25 \times (25-1) = 625 - 25 = 600$



$\Rightarrow d = s \times t$

$\Rightarrow (l + l_p) = 48 \times \frac{5}{18} \times 45$

$\Rightarrow (200 + l_p) = 24 \times 25$

$200 + l_p = 600$

$l_p = 600 - 200$

400

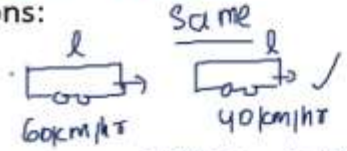
Problems on Trains

Q12. Two trains of equal length, running with the speeds of 60 and 40 kmph, take 50 seconds to cross each other while they are running in the same direction. What time will they take to cross each other if they are running in opposite directions ?

A) 10 sec B) 11 sec

C) 12 sec D) 8 sec

Solutions:



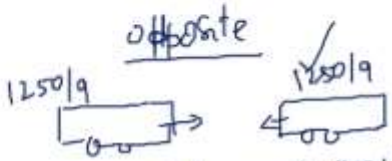
50 sec ✓ Same = Sub ✓

$\Rightarrow d = s \times t$

$(l+l) = (60-40) \times \frac{5}{18} \times 50$

$2l = 20 \times 5 \times 125$

$\Rightarrow l = \frac{1250}{9}$ ✓



$\Rightarrow d = s \times t$

$\Rightarrow \left(\frac{1250}{9} + \frac{1250}{9}\right) = (60+40) \times \frac{5}{18} \times t$

$5 \frac{2500}{9} = \frac{100 \times 5}{18} \times t$

$t = 10 sec$

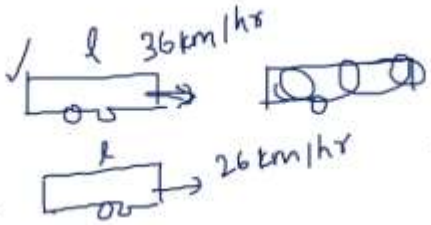
Problems on Trains

Q13. Two trains of equal length are running on parallel lines in the same direction at 36 km/hr and 26 km/hr. The faster train passes the slower train in 36 sec. The length of each train is ?

A) 28 mts B) 54 mts

C) 24 mts D) 50 mts

Solutions:



$t = 36 s$

Same = Sub

$d = s \times t$

$\Rightarrow (l+l) = (36-26) \times \frac{5}{18} \times 36$

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

$l = 50m$

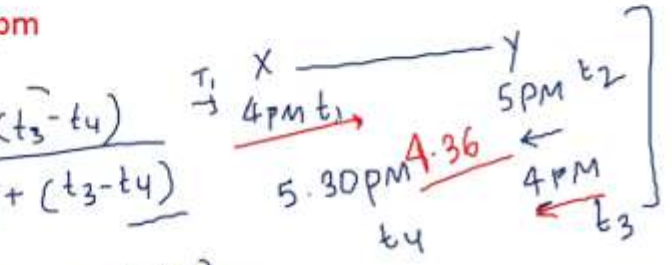
Problems on Trains

Q14. A train X starts from Meerut at 4pm and reached Ghaziabad at 5pm.While another train Y starts from Ghaziabad at 4pm and reaches Meerut at 5.30PM. The two trains will cross each other at?

a)4:36pm b)4.42pm c)4.48pm d)4.50pm

Solutions:

Meeting time $= t_3 + \frac{(t_3 - t_2)(t_3 - t_4)}{(t_1 - t_2) + (t_3 - t_4)}$



$\frac{3}{2} = 1.5 hrs$

1hr 30min

1.30

$\frac{3}{2}$ hrs

$4 + \frac{(4-5) \times (4-5.30)}{(4-5) + (4-5.30)} \Rightarrow 4 + \frac{1 \times 3/2}{1 + 3/2}$

$1 + \frac{3}{2} = \frac{5}{2}$

$= 4 + \left(\frac{3}{2} \times \frac{2}{5} \times 60\right) 12$

$= 4.36 pm$