

CLASS
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TIME AND DISTANCE

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- ① A man cover a certain distance with $x \text{ km/Hr}$ & come back with $y \text{ km/Hr}$. He takes t hrs to go and come back. find the distance ?

$$x \text{ km/Hr} \quad y \text{ km/Hr}$$

$$\begin{array}{c} y \text{ Hr} \\ x \text{ Hr} \\ \text{---} \\ xy \text{ Km unit} \\ (x+y) \text{ unit} \end{array}$$

$$1 \text{ unit} \longrightarrow \frac{t}{x+y}$$

$$xy \longrightarrow \frac{t}{x+y} \times xy \text{ Km.}$$

$$D = \frac{s_1 \times s_2}{s_1 + s_2} \times [\text{Total Time}]$$



- ② A boy goes to school at 3 km/Hr . and return at a speed of 2 km/Hr . If he takes 5 hrs in all. find the distance from his village to school ?

$$D = \frac{3 \times 2}{3+2} \times 5 = 6 \text{ Km.} \quad \underline{\underline{\text{Ans'}}}$$

- ③ A man travel a certain distance by train @ 25 km/Hr . and walk back @ 4 km/Hr . The whole journey took $5 \text{ hr } 48 \text{ min}$, what distance did he travel by train.

$$D = \frac{25 \times 4}{29} \times \frac{89}{5} = 20 \text{ km}$$

$$\begin{aligned} & 5 \text{ hr } 48 \text{ min} \\ & = 5 \frac{4}{5} \\ & = \frac{29}{5} \end{aligned}$$

- ④ A man go a certain distance with x km/Hr and he comes back with a speed of y km/Hr. If he takes t hrs more to come back than go. find the distance.

$$\begin{array}{ccc}
 & xy \text{ km unit} & \\
 & \swarrow y \text{ Hr} \quad \searrow x \text{ Hr} & \\
 x \text{ km/Hr} & & y \text{ km/Hr} \\
 \\
 (x-y) \text{ unit} & \longrightarrow t & \\
 \\
 1 \text{ unit} & \longrightarrow \frac{t}{x-y} & \\
 \\
 xy \text{ unit} & \longrightarrow \frac{t}{x-y} \times xy & \\
 \hline
 \end{array}$$

$$D = \frac{s_1 \times s_2}{s_1 - s_2} [\text{diff. b/w time}]$$



- ⑤ A man cover a certain distance from house to office if he travel @ 30 km/Hr , then he is late by 10 min but if he travel @ 40 km/Hr then he reaches his office 5 min earlier. find the distance from home to office .

$$\text{Time diff} = 15 \text{ min}$$

$$D = \frac{30 \times 40}{+2} \times \frac{15}{-60} = 30 \text{ km} \quad \underline{\text{Ans}}$$

- ⑥ starting from his house one day, a student walks @ 2.5 km and reaches his school 6 min late. Next day he ↑ his speed 1 km/Hr and reaches the school 6 min earlier. how far is the school from his house .

$$\text{Time diff} = 12 \text{ min}$$

$$s_1 = 2.5 \text{ km/Hr}, s_2 = 2.5 + 1 = 3.5 \text{ km/Hr}$$

$$D = \frac{\frac{5}{2} \times \frac{7}{2}}{1} \times \frac{+2}{-60} = \frac{5}{2} \times \frac{7}{2} \times \frac{1}{5} = \frac{7}{4} \text{ km.}$$

⑦ A man cover a certain distance by 10 km/Hr and becomes 15 min late. But if he travel the same distance with 12 km/Hr then he becomes 5 min late find the distance ?

$$\text{Time diff} = 10 \text{ min}$$

$$D = \frac{10 \times t^2}{2} \times \frac{10}{60} = 10 \text{ km.}$$

⑧ A man cover a certain distance on scooter and he travel 3 km per hr faster he would have taken 40 min less. But if he decrease his speed 2 km/Hr then he becomes 40 min late. find the distance.

$$D = \frac{s \times (s+3)}{3} \times \frac{40}{60} = \frac{s(s-2)}{2} \times \frac{40}{60} \quad \begin{matrix} \text{Time diff} = 40 \text{ (in set case)} \\ +40 \text{ (in and case)} \end{matrix}$$

$$\Rightarrow 2s+6 = 3s-6$$

$$s = 12 \text{ km/Hr.}$$

$$D = \frac{12 \times 15}{3} \times \frac{40^2}{60^2} = 40 \text{ km} \cancel{\text{Hrs}}$$

⑨ A man cover a certain distance by his car. Had he travel 6 km/Hr faster then he take 4 hr less time. But if he drive 6 km/Hr slower then he takes 6 hrs more. find the distance.

$$\frac{s \times (s+6) \times 4^2}{6^3} = \frac{s \times (s-6) \times 6}{6}$$

$$2s+12 = 3s-18$$

$$s = 30 \text{ km/Hr}$$

$$D = \frac{30 \times 36}{6} \times 4 = 720 \text{ km}$$

Ans.

- 10) A man travel a certain distance by his car. If he increase his speed 10 km/hr then he would take 1 hr less time. But if he further increase his speed 10 km/hr then he takes further 45 min lesser time. find the distance ?

$$\frac{s \times (s+10)}{10} \times 1 = \frac{s(s+20)}{20} \times \frac{1}{4}$$

$$1 \frac{45}{60} = \frac{3}{4}$$

$$8s + 80 = 7s + 140$$

$$s = 60 \text{ km/hr}$$

$$D = \frac{60 \times 70}{10} \times 1 = 420 \text{ Km.}$$

- 11) If a man had walk 20 km/hr faster he would have save 1 hr in the distance of 600 km. find his usual speed ?

$$\frac{s \times (s+20)}{20} \times 1 = 600$$



$$\Rightarrow s \times (s+20) = 12000 \text{ Km.}$$

TOOK value of s from options.

$$\frac{100 \times (100+20)}{s \times (s+20)} = 12000$$

$$s = 100 \text{ km/hr.}$$

- 12) In a flight of 600 Km an aircraft slow down due to bad weather, its avg speed for the trip reduced by 200 km/hr & the time of flight increased by 30 min. find the original speed ?

59.

$$\Rightarrow \frac{s(s-200)}{200} \times \frac{1}{2} = 600$$

$$\Rightarrow s(s-200) = 600 \times 400$$

↓
600

$$s = 600 \text{ km/hr.}$$

CLASS

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By  Chhoker

72064097

- (13) If a train with a speed of 60 km/hr cross a pole in 30 sec. find the length of the train?

$$\text{Km/hr} \times \frac{5}{18} = \text{m/sec}$$

$$\text{Distance} = \text{speed} \times \text{Time.}$$

$$\text{m/sec} \times \frac{18}{5} = \text{km/hr}$$

$$\frac{60}{60} \times \frac{5}{18} \times \frac{30}{10} = 500 \text{ mtrs.}$$

- (14) A 100 m long train with a speed of 30 km/hr can cross a man in how much time?

$$t = \frac{\text{Distance}}{\text{Speed}} = \frac{100}{30} = \frac{10}{3} \text{ sec}$$

$$T = 12 \text{ sec.}$$

- (15) A train running at a speed of 72 km/hr crossed a 260 m platform in 23 sec. find the length of train?

$$260 + \text{Train length} = 72 \times \frac{5}{18} \times 23 = 160$$

$$\text{Train length} = 160 - 260 = 200 \text{ mtrs.}$$

(16) A 275 m long train crosses a platform of equal length in 33 sec. find the speed of the train ?

Total distance covered by train to cross the platform = $275 + 275 = 550$ m

$$550 = s \times 33$$

$$s = \frac{\frac{50}{550}}{33} = \frac{50}{3} \text{ m/sec} = \frac{10}{3} \times \frac{18}{5} = 60 \text{ km/hr}$$

(17) A train running at a speed of 60 km/hr crosses a platform double of its length in 32.4 sec. find the length of the platform ?

length of train = x

length of platform = $2x$

Total distance in crossing = $x + 2x = 3x$

$$3x = \frac{60}{60} \times \frac{5}{18} \times \frac{324}{10} = 180$$

$$x = 180$$

length of train = 180 m

length of platform = $180 \times 2 = 360$ m.



Relative Speed

→ s_1 Two objects in same direction

→ s_2 Relative speed = $(s_1 - s_2)$

→ s_1 Two objects in opposite direction

← s_2 Relative speed = $(s_1 + s_2)$

- (18) A train crosses a man with a speed of 72 Km/Hr in 15 sec. find in how much time it will cross another train which is 50% more long then it if the other train is standing on platform?

$$\text{length of Train}_1 = \frac{72 \times 5}{18} \times 15 = 300 \text{ m}$$

$$\text{length of Train}_2 = 50\% \text{ more} = \frac{150}{100} \times 300 = 450 \text{ m}$$

Total distance to be covered by Train 1 in crossing

$$\text{Train 2} = 300 + 450 = 750 \text{ m}$$

$$\frac{150}{750} = \frac{4}{72} \times \frac{5}{18} \times T$$

$$T = \frac{150}{4} = 37 \frac{1}{2} \text{ sec.}$$

- (19) A train crosses a tunnel half of its length with a speed of 72 Km/Hr in 1 min, then find in how much time it will cross another train of double length w/c is standing on platform with 60% of its speed?

$$\text{Train length} = 2L$$

$$\text{Tunnel length} = L$$

$$3L = \frac{72 \times 5}{18} \times 60$$

$$L = 400 \text{ m.}$$

$$\text{Train}_1 = 400 \times 2 = 800 \text{ m.}$$

$$\text{Train}_2 = 2 \times 800 = 1600 \text{ m}$$

$$T_1 = 800$$

$$T_2 = 1600$$

$$\text{Total distance in crossing} = 2400$$

$$60\% \text{ of speed} = 12 \text{ m/sec.}$$

$$\therefore 2400 = 12 \times t$$

$$T = 200 \text{ sec. } \underline{\underline{\text{Ans}}}$$

(20) 2 trains of same length can cross a pole in $\frac{7}{4}$ sec &

9 sec. respectively. In how much time will they cross each other if they are coming from opposite direction.

↓ Pole

→ 7 sec. let length of train = 63 m

→ 9 sec. $s_1 = \frac{63}{7} = 9 \text{ m/sec.}$

$s_2 = \frac{63}{9} = 7 \text{ m/sec.}$

$\frac{63}{63} \rightarrow 9 \text{ m/s}$
 $\leftarrow \frac{63}{63} 7 \text{ m/s.}$

Relative speed = $7+9$
 $= 16.$

Time of cross = $\frac{126}{16} = \frac{63}{8} \text{ sec.}$

(21) 2 trains can cross a pole in 4 sec and 6 sec respectively. Find in how much time will they cross each other if they are coming from same direction & if the speed of the trains are in 7 : 9 ratio.

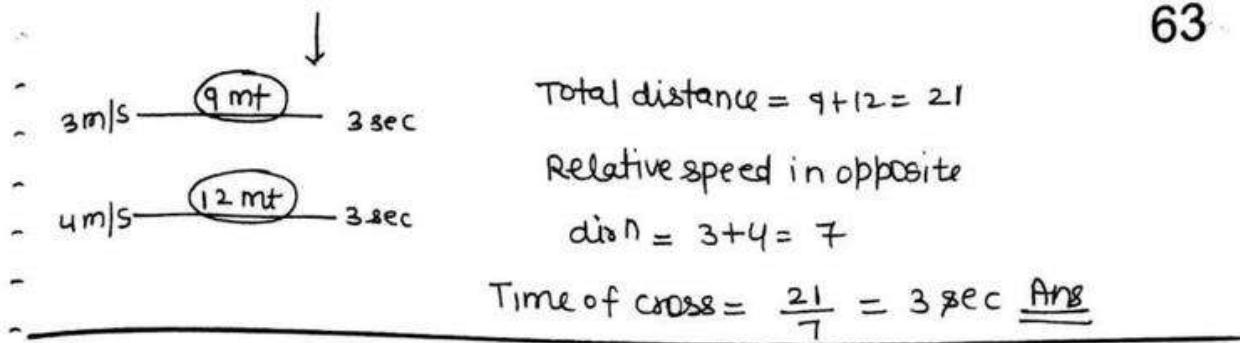
↓ Pole

7 m/s → 4 sec Total distance = $28+54 = 82 \text{ m}$

9 m/s → 6 sec. Relative speed in same dirn = $9-7 = 2$

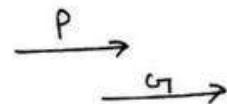
Time of cross = $\frac{82}{2} = 41 \text{ sec.}$

(22) The speed of two train in the ratio 3 : 4. Both crosses a pole in 3 sec while coming from opposite direction. In how much time they will cross each other?



- (23) A goods train and passenger train are running in same direction with a speed in the ratio 1:2. The driver of goods train observes that the passenger train coming from behind overtake and crossed his train completely in 60 sec. whereas a passenger on passenger train looks that he cross the goods train in 40 sec. find the ratio of their length.

Goods Train (G) = 1 m/sec



Passenger Train (P) = 2 m/sec.

$$P+G = 1 \text{ m/sec} \times 60$$

Relative speed in same direction

$$P+G = 60 \text{ mt.}$$

$$\text{direction} = 2-1 = 1 \text{ m/sec}$$

G → 1 m/sec.

$$P+G = 60$$

man → 2 m/sec.

$$\downarrow \quad \downarrow$$

$$G = 1 \text{ m/sec} \times 40$$

$$20 \quad 40$$

$$G = 40 \text{ mtr.}$$

$$G : P$$

$$40 : 20$$

$$2 : 1$$



Ans



G : P		
(Time Taken by Passenger)	Time Taken to cross both train each other	- Time Taken to cross the goods train by passenger

- (24) The ratio of speeds of a goods and passenger train is 7:9 in same direction. If the passenger train crosses the goods train in 60 sec while a passenger in the passenger train observes that he crosses the goods train in 35 sec. find the ratio of length of goods train to passenger train ?

$$\text{length of Good Train (G)} = 7 \text{ m/sec}$$

$$\text{length of Passenger Train (P)} = 9 \text{ m/sec}$$

$$\text{Relative speed in same dirn} = 9-7 = 2 \text{ m/sec.}$$

$$(P+G) = 2 \times 60 = 120$$

$$G \rightarrow 7 \text{ m/sec}$$

$$\text{man} \rightarrow 9 \text{ m/sec.}$$

$$\text{Relative Speed} = 9-7 = 2$$

$$G = 2 \times 35 = 70.$$

$$\therefore P + G = 120$$

↓ ↓
50 70

$$G : P$$

$$70 : 50$$

$$7 : 5$$

Ans

OR

$$\begin{array}{r:r} G & P \\ 35 & : 60-35 \\ 35 & : 25 \end{array}$$

$$\begin{array}{r:r} 7 & 5 \\ \hline & \text{Ans} \end{array}$$

- 25 A train overtakes a man going along the railway track at a speed of 6 km/hr in 10 sec if the length of the train is 200 m. Find the speed of the train ?

Train \rightarrow x km/hr

\rightarrow man 6 km/hr
10 sec.

$$\frac{4}{10} = (x-6) \times \frac{5}{18} \times 10$$

$$x = 78 \text{ km/hr}$$

By Pardeep Chhoker

7206446517

- 26 A gun is fired from behind a train the driver of train hears the sound $1\frac{1}{2}$ min later than guard. find the length of train if the speed of train & sound are 60 km/hr and 1100 m/min.

Train \rightarrow 1000 m/min

$$\frac{60,000}{60} = 1000 \text{ m/min.}$$

Sound \rightarrow 1100 m/min

$$D = \underbrace{100}_{\downarrow} \times \frac{3}{2} = 150 \text{ mt.}$$

Relative speed
in same dir.

- 27 A train can cross 2 men going along the railway track at 4 km/hr & 5 km/hr in same direction in 10 sec & 12 sec. find the length of train.

man₁ \rightarrow 4 km/hr man₂ \rightarrow 5 km/hr
 10 sec. 12 sec.

Train $x \rightarrow$

$$(x-4) \times \frac{5}{18} = (x-5) \times \frac{5}{18} \times \frac{6}{12}$$

(∵ both are length of trains. so equate them)

$$5x - 20 = 6x - 30$$

$$x = 10 \text{ km/hr.}$$

$$\left| \begin{array}{l} \text{length of train} = (10-4) \times \frac{5}{18} \times 10 = \frac{50}{3} \text{ metre} \\ \text{Ans.} \end{array} \right.$$

(OR)

$$10 \times 4 = 40$$

$$12 \times 5 = 60$$

$$12 - 10 = 2$$

$$\text{Speed} = \frac{60 - 40}{2} = 10 \text{ km/hr}$$

$$\text{length} = (10-4) \times \frac{5}{18} \times 10 = \frac{50}{3} \text{ metre.}$$

- 28 A train pass two person who are walking in opposite in w/c the train the is moving @ 5 m/sec & 10 m/sec. in 6 sec and 5 sec respectively. find the length of train.

$\longrightarrow x \text{ m/sec}$

$\longrightarrow x \text{ m/sec.}$

5 m/sec \leftarrow

6 sec

10 m/sec \leftarrow

5 sec.

$$(x+5) \times 6 = (x+10) \times 5$$

$$x = 20 \text{ m/sec.}$$

$$\text{length of train} = (20+5) \times 6 = 150 \text{ mtr. } \underline{\text{Ans}}$$

(OR)

$$5 \times 6 = 30$$

$$10 \times 5 = 50$$

$$\frac{50-30}{1} = 20 \text{ m/sec.}$$

$$\text{length} = (20+5) \times 6 = 150 \text{ mtr.}$$

- 29** Two trains of length 100 m & 80 m respectively run on parallel line. If they run in same direction they cross each other in 18 sec But if they are coming from opposite direction they cross each other in 9 sec. find the speed of faster train.

किसी भी direction में cross करे distance $(100+80) = 180$ एवं

दोगा cross करने के लिए ।

Speed of 1st train (x)

Speed of 2nd train (y)



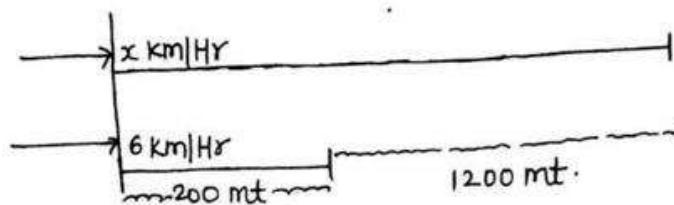
$$x-y = 10 \quad \frac{180}{18} = 10$$

$$x+y = 20 \quad \frac{180}{9} = 20$$

$$x = 15 \text{ km/sec.}$$

$$y = 5 \text{ m/sec.}$$

- 30** A truck crosses a man moving along the road at 6 km/hr. The man could see the truck upto 2 min find the speed of truck, at the time of disappearance the distance of truck to man is 1.2 Km ?



$$\text{distance travelled by man in } 2 \text{ min} = \frac{6 \times 2}{60}$$

$$= 0.2 \text{ km} = 200 \text{ mt.}$$

$$\text{distance covered by truck} = 200 + 1200 = 1400 \quad | \quad \text{Time} = \frac{2}{60} = \frac{1}{30} \text{ hr}$$

$$S = \frac{D}{T} = \frac{1400}{\frac{1}{30}} = 1400 \times 30 = 42 \text{ km/hr.}$$

(OR)

$$D = SXT$$

$$12 = (x-6) \times \frac{2}{60}$$

$$36 = x - 6$$

$$x = 42 \text{ km/hr}$$



- 31] A carriage driving in a fog passed a man who was walking at the rate of 3 km/hr in same direction. He could see the carriage for 4 min & it was visible to him upto a distance of 100 m. What was the speed of the carriage?

$$D = SXT$$

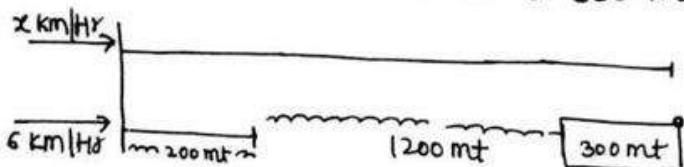
$$100m = \frac{1}{10} \text{ km}$$

$$\frac{1}{10} = (x-3) \times \frac{4}{60}$$

$$3 = 2x - 6$$

$$x = 4.5 \text{ km/hr.}$$

- 32 A train crosses a man going along the railway track at 6 km/hr. The man could see the train upto 2 min and then find the speed of the train if at the time of disappearance the distance b/w train to man was 1.2 Km ? & length of train is 300 metre ? 69



distance covered by man in 2 min = 200 mtr.

Total distance by train = $200 + 1200 + 300 = 1700$ mtr.

$$T = 2 \text{ min} = \frac{1}{30} \text{ hr.}$$

$$S = \frac{1.7}{\frac{1}{30}} = 51 \text{ km/hr}$$

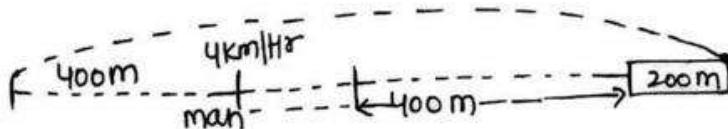
(OR)

$$1.5 = (x-6) \times \frac{2}{60}$$

$$x = 51 \text{ km/hr.}$$



- 33 A man could see 400 m during fog when he was moving with 4 km/hr, he saw a train coming from behind & disappeared in 3 min. If the length of train is 200 m, find the speed of the train ?



Total distance by train = $400 + 400 + 200 = 1000$ m = 1 km

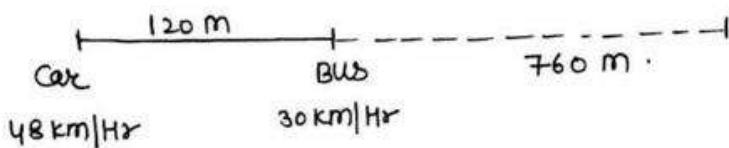
$$1 = (x-4) \times \frac{3}{60}$$

$$x = 24 \text{ km/hr}$$

$$D = SXT$$

ABR detail solve
कोई तो man का
3 min का distance
नहीं ले गे] .

- 34 A car is 120 m behind the bus, in how much time it will be 760 m ahead of bus if their speed are 48 km/hr and 30 km/hr ? 70



$$\text{Relative Speed} = 48 - 30 = 18 \text{ km/hr}$$

$$= \frac{18 \times 5}{18} = 5 \text{ m/sec.}$$

distance to be covered by ~~car~~ _{car} = 120 + 760 = 880.

$$\text{Time} = \frac{880}{5} = 176 \text{ sec. } \underline{\text{Ans.}}$$

CLASS

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By Pardeep Chhoker

7206446517

- 35 A theft is reported at 10 pm and police started chasing the thief at 1:00 am. calculate at what time the police will catch the thief, if speed of thief and police are 42 km/hr and 49 km/hr.
- 10.00 pm \rightarrow 42 km/hr

1:00 AM \rightarrow police have to cover 42×3 km distance

with Relative speed = $49 - 42 = 7$ km/hr

$$\text{Time} = \frac{42 \times 3}{7} = 18 \text{ hrs.}$$

- ⑥ A boy plants a bomb at a place and starts running at 30 m/sec. After 56 sec the bomb was blast, in how much time the sound of blast will be listen by the boy if the speed of sound is 450 m/sec.

$$\text{boy} \rightarrow 30 \text{ m/sec}$$

$$\text{sound} \rightarrow 450 \text{ m/sec.}$$

$$\text{distance travelled by boy in } 56 \text{ sec} = 30 \times 56 \text{ m}$$

$$\text{Relative speed of sound w.r.t. boy} = 450 - 30 = 420 \text{ m/sec.}$$

$$\text{Time} = \frac{30 \times 56}{420} = 4 \text{ sec.}$$

\therefore After 4 sec. boy will hear the sound of blast.

- 37 A dog chases rabbit. The rabbit is 125 leaps ahead of itself jumps from dog. The rabbit can jump 4 times in a time in which the dog can jump 3 times. The distance covered by the rabbit & dog in one jump is 1.75 and 2.75 m. In how many jumps the dog will catch the rabbit?

$$\begin{array}{ll} R & D \\ 1.75 & 2.75 \\ 7 : & 11 \end{array}$$

$$\text{Dog} = 3 \times 11 = 33 \text{ m/sec.}$$

$$\text{Rabbit} = 4 \times 7 = 28 \text{ m/sec.}$$

↓
distance in one jump.



$$\text{distance covered by Rabbit in } 125 \text{ jump} = 125 \times 7$$

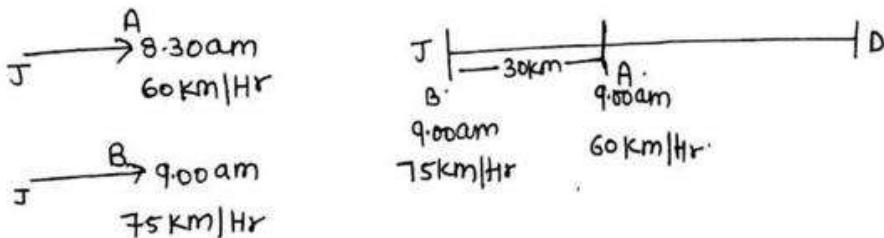
$$\begin{aligned} \text{Relative speed of dog w.r.t rabbit} \\ 33 - 28 = 5 \text{ m/sec.} \end{aligned}$$

$$\text{chasing Time} = \frac{125}{5}$$

$$= 125 \text{ sec. } \underline{\text{Ans.}}$$

$$\text{jumps} = 125 \times 3 = 525 \text{ jumps } \underline{\text{Ans}}$$

- 38 Two trains for delhi leaves jaipur at 8.30 am & 9.00 am and travel at 60 km/hr and 75 km/hr respectively. How many km away from jaipur will the two train meet?



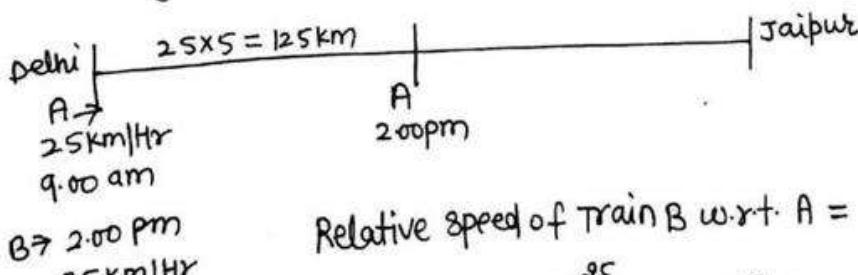
distance travelled by A in 30 min = $\frac{1}{2} \times 60 = 30$ km.

$$\text{Relative speed} = 75 - 60 = 15 \text{ km/hr}$$

$$\text{Time of catch} = \frac{30}{15} = 2 \text{ hr.}$$

From Jaipur they will meet $\Rightarrow 75 \times 2 = 150$ km.

- 39 A train travelling 25 km/hr leaves delhi at 9.00 am, another train travelling 35 km/hr at 8.00 pm, in the same direction. How many train km from delhi will they meet together?



Relative speed of Train B w.r.t. A = 10 km/hr

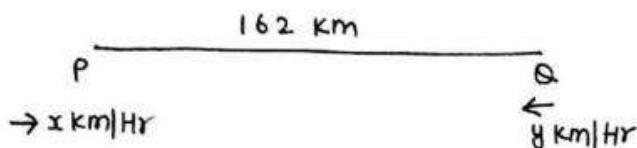
$$\text{Time of catch} = \frac{125}{10} = \frac{25}{2} \text{ hr}$$

From delhi they meet = distance travelled by train B =

$$35 \times \frac{25}{2} = 437\frac{1}{2} \text{ km}$$

Ans

- 40 Two places P & Q are 162 km apart. Two trains starts from P & Q towards each other at same time and meet after 6 hrs. Speed of one train is 8 km/hr faster than other. find the speed of both the trains.



$$x+y = \frac{162}{6} = 27 \quad (\text{Relative speed in opposite direction will be added})$$

$$x+y = 27$$

$$x-y = 8$$

$$x = \frac{35}{2} \text{ km/hr}$$

$$y = \frac{19}{2} \text{ km/hr.}$$

- 41 A, B and C start from Delhi at 10am, 11am & 12.00

towards Goa & their speed are 3km/H, 4km/H & 5km/H & After meeting on the way, B send back A to C with a message. At what time C will get the message?

10.00 am A \rightarrow 3km/hr

11.00 am B \rightarrow 4km/hr

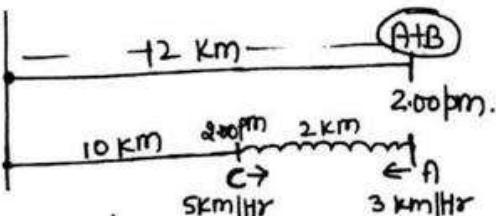
12.00 pm C \rightarrow 5km/hr

A in 1 hr = 3 Km.

R.S of B = 1 km/hr

Time of catch = $\frac{3}{1} = 3$ hr after

i.e. 11.00 am + 3 hr = 2.00 pm.
distance by B in 3 hr = $3 \times 4 = 12$ km.



$$\text{Time of message b/w A & C} = \frac{\text{Distance b/w them}}{\text{Relative speed}} = \frac{2}{8} = \frac{1}{4} \times 60 = 15 \text{ min}$$

meet at 2.15 pm.

- 42 Two trains starts at same time from delhi and jaipur towards each other with a speed of 80 km/hr and 95 km/hr. When they meet the faster train cover 180 km more distance than the other. find the distance b/w delhi & jaipur.



let they meet after x hr

so distance travelled by 1st train in x hr = $80x$

distance travelled by 2nd train in x hr = $95x$

distance b/w Delhi & jaipur = $80x + 95x = 175x$

$$\text{Now: } 95x - 80x = 180 \text{ km}$$

$$15x = 180$$

$$x = 12 \text{ hr}$$

so they will meet after 12 hr

Distance b/w Delhi & Jaipur = $175 \times 12 = 2100 \text{ km}$

- (OR) let they meet after 1 hr.

$$\text{Total distance} = 80 + 95 = 175 \text{ km}$$

$$\therefore 95 - 80 = 15 \text{ unit} \quad \begin{array}{c} 180 \\ \hline 12 \end{array}$$

$$\therefore \text{they meet after} = 1 \times 12 = 12 \text{ hr}$$

$$\therefore \text{Distance b/w Delhi & Jaipur} = 175 \times 12 = 2100 \text{ km} \quad \underline{\underline{\text{Ans}}}$$

75

- 43 Two trains start at same time from two stations towards each other @ 20 km/hr and 25 km/hr. When they meet the faster train cover 80 km more distance than other. find the distance.



let they meet after 1 hr.

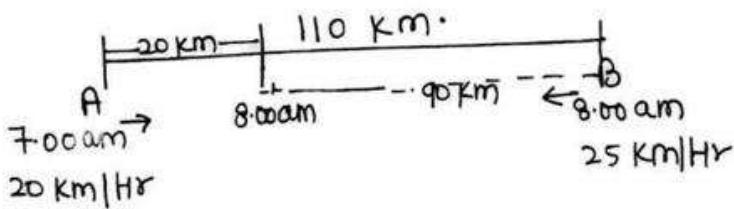
$$\text{Then distance} = 20 \times 1 + 25 \times 1 = 45 \text{ km.}$$

$$\therefore 25 - 20 = 5 \text{ km} \quad 80 \\ 1 \text{ unit} \quad 16 \text{ km.}$$

$$\therefore \text{They meet after} = 1 \times 16 = 16 \text{ hr.}$$

$$\text{distance} = 16 \times 45 = 720 \text{ km.}$$

- 44 Two stations A and B are 110 km apart. One train starts from A at 7.00 am and travel towards B. at 20 km/hr. Another train starts from B at 8.00 am towards A at 25 km/hr. At what time will they meet?



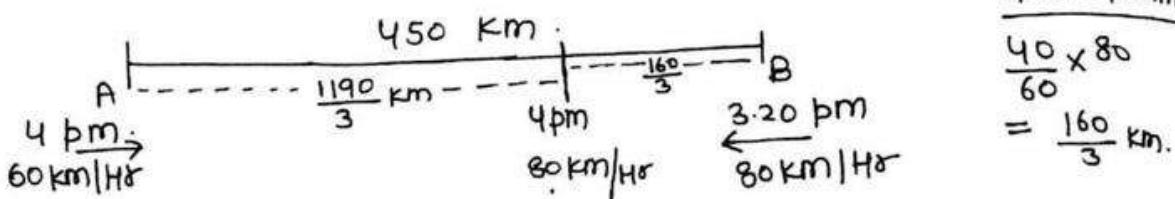
$$\text{Relative speed} = 20 + 25 = 45 \text{ km/hr.}$$

$$\text{Time of meet} = \frac{90}{45} = 2 \text{ hrs}$$

$$\Rightarrow 8.00 \text{ am} + 2 \text{ hr} = 10.00 \text{ am} \quad \underline{\text{Ans}}$$

45. The distance b/w two stations A and B is 450 km. A train starts at 4 pm with 60 km/hr from A to B. Another train starts from station B at 3.20 pm towards A with a speed of 80 km/hr. At what time will the both train meets.

76.



Let meet after 1 hr then distance = $60+80 = 140 \text{ km.}$

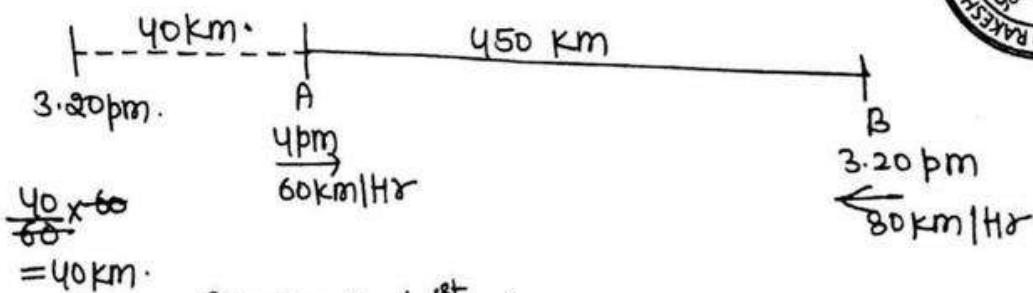
$$140 \text{ --- } \frac{1190}{3}$$

$$1 \text{ unit} \text{ --- } \frac{\frac{17}{1440}}{3} = \frac{17}{6} = 2\frac{5}{6} \text{ Hr} = 2 \text{ Hr } 50 \text{ min}$$

meet after 2 Hr 50 min.

i.e. $4 \text{ pm} + 2 \text{ Hr } 50 \text{ min} = \underline{6 \text{ Hr } 50 \text{ min}}$
 6.50 pm. Ans

OR



Assume that 1st train starts at 3.20.

Total distance = $40+450 = 490$

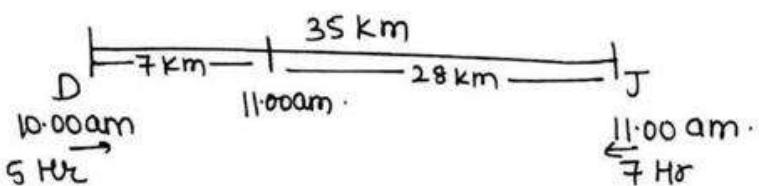
R.S. = $60+80 = 140$

Time of meet = $\frac{490}{140} = 3.50 \text{ Hr.}$

$3.20 \text{ pm} + 3.50 \text{ Hr} = 6.50 \text{ pm. r}$



- 46 A train starts from Jaipur at 10:00 am and reach Delhi at 3:00 pm. Another train starts from Delhi at 11 am and reach Jaipur at 6:00 pm. find the meeting time.



let distance = 35 km.

$$\text{speed of } D = 7 \text{ km/hr}$$

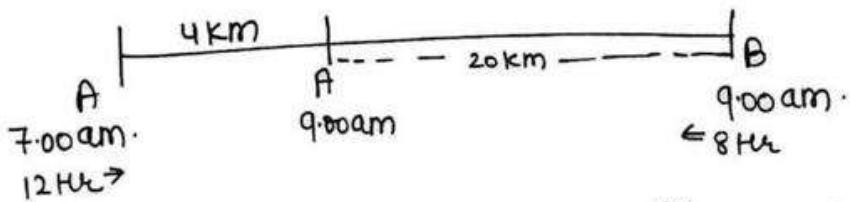
$$\text{Speed of } J = 5 \text{ km/hr}$$

$$\text{Meeting Time} = \frac{28}{12} = 2\frac{1}{3} \text{ hr} = 2 \text{ hr } 20 \text{ min}$$

i.e. they will meet $11:00 + 2 \text{ hr } 20 \text{ min} = 1:20 \text{ pm}$ Ans



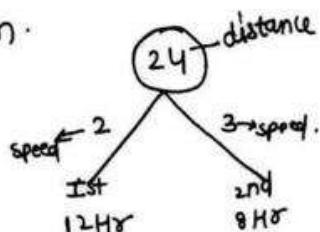
- 47 A train starts from station A at 7:00 am and reaches station B at 7:00 pm. Another train starts from station B at 9:00 am and reaches station A at 5 pm. find the time when they meet?



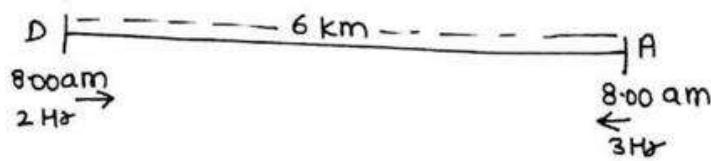
$$\text{Relative speed} = 2+3 = 5 \text{ km/hr}$$

$$\text{Meeting Time} = \frac{24}{5} = 4 \text{ hr}$$

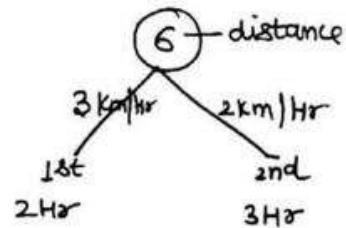
$9:00 \text{ am} + 4 \text{ hr} = 1:00 \text{ pm}$ Ans



- 48 A train starts from Delhi at 8.00 am reached Agra 78
 at 10 am. Another train starts from Agra at 8.00 am
 & reached Delhi at 11.00 am. find the meeting time?



$$\text{meeting Time} = \frac{6}{5} = 1.12 \text{ Hrs.}$$



$$8.00 \text{ am} + 1.12$$

$$= 9.12 \text{ am} \quad \underline{\text{Ans}}$$

- 49 By walking $\frac{6}{7}$ of his usual speed a man is 12 min late. find the usual time taken by him to cover that distance.

$\frac{6}{7}$	Speed $\frac{1}{6}$ unit	Time 12 min
---------------	-----------------------------	--------------------------

$$\text{usual time} = 6 \times 12 = 72 \text{ min} \quad \underline{\text{Ans}}$$

50

- In covering a certain distance the ratio of speed of A & B is 3 : 4. A takes 30 min more than B to reach the destination. find the time taken by A to reach the destination?

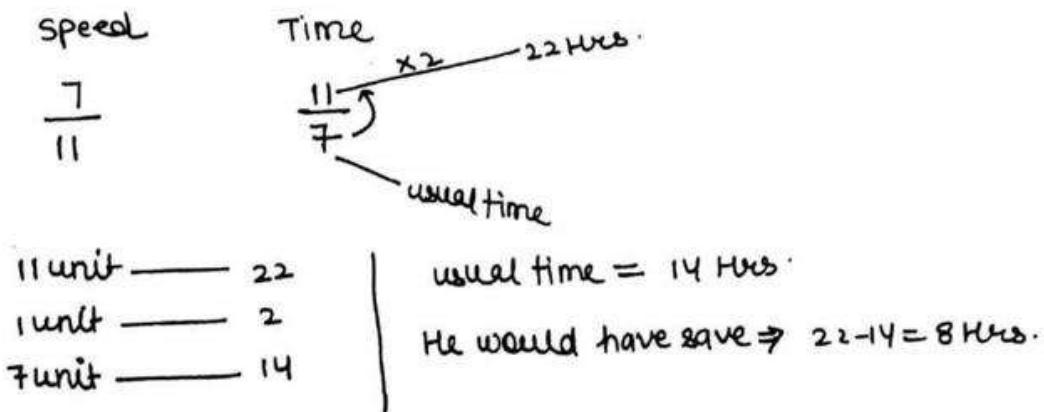
A	3	4
B	4	3

1 unit $\times 30$ = 30 min

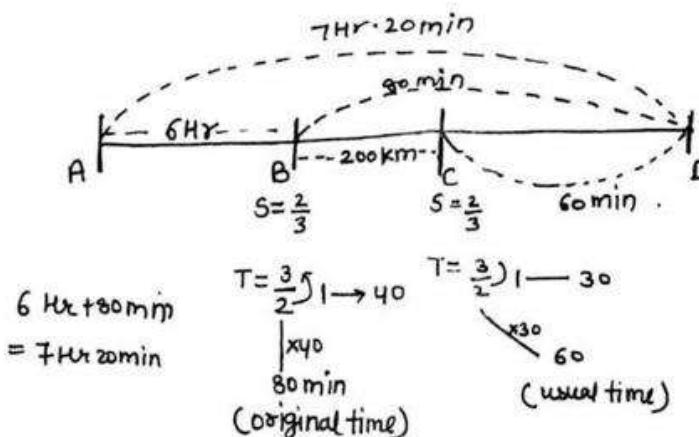
$$\text{usual time taken by A} = 4 \times 30 = 120 \text{ min}$$

$$\& \text{By B} = 3 \times 30 = 90 \text{ min.}$$

- 51 A person running at $\frac{7}{11}$ of its usual speed reached a place in 22 hrs. How much time would he save had he run his normal speed?



- 52 A train starts from Delhi at 8.00 am. After 6 hrs there was a breakdown in the train, due to which it travels $\frac{2}{3}$ of its normal speed and hence becomes 40 mins late. If the breakdown would be 200 km further then it becomes 30 min late only. find the distance from Delhi to Agra?



From point B to D usual time of train = 80 min

\therefore time from A to D = 7 hr 20 min

From C to D usual time = 60 min

\therefore B to C train takes $(80 - 60) = 20$ min and
this distance is given 200 Km.

$$T = \frac{20}{60} = \frac{1}{3} \text{ hr}$$

$$\text{Speed} = \frac{200}{\frac{1}{3}} = 600 \text{ km/hr}$$

Distance from A to D = $S \times T$

$$= \frac{200}{600} \times \frac{22}{3}$$

$$7 \frac{1}{3} = \frac{22}{3} \text{ hr}$$

$$= 4400 \text{ km} \quad \underline{\text{Ans.}}$$

	A	B	
speed	4 : 3		$\text{Speed} \propto \frac{1}{\text{Time}}$
Time	3 : 4		
	if speed is $\frac{4}{3}$ then time is $\frac{3}{4}$.		

OR

$$\begin{array}{ccc} S & T \\ \frac{2}{3} & \frac{3}{2} \end{array} \rightarrow 1 \text{ unit} \xrightarrow{\times 10} 10 \text{ min}$$

~~$\times 10$~~
20 min

$$T = \frac{20}{60} = \frac{1}{3} \text{ Hr}$$

$$D = 200 \text{ km.}$$

$$S = \frac{200}{\frac{1}{3}} = 600 \text{ km/Hr}$$

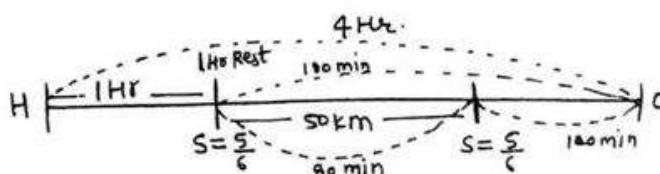
CLASS

By Pardeep Chhoker

10

7206446517

- 53] A man starts from his home to his office with a certain speed but after 1 Hr he meets with an accident & resumes his journey after 1 Hr and becomes 1 Hr 36 min late due to reducing his speed to $\frac{5}{6}$. If the accident would occurred after 50 km then he will be late by 1 Hr 20 min. Find the distance from home to office ?



$$T = \frac{6}{5}) 1 \text{ unit} - 36 \text{ min} \quad T = \frac{6}{5}) 1 \text{ unit} - 20 \text{ min}$$

~~$\times 36$~~
180 min (usual time) ~~$\times 20$~~
100 min (usual time)

speed की बगद से
36 min late हुआ है
1 Hr तो दूसरे खाड़ा रहा.

$$\begin{array}{ccc} S & T \\ \frac{5}{6} & \frac{6}{5} \end{array} \rightarrow 1 \text{ unit} \xrightarrow{\times 16} 16 \text{ min}$$

~~$\times 16$~~
80 min

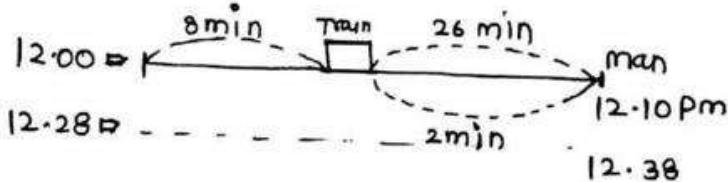
$$D = 50 \text{ km}$$

$$T = \frac{80}{60} = \frac{4}{3} \text{ Hour}$$

$$S = \frac{50 \times 3}{4} = \frac{75}{2} \text{ km/hr}$$

Distance b/w home to office = $\frac{75}{2} \times 4 = 150 \text{ km.}$

- 54] 2 guns were fired from same place at an interval of 28 mins. But a man sitting in the train approaching the place hears the 2nd firing 26 min after the 1st. If the speed of sound is 325 m/sec, find the speed of train?



	Time	Speed
Train	12:13	$\times 25 \rightarrow 25 \text{ m/s.}$
Sound	12:13	$\times 25 \rightarrow 325 \text{ m/s}$

$\therefore \text{Speed of Train} = 25 \text{ m/s.}$

OR

(28) $\frac{26}{2} \text{ को diff होगा sound का Time होगा}$

पिछी के बाद $\frac{26}{2}$ को $\frac{26}{13}$ में man/train का Time होगा

man को सुनाई दी वाला man/train का Time होगा,

man/train	$\frac{T}{26/13}$	$\frac{S}{1/13}$
sound	$\frac{1}{1}$	

32

83

- 55 Two guns were fired from same place at an interval of 28 mins. But a man sitting in the train approaching going away from the place hears the 2nd firing 30 min after the 1st. If the speed of train is 20 km/hr find the speed of sound?

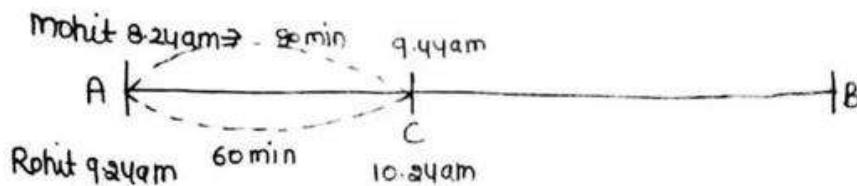
	Time	Speed
Train	20-15	1 $\xrightarrow{+20} 20 \text{ km/hr}$
Sound	2-1	15 $\xrightarrow{-20} 300 \text{ km/hr}$

Ans.

- 56 The buses are departed after every 20 min, but man going away from the bus depot after every 24 min get the buses. Find the speed of buses if the speed of man is 30 km/hr.

	T	S	Same concept as gun.
man	24-6	6 $\xrightarrow{+30} 30 \text{ km/hr}$	
bus	4-1	6 $\xrightarrow{-30} 180 \text{ km/hr Ans.}$	

- 57 Two places A & B are 300 km apart, ~~2 men P & Q~~ starts from city A at 8:24 am and an hour later Rohit starts from city A & after travelling for one hour he reaches at city C that Mohit had passed 40 min earlier. City C falls on the way from A to B. If they reaches city B at same time, find their speed.



mohit	T -804	S 3x
Rohit	-603	4x

$$\frac{\frac{100}{300}}{3x} - \frac{\frac{75}{300}}{4x} = 1$$

$$\frac{\partial S}{\chi} = 1$$

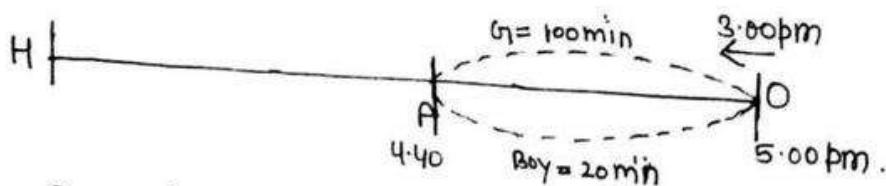
x = 25

$$\text{mohit} = 3 \times 25 = 75 \text{ km/hr}$$

$$\text{Rohit} = 4 \times 25 = 100 \text{ km/Hr}$$

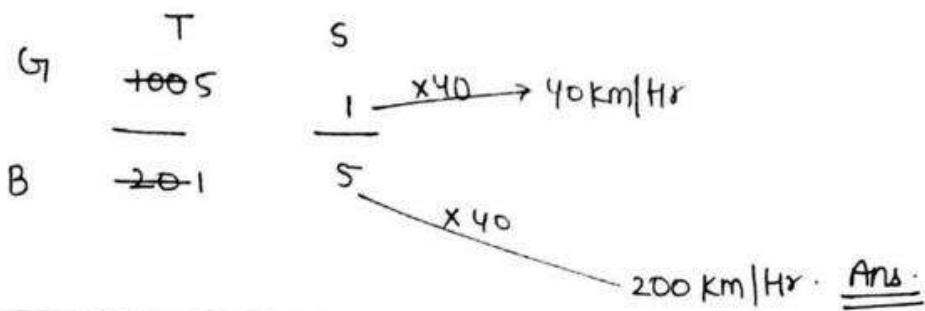


58 A boy starts from his home at a certain time with a certain speed to pick up his girlfriend from office at 5.00 pm. One day his girlfriend left the office at 3.00 pm and start walking to home with a speed of 40 km/hr and meet the boy in the way who left his home at his usual time. They reached home 40 min earlier than their usual time. find the speed of boy.



५० मिनट पहले
पहुँच गए धर

क्योंकि आज boy को A से O और O से A नहीं आना पड़ा
 \therefore A से O & O से A आने जाने में 40 min लगे ($20+20$)
 \therefore Hence they meet at 4-40 on the way.



59] 2 places A and B are 60 km apart. 2 men P & Q start from A at same time & meet 1st time at a place 12 km from B & they have to reach at A after immediate return from B, if the speed of slower person is 48 km/hr. find the diff of their speed?

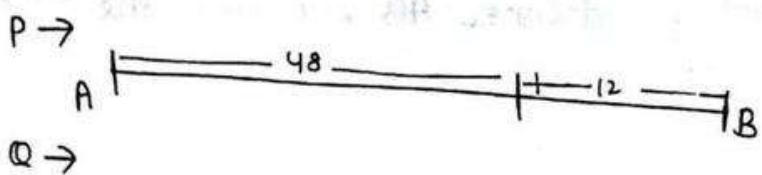
If two or more objects starts at same time for a certain time then they travel the distance in the ratio of their speeds and vice-versa.

Eg:

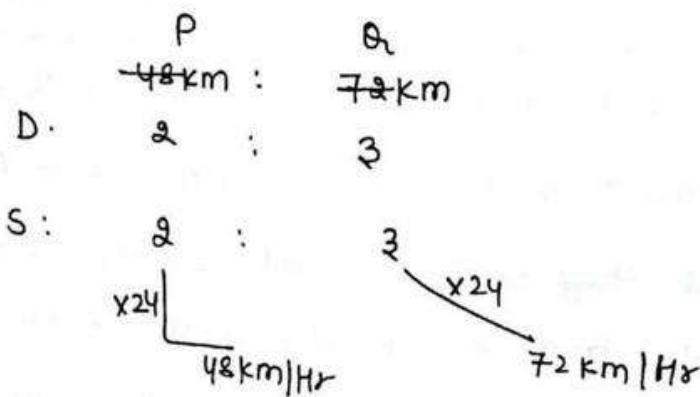
A	B
5 km/hr	: 4 km/hr
3 hr	
+5 km	3 hr
5	: 4

same ratio of speed & distance.





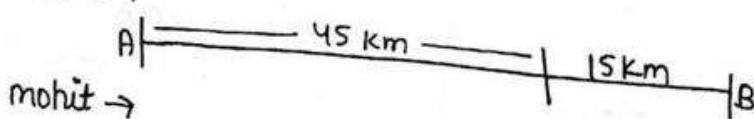
Q →



diff b/w their speed = 24 km/hr.

- 60 Rohit and mohit starts at same time from A to B, after reaching their destination they turned to their starting point and they meet 1st time at 15 km from B . If the diff b/w their speed is 60 km/hr then find the speed of faster if A & B are 60 km apart ?

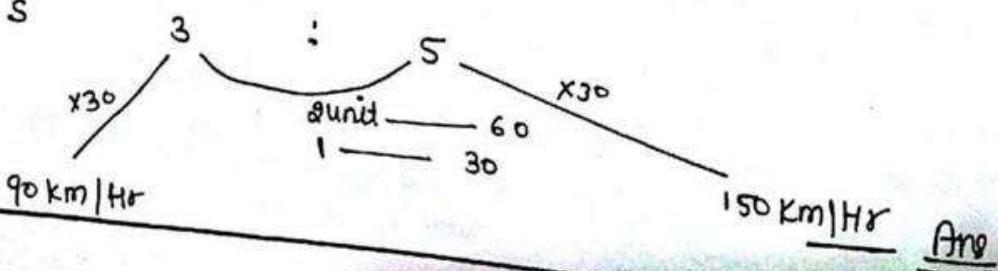
Rohit →



$$D \quad \text{Rohit} \quad \text{Mohit}$$

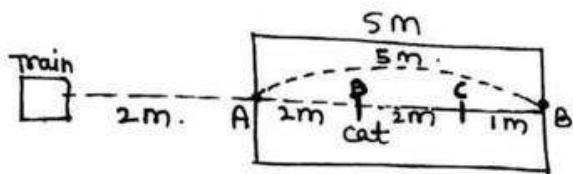
$$45 \text{ km} : 75 \text{ km}$$

S



87

- 61 A train approaches a tunnel AB, inside the tunnel a cat is located at a point ie $\frac{2}{5}$ the distance AB measured from the entrance. When the train whistle then cat runs. If the cat decides to run towards A side the train catches the cat exactly at A. If the cat decides to run towards B side, the train catches the cat exactly at B. find ratio of speed of train & cat ?

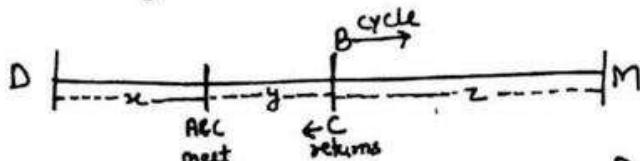


Train	Cat
Distance	5 : 1
Speed	5 : 1



* cat is at point D. Train & A के बीच का distance 2m है. जब Train A point पर पहुंचेगी तो cat D से C पर पहुंच जायेगी. अब जितने time में train A से 8sm cover करती है उतने time में cat C से B 1m. ∵ same time पे चले है, same time पर पहुंचे है. तो जो distance travel करेंगे उपरी speed की ratio में करेंगे।

- 62 A, B, C travels a distance of 1200 km from Delhi to Mumbai. B & C takes a car & A starts with tonga and after a certain distance C throws B from car. B takes a cycle and C returns to takes A and finally they reach mumbai at same time. If the speed of car is 50 km/h and of cycle & tonga is 10 km/h each. find the total time of journey.



जितने time में C (x+y) distance cover करेंगा उतने time में A (x) करेंगा। ∴ दोनों जो distance cover करेंगे वो speed की ratio में करेंगे।

$$A \quad \frac{C}{A} = \frac{x}{x+y} = \frac{50}{10} = \frac{5}{6}$$

$$\frac{x}{y} = \frac{1}{2}$$

$$\begin{array}{l} \text{Dis.} \quad \text{Speed.} \\ \text{C} \quad \frac{2y+z}{z} = \frac{56}{10} \\ \text{B} \quad \frac{2y+z}{z} = \frac{56}{10} \end{array}$$

same case C और B का होगा.

$$\boxed{\frac{z}{y} = \frac{1}{2}}$$

$$\begin{array}{l} x : y : z \\ 1 : 2 : 1 \end{array}$$

$1+2+1=4 \rightarrow 1200 \text{ Km}$
1 unit $\rightarrow 300 \text{ Km.}$

Time taken =
 $\frac{300}{10} + \frac{900}{50}$
 $= 48 \text{ Hrs. } \underline{\text{Ans.}}$

$T = \frac{D}{S}$

#

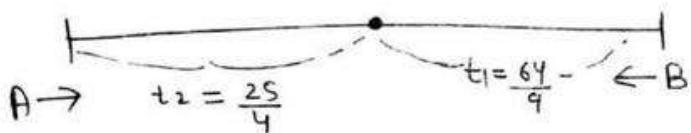


A & B starts walking towards each other

After meeting A cover his distance in t_1 time and B cover his distance in t_2 time
Ratio of their speed is

$$\frac{A}{B} = \sqrt{\frac{t_2}{t_1}}$$

- 63] 2 men A & B start from Delhi & Agre at same time towards each other, after meeting on the way they cover their remaining journey in $7\frac{1}{9}$ hr & $6\frac{1}{4}$ hr respectively. find the slower speed if faster speed is 40 km more than slower?



$$\frac{A}{B} = \sqrt{\frac{\frac{25}{4}}{\frac{64}{9}}} = \sqrt{\frac{25}{4} \times \frac{9}{64}} = \frac{15}{16}$$

$$\frac{A}{B} = \frac{15}{16} \text{) unit } \cancel{x 40} \text{. } 40 \text{ km}$$

$$A = 15 \times 40 = 600 \text{ km/hr}$$

$$B = 16 \times 40 = 640 \text{ km/hr.}$$

64 A distance of 600 km is to be covered in 2 parts. In 1st phase 120 km is travelled by train and rest by car and it took total of 8 hr, but if 200 km is covered by train and rest by car it takes 20 min more. find the avg speed of car and train?

$$\frac{120}{T} + \frac{480}{C} = 8 \text{ --- (i)}$$

$$\frac{200}{T} + \frac{400}{C} = 8\frac{1}{3} \text{ --- (ii)}$$

Multiply (i) by 5 and (ii) by 3.

$$\cancel{\frac{600}{T}} + \frac{2400}{C} = 40$$

$$\cancel{- \frac{600}{T}} + \frac{1200}{C} = 25$$

$$\frac{800}{C} = 15$$

$$C = 80 \text{ km/hr}$$

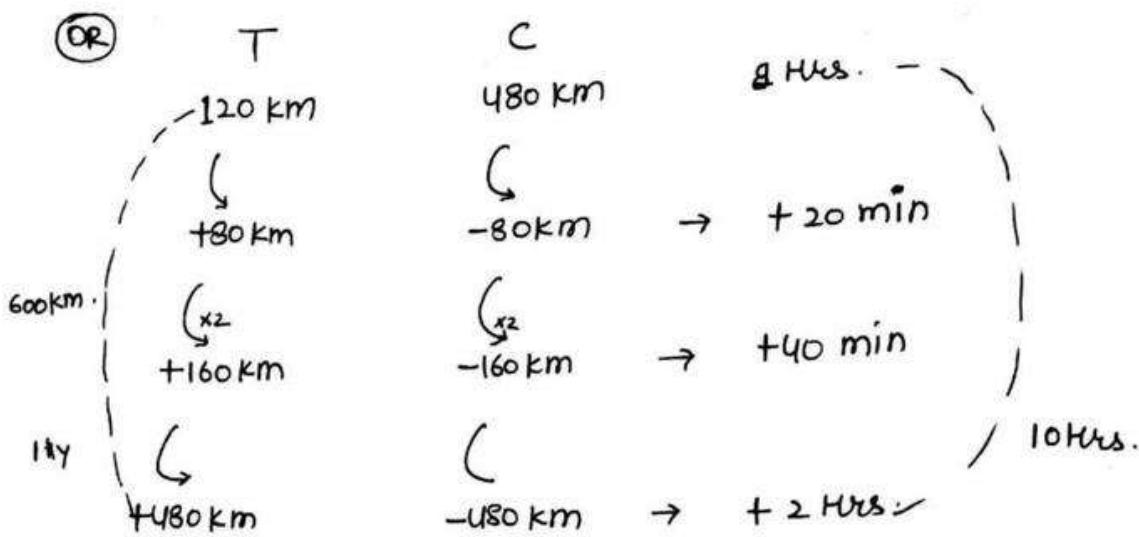
Put in (i)

$$\frac{120}{T} + \frac{480}{80} = 8$$

$$\frac{120}{T} = 8 - 6 = 2$$

$$T = \frac{120}{2} = 60$$

$$T = 60 \text{ km/hr}$$



$$\text{Speed of Train} = \frac{60\phi}{1\phi} = 60 \text{ km/Hr.}$$

⇒

T	C	
$\frac{120 \text{ km}}{60}$	$\frac{480 \text{ km}}{6}$	8 Hr
= 2 Hr	80 km/Hr.	
	↓ Car speed.	<u>Ans.</u>

CLASS

11.

By Pardeep Chhoker

7206446517

- 65 A man takes 6.30 hrs in walking to a certain distance and riding back on horse. If he rides both sides on horse he would have saved 2 hr 10 min. How much time does he take on walking both sides.

$$W + R = 6.30$$

$$R + R = 4:20$$

↓
↓

2.10 2.10

so $W + R = 6.30$
 ↓
 2.10



$$W = 4.20.$$

$$W + W = 4.20 + 4.20 = 8.40 \text{ Hrs.} \quad \underline{\text{Ans.}}$$

- 66 Without any stoppage a person travel a certain distance at an avg speed of 42 km/hr and with stoppage it travel the same distance with 28 km/hr avg speed. find how many min per hour does he stop ?

$$\frac{42 - 28}{42} \times 60$$

$$\frac{14}{42} \times 60 = 20$$

3

$$= 20 \text{ min/hr.}$$

$$\left(\frac{\text{Faster speed} - \text{Slower speed}}{\text{Faster speed}} \times 60 \right) \text{ min/hr}$$

- 67 Excluding stoppage the speed of bus is 54 km/hr 92
 Including stoppage it is 45 km/hr. How many min does the bus stops per hour.

$$\frac{54-45}{54} \times 60$$

$$\frac{9}{54} \times 60 = 10 \text{ min/hr. } \underline{\text{Ans}}$$

- 68 A train covers a distance of 36 Km with speed of 12 km/hr, if it stops 12 min after every 1 km. find the total time covered in distance by the train ?

$$\frac{36}{12} = 3 \text{ hrs.}$$

He stops 12 min after every 1 km.

\therefore He stops 35 times.

$$\frac{35 \times 12}{60} = 7 \text{ hrs he stops.}$$

$$\text{Total time} = 3+7 = 10 \text{ hrs.}$$



- 69 An express train travelled at 100 km/hr stopping for 3 min after every 75 km and a local train travelled at 50 km/hr stopping for 1 min after every 25 km. If both train starts together then how many kms did the local train travel in the time it took the express train to travel 600 km?

$$\frac{600}{100} = 6 \text{ hr.}$$

Stoppage Time = $\frac{600}{75} = 7$ times (8th time तो destination पर पहुंच जाएगी)
 7 times $\times 3 \text{ min.} = 21 \text{ min.}$

Total time taken by Express train = 6 hr 21 min

50 km/hr & stops 2 min in every hr.

$$6 \text{ hr} + 6 \times 2 (12 \text{ min})$$



300 km (in 6 hr 12 min)



$$\text{Time left} = 9 \text{ min} \Rightarrow \frac{50 \times \frac{9}{3}}{60} = 7.5 \text{ km.}$$

Total distance covered by slower train = 307.5 km.

Speed of a steam engine is 24 km/hr without any wagon. The decrease in speed of engine is directly proportional to the square root of no. of wagons attached. If 4 wagons are attached with engine speed becomes 20 km/hr. Find the max. no. of wagons which are attached with engine so that engine can carry.

$$\text{Decrease} \propto \sqrt{w}$$

$$D = K \sqrt{w}$$

$$24 - 20 = K \sqrt{4}$$

$$2 = K \times 2$$

$$K = 2$$

$$\therefore D = 2 \sqrt{w}$$

Train की speed zero

करने के लिए 24 decrease
करेंगे

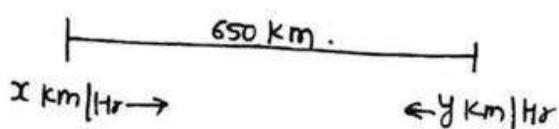
$$12 - 24 = 2 \sqrt{w}$$

$$w = 144$$

144 wagon पे speed
zero हो जाएगी means
Train 143 wagon से
जा सकती है।

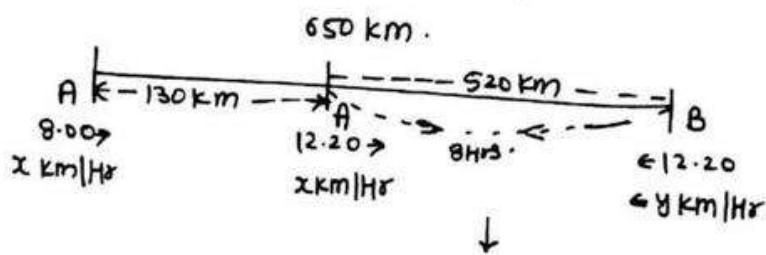
143 wagon Ans

71] The distance b/w 2 stations X and Y is 650 km. It 2 trains start together at same time from both stations towards each other and meet after 10 hrs but if one train is started 4 hrs 20 min after the first then they meet after 8 hrs. find the speed of trains.



meeting time = 10 hr.

$$\therefore \text{Relative speed } (x+y) = \frac{650}{10} = 65 \text{ km/hr.}$$



meet time = 8 hr.

$$D = S \times T = 65 \times 8 = 520 \text{ km.}$$

speed of A in covering 130 km in 4 hr 20 min

$$S = \frac{130}{4 \frac{1}{3}} \times 3 = 30 \text{ km/hr.}$$

$$4 \frac{20}{60} = \frac{13}{3} \text{ hrs.}$$

Speed of Train A ($x \text{ km/hr.}$) = 30 km/hr.

Speed of Train B ($y \text{ km/hr.}$) = $65 - 30 = 35 \text{ km/hr.}$

Ans

- 78 A person travel 120 km by a steamer, 460 km by train & 60 km by Horse. The total journey took 13 hr 30 min. If the rate of the train is 3 times that of horse and 1.5 times that of steamer. find the speed of train.

$$T \quad H \quad S \\ 3x : \quad 1x : \quad 2x$$

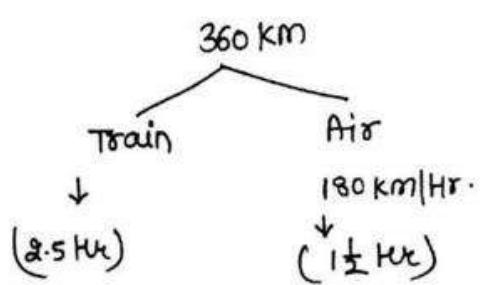
$$\frac{120}{3x} + \frac{60}{x} + \frac{460}{2x} = \frac{27}{2}$$

$$\frac{\frac{10}{x}}{x} = \frac{27}{2}$$

$$x = 20$$

$$\text{Speed of Train} = 3x = 3 \times 20 = 60 \text{ km/hr.}$$

- 73 A man travel 360 km in 4 hrs partly by air and partly by train. if he had travelled all the way by air then he would have arrived 2 hrs earlier at his destination and save $\frac{4}{5}$ of the time he was in train. find the distance travelled by air and train separately?



$$\text{By Air} = 180 \times \frac{3}{2} = 270 \text{ km.}$$

$$\text{By Train} = 360 - 270 = 90 \text{ km.} \\ \text{Ans.}$$

$$T+A = 4 \text{ hrs}$$

$$A = 4-2 = 2 \text{ hrs.}$$

$$\text{Speed in Air} = \frac{360 \text{ km}}{2 \text{ hrs}} = 180 \text{ km/hr.}$$

$$* \text{ Train time} = t \text{ hour}$$

$$t \times \frac{4}{5} = 2$$

$$t = 2.5 \text{ hr.}$$

$$\text{Air} = 4 - 2.5 = 1.5 \text{ hr.}$$

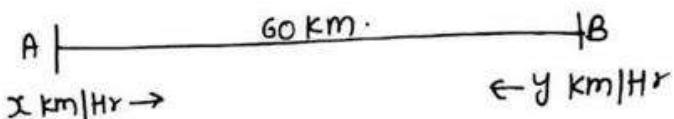
2 hr जल्दी

पहुंचा हो तो Train

के time का

$\frac{4}{5}$ save किया है।

- 74 From two places 60 km apart A & B starts towards each other at same time and meet each other after 6 hrs. if A travel $\frac{2}{3}$ of his speed and B travel with double of his speed then they would have met after 5 hrs. find the speed of A.



$$\begin{aligned} x + y &= 10 \\ \left(\frac{2x}{3} + 2y\right) &= 12 \\ \Rightarrow \cancel{x} + 3y &= 18 \\ \cancel{x} + y &= 10 \\ 2y &= 8 \\ y &= 4 \text{ km/hr} \\ x &= 10 - 4 = 6. \end{aligned}$$

$$\begin{aligned} R.S &= \frac{d}{t} \\ &= \frac{60}{6} \\ &= 10 \\ * \frac{60}{5} &= 12 \end{aligned}$$

$$x = 6 \text{ km/hr}$$

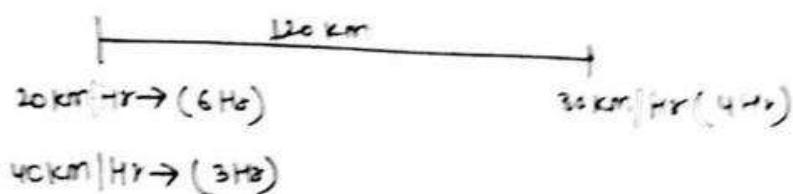
- 75 A man travel from A to B at 20 km/hr. and come back from B to A at 30 km/hr. find the avg. speed of the whole journey.

$$\text{Avg speed} = \frac{\text{Total distance}}{\text{Total time.}}$$



$$\begin{aligned} &\text{20 km/hr} \quad 60 \text{ km.} \quad 30 \text{ km/hr} \\ &\text{3 hr} \qquad \qquad \qquad 2 \text{ hr} \\ &\frac{120}{5} = 24 \text{ km/hr} \end{aligned}$$

- 76 A man travel from A to B at 20 km/hr and he come back from B to A at 30 km/hr. and he again travel from A to B at 40 km/hr. find the avg speed of the whole journey?

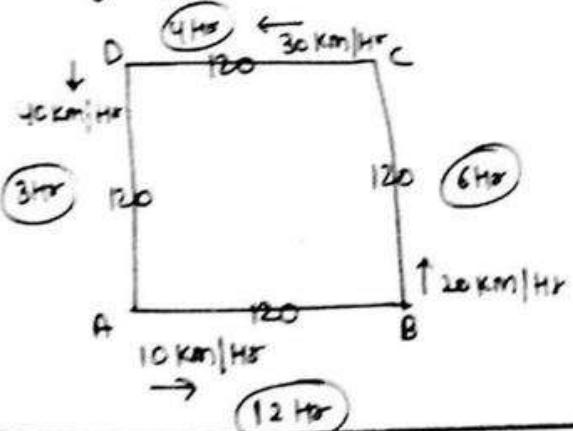


$$\text{Avg speed} = \frac{360}{13} \text{ km/Hr}$$

$$120 + 20 + 120 = 360$$



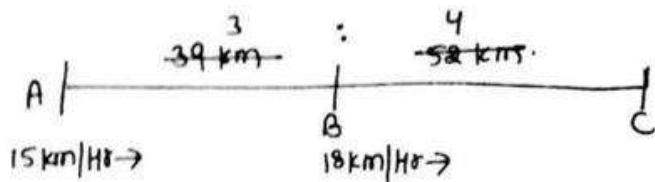
- 77 Four cities A, B, C & D are on the corners of a square. And the side of the square is 100 km. A man travel from A to B at 10 km/hr, B to C @ 20 km/hr, C to D @ 30 km/hr and D to A @ 40 km/hr. find the avg speed of the whole journey.



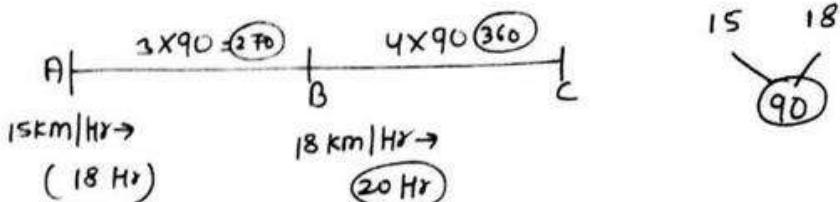
Avg. speed ने सभी
सिर्फ कोई नहीं दूरी
ने छोड़ दी है।

$$\frac{120 \times 4}{25} = \frac{96}{5} \text{ km/Hr}$$

- 78 A man travel from A to B a 39 km distance with a speed of 15 km/hr and he travel from B to C 52 km distance with a speed of 18 km/hr. find the avg speed of whole journey?

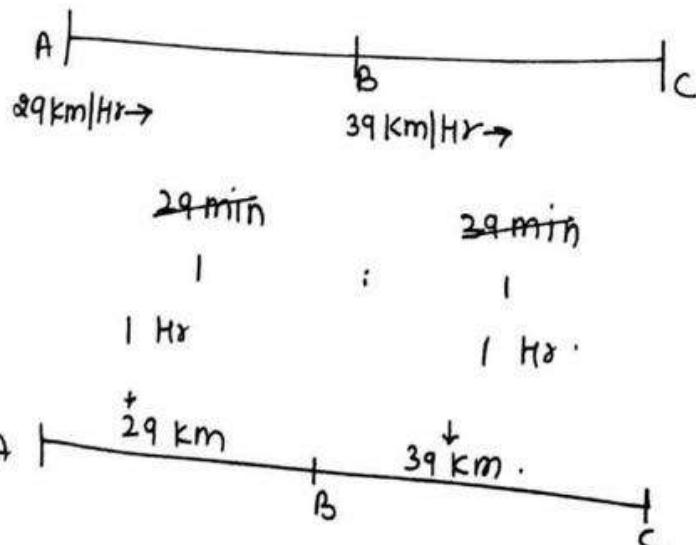


98
कोई भी distance
ले सकते हैं but
ratio same आना
चाहिए distance का.



$$\text{Avg speed} = \frac{270 + 360}{18 + 20} = \frac{630}{38} \text{ km/hr}$$

- 79] A man travel from A to B at a speed of 29 km/hr in 29 min. and he travel a distance from B to C with a speed of 39 km/hr in 29 min. find the avg speed of whole journey.



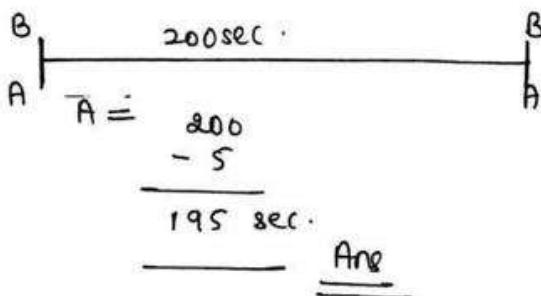
कोई भी Time ले
सकते हैं but original
वाले time का जो
ratio है वही दर्ता
देना चाहिए.

$$\text{Avg speed} = \frac{29+39}{1+1} = \frac{68}{2} = 34 \text{ km/hr.}$$

38

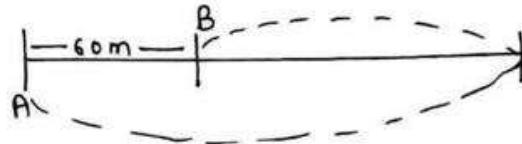
- 80 A gives B a start of 5 sec. in 1000 m race. But 99 both finish the race at same time. find the time taken by A to finish the race .if speed of B is 5m/sec .

$$B = \frac{1000}{5} = 200 \text{ sec.}$$



- 81 A is $1\frac{2}{3}$ times faster than B. A gives 60 m start to B in a race. find the length of race if both finish the race at same time.

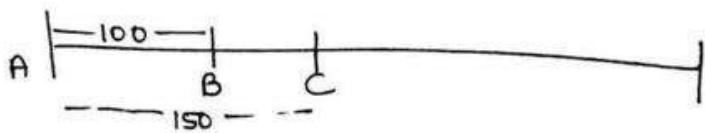
$$\begin{array}{l} A : B \\ \text{Speed} \rightarrow 5x : 3x \\ \text{distance} \quad 5x : 3x \\ \qquad \qquad \qquad 2x \rightarrow 60 \end{array}$$



$$x = 30$$

$$\text{Race track} = 5x = 150 \text{ mt.}$$

- 82 In a 1000 m race A gives a start of 100 m to B & 150 m to C. How much start B can give to C in a race of 1000 m.

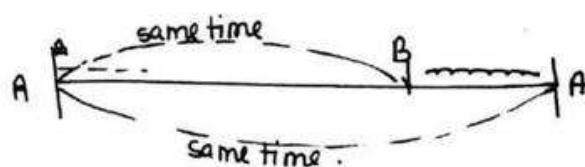


$$\begin{array}{ccc}
 A & B & C \\
 \text{D} \rightarrow 1000 : 900 : 850 \\
 & \quad \quad \quad \underbrace{\qquad\qquad}_{50} \\
 & 1000 \text{ mt} & " & " & " = \frac{50}{900} \times 1000 \\
 & & & & = 55 \frac{5}{9} \text{ m } \underline{\text{Ans}}
 \end{array}$$

if 900 mt race B to C a start of — 50 mt

83 A can finish a race in 3 min, 10 sec. while B can finish the same race in 3 min 20 sec. By what distance A will defeat B in a race of 1000 m.

$$\begin{array}{ccc}
 A & : & B \\
 \text{Time} & 190 & 200 \\
 \text{Speed} & 20 & 19 \\
 & \downarrow \times 50 & \downarrow \times 50 \\
 & 1000 & 950 \\
 & \quad \quad \quad \underbrace{\qquad\qquad}_{50 \text{ mt.}} & \underline{\text{Ans.}}
 \end{array}$$

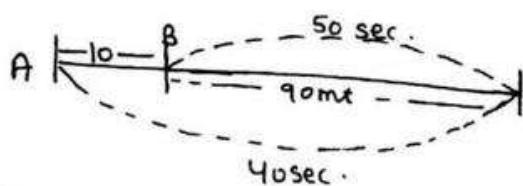


same Time पर चले हैं और
same time के लिए दोनों हैं तो
speed के ratio में distance cover
करेंगे.

84 In a 100 m race A runs at a speed of 9 km/hr. He gives a start of 10 m to B and still defeat him by 10 sec. find speed of B.

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

$$A = \frac{100 \times 2}{5} = 40 \text{ sec.}$$



B cover 90 mt in 50 sec.

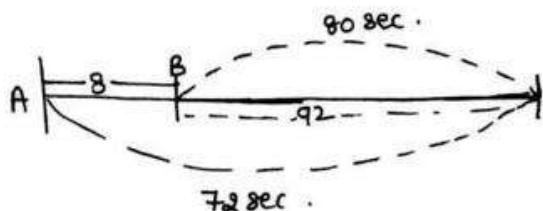
$$\text{Speed}_B = \frac{90}{50}$$

$$= \frac{9}{5} \text{ m/s.}$$

85 In a 100 m race A runs at a speed of 5 km/hr. He gives a start of 8 m to B and still defeat him by 8 sec. find speed of B ?

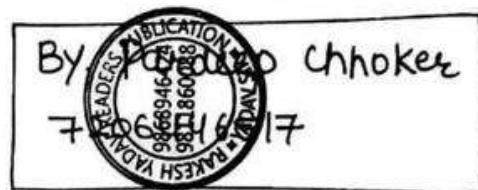
$$A = \frac{5 \times 5}{18} = \frac{25}{18} \text{ m/s}$$

$$A = \frac{4}{\frac{100 \times 18}{25}} = 7.2 \text{ sec.}$$



B will cover 92 m in 80 sec.

$$S = \frac{\frac{92}{23}}{80 - 72} = \frac{23}{20} \text{ m/sec.} \quad \underline{\text{Ans.}}$$



#

→ Boat (B)
~~~~→ water (W)

→ Boat  
water ←

$$\text{Relative Speed} = B + W$$

$$\text{Relative Speed} = B - W$$

$$\text{Downstream} = (B + W)$$

$$\text{Upstream} = (B - W)$$

- ① A boat road down a river at 21 km/hr and road up the river at 9 km/hr. What is the velocity of the stream.

$$B + W = 21$$

$$B - W = 9$$

$$2B = 30$$

$$B = 15 \text{ km/hr}$$



$$\text{water} = 21 - 15 = 6 \text{ km/hr. Ans.}$$

- ② A swimmer can swim downstream at 14 km/hr and upstream (us) at 6 km/hr. find the speed of swimmer in still water ?

$$S + W = 14$$

$$S - W = 6$$

$$2S = 20$$

$$S = 10 \text{ km/hr Ans}$$

- 3] The speed of a boatman in the direction of stream 103  
 is 15 km/hr. while the speed of stream is 1.5 km/hr.  
 What is the speed of boatmen against the stream.

$$B + W = 15$$

$$\begin{matrix} \downarrow \\ 1.5 \end{matrix}$$

$$B = 13.5 \text{ km/hr.}$$

$$\text{Upstream} \Rightarrow B - W$$

$$\Rightarrow 13.5 - 1.5 = 12 \text{ km/hr.}$$


---

- 4] A swimmer swims a distance of 36 km in 6 hrs downstream. and a distance of 40 km upstream in 8 hrs. find the speed of swimmer in still water ?

$$S = \frac{36}{6} = 6$$

$$B + W = 6$$

$$B - W = 5$$


---

$$B = 5.5 \text{ km/hr} \quad \underline{\text{Ans}}$$

$$W = 0.5 \text{ km/hr}$$


---

$$S = \frac{40}{8} = 5$$



- 5] In 3 hrs a swimmer can bow 21 km down stream and 15 km against the stream in same time. find the speed of stream ?

$$\frac{21}{3} = 7$$

$$B + W = 7$$

$$\frac{15}{3} = 5$$

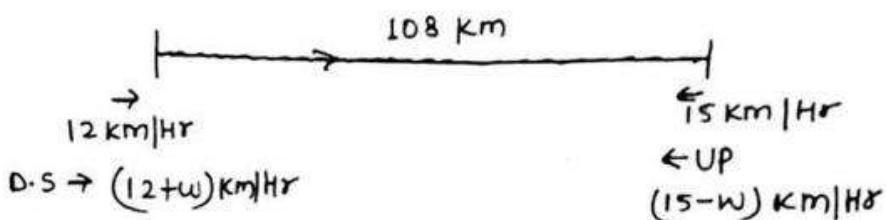
$$B - W = 5$$


---

$$B = 6 \text{ km/hr}$$

$$W = 1 \text{ km/hr} \quad \underline{\text{Ans.}}$$

- 6 Two places are 108 km apart. Two boats starts from both places at same time towards each other. If one boat is going downstream then other one is going to upstream. After how much time will they meet each other if their speeds are 12 km/hr & 15 km/hr.



$$\text{meeting time} = \frac{\text{distance}}{\text{relative speed}}$$

$$\text{Relative speed} = 12+w + 15-w = 27$$

$$\text{meet time} = \frac{108}{27} = 4 \text{ hrs.}$$

- 7 A boat takes double of time taken by it to go downstream while coming in upstream. If speed of water is 3 km/hr. find the speed of boat.

$$\frac{D}{B+3} \times 2 = \frac{D}{B-3} \quad T = \frac{D}{S}$$

$$2B-6 = B+3$$

$$B = 9 \text{ km/hr Ans.}$$

- 8 A man can row  $9\frac{1}{3}$  km/hr in still water & he finds that it takes him thrice as much time to row upstream as to row downstream. find speed of water/current.

$$\frac{28}{3} + w \times 3 = \frac{28}{3} - w$$

$$w = \frac{14}{3} \text{ km/hr.}$$

105  
D.S Relative speed =  $\frac{28}{3} + w$

U.P Relative speed =  $\frac{28}{3} - w$

$$T = \frac{D}{S}$$

**OR**

$$D.S = 1 \text{ hr}$$

$$U.P = 3 \text{ hrs.}$$

$$\left(\frac{28}{3} + w\right) \times 1 = \left(\frac{28}{3} - w\right) \times 3$$

$$w = \frac{14}{3} \text{ km/hr.}$$

$$D = ST$$

यहाँ distance को equate

किया गया है।

9. A boatman can row certain distance D.S in 2 hrs and U.P the same distance in 3 hrs. If the stream flows at the rate of 4 km/hr. find the speed of boat in still water ?

$$D.S = 2 \text{ hrs.}$$

$$U.P = 3 \text{ hrs.}$$

$$D.S \text{ speed} = B+4$$

$$U.P \text{ speed} = B-4$$

$$(B+4) \times 2 = (B-4) \times 3$$

$$2B+8 = 3B-12$$

$$B = 20 \text{ km/hr.}$$

10. A boatman goes 6 km upstream and back again to the starting point in 2 hrs. If the speed of water is 4 km/hr. find the speed of boat ? A) 6.5 km/hr  
B) 7.5 km/hr  
C) 8 km/hr  
D) 8.5 km/hr

$$\frac{6}{B+4} + \frac{6}{B-4} = 2$$

$$T = \frac{D}{S}$$

8 km/hr

either solve or pick from options.

option C satisfies.

$$B = 8 \text{ km/hr} \quad \underline{\text{Ans}}$$

D) 8.5 km/hr.

- 11 A boat travels upstream ~~s/t~~ <sup>u/s</sup> A to P and downstream P to B in 3 hrs. The distance b/w P to A is 4 km, the speed of water is 1 km/hr. find the speed of boat in still water ?

A) 4.5 km/hr.

$$\frac{4}{B+1} + \frac{4}{B-1} = 3 \text{ hr}$$

B) 5.2 km/hr

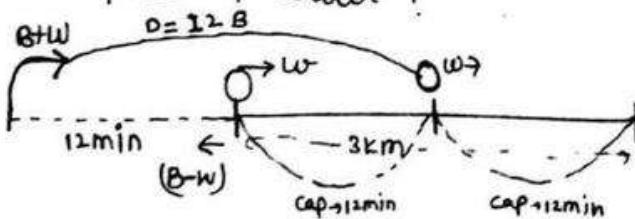
C) 2.5 km/hr

D) 3 km/hr

option D satisfies

$$B = 3 \text{ km/hr.}$$

- 12 Priyanka was travelling in her boat. suddenly a wind blows her hat off & started floating back downstream. The boat continued to travel upstream for 12 more minutes before priyanka realised her hat had fallen off. She turned back downstream and she caught up the hat as soon as it reached the starting point. If her hat flew off exactly 3 km from where she started find the speed of water?



Relative speed of Boat & cap =  $B+w+w = B$ .

$$\frac{B \times 12}{60} = \cancel{w+2w}. \quad D = ST \Rightarrow B \times 12 = 12B.$$

$$\text{R.s in same dirn} = B+w-w = B.$$

$$\text{Time of catch} = \frac{D}{S} = \frac{12}{\cancel{6}} = 12 \text{ min.}$$

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Total time taken by cap to flow back =  $12+12 = 24 \text{ min}$

$$D = 3 \text{ km}$$

$$T = \frac{24}{60} = \frac{2}{5}$$

$$S = \frac{D}{T} = \frac{3}{\frac{2}{5}} = 7\frac{1}{2} \text{ km/hr. } \underline{\text{Ans}}$$

**OR**

Boat की speed  
नहीं निकलेगी।

$$D = 3 \text{ km}$$

$$\text{Time} = \text{double ले लो} = 2 \times 12 = 24 \text{ min} = \frac{2}{5} \text{ hr.}$$

$$S = \frac{3}{\frac{2}{5}} = 7\frac{1}{2} \text{ km/hr. } \underline{\text{Ans}}$$

- 13] A boatman goes 39 km D.S and 25 km U.S & takes 8 hr. While it takes 10 hrs to go 52 km D.S and 30 km U.S. find the speed of boat ?

$$\frac{39}{B+W} + \frac{25}{B-W} = 8 \quad (\text{i})$$

put  $B+W=13$  in (i)

$$3 + \frac{25}{B-W} = 8$$

$$\frac{25}{B-W} = 5$$

$$B-W = 5$$

$$B+W = 13$$

$$B-W = 5$$

$$B = 9 \text{ km/hr}$$

$$W = 4 \text{ km/hr}$$

OR You can pick value from options or assume yourself to satisfy the eqn.

$$\frac{52}{B+W} + \frac{30}{B-W} = 10 \quad (\text{ii})$$

Multiply (i) by 6 and (ii) by 5

$$\frac{234}{B+W} + \frac{150}{B-W} = 48$$

$$\frac{260}{B+W} + \frac{150}{B-W} = 50$$

$$\cancel{\frac{26}{B+W}} \cancel{13} = f^2$$

$$B+W = 13$$

- [14]** A boatman goes 24 km D.S and 36 Km U.S in  $\frac{108}{9}$  hrs. While it takes  $8\frac{1}{2}$  hrs to go 36 km D.S and 24 km U.S. find the speed of boat?

$$\frac{24}{B+W} + \frac{36}{B-W} = 9 \times 3 \Rightarrow \frac{72}{B+W} + \frac{108}{B-W} = 27$$

$$\frac{36}{B+W} + \frac{24}{B-W} = \frac{17}{2} \times 2 \Rightarrow \frac{72}{B+W} + \frac{48}{B-W} = 17$$


---


$$\frac{60}{B-W} = 16$$

Put  $(B-W) = 6$  in eq(1)

$$B-W = 6$$

$$\frac{24}{B+W} + 6 = 9$$

$$\frac{24}{B+W} = 3$$

$$B+W = 8$$

$$B+W = 8$$

$$B-W = 6$$

$$B = 7 \text{ km/hr}$$

$$W = 1 \text{ km/hr.}$$

**[OR]**

Assume values to satisfy the eqn.

- [15]** A ship is 77 km from the shore, springs a leak which admits  $2\frac{1}{4}$  ton of water in every  $5\frac{1}{2}$  min. An outlet tank can throw out 12 tons of water per hour. Find at what speed it should move such that when it begins to sink a rescue ship moves with 6 km/hr escapes the passengers of the ship if 69 ton of water is enough to sink?

$$\frac{11}{2} \text{ min} \longrightarrow \frac{9}{4} \text{ ton}$$

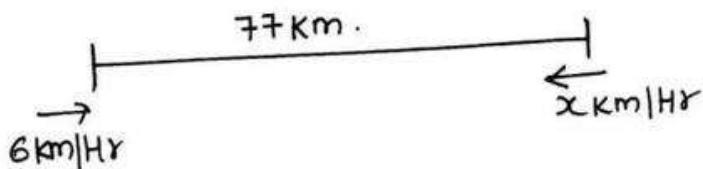
$$1 \text{ min} \longrightarrow \frac{\frac{9}{4}}{\frac{11}{2}} = \frac{9}{22} \text{ ton}$$

$$60 \text{ min} \longrightarrow \frac{\frac{9}{22}}{11} \times \frac{60}{30} = \frac{270}{11} \text{ ton/hr} \text{ enters into ship}$$

$$\Rightarrow \frac{270}{11} - (12) \text{, outlet pipe.}$$

$$\frac{270 - 132}{11} = \frac{138}{11} \text{ ton/hr filling in ship per hour.}$$

$$\text{Now } \frac{69}{138/11} = \frac{69 \times 11}{138} = \frac{11}{2} \text{ Hr} \rightarrow \text{ship will sink in } \frac{11}{2} \text{ hr.}$$



$$(6+x) \times \frac{11}{2} = 77^7$$

$$6+x = 14$$

$$x = 8 \text{ km/hr.} \quad \underline{\text{Ans.}}$$

By Pardeep Chhoker  
7206446517