

GATE



ALL BRANCHES

GENERAL APTITUDE

Quantitative Aptitude



Lecture No: 09

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TOPICS TO BE COVERED



More on Time and Distance



Train based Questions



Concept of Boats and Streams



Questionnaire on Races



$$\text{Time} = \frac{D}{S}$$



Q.

An employee goes to his office from his house at a speed of 60 km/hr and reaches his office 10 minutes late. If he follows the speed of 80 km/hr, he reaches his office 5 minutes early. Find the distance he covers to reach his office.

Assignment

$$\frac{x}{60} - \frac{x}{80} = \frac{15}{60}$$

$$\frac{x}{240} = \frac{1}{4}$$

60

$$\therefore x = 60 \text{ km}$$

$$D = S \times T$$

$$80 \left(\frac{T-5}{60} \right) = 60 \left(\frac{T+10}{60} \right)$$

$$\text{Time} = \frac{5}{6}$$

$$D = 60 \text{ km}$$

10:00 am

60 kmph \rightarrow 10:10

80 kmph \rightarrow 9:55

15 min




Q. A boy goes to his school with the speed of 40kmph and reaches his school 10 minutes early. If he follows the speed of 30kmph, he reaches his school 10 minutes late. Find the distance he covers to reach his school.

Assignment


A.  40 km

$$\frac{x}{30} - \frac{x}{40} = \frac{20}{60}$$

B.  45 km

C.  68 km

$$\frac{x}{120} = \frac{1}{3}$$

D.  32 km

$\therefore x = 40 \text{ km}$



Q.

If a car travels along four sides of a square at 100 kmph, 200 kmph, 300 kmph and 400 kmph. Find its average speed.



A. 152 km/hr



B. 180 km/hr

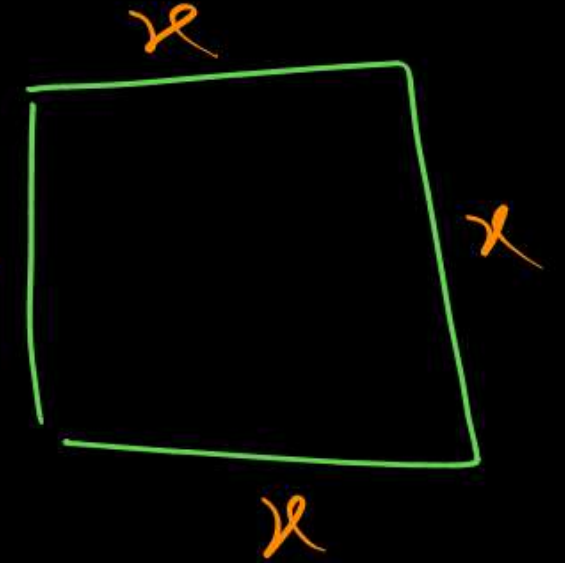


C. 150 km/hr



D. 192 km/hr

$$\frac{4x}{A.S} = \frac{x}{100} + \frac{x}{200} + \frac{x}{300} + \frac{x}{400}$$



$$\Rightarrow \frac{4x}{A.S} = \frac{12x + 6x + 4x + 3x}{1200}$$

$$\Rightarrow \frac{4x}{A.S} = \frac{25x}{48}$$

$$\therefore A.S = 48 \times 4 = 192 \text{ km/hr}$$



Q.

A person covers a certain distance at a certain speed. If he decrease his speed by 20%, then he takes 16 minutes more to cover the same distance. Find the time taken by him to cover the original distance at original speed.

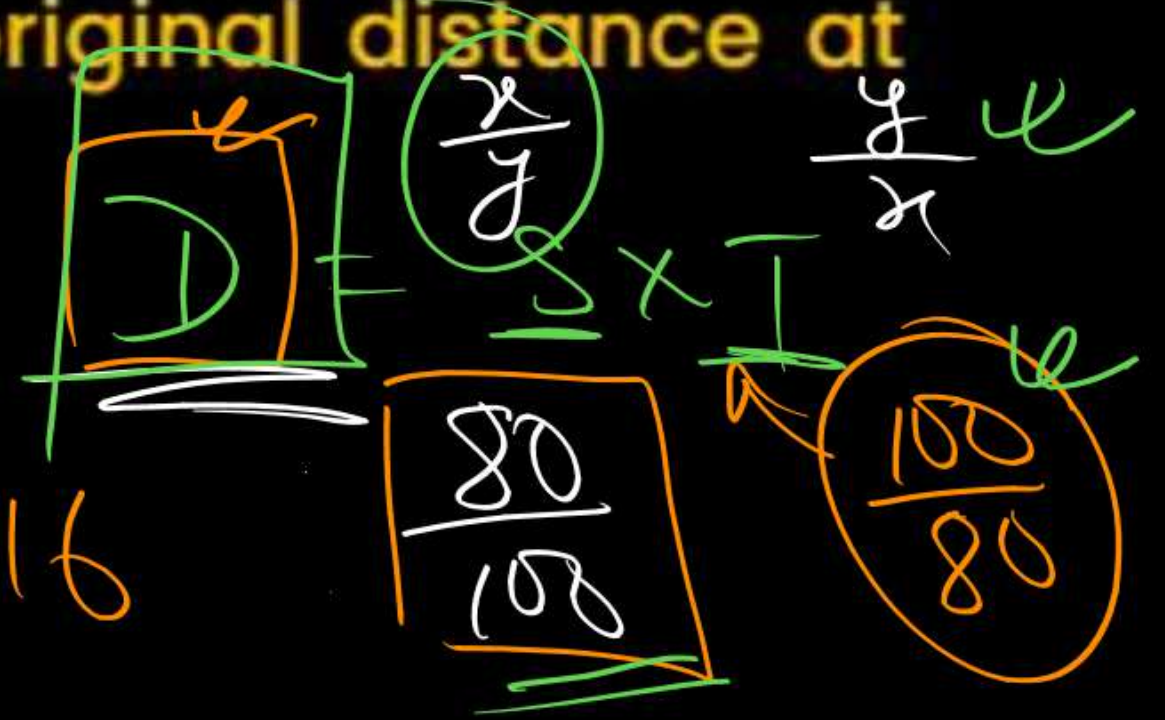
$$\Rightarrow \left(\frac{5}{4} - \frac{4}{4} \right) U \cdot T = 16$$

$$\frac{1}{4} U \cdot T = 16$$

$$U \cdot T = 64 \text{ min}$$

$$\frac{5}{4} U \cdot T - U \cdot T = 16$$

$$\left(\frac{5}{4} - 1 \right) U \cdot T = 16$$





Q. Walking $\frac{3}{4}$ th of the usual speed a man is late to office by 10 minutes, find the usual time.

$$\frac{4}{3}$$



A. 40 min



B. 12 min

$$\frac{4}{3} U \cdot T - U \cdot T = 10$$

$$\left(\frac{4}{3} - \frac{3}{3} \right) U \cdot T = 10$$



C. 30 min



D. 60 min

$$\frac{1}{3} U \cdot T = 10$$

$$U \cdot T = 30 \text{ min}$$



Q.

A car driver driving at a speed of 68 km/hr locates a lorry 40 meters ahead of him. After 10 seconds, the lorry is 60 meters behind him. Find the speed of the lorry.

$$R.S. = 36 \text{ km/h}$$

$$S.C - S.L = 36$$

$$\Rightarrow 68 - 36 = S.L$$

$$32 \text{ km/h}$$

10 sec

$$D = 100 \text{ meter}$$

$$t = 10 \text{ sec}$$

$$R.S = \frac{100}{10} = 10 \text{ m/sec}$$

$$\times \frac{18}{5}$$

$$68 \text{ km/h}$$



40m

?



Q.

A man takes 5 hours 45 minutes in walking to a certain place and riding back. He could have gained 2 hours by riding both ways. The time he would take to walk both ways is -----

$$2W = 7 \text{ hrs } 45 \text{ min}$$

$$(W + R = 5 \text{ hrs } 45 \text{ min}) \times 2$$

$$2R = 3 \text{ hrs } 45 \text{ min}$$

$$2W + 2R = 10 \text{ hrs } 90 \text{ min}$$

$$- \quad 2R = 3 \text{ hrs } 45 \text{ min}$$

Q. A man misses a train by 40 minutes if he travels at 30 kmph. If he travels at 40 kmph, then also he misses the train by 10 minutes. What is the minimum speed required to catch the train on time?

A. 60 km/hr

B. 50 km/hr

C. 55 km/hr

D. 45 km/hr

$$S = \frac{15}{60} \times \frac{3}{4}$$

$$= 45 \text{ km/hr}$$

$$\frac{x}{30} - \frac{x}{40} = \frac{1}{2}$$

$$\frac{x}{120} = \frac{1}{2}$$

$$\therefore x = \underline{\underline{60 \text{ km}}}$$

$$\frac{60}{30} = 2 \text{ hrs}$$

$$- 40 \text{ min}$$

$$\text{Time} = 1 \text{ hr } 20 \text{ min}$$

$$= 1 \frac{20}{60}$$

$$= \frac{4}{3} \text{ hrs}$$



Q.

Two boys begin together to write out a booklet containing 817 lines. The first boy starts with first line, writing at the rate of 200 lines an hour and the second boy starts with last line. He writes line 817 and so on backwards proceeding at the rate of 150 lines an hour. At what line will they meet?

A. 469th

B. 467th

C. 465th

D. 463rd

$$200 \times 2.334$$

$$= 200 \times \frac{817}{350}$$

$$= \frac{3268}{7}$$

$$= 466.8 = 467^{\text{th}}$$

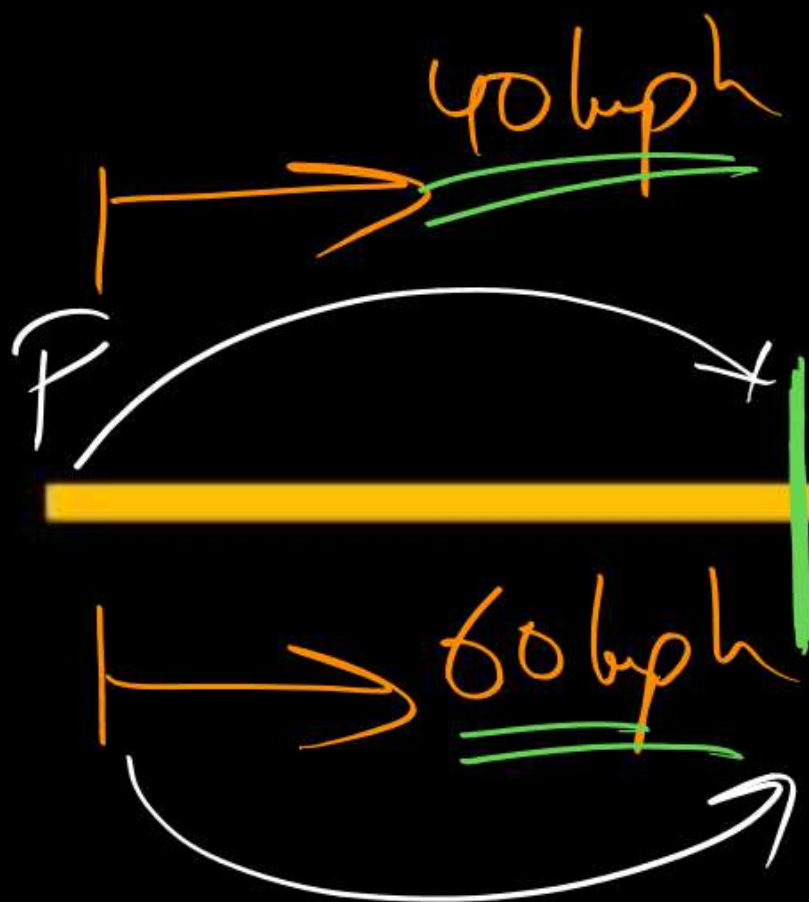
$$D = 817 \text{ lines}$$

$$R.S. = 350 \text{ lines/hr}$$

$$T = \frac{817}{350} = 2.335$$



Meeting at a point:



600 km

$$D_1 + D_2 = T \cdot D$$

$$D_1 = D_2$$

$$D = 600 \text{ km}$$

$$R - S = 20 \text{ km/hr}$$

$$T = \frac{600}{20} = 30 \text{ hrs}$$

Meeting at a point:

Handwritten notes: 40 km/h , 360 , 600 km

Two objects moving in opposite directions towards each other:
Distance covered by 1st object + Distance covered by 2nd object =
Total distance



Two objects moving in same directions :
Distance covered by 1st object = Distance covered by 2nd object





$$T = \frac{700}{140} = 5 \text{ hr} \quad \boxed{D_1} + \boxed{D_2} = T \cdot D \quad \checkmark \quad 7 \text{ am} + 5 \text{ hr}$$

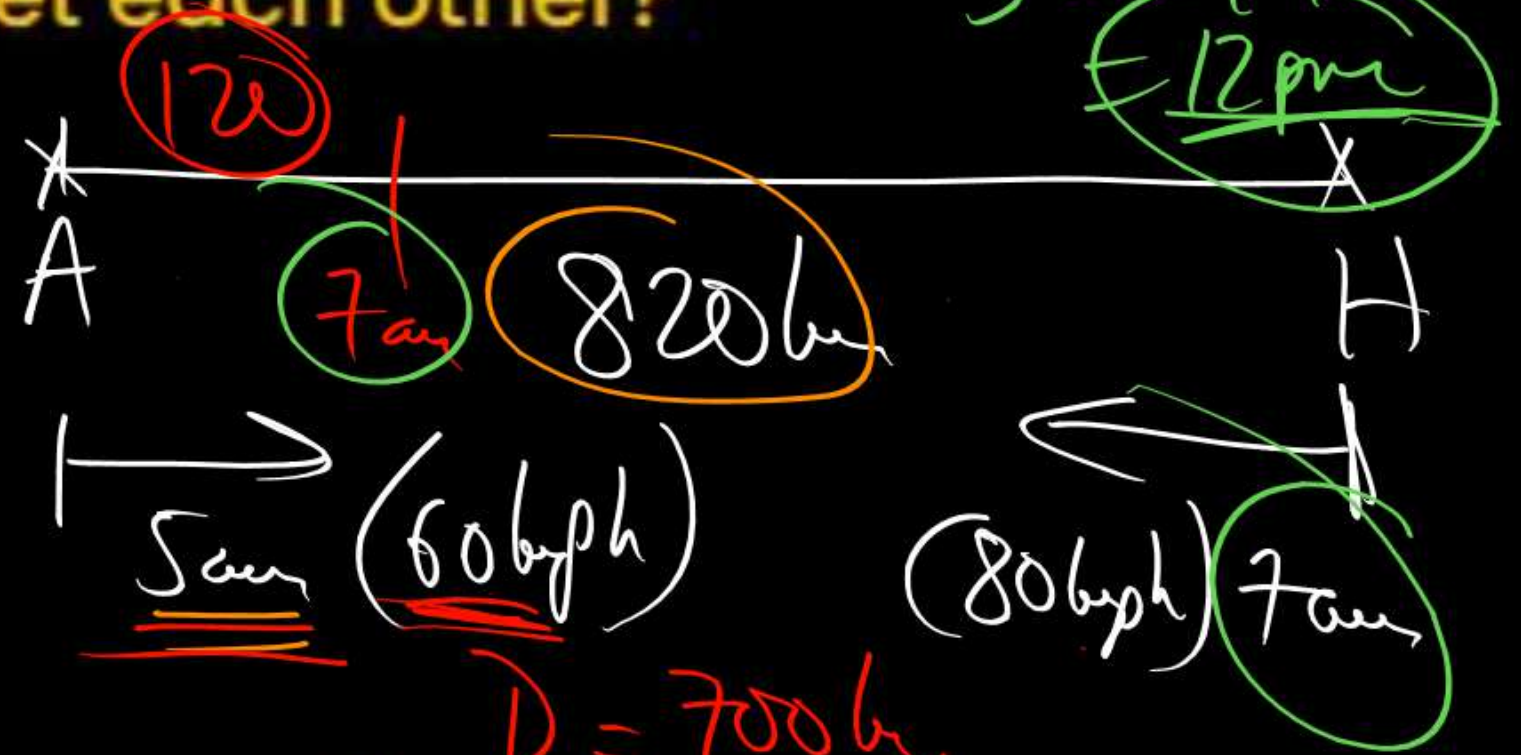
Q. A train starts from Ahmedabad to Howrah at 5am everyday with the speed of 60kmph. Another train starts from Howrah to Ahmedabad at 7am everyday with the speed of 80 kmph. If the distance between Ahmedabad and Howrah is given as 820km, then at what time the two trains meet each other?

After 5am $\rightarrow x$ hr

$$820 = 60x + 80(x-2)$$

$$\Rightarrow 820 = 60x + 80x - 160$$

$$\Rightarrow 980 = 140x$$



$$D = 700 \text{ km}$$

$$R.S. = 140 \text{ km/hr}$$

$$D_1 = D_2$$



Q.

A train starts from Chennai to Delhi at 11am with the speed of 110kmph. Another train starts from Chennai to Delhi at 9am the same day with the speed of 90 kmph. If the distance between Chennai and Delhi is given as 1920km, then at what time the two trains meet each other?

After 9am $\rightarrow x$ hrs

180km

$$9am + 11hrs = 8pm$$

$$\frac{180km}{20} = 9km$$

$$90x = 110(x-2)$$

11am (110kmph)

9am (90kmph)

$$20x = 2200 = 9km$$

$$x = 11hrs$$

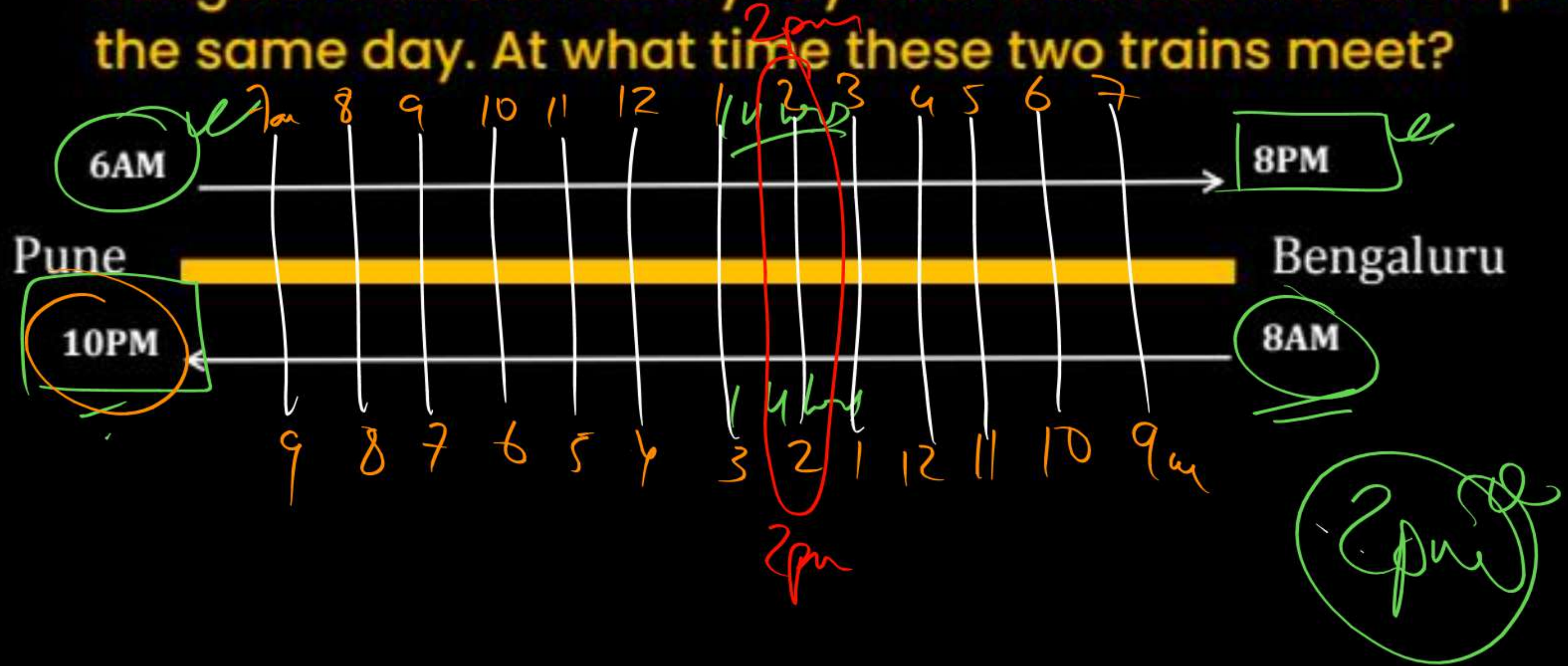
$$\Rightarrow 90x = 110x - 2200$$

\rightarrow



Q.

A train starts from Pune at 6am everyday and reaches Bengaluru 8pm the same day. Another train starts from Bengaluru at 8am everyday and reaches Pune at 10pm the same day. At what time these two trains meet?

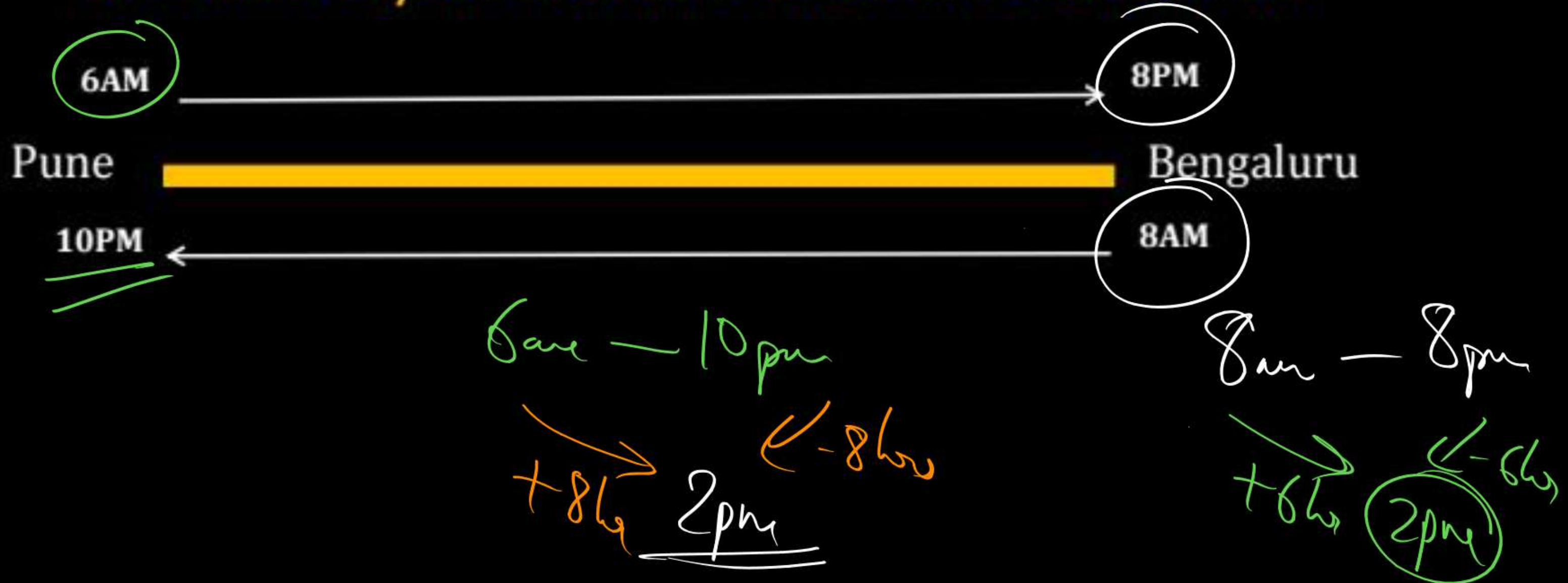




Q.

A train starts from Pune at 6am everyday and reaches Bengaluru 8pm the same day. Another train starts from Bengaluru at 8am everyday and reaches Pune at 10pm the same day. At what time these two trains meet?

$$\frac{12}{2} = 6^h \quad \frac{16}{2} = 8^h$$



$$D_1 = D_2$$

$$D_1 + D_2 = T \cdot D$$



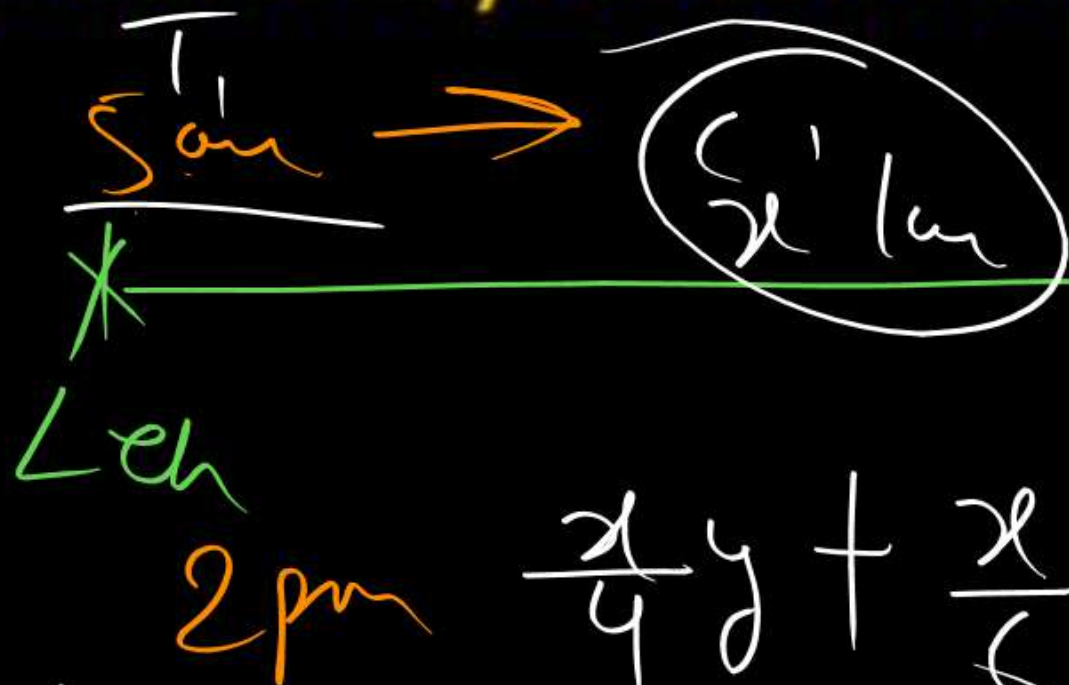
Q.

A train starts from Leh at 5am everyday and reaches Kanyakumari at 9am the same day. Another train starts from Kanyakumari at 8am everyday and reaches Leh at 2pm the same day. At what time these two trains meet?

$y = \frac{18}{5}$
 $3\frac{3}{5}$ hr

$T_1 = \frac{x}{4}$

$T_2 = \frac{x}{6}$



9am $\frac{3}{8} \times 12$
 Kanyakumari

After 5am \rightarrow 'y' hr

$\frac{x}{4}y + \frac{x}{6}(y-3) = x$

$\frac{y}{4} + \frac{y-3}{6} = 1$
 $\Rightarrow 3y + y - 6 = 12$
 $\Rightarrow 5y = 18$



Q. If a train travelling at 40 km/hr crosses another train of length 100 meter travelling at 14 km/hr in opposite directions in 30 seconds , then find the length of the train.

Assignment





Q.

A man rows his boat downstream @ 18 km/hr & upstream @ 10 km/hr. Find the speed of boat in still water.



A.

12 km/hr



B.

10 km/hr



C.

14 km/hr



D.

16 km/hr

Assignment

