TIME SPEED AND DISTANCE

AVG speed

S_1

A _____ B

S_2
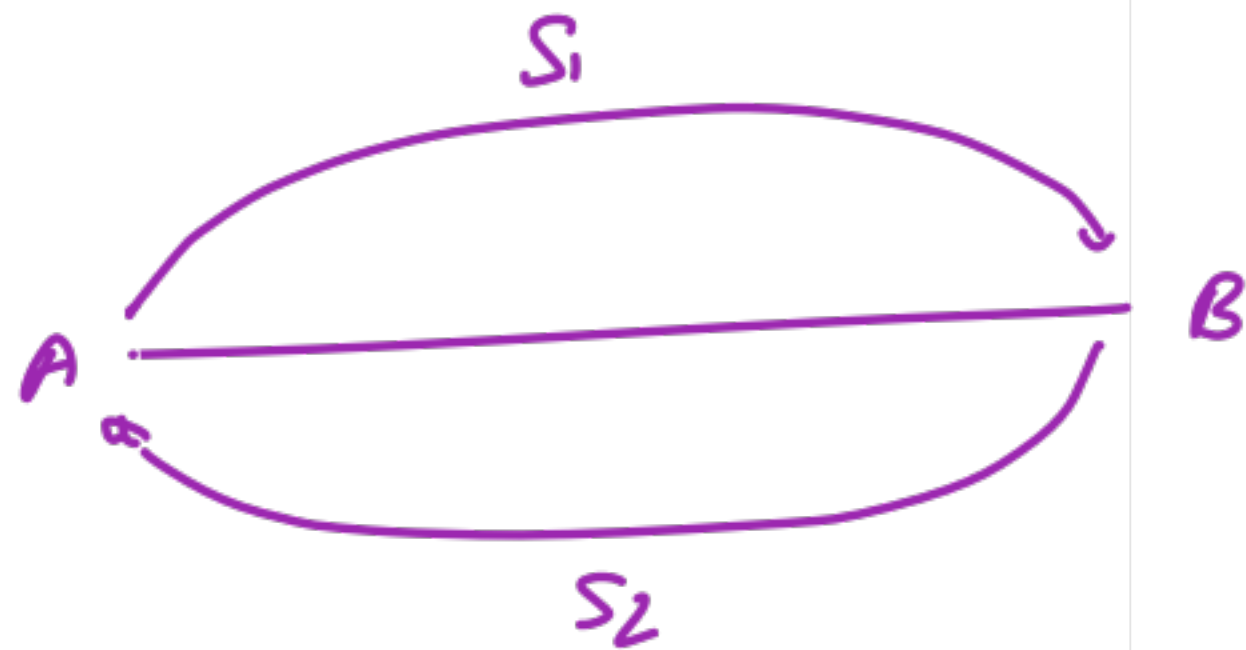
D = same

AVG speed $= \dfrac{2 S_1 \times S_2}{S_1 + S_2}$

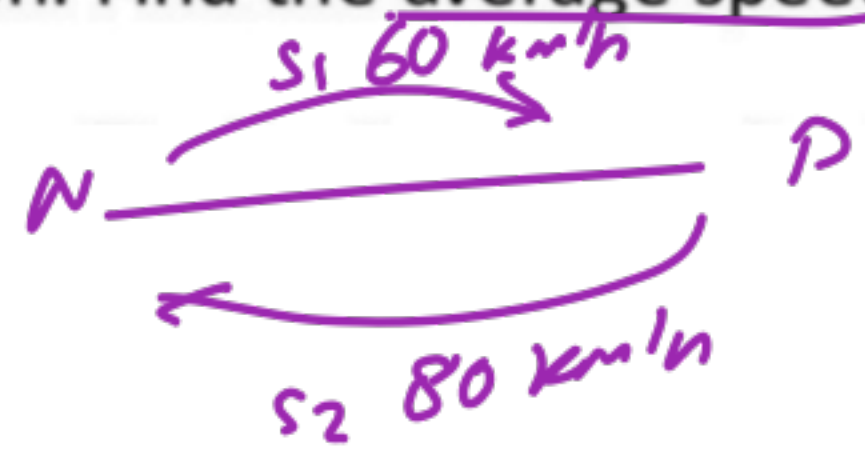AVG speed $= \dfrac{\text{Total Dist}}{\text{Total Time}} = \dfrac{D_1 + D_2 + D_3 \cdots}{T_1 + T_2 + T_3 \cdots}$

x km S_1 km/hr   2 km S_3 km/hr
y km S_2 km/hr

$S = \dfrac{D}{t}$ $t = \dfrac{D}{s}$

Pooja with her friend travelled from Noida to Delhi by motorbike at a speed of 60 kmph and returned to Noida at a speed of 80 kmph. Find the average speed for the whole journey ?

(a) 60 km/h

(b) $68\frac{4}{7}$ km/h

(c) $66\frac{2}{3}$ km/h

(d) 68 km/h

S_1 60 km/h

N ———————————— P

S_2 80 km/n

Avg speed $= \dfrac{2 \times S_1 \times S_2}{S_1 + S_2}$

$= \dfrac{2 \times 60 \times 80}{60 + 80}$

$= \dfrac{\cancel{2} \times 60 \times 80}{\cancelto{7}{140}}$

$= \dfrac{480}{7}$

$480 \quad 68\frac{4}{7}$

$\overline{7}$

$68\frac{4}{7}$

$\underline{68}$
$7\overline{)480}$
$\underline{42}$
60
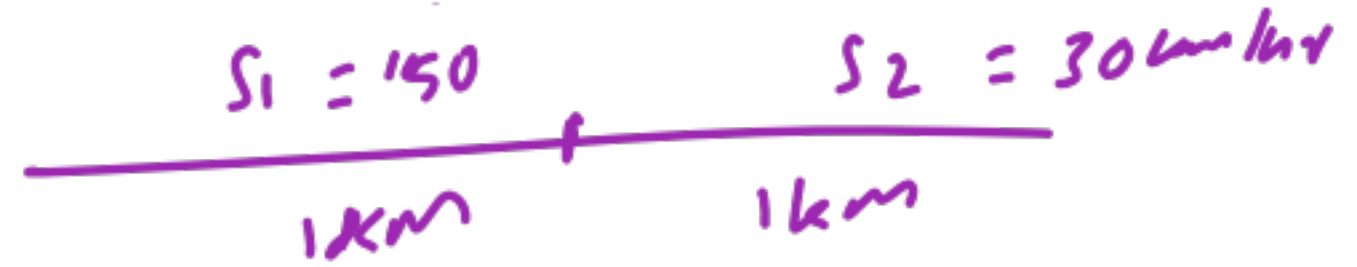$\underline{56}$
4

$6\frac{1}{2}$ ✓

Average speed $= \dfrac{2 S_1 S_2}{S_1 + S_2}$

$= \dfrac{\text{Total distance}}{\text{Total time}} = \dfrac{D_1 + D_2 + D_3}{T_1 + T_2 + T_3}$

A car moves at a constant speed of 150 km/h for one kilometre and at 30 kmph for the next one kilometre. What is the average speed of the car?

(a) 50 km/h ✓
(b) 55 km/h
(c) 120 km/h
(d) 90 km/h

$S_1 = 150$, $S_2 = 30 \, km/hr$

$1 km$ $1 km$

Avg speed $= \dfrac{2 S_1 S_2}{S_1 + S_2} = \dfrac{\overset{50}{2 \times \cancel{150} \times \cancel{30}}}{\underset{6}{\cancel{180}}}$

$= 50 \, km/hr$

Ankit travels a certain distance by bicycle at the rate of 16 km/h and walks back at the rate of 4 km/h. The whole journey took 10 hours. What is the distance he covered on the bicycle?

(a) 64 km

(b) 60 km

(c) 32 km

(d) 30 km

1) $\dfrac{S_1}{S_2} = \dfrac{16}{4} = \dfrac{4}{1}$

$\dfrac{t_1}{t_2} = \left(\dfrac{16}{4}\right)^{2 hr}$ $5 = 10 hr$

$1 = 2 hr$

$S = 16 km/hr$ $T = 2 hr$

$D = S \cdot T = 16 \times 2 = 32 \, km$

2) Avg Speed $= \dfrac{2S_1 S_2}{S_1 + S_2} = \dfrac{2 \times 16 \times 4}{20_5} = \dfrac{32}{5} \, km/hr$

$S = \dfrac{32}{5} \, km/hr$ $T = 10 \, hrs$

$D = S \times T = \dfrac{32}{\cancel{5}} \times \cancel{10}^{2} = \dfrac{64 \, km}{2}$

$= 32$

Abhishek went from P to Q at an average speed of x kmph and returned from Q to P at an average speed of y kmph. What was his average speed during the total journey ?

अभिषेक स्थान P से Q तक एक निश्चित गति x किमी / घंटा से जाता है तथा y किमी / घंटा से वापस आता है। कुल यात्रा में उसकी औसत गति बताएं ?

(a) $\dfrac{x+y}{xy}$

(b) $\dfrac{2xy}{x+y}$

(c) $\dfrac{2}{x+y}$

(d) $\dfrac{1}{x} + \dfrac{1}{y}$

A person travels 500 km by train at 100km/hr, 900 km by ship at 45 km/hr, 800km by aeroplane at 400 km/hr and 50 km by car at 50km/hr. What is the average speed for the entire distance ?

(a) $65\frac{5}{14}$ km/h·

(b) $80\frac{2}{7}$ km/h ✗2

(c) $80\frac{5}{14}$ km/h

(d) 80 km/h ✗

(S)

Avg speed : $\frac{T.D}{T.T}$ = $\frac{D_1 + D_2 + D_3 + D_4}{T_1 + T_2 + T_3 + T_4}$

$= \frac{500 + 900 + 800 + 50}{5 + 20 + 2 + 1}$

$= \frac{2250}{28}$ $\frac{1125}{14}$

$\frac{80}{14/1125}$
$\frac{112}{(S)}$

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

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

$\frac{500}{100}$

$\frac{20}{900}$
$\frac{}{45}$

$80\frac{5}{14}$

$\frac{1125}{14}$

$\frac{80}{14}$

$80\frac{5}{14}$

A motorbike moves with a speed of 48 kmph for 15 minutes and for next 5 minutes at a speed of 72 kmph. Find the average speed of the train ?

(a) 62.5 km/h
(b) 60 km/h
(c) 66 km/h
(d) 54 km/h

$$\text{Avg speed} = \frac{D_1 + D_2}{T_1 + T_2}$$

$$\frac{18}{60} = \frac{1}{4} hr$$

$$= \frac{48 \times \frac{1}{4} + 72 \times \frac{1}{12}}{\frac{1}{3}}$$

$$\frac{72}{60} \quad \frac{1}{3}$$

$$= (12 + 6) \times 3 = 18 \times 3 = 54$$

I walk a certain distance and ride back taking a total time of 41 minutes. I could walk both ways in 57 minutes. How long would it take me to ride both ways?

(a) 19.5 minutes

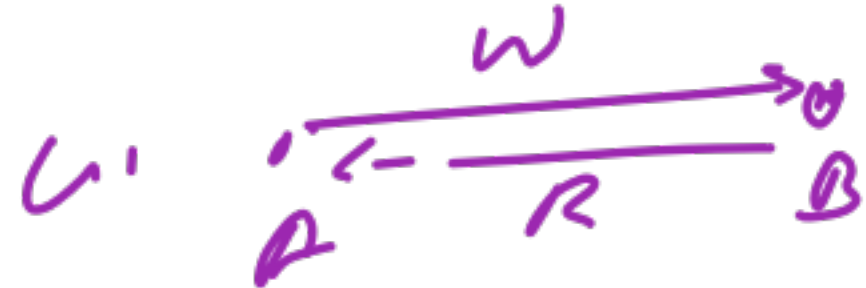(b) 25 minutes

(c) 20 minutes

(d) 21 minutes

$$W + R = 41$$

$$WHW = 57$$

$$2W = 57$$

$$41 \times 2 = 82$$

$$2R + 2 \times 41 = 82$$

$$2W = 57$$

$$2R = 25$$

$$41 \times 2$$

$$57$$

$$82$$

$$57$$

$$R + R = 2R$$

A man walks a certain distance and rides back in 3 hours 15 minutes. He could ride both ways in 3 hours. Find the time required by the man to walk both ways?

(a) 6 hours

(b) 4 hours 15 minutes

(c) 4 hours

(d) 3 hours 30 minutes

$$W + R = 3 \text{ hr } 15 \text{ min}$$

$$2 \begin{cases} R + R = 3 \text{ hr} \end{cases}$$

$$2R = 3$$

$$2W + 2R = 6 \text{ hr } 30 \text{ min}$$

$$2W = 3 \text{ hr } 30 \text{ min}$$

Excluding stoppages, the speed of a bus is 72 kmph and including stoppages, it is 60 kmph. For how many minutes does the bus stop per hour?

(a) 12

(b) 15

(c) 8

(d) 10

$$\frac{S}{72}{60}$$

$$\frac{60}{72}\frac{S}{6}$$

$$S \propto \frac{1}{t}$$

$$-\frac{50}{60}\Big) 10min$$

$$\frac{50}{60} =$$

Excluding stoppages, the speed of a bus is 60kmph and including stoppages, it is 45 kmph. For how many minutes does the bus stop per hour ?

ठहराव को छोड़कर, एक बस की गति 60 किमी प्रति घंटा है और ठहराव सहित, यह 45 किमी प्रति घंटे है। प्रति घंटे बस कितने मिनट के लिए रुकती है?

(a) 12

(b) 15

(c) 9

(d) 10

[CGL Mains 2017]

$$S \quad \frac{60}{45}$$

$$T \quad \frac{\overset{3}{\cancel{45}}}{\underset{4}{\cancel{60}}}$$

$$\frac{4hr}{4} - \frac{1hr}{4} \qquad 3/4 \Big) 1hr$$

$$1hr = \frac{1}{4}hr = \frac{1}{4} \times \overset{15}{\cancel{60}} = 15\ mins$$

S_1

.5 sec

100 M

S_1 S_2

100 m

S_1 S_2

100 m
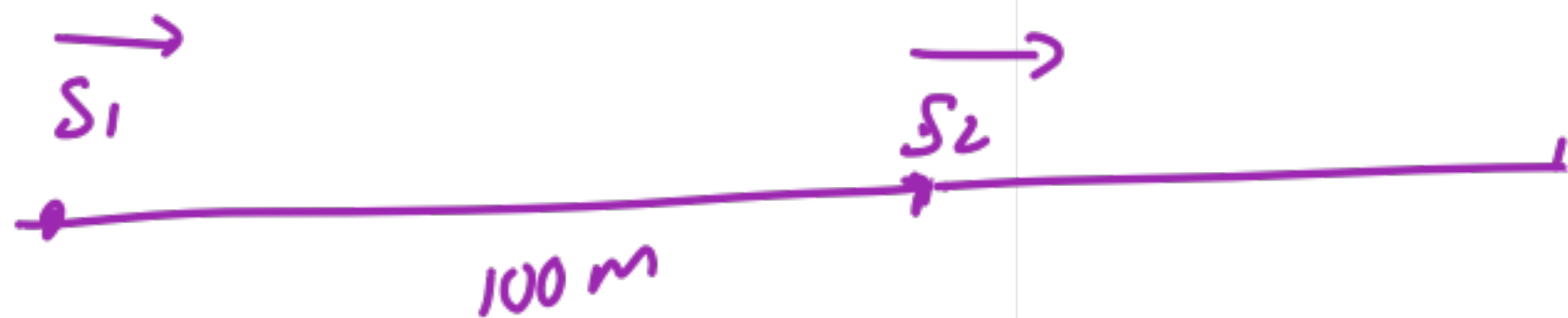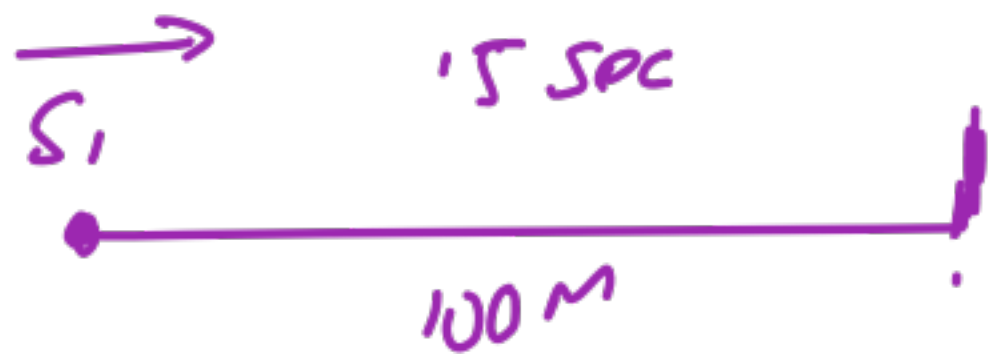
Relative Speed

1) Travelling in Same direction $= S_1 - S_2$ $\Rrightarrow$

2) "   " Opposite " $= S_1 + S_2$ $\rightarrow \leftarrow$

Distance between two places A and B is 750km. Two persons P and Q start from A and B with a speed of 69km/hr and 81km/hr respectively towards each other. Find the meeting time ?

दो स्थानों A और B के बीच की दूरी 750 किमी है, दो व्यक्ति P और Q, A और B से क्रमशः 69 किमी / घंटा और 81 किमी / घंटा की गति से एक दूसरे की ओर बढ़ते होते हैं। मिलने का समय ज्ञात कीजिये ?
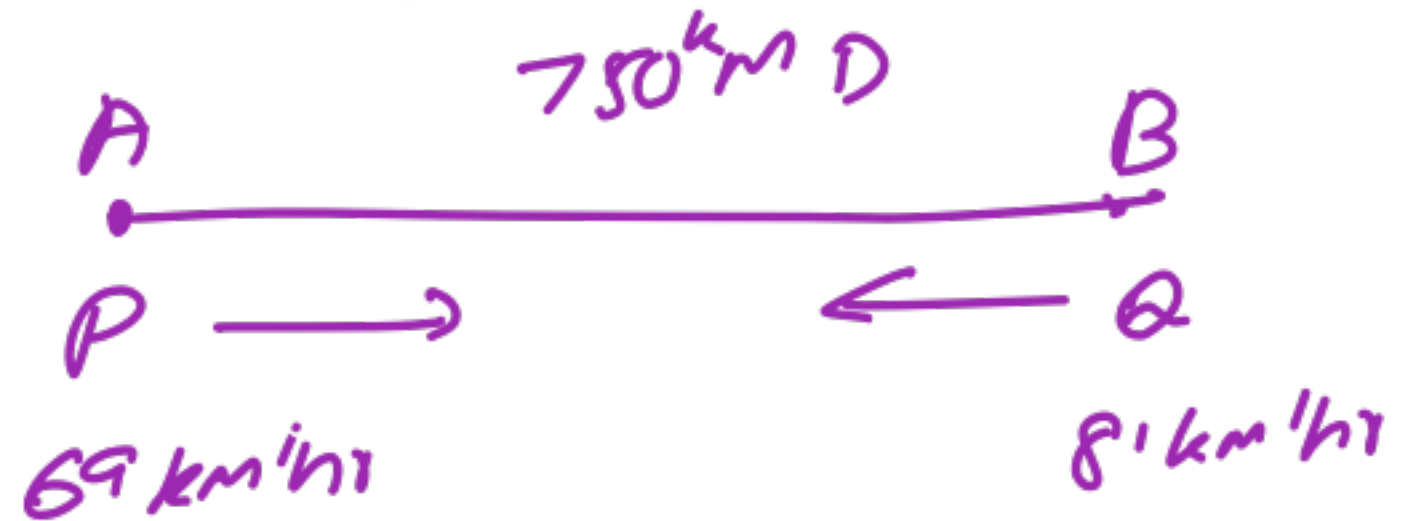
(a) $5\frac{1}{2}$ hours

(b) 5 hours

(c) 6 hours

(d) 10 hours

$$T = \frac{D}{S} = \frac{750}{150} = 5 \, hr$$

A —————————— 750 km D —————————— B

P ———→   ←——— Q

69 km/hr   81 km/hr

R.Speed = 69 + 81
= 150 km/hr-s

Distance between two places A and B is 660km. Two person P and Q having speed 60km/hr and 90km\hr respectively. P start from A at 9 o'clock and Q start from B at 10 o'clock to meet each other. Find the meeting time ?
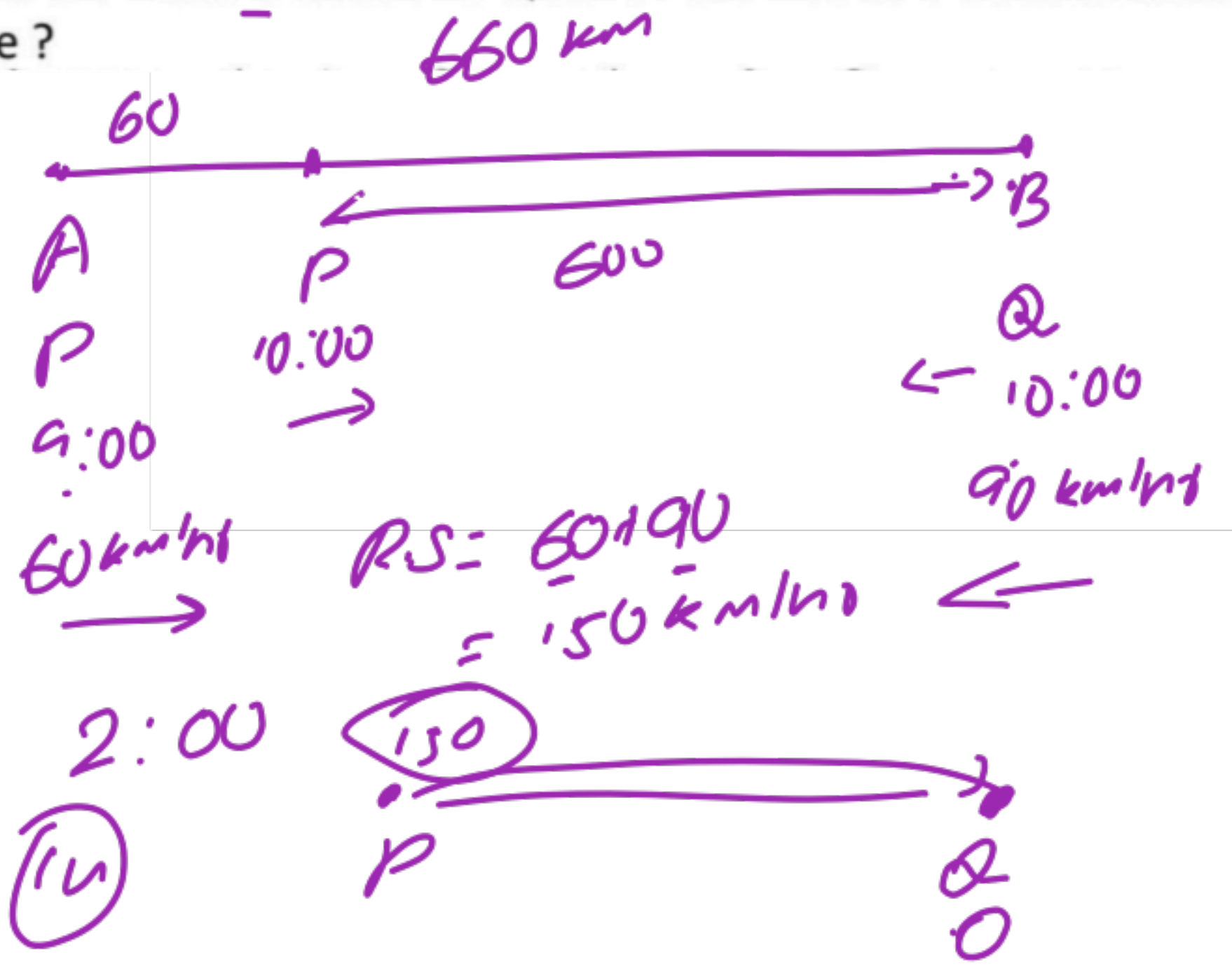
(a) 2:30 (b) 2:00
(c) 3:45 (d) 2:50

660 km

60

A
P
9:00

P
10:00
→

B

600

Q
← 10:00

90 km/hr

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

$= \dfrac{600}{180} = 4\,hr$

60 km/hr
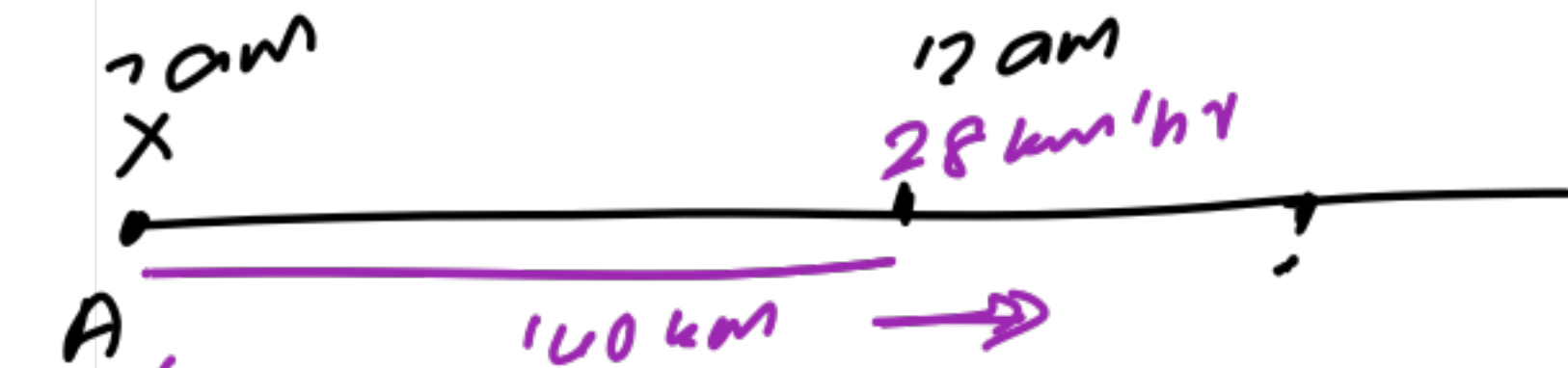→

RS = 60 + 90
= 150 km/hr ←

10 + 4 = 2:00

⟨4⟩

⟨150⟩
P

Q
O

A train X leaves from A at 7am at the speed of 28km/hr to reach B and a train Y leaves from A at 12pm at the sped of 40km/hr to reach B. Find the time at which they will meet ?

(a) 11 pm (b) 12:40 am

(c) 1 am   (d) 1:10am

7am

X

12 am

28 km/hr

A

Y

12

40km/hr $D = 5 \times 28 = 140$ km

100 km

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

$= \dfrac{\overset{35}{\cancel{140}}}{\underset{3}{\cancel{12}}} = \dfrac{35}{3}$ $11\dfrac{2}{3}$

11 hr $2\dfrac{2}{3}$ hr

11 hr 40 min

R. Speed $= 40 - 28$

$= 12$ km/hr

$\dfrac{2}{3} \times \overset{20}{\cancel{60}} = 40$ min

A theft reported at 10 pm & police start chasing the thief at 1:00 am. Calculate at what time police will catch the thief, if speed of thief & police are 42km/h & 49km/h respectively ?

10 बजे चोरी हुई और पुलिस ने 1 बजे चोर को पकड़ना शुरू किया। ज्ञात करो कि कितने घंटे में चोर पकड़ा जाएगा अगर चोर और पुलिस की चाल क्रमशः 42 km/h और 49 km/h है।

(a) 15 hours (b) 14 hours
(c) 21 hours (d) 18 hours

10:00 $\underline{\quad 3hr \quad}$ 1:00

$\underleftarrow{\quad 126^{km} \quad}$ 42km/hr

$\frac{1:00}{-49km/hr} - 1$

$D = 42 \times 3 = 126$
42km/hr

7 km/hr

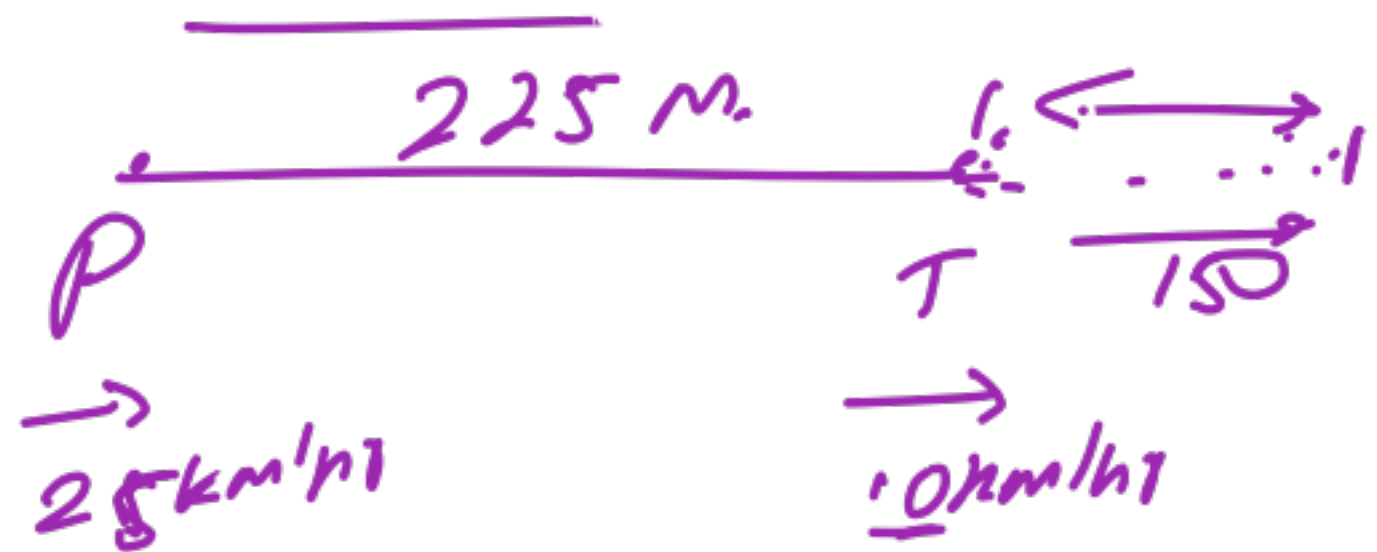$T = \frac{D}{S} = \frac{126}{7}$ 18 hours
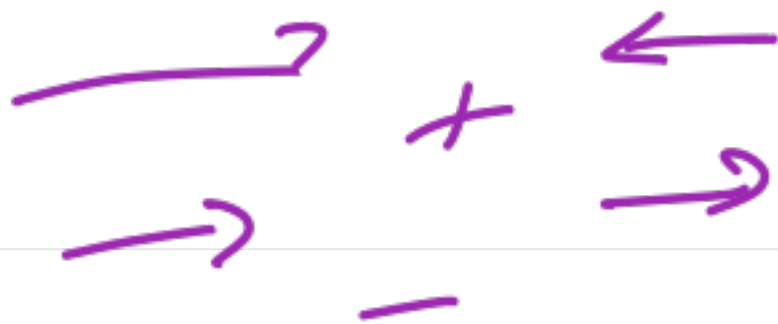
A thief is spotted by a policemen at a distance of 225 metres. When the policeman starts to chase, the thief also starts running. The speed of thief and policemen are 25 km/h and 10 km/h respectively. How far will have the thief run before he caught?

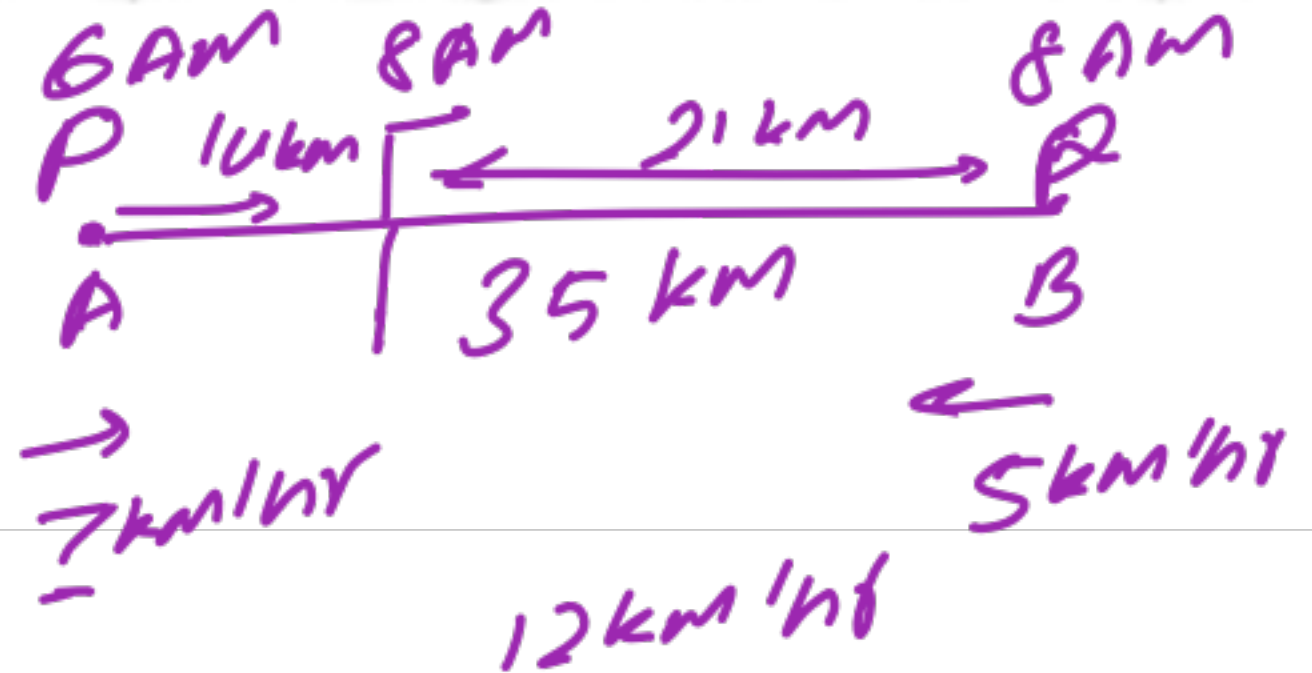(a) 125 m   (b) 150 m

(c) 175 m   (d) 120 m

225 m.

P

$\overrightarrow{25km/h1}$ T   150

$\overrightarrow{10km/h1}$

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

$T = \dfrac{225}{15 \times \frac{5}{18}} = \dfrac{225 \times 18}{15 \times 5} = 54 \text{ sec}$

15 km/h1

$D = S \times T = \dfrac{10 \times 5}{18} \times 54 = 150 \text{ m}$

A train starts from A at 6 AM and reaches B at 11 AM on the same day. Another train starts from B at 8 AM and reaches A at 3 PM on the same day. At what time the two trains will have crossed each other ?
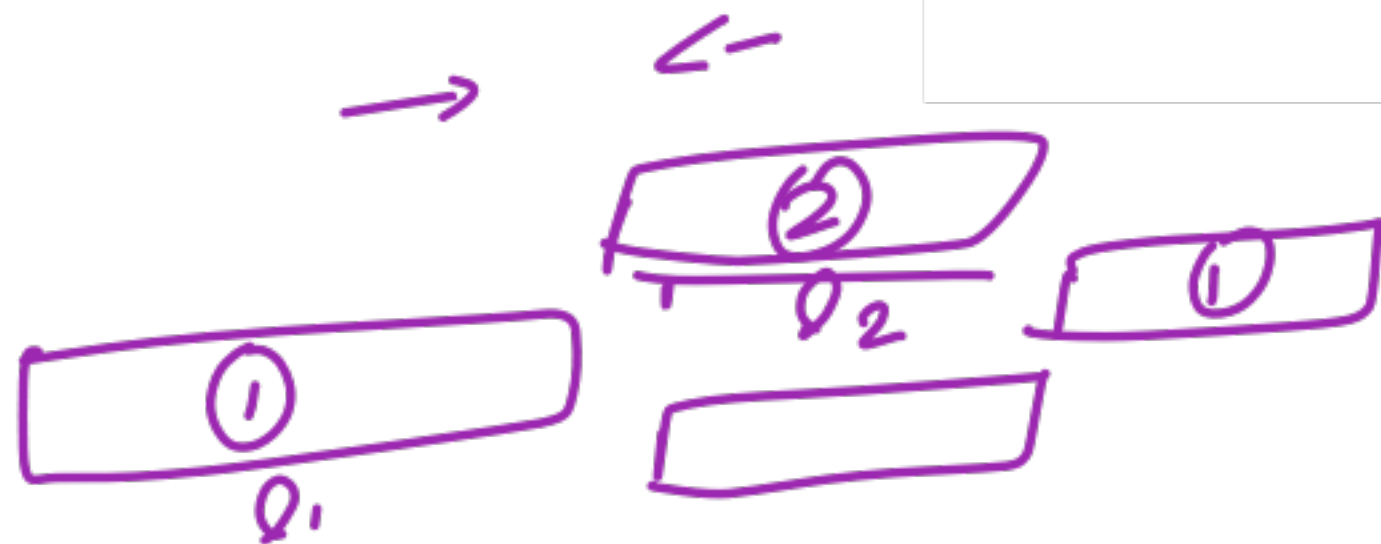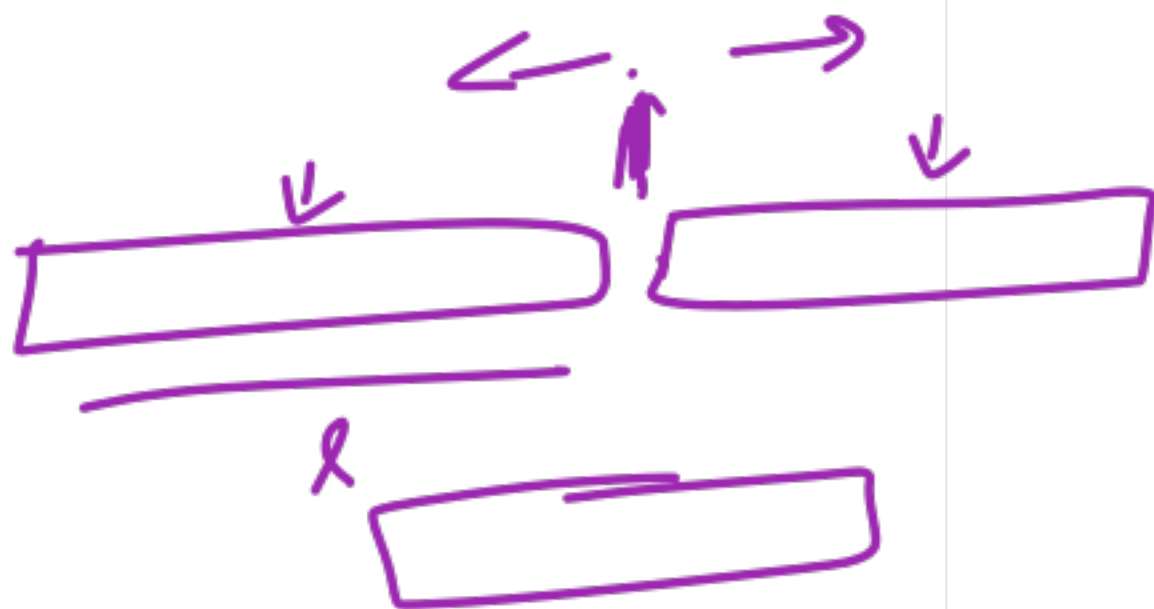
(a) 9:45 AM   (b) 8:45 AM

(c) 10:30 AM   (d) 7:45 AM

SPeed   T   D

7 km/hr P   5 hr
                   35 km
5   7 hr
km/hr Q

3/..r66 :65 $T = \frac{2r^7}{12u}$ 7/u : 3/u

6AM 8AM   8AM
P 10km ┌──── 21km ────→ ┐   P
   ──→ └←────────────── ┘   B
A   35 km   B

→
7km/hr
─
                              12km/hr

                   7/u : 3/u

                   1 hr 3/u hr
                   ─
                   1 hr 45 min
                   ─

5km/hr

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

$S_1 - S_2$

$S_1 + S_2$

$\ell_1 + \ell_2$

ℓ

② ℓ_2

① ℓ_1

Speed of a train is 36 km/h and it crosses a man in $7\frac{1}{2}$ minutes. Find the length of the train ?

एक ट्रेन की चाल 36 किमी / घंटा है और वो एक व्यक्ति को $7\frac{1}{2}$ मिनट में पार कर जाती है। तो ट्रेन की लम्बाई ज्ञात कीजिए ?

(a) 3 km

(b) 4.5 km

(c) 6 km

(d) 8.5 km

$$D = l = S \times T$$

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

$$\frac{30}{60}$$

$$2\,hr \times 60$$

$$hr \rightarrow min \times 60$$

$$min \rightarrow hr \times \frac{1}{60}$$