

GATE-2023 CRASH COURSE



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

$$D = S \times T$$

GENERAL APTITUDE

TIME & DISTANCE

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

km/h



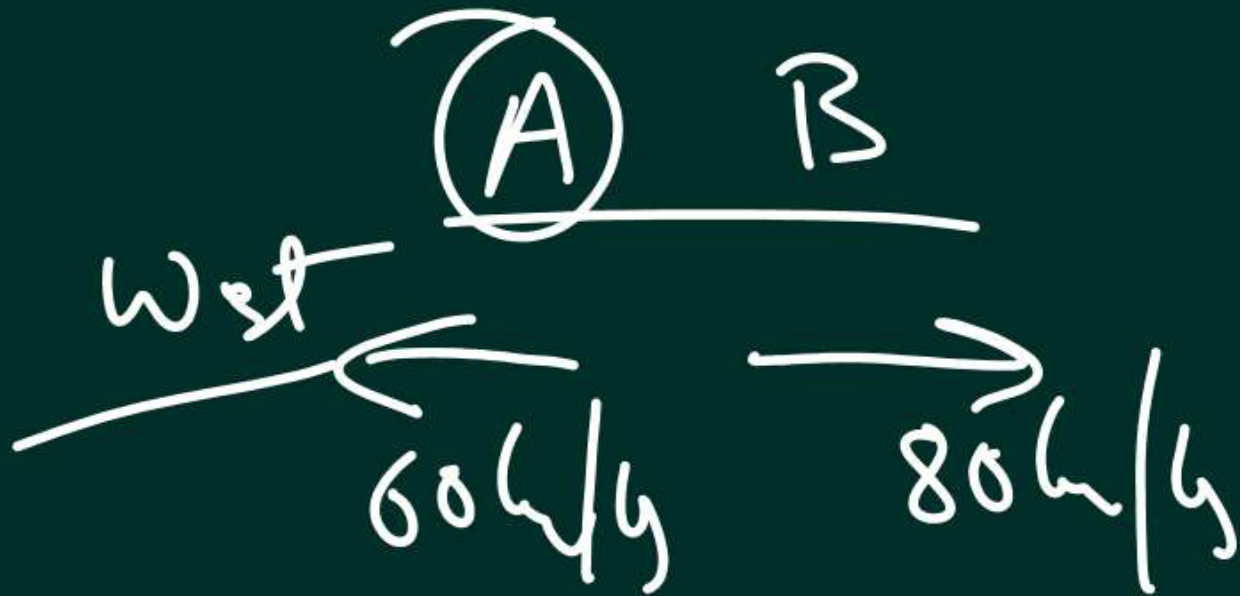
Lecture no-13

AMULYA RATAN SIR

Average Speed →



Relative Speed



opposite (+)

East Same (-)

TIME AND WORK



DISTANCE

$$\frac{\text{km}}{\text{h}}$$

= SPEED X TIME

TIME

SPEED

$$\frac{1000\text{m}}{3600\text{s}} \times 18$$

= DISTANCE / SPEED

= DISTANCE / TIME

• RELATIVE SPEED

• AVERAGE SPEED

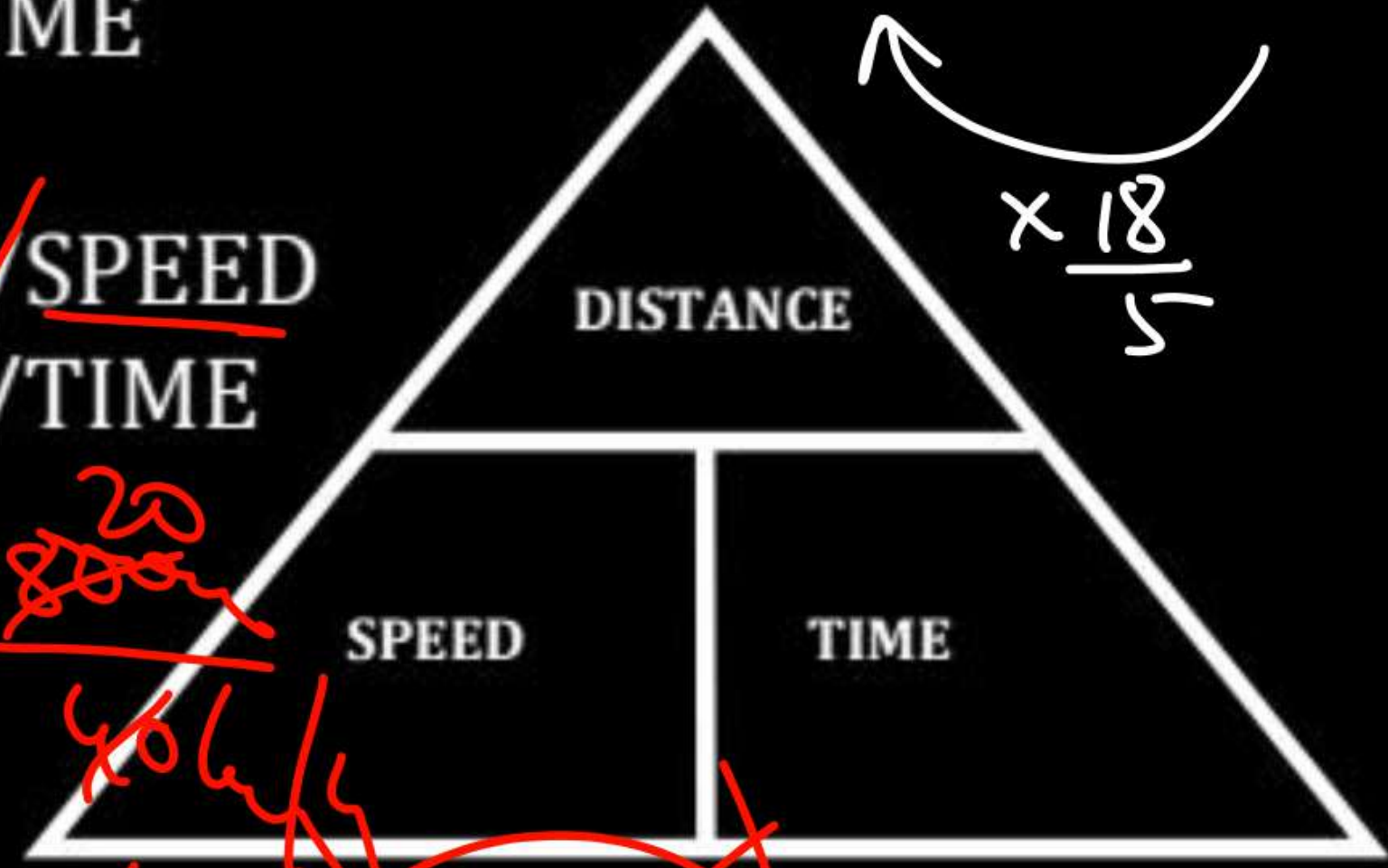
$$D = 800\text{m}$$

$$S = 40\text{ km/h}$$

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

$$\text{m/sec}$$

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



$$T = \frac{800}{40\text{ km/h}}$$

$$\text{m/hr/hr}$$



Q.

If you travel from P to Q at 20km/hr and Q to P at 30 km/hr. What would be your average speed of the journey?



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

20 km/hr

24 km/hr

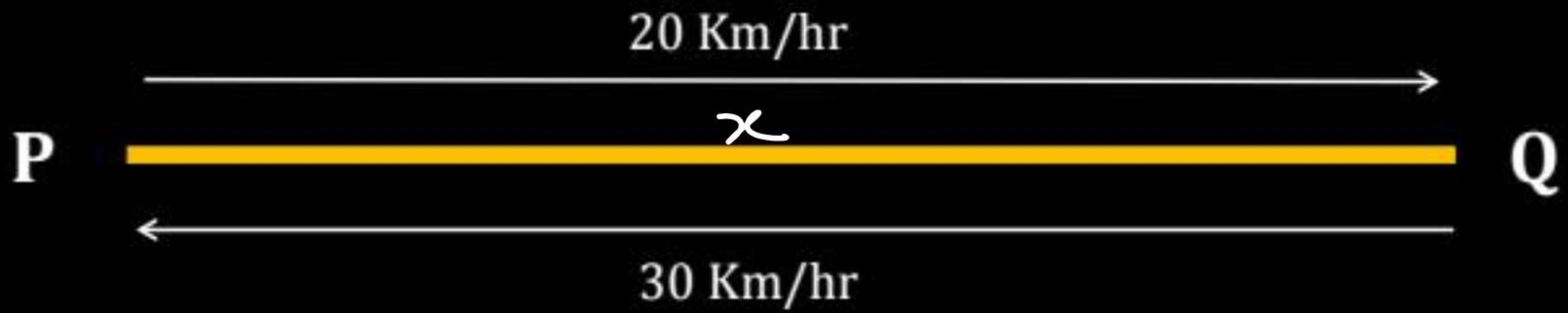
x km

$$\frac{x}{20} + \frac{x}{30} = \frac{2x}{\text{A.S.}}$$
$$\frac{8x}{60} = \frac{2x}{\text{A.S.}}$$

30 km/hr

A.S. = 24 km/hr





Q.1

A man travels from Delhi to Chandigarh in his car. 1/3 of journey he covers at 60 km/hr & remaining journey at 40 km/hr. Find the average speed of his journey.

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

$A.S. = \frac{T \cdot D}{T \cdot T}$

$T \cdot T = \frac{T \cdot D}{A.S.}$

$x \qquad 2x$

$\xleftarrow{\quad} \quad \quad \quad \xrightarrow{\quad}$

$D \qquad 60 \qquad 40$

$A.S. = 45 \text{ km/hr}$

$\frac{x}{60} + \frac{2x}{40} = \frac{3x}{A.S.}$

$\frac{2x + 6x}{120} = \frac{3x}{A.S.}$

$\frac{8x}{120} = \frac{3x}{A.S.}$

$\frac{2xy}{x+y}$



Q.2



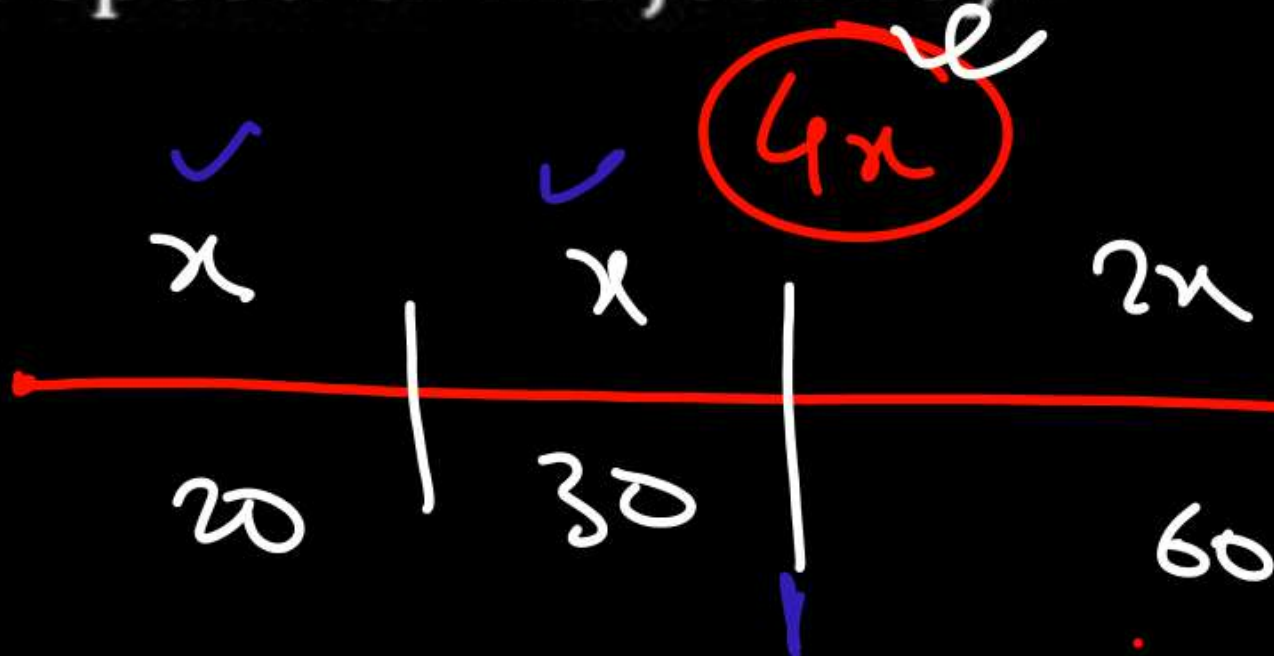
A man travels $\frac{1}{4}$ th of his journey at 20 km/hr, another $\frac{1}{4}$ th at 30 km/hr & remaining at 60 km/hr. Find the average speed of his journey.

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

$$A.S. = \frac{60 \times 4}{7}$$

$$= \frac{240}{7}$$

$$\frac{34.28 \text{ km/hr}}{34\frac{2}{7} \text{ km/hr}}$$



$$\frac{x}{20} + \frac{x}{30} + \frac{2x}{60} = \frac{4x}{A.S.}$$

$$\frac{7x}{60} = \frac{4x}{A.S.}$$

$$\frac{2 \times 24 \times 60}{84}$$

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

$$\frac{2 \times 24 \times 60}{84}$$



Q.3

Bhillai police observes a thief 800 metres away from him. The thief started running at 80 km/hr & the police at 170 km/hr. In how much time the police can catch the thief?



$$D = 800 \text{ m}$$

328 seconds

$$R.S. = 90 \text{ km/hr} \times \frac{5}{18} = 25 \text{ m/sec}$$

$$T = \frac{800 \text{ m}}{25 \text{ m/sec}}$$



Q.4



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.

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

$$\frac{4x - 3x}{240} = \frac{1}{4}$$

$$x = 60$$

$$T = \frac{5}{6}$$

$$80 \times \left(T - \frac{5}{6}\right) = 60 \times \left(T + \frac{10}{60}\right)$$

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

$$T = \frac{S.D.}{60}$$

$$D = S \times T$$

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



Q.5



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.

$$\frac{x}{30} - \frac{x}{40} = \frac{20}{60} - \frac{1}{3}$$

$$\underline{\underline{x = 40\text{ km}}}$$
$$\frac{4x - 3x}{120} = \frac{1}{3}$$

40



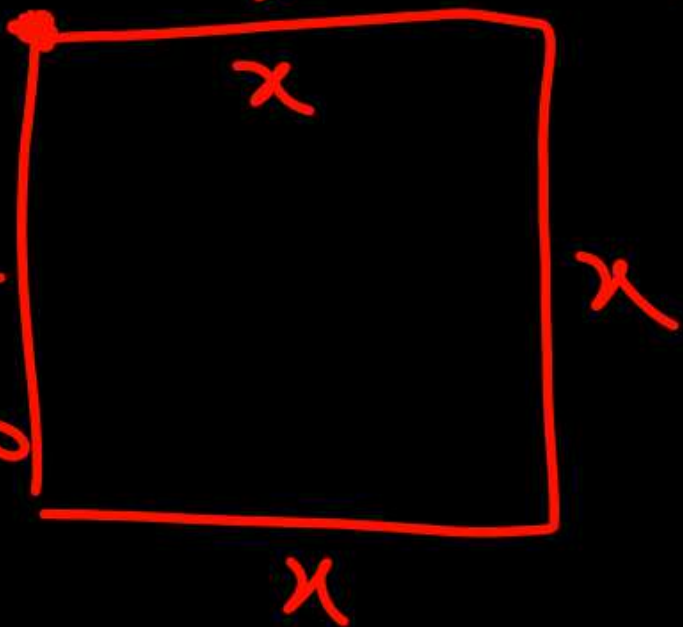
Q.6

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



$$A.S. = 48 \times 4 = \underline{\underline{192 \text{ km/h}}}$$

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



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

$$\frac{4x}{A.S.} = \frac{25x}{1200}$$

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



Q.7

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.

{ONGC-2014}

$$\frac{\cancel{100}^5}{\cancel{80}_4} U \cdot T - U \cdot T = 16$$
$$U \cdot T = \underline{\underline{64 \text{ min}}} \quad \frac{1}{4} U \cdot T = 16$$



Q.8



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 _____

$$2W + 2R = 10\text{hr } 45\text{min} \quad (W + R = 5\text{hr } 45\text{min}) \times 2$$

$$- 2R = 3\text{hr } 45\text{min} \quad \underline{R + R = 3\text{hr } 45\text{min}}$$

$$\underline{\underline{2W = 7\text{hr } 45\text{min}}}$$

$$W + W = ?$$



Q.9

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



$$S \times \frac{3}{4} \quad T \times \frac{4}{3}$$

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

$$U \cdot T = \underline{\underline{30 \text{ min}}} \quad \frac{1}{3} U \cdot T = 10$$



Q.10

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.



Q.10



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.

Handwritten calculations:

$$68 - L.S = 36$$
$$68 - 36 = L.S$$
$$D = 100m$$
$$T = 10s$$

Diagram illustrating the scenario:

Handwritten calculations for the solution:

$$R.S = \frac{100}{10} = 10m/s$$
$$10 \times \frac{18}{5} = 36km/h$$

Final answer: 32

Let's Understand



- Two objects meet only when

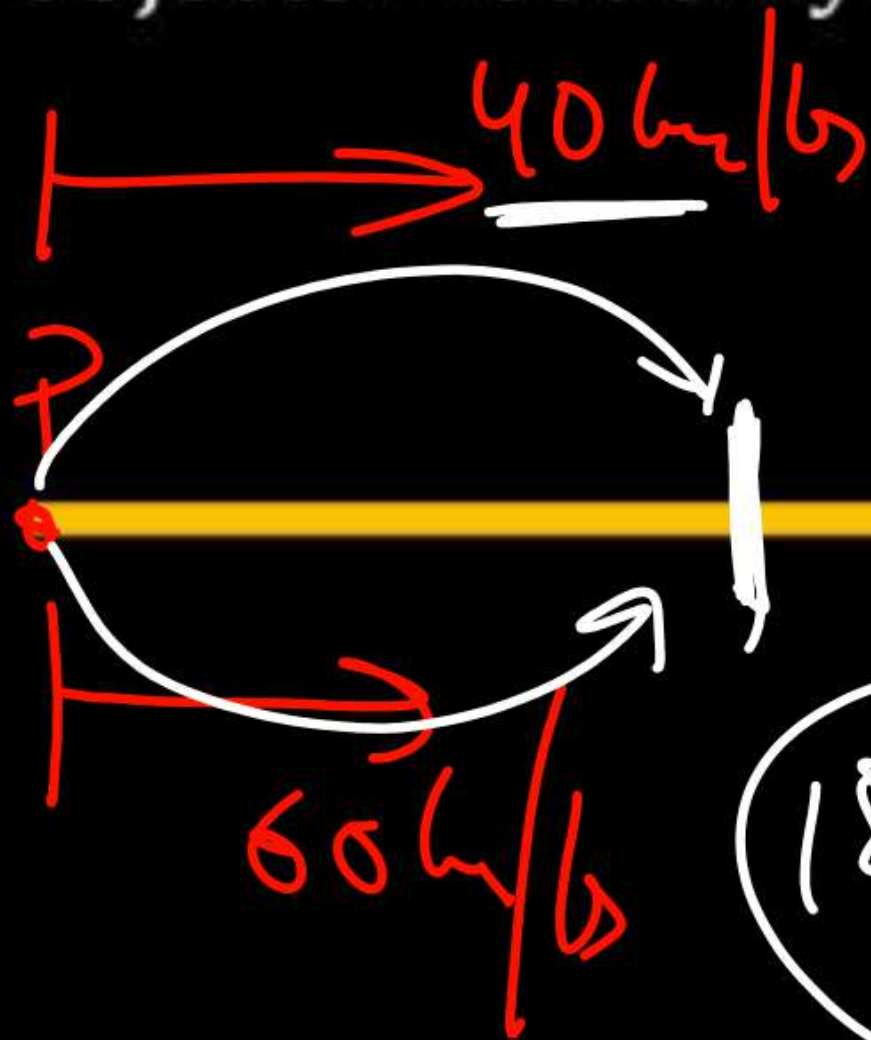
$$D_1 + D_2 = T.D.$$

1200

$$D_1 = D_2$$

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

$$R.S. = 20 \text{ km/h}$$



600 km

1800

$$T = \frac{600}{20} = \underline{\underline{30 \text{ hr}}}$$



