GATE

ALL BRANCHES

GENERAL APTITUDE

Quantitative Aptitude

Lecture No: 08

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TOPICS TO BE COVERED

1. Concept of Average Speed
2. Understanding Relative Speed
3. Basic Formulae and Logical Approach
4. Questionnaire on the Topic

Q. Two pipes A and B can fill a tank in 8 minutes and 12 minutes respectively. Both the pipes are opened together and after 3 minutes, pipe A is turned off. What is the total time required to fill the tank?

A. 3 minutes

B. 7.5 minutes

C. 4.5 minutes

D. 10 minutes

$A = \frac{1}{8}$ | $B = \frac{1}{12}$

$\frac{3}{8} + \frac{x}{12} = 1$

$9 + 2x = 24$

$\Rightarrow 2x = 15$

$\therefore x = \frac{15}{2}$

$= 7.5$

Assignment

Q. Pipes A and B can fill a tank in 4 hours and 8 hours respectively. Pipe C can empty it in 16 hours. If all the three pipes are opened together, then how long will it take to fill the tank?

A. 4.5 hours

B. 2 hours

C. 6 hours

D. 3.2 hours

$A = \frac{1}{4} \mid B = \frac{1}{8} \mid C = -\frac{1}{16}$

$A \& B \& C = \frac{1}{4} + \frac{1}{8} - \frac{1}{16} = \frac{4+2-1}{16} = \frac{5}{16}$

$\frac{16}{5} = 3.2 \text{ hrs}$

Q. A is twice as good a workman as B and together, they finish a piece of work in 18 days. In how many days will A alone finish the work?

A. 28 days

B. 30 days

C. 27 days

D. 29 days

$A = x$ | $B = 2x$

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

$\frac{1}{x} + \frac{1}{2x} = \frac{1}{18}$

$\frac{2+1}{2x} = \frac{1}{18}$

$\frac{3}{2x} = \frac{1}{18}$

$\therefore x = 27$

Assignment

Q. A can do ¾ th of a work in 12 days. In how many days can he finish $^{1}/_{8}$ th of work?

Assignment

Work	Days
$\frac{6}{8}$	12
$\frac{3}{4}$	
$\frac{1}{8}$	?

$$12 \times \frac{1}{8} \times \frac{4}{3} = 2$$

$= 2$ days

Q. A tank can be filled by 20 buckets each of capacity 13.5 litres. If the capacity of each bucket be 9 litres, how many buckets will fill the same tank?

A. 30

B. 25

C. 20

D. 15

Tank Cap

$= 20 \times 13.5 = 270$ lit

$\frac{270}{9} = 30$ lit

TIME and DISTANCE

Distance = D
Speed = S
Time = T

Relative speed = R.S.

Average speed $D = S \times T$

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

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

$S = \frac{1000m}{1\cancel{8}\cancel{00}\ sec}$

$D = 400m$

$S = 40\ km/h$

$T = ?$

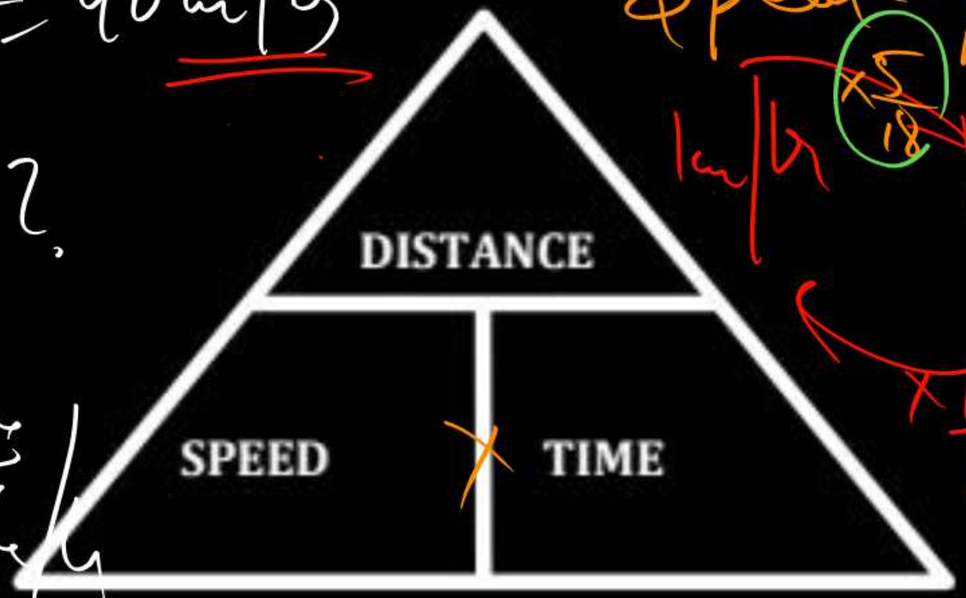
$T = \frac{400m}{40\ km/h}$

$? = 10\ m/km/h$

Speed $= \frac{km}{hr}$

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

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

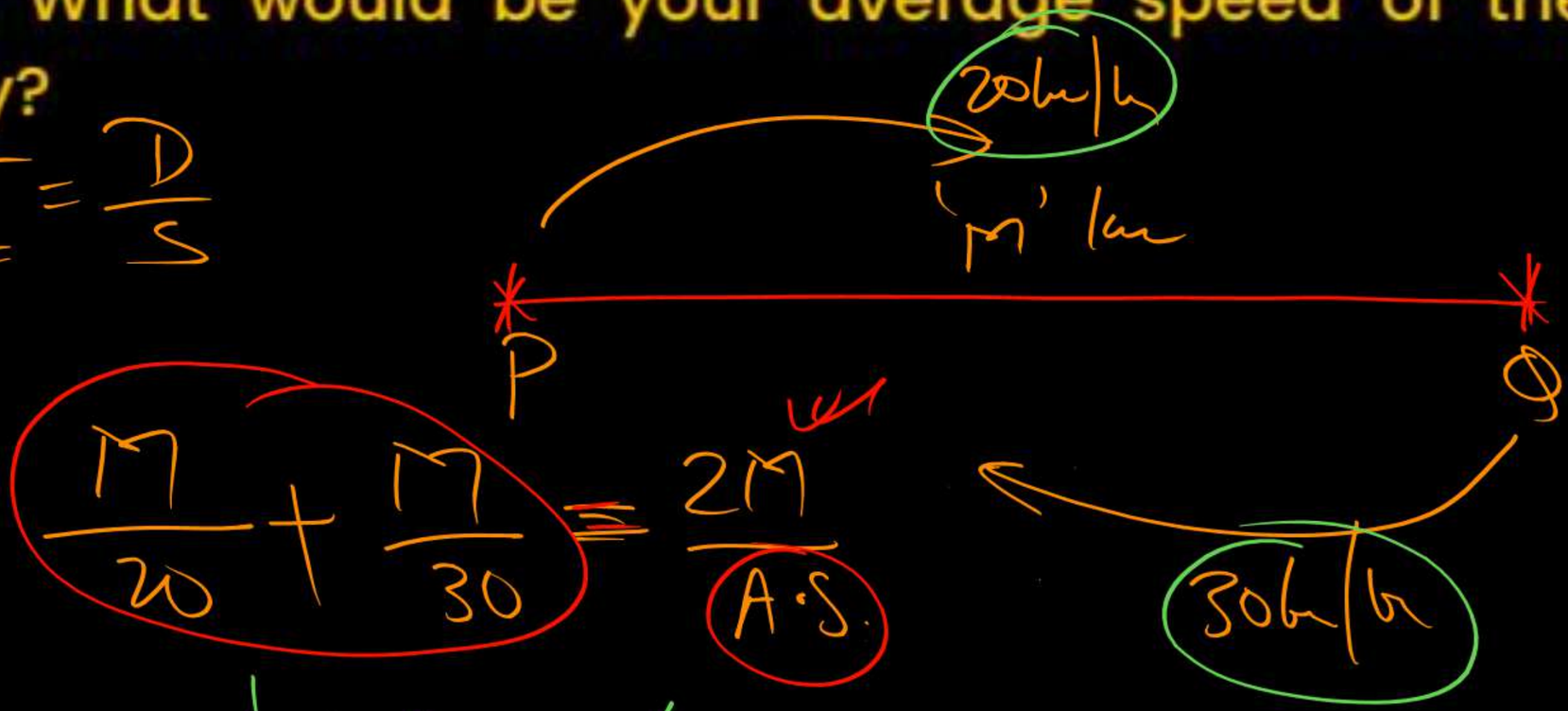


Q. If you travel from P to Q at 20km/hr and Q to P at 30 km/hr. What would be your average speed of the journey?

$A.S = \frac{\text{Total Dist}}{\text{Total Time}}$ $T = \frac{D}{S}$

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

$\frac{2xy}{x+y}$ ☆ X



$\frac{M}{20} + \frac{M}{30} = \frac{2M}{A.S.}$

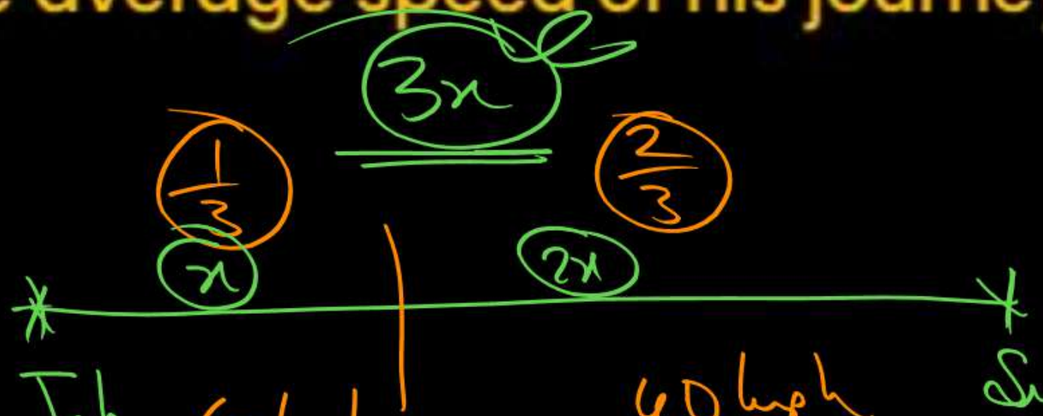
$\frac{5M}{60_{12}} = \frac{2M}{A.S}$

$A.S. = 24 \text{ km/hr}$

Q. A man travels from Jabalpur to Surat 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.

$\frac{x}{3} \times \frac{1}{60} + \frac{2x}{3} \times \frac{1}{40} = \frac{x}{A.S.}$

$\frac{1}{3}\left(\frac{x}{60} + \frac{2x}{40}\right) = \frac{x}{A.S.}$



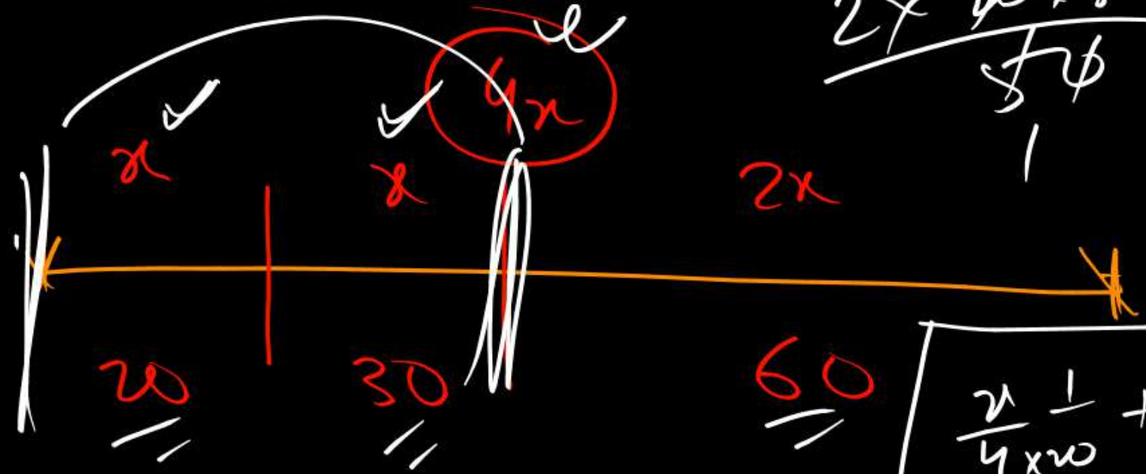
$\frac{x}{60} + \frac{2x}{40} = \frac{3x}{A.S.}$

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

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

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

Q. A man travels ¼th of his journey at 20 km/hr, another ¼th at 30 km/hr & remaining at 60 km/hr. Find the average speed of his journey.



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

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

$= \frac{240}{7} = 34\frac{2}{7}$

34.28

$\frac{x}{20} + \frac{x}{30} + \frac{2x}{60} = \frac{4x}{A.S.} \Rightarrow \frac{3x+2x+2x}{60} = \frac{4x}{A.S.}$

$\frac{2 \times 24 \times 60}{84} = \frac{240}{7}$

$\frac{2 \times 20 \times 30}{50} = 24 \text{ km/hr}$

$\frac{x}{4} \frac{1}{\times 20} + \frac{x}{4} \times \frac{1}{30} = \frac{2x+1}{240}$

$= \frac{x}{A.S.}$

$\frac{1}{4}\left(\frac{x}{20} + \frac{x}{30} + \frac{2x}{60}\right) = \frac{x}{A.S.}$

7am – 9am

Q. Lucknow 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?

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

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

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

$$= 25\text{ m/sec}$$

$= 32$ seconds

Same $\Rightarrow (-)$

opp $\Rightarrow (+)$

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

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

B. 45 km

C. 68 km

D. 32 km

Thank You !