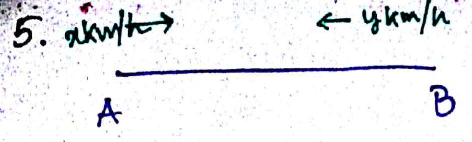
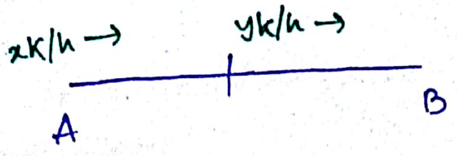
5. 

A man cover A to B with a ~~dist.~~ ~~...~~ speed x km/hr and return back with a dist y km/h.

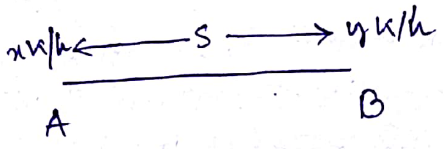
or,



A man covers half of the dist x k/h and half of the distance y k/h

$$\therefore \text{Avarage Speed} = \frac{2xy}{x+y}$$

Proof :



Let consider distance is s, forward journey x k/h. backward journey y k/h

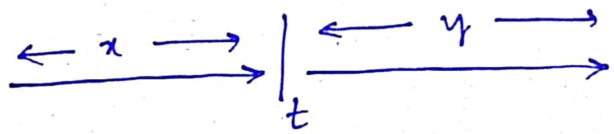
$$\therefore \text{Total journey} = s + s = 2s$$

$$\text{time} = \frac{\text{dist.}}{\text{Speed}} = \frac{s}{x} \text{ or } \frac{s}{y}.$$

$$\therefore \text{Avg. speed} = \frac{2s}{\frac{s}{x} + \frac{s}{y}} = \frac{2s}{s\left(\frac{1}{x} + \frac{1}{y}\right)}$$

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

6. Relative Speed :



$v > u$

A train length x moving with a speed v, another train length y moving with a speed u **same dir.** If $v > u$, second train crosses first train.

$\therefore$ Relative speed in same direction :

$$v - u = \frac{x+y}{t}.$$

K@ust@v