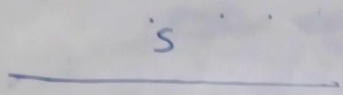
Time/speed Distance

Section A:-

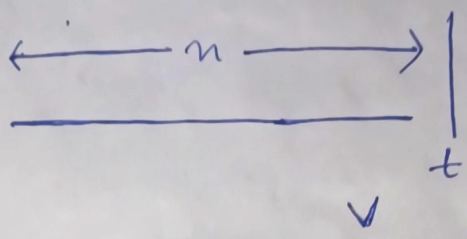
$$\text{speed} = \frac{\text{Distance}}{\text{time}}$$



$$V = \frac{s}{t}$$

$$s = V \times t$$

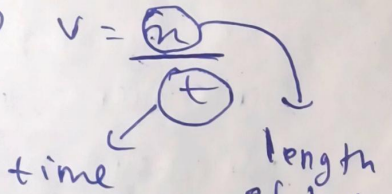
$$t = \frac{s}{V}$$



$$V = \frac{x}{t}$$

$$V = \frac{x+y}{t}$$

i) When a train crosses the person/pillar then, distance covered $\Rightarrow$ $V = \frac{x}{t}$



Similarly if train crosses another train/platform of length y then $V = \frac{x+y}{t}$

ii) A train crosses another train / bridge / platform then distance covered

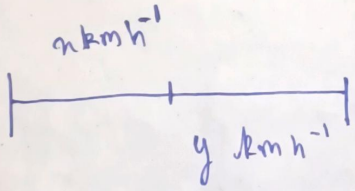
~~Length of train + length of train~~

= length of train + length of another bridge / platform

iii) Car covers s_1 distance in t_1 time, s_2 in t_2 and s_3 in t_3

then $\Rightarrow$ avg speed $= \dfrac{s_1+s_2+s_2}{t_1+t_2+t_3}$

iv)



avg speed $= 2xy/(x+y)$

car covers A to B distance (forward journey) with speed of x kmh^{-1} and backward journey with the speed of y kmh^{-1} OR half of the distance with x kmh^{-1} & the remainder half with a speed of y kmh^{-1}

v) 1 train length x and speed v km h^{-1}

2nd train of length y and speed u km h^{-1}

Relative velocity $\Rightarrow v-u = \frac{x+y}{t}$

[For same distance direction]

for opposite direction

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

vi) speed of boat = x km h^{-1}

speed of stream = y km h^{-1}

∴ Relative velocity in down stream = $(x+y)$ km h^{-1}

∴ " " " up stream = $(x-y)$ km h^{-1}

$\frac{x}{y} = \frac{t_2+t_1}{t_2-t_1}$

t_1 -> time in down stream

t_2 -> time in up stream

$$x = \frac{s}{2}\left(\frac{1}{t_1} + \frac{1}{t_2}\right)$$

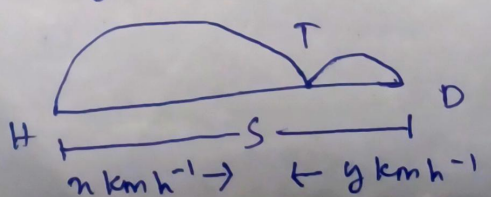
$$y = \frac{s}{2}\left(\frac{1}{t_1} - \frac{1}{t_2}\right)$$

vii) 2 trains, 1 started from Howrah and other from Delhi at the same time to their opposing direction after their crossing, they reached their destination in t_1 and t_2 hours respectively. Speed of 1st train / speed of 2nd train

$$\Rightarrow x/y = \sqrt{t_2/t_1}$$

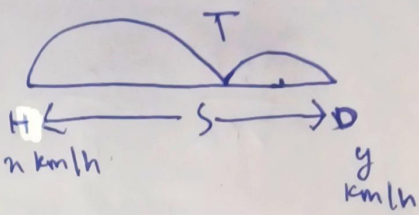
viii) Two train one started from howrah, other from delhi at the same time towards opposite direction with speed x, y km/h. If distance between howrah to Delhi is S km, when and where they will meet

$$T = \frac{S}{x+y}$$



ix) Same ~~boat~~ example but the trains dont start at the same time 2nd train starts p hours after 1st train then ~~[illegible]~~ when and where will they meet

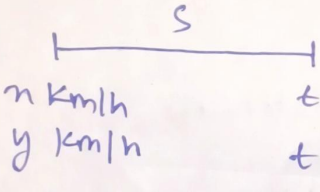
$$T = \frac{S + Py}{x + y}$$



x) km/h to m/s => multiply by $\frac{5}{18}$

m/s to km/h => >> >> $\frac{18}{5}$

xi)



~~[illegible]~~

$$\text{Distance } (S) = \frac{t_1 + t_2}{\frac{1}{x} - \frac{1}{y}}$$

$$= \frac{LH + EH}{\frac{1}{LV} - \frac{1}{EV}}$$

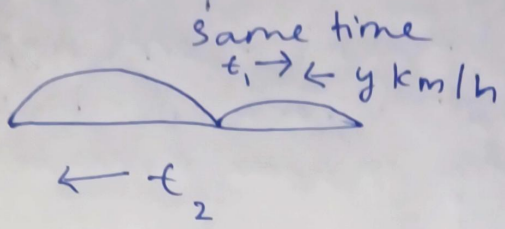
LH = Late hours

EH = Early hours

EV = Early velocity

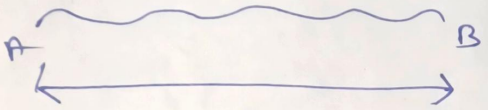
LV = Late velocity

vii)



$$\frac{1st}{2nd} = \frac{x}{y} = \sqrt{\frac{t_2}{t_1}}$$

vi)



t_2 (Upstream)

$t_2 > t_1$

Relative velocity Downstream =

$$V + u = \frac{S}{t_1} \quad \text{—} \quad (1)$$

" " Upstream :-

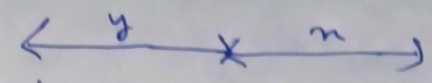
$$V - u = \frac{S}{t_2}$$

$$V = \frac{S}{2}\left(\frac{1}{t_1} + \frac{1}{t_2}\right)$$

$$u = \frac{S}{2}\left(\frac{1}{t_1} - \frac{1}{t_2}\right)$$

$$\frac{V}{u} = \frac{t_2 + t_1}{t_2 - t_1}$$

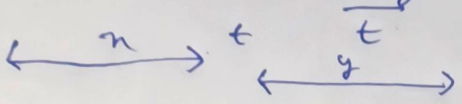
v)



v) u

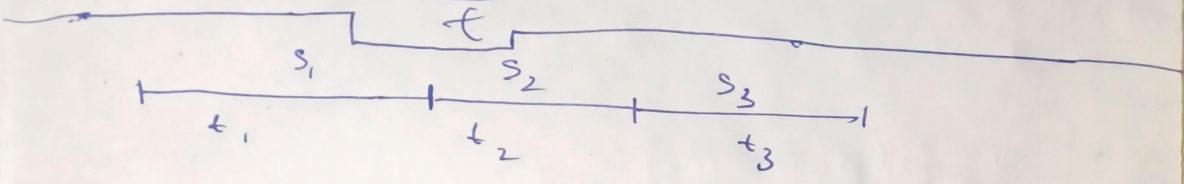
Relative velocity in same direction:-

$$V - u = \frac{n + y}{t}$$

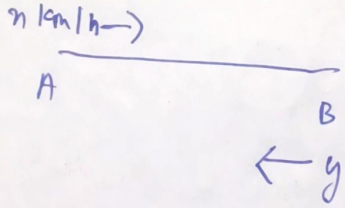


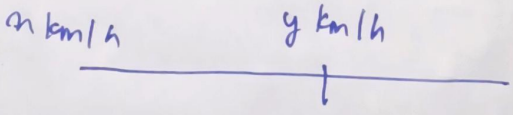
Relative velocity in opposite direction:-

$$V + u = \frac{n + y}{t}$$



Average speed $= \frac{TD}{TT} = \frac{S_1 + S_2 + S_3}{t_1 + t_2 + t_3}$





Average speed $= \frac{2ny}{n+y}$