

SPEED, DISTANCE, TIME

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

$$\frac{1 \text{ km}}{\text{hr}} = \frac{1000 \text{ m}}{60 \text{ sec} \times 60 \text{ sec}}$$

$$= \frac{5}{18} \text{ m/sec}$$

$$(\because t = K) \uparrow S \propto D \uparrow$$

$$\frac{S_1}{S_2} = \frac{D_1}{D_2}$$

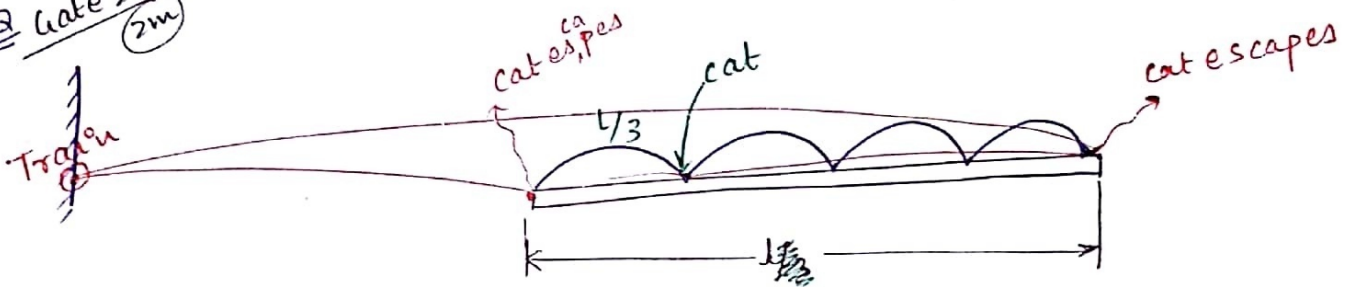
$$(\because D = K)$$

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

$$S \times t = K$$

$$S_1 \times t_1 = S_2 \times t_2$$

Q Gate 2017
(2m)



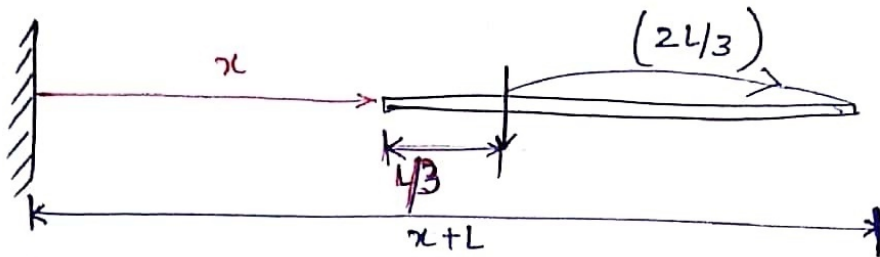
$$\frac{S_{PT}}{S_{PC}} = ?$$

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

$$C \rightarrow S = \frac{D_T}{T_1}$$

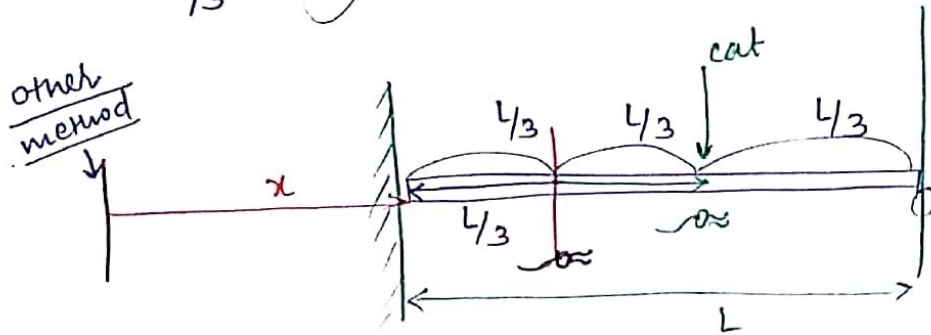
$$\frac{D_T}{T_1}$$

$$\frac{L/3}{T_1}$$



$$\frac{SP_T}{SP_C} = \frac{x}{L/3} = \frac{x+L}{2L/3} \Rightarrow 2x = x+L \Rightarrow x=L$$

$$\frac{L}{L/3} = \left(\frac{3}{1}\right)$$



$$\frac{SP_T}{SP_C} = \frac{L}{L/3} = \frac{3}{1} \quad (\because t = k) \quad \text{they reach simultaneously (at } t = k)$$

AVERAGE SPEED

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

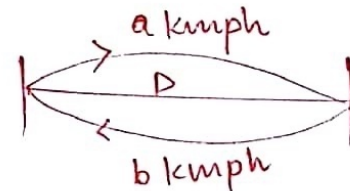
$$AM \geq GM \geq HM$$

$$\begin{array}{l} x_{50} \\ y_{52.5} \\ y_{51.5} \\ x_{48} \end{array}$$

$$\text{Avg sp} = \frac{TD}{TT} = \left[\frac{D_1 + D_2 + D_3}{t_1 + t_2 + t_3} \right]$$

$$\left[\frac{S_1 \times t_1 + S_2 \times t_2 + S_3 \times t_3}{t_1 + t_2 + t_3} \right] \checkmark$$

$$\frac{D_1 + D_2 + D_3}{\left(\frac{D_1}{S_1} + \frac{D_2}{S_2} + \frac{D_3}{S_3} \right)} \checkmark$$



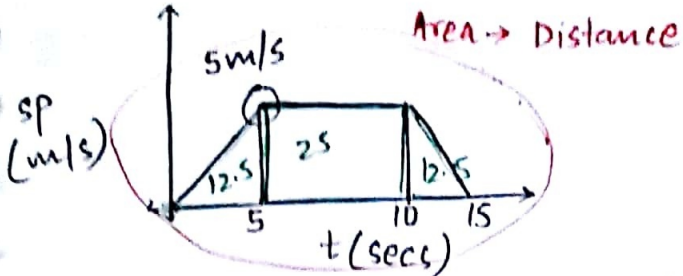
$$\text{Avg sp} = \frac{TD}{TT}$$

$$= \frac{2D}{D/a + D/b}$$

$$D/a + D/b$$

harmonic mean of a & b.

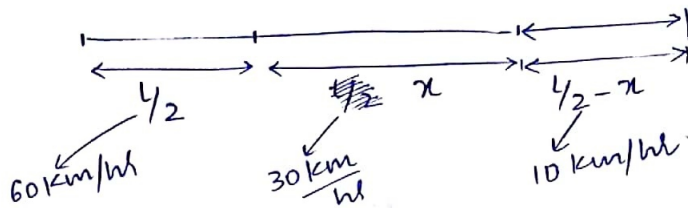
$$\text{Avg sp} = \frac{TD}{TT} = \frac{2ab}{a+b}$$



Average speed = $\frac{TD}{TT} \rightarrow \frac{\text{Area under any (s-t) graph}}{(TT)}$

Arsp = $\frac{50}{15} = 3.33 \text{ (m/s)}$ (during entire journey)

Q34
Pg 72



Arq sp = $\frac{1/2 + 1/2}{1/2 + 1/2}$

$\frac{1/2}{60} +$

~~$$= \frac{1}{120} + \frac{x}{30} + \frac{1}{20} - \frac{x}{20}$$~~

~~$$= \frac{1 + 4x + 6 - 6x}{120}$$~~

~~$$= \frac{1 + (-2x) + 6}{120}$$~~

~~$$\frac{7 - 2x}{120}$$~~

~~$$\frac{6}{120} = \frac{1}{20}$$~~

(34)

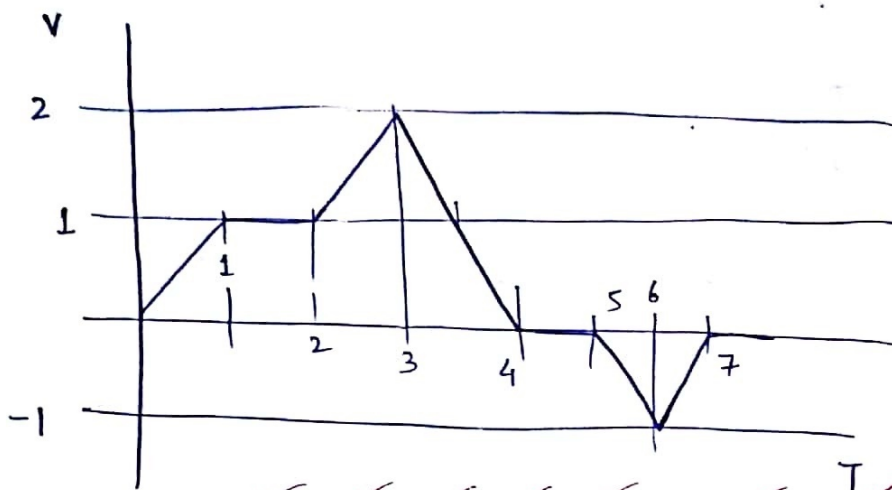
120 kms

$\left(\frac{60}{60} + 30/30 + 30/10 \right) \text{ hrs} = 24 \text{ kmph}$

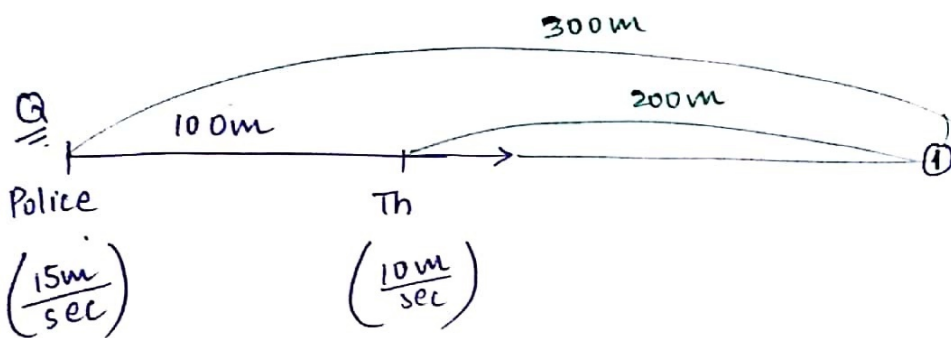
(40)

$\frac{(8 + 6 + 16) \text{ km}}{(\frac{1}{4} + \frac{1}{4} + \frac{1}{4}) \text{ hrs}} = \frac{30 \text{ km}}{3/4 \text{ hrs}} = 40 \text{ kmph} \checkmark$

Q154

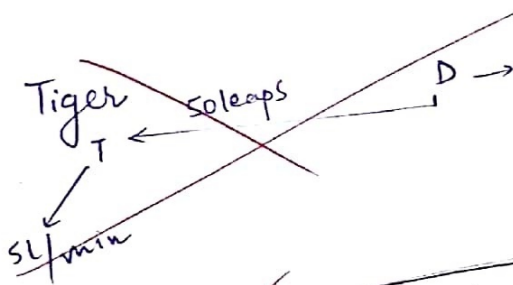


$\frac{1}{2} + 1 + 1 + 1 + 1 + \frac{1}{2} \times 2 + \frac{1}{2} + \frac{1}{2}$
 $1 + 2 + 1 + 1 = 5$ ✓



$\frac{100\text{m}}{(15-10)\text{m/sec}} = 20\text{sec}$ Relative speed

127

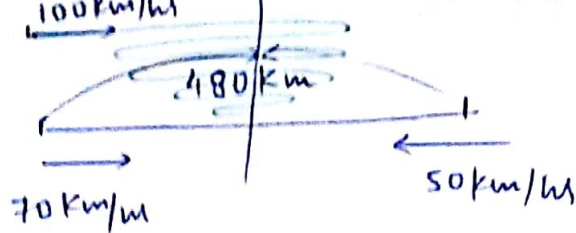


$\frac{SL}{min}$
 $\frac{D}{50} = \frac{S}{T}$
 each leap = 8m (Tiger)

SIR

$50 \times 8 = 400\text{m}$
 $5 \times \frac{8\text{m}}{min} = \frac{40\text{m}}{min}$
 $\frac{4 \times 5\text{m}}{min} = \frac{20\text{m}}{min}$
 $RS = \frac{400}{(40-20)\text{m/min}} = 20\text{mins}$

QT13
Pg 54

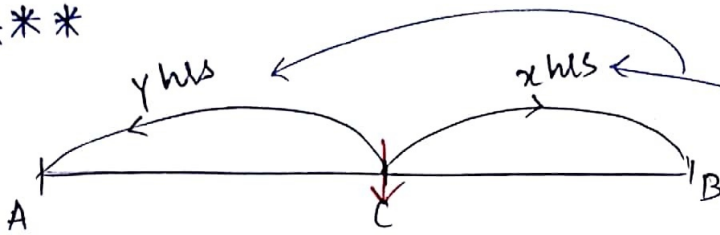


Bird remain in
here and do
not for
motion in
4 hrs

$$R_s = \frac{480 \text{ km}}{(70+50) \frac{\text{km}}{\text{hr}}} = \frac{480}{120} = 4 \text{ hrs}$$

$$\frac{\text{km}}{\text{hr}} \cdot 100 \times 4 \text{ hrs} = \frac{400 \text{ km}}{\text{hr}}$$

$$DB = SP_B \times t = 400 \text{ kms}$$



$$\frac{SP_A}{SP_B} = \sqrt{\frac{y}{x}}$$

① % ②

x & y are not
general time
taken.

Before meeting

x, y are time taken after
meeting.

$$SP_A \times t = AC$$

$$SP_B \times t = BC$$

After meeting

A goes CB in ' x ' hrs,

$$SP_A = \frac{CB}{x} = \frac{SP_B \times t}{x} \quad \text{--- ①}$$

B goes CA in ' y ' hrs,

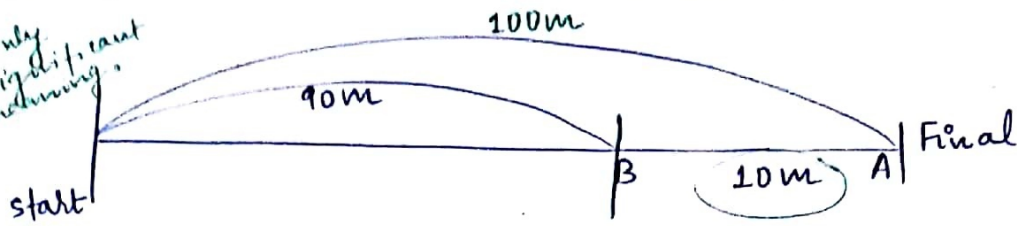
$$SP_B = \frac{AC}{y} = \frac{SP_A \times t}{y} \quad \text{--- ②}$$

T12 →

RACES. → pure application of Ratio / nothing but Ratio

A beats B by 10m in a 100m race.

B = 90m
A = 100m
→ only significant meaning.

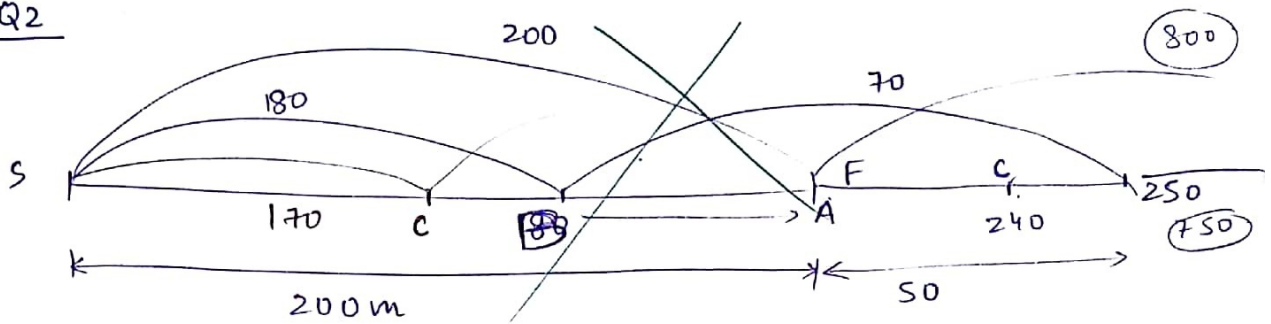


$$\left[\frac{S_A}{S_B} = \frac{100}{90} \right] (\because t = k)$$

Q A finishes 12m ahead of B and 18m ahead of C. while B finishes 8m ahead of C. then the length of the race.
a. 36, b. 48, c. 60, d. 72

Sol → Q2

Q1 Pg 53



$$\frac{S_A}{S_B} = \frac{200}{180} = \frac{20}{18}$$

$$\frac{S_B}{S_C} = \frac{250}{240} = \frac{25}{24}$$

$$\frac{S_A}{S_B} \times \frac{S_B}{S_C} = \frac{20}{18} \times \frac{25}{24} = \frac{250}{108}$$

$$\frac{S_A}{S_C} = \frac{250}{108}$$

Q1 Sol.

Pg 53

$$\frac{A}{B} = \frac{200}{180}$$

$$\frac{B}{C} = \frac{250}{240}$$

$$\left[\frac{A}{C} = \frac{A}{B} \times \frac{B}{C} \right]$$

$$\frac{A}{C} = \frac{20}{18} \times \frac{25}{24}$$

$$\frac{A}{C} = \left(\frac{500}{432} \right) \times 2 = \frac{1000}{864} = \frac{125}{108} \text{ m/s}^2$$

Q2

$$\frac{A}{B} = \frac{L}{L-12}$$

$$\frac{A}{C} = \frac{L}{L-18}$$

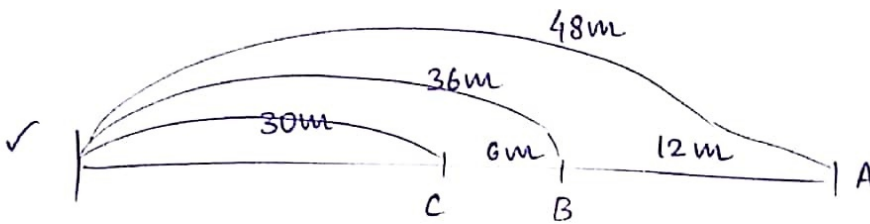
$$\frac{B}{C} = \frac{L}{L-8}$$

$$\frac{L}{L-18} = \frac{L}{L-12} \times \frac{L}{L-8}$$

$$\frac{L}{L-18} = \frac{L}{L-12} \times \frac{L}{L-8}$$

$$\left[\frac{L-12}{L-18} = \frac{L}{L-8} \right]$$

use options $\rightarrow L=48$



$$\frac{B}{C} = \frac{36}{30} = \frac{6}{5} \times \frac{8}{8} = \frac{48}{40} = \frac{6}{5} \text{ m/s}^2$$