8th Sandakian

cos-2

Task

① $V_1 = 40$ kmph $\rightarrow$ $x_1 = 30$ km $\rightarrow$ time $t_1 = \frac{x_1}{V_1} = \frac{30}{40} = \frac{3}{4}$

$V_2 = 20$ kmph $\rightarrow$ $x_2 = 30$ km $\rightarrow$ time $t_2 = \frac{x_2}{V_2} = \frac{30}{20} = \frac{3}{2}$

Total time $= t_1 + t_2 = \frac{3}{4} + \frac{3}{2} = \frac{3+6}{4} = \frac{9}{4}$

$\therefore$ $\langle$ speed $\rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{30+30}{\frac{9}{4}} = \frac{60^{20} \times 4}{9_3}$

$= \frac{80}{3} = 26.6$ kmph.

② $V_1 = 60$ kmph $\rightarrow$ $t_1 = 0.52$ h

$V_2 = 30$ kmph $\rightarrow$ $t_2 = 0.24$ h

$V_3 = 70$ kmph $\rightarrow$ $t_3 = 0.71$ h

$\langle$ speed $\rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{V_1 t_1 + V_2 t_2 + V_3 t_3}{t_1 + t_2 + t_3}$

$= \frac{60 \times 0.52 + 30 \times 0.24 + 70 \times 0.71}{0.52 + 0.24 + 0.71} = 59.9$ kmph

③ $x_1 = 100$ km $\rightarrow$ $V_1 = 50$ kmph

(4)

$x_1 = 100$ km first half of the distance with a speed v_1 and remaining half of the distance with v_2. then

$$\langle \text{speed} \rangle = \frac{2v_1v_2}{v_1+v_2} \quad ; v_1 = 50 \text{ kmph}$$

$\langle \text{speed} \rangle = 70$ kmph

$$\Rightarrow 70 = \frac{2 \times 50 \times v_2}{50+v_2}$$

$$\Rightarrow 7 = \frac{10v_2}{50+v_2} \Rightarrow 7(50+v_2) = 10v_2$$

$$\Rightarrow 350 + 7v_2 = 10v_2$$

$$\Rightarrow 350 = 3v_2 \Rightarrow v_2 = 116.6 \text{ kmph}.$$

(3) (3)

In $t_1 = 1$ sec, $x_1 = 15$m ; $x_2 = 25$m $\rightarrow t_2 = 1$ sec ; $x_3 = 35$m $\Rightarrow t_3 = 1$ sec

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{x_1+x_2+x_3}{t_1+t_2+t_3} = \frac{15+25+35}{1+1+1}$$

$$= \frac{75}{3} = 25 \text{ m/s}$$

(5)

distance $= 225$m ; $t = 5$ sec

$$\langle \text{speed} \rangle = \frac{\text{T. distance}}{\text{T. time}} = \frac{225}{5} = 45 \text{ m/s}.$$

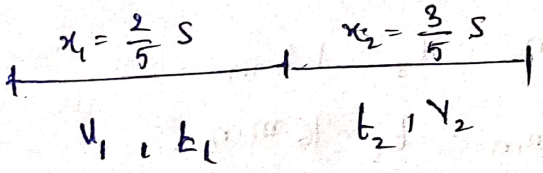
$$\langle \text{velocity} \rangle = \frac{\text{Total displacement}}{\text{Total time}} = 0.$$

(9)

Distance $= 120$ km ; $t = 2$ hr 30 mn $= \frac{5}{2}$ hr.

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{120}{\frac{5}{2}} = \frac{240}{5} = 48 \text{ kmph}$$

(6)



Here 'S' be the total distance.

t_1, t_2 are time taken to cover x_1 and x_2 distance.

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{S}{t_1 + t_2}$$

$$= \frac{S}{\frac{x_1}{v_1} + \frac{x_2}{v_2}} = \frac{S}{\frac{2}{5v_1}S + \frac{3S}{5v_2}}$$

$$= S\left[\frac{1}{\frac{2v_2 + 3v_1}{5v_1v_2}}\right] = \frac{5v_1v_2}{2v_2 + 3v_1}$$

(7)

$v_1 = 90$ kmph ; $t_1 = 5$ sec. $\quad v_3 = 60$ kmph

$v_2 = 40$ kmph ; $t_2 = 10$ sec $\quad t_3 = 15$ sec.

$$\langle \text{velocity} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{v_1t_1 + v_2t_2 + v_3t_3}{t_1 + t_2 + t_3}$$

$$= \frac{90 \times 5 + 40 \times 10 + 60 \times 15}{5 + 10 + 15} = \frac{100 + 400 + 900}{30}$$

$$= \frac{1400}{30} = 46.6 \text{ kmph}$$

(8)

$x_1 = 4$ km, $x_2 = 2$ km, $x_3 = 1$ km

$t_1 = 32$ min ; $t_2 = 22$ min ; $t_3 = 16$ min

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{x_1 + x_2 + x_3}{t_1 + t_2 + t_3}$$

$$= \frac{4+2+1}{32+22+16} = \frac{7}{70} = 0.1 \text{ km/min}$$

(10)

$V = 600$ kmph. ; $t = 2.5$ hrs.

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}}$$

$$\Rightarrow \text{Total distance} = \langle \text{speed} \rangle \times \text{time}$$

$$= 600 \times 2.5$$

$$= 1500 \text{ km}$$

Advanced

(1)

Total distance = 200 km + 200 km = 400 km.

Total time = 5 hrs + 5 hrs = 10 hrs.

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{400}{10} = 40 \text{ kmph}$$

$$\langle \text{velocity} \rangle = \frac{\text{Total displacement}}{\text{Total time}} = \frac{0}{10} = 0.$$

I Task

Advanced

(3)

Aparna house —— 150m —— school —— 200m —— Pramathi

Both are reaching the school at a time means Pramathi is moving faster

Aparna house is near to school.

Difference between their distances from school = 200 - 150
= 50m

(6)

For Gowthamia express $S = 200$ km

$t = 75$ min $= \frac{3}{4}$ hr.

$$\text{speed} = \frac{200}{\frac{3}{4}} = \frac{800}{3} \text{ kmph}$$

For shatabdi express $S = 150$ km time = 60 min = 1 hr

$$\text{speed} = \frac{150}{1} = 150 \text{ kmph}$$

For Rajdhani $S = 250$ km ; time = 120 min = 2 hr

$$\text{speed} = \frac{S}{t} = \frac{280}{2} = 140 \text{ kmph}$$

Total time taken = 5 hr + 5 hr = 10 hrs.

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{400}{10} = 40 \text{ kmph}$$

(12) (4) A

According to given data

Nithin covering 300 m in 15 sec where as

Jathin covering 600 m in 1 min → 60 sec.

so in Nithin speed = $\frac{300}{15} = 20$ m/s

Jathin speed = $\frac{600}{60} = 10$ m/s

clearly Nithin will win the race because his speed is more than Jathin.

(13) (5)

(a) Given Athelet speed = 10 m/s

bicycle speed = 20 m/min = $\frac{20 \text{ m}}{60 \text{ sec}} = \frac{1}{3}$ m/s = 0.33 m/s

scooter speed = 30 kmph = $30 \times \frac{5}{18} = \frac{25}{3} = 8.33$ m/s

$a > c > b$

(2)

(16) A Given For one revolution time taken = 4 sec.

(i) Along AB (half of rot) Distance covered = $\frac{1}{4}$ Circumference of a circle

$= \frac{1}{4} \times 2\pi r = \frac{\pi r}{2}$

For $\frac{1}{4}^{th}$ rotation time = 1 sec

$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{\frac{\pi r}{2}}{1} = \frac{\pi r}{2}$

(ii) Along AC (half of rotation)

Distance covered = $\frac{1}{2}$ Circumference of a circle

$= \frac{1}{2} \times 2\pi r = \pi r$

Time taken = 2 sec

$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{\pi r}{2}$.

(iii) For one complete revolution

Distance covered = Circumference of a circle

$= 2\pi r$

Time taken = 4 sec

$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{2\pi r}{4} = \frac{\pi r}{2}$

(10) (8)

(18) Given the body is covering x% of distance with a speed v_1, & $(100-x)$% with a speed v_2.

(a) $x = 20$ i.e) $20\% = \frac{20}{100} = \frac{1}{5}$ & $\rightarrow v_1 \rightarrow t_1 = \frac{\frac{s}{5}}{v_1} = \frac{s}{5v_1}$

Time

$80\% = \frac{80}{100} = \frac{4}{5} s \rightarrow v_2 \rightarrow t_2 = \frac{\frac{4s}{5}}{v_2} = \frac{4s}{5v_2}$

$\therefore \langle \text{speed} \rangle = \frac{2v_1v_2}{v_1+v_2} = \frac{\text{Total distance}}{\text{Total time}}$

$= \frac{s}{t_1+t_2} = \frac{s}{\frac{s}{5v_1} + \frac{4s}{5v_2}} \Rightarrow \frac{s}{\frac{s}{5}\left[\frac{1}{v_1} + \frac{4}{v_2}\right]}$

$\Rightarrow \frac{5v_1v_2}{v_2+4v_1}$ [By taking L.C.M]

(b) Total distance S : $x = 30$

$x\%$

$s_1 = 30\% = \frac{30}{100} \cdot S = \frac{3}{10} S \rightarrow v_1 \rightarrow t_1 = \frac{s_1}{v_1} = \frac{3S}{10v_1}$

$s_2 = (100-x)\% \Rightarrow 70\% = \frac{70}{100} S = \frac{7}{10} S \rightarrow v_2 ; \; t_2 = \frac{s_2}{v_2} = \frac{7S}{10v_2}$

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{S}{t_1 + t_2}$$

$$= \frac{S}{\frac{3S}{10v_1} + \frac{7S}{10v_2}} = \frac{S}{\frac{S}{10}\left[\frac{3}{v_1} + \frac{7}{v_2}\right]} = \frac{10}{\frac{3v_2 + 7v_1}{v_1 v_2}}$$

$$= \frac{10 v_1 v_2}{7v_1 + 3v_2}$$

(c) Total distance S $x = 40$

$s_1 = x\% = \frac{40}{100} S = \frac{2}{5} S \rightarrow v_1 ; \; t_1 = \frac{s_1}{v_1} = \frac{2S}{5v_1}$

$s_2 = (100-x)\% = \frac{60}{100} S = \frac{3}{5} S \Rightarrow v_2 ; \; t_2 = \frac{s_2}{v_2} = \frac{3S}{5v_2}$

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{S}{t_1 + t_2}$$

$$= \frac{S}{\frac{2S}{5v_1} + \frac{3S}{5v_2}} = \frac{S}{\frac{S}{5}\left[\frac{2}{v_1} + \frac{3}{v_2}\right]} = \frac{5}{\frac{2v_2 + 3v_1}{v_1 v_2}}$$

$$= \frac{5 v_1 v_2}{2v_2 + 3v_1}$$

(d) Total distance $= S$: $x = 50$

$s_1 = x\% = \frac{50}{100} S = \frac{1}{2} S \rightarrow v_1 ; \; t_1 = \frac{s_1}{v_1} = \frac{S}{2v_1}$

$s_2 = (100-x)\% = \frac{50}{100} S = \frac{1}{2} S \rightarrow v_2 ; \; t_2 = \frac{s_2}{v_2} = \frac{S}{2v_2}$

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{S}{t_1 + t_2} = \frac{S}{\frac{S}{2v_1} + \frac{S}{2v_2}}$$

$$= \frac{S}{\frac{S}{2}\left[\frac{1}{v_1} + \frac{1}{v_2}\right]} = \frac{2}{\frac{v_2 + v_1}{v_1 v_2}}$$

$$= \frac{2 v_1 v_2}{v_1 + v_2}$$

LTask

CUQ's

④

Speed = 35 kmph ; time = 12 min $= 12 \times \frac{1}{60}$ hrs

$= \frac{1}{5}$ hrs

∴ Distance = speed × time

$= 35 \times \frac{1}{5} = 7$ km

⑥

$x_1 = 2$ cm, $x_2 = 1.5$ cm ; $x_2 = 2.5$ cm, $x_3 = 3$ cm.

$t_1 = t_2 = t_3 = t_4 = 1$ sec

$\langle$ speed $\rangle$ $=$ $\frac{\text{Total distance}}{\text{Total time}}$

$= \frac{x_1 + x_2 + x_3 + x_4}{t_1 + t_2 + t_3 + t_4} = \frac{2 + 1.5 + 2.5 + 3}{1 + 1 + 1 + 1}$

$= \frac{9}{4} = 2.25$ cm/sec $= 2.25 \times 10^{-2}$ m/s

⑦

Distance $S_1 = 40$ km ; time $t_1 = 1$ hr.

Speed $= \frac{\text{distance}}{\text{time}} = \frac{40}{1} = 40$ kmph

Distance $S_2 = 10$ km ; time $t_2 = 15$ min $= 15 \times \frac{1}{60} = \frac{1}{4}$ hr.

Speed $= \frac{\text{Distance}}{\text{time}} = \frac{10}{\frac{1}{4}} = 40$ kmph

That is the car is moving with uniform speed.

(8)

$$36 \text{ kmph} = 36 \times \frac{1000 \text{ m}}{60 \text{ min}}$$

$$= 600 \text{ m/min.}$$

(9)

radius = 200m ; time = 5 min = 5×60 = 300 sec

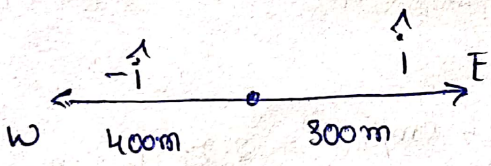
For half rotation distance = πr

$$= \frac{22}{7} \times 200 \text{ m.}$$

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{\frac{22}{7} \times 200}{300} = \frac{44}{21} \text{ m/s}$$

SAQ's

(1)



Total distance = 300m + 400m

= 700 m.

Total time = 18 sec.

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{700}{18} = 38.88 \text{ m/s.}$$

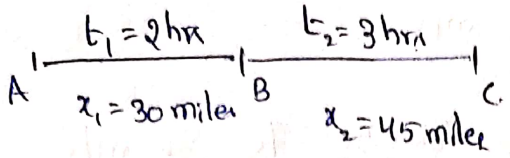
Total displacement = $300\hat{i} + 400(-\hat{i}) = 300\hat{i} - 400\hat{i}$

$= -100\hat{i}$ m

$|\text{displacement}| = |-100\hat{i}| = 100$m

$$\langle \text{velocity} \rangle = \frac{\text{Total displacement}}{\text{Total time}} = \frac{100}{18} = 5.55 \text{ m/s}$$

②



$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{x_1 + x_2}{t_1 + t_2}$$

$$= \frac{30+45}{2+3} = \frac{75}{5} = 15 \text{ miles/hr.}$$

③

$V_1 = 20$ m/sec $\rightarrow S_1 = 30$ m [First half of total distance 60 m]

$V_2 = 12$ m/s $\rightarrow S_2 = 30$m [2nd half of total distance]

$$\therefore \quad \langle \text{speed} \rangle = \frac{2V_1V_2}{V_1+V_2} = \frac{2\times 20\times 12}{20+12} = \frac{10}{\frac{40\times 12}{32}3}$$

$$= \frac{30}{2} = 15 \text{ m/s.}$$

④

Total distance $S = 60$ km

Ist half of the distance (30m) is moving with $V_1 = 60$ kmph and 2nd half of the distance (30m) with $V_2 = 40$ kmph.

$$\therefore \quad \langle \text{speed} \rangle = \frac{2V_1V_2}{V_1+V_2} = \frac{2\times 60\times 40}{60+40} = \frac{2\times 2400}{100} = 48 \text{ kmph}$$

$$\text{Total time} = \frac{x_1}{V_1} + \frac{x_2}{V_2} = \frac{30}{60} + \frac{30}{40} = \frac{1}{2} + \frac{3}{4} = \frac{2+3}{4}$$

$$= \frac{5}{4} \text{ hr} = \frac{5}{4}\times 60 \text{ min} = 75 \text{ min}$$

(5)

$u = 20$ m/s : $v = 50$ m/s

$$\langle \text{velocity} \rangle = \frac{u+v}{2} = \frac{20+50}{2} = \frac{70}{2} = 35 \text{ m/s}$$

(6)

Total distance travelled = 100 m.

Time = 10.48 sec.

$$\langle \text{velocity} \rangle = \frac{\text{Distance}}{\text{Time}} = \frac{100}{10.48} = 9.54 \text{ m/s}$$

(7)

For $t_1 = \frac{1}{2}$ hr distance travelled = 0.25 miles

$$v_1 = \frac{d_1}{t_1} = \frac{0.25}{\frac{1}{2}} = 0.5 \text{ mph}$$

For $t_2 = \frac{1}{2}$ hr distance travelled = 0.2 miles

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{0.25+0.2}{\frac{1}{2}+\frac{1}{2}} = 0.45 \text{ mph}$$

(8)

Here The total distance = AB + BA = 2 (AB) or 2(BA)

From A → B means Ist half of the distance covered with a speed $v_1 = 50$ kmph and B → A means 2nd half of the distance with a speed $v_2 = 30$ kmph.

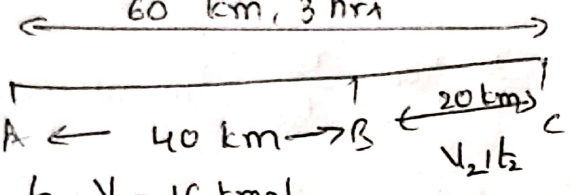
$$\langle \text{speed} \rangle = \frac{2v_1v_2}{v_1+v_2} = \frac{2\times50\times30}{50+30} = \frac{12.5}{\frac{100\times30}{80}} = 37.5 \text{ kmph}$$

(9)

From the given data Total distance = 60 km

Time = 3 hrs.

$\therefore$ $\langle$ speed $\rangle$ = $\frac{\text{Total distance}}{\text{Total time}} = \frac{60}{3} = 20$ kmph



$\langle$ speed $\rangle$ = $\frac{\text{Total distance}}{\text{Total time}}$

40 km $\rightarrow \frac{2}{3}$ of Total distance (S)

20 km $\rightarrow \frac{1}{3}$ of Total distance

$t_1 = \frac{\frac{2}{3}S}{v_1} \Rightarrow \frac{2S}{3v_1}$

$t_2 = \frac{\frac{1}{3}S}{v_2} = \frac{S}{3v_2}$

$\Rightarrow 20 = \frac{S}{\frac{2S}{3v_1} + \frac{S}{3v_2}}$

$\Rightarrow 20 = \frac{S}{\frac{S}{3}\left[\frac{2}{v_1} + \frac{1}{v_2}\right]}$

$\Rightarrow 20 = \frac{3v_1v_2}{2v_2 + v_1}$

$\Rightarrow 20(2v_2 + 16) = 3 \times 16 \times v_2$

$\Rightarrow 10v_2 + 80 = 12v_2 \Rightarrow 2v_2 = 80 \Rightarrow v_2 = 40$ kmph

(10)

$\langle$ velocity $\rangle$ = $\frac{\text{Total displacement}}{\text{Total time}} = \frac{5 + 15}{2 + 2} = \frac{20}{4}$

= 5 m/s

L Task Advanced

(4)

$l_s = 7$ cm

distance travelled by sec hand $= 2\pi r$

$= 2 \times \frac{22}{7} \times 7$ cm

$= 44$ cm

Time $= 60$ sec

$\therefore$ speed of sec hand $= \frac{d}{t} = \frac{44}{60} = \frac{11}{15}$ cm/s

$l_m = 5$ cm

Distance travelled by min hand $= 2\pi r$

$= 2 \times \frac{22}{7} \times 5$

$= \frac{44 \times 5}{7}$ cm

Time $= 60$ min $= 3600$ sec

$\therefore$ speed of min hand $= \frac{d}{t} = \frac{\frac{44 \times 5}{7}}{3600} = \frac{220}{7 \times 3600}$ (11, 180)

$= \frac{11}{1260}$ cm/s

$l_{hr} = 3.5$ cm

Distance travelled by hr hand $= 2\pi r$

$= 2 \times \frac{22}{7} \times 3.5$

$= 22$ cm

Time $=$ 1 hr $= 12$ hr $= 12 \times 3600$ sec

Speed $= \frac{d}{t} = \frac{22}{12 \times 3600} = \frac{11}{6 \times 3600} = \frac{11}{21600}$ cm/s

Advanced

L Task

(10)

$x_1 = 240$ km $\longrightarrow$ $t_1 = 4$ hrs

$x_2 = 120$ km $\longrightarrow$ $t_2 = 3$ hrs

$x_3 = 30$ km $\longrightarrow$ $t_3 = \frac{1}{2}$ hr.

Speed = $\frac{x_1}{t_1}$ (or) $\frac{x_2}{t_2}$ (or) $\frac{x_3}{t_3}$ in all cases we get

$= \frac{240}{4}$ (or) $\frac{120}{3}$ (or) $\frac{30}{\frac{1}{2}}$ ~~= 60 kmph~~

$\frac{240}{4}$ ↓ Train → 60 kmph

$\frac{120}{3}$ ↓ Car → 40 kmph

$\frac{30}{\frac{1}{2}}$ ↓ cycle → 6 kmph.

Total distance = $240 + 120 + 3 = 363$ km.

Total time = $4 + 3 + \frac{1}{2} = 7.5$ hrs

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{363}{7.5} = \frac{3630}{75} = 48.4 \text{ kmph}$$

1, 2, 3 & 1 are there → L Task

L Task

(9)

If x_1 distance covered with a velocity v_1 and x_2 with velocity v_2

$$\langle vel \rangle = \frac{x_1 + x_2}{\frac{x_1}{v_1} + \frac{x_2}{v_2}}$$ use this formula

(a) $x = 20\% \rightarrow x_1 = \frac{1}{5}x$

$x_2 = \frac{4}{5}x$.

$$\langle vel \rangle = \frac{\frac{1}{5}x + \frac{4}{5}x}{\frac{x}{5v_1} + \frac{4x}{5v_2}} = \frac{x}{\frac{x}{5}\left[\frac{1}{v_1} + \frac{4}{v_2}\right]}$$

$$\rightarrow \frac{5v_1v_2}{v_2 + 4v_1}$$

(b) $x = 30\% \rightarrow x_1 = \frac{3}{10}x$

$x_2 = \frac{7}{10}x$

$$\langle vel \rangle = \frac{\frac{3}{10}x + \frac{7}{10}x}{\frac{3x}{10v_1} + \frac{7x}{10v_2}} = \frac{x}{\frac{x}{10}\left[\frac{3}{v_1} + \frac{7}{v_2}\right]}$$

$$= \frac{10v_1v_2}{3v_2 + 7v_1}$$

(c) $x = 40\% \rightarrow x_1 = \frac{2}{5}x$

$x_2 = \frac{3}{5}x$

$$\langle vel \rangle = \frac{\frac{2x}{5} + \frac{3x}{5}}{\frac{2x}{5v_1} + \frac{3x}{5v_2}} = \frac{x}{\frac{x}{5}\left[\frac{2}{v_1} + \frac{3}{v_2}\right]}$$

$$= \frac{5v_1v_2}{2v_2 + 3v_1}$$

(d) $x = 50\% \rightarrow x_1 = \frac{1}{2}x$

$x_2 = \frac{1}{2}x$.

$$\langle vel \rangle = \frac{\frac{x}{2} + \frac{x}{2}}{\frac{x}{2v_1} + \frac{x}{2v_2}} = \frac{x}{\frac{x}{2}\left[\frac{1}{v_1} + \frac{1}{v_2}\right]}$$

$$= \frac{2v_1v_2}{v_1 + v_2}$$

(16) Given car takes T sec to complete $\frac{1}{4}^{th}$ of rotation

For Full rotation = 4T sec.

For Half rotation = 2T sec.

(8)

L Topic

For one Rotation = Displacement = 0

$$\langle \text{velocity} \rangle = \frac{\text{Total displacement}}{\text{Total time}} = 0$$

Total distance = Circumference of a circle

$= 2\pi R$

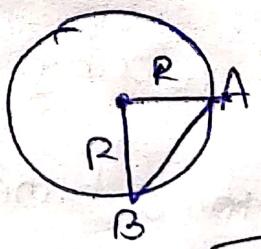
$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{2\pi R}{4T} = \frac{\pi R}{2T}$$

For Half rotation Displacement = 2R

$$\langle \text{velocity} \rangle = \frac{\text{Total displacement}}{\text{Total time}}$$

$$= \frac{2R}{2T} = \frac{R}{T}$$

For $\frac{1}{4}^{th}$ of Rotation =



Displacement = $AB = \sqrt{R^2+R^2} = \sqrt{2}\,R$

$$\langle \text{velocity} \rangle = \frac{\text{Total displacement}}{\text{Total time}}$$

$$= \frac{\sqrt{2}\,R}{2T}$$

(17) (i) Here train is moving with ~~uniform speed~~

Exam

(1)

distance = 3 km ; t = 5 min = 5 × 60 = 300 s

= 3000 m

= 300000 cm

speed = $\frac{\text{distance}}{\text{time}} = \frac{300000}{300} = 1000$ cm/s

(or) = $\frac{3000\text{ m}}{300\text{ sec}} = 10$ m/s (or) $10 \times \frac{18}{5}$ kmph

= 36 kmph

(3)

r = 7m ; t = 2 sec.

(a) distance = $\frac{2\pi r}{2} = \frac{2 \times \frac{22}{7}}{2} \times 7 = 22$ m

(b) Displacement = $2r = 2 \times 7 = 14$ m

(c) speed = $\frac{\text{distance}}{\text{time}} = \frac{22}{2} = 11$ m/s

(d) velocity = $\frac{\text{displacement}}{\text{time}} = \frac{14}{2} = 7$ m/s