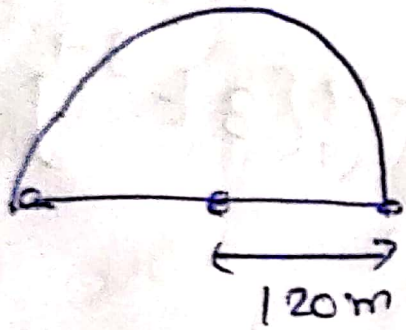


8th class WS-3 { Distance, Displacement
Task Average speed and Average velocity }

1) Given The ~~ere~~ cyclist is revolving in a circular path
of radius $r = 120$

Time taken For half rotation = 1 min = 60 sec.

$$\therefore \text{Total displacement} = 2r \Rightarrow 2 \times 120 \\ \Rightarrow 240 \text{ m}$$



$$\therefore \text{Average velocity} = \frac{\text{Total displacement}}{\text{Total time}}$$

$$= \frac{240 \text{ m}}{60 \text{ sec}} = 4 \text{ m sec}^{-1}$$

②

Given that a motorist drives for north with

a speed = 85 kmph.

in Time = 35 min = $\frac{35}{60}$ hrs

His displacement s_1 = speed $\times$ time

$$= 85 \times \frac{35}{60}$$

$$= 49.56 \text{ km.}$$

He then continued his journey towards north

covered a distance (d) = 130 km.

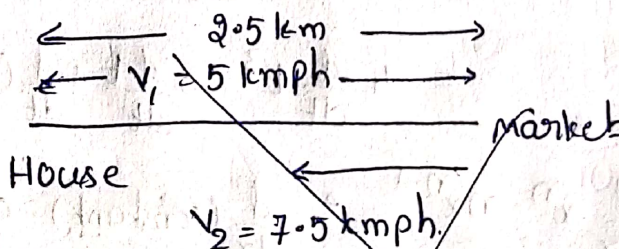
$\therefore$ Total displacement = $s_1 + d$

$$= 49.56 + 130$$

$$= 179.56 \text{ km}$$

$$\approx 179.6 \text{ km.}$$

③



Total time taken

$$= 50 \text{ min}$$

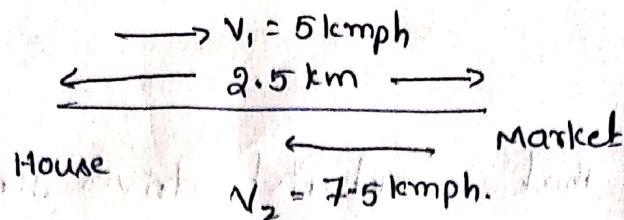
$$= \frac{50}{60} \text{ hrs.}$$

clearly The first half of distance [House-Market] covered with a speed v_1 and next half of distance [Market] with a speed v_2 .

$$\therefore \langle \text{speed} \rangle = \frac{2v_1 v_2}{v_1 + v_2} = \frac{2 \times 5 \times 7.5}{5 + 7.5}$$

$$= 6 \text{ kmph}$$

(3)



clearly The person is covering first half of the distance [House-Market] with a speed v_1 and remaining half of the distance [Market-house] with a speed v_2

$$\therefore \langle \text{speed} \rangle = \frac{2v_1 v_2}{v_1 + v_2}$$

$$= \frac{2 \times 5 \times 7.5}{5 + 7.5}$$

$$= 6 \text{ kmph} = 6 \times \frac{5}{18} \text{ m/s} = \frac{5}{3} \text{ m/s}$$

(4)

Given displacement of the particle

$$x = 4t^3 - 3t + 2$$

$$\therefore \langle \text{velocity} \rangle = \frac{dx}{dt} = \frac{d}{dt} [4t^3 - 3t + 2]$$

$$= 4 \frac{d}{dt} t^3 - 3 \frac{d}{dt} t + \frac{d}{dt} (2)$$

$$\left[\because \frac{d}{dx} x^n = nx^{n-1} \right] \quad \frac{d}{dx} (\text{constant}) = 0$$

$$\therefore \langle \text{velocity} \rangle = 4[3t^{3-1}] - 3 + 0$$

$$= 12t^2 - 3$$

$$\text{At } t = 3 \text{ sec} \Rightarrow \langle \text{velocity} \rangle = 12(3)^2 - 3$$

$$= 108 - 3 = 105 \text{ m/s}$$

⑥ Given $t_1 = 4 \text{ sec} \rightarrow \text{Distance travelled } d_1 = 16 \text{ m}$
 $t_2 = 2 \text{ sec} \rightarrow \text{Distance travelled } d_2 = 16 \text{ m}$

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

$$= \frac{d_1 + d_2}{t_1 + t_2}$$

$$= \frac{16 + 16}{4 + 2} = \frac{32}{6} = 6.33 \text{ m/s.}$$

⑦

Total distance she swam = 180 m

Total time taken = 1 min = 60 sec

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

$$= \frac{180}{60} = 3 \text{ m/s.}$$

⑩

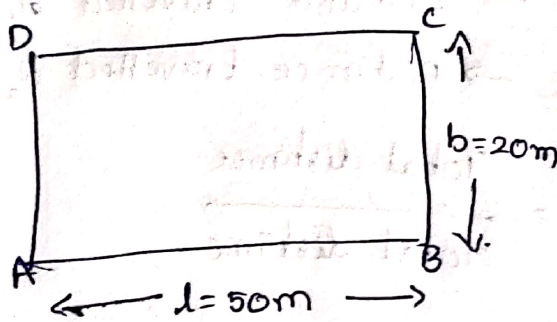
After a turns around a rectangular track
The runner back to his starting point.

$\therefore$ Initial position = Final position

$$\Rightarrow \text{Displacement} = \text{Final position} - \text{Initial position} \\ = 0$$

$$\therefore \langle \text{velocity} \rangle = \frac{\text{Total displacement}}{\text{Total time}} = \frac{0}{100} = 0.$$

(9)



For one rotation

$$\begin{aligned}\text{Total distance} &= \text{Circumference} \\ &= 2(l+b) \\ &= 2(50+20) = 2 \times 70 \\ &= 140 \text{ m.}\end{aligned}$$

For Two rotations

$$\begin{aligned}\text{Total distance} &= 2 \times 140 \\ &= 280 \text{ m.}\end{aligned}$$

$$\text{Total time} = 100 \text{ sec}$$

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

$$= \frac{280}{100} = 2.8 \text{ m/s}$$

(19)

We know that $\text{Time} = \frac{\text{distance}}{\text{speed.}}$

$$\text{Time for } 120 \text{ km} = t_1 = \frac{120}{60} = 2 \text{ hrs}$$

$$\text{Time for } 180 \text{ km} = t_2 = \frac{180}{90} = 2 \text{ hrs}$$

$$\therefore \text{Total distance travelled} = 120 + 180 = 300 \text{ km}$$

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

$$= \frac{300}{t_1 + t_2} = \frac{300}{2+2}$$

$$= \frac{300}{4} = 75 \text{ kmph}$$

⑦ Given length of the pool = 90m

For covering 180m, she takes 1 min = 60 sec

she is coming back to her initial position after

1 min [According to data given in question]

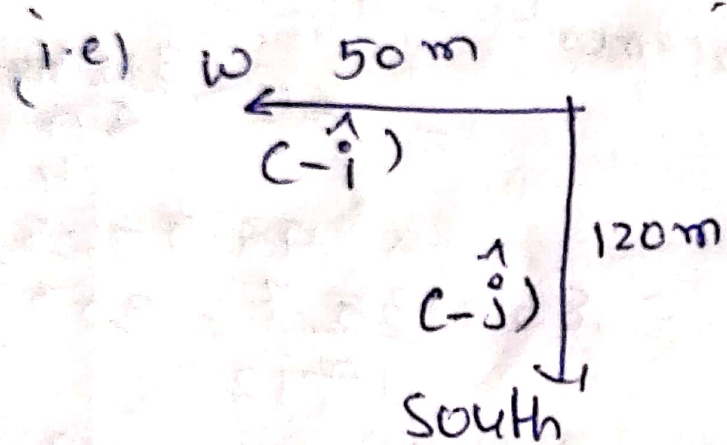
so her total displacement = 0

$$\therefore \langle \text{velocity} \rangle = \frac{\text{Total displacement}}{\text{Total time}} = \frac{0}{60} = 0$$

⑧ distance she traveled swam = 180m

⑤ Given Problem Gravel 50m west and 120m south

① Distance travelled = Total path length covered



$$= 50 + 120 = 170\text{m.}$$

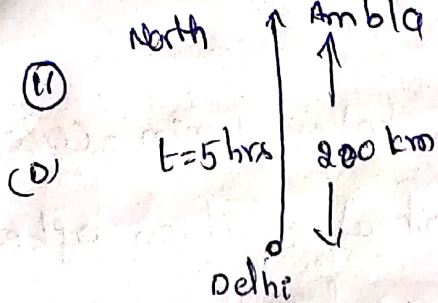
whenever directions are given
we have to take vector form for
measuring displacement

$$\Rightarrow \text{Displacement} = -50(-\hat{i}) + 120(-\hat{j})$$
$$= -50\hat{i} - 120\hat{j}$$

$$\therefore |\text{Displacement}| = \sqrt{(-50)^2 + (-120)^2}$$

$$= \sqrt{2500 + 14400} = \sqrt{16900}$$

$$= \sqrt{(130)^2} = 130\text{ km}$$



As the car returns to delhi

Then The Displacement = 0

Because initial and final positions are same [delhi]

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

Here Total distance covered by the car = 200 + 200
= 400 km
For complete journey

$$\text{Total time taken} = 5 \text{ hr} + 5 \text{ hr} = 10 \text{ hrs}$$

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

(12) According to given data

4
Nithin covering 300m in 15 sec where as

Jathin covering 600m in 1 min $\rightarrow$ 60 sec.

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

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

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

(13)

(a) Given Athlete speed = 10 m/s

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

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

$$a > c > b$$

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

(i) Along AB
(half of rot)

$$\text{Distance covered} = \frac{1}{4} \text{ Circumference of a circle}$$
$$= \frac{1}{4} \times 2\pi r = \frac{\pi r}{2}$$

For $\frac{1}{4}$ 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)

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

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

Time taken = 2 sec

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

(iii) For one complete revolution

$$\text{Distance covered} = \text{Circumference of a circle}$$
$$= 2\pi r$$

Time taken = 4 sec

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

(18) Given the body is covering $x\%$ of distance with a speed v_1 and $(100-x)\%$ with a speed v_2 . Time t

$$= 5 \text{ hrs}$$

(18)

Given $x = 20$: let the total distance = s

$$x\% \Rightarrow 20\% = \frac{20}{100} s = \frac{1}{5} s \xrightarrow{\text{Distance}} \xrightarrow{\text{speed}} v_1 \xrightarrow{\text{time}} t_1 = \frac{s}{5v_1}$$

$$80\% = \frac{80}{100} s = \frac{4}{5} s \xrightarrow{\text{Distance}} \xrightarrow{\text{speed}} v_2 \xrightarrow{\text{time}} t_2 = \frac{4s}{5v_2}$$

$$\begin{aligned} \langle \text{speed} \rangle &= \frac{\text{Total distance}}{\text{Total time}} = \frac{s}{t_1 + t_2} \\ &= \frac{s}{\frac{s}{5v_1} + \frac{4s}{5v_2}} \\ &= \frac{s}{\frac{s}{5} \left[\frac{1}{v_1} + \frac{4}{v_2} \right]} \\ &= \frac{5}{\frac{v_2 + 4v_1}{v_1 v_2}} = \frac{5v_1 v_2}{4v_1 + v_2} \end{aligned}$$

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

$x\%$

100

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

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

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

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

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

(c) Total distance $S : x = 40$

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

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

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

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

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

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

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

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

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

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

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



(19)

we know that $\text{Time} = \frac{\text{distance}}{\text{speed}}$

$$\text{Time for 120 km} = t_1 = \frac{120}{60} = 2 \text{ hrs}$$

$$\text{Time for 180 km} = t_2 = \frac{180}{90} = 2 \text{ hrs}$$

$$\therefore \text{Total distance travelled} = 120 + 180 = 300 \text{ km}$$

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

$$= \frac{300}{t_1 + t_2} = \frac{300}{2 + 2}$$

$$= \frac{300}{4} = 75 \text{ kmph}$$

3

20

Given Average speed = 60 kmph

Distance = 300 km

$$\therefore \text{Time} = \frac{\text{Total distance}}{\text{Average speed}}$$

$$= \frac{300}{60}$$

$$= 5 \text{ hrs}$$

18

9th Integrated
ws-1 → Task
Integer type

⑧

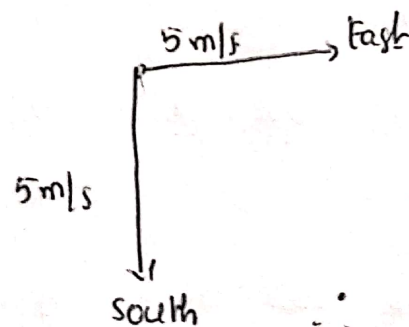
Given distance covered by the car $d = 45 \text{ m}$

Time $t = 9 \text{ sec}$

$$\begin{aligned}\therefore \text{speed} &= \frac{\text{distance}}{\text{Time}} \\ &= \frac{45}{9} \\ &= 5 \text{ m/s.}\end{aligned}$$

⑨

The direction of velocity of wind blowing is



East indicated by a unit vector $\hat{i}$

South indicated by a unit vector $\hat{j}$

$$\begin{aligned}\therefore \text{The resultant velocity of wind} &= 5(\hat{i}) + 5(-\hat{j}) \\ &= 5\hat{i} - 5\hat{j}\end{aligned}$$

$$\therefore \text{The magnitude of velocity} = |\mathbf{v}| = \sqrt{5^2 + (-5)^2}$$

$$= \sqrt{25 + 25}$$

$$= \sqrt{(25)(2)}$$

$$= 5\sqrt{2} = 5 \times 1.414$$

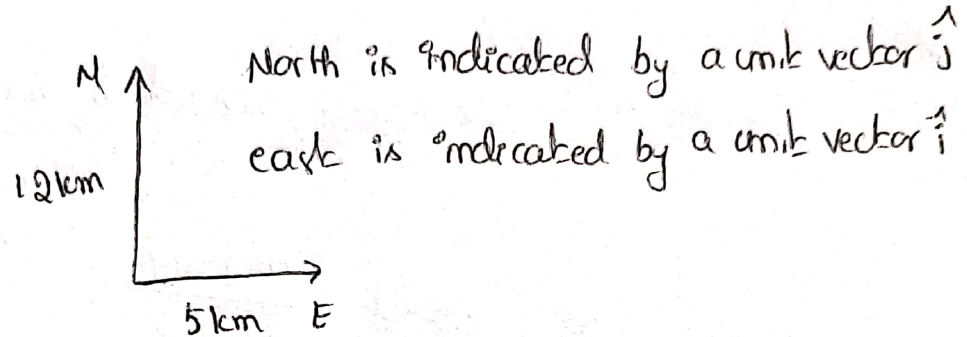
$$= 7.07 \text{ m/s}$$



Task advanced level

(9)

The direction of motion of a body is shown as



∴ The resultant displacement of the body

$$is = 5\hat{i} + 12\hat{j}$$

$$|displacement| = \sqrt{5^2 + 12^2}$$

$$= \sqrt{25 + 144} = \sqrt{169} = 13 \text{ km}$$

(10)

$$\text{Total distance covered} = 10 \text{ km} + 20 \text{ km}$$

$$= 30 \text{ km}$$

$$\text{Total time taken} = 5 + 10$$

$$= 15 \text{ sec.}$$

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

$$= \frac{30 \text{ km}}{15 \text{ sec}} = 2 \text{ km/sec.}$$

20

Given Average speed = 60 kmph

Distance = 300 km.

$$\text{Time} = \frac{\text{Total distance}}{\text{Average speed}} = \frac{300 \text{ km}}{60} = \underline{5 \text{ hrs}}$$

2. Torque

CUQ's

⑥ The total distance covered by ant is $= 2 \text{ cm} + 1.5 \text{ cm} + 2.5 \text{ cm} + 3 \text{ cm}$
 $= 9 \text{ cm}$

The total time taken $= 1 + 1 + 1 + 1 = 4 \text{ sec.}$

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{9}{4} = 2.25 \text{ cm/sec}$$
$$= 2.25 \times 10^{-2} \text{ m/s}$$

⑦ Given radius of circular path = 200 m

Time taken for half revolution = 5 min = $5 \times 60 = 300 \text{ sec}$

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{\pi r}{300}$$

$$= \frac{2.2}{7} \times \frac{200}{300} = \frac{44}{7 \times 3} = \frac{44}{21} \text{ m/s}$$

The distance covered for half rotation = $\frac{1}{2}$ (circumference)
 $= \frac{1}{2} \times 2\pi r = \underline{\pi r}$

- ① Given in a time $t_1 = 2 \text{ sec}$, An object moves a distance of $s_1 = 10 \text{ m}$
- $$\langle \text{velocity} \rangle = \frac{s_1}{t_1} = \frac{10}{2} = 5 \text{ m/s}$$

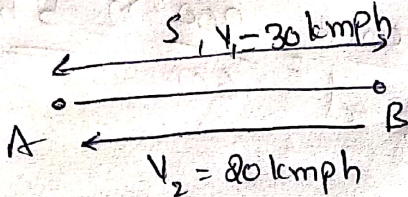
in a time $t_2 = 8 \text{ sec}$, distance covered $s_2 = 20 \text{ m}$.

$$\langle \text{velocity} \rangle = \frac{s_2}{t_2} = \frac{20}{8} = 2.5 \text{ m/s}$$

Total distance covered = $s_1 + s_2 = 10 + 20 = 30 \text{ m}$

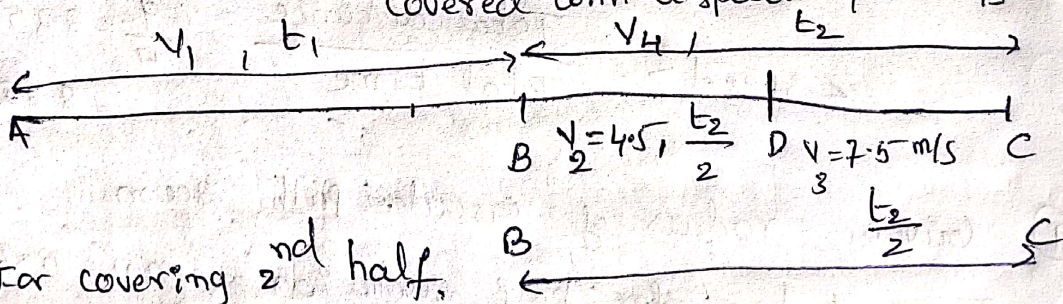
Total time taken = $t_1 + t_2 = 2 + 8 = 10 \text{ sec}$

$$\langle \text{velocity} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{30 \text{ m}}{10 \text{ sec}} = 3 \text{ m/s}$$

- ②  For the entire Journey of motor cyclist, 1st half $[A \rightarrow B]$ is covered with a speed v_1 , 2nd half $[B \rightarrow A]$ is covered with a speed v_2 .
- $$\langle \text{speed} \rangle = \frac{2v_1v_2}{v_1 + v_2} = \frac{2 \times 30 \times 20}{30 + 20}$$

$$= \frac{2 \times 30 \times 20}{50} = 24 \text{ kmph}$$

- ③ Given that The first half of the distance is covered with a speed $v_1 = 3 \text{ m/s}$



For covering 2nd half of the distance, the effective velocity becomes

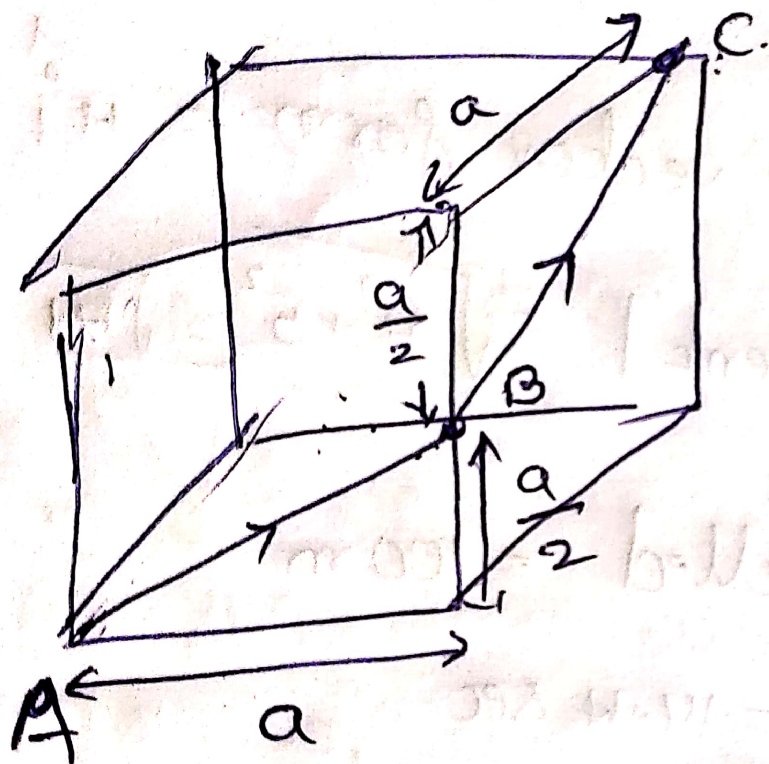
$$v_4 = \frac{v_2 + v_3}{2} = \frac{4.5 + 7.5}{2}$$

For Total Journey

$$v_4 = \frac{12}{2} = 6 \text{ m/s}$$

$$\therefore \langle \text{velocity} \rangle = \frac{2v_1v_4}{v_1 + v_4} = \frac{2 \times 3 \times 6}{3 + 6} = \frac{12 \times 2}{9} = 4 \text{ m/s}$$

(4)



The shortest distance or minimum distance covered by the ant to reach diagonally opposite corner is AC

From Fig $AC = AB + BC$

$$= \sqrt{a^2 + \left(\frac{a}{2}\right)^2} + \sqrt{a^2 + \left(\frac{a}{2}\right)^2}$$

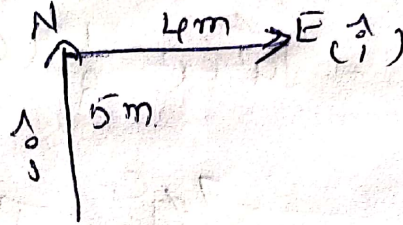
$$\Rightarrow 2 \sqrt{a^2 + \left(\frac{a}{2}\right)^2} = 2 \sqrt{a^2 + \frac{a^2}{4}}$$

$$\Rightarrow 2 \sqrt{\frac{5a^2}{4}} = \frac{2\sqrt{5}a}{2} = \sqrt{5}a$$

$$\textcircled{6} \quad \langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}}$$

$$= \frac{50}{300} = \frac{1}{6} \text{ m/s}$$

$\textcircled{7}$ The directions of motion of a body are represented as shown below



$\therefore$ The displacement = vector form = $4\hat{i} + 5\hat{j} \text{ m}$

$$\therefore |\text{Displacement}| = \sqrt{4^2 + 5^2} = \sqrt{41} = 6.4 \text{ m}$$

$\textcircled{8}$

Total distance travelled = 100 m

Time taken = 14.4 sec.

$$\langle \text{velocity} \rangle = \frac{\text{Total distance}}{\text{Time taken}} = \frac{100}{14.4} = 6.94 \text{ m/s}$$

$\textcircled{9}$

Here, the body travels total distance = $2(AB)$
The 1st half of the distance $[A \rightarrow B]$ is covered with a speed 40 m/s and 2nd half of the distance $[B \rightarrow A]$ covered with a speed of 60 m/s

$$\begin{array}{c} \xrightarrow{v_1 = 40 \text{ m/s}} \\ A \quad \quad \quad B \\ \xleftarrow{v_2 = 60 \text{ m/s}} \end{array} \quad \langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}}$$

$$\langle \text{speed} \rangle = \frac{2v_1 v_2}{v_1 + v_2} = \frac{2 \times 40 \times 60}{40 + 60} = \frac{80 \times 60}{100} = 48 \text{ m/s}$$

- (10) In this problem in a total time of 10 hrs the bus returns to Delhi. i.e.)
initial and final positions of the body are same

$$\therefore \text{Displacement} = \text{Final position} - \text{initial position}$$

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

(11) Total distance covered = 3 km = 3×10^3 m

Time taken = 5 min = $5 \times 60 = 300$ sec
or = $\frac{5}{60} = \frac{1}{12}$ hrs.

(a) speed = $\frac{\text{distance}}{\text{time}} = \frac{3 \times 10^3 \text{ m}}{300} = 1000 \text{ m/sec}$

(b) speed = $\frac{3000}{300} = 10 \text{ m/s}$ (c) speed = $\frac{18}{5} = 3.6 \text{ kmph}$

$$\boxed{1 \text{ m/s} = \frac{18}{5} \text{ kmph}}$$

(12) velocity of a car = 45 kmph.

(a) In a time = 1 hr $\rightarrow$ Distance = velocity $\times$ time
= $45 \times 1 \text{ hr} = 45 \text{ km}$

(b) If time = 1 min $\rightarrow$ Distance = $\frac{45 \times 10^3}{60} = 750 \text{ m/min}$

(c) $45 \text{ kmph} = 45 \times \frac{5}{18} \text{ m/s} = \frac{25}{2} = 12.5 \text{ m/s}$

(15) Radius of Circular Path = 7 m ; Time taken = 2 sec

Distance = circumference of a circle = $2\pi r$
= $2 \times \frac{22}{7} \times 7$
= 44 m

Displacement = 0 For one rotation

speed = $\frac{\text{distance}}{\text{time}} = \frac{44}{2} = 22 \text{ m/s}$

Displacement = $2r = 2 \times 7 = 14 \text{ m}$ (half rotation)

Velocity = $\frac{\text{Displacement}}{\text{Time}} = \frac{14}{2} = 7 \text{ m/s}$

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

For Full rotation = $4T$ sec.

For Half rotation = $2T$ sec.

For one Rotation = Displacement = 0

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

Total distance = Circumference of a circle

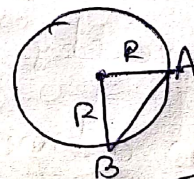
$$\langle \text{speed} \rangle = \frac{\text{Total distance} = 2\pi R}{\text{Total time} = 4T} = \frac{2\pi R}{4T} = \frac{\pi R}{2T}$$

For Half rotation Displacement = $2R$

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

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

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



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

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

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

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

$$\text{speed} = \frac{\text{distance}}{\text{Time}} = \frac{240}{4} = 60 \text{ kmph}$$

$$= 60 \text{ kmph}$$

$$(ii) \text{ speed of car} = \frac{\text{distance}}{\text{time}} = \frac{120}{3} = 40 \text{ kmph}$$

$$(iii) \text{ speed of Bus} = \frac{3 \text{ km}}{\frac{1}{2} \text{ hr}} = 6 \text{ kmph}$$

(iv) Total distance travelled by ~~Be~~ Been

$$= 240 \text{ km} + 120 \text{ km} + 3 \text{ km}$$

$$= 363 \text{ km}$$

$$(v) \text{ Total time Mr. Been travelled} = 4 \text{ hrs} + 3 \text{ hrs} + \frac{1}{2} \text{ hr} = 7.5 \text{ hr}$$

$$(vi) \text{ < speed >} = \frac{\text{Total distance}}{\text{Total time}} = \frac{363 \text{ km}}{7.5 \text{ hr}} = 48.4 \text{ kmph}$$

(18) Let the distance between A and B is d km

$$\text{Time taken to travel from A to B} = \frac{d}{4} \text{ hr}$$

$$\text{Time taken to travel from B to A} = \frac{d}{6} \text{ hr}$$

$$\text{Total distance travelled} = d + d = 2d$$

$$\text{Total time taken} = \frac{d}{4} + \frac{d}{6} = \frac{3d + 2d}{12} = \frac{5d}{12} \text{ hr}$$

$$\text{< speed >} = \frac{\text{Total distance}}{\text{Total time}} = \frac{2d}{\frac{5d}{12}} = \frac{24}{5} = 4.8 \text{ kmph}$$

$$\text{Here time taken from A} \rightarrow \text{B} = \frac{\text{distance}}{v_1} = \frac{d}{4} \text{ hr}$$

$$\text{B} \rightarrow \text{A} = \frac{d}{v_2} = \frac{d}{6} \text{ hr}$$

(19) Distance travelled for 3 hrs $= d_1 = v_1 t_1 = 15 \times 3 = 45 \text{ km}$

Distance travelled for 2 hrs $= d_2 = v_2 t_2 = 20 \times 2 = 40 \text{ km}$

$$\text{Total distance} = d_1 + d_2 = 45 \text{ km} + 40 \text{ km} = 85 \text{ km}$$

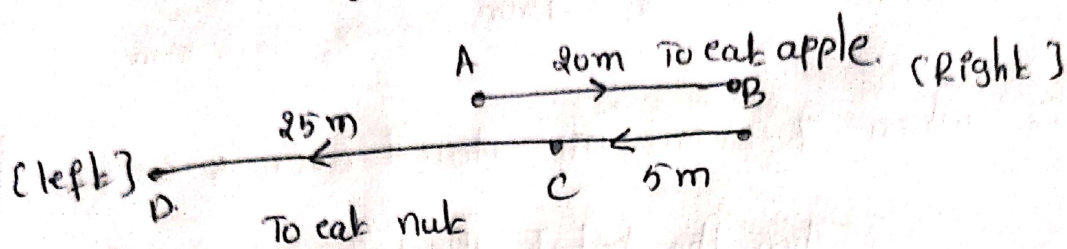
$$\text{Total time} = 3 \text{ hr} + 2 \text{ hr} = 5 \text{ hrs}$$

$$\text{< speed >} = \frac{\text{Total distance}}{\text{Total time}} = \frac{85 \text{ km}}{5 \text{ hr}} = 17 \text{ kmph}$$

WS-2 6th, WS-3 8th

(5)

Direction of motion of Pig



$$\begin{aligned}\text{Total distance travelled} &= 20 + 5 + 25 \\ &= 50 \text{ m}\end{aligned}$$

$$\text{Total time taken} = 300 \text{ sec}$$

$$\begin{aligned}\text{Total Displacement} &= \text{shortest distance} \\ &\text{between final and initial positions}\end{aligned}$$

$$= D - A$$

$$\Rightarrow -20 - 5 \Rightarrow$$

$$= 30 - 20$$

$$= 10 \text{ m}$$

$$\langle \text{velocity} \rangle = \frac{\text{Total displacement}}{\text{Total time}} = \frac{10}{300} = 0.033 \text{ m/s}$$

$$\langle \text{speed} \rangle = \frac{\text{Total distance}}{\text{Total time}} = \frac{50}{300} = \frac{1}{6} \text{ m/s}$$