7th foundation +

WS-4

T Task

(1)

Velocity of bullet $V = 120$ m/sec

Distance $d = 200$ m

$$\text{Time} = \frac{\text{distance}}{\text{velocity}} = \frac{200}{120} = \frac{5}{3} = 1.67 \text{ sec}$$

(2)

distance between sun and earth $= 1.6 \times 10^8$ km

Time $= 400$ sec

$$\text{Velocity} = \frac{\text{distance}}{\text{Time}} = \frac{1.6 \times 10^8}{400} = \frac{16 \times 10^5}{4}$$

$$= 4 \times 10^5 \text{ km/sec}$$

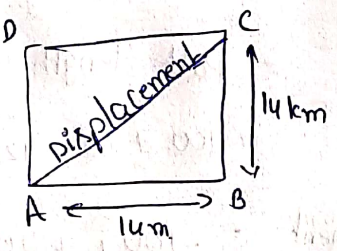
(3)

Distance $= 28$ km

Time $= 7$ sec.

$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{28}{7} = 4 \text{ km/sec}$$

(4)



Displacement = length of diagonal

$$= \sqrt{14^2 + 14^2}$$

$$= 14\sqrt{2}$$

$$\text{velocity} = \frac{\text{Displacement}}{\text{time}} = \frac{14\sqrt{2}}{7} = 2\sqrt{2} \text{ km/sec}$$

(5)

Distance = 2 km = 2000 m

Time = 5 min. = 5×60 = 300 sec.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{2000}{300} = \frac{20}{3} = 6.66 \text{ m/sec}$$

(6)

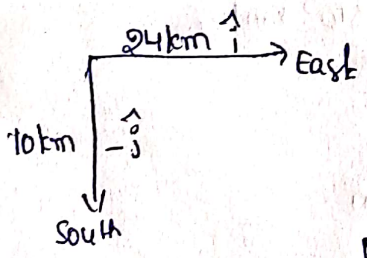
East, west are represented by the unit vectors $\hat{i}, -\hat{i}$

South is represented by the unit vector $-\hat{j}$.

∴ The displacement of a student = $2\hat{i} - 2\hat{i} - 2\hat{j} = -2\hat{j}$

|displacement| = $|-2\hat{j}| = 2$ km

(7)



Distance = Path length covered

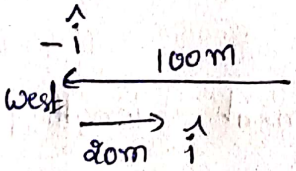
= 10 km + 24 km = 34 km.

Displacement = $24\hat{i} - 10\hat{j}$

$$|\text{Displacement}| = \sqrt{(24)^2 + (-10)^2}$$

$$= \sqrt{576+100} = \sqrt{676} = 26 \text{ km}$$

(8)



Distance = Path length covered

= 100 + 20 = 120 m

Displacement = $-100\hat{i} + 20\hat{i}$

$= -80\hat{i}$

⇒ |Displacement| = $|-80\hat{i}| = 80$ m.

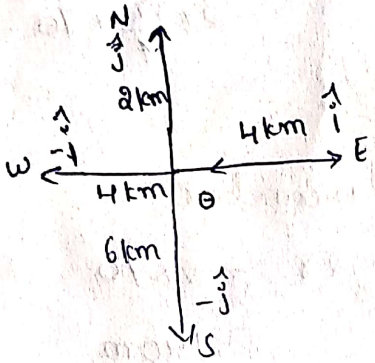
(9)

For one circle distance covered = path length

= 1600m

Displacement = 0

(10)



Total distance covered = path length

= 2 + 6 + 4 + 4 = 16 km

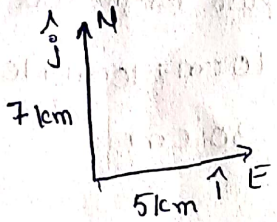
Displacement = $4\hat{i} + 4(-\hat{i}) + 2(\hat{j}) + 6(-\hat{j})$

= $4\hat{i} - 4\hat{i} + 2\hat{j} - 6\hat{j}$

= $-4\hat{j}$

|displacement| = $|-4\hat{j}|$ = 4 km

(13)



Total distance covered = 5 km + 7 km = 12 km

Displacement = $5\hat{i} + 7\hat{j}$

= $\sqrt{5^2 + 7^2}$ = $\sqrt{25+49}$

= $\sqrt{74}$ = 8.6 km

(14)

(a) 36 kmph = $\frac{\cancel{36}^{2}}{\cancel{18}} \times \frac{5}{1}$ m/s

= 10 m/s

(b) 15 m/s = $\frac{\cancel{15}^{3}}{\cancel{5}} \times \frac{18}{1}$ kmph

= 54 kmph

(c) 1 km/min = $\frac{1000}{60}$ = 16.66 m/sec

(15)

radius $r = 70m$

For one revolution

Distance covered = path length covered

= Circumference of a circle

$= 2\pi r$

$= 2 \times \frac{22}{7} \times 70^{10} = 440m$

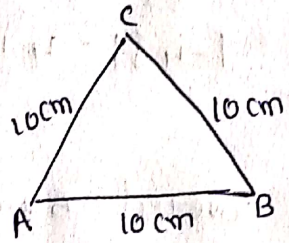
For half revolution

Displacement = Diameter

$= 2r = 2 \times 70$

$= 140m.$

(16)



For one rotation

Distance = path length covered

= 10 cm + 10cm + 10 cm

= 30 cm

Displacement = 0

(17)

we know that $speed \propto \frac{1}{time}$

$$\frac{speed_1}{speed_2} = \frac{time_2}{time_1} \Rightarrow time_2 = \frac{speed_1}{speed_2} \times time_1$$

$$\Rightarrow speed_2 = \frac{speed_1}{time_2} \times time_1$$

$$= \frac{60}{60} \times 40$$

$speed_2 = 40 kmph$

(18)

(a) 1 m/sec = 100 cm/sec

$1\,cm = 10^{-2}\,m$

(b) 20 cm/sec = 0.2 m/sec

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

(c) 3 m/sec = $3 \times \frac{18}{5}$ kmph

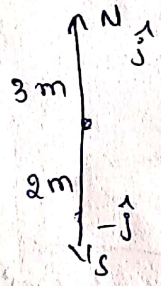
= 10.8 kmph

(d) 18 kmph = $18 \times \frac{5}{18}$ m/s = 5 m/s

L Taste

CUQ's

(10)



Distance covered = 3m + 2m = 5m

Displacement = $3\hat{j} + 2(-\hat{j}) = 3\hat{j} - 2\hat{j} = 1\hat{j}\,m$

|Displacement| = $|1\hat{j}| = 1m$

Jee main level

(1)

distance = 600 cm

= 6m

time = 5 min

= 5×60 sec

$speed = \frac{distance}{time}$

$= \frac{6}{5\times60} = \frac{1}{50}$ m/sec

$= \frac{1}{50} \times \frac{18}{5} \times 100 = \frac{36}{5} = 7.5$ kmph

(2)

$\frac{speed_{car}}{speed_{train}} = \frac{\frac{600}{2}}{\frac{75\times10^3}{50}}$

$= \frac{600}{2} \times \frac{50}{75\times10^3}$

$= \frac{6}{30} = \frac{1}{5}$

③

radius = 14m

For 10 times the distance covered = 10 × circumference

$= 10 \times 2\pi r$

$= 10 \times 2 \times \frac{22}{7} \times 14^2$

$= 880\ m$

$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{880}{60 \times 10} = \frac{44}{30} = 1.46\ m/s$

④

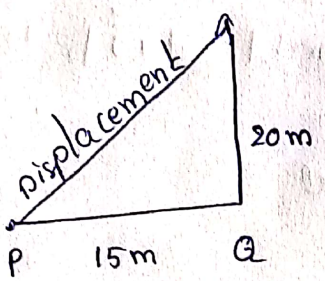
Speed = 35 kmph ; time = 12 min $= 12 \times \frac{1}{60}$ hr

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

Distance = speed × time

$= 35 \times \frac{1}{5} = 7$ hr.

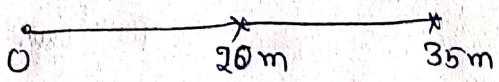
⑤



Displacement $= \sqrt{(15)^2 + (20)^2} = \sqrt{225+400}$

$= \sqrt{625} = 25\ m$

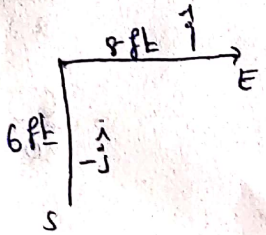
⑥



Displacement = 35 − 20

= 15m

⑦



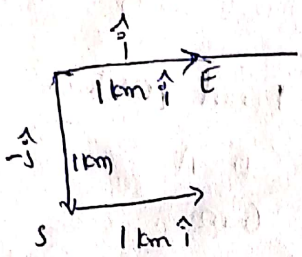
Distance = path length covered = 6 ft + 8 ft

= 14 ft

Displacement $= 8(\hat{i} + 6(-\hat{j})) = 8\hat{i} - 6\hat{j}$

$|\text{Displacement}| = \sqrt{8^2 + (-6)^2} = \sqrt{64+36} = \sqrt{100} = 10$ ft

⑧

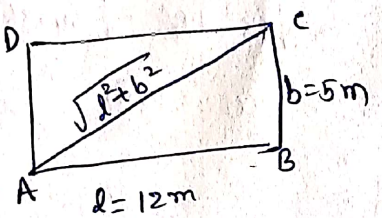


Displacement = $1\hat{i} + 1(-\hat{j}) + 1\hat{i}$

$= 2\hat{i} - \hat{j}$

$|\text{Displacement}| = \sqrt{2^2+(-1)^2} = \sqrt{4+1} = \sqrt{5}$ km

⑨

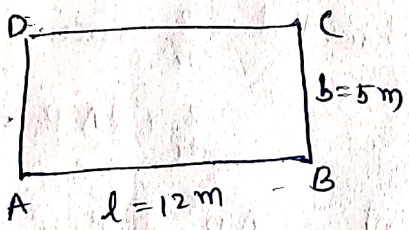


Displacement $= \sqrt{l^2+b^2} = \sqrt{12^2+5^2}$

$= \sqrt{144+25} = \sqrt{169}$

$= 13$ m

⑩



For one round

The distance travelled $= 2(l+b)$

$= 2(12+5) = 2\times 17 = 34$m

⑬

Velocity $= 45$ kmph $= 45 \times \frac{5}{18}$ m/sec

ⓐ Distance = Velocity × time

$= 45 \times 1$

$= 45$ km

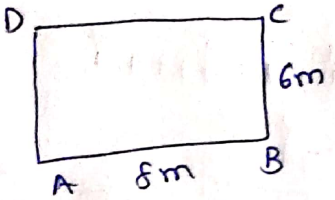
ⓑ Distance $= 45 \times \frac{5}{18} \times 1000 \times 60$

$= 750$ m

ⓒ Distance $= 45 \times \frac{5}{18} \times 1$

$= 12.5$ m

(15)



From the fig $A \to B \to C \to D$

Displacement = Final position - initial position

$= D - A$

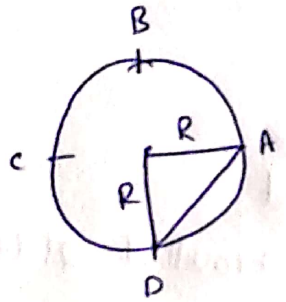
$= 6\,m$

To reach $A \to C$ Displacement $= \sqrt{1^2+5^2}$

$= \sqrt{8^2+6^2} = \sqrt{64+36}$

$= \sqrt{100} = 10m$

(16)



For $\frac{3}{4}$th of rotation

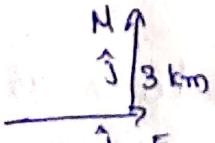
Distance travelled $= \frac{3}{4} \times$ circumference of a circle

$= \frac{3}{4} \times 2\pi R = \frac{3}{2}\pi R$

Displacement $= AD = \sqrt{R^2+R^2} = \sqrt{2}R$

$\therefore$ Distance : Displacement $= \frac{3\pi}{2}R : \sqrt{2}R = 3\pi : 2\sqrt{2}$

(17)



Displacement $= 4\hat{i} + 3\hat{j}$

$|\text{Displacement}| = \sqrt{4^2+3^2} = \sqrt{16+9} = \sqrt{25} = 5$ km

Time = 2 sec

Velocity $= \frac{\text{Displacement}}{\text{time}} = \frac{5}{2} = 2.5$ km/sec