6th integrated

Cos-7

Thank.

(1)

$V = 120$ m/sec. $\therefore$ $d = 200$ m away

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

(2)

$d = 1.6 \times 10^8$ km $= 1.6 \times 10^{11}$ m ; $t = 400$ sec

$\text{Velocity} = \frac{\text{distance}}{\text{time}} = \frac{1.6 \times 10^{11}}{400} = \frac{16 \times 10^{10}}{4 \times 100}$

$= 4 \times 10^8$ m/s $\Rightarrow 4 \times 10^5$ km/sec

(3), (4)

distance $= 28$ km ; $t = 7$ sec.

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

distance $2a = 28 \Rightarrow a = 14$ km.

As the body reaches diagonally opposite corner

displacement $= \sqrt{2} \times \text{side} = 14\sqrt{2}$ km.

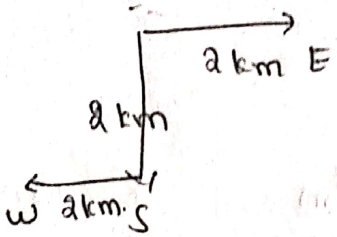
$\text{velocity} = \frac{\text{displacement}}{\text{time}} = \frac{14\sqrt{2}}{7} = 2\sqrt{2}$ km/sec

(5)

distance = 2 km ; t = 5 min

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{2 \text{ km}}{5 \times 60} = \frac{2 \times 1000}{300} = 6.66 \text{ m/s}$$

(6)



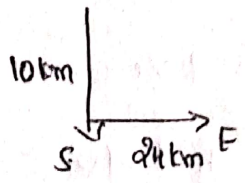
$$\text{Displacement} = 2\hat{i} + 2(-\hat{j}) + 2(-\hat{i})$$

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

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

$\hat{i}$, $-\hat{j}$, $-\hat{i}$ are unit vectors along East, south & west respectively

(7)

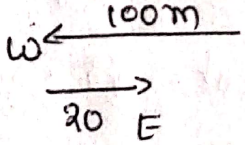


$$\text{Distance} = 10 + 24 = 34 \text{ km}$$

$$\text{Displacement} = 24\hat{i} + 10(-\hat{j}) = 24\hat{i} - 10\hat{j}$$

$$|\text{Displ}| = \sqrt{(24)^2 + (-10)^2} = \sqrt{576 + 100} = \sqrt{676} = 26 \text{ km}$$

(8)



$$\text{Distance} = 100 + 20 = 120$$

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

$$= -80\hat{i}$$

$$|\text{Displ}| = |-80\hat{i}| = 80 \text{ m}$$

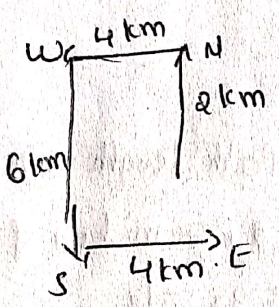
(9)

For one rotation distance = Path length covered

= 1600 m

Displacement = 0 because the body back to it's original position.

(10)



Distance: 2 km + 4 km + 6 km + 4 km.

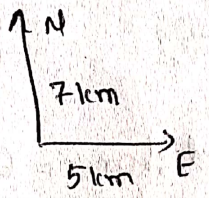
= 16 km

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

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

$|\text{Displ}| = |-4\hat{j}| = 4$ km

(13)



Total distance: 7 km + 5 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 $= 36 \times \frac{5}{18} = 2 \times 5 = 10$ m/s

(b) 15 m/sec $= 15 \times \frac{18}{5} = 3 \times 18 = 54$ kmph

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

(15)

$r = 70m$.

For one revolution distance $= 2\pi r$

$= 2 \times \frac{22}{7} \times 70$ (10)

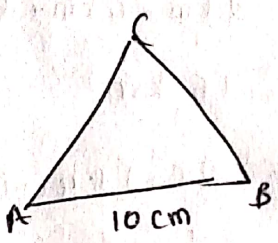
$= 440m$

For half revolution Displacement $= 2 \times r$

$= 2 \times 70$

$= 140m$

(16)



Distance = Path length covered

= Perimeter of triangle

$= 3 \times$ side

$= 3 \times 10cm = 30$ cm

Displacement $= 0$ because it is back to its starting point.

(17)

Speed = 60 kmph : distance = 60 mm.
time$_1$

Speed$_2$ = ?

time$_2$ = 40 min

$$\text{Speed} \propto \frac{1}{\text{time}}$$

$$\Rightarrow \frac{\text{Speed}_1}{\text{Speed}_2} = \frac{\text{time}_2}{\text{time}_1}$$

$$\Rightarrow \frac{60}{\text{Speed}_2} = \frac{40}{60} \Rightarrow \text{Speed}_2 = \frac{360}{4} = 90 \text{ kmph}$$

(18)

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

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

$1\ \frac{cm}{sec} = 10^{-2}\ m/s$

$1\ \frac{m}{sec} = 100\ cm/sec$

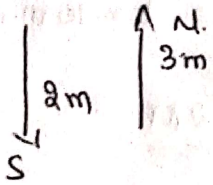
(c) $3\ m/sec = 3 \times \frac{18}{5}\ kmph = 10.8\ kmph$

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

L Task

CUQ

(10)



Distance = Path length covered

$= 2m + 3m = 5m$

Displacement $= -2\hat{j} + 3\hat{j} = 1\hat{j}$

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

Jee mains level

(1)

distance $= 6000\ m = 6\ km$; $t = 5\ min = 5 \times 60 = 300\ sec$

speed $= \frac{\text{distance}}{\text{time}} = \frac{6000}{300} = \frac{10}{50}\ m/sec = \frac{10}{50} \times \frac{18}{5}\ kmph$

$= 72\ kmph$

(2)

$d_{car} = 600m$ $\quad t_c = 2\ min$

$S_{train} = 75\ km$ $\quad t_t = 50 min$

$= 75 \times 10^3\ m$

$$\frac{S_{car}}{S_{train}} = \frac{d_{car}}{d_{train}} \times \frac{t_{train}}{t_{car}}$$

$$= \frac{600}{75 \times 10^3} \times \frac{50}{2} = \frac{1}{5}.$$

(3)

$r = 14m$ $\quad \therefore n = 10$ times $\quad t = 10 min = 600 sec$

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{10 \times 2\pi r}{t}$$

$$= \frac{10 \times 2 \times \frac{22}{7} \times 14}{600} = \frac{22 \times 4}{60} = \frac{22}{15} = 1.46 m/s$$

(4)

Speed $= 35$ kmph $\quad \therefore t = 12\ min = \frac{12}{60}\ hrs$

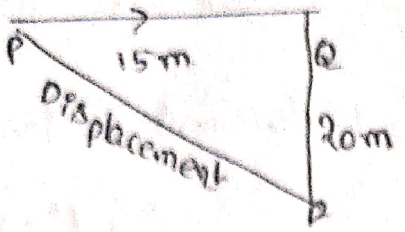
$= 35 \times 5$ $\quad = \frac{1}{5}\ hrs$

$\therefore$ distance = Speed $\times$ time

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

$= 7\ km$

(5)

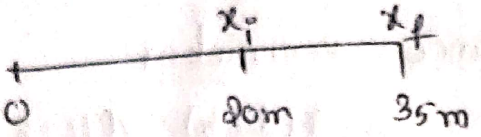


$PR = \sqrt{PQ^2 + QP^2}$

$= \sqrt{15^2 + 20^2}$

$= \sqrt{225+400} = \sqrt{625} = 25m$

(6)

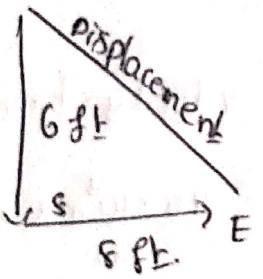


displacement $= x_f - x_i$

$= 35 - 20$

$= 15m$

(7)



Distance = Path length covered

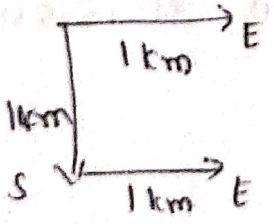
$= 6ft + 8ft$

$= 14 ft$

Displacement $= \sqrt{6^2 + 8^2}$

$= \sqrt{36+64} = \sqrt{100} = 10ft$

(8)



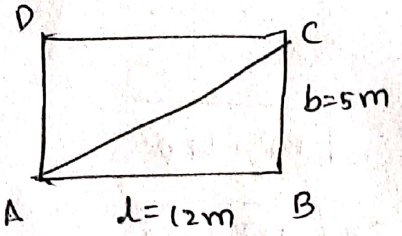
Displacement $= 1\hat{i} + 1(-\hat{j}) + 1\hat{i}$

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

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

$\hat{i}, -\hat{j}$ are unit vectors along east and south.

(9) & (10)



'C' is diagonally opposite corner to A.

Displacement = length of diagonal

$= \sqrt{l^2+b^2}$

$= \sqrt{12^2+5^2} = \sqrt{169} = 13\,m$

For one rotation

Distance = Perimeter

$= 2(l+b) = 2(12+5)$

$= 2\times 17 = 34\,m$

(13)

velocity = 45 kmph

(a) $t = 1\,hr$ distance = velocity × time = $45 \times 1 = 45\,km$

(b) $t = 1\,min$ distance = $\frac{45\times10^3\,m}{60} \times \Rightarrow 750\,m$ in 1 min

(c) $t = 1\,sec$ distance = $\frac{45\times10^3}{3600} = 12.5\,m$

(14)

1566 m = ~~1566~~ 1.566 km (or) 1566×10^2 cm

(15)

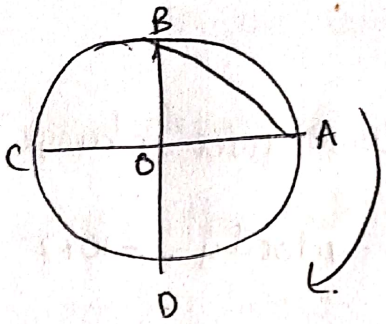
Given $l = 8m$, $b = 6m$.

A → B → C → D Displacement = shortest distance b/w A and D

= breadth = 6m.

A → C → time = 5 sec Velocity = $\frac{\text{Displacement}}{\text{time}} = \frac{\sqrt{8^2+6^2}}{5} = \frac{10}{5} = 2\,m/s$

(16)



$\frac{3}{4}^{th}$ of rotation the body reaches to B.

$\therefore$ Distance $= \frac{3}{4} \times$ circumference

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

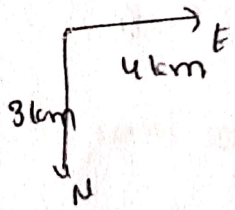
Displacement = length of AB

$= \sqrt{OA^2+OB^2} = \sqrt{R^2+R^2}$

$= \sqrt{2}\,R.$

$\therefore \quad \frac{\text{Distance}}{\text{Displacement}} = \frac{\frac{3}{2}\pi R}{\sqrt{2}\,R} = \frac{3\pi}{2\sqrt{2}}$

(17)



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