

Ttask

①

To cover $s_1 = 120\text{m} \rightarrow t_1 = 2\text{sec}$

$s_2 = 240\text{m} \rightarrow t_2 = ?$

Given train is moving with uniform speed

$\therefore$ speed = constant

$$\Rightarrow \frac{s_1}{t_1} = \frac{s_2}{t_2}$$

$$\Rightarrow \frac{120}{2} = \frac{240}{t_2} \Rightarrow \frac{1}{2} = \frac{2}{t_2} \Rightarrow t_2 = 4\text{ sec}$$

②

time = 3 hrs ; speed = 65 kmph.

$$\therefore \text{speed} = \frac{\text{distance}}{\text{time}} \Rightarrow \text{distance} = \text{speed} \times \text{time}$$

$$= 65 \times 3 \\ = 195 \text{ km}$$

③

distance = 28 km

time = 7 sec.

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

$$\text{speed} = \frac{28}{7}$$

$$= 4 \text{ km/sec}$$

④

Speed = 20 m/s

time = 10 sec

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

$$\Rightarrow \text{distance} = \text{speed} \times \text{time}$$

$$= 20 \times 10$$

$$= 200 \text{ m.}$$

⑤

$$\begin{aligned} \text{distance} &= 2 \text{ km} \\ t &= 5 \text{ min} \\ &= 5 \times 60 \text{ sec} \end{aligned}$$

$$\begin{aligned} \text{speed} &= \frac{\text{distance}}{\text{time}} \\ &= \frac{2 \times 1000}{5 \times 60} = \frac{20}{3} = 6.66 \text{ m/s} \end{aligned}$$

⑥

$$\text{speed} = 72 \text{ kmph} ; \quad t = 20 \text{ min} = \frac{1}{3} \text{ hr.}$$

$$\begin{aligned} \therefore \text{speed} &= \frac{\text{distance}}{\text{time}} \Rightarrow \text{distance} = \text{speed} \times \text{time} \\ &= 72 \times \frac{1}{3} \\ &= 24 \text{ km} \end{aligned}$$

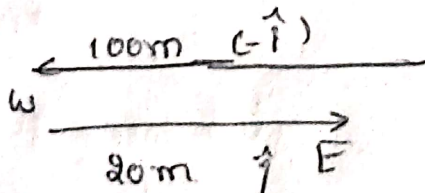
⑦

$$V_1 = 30 \text{ kmph} \rightarrow t_1 = 30 \text{ min} = \frac{1}{2} \text{ hr.}$$

$$V_2 = 40 \text{ kmph} \rightarrow t_2 = 40 \text{ min} = \frac{2}{3} \text{ hr.}$$

$$\begin{aligned} \text{Total distance travelled} &= V_1 t_1 + V_2 t_2 \\ &= 30 \times \frac{1}{2} + 40 \times \frac{2}{3} \\ &= 15 + 13.33 \times 2 \\ &= 15 + 26.66 = 41.67 \text{ km} \end{aligned}$$

⑧



$$\begin{aligned} \text{Total distance} &= 100 \text{ m} + 20 \text{ m} \\ &= 120 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{Displacement} &= 100(-\hat{i}) + 20(\hat{i}) \\ &= -80\hat{i} \end{aligned}$$

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

(2)

(9)

Distance covered = path length = 1600 m

After one rotation the runner come back to its original position $\therefore$ Displacement = 0.

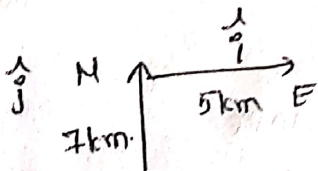
(10)

$$v_1 = 30 \text{ kmph} \rightarrow t_1 = 30 \text{ min} = \frac{1}{2} \text{ hr}$$

$$v_2 = 60 \text{ kmph} \rightarrow t_2 = 30 \text{ min} = \frac{1}{2} \text{ hr}$$

$$\begin{aligned} \text{Total distance travelled} &= v_1 t_1 + v_2 t_2 \\ &= 30 \times \frac{1}{2} + 60 \times \frac{1}{2} \\ &= 15 + 30 = 45 \text{ km} \end{aligned}$$

(13)



$$\text{Total distance} = 7 \text{ km} + 5 \text{ km} = 12 \text{ km}$$

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

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

$$= \sqrt{74} = 8.6 \text{ km} \rightarrow \text{NE}$$

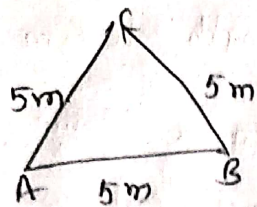
(14)

$$\textcircled{a} \quad 76 \text{ kmph} = 76 \times \frac{5}{18} = 4.1 \times 5 = 20.5 \text{ m/sec}$$

$$\textcircled{b} \quad 5 \text{ m/sec} = 5 \times \frac{18}{5} \text{ kmph} = 18 \text{ kmph}$$

$$\textcircled{c} \quad 1 \text{ km/min} = \frac{1000}{60} \text{ m/sec} = 16.66 \text{ m/sec}$$

(15)



For one rotation.

$$\begin{aligned}\text{Distance} &= AB + BC + CA \\ &= 5\text{m} + 5\text{m} + 5\text{m} = 15\text{m}\end{aligned}$$

Displacement $\rightarrow$ After one rotation, the body come back to it's original position

$$\text{Displacement} = 0$$

(16)

$$\begin{aligned}t &= 0.2 \text{ sec} \quad ; \quad \text{speed} = 30 \text{ kmph} = 30 \times \frac{5}{18} \text{ m/sec} \\ &= \frac{25}{3} \text{ m/sec}\end{aligned}$$

$$\text{distance} = \text{speed} \times \text{time}$$

$$= \frac{25}{3} \times 0.2 = \frac{5}{3} = 1.66 \text{ m}$$

(17)

$$\text{Distance} = 100 \text{ m} ; \quad \text{Time} = 10 \text{ sec}$$

$$\text{speed} = \text{velocity} = \frac{\text{Distance (or) Displacement}}{\text{Time}}$$

$$= \frac{100}{10} = 10 \text{ m/s}$$

(18)

$$\text{a) } 1 \text{ m/sec} = 100 \text{ cm/sec}$$

$$\text{b) } 20 \text{ cm/sec} = 0.2 \text{ m/sec}$$

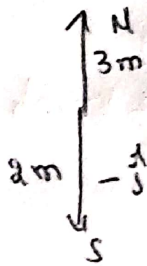
$$\text{c) } 3 \text{ m/sec} = 3 \times \frac{18}{5} \text{ kmph} = 10.8 \text{ kmph}$$

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

(3)

1-TaskCUQA

(10)



$$\text{Distance} = 2\text{m} + 3\text{m} = 5\text{m}$$

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

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

SAQA

(1)

$$\text{distance} = 60\text{ km} : t = 3\text{ hrs}$$

$$\text{velocity} = \frac{\text{distance}}{\text{time}} = \frac{60}{3} = 20\text{ kmph}$$

(2)

$$\text{Speed} = 12\text{ m/s} : t = 25\text{ min} = \frac{25}{60}\text{ hrs}$$

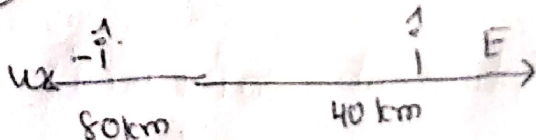
$$= 12 \times \frac{18}{5}\text{ kmph}$$

$$= \frac{5}{12}\text{ hr}$$

$$\therefore \text{distance} = \text{speed} \times \text{time}$$

$$= 12 \times \frac{18}{5} \times \frac{5}{12} = 18\text{ km}$$

(3)



$$t = 2\text{ hrs}$$

$$\therefore \text{Displacement} = 40\hat{i} + 80(-\hat{i}) = 40\hat{i} - 80\hat{i}$$

$$|\text{Displacement}| = |-40| = 40\text{ km}$$

$$\text{velocity} = \frac{\text{Displacement}}{\text{time}} = \frac{40}{2} = 20\text{ kmph}$$

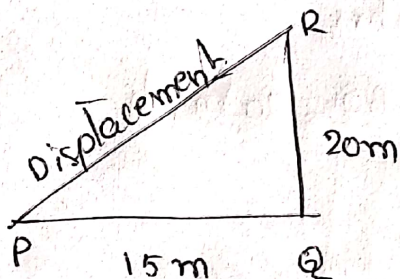
④

$$\begin{aligned} \text{time} &= 50 \text{ min} \\ &= 50 \times \frac{1}{60} \text{ hr} \\ &= \frac{5}{6} \text{ hr} \end{aligned}$$

$$\begin{aligned} \text{Speed} &= 24 \text{ m/s} \\ &= 24 \times \frac{18}{5} \text{ kmph} \end{aligned}$$

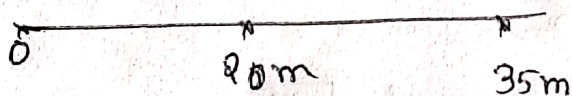
$$\begin{aligned} \therefore \text{distance} &= \text{speed} \times \text{time} \\ &= 24 \times \frac{18}{5} \times \frac{5}{6} = 72 \text{ km} \end{aligned}$$

⑤



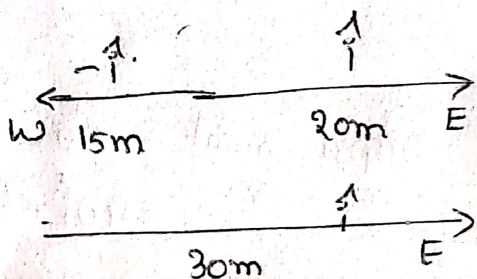
$$\begin{aligned} PR &= \sqrt{PQ^2 + QR^2} = \sqrt{15^2 + 20^2} \\ &= \sqrt{225 + 400} = \sqrt{625} = 25 \text{ m} \end{aligned}$$

⑥



$$\begin{aligned} \text{Displacement} &= 35 - 20 \\ &= 15 \text{ m} \end{aligned}$$

⑦

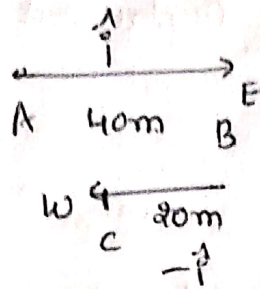


$$\text{Distance} = 20 + 15 + 30 = 65 \text{ m}$$

$$\begin{aligned} \text{Displacement} &= 20\hat{i} + 15(-\hat{i}) \\ &\quad + 30\hat{i} \\ &= 50\hat{i} - 15\hat{i} \\ &= 35\hat{i} \end{aligned}$$

(4)

(8)



$$\text{Total distance} = AB + BC$$

$$= 40 + 20$$

$$= 60 \text{ m}$$

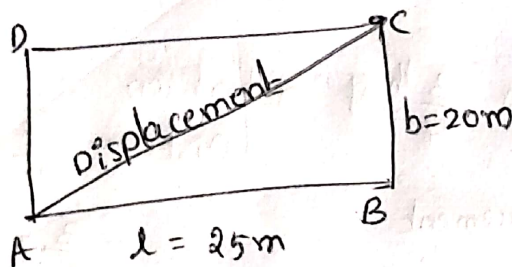
$$\text{Displacement} = 40\hat{i} + 20(-\hat{i})$$

$$= 40\hat{i} - 20\hat{i}$$

$$= 20\hat{i}$$

$$|\text{Displacement}| = |20\hat{i}| = 20 \text{ m}$$

(9), (10)



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

$$= \sqrt{(25)^2 + (20)^2}$$

$$= 5\sqrt{25 + 16}$$

$$= 5\sqrt{41} \approx 5 \times 7 = 35 \text{ m}$$

For one round

$$\text{distance} = \text{Perimeter}$$

$$= 2(l + b)$$

$$= 2(25 + 20) = 2 \times 45 = 90 \text{ m}$$

(13)

$$\text{velocity} = 45 \text{ kmph} \quad \text{or} \quad 45 \times \frac{5}{18} \text{ m/s} \quad \text{or} \quad 45 \times \frac{1000}{60} \text{ m/min}$$

$$\text{(a) distance} = \text{velocity} \times \text{time}$$

$$= 45 \times 1 \text{ hr}$$

$$= 45 \text{ km}$$

$$\text{(b) distanc.} = 45 \times \frac{1000}{60}$$

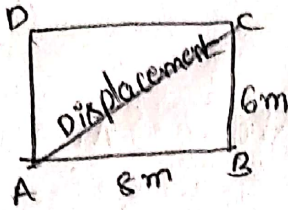
$$= 750 \text{ m}$$

$$\text{(c) } d = 45 \times \frac{5}{18}$$

$$= 12.5 \text{ m}$$



(15)

 $A \rightarrow B \rightarrow C$

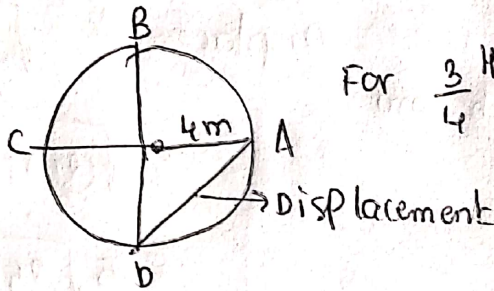
$$\begin{aligned}\text{Displacement} &= \sqrt{a^2 + b^2} \\ &= \sqrt{8^2 + 6^2} = \sqrt{64 + 36} \\ &= \sqrt{100} = 10 \text{ m}\end{aligned}$$

 $A \rightarrow D$ displacement of ant = $AD = 6 \text{ m}$

time = 2 sec

$$\text{Velocity} = \frac{\text{Displacement}}{\text{time}} = \frac{6}{2} = 3 \text{ m/s}$$

(16)

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

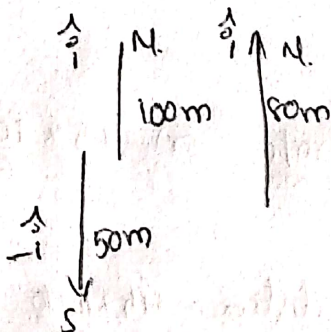
$$\begin{aligned}\text{Distance} &= \frac{3}{4} \times \text{Circumference} \\ &= \frac{3}{4} \times 2\pi r \\ &= \frac{3 \times 2\pi \times 4}{4} = 6\pi\end{aligned}$$

$$\text{Displacement} = AD = \sqrt{2} R$$

$$\therefore \text{Distance} : \text{Displacement} = 6\pi : 4\sqrt{2} = 3\pi : 2\sqrt{2}$$

$$\Rightarrow 6\pi : 4\sqrt{2} \Rightarrow 3\pi : 2\sqrt{2}$$

(17)



$$\text{Total distance} = 100 + 50 + 50 = 200 \text{ m}$$

$$\text{Displacement} = 100\hat{i} + 50\hat{i} - 50\hat{i} = 100\hat{i}$$

$$|\text{Displacement}| = |100\hat{i}| = 100 \text{ m}$$