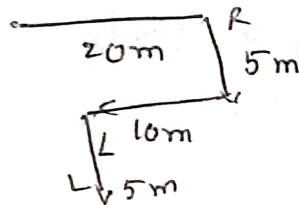


6th advanced
ws-5

Thank

①

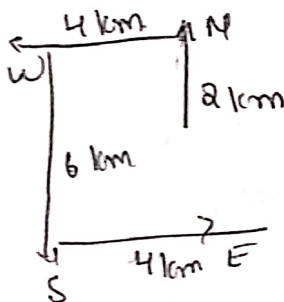
①



$$\begin{aligned}\text{Distance} &= \text{Path length} \\ &= 20 + 5 + 10 + 5 \\ &= 40\text{m}\end{aligned}$$

$$\text{Displacement} = 20 + 10 - 5 + 5 = 30\text{m}$$

②



$$\begin{aligned}\text{Distance} &= \text{Total path length covered} \\ &= 2\text{km} + 4\text{km} + 6\text{km} + 4\text{km} \\ &= 16\text{km}\end{aligned}$$

$$\begin{aligned}\text{Displacement} &= 2\hat{j} - 4\hat{i} - 6\hat{j} + 4\hat{i} \\ &= -4\hat{j} = 4\text{km south}\end{aligned}$$

③

$$\text{Speed} = 25\text{ m/s}$$

$$\text{we know } 1\text{kmph} = \frac{5}{18}\text{ m/s} \Rightarrow 1\text{m/s} = \frac{18}{5}\text{ kmph}$$

$$\text{speed} = \frac{25 \times 18}{5} = 90\text{ kmph}$$

④

$$R = 14\text{m}$$

$$\text{Distance} = 6 \times \text{Circumference} = 6 \times 2\pi r = 6 \times 2 \times \frac{22}{7} \times 14^2$$

$$\text{speed} = \frac{\text{Distance}}{\text{time}} = \frac{6 \times 2 \times 22 \times 2}{5 \times 60 \times 10} = \frac{8.8}{5} = 1.76\text{ m/s}$$



(5)

$$\text{Speed}_A = \frac{\text{distance}_A}{\text{time}} = \frac{180}{6} = 30 \text{ kmph}$$

$$\text{Speed}_B = \frac{\text{distance}_B}{\text{time}} = \frac{200}{4} = 50 \text{ kmph}$$

$\text{Speed}_B > \text{Speed}_A \therefore B \text{ travels faster}$

(6)

$$\text{Speed} = 39 \text{ kmph} ; \text{ time} = 20 \text{ min} = \frac{1}{3} \text{ hr}$$

$$\begin{aligned} \text{distance} &= \text{speed} \times \text{time} \\ &= 39 \times \frac{1}{3} = 13 \text{ km} \end{aligned}$$

(7)

$$\text{distance} = 500 \text{ m.}$$

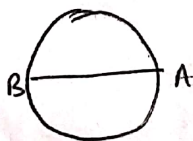
$$t_{\text{Ramu}} = 25 \text{ sec} ; t_{\text{Somu}} = 50 \text{ sec.}$$

$$\therefore \text{Speed}_{\text{Ramu}} = \frac{\text{distance}}{t_{\text{Ramu}}} = \frac{500}{25} = 20 \text{ m/s}$$

$$\text{speed}_{\text{Somu}} = \frac{500}{t_{\text{Somu}}} = \frac{500}{50} = 10 \text{ m/s}$$

Ramu runs faster.

(8)



For one half rotation

$$\begin{aligned} \text{Distance} &= \frac{1}{2} \times \text{Circumference} \\ &= \frac{1}{2} \times 2\pi r = \pi r \end{aligned}$$

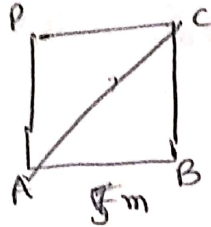
$$\text{Displacement} = \text{Diameter} = 2r = 0$$

$$\Rightarrow \frac{\text{Distance}}{\text{Displacement}} = \frac{\pi r}{0} = \frac{\pi r}{0} = \infty$$

(9)

Displacement of Aeroplane = $\sqrt{(400)^2 + (300)^2 + (1200)^2}$
 $= 1300 \text{ km}$

(10)



Distance = Total path length covered
 $= AB + BC = 5\text{m} + 5\text{m} = 10\text{m}$

Displacement = length of diagonal
 $= \sqrt{2} \times \text{side}$
 $= \sqrt{2} \times 5 = 5 \times 1.414 = 7.07\text{m}$
 $\approx 7.1\text{m}$

(11)



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

Displacement = $5\hat{i} + 7\hat{j}$
 $= \sqrt{5^2 + 7^2} = \sqrt{25 + 49}$
 $= \sqrt{74} \approx 8.6 \text{ km}$

only, a, b correct

(12)

distance = 3 km (or) 3000 m ; $t = 5 \text{ min} = 5 \times 60 \text{ s}$

(a) $\therefore \text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{3000 \text{ m}}{300 \text{ sec}} = 10 \text{ m/s}$

(b) (or) $\Rightarrow \frac{10 \times 18}{5} \text{ kmph} = 36 \text{ kmph}$

(c) (or) $\Rightarrow 10 \text{ m/s} = 10 \times \frac{100 \text{ cm}}{1 \text{ m}} = 1000 \text{ cm/s}$ all are correct

(13)

$$\text{Velocity} = 75 \text{ kmph}$$

$$(a) \quad t_1 = 1 \text{ hr} \Rightarrow \text{distance} = \text{velocity} \times \text{time} = 75 \times 1 = 75 \text{ km.}$$

$$(b) \quad t_2 = 60 \text{ min} \Rightarrow \text{distance} = 75 \times 10^3 / 60 = 1250 \text{ m}$$

$$(c) \quad t_3 = 3600 \Rightarrow \text{distance} = \frac{75 \times 10^3}{3600} = 20.8 \text{ m}$$

(14)

$$r = 14 \text{ m.} \quad \therefore \rightarrow \text{Time} = 4 \text{ sec}$$

$$(a) \text{ For half rotation distance} = \pi r = \frac{22}{7} \times 14^2 = 44 \text{ m}$$

$$(b) \quad \text{displacement} = 2r = 2 \times 14 = 28 \text{ m}$$

$$(c) \quad \text{speed} = \frac{\text{distance}}{\text{time}} = \frac{44}{4} = 11 \text{ m/sec}$$

$$(d) \quad \text{velocity} = \frac{\text{displacement}}{\text{time}} = \frac{28}{4} = 7 \text{ m/s}$$

(15)

$$\text{Radius} = r.$$

$$\text{For one rotation : distance} = \text{Circumference} \\ = 2\pi r$$

$$\text{Displacement} = 0$$

$$\text{For half rotation distance} = \frac{1}{2} \times \text{Circumference}$$

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

$$\text{Displacement} = 2r$$

$$\frac{1}{4}^{\text{th}} \text{ rotation} \Rightarrow \text{Distance} = \frac{1}{4} \times \text{Circumference}$$

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



(3)

15th continuation

 $\frac{1}{4}$ th rotation

AB = Displacement

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

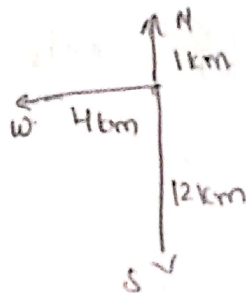
$$= \sqrt{R^2 + R^2} = \sqrt{2} R$$

For $\frac{3}{4}$ th rotationDistance = $\frac{3}{4}$ × Circumference

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

Displacement = AB = $\sqrt{2} R$

(16)



Distance = Path length covered

$$= 12 + 4 + 1 = 17 \text{ km}$$

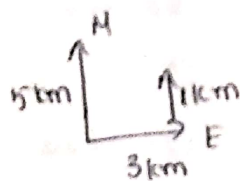
Displacement = $-12\hat{j} + \hat{j} + 4\hat{i}$

$$= -11\hat{j} + 4\hat{i}$$

$$|\text{Displacement}| = \sqrt{(-11)^2 + (4)^2} = \sqrt{121 + 16}$$

$$= \sqrt{137} = 11.6 \text{ km}$$

(17)



Distance = 5 km + 3 km + 1 km

$$= 9 \text{ km}$$

Displacement = $5\hat{j} + 1\hat{j} + 3\hat{i}$

$$= 6\hat{j} + 3\hat{i}$$

$$|\text{Displacement}| = \sqrt{6^2 + 3^2} = \sqrt{36 + 9} = \sqrt{45} = 6.7 \text{ km}$$

(18)

speed = 30 m/s ; distance = 12 m

$$t = \frac{\text{distance}}{\text{speed}} = \frac{12}{30} = 0.4 \text{ s}$$

(19)

$$\text{velocity} = 35 \text{ kmph} \quad ; \quad \text{time} = 6 \text{ hr}$$

$$\begin{aligned} \text{distance} &= \text{velocity} \times \text{time} \\ &= 35 \times 6 = 210 \text{ km} \end{aligned}$$

(20)

(i)

$$r = 7 \text{ cm}$$

$$\text{Distance travelled} = 2\pi r = 2 \times \frac{22}{7} \times 7 = 44 \text{ m}$$

$$\text{time} = 60 \text{ sec}$$

$$\text{speed} = \frac{\text{Distance}}{\text{time}} = \frac{44}{60} = \frac{11}{15} \text{ m/s}$$

(ii)

$$r_m = 5 \text{ cm}$$

$$\text{distance travelled} = 2\pi r_m = 2 \times \frac{22}{7} \times 5$$

$$\text{time} = 60 \text{ min} = 60 \times 60 \text{ sec}$$

$$\text{speed} = \frac{\text{Distance}}{\text{time}} = \frac{2 \times \frac{22}{7} \times 5}{60 \times 60} = \frac{11}{7 \times 30 \times 6} = \frac{11}{1260} \text{ cm/s}$$

(iii)

$$r_{hr} = 305 \text{ cm} \quad ; \quad t = 12 \text{ hr} = 12 \times 60 \times 60$$

$$\text{Distance} = 2\pi r_{hr} = 2 \times \frac{22}{7} \times 305 = 22 \text{ m}$$

$$\text{speed} = \frac{\text{Distance}}{\text{time}} = \frac{22}{12 \times 60 \times 60} = \frac{11}{6 \times 60 \times 60} = \frac{11}{21600} \text{ cm/s}$$

①

$$\text{distance} = 2205 \text{ km} ; \text{ time} = 5 \text{ hrs}$$

$$\text{Speed} = \frac{2205}{5} = 441 \text{ kmph}$$

②

$$\text{distance} = 168 \text{ km} ; \text{ time} = 4 \text{ hrs}$$

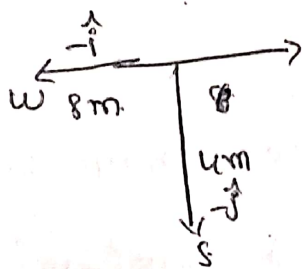
$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{168}{4} = 42 \text{ kmph}$$

③

$$\text{Velocity} = 30 \text{ m/s} ; \text{ time} = 20 \text{ min} = 20 \times 60 \text{ sec}$$

$$\begin{aligned} \therefore \text{Displacement} &= \text{Velocity} \times \text{time} = 30 \times 20 \times 60 \\ &= 36000 \text{ m} \end{aligned}$$

④

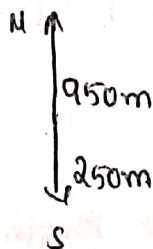


$$\text{time} = 5 \text{ sec} ; \text{ Displacement} = -8\hat{i} - 4\hat{j}$$

$$\begin{aligned} &= \sqrt{(-8)^2 + (-4)^2} \\ &= \sqrt{64 + 16} = \sqrt{80} \approx 9 \text{ m} \end{aligned}$$

$$\text{velocity} = \frac{\text{Disp}}{\text{time}} = \frac{9}{5} = 1.8 \text{ m/s}$$

⑤

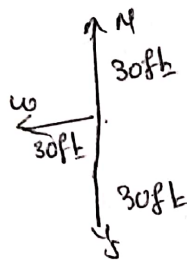


$$\text{time} = 20 \text{ sec}$$

$$\text{Distance} = 950 + 250 = 1200 \text{ m}$$

$$\text{speed} = \frac{\text{Distance}}{\text{time}} = \frac{1200}{20} = 60 \text{ m/s}$$

6)

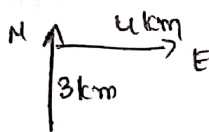


$$\text{Distance} = 30 \text{ ft} + 30 \text{ ft} + 30 \text{ ft} = 90 \text{ ft}$$

$$\begin{aligned} \text{Displacement} &= 30\hat{j} - 30\hat{j} - 30\hat{i} \\ &= -30\hat{i} \end{aligned}$$

$$|\text{Displacement}| = |-30\hat{i}| = 30 \text{ ft}$$

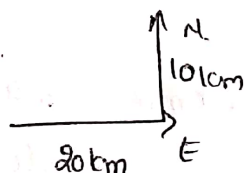
7)



$$\text{Distance} = 3 \text{ km} + 4 \text{ km} = 7 \text{ km}$$

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

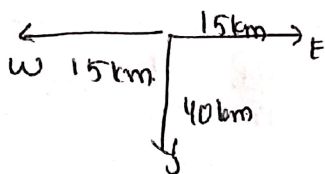
8)



$$\text{Distance} = 20 \text{ km} + 10 \text{ km} = 30 \text{ km}$$

$$\begin{aligned} \text{Displacement} &= \sqrt{20^2 + 10^2} = \sqrt{500} = 10\sqrt{5} \text{ km} \\ &= 22.36 \text{ km} \end{aligned}$$

9)

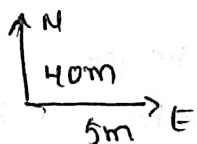


$$\text{Distance} = 15 + 40 + 15 = 70 \text{ km}$$

$$\begin{aligned} \text{Displacement} &= -15\hat{i} + 15\hat{i} - 40\hat{j} \\ &= -40\hat{j} \end{aligned}$$

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

10)



$$\text{Distance} = \text{Path length} = 40 + 5 = 45 \text{ m}$$

$$\begin{aligned} \text{Displacement} &= 5\hat{i} + 40\hat{j} = \sqrt{5^2 + 40^2} \\ &= \sqrt{5^2 + (5 \times 8)^2} = 5\sqrt{1 + 64} = 5\sqrt{65} \\ &= 40.3 \text{ m} \end{aligned}$$

⑤

④

Growthani Express :- distance = 200 km; time = 75 min

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{200}{75} = \frac{8}{3} \text{ m/min}$$

Shatabdi Express :- distance = 150 km; time = 60 min

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{150}{60} = \frac{5}{2} \text{ m/min}$$

Rajdhani Express :- distance = 280 km; time = 120 min

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{280}{120} = \frac{7}{3} \text{ m/min}$$

'D' correct

②

For half rotation

$$\text{Distance} = \frac{1}{2} \times \text{Circumference}$$

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

$$\text{Displacement} = \text{Diameter} = 2R$$

④

From fig

$$\text{For ABC} \Rightarrow AB + BC = 5 + 5 = 10 \text{ m}$$

$$\text{For CDA} \Rightarrow \text{Displacement} = \sqrt{2} \times \text{side} = 5\sqrt{2} \text{ m}$$

$$\text{ABCD} = \text{Total distance} = 4 \times a = 4 \times 5 = 20 \text{ m}$$

⑤

$$\text{distance} = 22 \text{ km}$$

$$\pi r = 22 \text{ km}$$

$$\frac{22}{7} \times r = 22 \Rightarrow r = 7 \text{ km}$$

$$t = 3 \text{ min} \text{ and } v = 200 \text{ rev}$$

$$\text{velocity} = \frac{\text{displacement}}{\text{time}} = \frac{2\pi r}{200} = \frac{2 \times 7}{200} = 7 \times 10^{-2} \text{ km/s} = 70 \text{ m/s}$$

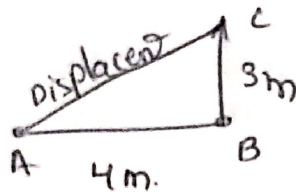
⑥



$$\text{Total distance} = h + h = 2h$$

$$\text{Total displacement} = 0$$

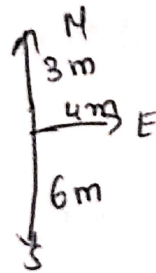
⑦



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

$$= \sqrt{4^2 + 3^2} = \sqrt{25} = 5 \text{ m}$$

⑧



$$\text{Distance} = 3 + 4 + 4 = 13 \text{ m}$$

$$\text{Displacement} = -6\hat{j} + 3\hat{j} + 4\hat{i}$$

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

$$\Rightarrow |\text{Displ}| = \sqrt{(-3)^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25} = 5 \text{ m}$$