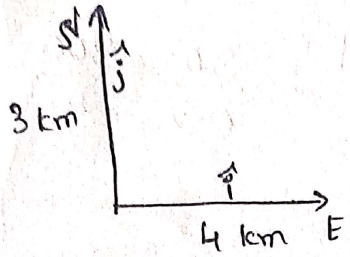
WS-5

Thask

(1)



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

|Displacement| $= \sqrt{4^2+3^2} = \sqrt{16+9}$

$= \sqrt{25} = 5$ km NE

(2)

Velocity of a train = 120 kmph $= 120 \times \frac{5}{18}$

Time = 30 sec

Distance = Velocity × time

$= \frac{40}{120} \times \frac{5}{18} \times \frac{30}{3}^{5} = 1000$ m

(3)

Initial speed u = 30 kmph

Final speed v = 60 kmph

Time t = 10 sec

∴ change in velocity = $v-u = 60-30 = 30$ kmph

$= 30^{5} \times \frac{5}{18_3} = \frac{25}{3}$ m/s

∴ Acceleration = $\frac{\text{Change in velocity}}{\text{time}} = \frac{\frac{25}{3}}{10} = \frac{25}{30} = \frac{5}{6}$

$= 0.833$ m/s^2

(4)

Distance = 30 m

time = 0.2 sec

$$\text{velocity} = \frac{\text{displacement}}{\text{time}} = \frac{30}{0.2} = \frac{300}{2} = 150 \text{ m/s}$$

(5)

Velocity of train = 5 kmph $= 5 \times \frac{5}{18}$ m/s

Distance travelled = 600m [500+100]

$$\text{time taken} = \frac{\text{Distance}}{\text{velocity}} = \frac{600 \text{ m} \times 18}{25}$$

$$= 432 \text{ sec.}$$

(6)

velocity $u = 400$ km/s : time = 10 sec

$v = 600$ km/s.

From $v = u + at$ $\Rightarrow 600 = 400 + a \times 10$

$\Rightarrow a = 20 \text{ m/s}^2$

From $s_1 = ut + \frac{1}{2}at^2$

$$= 400 \times 10 + \frac{1}{2} \times 20 \times (10)^2 = 4000 + 10 \times 100$$

$$= 5000 \text{ km}$$

~~$\Rightarrow 4000 + 36000$~~

Distance covered in next 50 sec is $s = u \times \text{time}$

$= 600 \times 50$

$= 30\,000$

Total distance $= s_1 + s_2 = 5000 + 30,000$

$= 35,000$ km

(7)

time = 2 min = 120 sec

velocity = 330 m/s.

distance = velocity × time

= 330 × 120 × 1

= 3960 = 39.6 km

(8)

Initial velocity $u = 50$ kmph $= 50 \times \frac{5}{18}$ m/sec

time $= 32$ sec. ; $a = 0.5$ m/s^2

From $v = u + at$

$\Rightarrow v = 50 \times \frac{5}{18} + 0.5 \times 32$

$\Rightarrow v = \frac{250}{18} + 16 = 13.7 + 16 = 29.7$ m/s.

(16)

From graph acceleration $= \frac{v}{t}$ = slope of graph

$= \frac{20}{10} = 2$ m/s^2.

(14), (15), (16)

distance = 9 km.

velocity = 18 kmph.

Time $= \frac{\text{distance}}{\text{velocity}} = \frac{9}{18} = \frac{1}{2}$ hr.

(15) continuation

distance = 9 km

velocity = 15 kmph

Time taken = $\frac{\text{distance}}{\text{velocity}} = \frac{9}{15} = \frac{3}{5}$ hr.

(16)

Total time = $\frac{1}{2} + \frac{3}{5} = \frac{5+6}{10} = \frac{11}{10}$ hrs

(17)

Given radius = 0.5 m

For one rotation distance = $2\pi r$.

For 14 rotations = $2\pi r \times 14$

$= 2 \times \frac{22}{7} \pi \times 0.5 \times 14$

$\Rightarrow 14\pi$

(18)

distance = 210 km

speed = 70 kmph

time = $\frac{\text{distance}}{\text{speed}} = \frac{210}{70} = 3$ hrs

(19)

distance d_1 = 60 km ; d_2 = 100 km

time t_1 = 30 min ; t_2 = ?

$\frac{d_1}{t_1} = \frac{d_2}{t_2} \Rightarrow$ ~~$t_2 = \frac{d_1 \times}{d_2 \times t_1} = \frac{60}{100}$~~

$\Rightarrow \frac{60}{30} = \frac{100}{t} \Rightarrow t_2 = 50$ min

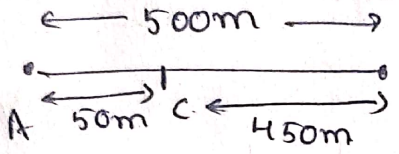
For main level

(1)

P ——— 45 m ——— Q

∴ displacement = 45 m.

(2)



Displacement = Final position − initial position

= C − A

= 50m

(4)

distance = 20 km ; time = 4 hrs

speed = $\frac{\text{distance}}{\text{time}} = \frac{20}{4} = 5$ kmph

(5)

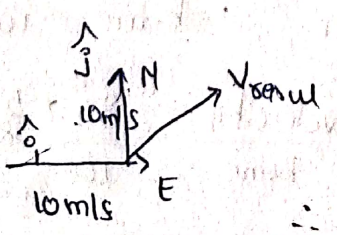
After 5 sec the body reaches to point of Projection so displacement = 0

(6)

velocity = 200 5 m/s = constant.

∴ acceleration = $\frac{\text{change in velocity}}{\text{time}} = \frac{0}{t} = 0 \text{ m/s}^2$

(7)

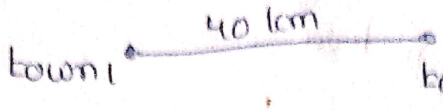


$V_{res} = 10\hat{i} + 10\hat{j} \Rightarrow |V_{res}| = \sqrt{10^2+10^2}$

$= 10\sqrt{2}$ m/s

∴ Acceleration = $\frac{V_{res}}{\text{time}} = \frac{10\sqrt{2}}{10} = \sqrt{2}$ m/s²

(8)

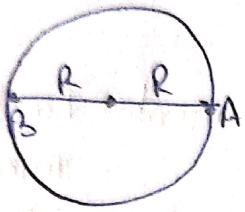


Displacement = 40 km

= 40×10^3 m.

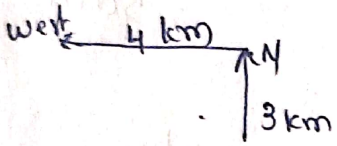
(9)

As the rat reaches diametrically opposite Point



Displacement = 2R

(10)



Total distance travelled = 3 + 4

= 7 km

(11)

initial speed = 25 m/s ; final speed (v) = 10 m/s

time = 5 sec

Then Retardation = -ve acceleration

$$= \frac{v - u}{t} = \frac{10 - 25}{5}$$

$$= \frac{-15}{5} = -3 \text{ m/s}^2$$

(18)

velocity = 36 kmph : time = 10 sec.

$$\text{Acceleration} = \frac{\text{velocity}}{\text{time}} = \frac{\cancel{36}^{2} \times \frac{5}{\cancel{18}}}{10} = \frac{2 \times 5}{10} = 1 \text{ m/s}^2$$