Exercise :-

1) Diameter of Circular track (D) = 200m

Radius of Circular track (r) = $\frac{200}{2}$

= 100 m

Time taken by the athlete for one round (t) = 40s.

Distance Covered by athlete in one round (s) = $2\pi r$

$= 2 \times \left(\frac{22}{7}\right) \times 100$

Speed of the athlete (v) = $\frac{\text{Distance}}{\text{time}}$

$= \frac{(2 \times 200)}{(7 \times 40)}$

$= \frac{4400}{7 \times 40}$

Distance Covered in 140s = Speech (s) $\times$ (t)

$= \frac{4400}{(7 \times 4 \times (2 \times 60 + 20)}$

$$= \frac{4400}{(7 \times 40) \times 140}$$

$$= \frac{4400 \times 140}{7 \times 40}$$

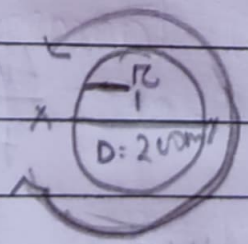
$$= 2200 \text{ m}$$

No of round in 40s = 1 round

No of round in 140s = $\frac{140}{40}$

$$= 3\frac{1}{2}$$

After taking Start from position X, the athlete will lee at position Y after $3\frac{1}{2}$ rounds as show in figure:



Hence, Displacement of the athlete with respect to inital position at X = XY.

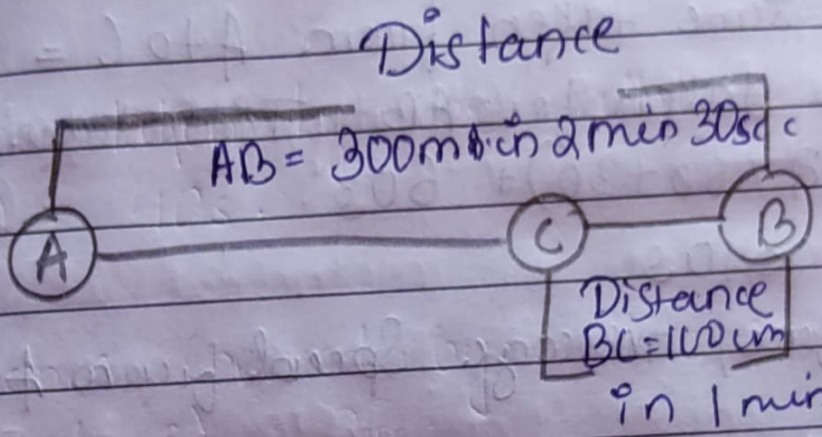
= Diameter of circular track

= 200 m

~~200 m~~

2) Total distance covered from AB
= 300 m

Total time taken = 2×60 + 30s
= 150s



Therefore, Average Speed from AB =
$= \frac{TD}{TT}$

$= \frac{300}{150 ms^{-2}}$

$= 2ms^{-1}$

Therefore, Velocity from AB =

$\frac{\text{Dis AB}}{\text{Time} = 300} = 2ms^{-1}$

$150 ms^{-1}$

(f) Total Distance covered from
A C = AB + BC

= 300 + 200m

Total time taken from A to C =
= Time taken for AB + Time taken of BC
= (2 × 60 + 30) + 60s
= 210 s

Therefore, Average Speed from A C =

$= \frac{\text{D}}{\text{t}}$

$= \frac{400}{210\ ms^{-1}}$

$= 1.904\ ms^{-1}$

Displacement (S) from A to C =
= AB - BC

= 300 - 100 m
= 200 m

Time (t) taken for displacement from
A C = 210s

Therefore, Velocity from A C = $\frac{D(s)}{T(t)}$

$= \frac{200}{210\ ms^{-1}} = 0.952\ ms^{-1}$

3) The distance Abdul Abdul Commutes while driving from Home to Schoo - S
let us assume time taken by Abdul to commutes this distance = t_1
Distance Abdul commutes while driving from School to home = S.
let us assume time taken by Abdul to commutes this distance = t_2
Avercage Speed from home to School $V_1av = 20 km\,h^{-1}$
Avercage Speed from home to School $V_2av = 30 km\,h^{-1}$
Also we know Time taken from Home to School $t_1 = S/V_1av$
Similarly time taken from School and backward to home $t_2 = S/V_2av$
Total distance from home to school and backward = 2S
Total time taken from home to School and backward (T) = $S/20 + S/30$
Therefore, Avercage Speed (Vav) for covering total distance (2S) = $\frac{\text{Total D}}{\text{Total Time}}$

$$= \frac{2S}{(S/20)+(S/30)}$$

$$= 2S / [(30S+20S)/600$$

$= \frac{1200s\beta}{50s}$

$= 24 Kmh^{-1}$

4) Given Initial Velocity of Motorboat, $u = 0$

Acceleration of motorboat, $a = 3.0 ms^{-2}$

Time under Consideration, $t = 8.0s$

We know that Distance, $S = ut + (\frac{1}{2})at^2$

Therefore, The distance travel by motorboat $= 0 \times 8 + (\frac{1}{2}) 3.0 \times 8^2$

$= (\frac{1}{2}) \times 3 \times 8 \times 8m$

$= 96 m$

(7) Let us assume, the final velocity with ball will Strike the ground be 'v' and time is taken to Strike the ground be 't'.

Initial velocit of ball, $u = 0$
Distance or height of fall, $s = 20m$
Downward acceleration, $a = 10ms^{-2}$
As we know, $2as = v^2 - u^2$
$v^2 = 2as + u^2$
$= 2 \times 10 \times 20 + 0$
$= 400$
$\therefore$ final Velocity of ball, $v = 20m^{-1}$

$$t = \frac{(v-u)}{a}$$

$\therefore$ Time taken by the ball ~~$v = 20\ ms^{-1}$~~ to Strike $= \frac{(20-0)}{10}$

$$= \frac{20}{10}$$
$$= 2 \text{ seconds.}$$

9) a) Possible

When a ball is thrown up at maxium height, it has zero velocity, although it will have constant acceleration due to gravity, which is equal to $9.8\ m/s^2$.

b) Possible

When a car is moving in a circular track, its acceleration is perpendi-cular to its direction.

10) Radius of the circular orbit, $r = 42250\ Km$.

Time taken to revolve around the earth, $t = 24\ h$.

Speech of a circular moving object, $V = \frac{(2\pi r)}{t}$

$$= \frac{[2 \times (\frac{22}{7}) \times 42250 \times 1000]}{(24 \times 60 \times 60)}$$

$$= \frac{(2 \times 22 \times 42250 \times 1000)}{(7 \times 24 \times 60 \times 60)} ms^{-1}$$

$$= 3073.74 \ ms^{-1}$$