20/9/21

Ch-1 Exercise Ques (CC HA)

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1. A/Q,
diameter of the circular track = 200m
Radius, $r = 100$ m
In 40s, athelete completes 1 round
" 1s, " " $\frac{1}{40}$ round
In 140s, " " $\frac{140}{40}$ round.

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

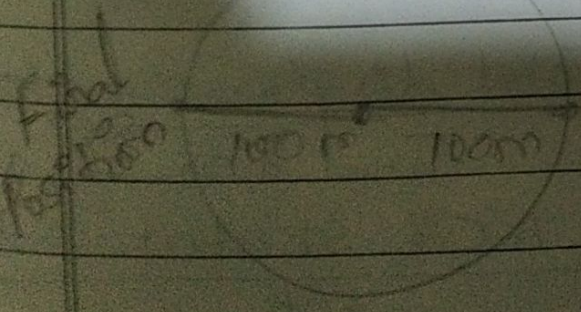
Distance covered, $= 3 \times 2\pi r + \frac{1}{2} \times 2\pi r$

$= 3 \times 2 \times \frac{22}{7} \times 100 + \frac{1}{2} \times 2 \times \frac{22}{7} \times 100$

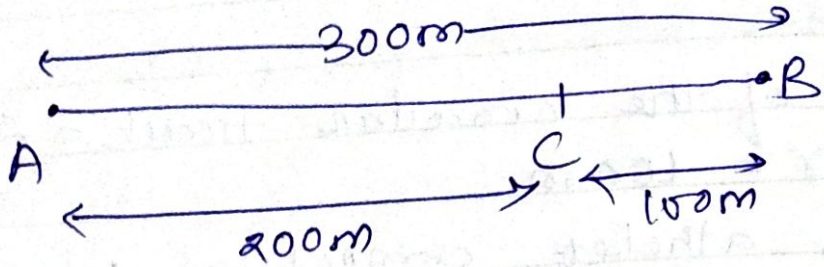
$= 2200$ m.

Displacement = shortest path b/w the initial & the final position. $= 2r$
$= 200$ m.

Ans



2.



AB – 300m
BC – 100m
~~AC~~

(i) From A to B, Joseph covers 300m distance.
Time = 2min 30s = 2×60 + 30 = 150s.

∴ Avg Speed = $\frac{\text{Total distance}}{\text{Total time}}$

$= \frac{300}{150} = 2\ m/s$

∴ Avg Velocity = $\frac{\text{Total displacement}}{\text{Total time}}$

$= \frac{300}{150} = 2\ m/s$

(ii) From A to C, Joseph covers 400m distance
Time = 150s + 1min = 150s + 60s =
= 210s.

Avg speed = $\frac{400}{210} = 1.9\ m/s$

Avg Velocity = $\frac{\text{Total displacement (AC)}}{\text{Total time}}$

$= \frac{\text{AC (Shortest path)}}{210}$

$= \frac{200}{210} = 0.952\ m/s$

3. Let the distance covered by Abdul while driving to school be 'x'.

While going, $V_1 = 20 = \frac{x}{t_1}$ [$\because t_1$ = time to cover x]

While returning, $V_2 = 30 = \frac{x}{t_2}$ [$\because t_2$ = time to cover x]

So, we have, $t_1 = \frac{x}{20}$ & $t_2 = \frac{x}{30}$

$\therefore$ Avg Speed = $\frac{\text{Total distance}}{\text{Total time}}$.

$$= \frac{2x}{\frac{x}{20} + \frac{x}{30}} = \frac{2x}{\frac{5x}{60}}$$

$$= 24 \text{ km/h}$$

4. The motorboat starts from rest, so initial velocity, $u = 0$

Time taken, $t = 8s$

Accel^n, $a = 3 m/s^2$

$\therefore$ Distance (s) = $ut + \frac{1}{2}at^2$ (from II eqn of motion)

$$s = 0(8) + \frac{1}{2}(3)(8)^2$$

$$s = \frac{1}{2} \times 3 \times 64 \Rightarrow s = 96 \text{ m}.$$

Ans

5. Initial speed of car A = 52 kmph = $52 \times \frac{5}{18}$

= 14.44 m/s

The car stops in 5s, i.e. final speed of car (v) = 0, time (t) = 5s.

For s-t graph of 'A',

s	14.44 m/s	0
t	0	5

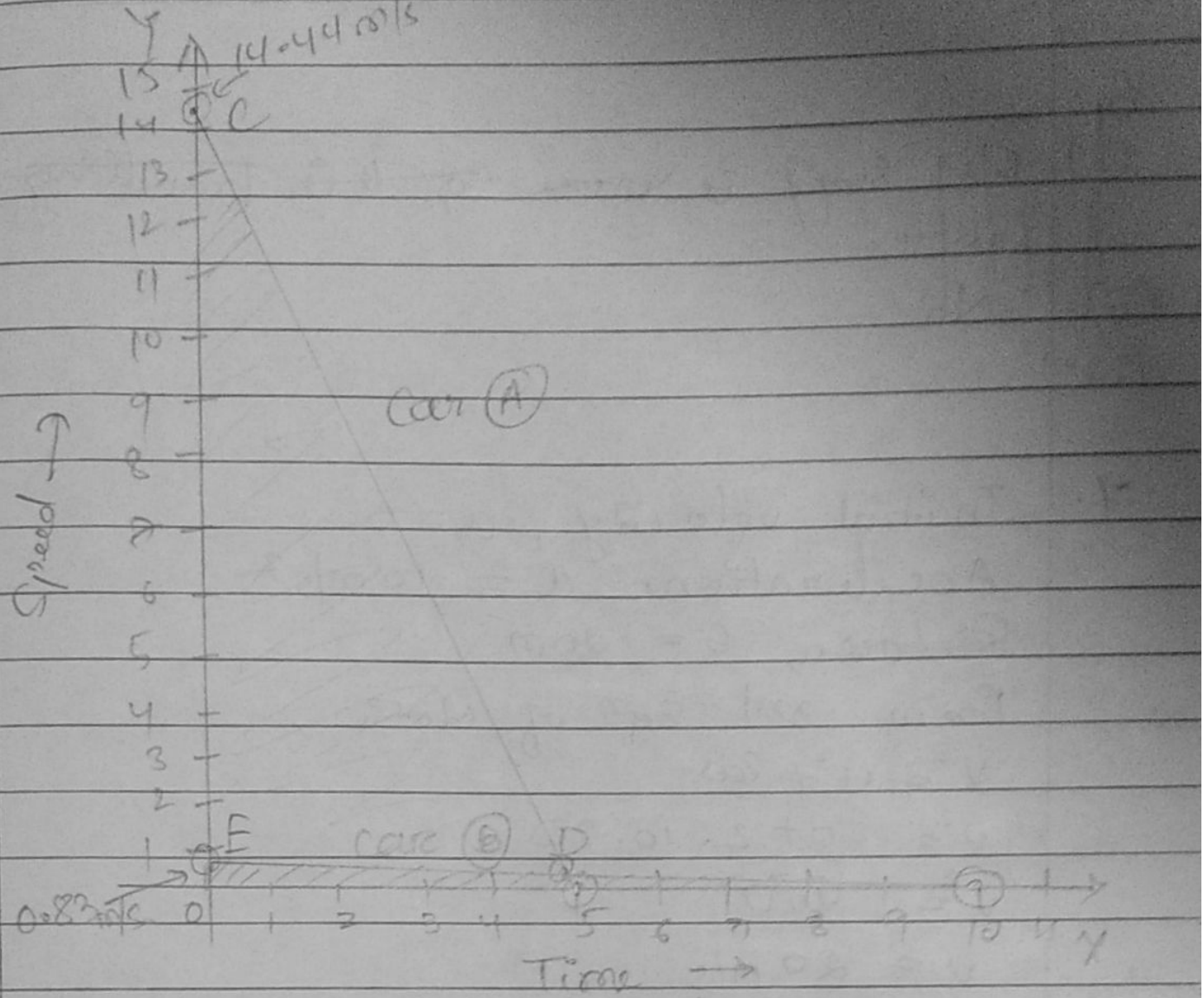
Initial speed of car B = 3 kmph = $3 \times \frac{5}{18}$

= 0.83 m/s

The car stops in 10s, i.e final speed of car, v = 0, time (t) = 10s.

For s-t graph of B,

s	0.83 m/s	0
t	0	10s



Distance by travelled by Car (A) = Area of $\triangle OCD$

$$= \frac{1}{2} OC \times DD = \frac{1}{2} \times 14.44 \times 5$$
$$= 36.1 \text{ m}$$

Distance travelled by Car (B) = Ar($\triangle OEF$)

$$= \frac{1}{2} OE \times EF = \frac{1}{2} \times 0.83 \times 10 = 4.15 \text{ m}$$

∴ Car (A) travelled farthar than (B) after applying brakes.

7. Initial velocity, $u = 0$

Acceleration, $a = 10\ m/s^2$

Distance, $s = 20m$

from 3rd Eqn of Motion,

$v^2 = u^2 + 2as$

$v^2 = 0 + 2.10.20$

$v^2 = 400$

$v = 20\ m/s$

from 1st Eqn of Motion,

$v = u + at$

$20 = 0 + 10(t)$

$20 = 10t$

$t = \frac{20}{10}$

$\therefore$ at $t = 2s$ (Ans), ball will strike the ground.

8. The area under the slope of S-t graph gives- distance.

(9) We have, of distance ax. of,
5 sq. on x axis = 2s.
1 sq " " = $\frac{2}{5}$ s
30 sq on Y axis = 2 m/s
1 sq " " = $\frac{2}{3}$ m/s

So, area of 1 sq. on graph = $\frac{2}{5} \times \frac{2}{3} = \frac{4}{15}$ m

∴ 1 square represent distance = $\frac{4}{15}$ m
Here, 60 (approx) squares are there under the area of the slope for 4s.
So, distance = $\frac{4}{15} \times 60 = 16$ m

Parallelogram