H/W

CH-1 MOTION

Date 1/10/21
Page 1

NCERT

Q/Ans

1) An athelete completes one round of a circular track of diameter 200m in 40s. What will be the distance covered & the displacement at the end of 2 mins 20 secs)

Ans) Given,

diameter = 200m

radius = d/2 = 200/2 = 100m.

To complete one round

$t = 40s$

dis : 200m

How many round would the athelete complete in 2m 20s

$t = 2m\ 20s = 140s$

no. of rounds $= \frac{140}{40} = 3.5$ rounds.

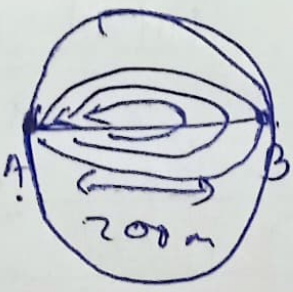
1 round = circumference $= 2\pi r$

3.5 rounds $= 2 \times \frac{22}{7} \times 100 \times \frac{3.5}{10}$

$= 2200\ m$

$\therefore$ Total dis $= 2200\ m$

When the ~~athlete~~ athelete covers 3 rounds he comes back to his initial pt.



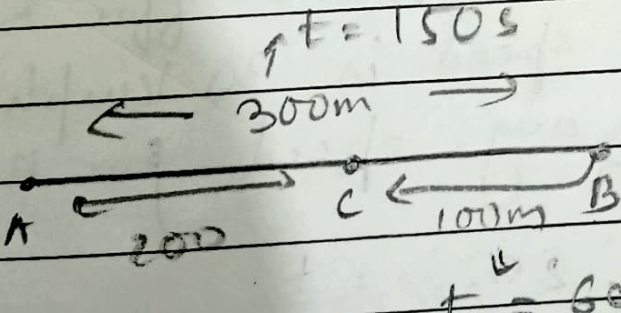
But here the athelete covers 3.5 rounds

So, in the half round he reaches pt. B.

The dis b/w A & B {shortest} is d = 200m

∴ Total dis = 200m

2) Joseph jogs from one end A to the other end B of a st. 300m road in 2 mins 30 secs & then turns around & jogs 100 m back to pt. C in another 1 min. What Joseph's avg-speeds & velocitgies in jogging
(a) from A to B
(b) from A to C?



a) $A_s = \frac{td}{tt} = \frac{2300}{150} = 2\ m/s$.

$$A_v = \frac{ts}{tt} = \frac{300}{180} = 2\ m/s$$

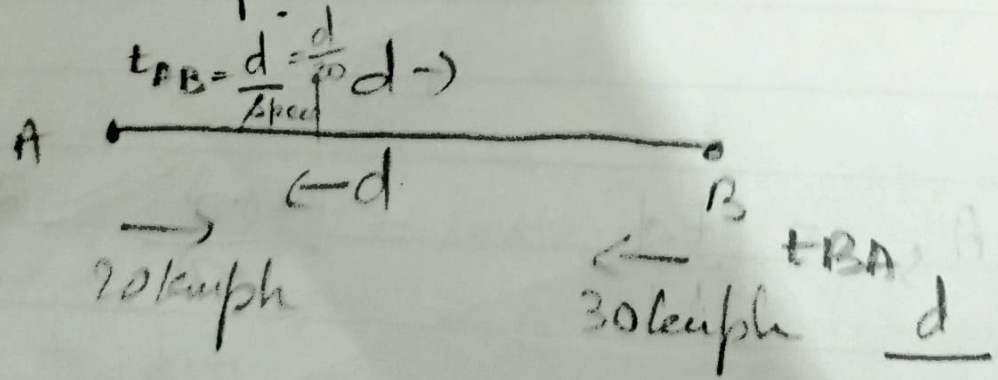
Ans) b) A → C

$$A_s = \frac{td}{tt} = \frac{400}{210} = 1.90 m/s$$

$$A_v = \frac{ts}{tt} = \frac{200}{210} = 0.95 m/s$$

3) Abdul, while driving to school, computes the avg. speed for his trip to be 20 kmph. On his return trip along the same route, there is less traffic & the average speed is 30 kmph. What is the avg. speed for Abdul's trip?

Ans)



$$A_s = \frac{td}{tt} = \frac{2d}{t_{AB} + t_{BA}}$$

$$= \frac{2d}{\frac{d}{20} + \frac{d}{30}}$$

$$= \frac{2d}{250\,d/20\times30}$$

$$= \frac{420 \times 30}{25} = 24 \text{ kmph}.$$

(or)

$$A_s = \frac{2V_1V_2}{V_1 + V_2} = \frac{2 \times 20 \times 30}{50}$$

$$= 24 \text{ kmph}.$$

4) A motorboat starting from rest on a lake accelerates in a st. line at a const. rate of $3.0\ m/s^2$ for 8.0 s. How far does the boat travel during this time?

Ans)

$u = 0\ m/s$

$a = 3m/s^2$

$t = 8\ s$

2nd eqn

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

$s = \frac{1}{2}at^2$

$= \frac{1}{2} \times 3 \times 32$

$= 96\ m$ (K)

$\therefore s = 96\ m$

5) A driver of a car travelling at 52 kmh^{-1} applies the brake & accelerates uniformly in the opp. dirn. The car stops in 5 s. Another driver going at $9 kmh^{-1}$ in another car applies his brakes slowly & stops in 10 s. On the same graph paper, plot the speed versus time graphs for the two cars. Which of the two cars travelled farther after breakes were applied?

Ans) 1st driver

$u = 52\ kmph = \frac{2 \times 5}{18} = 2.89$

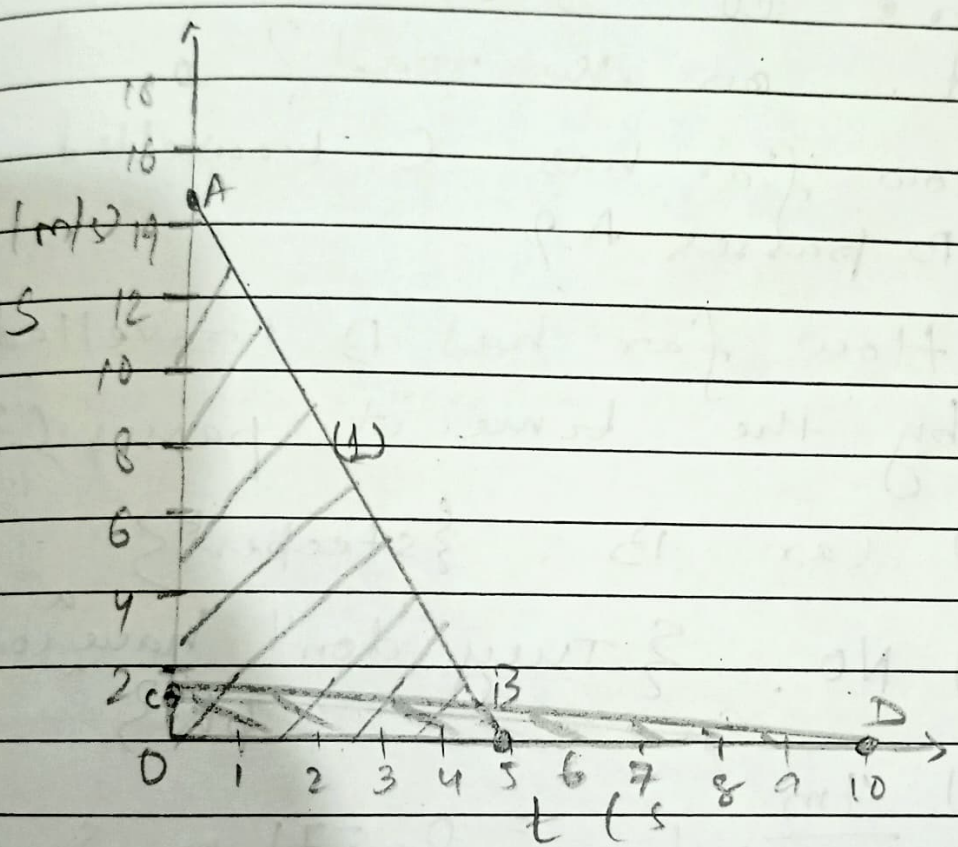
$= 14.45$

$v = 0, t = 5s$.

2nd driver

$u = 3\text{ kmph} = \frac{3 \times 5}{18} = 0.83\text{ m/s}$

$v = 0, \quad t = 10\text{s}$



1st driver = $\triangle OAB = \frac{1}{2} \times 5 \times 14.45 = 36.125\text{ m}$ (7.225)

2nd driver = $\triangle OCD = \frac{1}{2} \times 10 \times 0.83 = 4.15\text{ m}$.

∴ 1st car travelled farther after the breakes were applied.

6) Fig 8.11 shows the distance-time graph of three objects A, B & C. Study the graph & answer the questions :-

a) Which of three is travelling the fastest?

b) Are all 3 ever at the same pt. on the road?

c) How far has C travelled when B passes A?

d) How far has B travelled by the time it passes C?

Ans (a) Car B. {steepest}

Ans (b) No. {They don't have a common pt.}

Ans (c) $\frac{4m}{7 \text{ blocks}} = 0.571 \text{ m}$ {every single pt.}

$\Rightarrow 4 + 6(0.571)$

$= 10(0.571) = 5.71 \text{ km}$

Ans (d) $4 + 2(0.571) = 5.14 \text{ km}$

7) A ball is gently dropped from a height of 20 m. If its velocity increases uniformly at the rate of $10 m/s^2$, with what velocity will it strike the ground?

Ans) $u = 0 m/s$
$s = 20 m$
$a = 10 m/s^2$
$v = ?$

$a = 10 m/s^2$ ↓

Third eqⁿ of motion

$v^2 = u^2 = 2as$
$v^2 = 2 \times 10 \times 20$
$v = \sqrt{400}$
$v = 20 m/s$

First eqⁿ
$v = u + at$

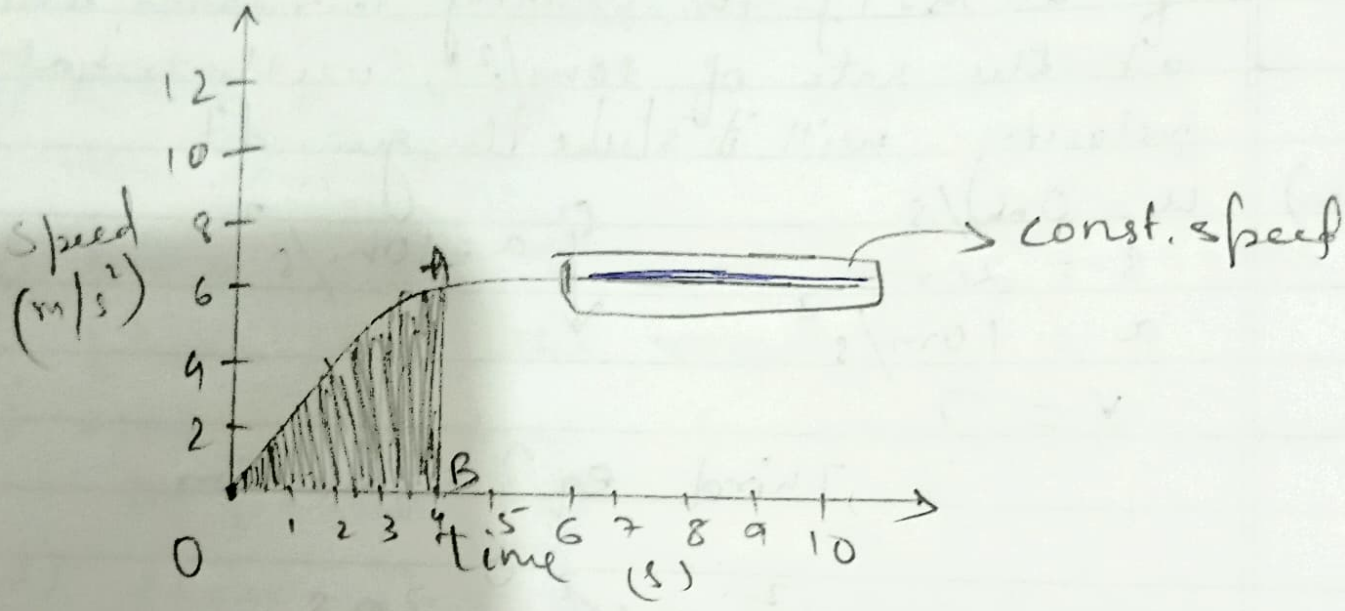
$t = \frac{v}{a} = \frac{20}{10} = 2s.$

8) The speed - time graph for a car is shown.

a) Find out how far the car travels in the 1st 4 sec. Shade the ar on the graph that represents the dis. travelled by the car during the period.

b) Which part of the graph represe-nts uniform motion of the car?

Ans)(a)



Area under the curve

$$\Delta = \frac{1}{2} \times b \times h$$

$$\Delta AOB = \frac{1}{2} \times 4 \times 6 = 12\,m \text{ (Ans)}.$$

Ans)(b) The part shaded blue colour b/w 6 to 10 s represents uniform motion of the car.