Exercise

(1) Diameter = 200
Circumference = 200π
Distance Covered in 40 sec.
200π metre
Distance Covered in 1 sec = $\frac{200\pi}{40}$
Distance Covered in 2 mins 20 sec (140 sec)

$$\frac{140 \times 200\pi}{40} = \frac{140 \times 200 \times 22}{40 \times 7}$$
$$= 2200$$

No. of laps Completed by a Athlete is 140 Second = $\frac{140}{40} = 3.5$

Distance = 2200m
Displacement = 200m

(2) Distance Covered from A to B = 300 mts.

Distance covered from A to C = 300 + 1000 = 1300 mts

Time taken from A to B = 2mins
30 sec = 150 sec.

Time taken from A to C = 2mins
30sec + 1 mins = 210 secs.

Displacement from A to B = 300 mts

Displacement from A to C =
300 - 1100 = 200 mtrs

Average speed = $\frac{\text{Td}}{\text{Tt}}$

Average velocity = $\frac{\text{Td}}{\text{Tt}}$

Average speed from A to B = $\frac{300}{150}$
2m/s

A to C = $\frac{400}{210}$ = 1.9m/s

Average velocity from = $\frac{300}{150}$ = 2m/s
A to C = $\frac{200}{210}$ = 0.95m/s

(3) Time taken to reach school = t_1
Time taken to reach home = t_2
Average speed = 20 kmph (school)
= 30 kmph (home).

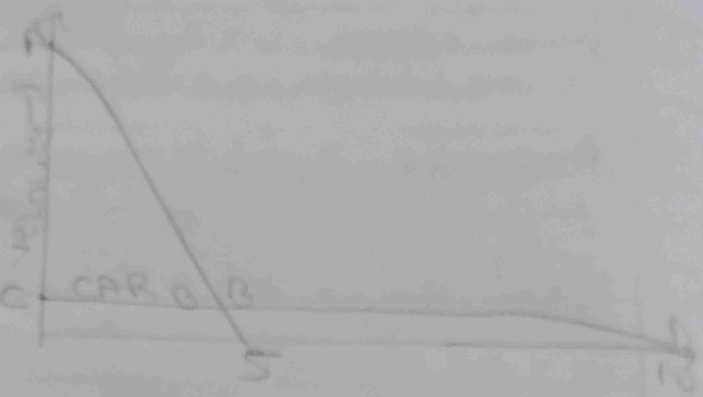
$t_1 = \frac{d}{20}$, $t_2 = \frac{d}{30}$

Average speed = $\frac{d+d}{t_1+t_2} = \frac{2d}{\frac{d}{20}+\frac{d}{30}} = \frac{24}{5}$

= 24 m/sec

(4) Initial velocity = 0 m/s
Accelaration = 3 m/s^2
Time = 8 s
As 2nd equation of motion, $S = ut + \frac{1}{2}at^2$. Therefore, the total distance travelled by boat in 8 sec = $0 + \frac{1}{2} \times 3 \times 8 \times 8$
= 96 mtrs.

(5)



Displacement of the first car = Area of Δ AOB $\frac{1}{2}$ × OB × OA

OB = 5 sec, OA = 52 km/h = 14.44 m/s

Area of = $\frac{1}{2}$ × 5 × 14.44 = 36 mtrs.

Displacement of 2nd car = Area of Δ COD

$\frac{1}{2}$ × OD × OC

OC = 10 sec

OD = 3 km/hr

$\frac{1}{2}$ × 10 × 0.83 = 4.15 Mtrs.

(6) a) Since the three lines do intersect

a) Since, the slope of line B is greater B is travelling at fastest speed.

b) Since, the three lines do intersect at a single point, the three objects never met at the same point on the road.

c) Since, there are 7 unit areas of graph between O and 4 on the y axis, 1 graph unit equal $\frac{4}{7}$ km

since, the intial point of object IC is 4 graph units away from the origin. Its intial distance from the origin is $4 \times \frac{4}{7} = \frac{16}{7}$ km.

Total distance travelled by C

(c) This time $= 8 - \frac{16}{7}$ sec

$= 5.71$ sec.

d) The distance that object B has covered at the point where is passes C is equal to a graph unit.

Distance travelled $= 9 \times \frac{1}{7}$

$= \frac{36}{7}$

$= 5.14$ km

(7) $u = 0$

$S = 20$ m

$a = 10$ m/s

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

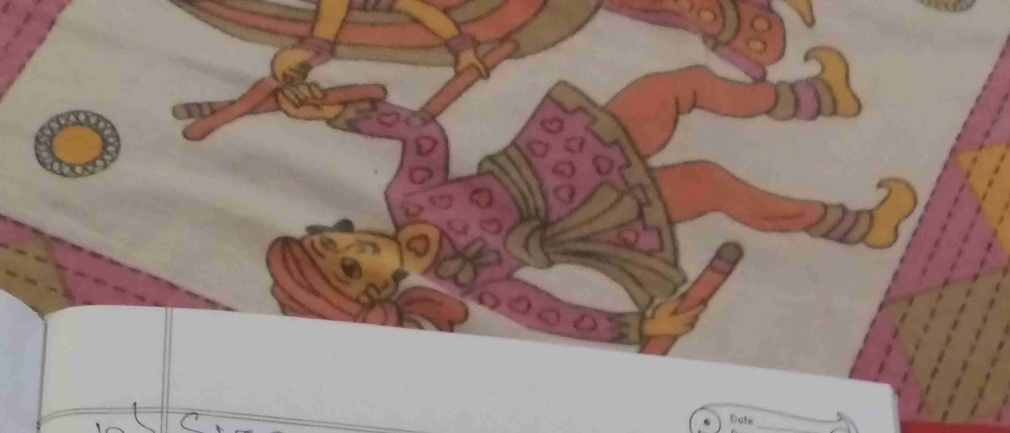
$v^2 = 2 \times 10 \times 20 + 0$

$v^2 = 400$ m^2/s^2

$v = 20$ m/s^2

(8) a) $\frac{1}{2} \times 4 \times 6 = 12$ mins

∴ The car travels 12 m in 14 sec.



b) Since the speed of the car does not change from the points (v = 6) and (v = 10), the car is said to be in uniform motion from the 6th to the 10th sec.

c) a) It is possible, an object thrown up into the air has a constant acceleration due to gravity acting on it. However, when it reaches its maximum height, its velocity is zero.

b) It is impossible; acceleration implies an increase or decrease in speed and uniform speed implies that the speed does not change over time.

c) It is possible, for an object accelerating in a curved trajectory, the acceleration is perpendicular to direction caused by the

object.

(10) Radius = 42250 km
Circumference = $2\pi r = 265574.42$ km

Time = 24 hrs
Speed = 11065.4 km/hr

∴ The satellite orbits the earth at a speed of 11065.4 km/hr