

Exercise

1: Diameter = 200 m

Circumference = 200π

Distance covered in 40 seconds = 200π metre

Distance covered in 1 second = $\frac{200\pi}{40}$

Distance covered in 2 min = 20 sec = 140π (40 sec)

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

No. of laps completed by athlete in 140 seconds = $\frac{140}{40} = 3.5$

Distance = 2200 m

Displacement = 200 m

2: Distance covered from A to B = 300 metres

Distance covered from A to C = $300 + 1000$ metres

Time taken from A to B = 2 min = 30 sec
= 150 sec

Time taken from A to C = 2 min = 30 sec
+ 1 min = 210 sec

Displacement from A to B = 300 mtrs

Displacement from A to C = $300 - 100 = 200$ mtrs

$$\text{Average speed} = \frac{t \cdot d}{t t}$$

$$\text{Average velocity} = \frac{t \cdot d}{t t}$$

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

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

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

$$\text{A to C} = \frac{200}{210} = 0.95 \text{ m/s}$$

3) distance to reach school = distance to reach home = d

Time taken to reach school = t_1

Time taken to reach home = t_2

$$\begin{aligned} \text{Average speed} &= 20 \text{ Kmph (school)} \\ &= 30 \text{ Kmph (home)} \end{aligned}$$

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

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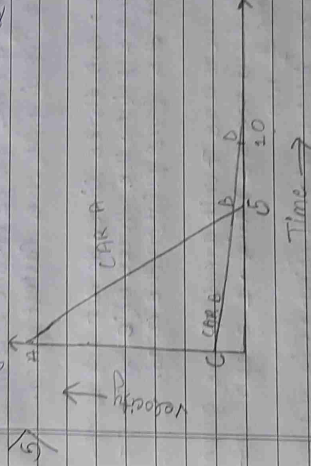
$$\text{Average speed} = \frac{d+t_d}{t_{tt1}+t_{tt2}} = \frac{2d}{\frac{d}{20} + \frac{d}{30}} = \frac{120}{5} = 24 \text{ m/s}$$

4) Initial velocity = 0 m/s

Acceleration = 3 m/s^2

Time = 8 s

As And equation of motion; $s = ut + \frac{1}{2}at^2$
 Therefore the total distance travelled?
 by boat in 8 seconds = $0 + \frac{1}{2} \times 3 \times 8^2$
 $s = 96 \text{ metres}$.



Displacement of first car = Area of $\triangle AOB = \frac{1}{2} \times OB \times OA$

$$OB = 5 \text{ seconds}, OA = 52 \text{ km/hr} = 14.44 \text{ m/s}$$

$$\text{Area of } \Delta = \frac{1}{2} \times 5 \times 14.44 = 36 \text{ metres}$$

Displacement of and ~~area~~ car = Area of Δ cos

$$\frac{1}{2} \times OD \times OC$$

$$OC = 10 \text{ sec}$$

$$OD = 3 \text{ km/hr}$$

$$\frac{1}{2} \times 10 \times 0.83 = 4.15 \text{ metres}$$

a) since, the slope of line B is the greatest, B is travelling at the fastest speed.

b) since, the three lines do not intersect at a single point, the three objects never meet at the same point on the road.

c) since there are 7 unit area of the graph between O and 4 on the Y axis, 1 graph unit equals $\frac{4}{7}$ km.

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

when A passes B, the distance between the origin and C is 8 km.

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Total distance travelled by C in this time
 $= 8 - \frac{16}{7} \text{ km}$
 $= 5.71 \text{ km}$

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

$$\begin{aligned} \text{Distance travelled} &= 9 \times \frac{4}{7} \\ &= \frac{36}{7} \\ &= 5.14 \text{ km.} \end{aligned}$$

7. $u = v$

$$s = vt$$

$$a = 10 \text{ m/s}$$

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

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

$$v^2 = 400 \text{ m}^2/\text{s}^2$$

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

8. a) $\frac{1}{2} \times 4 \times 6 = 12 \text{ metres}^2$

\therefore The car travels 12 m in 14 sec.

b) Since the speed of the car does not change from the point $(u = 6)$ & $(u = 10)$, the car is said to be in uniform motion from the 6th to the 10th second.

a) If 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 circular trajectory, the acceleration is perpendicular to the direction followed by the object.

10. Radius = 4280 km

$$\text{Circumference} = 2\pi r = 265571.42 \text{ km}$$

$$\text{Time} = 24 \text{ hr}$$

$$\text{Speed} = 11065.4 \text{ km/hr}$$

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