

Exercises

1. Diameter of circular track = 200m

$$\therefore \text{Its circumference} = 2 \times \frac{22}{7} \times 100$$

$$= \frac{4400}{7} \text{ m}$$

$$\text{Time taken to cover } \frac{4400}{7} \text{ m} = 40 \text{ s}$$

So, distance covered in 2 min 20 sec / 140 sec

$$= \frac{15400}{7} \text{ m}$$

$$= 2200 \text{ m}$$

ii) Displacement = 0

$$2. \text{ a) Average speed from jogging A to B} \\ = \frac{300 \text{ (m)}}{150 \text{ (sec)}} = 2 \text{ m s}^{-1}$$

Average velocity from jogging A to B

$$= \frac{300 \text{ (m)}}{150 \text{ (sec)}} = 2 \text{ m s}^{-1}$$

b. Average speed = 1.90 m/s
Average velocity = 0.95 m/s

Q. 4. Initial velocity (u) = 0
Acceleration of the motorboat; $a = 3 \text{ m/s}^2$
Time taken = 8 sec

A/q eq 2 of motion:

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

Distance covered by the motorboat, s

$$s = 0 + \frac{1}{2} \times 3 \times (8)^2 = \frac{1}{2} \times 3 \times 64 = 96 \text{ m}$$

\therefore boat travels 96 m.

5. Driver - A

Initial speed of the car = $u_1 = 52 \text{ km/h}$
or 14.4 m/s

Time to stop the car, $t_1 = 5 \text{ s}$
Final speed of the car becomes zero

after 5s of application of brakes

Driver 2

Initial speed of car $u_2 = 3 \text{ km/h}$
 $= 0.8333 \text{ m/s}$

Time taken to stop the car,
 $t_2 = 10 \text{ s}$

Final speed of the car becomes zero after 10s of application of ~~or~~ brakes. ~~Plot of the two cars on a speed-time graph is shown in the following figure~~

Distance covered in Case A,

$$S_1 = \frac{1}{2} \times OP \times OR = \frac{1}{2} \times 14.4 \times 5 = 36 \text{ m}$$

Distance covered in Case B,

$$S_2 = \frac{1}{2} \times 0.83 \times 10 = 4.15 \text{ m}$$

Here, Car A travelled a greater distance compared to B.

6. a) Object B

b) No

c) 5.714 km

d) 5.143 km

7. Distance covered by the ball = 20m
Acceleration = 10m/s^2

~~Initial~~ Initial velocity = 0

Final velocity be, v

A/Q,

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

$$v^2 = 0 + 2(10)(20)$$

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

A/Q, 1st eq of motion

$$v = u + at$$

where, t is time taken by the ball to strike the ground.

$$20 = 0 + 10(t)$$

$$t = 2s$$

Hence, ball strikes the ground after 2s with velocity 20m/s

Q. a) Possible

When a ball is thrown up at max height, it has 0 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 circular track, its acceleration is perpendicular to its direction.