

Hw

MOTION

1 The planet Neptune travels in a nearly circular orbit of radius $r = 4.5 \times 10^9$ km, about the sun. It takes Neptune 165 years to make a complete trip around the sun. How fast (in km/h) does it travel in its orbit?

Ans Radius = 4500000000 km
 Time = 165 years = 1445400 hours.
 Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{4500000000}{1445400} \approx 3113.325$ km/h.

2a Distance moved by the cyclist.

Ans Circumference $\Rightarrow 2\pi r = 314$ m.

$$\Rightarrow 2 \times 22 = 314 \text{ m.}$$

$$r = \frac{314 \times 7}{44} = \frac{2198}{44} = 49.95 \text{ m.}$$

$$\text{Diameter} = 49.95 \times 2 = 99.9 \text{ m.}$$

$$\text{Distance moved by the cyclist} = 99.9 \text{ m.}$$

b The displacement of the cyclist if AB represents N-S direction.

Ans Displacement = 99.9 m.

c The average velocity of the cyclist.

$$\text{Ans Average Velocity} = \frac{v_1 + v_2}{2} = \frac{15.7 + 15.7}{2}$$

$$= \frac{31.4}{2} = 15.7 \text{ m/s.}$$

3a Define Circular Motion.

Ans Circular Motion is a movement of an object along the circumference of a circle.

b An artificial satellite is moving in a circular orbit of radius 42,250 km. Calculate speed if it takes 24 hours to revolve once around the Earth.

Ans Distance covered by satellite in 24 hours (s) =

$$2\pi r = 2 \times 3.14 \times 42250 = 265464.58 \text{ km.}$$

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{265464.58}{24 \times 60 \times 60} = 3.07 \text{ km s}^{-1}.$$