

Home Assignment

Q1. The planet Neptune travels in a nearly circular ~~ob~~ orbit of radius, $r = 4.5 \times 10^9$ km, about the sun. It takes Neptune 165 y to make a complete trip around the sun. How fast (in km/h) does Neptune travel in its orbit?

Ans:- \Rightarrow Radius of orbit = 4.5×10^9 km

Time taken by Neptune to make a revolution = 165 y

$$= 165 \times 365 \times 24 \text{ hr}$$

$$v = \frac{2\pi r}{T} = \cancel{2} \times \frac{\cancel{22}^1}{7} \times \frac{45}{10} \times 10^9 \times \frac{1}{165 \times 365 \times 24}$$

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$$= \cancel{2} \times \frac{\cancel{22}^1}{7} \times \frac{45}{10} \times 10^9 \times \frac{1}{165 \times 365 \times 24}$$

$$= 19,569 \text{ km/hr}$$

$$\begin{array}{r} 75 \\ 25 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 73 \\ 8 \\ \hline 2 \end{array}$$

Q2. A circular cycle track has a circumference of 314m with AB as one of its diameter. A cyclist travels from A to B along the circular path with a velocity of constant magnitude 15.7 m/s. Find:

- the distance moved by the cyclist
- the displacement of the cyclist if AB represents north-south direction.
- the ~~ave~~ average velocity of the cyclist.

sol: (a) Distance moved by the cyclist = $\pi r = \frac{314}{2} = 157 \text{ m}$

(b) Displacement of cyclist = ~~diameter~~ AB = diameter of track

$$2\pi r = 314$$

$$\Rightarrow 2r = \frac{314 \times 100}{314} \Rightarrow d = 100 \text{ m}$$

$$\therefore \text{Displacement} = 100 \text{ m}$$

(c) Time taken by the cyclist = ~~100~~

$$v = \frac{s}{t} \Rightarrow t = \frac{s}{v}$$

$$\Rightarrow t = \frac{157}{15.7} = 10 \text{ s}$$

$$V_{\text{avg}} = \frac{\text{Displacement}}{\text{Time}} = \frac{100}{10} = 10 \text{ m/s}$$

Q3. Define circular motion.

(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.

Sol:- The movement of an object while rotating along a circular path is called circular motion. Circular motion is of two types:-

1. Uniform circular motion
2. Non-uniform circular motion

(b) Rdt Radius of orbit = 42,250 km
Time taken to revolve once around the earth = 24 hours

$$V = \frac{2\pi r}{t} = \frac{2 \times 42,250}{24} \times \frac{1}{6}$$
$$= 11065 \text{ km/h}$$