

H.W  
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(89)

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 165y to make a complete trip around the sun. How fast (in km/h) does ~~the~~ Neptune travel in its orbit?

Ans  $\Rightarrow v = \frac{2\pi r}{T} = \frac{2 \times \pi \times 4.5 \times 10^9}{165 \times 365 \times 24}$

$$= \frac{2 \times \pi \times 4.5 \times 10^9}{1445400}$$
$$= \frac{\pi \times 10^9}{160600}$$
$$= \frac{\pi \times 10^7}{1606}$$
$$= \frac{22}{7} \times \frac{10^7}{1606} = \frac{10^7}{511} = 19569.47 \text{ km/hr}$$

2. 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 15.7m/s. Find:

- a) the distance moved by the cyclist

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

$$= \pi = 50 \text{ m}$$

Given that,  $v = 15.7$  m/s

Distance moved equals to  $\pi r = 3.14 \times 50$   
= 157m

b) Displacement = diameter  
=  $2r = 100\text{m}$

c) Time taken =  $\frac{157}{15.7} = 10\text{s}$

Avg. velocity =  $\frac{\text{displacement}}{\text{time}} = \frac{100}{10} = 10\text{m/s}$

3. Define circular motion.

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

Ans → Motion of a particle along a circular path is called circular motion.

Radius = 42250 km

time = 24 hrs

distance =  $2\pi r$

$$= \frac{2 \times 22 \times 42250}{7}$$

$$= \frac{2 \times 22 \times 42250}{7} \text{ km}$$

speed =  $\frac{\text{distance}}{\text{time}}$

$$= \frac{2 \times 22 \times 42250}{7}$$

$$\underline{\quad\quad\quad}$$

$$24$$

$$= \frac{2 \times 22 \times 42250}{7 \times 24}$$

$$= \frac{1 \times 11 \times 21125}{7 \times 3}$$

$$= \underline{232375}$$

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$$= 11065.47 \text{ km/h or } 3.07 \text{ km/s}$$

A