

# HOMWORK

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- 1) The planet Neptune travels in a nearly circular orbit of radius  $= 4.5 \times 10^9$  km, about the sun. It takes Neptune 165y to make a complete trip around the sun. How fast (in km/h) does not Neptune travel in its orbit?

$$V = \frac{2\pi r}{T} = \frac{2(3.14)(4.5 \times 10^9 \text{ km})}{(165 \text{ d})(365 \text{ d/y})(24 \text{ h/d})} = 2.0 \times 10^4 \text{ km/h}$$

- 2) A circular cycle track has circumference of 314 m with AB as one of its diameters. A cyclist travels from A to B along the circular path with a velocity of constant magnitude 15.7 m/s. Find (a) the distance moved by the cyclist, (b) the displacement of the cyclist if AB represents North-South direction?, (c) the avg. velocity of the cyclist.

a) Distance moved equal to  $\pi r = 3.14 \times 50 = 157 \text{ m}$

b) Displacement = AB =  $2r = 2 \times 50 = 100 \text{ m}$  towards south,

c) Time taken by the cyclist to reach B from A  
 $= \frac{157}{15.7} = 10 \text{ s}$ .

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

3) i) Define circular motion

Circular motion is the motion of a body along the sides of a polygon of infinite no. of sides with uniform speed, the direction changing continuously.

ii) An artificial satellite is moving in a circular orbit of radius 42250 km. Calculate speed, if it takes 24 hrs to revolve once around the Earth.

$$\begin{aligned} \text{Radius} &= 42250 \text{ km, time} = 24 \text{ hrs} \\ \text{Dis. travelled} &= \text{circumference of circle} = 2\pi r \\ &= 2 \times \frac{22}{7} \times 42250 \end{aligned}$$

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

$$= \frac{2 \times \frac{22}{7} \times 42250}{24} = \frac{232375}{21}$$

$$= 11065.47 \text{ km/hr.}$$

$$\text{Conversion} = \frac{232375}{21} \times \frac{\text{km}}{3600 \text{ sec}}$$

$$= \frac{232375}{21 \times 3600} \text{ km/s} = \frac{9295}{21 \times 144} \text{ km/s}$$

$$= \frac{9295}{2024} \text{ km/s} = 3.07 \text{ km/s.}$$