(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 y to make a complete trip around the sun. How fast (in Km/hr) does not Neptune travel in his orbit?

Ans- $v = \frac{2\pi r}{T} = \frac{2(3.14)(4.5 \times 10^9 \text{ Km})}{(165 \text{ d})(365 \text{ d}/1 \text{ y})(24 \text{ h}/1 \text{ d})} = 2.0 \times 10^4 \text{ Km/h}$

(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 15.7 m/s.

Find (a) the distance moved by the cyclist

(b) the displacement of the cyclist if AB represents north - South direction.

(c) the average velocity of the cyclist.

Ans- Given,

circumference $2\pi r = 314$ m

$\therefore$ Radius $= r = \frac{314}{2\pi}$

$= \frac{314}{2 \times 3.14} \times 50$ m

a) Distance moved, $s = \frac{1}{2} \times$ circumference

$= \frac{1}{2} \times 314 = 157$ m

(b) Displacement $= \overrightarrow{AB} = 2r = 100$ m

Displacement is in north-south direction.

(c) Time taken in going from A to B = $\frac{157\ m}{15.7\ m/s}$ = 10 s

∴ Average velocity = $\frac{\text{Displacement}}{\text{Time}}$

$= \frac{100}{10}$

= 10 m, in north-south direction.

(3) a) Define Circular motion.

Ans - Circular motion is a movement of an objet along the circumference of a circle or rotation along a circular path.

b) Distance covered by the satellites in 24 hrs.

$s = 2\pi r$

$= 2 \times 3.14 \times 42250 = 265464.58\ km$

Therefore speed of the satellite.

$v = \frac{\text{distance travelled}}{\text{time taken}} = \frac{265464.58}{24 \times 60 \times 60}$

$= 3.07\ Kms^{-1}$