HW 8/7/21

ODM CONNECT APP HOMEWORK

Q1. 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 not Neptune travel in its orbit?

Ans) Radius $= 4.5 \times 10^9$ km

$= \frac{45}{10} \times 1000000000 = 4500000000$ km

Time $= 165y = 165 \times 365 = 60295$ days

$= 60225 \times 24 = 1445400$ hrs

Angular velocity $= \omega = \frac{\theta}{t} = \frac{2\pi r}{1445400}$

$= 2 \times \frac{22}{7} \times 4500000000 \div 1445400$

$= 2 \times \frac{22}{7} \times 450000000 \times \frac{1}{1445400/657}$

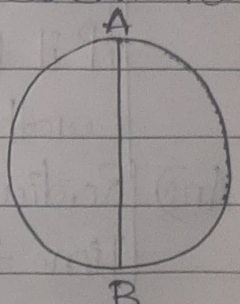
$= 19569.47$ Km/h.

So, it travels 19569.47 Km/h fast.

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:

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

a) Distance moved by the cyclist $= \pi r = 3.14 \times 50 = 157$ m

b) Displacement of the cyclist if AB represents north-south direction $= \vec{AB} = 2r = 2 \times 50 = 100$m

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

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

$= \frac{100}{10}$

= 10 m/s, in north-south direction.

Q3.9) Define circulare motion.

Ans) The motion of a body moving around a fixed point in a circulare path is known as circulare motion.

b) An artificial satellite is moving in a circulare ~~path~~ orbit of radius 42,250 km. calculate speed, if it takes 24 hours to revolve once around the earth.

Ans) Radius of the orbit = 42250

Time taken = 24 hours

Distance travelled by the satellite

= circumference of circle

$= 2\pi r$

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

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

Now,

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

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

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

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

$= \frac{232375}{21}$

$= 11065.47$ Km/hr.

∴ It takes 11065.47 kmph to revolve once around the earth.