.10.2021

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Q1. What is uniform circular motion? How is uniform circular motion regared as an accelerat-ed motion? Explain.

→ The circular motion in which the body covers equal distance in equal interval of time in the circular path is called uniform circular motion.

Eg: Motion of earth, hands of clock, cycling around a circular path of constant speed, blades of fan etc.

→ In circular motion, the direction of the object changes continously along the target. Thus, the velocity of the object changes. As the velocity changes, it is ~~called~~ regaraded as accelerated motion.

Q2. An object is moving with uniform speed in a circle of radius r. Calculate the distance & displacement

a) when it completes half the circle.

→ Distance: πr

Displacement: diameter.

b) when it completes full circle

→ distance: $2\pi r$

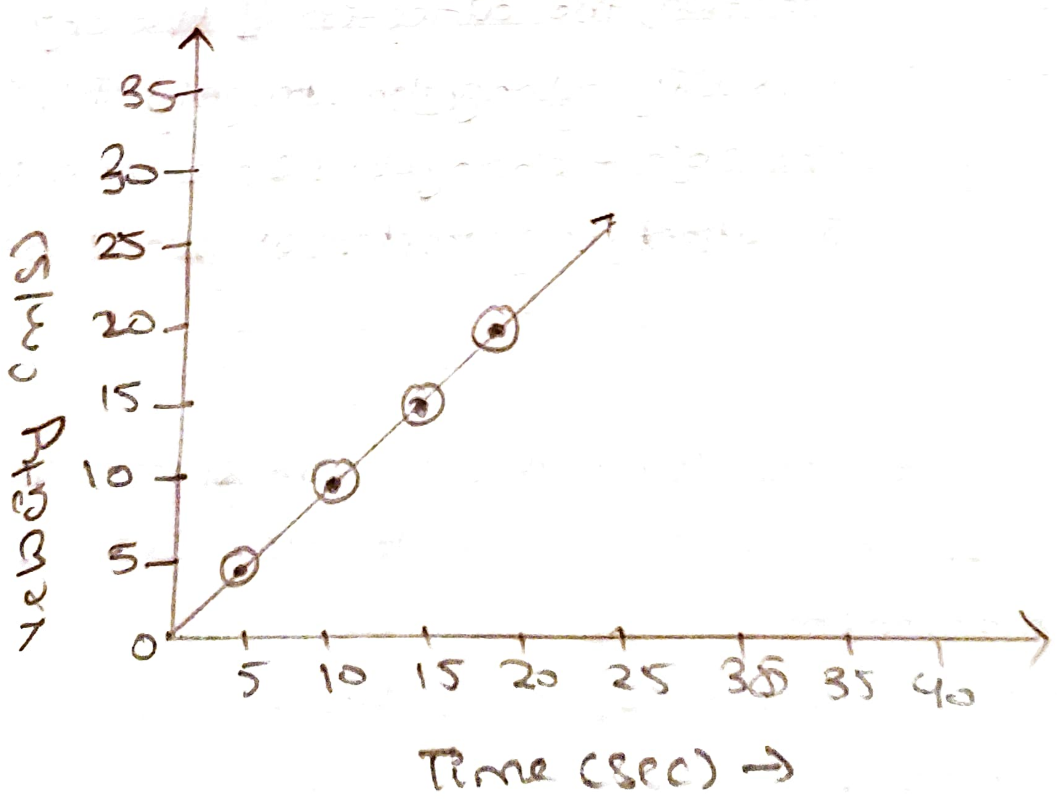
displacement: 0

c) what type of motion does the object possess?

→ circular motion.

3. Draw velocity-time graph for an uniformly accelerated object. Using velocity-time graph, derive $v = u + at$.

→



Equation - II $v = u + at$ (Velocity time relation)

let us consider an object moves with velocity (u) at 'A' with uniform acceleration 'a', after 't' second it reach of 'B' with velocity 'v' after covering a distance 's'.

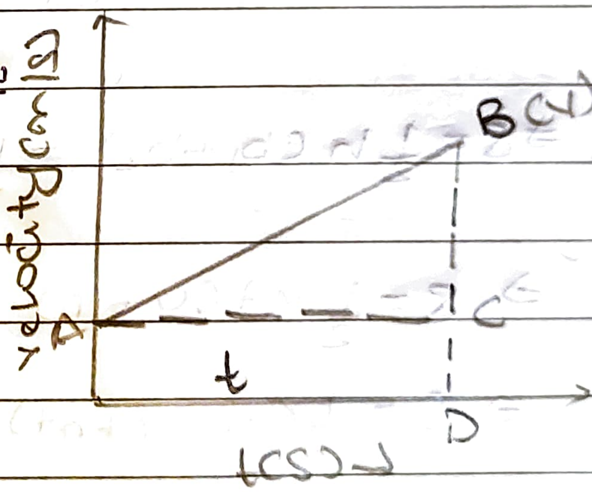
We know that, slop of v~t graph stands for acceleration.

→ slop of v~t graph $= \tan\theta = \frac{p}{b}$

→ $a = \frac{BD - CD}{AC} = \frac{v-u}{t}$

⇒ $at = v - u$

⇒ $v = u + at$



Q4. Write the three equations for the uniformly accelerated motion. Also derive the second & third equations by graphical method.

→ (i) $v = u + at$

(ii) $s = ut + 1/2\,at^2$

(iii) $v^2 - u^2 = 2as$

Equation 2: $s = ut + 1/2 at^2$ (graphically)

let us consider an object moves with velocity (u) at 'A' with uniform acceleration 'a', after 't' second it reach at 'B' with velocity 'v' after covering a distance 's'.

we know that area under v~t graph stands for distance cover.

⇒ Distance cover = Area under AB
= In OABD trapezium

$\Rightarrow s = \frac{1}{2} h (b_1 + b_2) = \frac{1}{2} \times OD (OA + BD)$

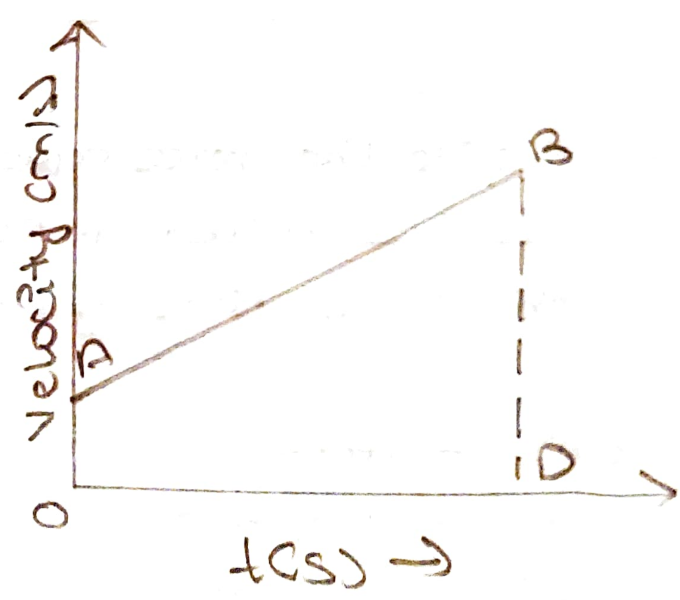
$\Rightarrow s = \frac{1}{2} \times t (u + v)$ (from eqn ⇒ $v = u + at$)

$\Rightarrow s = \frac{1}{2} (u + v + at)$

$\Rightarrow s = \frac{t}{2} (2u + at)$

$\Rightarrow s = ut + 1/2 at^2$

(Proved)



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Third equation of motion: $v^2 - u^2 = 2as$

Let us consider an object moves with velocity 'v' at 'A' with uniform acceleration 'a', after 't' second it reach of 'B' when velocity 'v' after covering a distance 's'.

We know that area under v~t graph stands for distance cover.

$\Rightarrow$ Distance cover = Area under AB.

= Ar OABD trapezium

$s = \frac{1}{2} h (b_1 + b_2) = \frac{1}{2} \times OD \times (OA + BD)$

$s = 1/2 \times t(u+v) = 1/2 \times (\frac{v-u}{a}) \times u + v$

$s = \frac{v^2 - u^2}{2a} \Rightarrow v^2 - v^2 = 2as$ (Proved)