

AL Physics Notes

Circular Motions

Definition

- Uniform Circular Motion:
 - motion going around the circle at constant speed
- Radian:
 - One radian is the angle **subtended** at the centre of a circle by an arc of length equal the **radius** of the circle
 - $1 \text{ rad} = \frac{180^\circ}{\pi}$
 - $1^\circ = \frac{\pi}{180^\circ}$
- Angular displacement:
 - angle θ of rotation if the angle is **in radian**
- Angular velocity:
 - angular speed is the rate of change of angle **in radian**
 - $\omega = \frac{\Delta\theta}{\Delta t} = \frac{2\pi}{T}$
- Period
 - T time for make one **complete** revolution
 - $T = \frac{1}{f}$
- Frequency
 - f number of revolution per second
 - $f = \frac{1}{T}$

Key points

- Linear velocity:
 - $v = \frac{s}{t} = \frac{2\pi r}{T} = 2\pi r f = r\omega$
 - if not specify, speed for UCM means linear speed
 - numerical value for velocity is the same as speed, the direction is always the tangent with the direction of moving
- Acceleration
 - $a = \frac{\overrightarrow{\Delta v}}{\Delta t} = \frac{v^2}{r} = r\omega^2$
 - notice that the velocity here used to derive the acceleration must have the vector notation

- derivation obtained by consider isosceles triangle and take ratio for similar triangle. Cord approximate to arc and obtain the answer under the consideration of small amount of time
- Centripetal force
 - $F = \frac{mv^2}{r} = mr\omega^2$
 - tension changes during rotation vertically
 - at the top, $T + mg = \frac{mv^2}{r}$
 - at the bottom, $T - mg = \frac{mv^2}{r}$
- Energy & Work
 - Work = 0
 - Energy not used
 - $W = Fd \cos \theta$ since the direction of movement is always perpendicular so no work is done, hence no energy is used
- Origin of centripetal force
 - resolving the vector results in two direction of force, and that will be one which provide centripetal force

Oscillations

Definition

Gravitational Fields

Electric Fields

Magnetic Fields

Electromagnetism

Alternative Current

Capacitance

Electronics

Thermodynamics

Communication

Quantum Physics

Nuclear Physics

Medical Imaging

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