Circular Motion

Centripetal Force

Centripetal force is a force that makes an object follow a curved path: it always directs orthogonally to the velocity of the object, toward the instantaneous center of the curvature of the path.

T= $\frac{2πR}{v}$ $T= \frac{2πv}{a}$ a=$\frac{V^{2}}{R}$ $F\_{Centripetal }=m$a = m$\frac{V^{2}}{R}$



Vertical Circular Motion



For object at the top (A), $F\_{Centripetal }$= m$\frac{V^{2}}{R}$ =mg + $T\_{top}$

For object at the bottom (C), $F\_{Centripetal }$= m$\frac{V^{2}}{R}$ = $T\_{bottom}$ - mg

Horizontal Circular Motion

Examples of circular motion include:

\*An artificial satellite orbiting the Earth at a constant height

 $F\_{Centripetal }$= $\frac{GMm}{R^{2}}$ = m$\frac{V^{2}}{R}$



 M is the earth’s mass =6.0 x $10^{24}$ kg G=

 \*A stone that is tied to a rope and is being swung in circles



 T cos(θ)= mg

 T sin(θ) = $F\_{Centripetal }$= m$\frac{V^{2}}{R}$

 \*A car turning through a curve in a [race track](https://en.wikipedia.org/wiki/Race_track)



 N sin(θ) =mg

 N sin(θ) = $F\_{Centripetal }$= m$\frac{V^{2}}{R}$

\*An electron moving perpendicular to a uniform [magnetic field](https://en.wikipedia.org/wiki/Magnetic_field)



 $V\_{normal to B}$ = V cos($θ)$ $V\_{paralel to B}$ = V sin($θ)$

 $F\_{Centripetal }$= q V cos($θ)$ x B =m$\frac{(Vcos\left(θ\right) )^{2}}{R}$

 R = $\frac{qV cos(θ)}{B}$

 Pitch = V sin($θ)$ x T = V sin($θ)$ X $ \frac{2πR}{ V cos(θ) }= 2πR tan(θ) $

\*Bohr Model



 $F\_{Centripetal }$= k$\frac{q^{2}}{r^{2}}$ = m$\frac{V^{2}}{R}$

 Mass of electron = 9 x $10^{-31 } kg$