Circular motion

Angular velocity(omega)

Omega = (deltatheta)/(delta t)

Linear velocity V= (ds)/(dt)

V = romega

Angular acceleration(alpha) = (domega)/(dt)

Linear acceleration along circle

Tangential acceleration (a\_{t}) = (d|v|)/(dt)

It is the component of acceleration responsible for linear speed

Speed = constant a\_{t} = 0

The component of linear acceleration towards centre or in radial direction is called centripetal acceleration it is responsible for change in direction of linear velocity

a\_{r} = v^2/r = r omega^2

these two components are mutually perpendicular so net linear acceleration is vector sum

a= sqrt(a\_{t}^2 +a\_{r}^2)

tantheta = a\_{r}/a\_{t}

three types of circular motion

1. Uniform circular motion v and omega are constant so a= a{r}
2. Accelerated circular motion v and omega increasing so, a\_{t} is in direction of v and alpha in direction of omega  
   a = sqrt(a\_{t}^2 + a\_{r}^2)

v

a\_{t}

a

a\_{r}

1. Retarding circular motion v and omega decreasing a\_{t} is in the opposite direction of v and alpha is in opposite of omega

Omega is perpendicularpaper inward , alpha is perpendicular to paper outward in circular motion, if alpha = constant

Omega = omega\_{0} + alphat

Omega^2 – omega\_{0}^2 = 2alphatheta

Theta = omega\_{0}t +1/2 alphat^2

For remembering – omega =v, omega\_{0} = u

If alpha not equal to constant

Omega = (dtheta)/(dt) alpha = (domega)/(dt)

On any curve path a= sqrt(a\_{t}^2 + a\_{r}^2)

Omega = r\_{ꓕ} \*v

Alpha = r\_{ꓕ} \* a

Friction and banking

V = sqrt(rg tantheta) = sqrt(murg) mu = tantheta

If vehicle at rest friction is upward

If v > sqrt(rg tantheta) friction is downward

If v < sqrt(rg tantheta) friction is upward

If v = sqrt(rg tantheta) friction = 0

Centripetal force

Centrifugalo force

Vertical circle