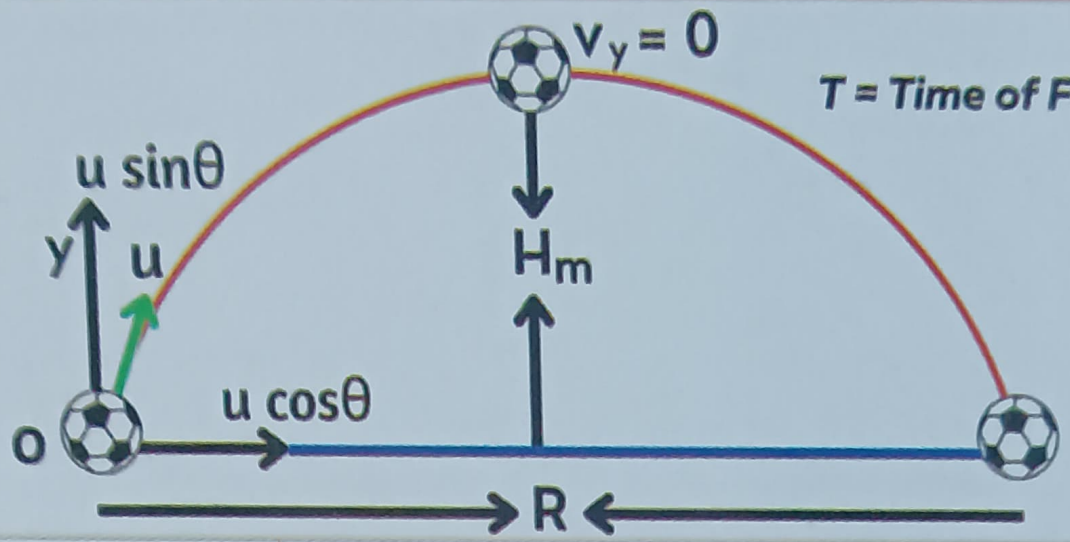
Projectile Motion



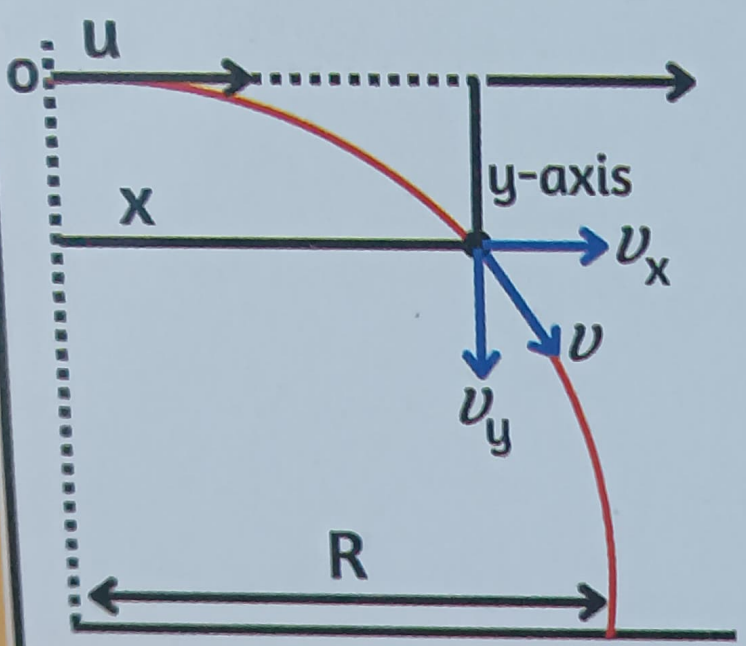
Time of Flight	Maximum Height	Horizontal Range
$T = \frac{2u\sin\theta}{g}$	$H = \frac{u^2\sin^2\theta}{2g}$	$R = \frac{u^2\sin 2\theta}{g}$

Equation of Trajectory

θ = angle of an projectile with horizontal

$$y = x\tan\theta\left[1 - \frac{x}{R}\right]$$

Horizontal Projectile Motion



Time of flight,

$$T = \sqrt{\frac{2H}{g}}$$

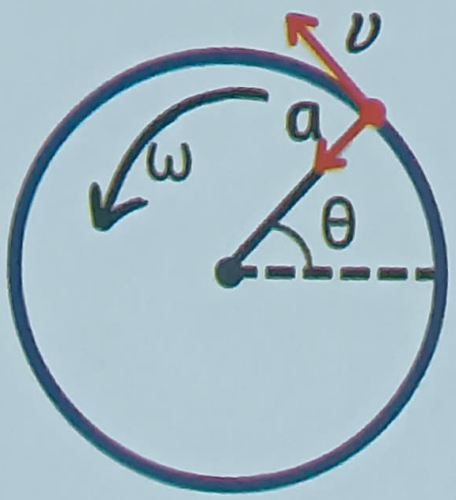
Horizontal range,

$$R = u\sqrt{\frac{2H}{g}}$$

Velocity of projectile after t,

$$vt = \sqrt{u^2 + (gt)^2}$$

Circular motion



Angular Displacement

$$\Delta\theta = \frac{\Delta s}{r}$$

Angular Acceleration

$$\alpha = \lim_{\Delta t \to 0} \frac{\Delta\omega}{\Delta t}$$

$$a = r\alpha \; ; \; \alpha = \frac{v^2}{r}$$

Angular Velocity

$$\omega = \frac{\Delta\theta}{\Delta t} \; ; \; v = r\omega$$

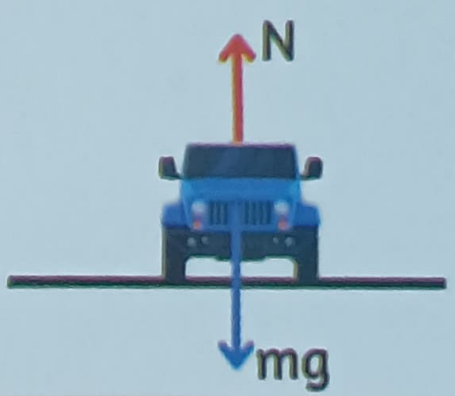
Centripetal Force

$$F = \frac{mv^2}{r} = mr\omega^2$$

Motion of Car on a Level Road.

$$v^2 \leq \mu_s R g$$

$$v_{max} = \sqrt{\mu_s R g}$$



Maximum Speed of the vehicle for a safe turn on a banked road

$$v_{max} = \sqrt{\frac{rg(\tan\theta + \mu_s)}{(1 - \mu_s \tan\theta)}}$$