

## PROJECTILE MOTION & VECTORS

**Time of flight :**  $T = \frac{2u \sin \theta}{g}$

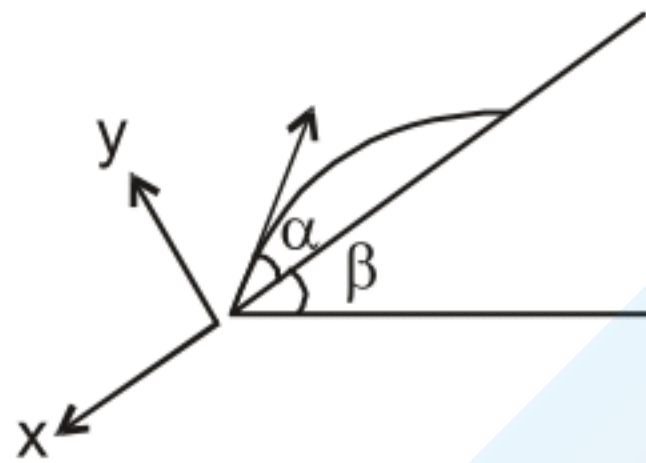
**Horizontal range :**  $R = \frac{u^2 \sin 2\theta}{g}$

**Maximum height :**  $H = \frac{u^2 \sin^2 \theta}{2g}$

**Trajectory equation (equation of path) :**

$$y = x \tan \theta - \frac{gx^2}{2u^2 \cos^2 \theta} = x \tan \theta \left(1 - \frac{x}{R}\right)$$

**Projection on an inclined plane**



	<b>Up the Incline</b>	<b>Down the Incline</b>
<b>Range</b>	$\frac{2u^2 \sin \alpha \cos(\alpha + \beta)}{g \cos^2 \beta}$	$\frac{2u^2 \sin \alpha \cos(\alpha - \beta)}{g \cos^2 \beta}$
<b>Time of flight</b>	$\frac{2u \sin \alpha}{g \cos \beta}$	$\frac{2u \sin \alpha}{g \cos \beta}$
<b>Angle of projection with inclined plane for maximum range</b>	$\frac{\pi}{4} - \frac{\beta}{2}$	$\frac{\pi}{4} + \frac{\beta}{2}$
<b>Maximum Range</b>	$\frac{u^2}{g(1 + \sin \beta)}$	$\frac{u^2}{g(1 - \sin \beta)}$