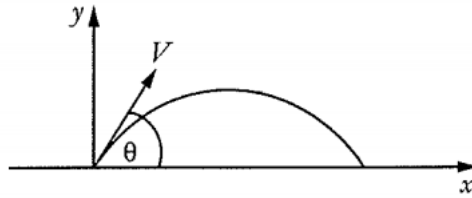


1. Proofs of Projectile Motion

➤ Proof



Given $a = -g\mathbf{j}$

a) show $v(0) = V \cos \theta \mathbf{i} + V \sin \theta \mathbf{j}$

b) show $v(t) = V \cos \theta \mathbf{i} + (V \sin \theta - gt)\mathbf{j}$

c) show $r(t) = V \cos \theta t \mathbf{i} + (V \sin \theta t - \frac{1}{2}gt^2)\mathbf{j}$

d) show the cartesian form is given $y = x \tan \theta - \frac{gx^2}{2V^2 \cos^2 \theta}$

e) show the greatest height of the projectile is given $y = \frac{V^2 \sin^2 \theta}{2g}$

f) Hence, show the maximum possible height if the angle can vary is $\frac{V^2}{2g}$

g) show the greatest height of the projectile occurs at $x = \frac{v^2 \sin 2\theta}{2g}$

h) show the time of flight of the projectile is given $t = \frac{2v \sin \theta}{g}$

i) show the range of flight of the projectile is given $x = \frac{v^2 \sin 2\theta}{g}$

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