5.3 General Launch Angle Projectiles

LEARNING TARGETS

5.3 I can interpret, analyze, and calculate the motion of a general launch angle projectile.

PROJECTILE MOTION

Zero Launch Angle Projectiles

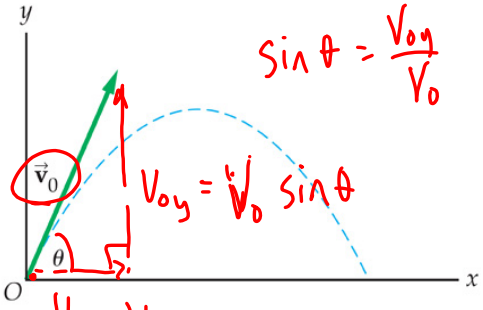
$V_{oy} = 0$

$x_f = V_{ox} t$

$t = \sqrt{\frac{2h}{g}}$

$a_x = 0$ $a_y = g$

General Launch Angle



$\sin\theta = \frac{V_{oy}}{V_0}$

$V_{oy} = V_0 \sin\theta$

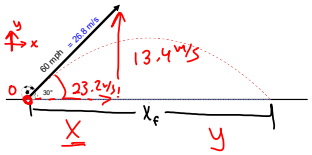
$V_{0x} = V_0 \cos\theta$

How Far?

If a soccer player kicks a ball 60.0-mph at an angle of 30° above the ground, how far will it travel before it hits the ground?

How Far? $1\ m/s = 2.24\ mph$

If a soccer player kicks a ball 60.0-~~mph~~ at an angle of 30° above the ground, how far will it travel before it hits the ground?



x	y
$x_0 = 0$	$y_0 = 0$
$a_x = 0$	$a_y = -9.8\ m/s^2$
$V_{0x} = 23.2\ m/s$	$V_{oy} = 13.4\ m/s$
$x_f = ?$	$y_f = 0$

$x_f = V_{0x} t = (23.2\ m/s)(2.73\ s)$

$x_f = 63\ m$

$y_f = y_0 + V_{oy} t + \frac{1}{2} a_y t^2$

$0 = V_{oy} t + \frac{1}{2} a_y t^2$

$0 = t\left(V_{oy} + \frac{1}{2} a_y t\right)$

$t = 0$ or 0

$V_{oy} + \frac{1}{2} a_y t = 0$

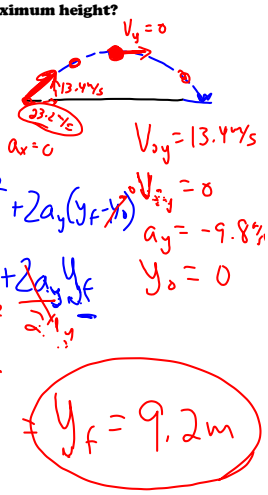
$-V_{oy}$

$\frac{1}{2} a_y$

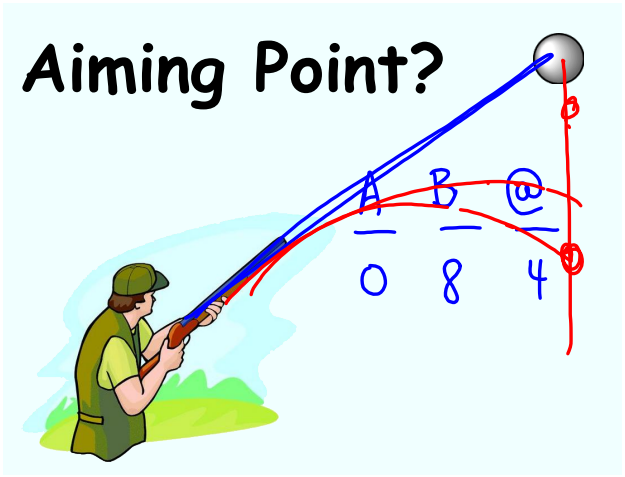
$t = \frac{-2V_{oy}}{a_y} = 2.73\ s$

How High?

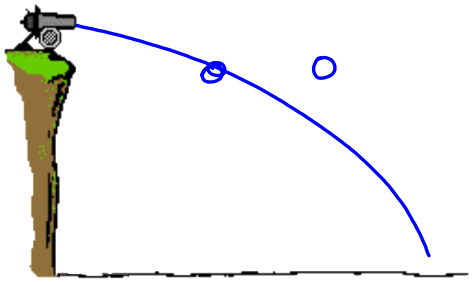
If a soccer player kicks a ball 60.0-mph at an angle of 30° above the ground, what is the balls maximum height?



Aiming Point?



Aiming Point?



Monkey and the Hunter