

5.3

General Launch Angle Projectiles

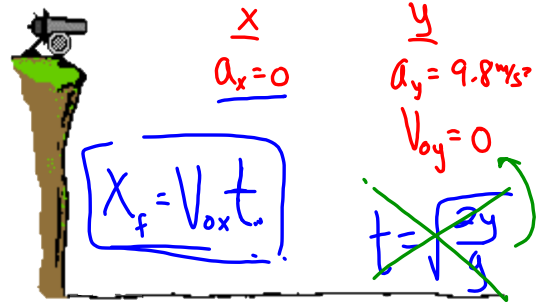
LEARNING TARGETS

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

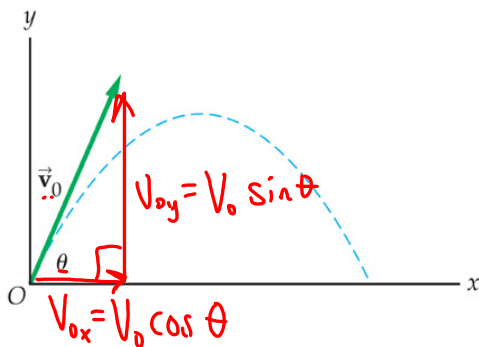


PROJECTILE MOTION

Zero Launch Angle Projectiles



General Launch Angle

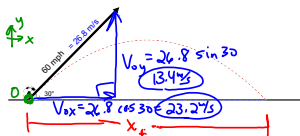


How Far?

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? $1 \text{ mph} = 2.24 \text{ m/s}$
 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?



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

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

$$x_f = 63 \text{ m}$$

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

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

$$0 = t (V_{0y} + \frac{1}{2} a_y t)$$

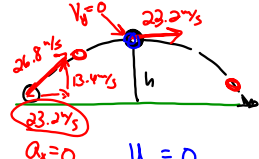
$$0 = V_{0y} + \frac{1}{2} a_y t$$

$$-\frac{V_{0y}}{\frac{1}{2} a_y} = -V_{0y} \cdot \frac{2}{a_y}$$

$$t = \frac{-2V_{0y}}{a_y} = 2.73 \text{ s}$$

How High?

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



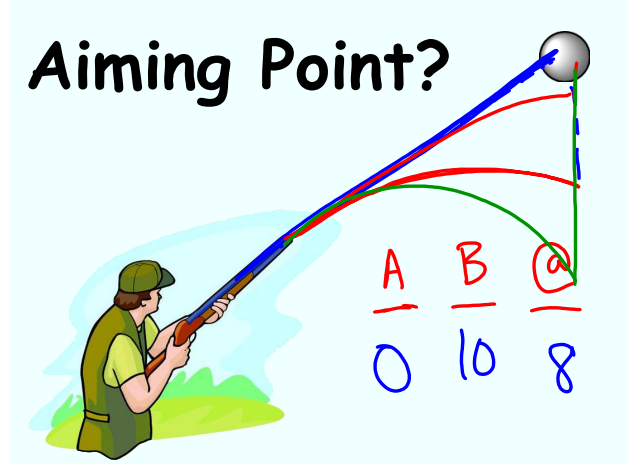
$$V_{fy} = V_{oy} + 2a_y(y_f - y_o)$$

$$0 = V_{oy}^2 + 2a_y y_f$$

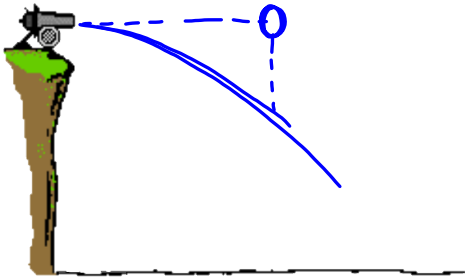
$$\frac{-V_{oy}^2}{2a_y} \Rightarrow y_f = 9.2 \text{ m}$$

$a_x = 0$ $y_o = 0$
 $V_{oy} = 30.0 \text{ m/s}$ $V_{fy} = 0$
 $a_y = -9.8 \text{ m/s}^2$

Aiming Point?



Aiming Point?



Monkey and the Hunter



HOMEWORK

Unit 5 Problems
(10-14)