Projectile Motion

2nd video

$v_x = v_{x,i} = v_i \cos\theta = constant$ $\Delta x = (v_i \cos\theta)\Delta t$ $v_{y,f} = v_i \sin\theta + a_y \Delta t$

$v_{y,f}{}^2 = v_i{}^2 (\sin\theta)^2 + 2a_y \Delta y$ $\Delta y = (v_i \sin\theta)\Delta t + \frac{1}{2} a_y (\Delta t)^2$

Practice

A projectile is launched with at an angle of 35° above the horizontal and lands 26 meters away.

a. What is the initial speed?

b. What is the max height reached?

Givens

Δy =_____

g = -9.8 m/s^2

v_i = _____

Δx = 26 m

° = 35 °

$v_x = v_{x,i} = v_i \cos\theta = constant$ $\Delta x = (v_i \cos\theta)\Delta t$ $v_{y,f} = v_i \sin\theta + a_y \Delta t$

$v_{y,f}{}^2 = v_i{}^2 (\sin\theta)^2 + 2a_y \Delta y$

Practice

$\Delta y = (v_i \sin\theta)\Delta t + \frac{1}{2} a_y (\Delta t)^2$

A projectile is launched with at an angle of 35° above the horizontal and lands 26 meters away.

a. What is the initial speed?
b. What is the max height reached?

Givens
Δy =_____
g = -9.8 m/s^2
v_i = 16.51 m/s
Δx = 26 m
° = 35 °

$v_x = v_{x,i} = v_i \cos\theta = constant$ $\Delta x = (v_i \cos\theta)\Delta t$ $v_{y,f} = v_i \sin\theta + a_y \Delta t$

$v_{y,f}{}^2 = v_i{}^2 (\sin\theta)^2 + 2a_y \Delta y$

Practice

$\Delta y = (v_i \sin\theta)\Delta t + \frac{1}{2} a_y (\Delta t)^2$

A projectile is launched with at an angle of 40° above the horizontal and an initial speed of 6.44 m/s. If the projectile is in the air for 1.33 seconds, what is…

a. the horizontal displacement?
b. Vertical displacement?

Givens
Δy =_____
g = -9.8 m/s^2
v_i = 6.44 m/s
Δx = _____
° = 40 °
Δt = 1.33 s