11.7 Parametric Applications

Essential Question

How can I use parametric equations to solve projectile motion problems?

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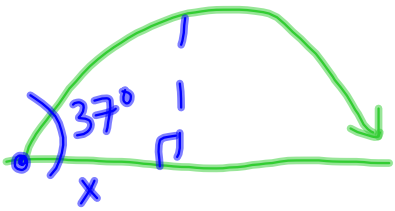
Projectile Motion

1. A cannon shoots from the ground at an angle of 37° with an initial velocity of 300 ft/sec. Write a set of parametric equations to model the situation.



$x = 300\cos(37°)t$

$y = 300\sin(37°)t - 16t^2$

f: $16t^2$

m: $9.8t^2$

When is the cannonball 500 feet away? hz

$\frac{500}{300\cos 37} = \frac{300\cos(37)t}{300\cos 37}$

$t \approx 2.18$ sec

What if the cannon is 4 feet above the ground? changes y

$x = 300\cos(37)t$

$y = 300\sin(37)t - 16t^2 + 4$

What if there is a wind of 10 ft/sec behind (with) the cannonball? changes x

$x = 300\cos(37)t + 10t$

$y = 300\sin(37)t - 16t^2 + 4$

There is a wall 2500 feet away with a height of 120 feet. Does the cannonball clear the wall?

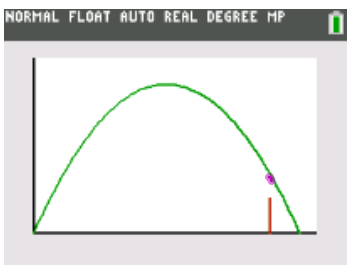
wall $x = 2500$

$y = 12t$

$t_{max}: 10$

$y = 10t$

$t_{max}: 12$



yes!