Algebra 1 Unit 6: Quadratic Functions Notes

# Day 6: Applications of Quadratics

| If you are solving for the vertex: | If you are solving for the zeros: |
|---|---|
| -Maximum/Minimum (height, cost, etc) | -How long did it take to reach the ground? |
| -Greatest/Least Value | -How long is an object in the air? |
| -Maximize/Minimize | -How wide is an object? |
| -Highest/Lowest | -Finding a specific measurement/dimension |

*1. Suppose the flight of a launched bottle rocket can be modeled by the equation $y = -x^2 + 6x$, where y measures the rocket's height above the ground in meters and x represents the rocket's horizontal distance in meters from the launching spot at x = 0.*

a. How far has the bottle rocket traveled horizontally when it reaches it maximum height? What is the maximum height the bottle rocket reaches?

$y = -x^2 + 6x + 0$

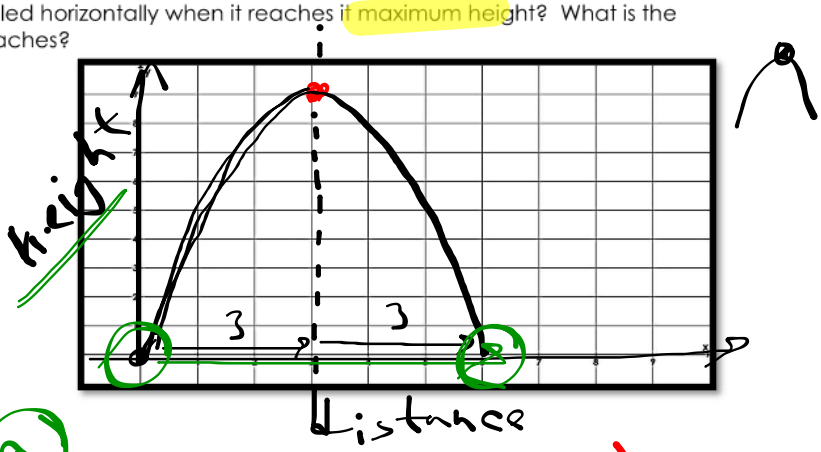
$a: -1$ $b: 6$ $c: 0$

$x = \frac{-b}{2a}$

$x = \frac{-6}{2(-1)} = 3$

$y = -(3)^2 + 6(3)$

$y = -9 + 18 = 9$




VERTEX: (3, 9)

b. When is the bottle rocket on the ground? How far does the bottle rocket travel in the horizontal direction from launch to landing?

3m + 3m = 6m

24

Algebra 1 Unit 6: Quadratic Functions Notes

2. A frog is about to hop from the bank of a creek. The path of the jump can be modeled by the equation $h(x) = -x^2 + 4x + 1$, where h(x) is the frog's height above the water and x is the number of seconds since the frog jumped. A fly is cruising at a height of 5 feet above the water. Is it possible for the frog to catch the fly, given the equation of the frog's jump?

$h(x) = -x^2 + 4x + 1$

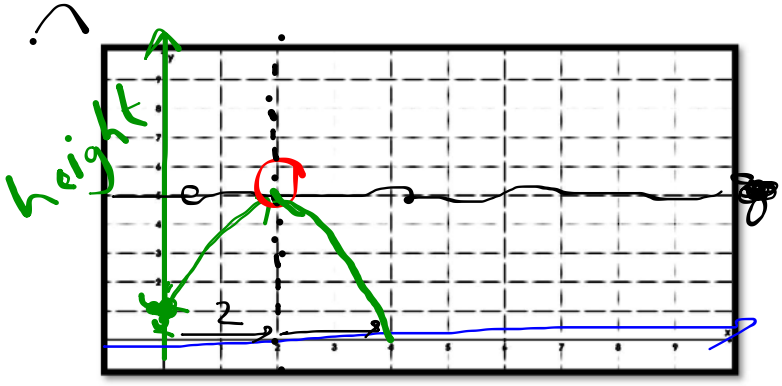
a: -1
b: 4
c: 1

$x = \frac{-4}{2(-1)} = 2$

$y = -(2)^2 + 4(2) + 1$

$y = -4 + 8 + 1 = 5$

(2, 5) height




b. When does the frog land back in the water?

approx 4 sec

c. When will the frog be 3 feet in the air?

$y = -x^2 + 4x + 1$

$3 = -x^2 + 4x + 1$

$-3 \quad -3$

$0 = -x^2 + 4x - 2$

a: -1
b: 4
c: -2

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{-4 \pm \sqrt{16 - 4(-1)(-2)}}{2(-1)}$

25

# Quadratic Keywords