Simplify: $\frac{-7 \pm \sqrt{98}}{14}$

98
$2 \quad 49$
$7 \quad 7$

$\frac{-7 \pm \sqrt{2 \cdot 7 \cdot 7}}{14}$

$\frac{(-7 \pm 7\sqrt{2}) \div 7}{14 \div 7} = \frac{-1 \pm 1\sqrt{2}}{2}$

Algebra 1 Unit 9 - Quadratic Equations Notes

Day 10: Applications of Quadratics

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

3ft 9ft

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

max height = VERTEX

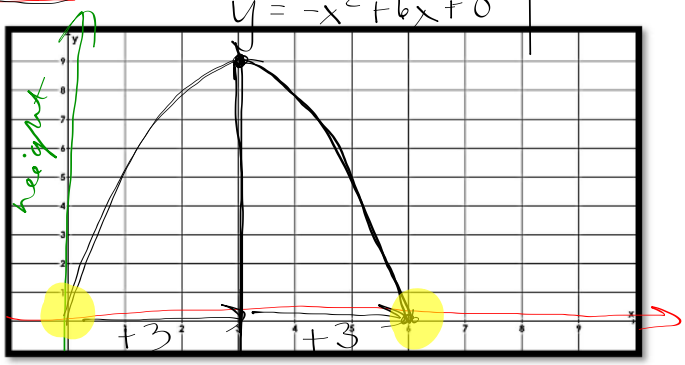
$x = \frac{-b}{2a} = \frac{-6}{2(-1)} = 3$

a: -1
b: 6
c: 0

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

$y = -9 + 18$

$y = 9$



(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?

y=0

$0 = -x^2 + 6x$

a = -1
b = 6
c = 0

$b^2 - 4ac = (6)^2 - 4(-1)(0) = 36$

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

$x = \frac{-6 \pm \sqrt{36}}{2(-1)}$

$\frac{-6+6}{-2} = \frac{0}{-2} = 0$

$\frac{-6-6}{-2} = \frac{-12}{-2} = 6$

x = 0, x = 6

Algebra 1 Unit 9 - Quadratic Equations Notes

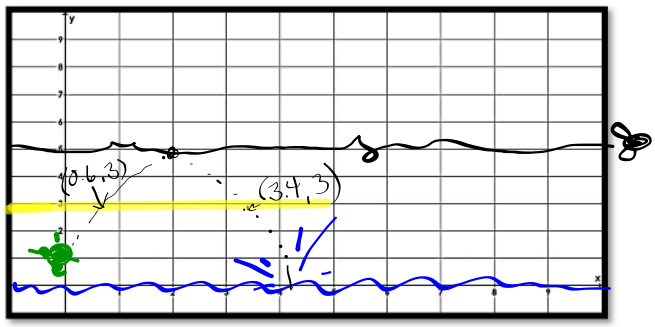
2. A frog is about to hop from the bank of a creek. The path of the jump can be modeled by the equation $h(x) = -x^2 + 4x + 1$, where h(x) is the frog's height above the water and x is the number of seconds since the frog jumped. A fly is cruising at a height of 5 feet above the water. Is it possible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

y-int

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

a: -1
b: 4
c: 1

$y = -(2)^2 + 4(2) + 1$
$y = -4 + 8 + 1$
$y = 5$



(2, 5)

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

$x = \frac{-b \pm \sqrt{\quad}}{2a}$

$b^2 - 4ac = 4^2 - 4(-1)(1) = 20$

$x = \frac{-4 \pm \sqrt{20}}{2(-1)}$

$\frac{-4 + \sqrt{20}}{-2} = \frac{.47}{-2} = -0.2$

$\frac{-4 - \sqrt{20}}{-2} = \frac{-8.4}{-2} = 4.2$

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

$x = \frac{-b \pm \sqrt{\quad}}{2a}$

$b^2 - 4ac = 4^2 - 4(-1)(-2) = 16 - 8 = 8$

$x = \frac{-4 \pm \sqrt{8}}{-2}$

$\frac{-4 + \sqrt{8}}{-2} = 0.58$

$\frac{-4 - \sqrt{8}}{-2} = 3.4$