

$$D: t \geq 0$$

$$R: 0 \leq y \leq \text{max}$$

$$y_1 = x^2 - 4x + 8$$

$$a = 1$$

$$y_2 = 4x^2 - 4x + 8$$

$$a = 4 \quad \text{skinny}$$

$$y_3 = .25x^2 - 4x + 8$$

$$a = .25 \quad \text{fat?}$$

LESSON 4-2 Solving Quadratic Equations by Graphing

I can... determine how many solutions a function has and find the value of those solution/roots/zeros by graphing.

Quadratic equations - quadratic function that is set to a value.

Standard form: $ax^2 + bx + c = 0$

$a \neq 0$, and a, b and c are integers

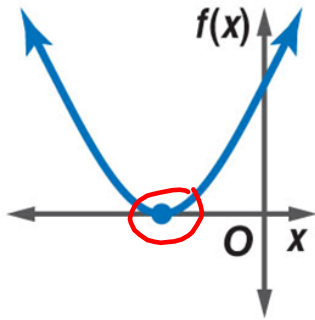
Solutions are called **roots**. A method to find roots is to find the **zeros**. These words are interchangeable.

Zeros are the x-intercepts of the graph.

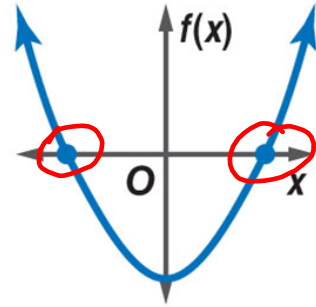
The x-axis is the line $y=0$.

Types of Solutions

Determined by # of times it crosses the x-axis



one real solution



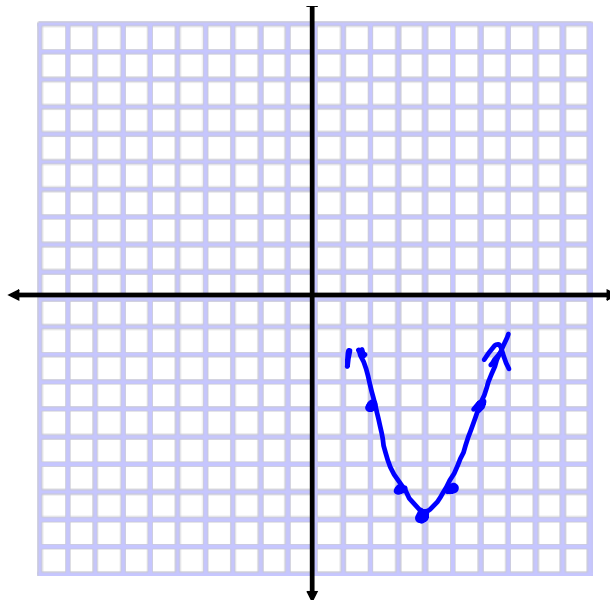
two real solutions



TWO IMAGINARY SOLUTIONS

no real solution

Does this graph have solutions?



How many solutions? What are the solutions?

2 solutions $(1,0)$ $(-3,0)$ $x=1$ $x=-3$

Equation in factored form:

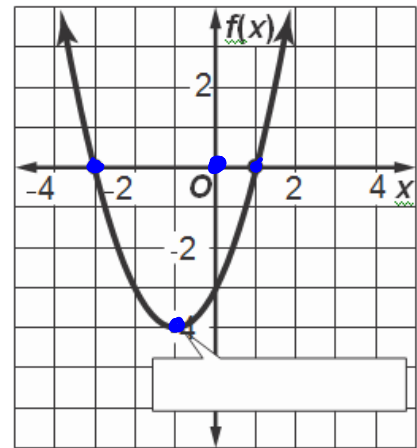
$$y = (x-1)(x+3)$$

Equation in standard form:

$$y = x(x+3) - 1(x+3)$$

$$y = x^2 + 3x - x - 3$$

$$y = x^2 + 2x - 3$$



How many solutions? What are the solutions?

One Solution $(-3,0)$ $x=-3$

Equation in factored form:

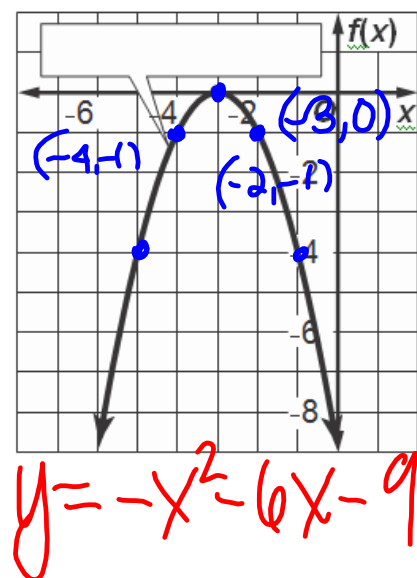
$$y = -(x+3)(x+3)$$

Equation in standard form:

$$y = -(x(x+3) + 3(x+3))$$

$$x^2 + 3x + 3x + 9$$

$$y = -(x^2 + 6x + 9)$$



$$y = -x^2 - 6x - 9$$

1. Solve $x^2 + 6x + 8 = 0$ by graphing. Check.

$$a=1 \quad b=6 \quad c=8 \quad (-3, -1)$$

$$(0, 8) \quad x = \frac{-b}{2a} = \frac{-6}{2} = -3$$

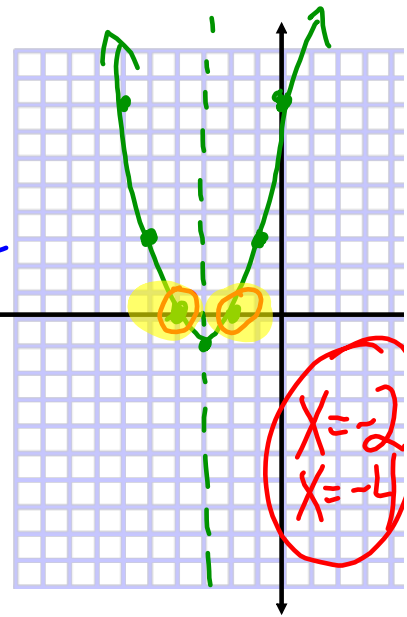
$$f(-3) = (-3)^2 + 6(-3) + 8$$

$$9 - 18 + 8 = -1$$

$$f(-2) = 4 - 12 + 8 = 0$$

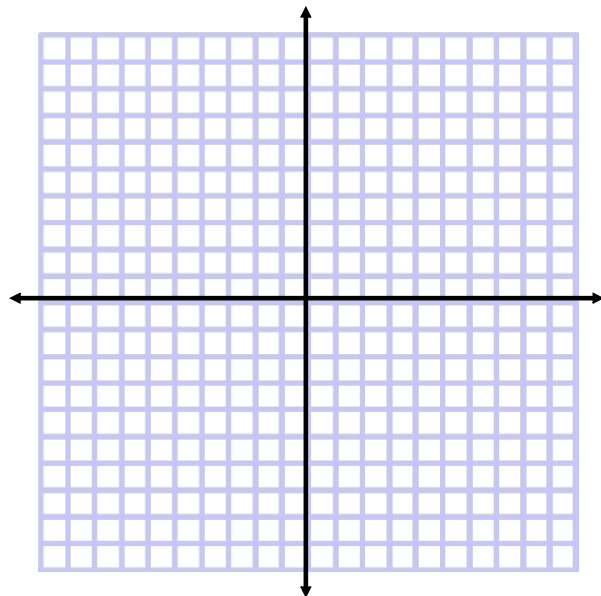
$$f(-1) = 1 - 6 + 8 = 3$$

x	y
-5	3
-4	0
-3	-1
-2	0
-1	3



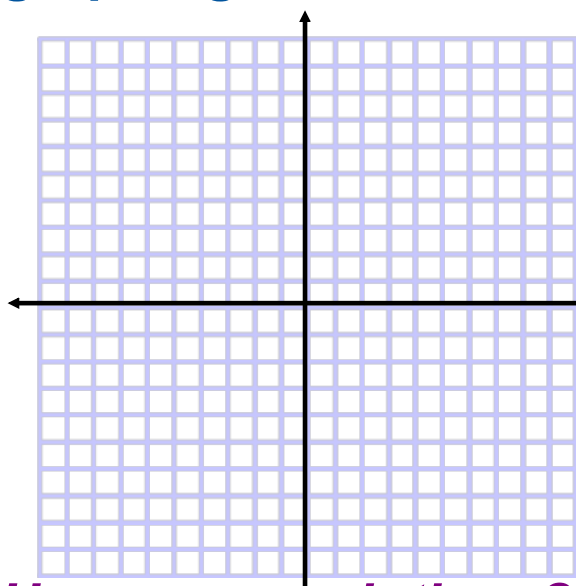
How many solutions??

2. Solve $x^2 + 2x - 3 = 0$ by graphing. Check.



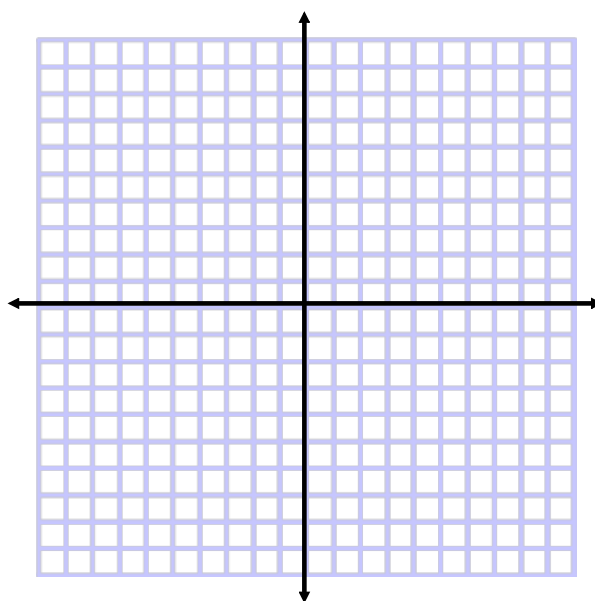
How many solutions??

3. Solve $x^2 - 6x = -9$ by graphing. Check.



How many solutions??

5. Solve $-x^2 + 4x - 1 = 0$ by graphing. Check.



How many solutions??

6. **BASEBALL** Nolan throws a baseball with an upward velocity of 96 feet per second. Ignoring his height how long will it take the ball to reach the ground?

Use the formula $h(t) = v_0t - 16t^2$, where t is the time in seconds and v_0 is the initial velocity in feet per second.

Homework 4.2

WS

Pg 233 #13,38,54