4.1 Solving by graphing

Tuesday, October 17, 2023 10:26 AM

$y = ax^2 + bx + c$

Pre-Calc 11 Name: _____ (1) Block: _____

(2) factoring

(3) complete the square & square root principle

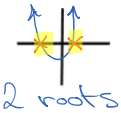
(4) quadratic formula

4.1 Solving Quadratic Equations Graphically

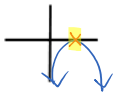
You can solve a ***Quadratic Equation*** of the form $0 = ax^2 + bx + c$ by graphing the corresponding quadratic function $f(x) = a(x-p)^2 + q$. The ***solutions*** to a quadratic equation are called the ***roots*** of the equation. You can find the roots of a quadratic equation by determining the x-intercepts of the graph, also called the ***zeros*** of the corresponding quadratic function.

A quadratic equation can have three outcomes:

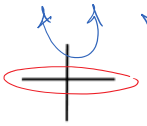
- Two roots
- One root
- No roots



2 roots



1 root



No solution / no roots.

Solve graphically and check your roots/solutions.

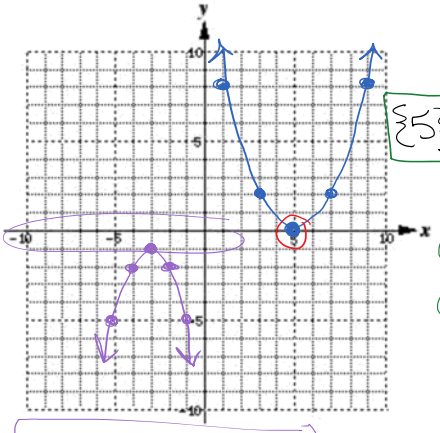
Steps Graphing:

1) plot vertex (5,0)

2) follow Avg Joe multiply the "up" by "a"

$f(x) = \frac{1}{2}(x-5)^2$, $f(x) = 0$

x	y
1	$\frac{1}{2}(1) = \frac{1}{2}$
2	$\frac{1}{2}(4) = 2$
3	$\frac{1}{2}(9) = \frac{9}{2}$
4	$\frac{1}{2}(16) = 8$



{5}

Check $x = 5$

$0 = \frac{1}{2}(x-5)^2$

$0 = \frac{1}{2}(5-5)^2$

$0 = \frac{1}{2}(0)^2$

$0 = 0$ ✓

$0 = -(x+3)^2 - 1$

vertex $(-3,-1)$

$a = -1$ Avg Joe upside down.

→ doesn't cross x-axis: No solution

Solve graphically and check your roots/solutions.

$0 = -x^2 + 6x - 9$

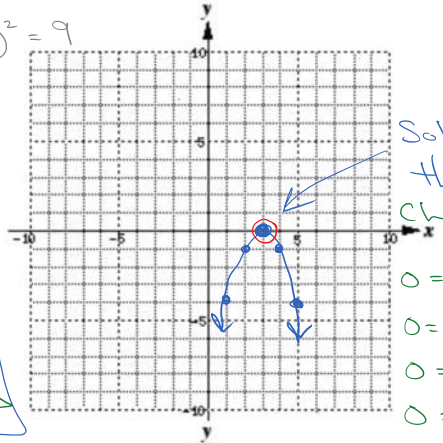
$\left(\frac{-6}{2}\right)^2 = (-3)^2 = 9$

$0 = -1(x^2 - 6x + 9 - 9)$ (+9, −9)

$0 = -(x - 3)^2$

vertex (3, 0)

$a = -1$



Solution is the x-int.

{3}

x = 3

Check x = 3

$0 = -x^2 + 6x - 9$

$0 = -(3)^2 + 6(3) - 9$

$0 = -9 + 18 - 9$

$0 = 0$ ✓

$\frac{-2}{-1} \cdot \frac{-4}{-4}$

$\left(\frac{1}{4}x^2 - 2x\right) + 3 = 0$

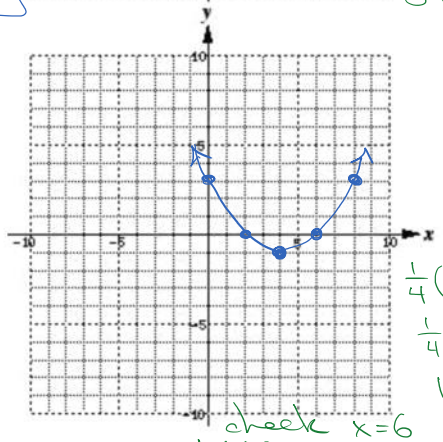
$\frac{1}{4}(x^2 - 8x + 16 - 16) + 3 = 0$ (−4, +16)

$\frac{1}{4}(x - 4)^2 - 1 = 0$

vertex (4, −1)

$a = \frac{1}{4}$

x	y
2	$\frac{1}{4}(2-4)^2 - 1 = -1$
3	$\frac{1}{4}(3-4)^2 - 1 = -\frac{3}{4}$
4	$\frac{1}{4}(4-4)^2 - 1 = -1$
5	$\frac{1}{4}(5-4)^2 - 1 = -\frac{3}{4}$
6	$\frac{1}{4}(6-4)^2 - 1 = 0$



{2, 6}

Check x = 2

$\frac{1}{4}(2)^2 - 2(2) + 3 = 0$

$\frac{1}{4}(4) - 4 + 3 = 0$

$1 - 4 + 3 = 0$

$0 = 0$ ✓

check x = 6

$\frac{1}{4}(6)^2 - 2(6) + 3 = 0$

$9 - 12 + 3 = 0$

$0 = 0$ ✓

Practice on graph paper: p215 #1, 2, 3bef, 4cf

when vertex isn't whole/integer #'s then use DESMOS.