Warm-Up

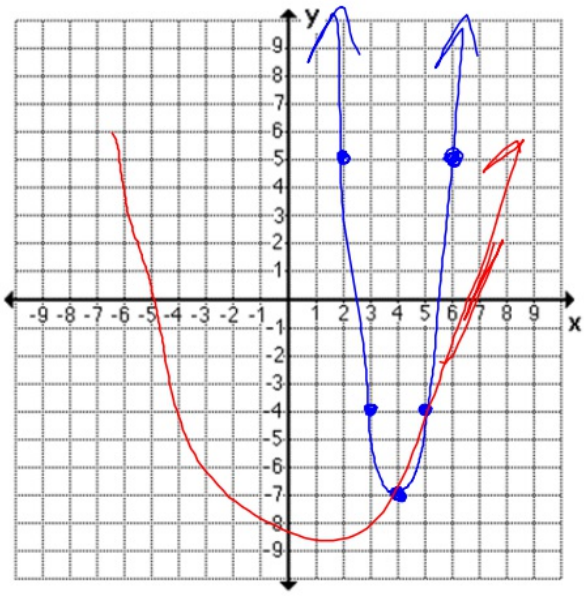
Do this on the back of yesterday's Classwork

Graph and label the parts of:

$f(x) = 3(x-4)^2 - 7$

Example :

$$f(x) = 3(x-4)^2 - 7$$



Vertex: $(4,-7)$

AOS: $x = 4$

Y-Int: $(0,41)$

Points:

X-Int: $(2.47,0)\ (5.53,0)$

Zeros:

$0 = 3(x-4)^2 - 7$

$+7 \qquad +7$

$\frac{7}{3} = \frac{3(x-4)^2}{3}$

$\sqrt{\frac{7}{3}} = \sqrt{(x-4)^2}$

$\pm\sqrt{\frac{7}{3}} = x - 4$

$+4 \qquad +4$

$4 \pm \sqrt{\frac{7}{3}} = x$

$4 \pm \frac{\sqrt{7}}{\sqrt{3}}\frac{\sqrt{3}}{\sqrt{3}} = 4 \pm \frac{\sqrt{21}}{3}$

$x = 7, 5$

Solutions

- Also Called "Roots" or "Zeros"

- Can be found by:
  - Factoring
  - Taking square roots
  - Quadratic Formula
  - Completing the square
  - Graphing (X-Intercepts)

Objective

Today we will:

Solve Quadratic Equations by Completing the Square

Completing the Square

Method used for:

- Solving Quadratic Equations
- Converting from standard Form to Vertex Form

Steps

1) Move C to other side $(ax^2 + bx = c)$
2) Create a new C value by using $\left(\frac{b}{2}\right)^2$
3) Make sure to add this to both sides!!
4) Factor left side
5) Solve by taking square roots

Ex. 1) $b^2 - 14b + 50 = 10$

$-50 \quad -50$

$b^2 - 14b = -40$

$b^2 - 14b + 49 = -40 + 49$

$\sqrt{(b-7)^2} = \sqrt{9}$

$b - 7 = \pm 3$

$b = 7 \pm 3$

$b = 10, \; b = 4$

$\left(\frac{b}{2}\right)^2$

$\left(\frac{-14}{2}\right)^2$

$(-7)^2$

49

$f(x) = r^2 + 4r - 16$

Ex. 2) $r^2 + 4r - 25 = -9$

$+25 \quad +25$

$r^2 + 4r = 16$

$r^2 + 4r + 4 = 16 + 4$

$(r+2)^2 = \sqrt{20}$

$r + 2 = \pm\sqrt{20}$

$r = -2 \pm \sqrt{4}\sqrt{5}$

$\boxed{r = -2 \pm 2\sqrt{5}}$

-6.47

2.47

$\left(\frac{b}{2}\right)^2$

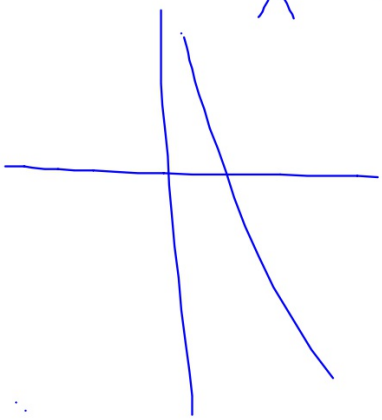
$\left(\frac{4}{2}\right)^2$

$(2)^2$

4

Ex. 3) $x^2 - 18x + 50 = 5$

$x^2 - 18x = -45$



$x = 3 \quad x = 15$

Ex 4) $v^2 - 10v - 28 = 7$

Ex. 5 $2n^2 + 16n + 17 = -2$

Ex. 6 $b^2 - 12b - 71 = -7$

Wrap Up

What are the 4 ways to Solve Quadratic Equations?

What else do we use Completing the Square for?

What do we add to both sides when CTS?