U2 Day 9 - Completing the Square

SWBAT: _____

Some quadratics cannot be factored. Oh no! What can we do to solve them?? We can "fix" the equation by completing the square!

Remember quadratic trinomials? $ax^2 + bx + c = 0$

1) *a* MUST BE EQUAL TO 1! For example: $x^2 - 4x + 2 = 0$ $a = 1$

2) MOVE THE CONSTANT TO THE OTHER SIDE! $x^2 - 4x + 2 = 0$

Leave room for *plus the magic number*: $x^2 - 4x + \underline{4} = -2 + 4$

3) FIND HALF OF b and put it in the factored form! $(x - 2)^2 = 2$

b = -4 so $\frac{b}{2} = -2$ Drop it in the $(x \quad)^2$
Square it and add it to both sides.

4) TAKE THE SQRT of both sides and solve for *x* = # $\sqrt{(x-2)^2} = \pm\sqrt{2}$

Don't forget the ±

$x - 2 = \pm\sqrt{2}$

The End! $x = 2 \pm \sqrt{2}$

Time to Practice!

$x^2 - 12x + 5 = 0$

$\left(\frac{-12}{2}\right)^2 = 36$

$-5 \quad -5$

$x^2 - 12x + 36 = -5 + 36$

$(x-6)^2 = 31$

$x - 6 = \pm\sqrt{31}$

$x = 6 \pm \sqrt{31}$

$x^2 + 6x + 10 = 0$

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

$\sqrt{-1} = i$

$-10 \quad -10$

$x^2 + 6x + 9 = -10 + 9$

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

$x + 3 = \pm\sqrt{-1} = \pm i$

$x = -3 \pm i$

$5x^2 - 6x - 8 = 0$ Factor out 5 so *a*=1

$\left(\frac{-3}{5}\right)^2 = \frac{9}{25}$

$+8 \quad +8$

$\frac{5x^2}{5} - \frac{6x}{5} = \frac{8}{5}$

$x^2 - \frac{6}{5}x + \frac{9}{25} = \frac{8}{5} + \frac{9}{25}$

$(x - 3/5)^2 = \frac{49}{25}$

$x - 3/5 = \pm\frac{7}{5}$

$\left(\frac{1}{2}\right)\left(-\frac{6}{5}\right) = -\frac{6}{10} = -\frac{3}{5}$

$x = \frac{3}{5} \pm \frac{7}{5} = \frac{10}{5}, -\frac{4}{5}$

$= 2, -\frac{4}{5}$

$3x^2 - 12x + 7 = 0$ Factor out 3 so a=1

$\frac{3x^2}{3} - \frac{12x}{3} = \frac{-7}{3}$

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

$(x-2)^2 = \frac{5}{3}$

$x - 2 = \pm\sqrt{\frac{5}{3}}$

$x = 2 \pm \sqrt{5/3}$