Quadratic Relations: Day 5 – Common Factoring

Today, we will learn how to factor quadratics in standard form when the ***a*-value is not 1**.

Factoring Quadratic Equations in the Form $y = ax^2 + bx + c$

$$Factor: y = 2x^2 - 4x - 30$$

First, **factor out** the *a*-value from every term!

$y = 2x^2 - 4x - 30$ BECOMES $y = 2(x^2 - 2x - 15)$

List all possible factors of the *c* inside the brackets (In this case, c = -15)

+1, -15
-1, +15
+3, -5
-3, +5

> If *c* is negative, you must have a negative factor and a positive factor.
>
> If *c* is positive **and** *b* is positive you must have two positive factors.
>
> If *c* is positive **and** *b* is negative you must have two negative factors.

Determine which set of factors **sums** to the *b inside the brackets*

(+1) + (-15) = -14
(-1) + (+15) = +14
(+3) + (-5) = -2
(-3) + (+5) = +2

r = +3
s = -5

Write the factored-form equation.
Include the common factor!

$$\boldsymbol{y = 2(x + 3)(x - 5)}$$

Therefore, the standard form equation $y = 2x^2 - 4x - 30$ is equivalent to the factored form equation $y = 2(x - 5)(x + 3)$. Both equations will produce the same parabolic graph!

Factor out a from each term!

Use a calculator!

Factor: $y = \underline{2x^2} + \underline{10x} + \underline{12}$
$\quad\quad\quad\quad 2 \quad\; 2 \quad\; 2$

$y = 2(x^2 + 5x + 6)$

$y = 2(x+2)(x+3)$

Factor: $y = \underline{3x^2} + \underline{3x} - \underline{90}$
$\quad\quad\quad\quad 3 \quad\; 3 \quad\; 3$

$y = 3(x^2 + x - 30)$

$y = 3(x+6)(x-5)$

Factor: $y = \underline{3x^2} - \underline{12x} - \underline{96}$
$\quad\quad\quad\quad 3 \quad\; 3 \quad\; 3$

$y = 3(x^2 - 4x - 32)$

$y = 3(x-6)(x+4)$

Factor: $y = \underline{4x^2} - \underline{4x} - \underline{24}$
$\quad\quad\quad\quad 4 \quad\; 4 \quad\; 4$

$y = 4(x^2 - x - 6)$

$y = 4(x-3)(x+2)$

Factor: $y = \underline{4x^2} - \underline{20x}$
$\quad\quad\quad\quad 4 \quad\; 4$

$y = 4(\underbrace{x^2 - 5x})$

$y = 4x(x-5)$

Factor: $y = \underline{2x^2} - \underline{18}$
$\quad\quad\quad\quad 2 \quad\; 2$

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

$y = 2(x+3)(x-3)$