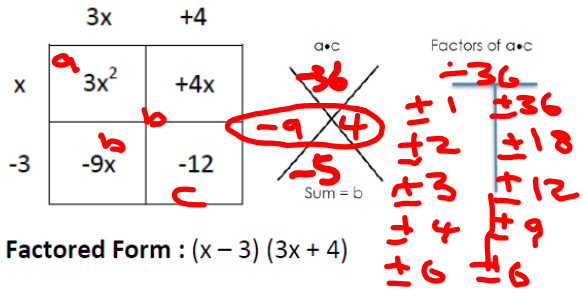
Graphic Organizer: Reviewing Methods for Factoring

Before you factor any expression, you must always check for and factor out a **Greatest Common Factor (GCF)!**

	Looks Like	How to Factor	Examples
GCF (Two Terms)	$ax^2 - bx$	Factor out what is common to both terms (mentally or list method) $x^2+5x=0$ $x(x+5)=0$ $x=0$; $x=-5$	$x^2 + 5x = x(x + 5)$ $18x^2 - 6x = 6x(3x - 1)$ $-9x^2 - x = -x(9x + 1)$
A = 1	$x^2 + bx + c$	Think of what two numbers multiply to get the c term and add to get the b term (Think of the diamond). You also need to think about the signs: $x^2 + bx + c = (x + \#)(x + \#)$ $x^2 - bx + c = (x - \#)(x - \#)$ $x^2 - bx - c / x^2 + bx - c = (x + \#)(x - \#)$	$x^2 + 8x + 7 = (x + 7)(x + 1)$ $x^2 - 5x + 6 = (x - 2)(x - 3)$ $x^2 - x - 56 = (x + 7)(x - 8)$
A not 1	$ax^2 + bx + c$	**Area Model:** $3x^2 - 5x - 12$  **Factored Form :** $(x - 3)(3x + 4)$	$9x^2 - 11x + 2 = (9x - 2)(x - 1)$ $2x^2 + 15x + 7 = (2x + 1)(x + 7)$ $3x^2 - 5x - 28 = (2x + 7)(x - 4)$
Difference of Two Squares	$x^2 - 9 = 0$ $+9 \quad +9$ $x^2 = 9$ $x^2 - c$ $x = \pm 3$	Both your "a"and "c" terms should be perfect squares and since there is no "b" term, it has a value of 0. You must also be subtracting the a and c terms. Your binomials will be the exact same except for opposite signs. **Difference of Squares** $a^2 - b^2 = (a + b)(a - b)$ $x^2 - 9 = 0$ $(x+3)(x-3)=0$ $x=-3$, $x=3$	$(a+b)(a-b)$ $x^2 - 9 = (x + 3)(x - 3)$ $x^2 - 100 = (x + 10)(x - 10)$ $4x^2 - 25 = (2x + 5)(2x - 5)$
Perfect Square Trinomials	$x^2 + bx + c$ "c" is a perfect square "b" is double the square root of c	Factor like you would for when a = 1	$x^2 - 6x + 9 = (x - 3)(x - 3)$ $= (x - 3)^2$ $x^2 + 16x + 64 = (x + 8)(x + 8)$ $= (x + 8)^2$

Essential Question 3/9/2021

- How can I solve quadratic equations by completing the square?

Learning Target

Solve Quadratic Equations by Completing the Square

Solving by Completing the Square

Standard(s): MGSE9–12.A.REI.4b
Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, factoring, completing the square, and the quadratic formula, as appropriate to the initial form of the equation (limit to real number solutions).

What number will complete the square?

Complete the square to form a perfect square trinomial and then factor.

a. $x^2 + 12x + \boxed{36}$

$\frac{12}{2} = 6^2$

b. $z^2 - 4z + \boxed{4}$

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

c. $x^2 - 18x + \boxed{81}$

$\frac{-18}{2} = (-9)^2$

Steps to Solving by Completing the Square

The Equation:	$x^2 + 6x + 2 = 0$
STEP 1: Write the equation in the form $x^2 + bx + \square = c + \square$ (Bring the constant to the other side)	$x^2+6x+9 = -2+9$ $2 = (3)^2 = 9$
STEP 2: Make the left-hand side a perfect square trinomial by adding $\left(\frac{b}{2}\right)^2$ to **both** sides	$x^2+6x+9 = 7$
STEP 3: Factor the left side, simplify the right side	$(x+3)^2 = 7$
STEP 4: Solve by taking square roots on both sides	$x+3 = \pm\sqrt{7}$ $x = -3 \pm \sqrt{7}$

Group Practice: Solve for x by "Completing the Square" - I do

1. $x^2 - 6x - 72 = 0$

$x^2 - 6x = 72$

$2 = (-3)^2 = 9$

$x^2 - 6x + 9 = 72 + 9$

$(x - 3)^2 = \sqrt{81}$

$x - 3 = \pm 9$

x = _____

$x = 3 \pm 9$

$x = 12$ and -6

Practice - We do: $x^2 - 18x = -80$

2. $x^2 + 80 = 18x$

$\frac{-18}{2} = (-9)^2 = 81$

$x^2 - 18x + 81 = 80 + 81$

Perfect square trinomial

$(x-9)^2 = \sqrt{1}$

$x - 9 = \pm 1$

$x = 9 \pm 1$

$x =$ 10 and 8

Practice - You do:

3. $x^2 - 14x - 59 = -20$

$x^2 - 14x = -20 + 59$

$x^2 - 14x = 39$

$\frac{b}{2} = (-7)^2 = 49$

$x^2 - 14x + 49 = 39 + 49$

$(x-7)^2 = 88$

$x - 7 = \pm\sqrt{4 \times 22}$

$x - 7 = \pm 2\sqrt{22}$

X = ____________________

$x = 7 \pm 2\sqrt{22}$

Practice - You do:

4. $2x^2 - 36x + 10 = 0$

$x^2 - 18x + 5 = 0$

$\frac{2}{2}$

$x^2 - 18x = -5$

$\frac{a}{2} = (-9)^2 = 81$

$x^2 - 18x + 81 = -5 + 81$

$(x - 9)^2 = 76$

$x - 9 = \pm\sqrt{4 \times 19}$

$x = \_\_\_\_\_$

2

$x - 9 = \pm 2\sqrt{19}$

$x = 9 \pm 2\sqrt{19}$

Attachments

Functions notation.ppt

Functions Practice HW.docx

Functions notation notes.ppt