ALGEBRA 1:

Week of April 20

MORE FACTORING

Day 1: Practice Problems Set 1

Day 2: Practice Problems Set 2

Day 3: Work through the notes for 3.6 Continued & work through the examples.

Day 4: Practice Problems Set 3

Check Google Classroom for online help sessions.

Practice Problems: Set 1

Tic-Tac-Toe ~ Differences of Squares

Convert the quadratic functions from factored form to general form.

1. $g(x) = (x-3)(x+3)$ **2.** $f(x) = (2x+5)(2x-5)$ **3.** $y = (3x-1)(3x+1)$

4. $y = (x-10)(x+10)$ **5.** $p(x) = (4x-3)(4x+3)$ **6.** $y = (x+6)(x-6)$

7. What do you notice about the product of each pair of binomials in **#1–6**?

8. Create another quadratic function that follows the same pattern. Write the function in both factored and general form.

9. Examine the factored form and general form of each quadratic function above. The functions are called differences of squares. How does this name connect to the general form?

Use the pattern you observed in the exercises above to factor each binomial.

10. $y = x^2 - 49$ **11.** $h(x) = 9x^2 - 16$ **12.** $y = 4x^2 - 121$

13. $y = 25x^2 - 1$ **14.** $h(x) = x^2 - 64$ **15.** $f(x) = 100x^2 - 81$

Practice Problems: Set 2

Tic-Tac-Toe ~ Greatest Common Factor

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Factoring a quadratic expression often makes it easier to work with if you are graphing or solving. Some quadratic expressions have a greatest common factor that can be factored out of the function first. This may leave an expression that is easier to factor.

EXAMPLE Factor $6x^2 + 30x + 36$.

Solution

Find the greatest common factor or largest term that divides evenly into all three terms.	GCF = 6
Factor out the GCF.	$6x^2 + 30x + 36 = 6(x^2 + 5x + 6)$
Factor the expression left inside the parentheses.	$6(x+2)(x+3)$

Factor each quadratic expression.

1. $7x^2 + 14x - 56$ **2.** $6x^2 - 72x + 216$ **3.** $5x^2 + 15x - 20$

4. $4x^2 + 16x + 12$ **5.** $3x^2 + 24x + 36$ **6.** $6x^2 - 20x + 6$

7. $8x^2 - 32$ **8.** $4x^2 - 4x$ **9.** $3x^2 - 12x - 63$

ALGEBRA: Lesson 3.6 *part 2*

Converting $ax^2 + bx + c$ to Factored Form

Convert quadratic expressions in the form $ax^2 + bx + c$ to factored form.

*****THE SHORTCUT*****

Factoring by Grouping

Tic-Tac-Toe ~ Factoring by Grouping

In **Lesson 3.6**, you learned to factor expressions in the form $ax^2 + bx + c$ where $a \neq 0$ using an educated "guess and check" method. Another method for factoring this type of expression is called "Factoring by Grouping". Follow the process shown below for the expression $3x^2 - 11x - 4$.

Steps to Factoring by Grouping	Example: $3x^2 - 11x - 4$
1. Find the product of a and c.	$ac = 3 \cdot (-4) = -12$
2. Find two factors of ac that add to the center term b (the coefficient of x).	Factors of ac that sum to b: -12 and 1; $-12 + 1 = -11$
3. Write the center term using the sum of the two new factors including the proper signs.	$3x^2 - 11x - 4 = 3x^2 - 12x + 1x - 4$
4. Group the terms to form pairs (the first two terms and the last two terms). Factor each pair by finding common factors.	$3x^2 - 12x + 1x - 4 = 3x(x-4) + 1(x-4)$
5. Factor out the common binomial parentheses.	$(x-4)(3x+1)$

Example 1

$2x^2 - 5x + 3$

ac = 6

10 = -1(-6) or -2(-3)

-1 + -6 = -7 (no)

-2 + (-3) = -5 (YES!)

So: $2x^2 - 2x - 3x + 3$

Example 1 cont.

$2x^2 - 2x - 3x + 3 \quad = \quad \underline{2x^2 - 2x} - (\underline{3x - 3})$

Be careful with the negatives!

First part has a 2x in common;

Second part has a 3 in common

$2x(x – 1) – 3(x – 1)$

Final answer: $(2x – 3)(x – 1)$

Use FOIL to check!

Example 1 – take 2!

$2x^2 - 5x + 3$ So: $2x^2 \mathbf{- 2x - 3x} + 3$

BUT – it also can be written this way:

$2x^2 \mathbf{- 3x - 2x} + 3 \quad = \underline{2x^2 - 3x} - (\underline{2x - 3})$

First part has an x in common;

Second part has a 1 in common

$x(2x – 3) – 1(2x – 3)$

Final answer: $(x – 1)(2x – 3)$ SAME ANSWER!

Example 2

$4x^2 - 35x – 9$ ac = -36

-36 = -1(36) or 1(-36) or -2(18) or 2(-18) or -3(12) or 3(-12) or -4(9) or 4(-9) or -6(6)

Sum of -35? =1(-36)

So: $4x^2 + 1x - 36x - 9 \quad = \quad \underline{4x^2 + 1x} - (\underline{36x + 9})$

Factor: $x(4x + 1) – 9(4x + 1)$

Answer: $(x – 9)(4x + 1)$

<u>3.6 Practice Problems</u>: Set 3

Factor by Grouping.
Use foil to check.

1. $2x^2 + 7x + 6$	**2.** $2x^2 + 13x + 15$	**3.** $5x^2 + 6x + 1$
4. $2x^2 – x – 6$	**5.** $3x^2 + 2x – 1$	**6.** $4x^2 + 8x + 3$
7. $6x^2 + 17x – 3$	**8.** $3x^2 – 22x + 7$	**9.** $9x^2 + 27x + 20$

ANSWER PAGE

Set 1:
Difference of Squares
1. $x^2 − 9$
2. $4x^2 − 25$
3. $9x^2 − 1$
4. $x^2 − 100$
5. $16x^2 − 9$
6. $x^2 − 36$
7. There isn't a b value
8. (your own answer)
9. First term is a perfect square; last term is a perfect square. Difference = subtract
10. $(x + 7)(x − 7)$
11. $(3x + 4)(3x − 4)$
12. $(2x + 11)(2x − 11)$
13. $(5x + 1)(5x − 1)$
14. $(x + 8)(x − 8)$
15. $(10x + 9)(10x − 9)$

Set 2:
Greatest Common Factor
1. $7x(x + 4)(x − 2)$
2. $6(x − 6)(x − 6)$ or $6(x − 6)^2$
3. $5x(x + 4)(x − 1)$
4. $4x(x + 3)(x + 1)$
5. $3x(x + 6)(x + 2)$
6. $2(3x − 1)(x − 3)$
7. $8(x + 2)(x − 2)$
8. $4x(x − 1)$
9. $3(x − 7)(x + 3)$

Set 3:
Factoring by Grouping
1. $(2x + 3)(x + 2)$
2. $(2x + 3)(x + 1)$
3. $(5x + 1)(x + 1)$
4. $(2x + 3)(x − 2)$
5. $(3x − 1)(x + 1)$
6. $(2x + 1)(2x + 3)$
7. $(6x − 1)(x + 3)$
8. $(3x − 1)(x − 7)$
9. $(3x + 4)(3x + 5)$

ALGEBRA: LAST SLIDE for this week!