Lesson 4.1.3: Advanced Factoring

Targets:

1. I understand how to factor a quadratic expression into a binomial.

Warm Up:

In Lesson 4.1.2, we saw that factoring is the reverse process of multiplication. We factor a polynomial by reversing the distribution process.

Consider the following example of multiplication:

<u>Factored Form</u>   <u>Expanded Form</u>

$$(x+3)(x+5) \rightarrow x^2 + 5x + 3x + 15 \rightarrow x^2 + 8x + 15$$

When we compare the numbers in the factored form with the numbers in the expanded form, we see that 15 (c) is the product of the two numbers (3 · 5) and 8 (b) is their sum (3 +5).

- Can you explain why that relationship exists between the numbers in the factors and the numbers in the final expanded form?

Practice 1

Use the distributive property to expand each binomial into a quadratic expression:

1.) $(5x+2)(x+3)$ 2.) $(3x+6)(x+4)$ 3.) $(2x+5)(3x+4)$

- For each problem in Practice 1, how did you calculate for a, b, and c of the quadratic expression? (Reminder: a quadratic is in the form of $ax^2 + bx + c$)

- How is this different from how you calculated for them in the Warm Up?

- How is this the same as how you calculated for them in the Warm Up?

Practice 2

Use the pattern you discovered in Practice 1 to help you work backwards. Factor this quadratic expressions into binomial expressions:

a. $5x^2 + 17x + 14 = (\_\,x\pm\_\,)(\_\,x\pm\_\,)$

Step 1: What are your options for factors of $5x^2$?
Step 2: What are you options for factors of 14?
Step 3: What combination of the factors from step 1 and step 2 would give you $17x$?

b. $3x^2 - x - 4 = (\_\,x\pm\_\,)(\_\,x\pm\_\,)$

Step 1: What are your options for factors of $3x^2$?
Step 2: What are you options for factors of -4 ?
Step 3: What combination of the factors from step 1 and step 2 would give you $-x$?

Practice 3

Use the same steps used in Practice 2 to help you factor the following quadratic expressions:

1.) $3x^2 - 2x - 8$ 2.) $3x^2 + 10x - 8$ 3.) $2x^2 - 21x - 36$

Exit Ticket

Factor the following quadratic expressions:

1.) $3x^2 - 2x - 5$ 2.) $-2x^2 + 5x - 2$

3.) $5x^2 + 19x - 4$ 4.) $4x^2 - 12x + 9$