Polynomials Lesson 4 – Binomial Multiplication Name:

Instructions: Fill in the all missing information as we go through the lesson. Do all example problems and show all work. In the extra space provided, write questions or ideas you may have. Use [Quizzizz lesson](https://quizizz.com/admin/presentation/63bebc03140ce7001dfa1c3a?source=lesson_share) (QR code) or [PowerPoint](https://quizizz.com/admin/presentation/63bebc03140ce7001dfa1c3a?source=lesson_share) with this handout.

Warm Up:
1. What is the slope of the equation y = 2x – 11?

2. Distribute and combine like terms: *x*(*x* – 3) + 5(*x* – 3).

Today’s Objective: Today we will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ binomial expressions. We will use our method of distribution we learned yesterday and then find a “short-cut,” called FOIL. We will also learn about the form of a quadratic expression.

Specifically, we will be looking for patterns in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that are quadratic.

Quadratic polynomials have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_.

A fact about quadratic polynomials:

Example #1: Multiply the following.

|  |
| --- |
| $$(x+5)(x-3)$$ |
| **Set Up** |  |
| **Distribute** |  |
| **Combine Like Terms** |  |

This answer is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because it has a degree of \_\_\_\_\_\_\_\_\_\_\_\_\_\_. These are INCREDIBLY IMPORTANT!

The Standard Form of a quadratic expression is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The

leading coefficient is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the constant term is \_\_\_\_\_\_\_\_\_\_\_\_.

In the expression $x^{2}-8x+42,$ identify the value of *a, b,* and *c*.

*a = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ b = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ c = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Note: In the following example *a* and *b* and *c* are all \_\_\_\_\_\_\_\_\_\_\_\_\_.

*x*2 + *x* + 1

Write a quadratic expression where *a* = 2, *b =* 0¸and *c* = ―4

*a* is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and *c* is called the ­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Example 2: Distribute the following expression.**

|  |
| --- |
| $$(x+4)(x-4)$$ |
| **Set Up** |  |
| **Distribute** |  |
| **Combine Like Terms** |  |

This quadratic is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because the first and

last terms are both \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Example #3:

|  |
| --- |
| $$(2x+5)(x-7)$$ |
| **Set Up** |  |
| **Distribute** |  |
| **Combine Like Terms** |  |

What is the leading coefficient?

What is the constant term?

Example #4**: Below there is a table of binomials being multiplied and their products. Can you find a relationship between the value of *b* and the original expression?**

|  |
| --- |
| **Binomials** |
| **Original Expression** | **Product** |
| (*x* + 4)(*x* + 2) | $$x^{2}+6x+8$$ |
| $$\left(x+5\right)\left(x+6\right)$$ | $$x^{2}+11x+30$$ |
| $$\left(x+1\right)\left(x+4\right)$$ | $$x^{2}+5x+4$$ |
| $$\left(x+10\right)\left(x+9\right)$$ | $$x^{2}+19x+90$$ |
| $$\left(x+3\right)\left(x+3\right)$$ | $$x^{2}+6x+9$$ |
| $$\left(x+11\right)\left(x+4\right)$$ | $$x^{2}+15x+44$$ |

The relationship between the original expression and the value of *b* is:

The relationship between the original expression and the value of *c* is:

Why has the value of *a* always been one here?

What do you notice about the signs of the original and product?

FOIL

Let’s learn the short-cut for multiplying binomials. The acronym is called FOIL which stands for:

F: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ O: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ I: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ L: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Consider (2*x* + 3)(4*x* ― 5). Write down the value of each:

First:

Outer:

Inner:

Last:

|  |  |
| --- | --- |
| FOIL method Poster for multiplying binomials | Middle school math, Math  methods, Studying math | **Q**: **Why is the leading coefficient NOT 1 here?****Answer:** |

**Important Note**: FOIL is a short-cut that only works when multiply a

\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with another \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Practice Time

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Example** | **First** | **Outside** | **Inside** | **Last** | **Answer** |
| $$(x-4)(x+3)$$ |  |  |  |  |  |
| $$\left(x+5\right)\left(x+7\right)$$ |  |  |  |  |  |
| $$\left(x-6\right)\left(x-4\right)$$ |  |  |  |  |  |
| $$\left(3x+2\right)\left(2x-3\right)$$ |  |  |  |  |  |
| $$\left(3x-5\right)^{2}$$ |  |  |  |  |  |
| $$\left(x+8\right)\left(x+1\right)$$ |  |  |  |  |  |
| $$\left(x+2\right)\left(x+3\right)$$ |  |  |  |  |  |
| $$\left(x+6\right)\left(x+1\right)$$ |  |  |  |  |  |
| $$\left(5x-4\right)\left(5x+4\right)$$ |  |  |  |  |  |

Bonus Question: What happens when the binomials have the same middle sign?

What happens if the middle sign in the binomials is different?