

## Lesson 18: Factoring Day 1

### Objectives:

- ~ Factor out a Greatest Common Factor (GCF)
- ~ Factor Trinomials with  $A=1$
- ~ Factor Difference of Squares

## Lesson 18: Factoring Day 1

Today, we are going to learn how to  
UNDO *distributing* and FOIL.

This is called **FACTORING**.

Remember the Distributive Property?

$$a(x + y) = ax + ay$$

Well, today, we are going to  
"UN-distribute".

It's called FACTORING.

$$ax + ay = a(x + y)$$

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**Factors:** Factors are numbers/polynomials that are multiplied together to get the whole.

**Example:**

$$3(2) = 6 \quad \sim \text{3 and 2 are factors of 6} \quad \sim$$

$$(3x + 1)(x - 5) = 3x^2 - 14x - 5$$

$\sim (3x + 1)$  and  $(x - 5)$  are factors of the right side polynomial.  $\sim$

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This leads us to UNDOing FOIL. To undo FOIL, we need to remember what the Standard Polynomial looks like.

The Standard Polynomial is  $Ax^2 + Bx + C$  where  $A$ ,  $B$ , &  $C$  are real numbers.

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We will use this box to help us organize our work to figure out what two binomials multiply to be the polynomial given.

$ax^2$	
	$c$

Essentially, we are trying to find two numbers that multiply to be  $A(C)$  and add to be  $B$ .

$$Ax^2 + Bx + C$$

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### Box Method of Factoring:

**Step 1:** In the upper left box, put your first term, In the lower right box, put your last term.

$ax^2$	
	$c$

**Step 2:** Multiply  $A \times C$  and factor the product to find factors that add up to  $B$ . Put these factors (with an  $x$  attached) into the other two boxes. Order doesn't matter.

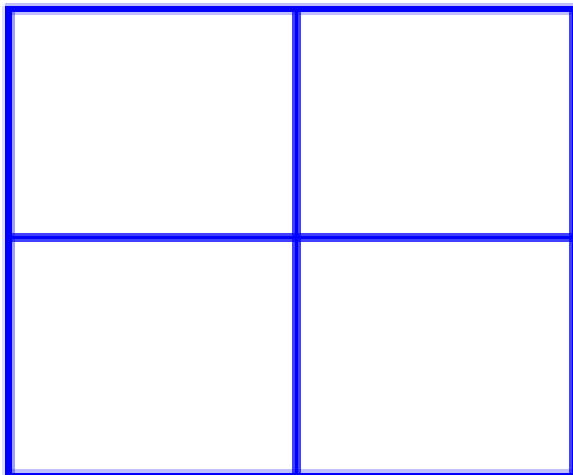
**Step 3:** Find the  $GCF$  of each row and each column. Keep the sign of the upper right and lower left boxes as part of the  $GCF$ .

**Step 4:** Rewrite the  $GCF$ 's of the rows in one set of parentheses, and the  $GCF$ 's of the columns in one set of parentheses. This is your final factorization.

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Ex 1: Factor

$$y^2 + 11y + 28$$



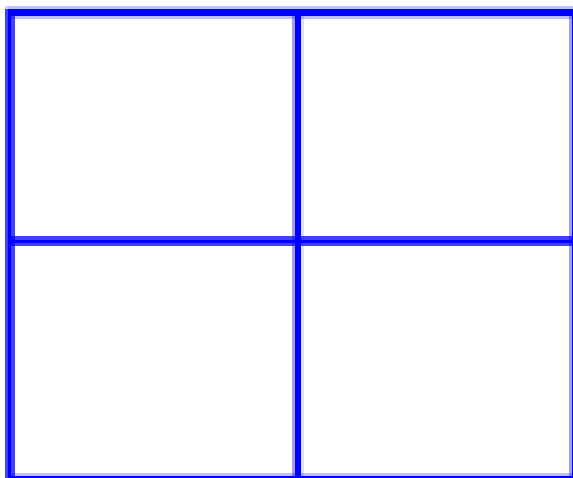


THINK!

- ~If both  $b$  and  $c$  are positive, the factors of  $c$  must both be positive.
- ~If  $b$  is negative and  $c$  is positive, both factors of  $c$  must be negative.
- ~If both  $b$  and  $c$  are negative, you must have one positive and one negative factor of  $c$ .

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Ex 2: Factor  $2t^2 - 22t + 36$   
(remember GCF...)



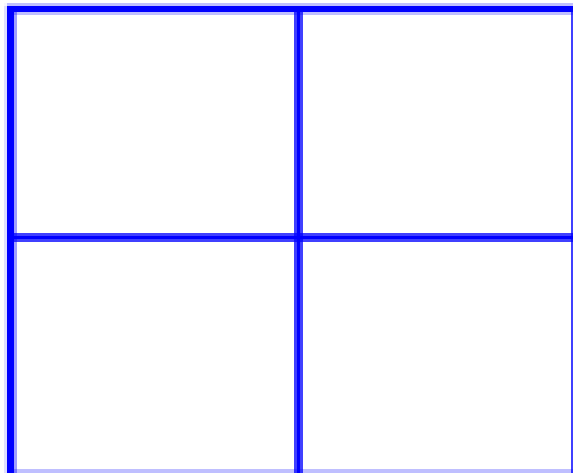
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Ex 3: Factor  $3x^2 + 21x + 36$


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Ex 4: Factor

$$x^2 - 2xy + y^2$$

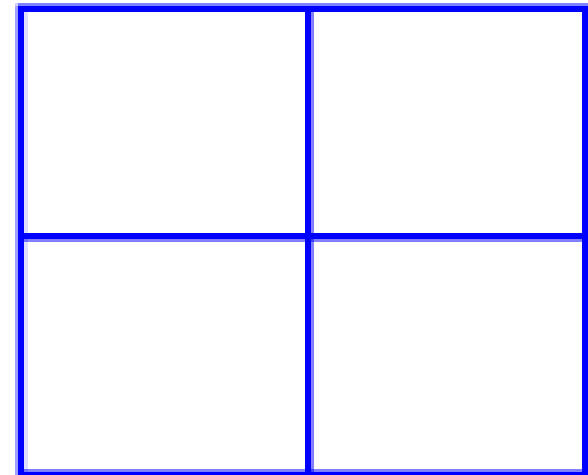


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*IDENTIFYING "PRIME" TRINOMIALS:*

A "prime" trinomial is one that cannot be factored because there are no integer factors of  $c$  that add to  $b$ .

Ex 5:       $x^2 + 5x + 10$



There are no factors of 10 that sum to 5, so ... It's Prime!

# Difference of Squares

Now, we have another kind of polynomial that we can factor. It is called the difference of squares.

The polynomial looks like this:

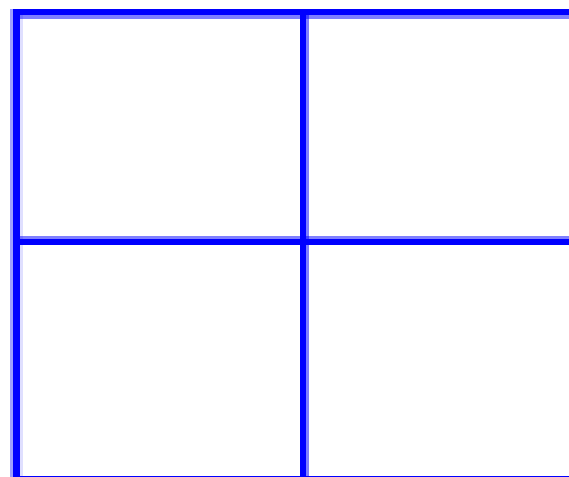
$$a^2 - b^2 = (a - b)(a + b)$$

Essentially, the middle term  $b=0$ .

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Ex 6: Factor

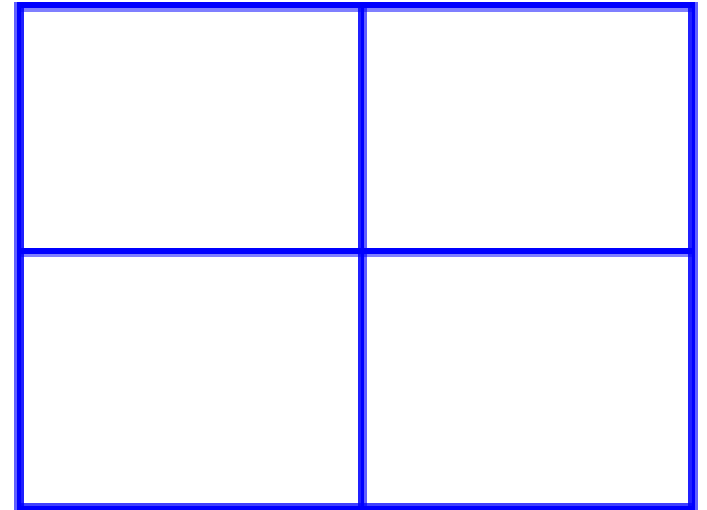
$$x^2 - 9$$



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Ex 7: Factor

$$t^2 - 121$$

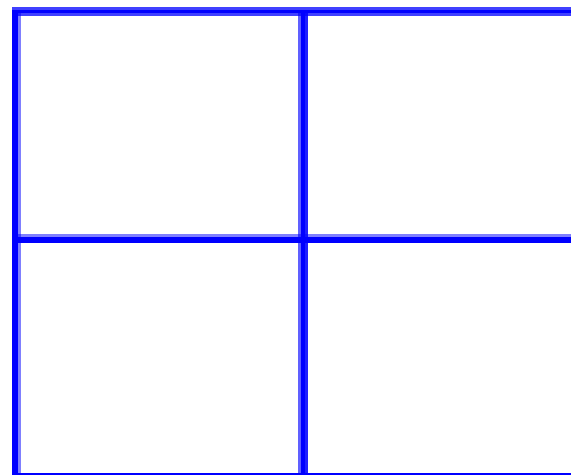




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Ex 8: Factor

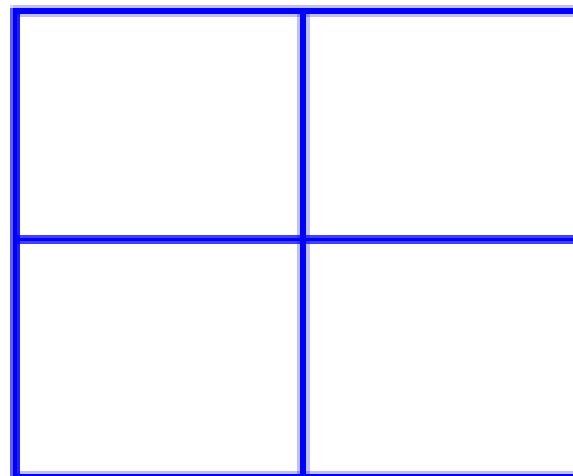
$$y^4 - 16$$



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Ex 9: Factor

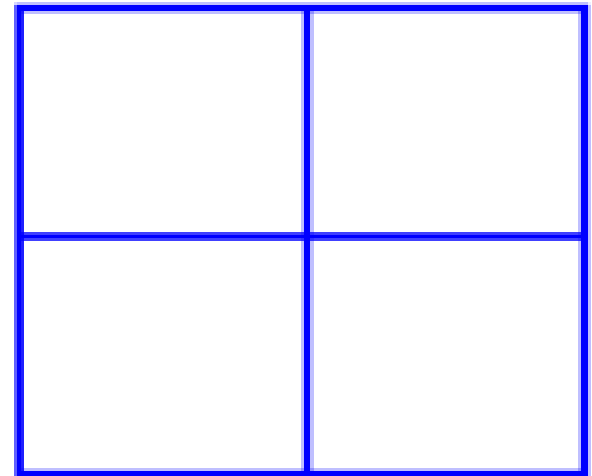
$$x^2 - 64$$



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Ex 10: Factor

$$16x^2 - 64$$



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Can you?

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# Journal 18

Due at end of Math Lab

# Assignment 18

Due at the beginning of B1 class