Lesson 5.5: Factoring

By the end of the lesson, we will be able to:

~ Factor trinomials in the form $x^2 + bx + c$

~ Factor trinomials in the form $ax^2 + bx + c$

~ Factor trinomials using substitution.

Lesson 5.5: Factoring

Factoring is essentially "undistributing". We are trying to write a ***second-degree*** polynomial as the product of ***2 first degree*** binomials. There is a pattern that always appears when we're factoring.

$$If\ x^2 + bx + c = (x + m)(x + n),$$
$$then\ \ b = m + n\ \ and\ \ c = m \cdot n$$

Lesson 5.5: Factoring

Box Method of Factoring:

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

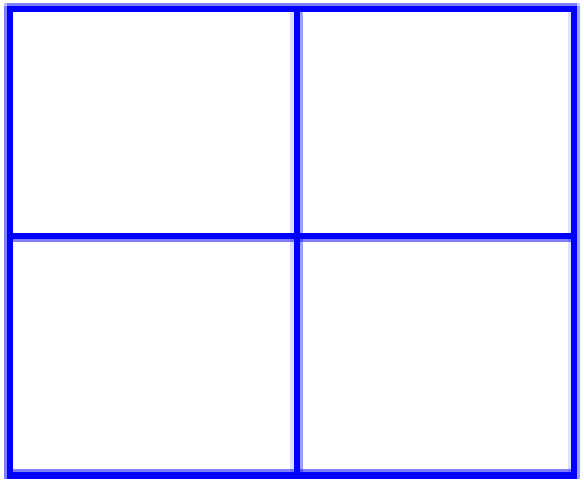
ax^2	
	c

Step 2: Multiply *AxC* 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.

Ex 1: Factor $y^2 + 11y + 28$



THINK!

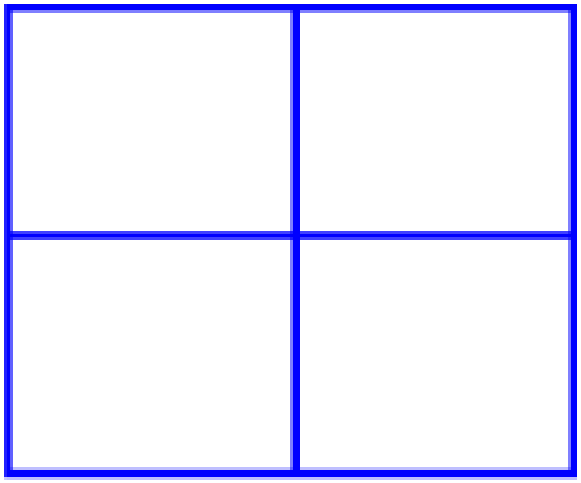
~If both b and c are positive, the factors of c must both be positive.

~If b is negative and c is positive, both factors of c must be negative.

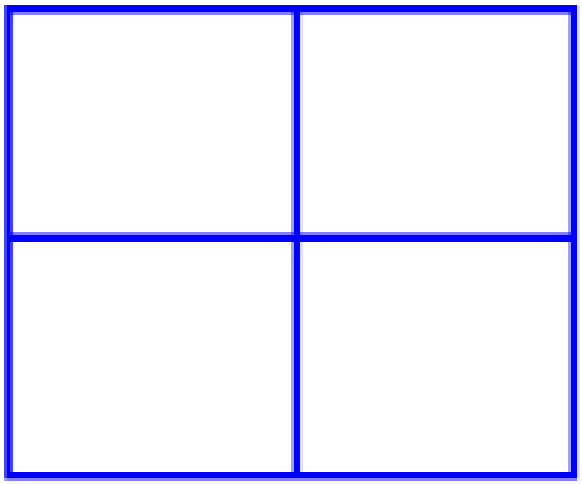
~If both b and c are negative, you must have one positive and one negative factor of c.

Ex 2: Factor $2t^2 - 22t + 36$

(remember GCF...)



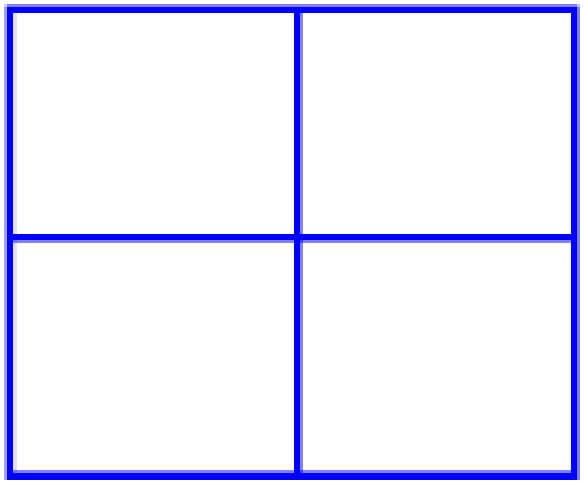
Ex 3: Factor $x^2 - 2xy + y^2$



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 4: $x^2 + 5x + 10$



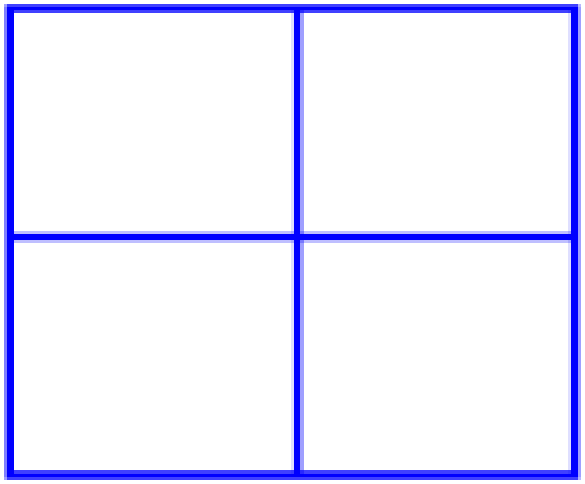
There are no factors of 10 that sum to 5, so ... It's Prime!

FACTORING WHERE THERE ARE GCF'S:

The first rule of factoring is always

LOOK FOR A GCF!!!!

Example 5: Factor $2k^3 + 6k^2 - 56k$



FACTORING TRINOMIALS WITH A LEADING COEFFICIENT: $ax^2 + bx + c$, where $a \neq 1$

There are two methods of factoring trinomials with a leading coefficient:

~ Factoring by grouping

~ Factoring by Trial and Error (also called "Guess and Check").

FACTORING BY GROUPING:

ax^2	
	c

Step 1: Find the value of $a \cdot c$

Step 2: Find the pair of integers whose product equals *ac*, and whose sum equals *b*. Call these integers ***m*** and ***n***, where $mn = ac$ and $m + n = b$

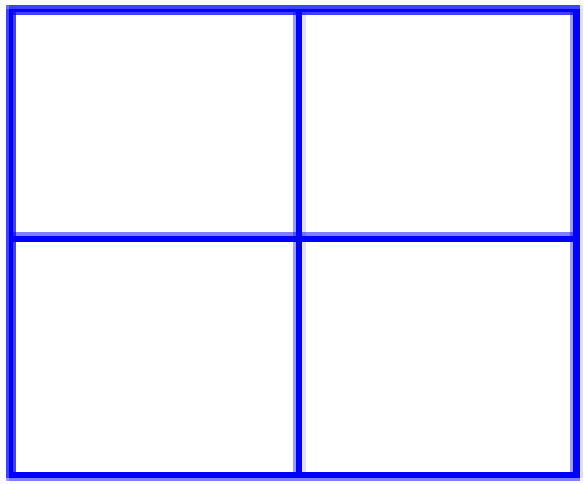
Step 3: Rewrite the expression as:

$$ax^2 + bx + c = ax^2 + mx + nx + c$$

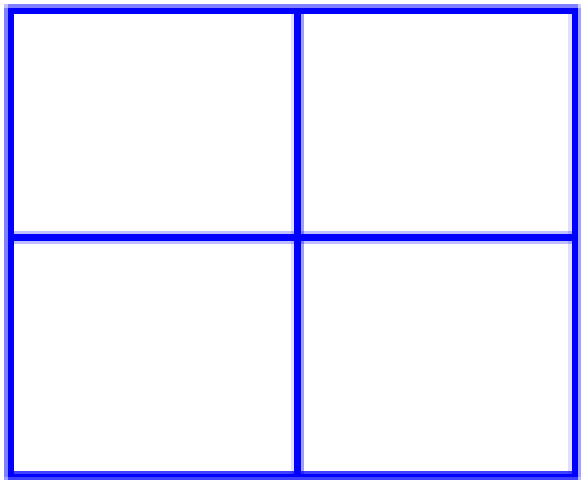
Step 4: Factor the new expression by grouping.

Step 5: CHECK YOUR ANSWER!

Example: Factor $6x^2 - 5x - 4$



Example: Factor $-15x^2 + 23x - 4$

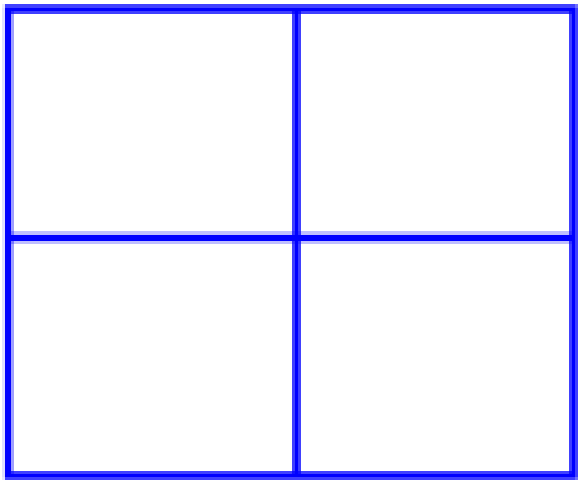


FACTORING BY SUBSTITUTION:

Sometimes our trinomials have variables with extra large exponents, or even use binomials in place of variables. To factor these, we can use substitution.

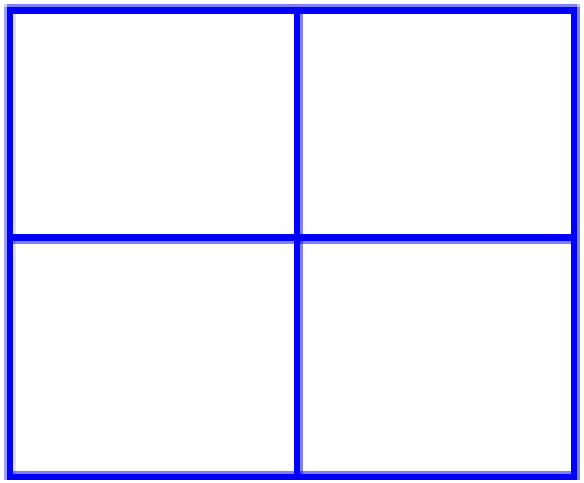
Example: Factor $2n^4 - 7n^2 - 15$

Substitute: $x = n^2$



Example: Factor $2(x+1)^2 + 3(x+1) - 35$

Substitute: $z = (x+1)$



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Can you?

Assignment:

Page 407: #'s 9, 11, 15, 21, 25, 29, 35, 39, 43, 47, 51, 55, 57, 59, 63, 65, 67, 79, 83

AND

Page 442: #'s 65, 69, 73, 75

(23 problems)