

## Beginning Algebra ~ Lesson 33

Work the following examples as you listen to the recorded lecture.

### Factoring Complex Trinomials

Problem type:  $ax^2 + bx + c$  (Where  $a$ ,  $b$  and  $c$  are numbers, and  $x$  is the unknown.)

#### Rules for signs: Use the same sign rules for all trinomials

**Rule 1:** If the **2<sup>nd</sup> sign is +**, then both factor signs will match the **1<sup>st</sup> sign** in the problem.  
 $ax^2 + bx + c \rightarrow ( \quad + \quad )( \quad + \quad )$      $ax^2 - bx + c \rightarrow ( \quad - \quad )( \quad - \quad )$

**Rule 2:** If the **2<sup>nd</sup> sign is -**, then the factor signs will be different, + and -.  
 $ax^2 + bx - c \rightarrow ( \quad + \quad )( \quad - \quad )$      $ax^2 - bx - c \rightarrow ( \quad + \quad )( \quad - \quad )$

**Rule 3:** Use 2<sup>nd</sup> operation to find out if you add or subtract factors to equal  $b$ .

#### Steps to remember:

1. Set the factor statement
2. Set the binomial factors with the signs
3. Factor the variable squares
4. Find all factor combinations for "a" and "c" until one matches the factor statement
5. Place the "a" factors in the 1<sup>st</sup> positions and the "c" factors in the 2<sup>nd</sup> positions of the binomial pairs
6. FOIL to check

Example 1: $25x^2 - 20x + 4$	Step 1: Factor Statement:
$( \quad ) ( \quad )$	Step 2: Set signs for the factors.
	Step 3: Factor the variable squares.
	Step 4: Factor $a$ ; factor and reverse factor $c$ $a = \underline{\hspace{2cm}}$ $c = \underline{\hspace{2cm}}$ <u>Factor Statement Work Space</u>  <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/>
	Look for the combination that fits the factor statement.
	Step 5: Use the "a" factors in the 1 <sup>st</sup> positions and the "c" factors in 2 <sup>nd</sup> positions of your solution.
	Step 6: FOIL to check.

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Example 2: $20x^2 + 27x - 8$	Step 1: Factor Statement:
(        ) (        )	Step 2: Set signs for the factors.
	Step 3: Factor the variable squares.
	Step 4: Factor $a$ ; factor and reverse factor $c$ $a = \underline{\hspace{2cm}}$ $c = \underline{\hspace{2cm}}$ <u>Factor Statement Work Space</u>  <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Look for the combination that fits the factor statement.
	Step 5: Use the "a" factors in the 1 <sup>st</sup> positions and the "c" factors in 2 <sup>nd</sup> positions of your solution.
	Step 6: FOIL to check.

Example 3: $2x^2 + 17x + 10$	Step 1: Factor Statement:
(        ) (        )	Step 2: Set signs for the factors.
	Step 3: Factor the variable squares.
	Step 4: Factor $a$ ; factor and reverse factor $c$ $a = \underline{\hspace{2cm}}$ $c = \underline{\hspace{2cm}}$ <u>Factor Statement Work Space</u>  <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Look for the combination that fits the factor statement.
	Step 5: Use the "a" factors in the 1 <sup>st</sup> positions and the "c" factors in 2 <sup>nd</sup> positions of your solution.
	Step 6: FOIL to check.

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<p>Example 4:  <math>6x^2y^2 - 2xy^2 - 60y^2</math></p>	<p>Step 1: Factor Statement:</p>
	<p>Step 2: Set signs for the factors.</p>
	<p>Step 3: Factor the variable squares.</p>
	<p>Step 4: Factor a; factor and reverse factor c  <math>a = \underline{\hspace{2cm}}</math>    <math>c = \underline{\hspace{2cm}}</math>    <u>Factor Statement Work Space</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Look for the combination that fits the factor statement.</p>
	<p>Step 5: Use the "a" factors in the 1<sup>st</sup> positions and the "c" factors in 2<sup>nd</sup> positions of your solution.</p>
	<p>Step 6: FOIL to check.</p>

<p>Example 5:  <math>-x^2 + 24x + 25</math></p>	<p>Step 1: Factor Statement:</p>
	<p>Step 2: Set signs for the factors.</p>
	<p>Step 3: Factor the variable squares.</p>
	<p>Step 4: Factor a; factor and reverse factor c  <math>a = \underline{\hspace{2cm}}</math>    <math>c = \underline{\hspace{2cm}}</math>    <u>Factor Statement Work Space</u></p> <p>_____</p> <p>_____</p> <p>Look for the combination that fits the factor statement.</p>
	<p>Step 5: Use the "a" factors in the 1<sup>st</sup> positions and the "c" factors in 2<sup>nd</sup> positions of your solution.</p>
	<p>Step 6: FOIL to check.</p>