Factoring

Factoring Trinomials with a Nontrivial Leading Coefficient

Factoring Trinomials of the Form $ax^2 + bx + c$ where $a \neq 1$

The "AC Method:"

- Find a pair of numbers whose product is *ac* and whose sum is b.
- If such a pair exists, expand the trinomial into four terms. Write the term *bx* as a sum or difference using the two numbers you found in the previous step.
- Factor by grouping.

The AC method may seem strange at first, but it actually is the exact reverse of the FOIL process. Every time you use FOIL to expand an expression, you get four terms that depend on your original coefficients. The AC method is a way of finding those four terms, and the "un-FOILing."

Example: Factor $4x^2 + 11x + 6$ using the AC method, step-by-step:

- We need to find a pair of numbers whose product is _____ and whose sum is _____.
- What do we know about the signs (+/-) of these numbers?

- Create a table of "factor pairs" for _____.

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- Which two numbers have the needed sum?
- Rewrite $4x^2 + 11x + 6$ *using four terms*.

- Factor by this expression using factoring by grouping.

Example: Factor $12y^2 + 5y - 3$ using the AC method, step-by-step:

- We need to find a pair of numbers whose product is _____ and whose sum is _____.
- What do we know about the signs (+/-) of these numbers?

- Create a table of "factor pairs" for _____.

- Which two numbers have the needed sum?
- Rewrite $12y^2 + 5y - 3$ *using four terms and then factor it using factor by grouping*.

Example: Factor $5z^2 - 13z + 6$ using the AC method, step-by-step:

- We need to find a pair of numbers whose product is _____ and whose sum is _____.
- What do we know about the signs (+/-) of these numbers?

- Create a table of "factor pairs" for _____.

- Which two numbers have the needed sum?
- Rewrite $5z^2 - 13z + 6$ *using four terms and then factor it using factor by grouping*.

Example: Factor the trinomials below using the AC method.

$10x^2 - x - 3$

$15y^2 - 17y + 4$

Example: Factor each trinomial completely, making sure to first factor out the GCF.

$60x^2 + 250x + 140$

$16y^6 - 28y^5 + 6y^4$

Example: Factor each trinomial completely.

$4x^2 + 7xt - 2t^2$

$12x^2y^2 - 12xy - 45$

Example: Factor each trinomial by guessing and checking. (This method is primarily useful when *a* and *c* are prime numbers.)

$5x^2 + 7x + 2$

$3y^2 - 22 + 7$