Factoring

Factoring Trinomials with Leading Coefficient One

Factoring Trinomials of the Form $x^2 + bx + c$

When multiplying (x+1)(x+8) we obtain $x^2 + 9x + 8$. The goal of factoring is to write the polynomial $x^2 + 9x + 8$ as the product of two factors. In short, we will reverse the process of using FOIL.

Process:

- Write $x^2 + bx + c = (x \quad)(x \quad)$
- Find a pair of numbers whose product is c and whose sum is b
- Fill in the "blank spaces" with the corresponding pair.
- If two such numbers do not exist, the trinomial is *prime*.

Let's now use this process to factor $x^2 + 9x + 8$

Example: Factor $x^2 + 7x + 12$

- 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?
- Factor the trinomial.

Example: Factor $x^2 - 6x + 8$

- 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?
- Factor the trinomial.

Example: Factor $x^2 - 9x - 10$

- 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?
- Factor the trinomial.

Example: Factor each trinomial.

$t^2 + 29t + 100$

$x^2 - 9x - 4$

$y^2 - 10y + 25$

$z^2 + 11z - 80$

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

$2x^2 - 4x - 70$

$4y^5 + 48y^4 + 144y^3$

$-3t^3 + 45t^2 - 150t$

$-z^2 - .2z + .15$

Example: Factor each trinomial completely.

$-y^3z - 7y^2z + 60yz$

$x^2y^2 - 12xy + 27$

$x^2 + 4xy + 4y^2$

$-2x^2y^2 + 18x^2yz + 72x^2z^2$

Factoring trinomials whose highest power is greater than 2 is possible so long as the **highest power is even, the next highest power is half the highest power, and the third term is a constant.**

Example: Factor the following trinomials.

$x^8 + 2x^4 + 1$

$h^{18} - 5h^9 + 6$