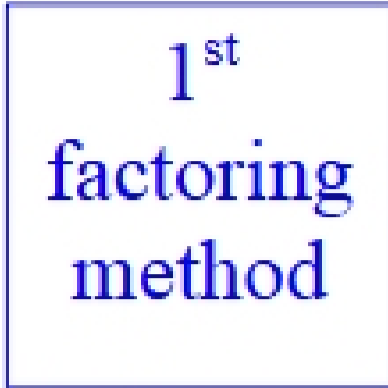


*There are several good study tips in this lesson on the textbook pages.

1st
factoring
method



I Factoring Polynomials

If two binomials are multiplied together, each polynomial is a **factor** of the product. The first factoring method to always try is called **factoring out the greatest common factor**. If a polynomial cannot be factored using integer coefficients, it is a **prime** polynomial.

Ex 1: Factor each polynomial by factoring out the GCF.

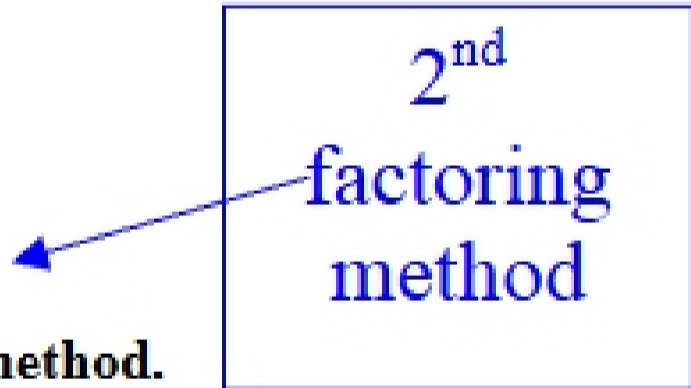
a) $5y^2z - 15yz^3 =$

b) $6ab^2c + 9a^2b^2c - 12abc^3 =$

c) $4(x - y) + 3c(x - y) =$

d) $11xy^2 + 3ab =$

2nd
factoring
method



Some 4-term polynomials can be factored using what is called the **grouping method**.

1. Group the first two terms together and factor out the GCF.
2. Group the last two terms together and factor out the GCF.
3. If there is a binomial that is a GCF of the result, that GCF is factored out and the result is a product of two binomial factors.

Ex 2: Factor each polynomial by the grouping method.

a) $ax - ay + 2bx - 2by =$

c) $ax - 4x - 2ay + 8y =$

b) $12x^3 - 20y - 16x^2y + 15x =$

d) $4ax + 12 - 3a + a^2 =$

A polynomial of the form $x^2 - y^2$ is called a **difference of squares**. A difference of squares factors as follows: $x^2 - y^2 = (x + y)(x - y)$

3rd
factoring
method

Ex 3: Factor each polynomial completely.

a) $4x^4 - 16 =$

b) $25 + 16a^2 =$

c) $(x + 2)^2 - 9 =$

d) $81r^4 - 16s^4 =$

The following are called **perfect square trinomials** because each equals a binomial squared when factored (as shown in these formulas).

4th
factoring
method

$$x^2 + 2xy + y^2 = (x + y)^2$$

Double product of sq. roots
of 1st term and last term

$$x^2 - 2xy + y^2 = (x - y)^2$$

Perfect square

Perfect square

Ex 4: Factor each.

a) $9a^2 - 12ab + 4b^2 =$

b) $100x^2 + 20x + 1 =$

c) $9x^2 - 15x + 4 =$

There are two ways commonly used to factor trinomials. Both require these first steps.

1. Write the trinomial in descending order.
2. Factor out any GCF, possibly including a (-) so that the leading term has a positive coefficient.

Some students find success with 'trial and error', simply trying different combinations until one is found such that when FOILED, the proper trinomial results.

To factor a trinomial of the form $x^2 + bx + c$, using the 'trial-and-error' process.

Follow these steps:

1. Make your first terms have a product of x^2 (x and x)
2. Make your last terms have a product of c .
3. Find the sum of the inner and outer terms and check if it equals bx . If not, go back to steps 1 and 2 and try a different combination, until step 3 checks.

Other students like to use grouping to factor a trinomial. Sometimes I call this the product/sum method. Here are the steps for grouping or the product/sum method.

If a trinomial is of the form $x^2 + bx + c$, find a pair of numbers r and s ; such that the product $(r)(s)$ equals c and the sum $r + s$ equals b . Then the factors are $(x + r)(x + s)$.

Ex 5: Factor each trinomial.

a) $b^2 + 12b + 20 =$

b) $x^2 - 7x + 10 =$

c) $c^2 + 10c + 100 =$

d) $3x^3 - 12x^2 - 36x =$

e) $m^2 - 20mn + 64n^2 =$

f) $x^4 - x^2 - 6 =$

g) $x^{10} + 4x^5 - 192 =$

Factoring
trinomials is the
last factoring
method.