

# 1.2 Factoring Polynomials

**Factoring is the reverse of multiplication.**

To **factor** a polynomial is to find an equivalent expression that is the product of polynomials. An equivalent expression of this type is called a *factorization* of the polynomial.

## GCF: Greatest Common Factor

- When factoring a polynomial, we look for factors common to every term and then use the distributive law.
- When the leading coefficient is a negative number, we generally factor out a common factor with a negative coefficient.

**Examples: Factor out a common factor:**

$$-4x^2 - 16x$$

$$9m^2 - 27$$

$$25x^2y^5 + 35x^6y^3 - 15x^3y^4$$

## Factor by Grouping

The largest common factor is sometimes a binomial.

Often, in order to identify a common binomial factor, we must regroup into two groups of two terms each:  $(x + 4)m + (x + 4)(y - b)$ .

### To Factor $ax^2 + bx + c$ Using Grouping

1. Make sure that any common factors have been factored out.
2. Multiply the leading coefficient  $a$  and the constant  $c$ .
3. Find a pair of factors of  $ac$ , whose sum is  $b$ .
4. Rewrite the trinomial's middle term,  $bx$ , as  $px + qx$ .
5. Factor by grouping.

**Examples – Factor the following using Factor by Grouping method.**

$$3x - 3y - ax + ay$$

$$x^2 - 3xy - 28y^2$$

$$6x^2 + 5x - 6$$