

## Lesson 11-3

**Example 1**

Find factors of  $3m + 9$ .

**Solution**

3 will divide  $3m$  evenly, and it will also divide 9 evenly. Therefore, 3 is a factor of the polynomial. What is the other factor that pairs with 3? You can find it by dividing each term of the binomial by 3.

$$\begin{aligned}\frac{3m + 9}{3} &= \frac{(3)(m)}{3} + \frac{(3)(3)}{3} \\ &= m + 3\end{aligned}$$

The factors are the 3 that you extracted, and  $(m + 3)$ , the quotient.

So,  $3m + 9 = 3(m + 3)$ .

**Example 2**

Find the factors of  $6m + 12m^2$ .

**Solution**

You can see that 6 is a factor of both terms. You can also see that  $m$  is a factor of both terms. In addition, therefore,  $(6)(m)$  or  $6m$  is also a factor. In fact,  $6m$  is the greatest common factor, or GCF, because it includes all the common factors. The paired factor is again found as follows.

$$\begin{aligned}\frac{6m + 12m^2}{6m} &= \frac{(6)(m)}{(6)(m)} + \frac{(6)(2)(m)(m)}{(6)(m)} \\ &= 1 + 2m\end{aligned}$$

So,  $6m + 12m^2 = 6m(1 + 2m)$ .

**Example 3**

Find the greatest common factor of  $25a^2b$  and  $5a^4b^3$ . Then find the paired factor that will create the expression  $25a^2b - 5a^4b^3$ .

**Solution**

$$\begin{array}{l} 25a^2b = (5)(5) \quad (a)(a) \quad (b) \\ 5a^4b^3 = (5) \quad (a)(a)(a)(a) \quad (b)(b)(b) \\ \qquad \qquad (5) \quad (a)(a) \quad (b) \end{array} \quad \square \quad 5a^2b \quad \text{Greatest Common Factor}$$

$$\begin{aligned} \frac{25a^2b - 5a^4b^3}{5a^2b} &= \frac{(5)(5)(a)(a)(b)}{(5)(a)(a)(b)} - \frac{(5)(a)(a)(a)(a)(b)(b)(b)}{(5)(a)(a)(b)} \\ &= 5 - a^2b^2 \end{aligned}$$

**Example 4**

**MANUFACTURING** A company manufactures posters with famous quotes. Each poster has an area of  $16a^2b$  square inches. The length of each poster is  $4ab$  inches. Find the width.

**Solution**

$$16a^2b \div 4ab = \frac{(2)(2)(2)(2)(a)(a)(b)}{(2)(2)(a)(b)} = (2)(2)(a) = 4a$$

The width of the poster is  $4a$ .