

## Evaluating Variable Expressions

### Objective A How to Evaluate Variable Expressions

A **variable** is a number represented by a letter of the alphabet that may vary or change.

A **variable expression** is an equation or expression that contains one or more **variables**.

#### Example

$$3x^2 - 5y + 2xy - x - 7$$

This is read as three times the value of  $x$  squared minus five times the value of  $y$  plus two times the value of  $x$  times  $y$  minus  $x$  minus 7.

$3x^2$ ,  $-5y$ ,  $2xy$  and  $x$  are the **variable terms** because they contain the **variables**  $x$  and  $y$ .  $x$  and  $y$  are the **variables** because the numeric (number) values for these letters may vary.  $-7$  is referred to as a **constant** because the numeric (number) value for this always remains the same.

To **evaluate the variable expression**, we must substitute numbers for the variables. Let us evaluate the expression using 4 for  $x$  and 2 for  $y$ .

#### Example 1:

**Evaluate:**  $3x^2 - 5y + 2xy - x - 7$  when  $x = 4$  and  $y = 2$

$$\begin{aligned} 3x^2 - 5y + 2xy - x - 7 &= [3(4^2)] - [5(2)] + [2(4)(2)] - 4 - 7 \\ &= [3(16)] - 10 + [2(8)] - 4 - 7 \\ &= 48 - 10 + 16 - 4 - 7 \\ &= 43 \end{aligned}$$

#### Example 2:

**Evaluate:**  $2x^2 + 3y - 4xy + x + 3$  when  $x = 3$  and  $y = 1$

$$\begin{aligned} 2x^2 + 3y - 4xy + x + 3 &= [2(3^2)] + [3(1)] - [4(3)(1)] + 3 + 3 \\ &= [2(3^2)] + [3(1)] - [4(3)(1)] + 3 + 3 \\ &= [2(9)] + 3 - [4(3)] + 3 + 3 \\ &= 18 + 3 - 12 + 3 + 3 \\ &= 15 \end{aligned}$$