Lesson 13-2

Example 1 Add Polynomials
Find each sum.

a. $(5x + 3) + (2x + 9)$

Method 1 Add vertically.

$$\begin{array}{rl} 5x + 3 & \\ \underline{(+)\ 2x + 9} & \text{Align like terms.} \\ 7x + 12 & \text{Add.} \end{array}$$

Method 2 Add horizontally.

$$\begin{aligned} &(5x + 3) + (2x + 9) \\ &= (5x + 2x) + (3 + 9) \\ &= 7x + 12 \end{aligned}$$

The sum is $7x + 12$.

b. $(3x^2 + 5x - 11) + (x^2 + 8x + 9)$

Method 1

$$\begin{array}{rl} 3x^2 + 5x - 11 & \\ \underline{(+)\ x^2 + 8x + 9} & \text{Align like terms.} \\ 4x^2 + 13x - 2 & \text{Add.} \end{array}$$

Method 2

$$\begin{aligned} &(3x^2 + 5x - 11) + (x^2 + 8x + 9) && \text{Write the expression.} \\ &= (3x^2 + x^2) + (5x + 8x) + (-11 + 9) && \text{Group like terms.} \\ &= 4x^2 + 13x - 2 && \text{Simplify.} \end{aligned}$$

c. $(3x^3 - 2x^2 + 4x + 6) + (-2x^3 + 7x^2 + 5x - 3)$

$$\begin{aligned} &(3x^3 - 2x^2 + 4x + 6) + (-2x^3 + 7x^2 + 5x - 3) && \text{Write the expression.} \\ &= [3x^3 + (-2x^3)] + (-2x^2 + 7x^2) + (4x + 5x) + [6 + (-3)] && \text{Group like terms.} \\ &= x^3 + 5x^2 + 9x + 3 && \text{Simplify.} \end{aligned}$$

The sum is $x^3 + 5x^2 + 9x + 3$.

d. $(x^3 + 3x^2y^2 + 2x^2 + y^3) + (3x^3 - 7x^2y^2 + 5y^3)$

$$\begin{array}{l} (x^3 + 3x^2y^2 + 2x^2 + y^3) \\ \underline{+ (3x^3 - 7x^2y^2 \qquad + 5y^3)} \\ 4x^3 - 4x^2y^2 + 2x^2 + 6y^3 \end{array}$$

Leave a space because there is no other x^2 term.

The sum is $4x^3 - 4x^2y^2 + 2x^2 + 6y^3$.

Example 2 Use Polynomials to Solve a Problem

GEOMETRY The sides of a triangle are given by $2x + 3$, $6x - 4$, and $4x + 1$.

a. Find the perimeter of the triangle.

$P = (2x + 3) + (6x - 4) + (4x + 1)$	Perimeter is the sum of the three sides.
$P = (2x + 6x + 4x) + (3 + -4 + 1)$	Combine like terms.
$P = 12x$	Simplify.

The perimeter of this triangle is given by $12x$.

b. Find the perimeter if $x = 3$.

$P = 12x$	Perimeter of given triangle.
$P = 12(3)$	Replace x with 3.
$P = 36$	

The perimeter of this triangle is 36 units.