

## Adding and Subtracting Polynomials

You have used properties to simplify expressions.

$$4a + 3a - 2 = (4 + 3)a - 2 \\ = 7a - 2$$

Distributive Property  
Substitution Property of Equality

$$5x^2 + 3y + 2x^2 - y = 5x^2 + 2x^2 + 3y - y \\ = (5 + 2)x^2 + (3 - 1)y \\ = 7x^2 + 2y$$

Commutative Property of Addition  
Distributive Property  
Substitution Property of Equality

Suppose you want to add the polynomials  $(3x + 2y)$  and  $(8x + 3y)$ .  
You can use the same properties to find the sums.

**Example 1: Add each of the following.**

a)  $(3x + 2y) + (8x + 3y)$

$$(3x+2y)+(8x+3y)=(3x+8x)+(2y+3y) \\ =(3 + 8)x+(2 + 3)y \\ = 11x + 5y$$

b)  $(-3x^2 + 2x + 7) + (6x^2 - 5x - 3)$

$$(-3x^2+2x+7) + (6x^2-5x-3) = (-3x^2+6x^2) + (2x-5x) + [7+(-3)] \\ = (-3+6)x^2 + [2+(-5)]x + [7+(-3)] \\ = 3x^2 + (-3)x + 4 \\ = 3x^2 - 3x + 4$$

Recall that you can subtract a rational number by adding its additive inverse or opposites. Similarly, you can subtract a polynomial by adding its additive inverse. To find the additive inverse of a polynomial, replace each term by its additive inverse.

Polynomial	Additive Inverse
$x + 2y$	$-x - 2y$
$2x^2 - 3x + 5$	$-2x^2 + 3x - 5$
$-8x + 5y - 7z$	$8x - 5y + 7z$
$3x^3 - 2x^2 - 5x$	$-3x^3 + 2x^2 + 5x$