Name: _____ Date: _____

Subtracting Polynomials Activity

To subtract a polynomial you add its opposite, or subtract each of its terms.

Example A: Subtract $(2x^3 + 8x^2 + x - 10) - (5x^2 - 4x + 6)$ horizontally and vertically.

Horizontally

Step 1: Distribute the negative. $(2x^3 - 8x^2 + x + 10) - (5x^2 - 4x + 6)$

Step 2: Identify like terms. $2x^3 + 8x^2 + x + 10 - 5x^2 + 4x - 6$

Step 3: Group like terms. $2x^3 + (8x^2 - 5x^2) + (x + 4x) + (10 - 6)$

Step 4: Combine coefficients of like terms. $2x^3 + 3x^2 + 5x + 4$

Solution: $(2x^3 + 8x^2 + x + 10) - (5x^2 - 4x + 6) = 2x^3 + 3x^2 + 5x + 4$

MATH TERMS

The **opposite** of a number or a polynomial is its additive inverse.

Vertically

Step 1: Vertically align like terms.

$$\begin{array}{r} 2x^3 + 8x^2 + x + 10 \\ -(5x^2 - 4x + 6) \\ \hline \end{array}$$

Step 2: Distribute the negative.

$$\begin{array}{r} 2x^3 + 8x^2 + x + 10 \\ -5x^2 + 4x - 6 \\ \hline \end{array}$$

Step 3: Combine coefficients of like terms. $2x^3 + 3x^2 + 5x + 4$

Solution: $(2x^3 + 8x^2 + x + 10) - (5x^2 - 4x + 6) = 2x^3 + 3x^2 + 5x + 4$

Try These A: Subtract. Write your answers in standard form.

a. $(5x - 5) - (x + 7)$

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

c. $(y^2 + 3y + 8) - (4y^2 - 9)$

d. $(12 + 5x + 14x^2) - (8x + 15 - 7x^2)$

1. Are the answers to Try These A polynomials? Justify your response.

MATH TIP

Polynomials are *closed* under subtraction. A set is closed under subtraction if the difference of any two elements in the set is also an element of the set.

2. Explain why the difference of two polynomials will always be a polynomial.

3. Subtract the following polynomials. Write your answer in standard form.

   a. $(x^2 + 2x + 3) - (4x^2 - x + 5)$

   b. $(5y^2 + y - 2) - (-y^2 - 3y + 4)$

   c. $(y^4 + y^2 + 2y) - (-y^4 + 3)$

   d. $(9x^2 + x - 12) - (14x^2 - 7x - 2)$

4. Write two polynomials whose difference is $6x + 3$.