Polynomials

Defining Polynomials

Adding Like Terms

Vocabulary

- **<u>Monomials</u> - a number, a variable, or a product of a number and one or more variables.** $4x$, $20x^2yw^3$, -3, a^2b^3, and $3yz$ are all monomials.

- **<u>Polynomials</u> – one or more monomials added or subtracted**
  - $4x + 6x^2$, $20xy - 4$, and $3a^2 - 5a + 4$ are all polynomials.

Like Terms

Like Terms refers to monomials that have the same variable(s) but may have different coefficients. The variables in the terms must have the same powers.

Which terms are like? $3a^2b$, $4ab^2$, $3ab$, $-5ab^2$

$4ab^2$ and $-5ab^2$ are like.

Even though the others have the same variables, the exponents are not the same.

$3a^2b = 3aab$, which is different from $4ab^2 = 4abb$.

Like Terms

Constants are like terms.

Which terms are like? 2x, -3, 5b, 0

-3 and 0 are like.

Which terms are like? 3x, $2x^2$, 4, x

3x and x are like.

Which terms are like? 2wx, w, 3x, 4xw

2wx and 4xw are like.

Adding Polynomials

Add: $(x^2 + 3x + 1) + (4x^2 + 5)$

Step 1: **Underline like terms:**

$$(x^2 + 3x + 1) + (4x^2 + 5)$$

Notice: '3x' doesn't have a like term.

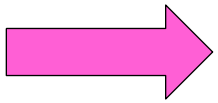
Step 2: **Add the coefficients of *like terms*, do not change the powers of the variables:**

$$(x^2 + 4x^2) + 3x + (1 + 5)$$

$$\mathbf{5x^2 + 3x + 6}$$

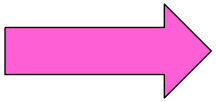
Adding Polynomials

Some people prefer to add polynomials by stacking them.
If you choose to do this, be sure to line up the like terms!

$(x^2 + 3x + 1) + (4x^2 + 5)$ 

$$\begin{array}{r} (x^2 + 3x + 1) \\ +\ (4x^2 \qquad +5) \\ \hline \mathbf{5x^2 + 3x + 6} \end{array}$$

Stack and add these polynomials: $(2a^2+3ab+4b^2) + (7a2+ab+-2b^2)$

$(2a^2+3ab+4b^2) + (7a2+ab+-2b^2)$ 

$$\begin{array}{r} (2a^2 + 3ab + 4b^2) \\ +\ (7a^2 + ab + -2b^2) \\ \hline \mathbf{9a^2 + 4ab + 2b^2} \end{array}$$

Adding Polynomials

- Add the following polynomials; you may stack them if you prefer:

1) $(3x^3 - 7x) + (3x^3 + 4x) = 6x^3 - 3x$

2) $(2w^2 + w - 5) + (4w^2 + 7w + 1) = 6w^2 + 8w - 4$

3) $(2a^3 + 3a^2 + 5a) + (a^3 + 4a + 3) =$

$3a^3 + 3a^2 + 9a + 3$

Subtracting Polynomials

Subtract: $(3x^2 + 2x + 7) - (x^2 + x + 4)$

<u>Step 1</u>: Change subtraction to addition (*Keep-Change-Change.*).

$$(3x^2 + 2x + 7) + (- x^2 + - x + - 4)$$

<u>Step 2</u>: Underline OR line up the like terms and add.

$$\begin{array}{r} (3x^2 + 2x + 7) \\ + (- x^2 + - x + - 4) \\ \hline 2x^2 + x + 3 \end{array}$$

Subtracting Polynomials

- Subtract the following polynomials by changing to addition (Keep-Change-Change.), then add:

1) $\left(x^2 - x - 4\right) - \left(3x^2 - 4x + 1\right) = -2x^2 + 3x - 5$

2) $\left(9y^2 - 3y + 1\right) - \left(2y^2 + y - 9\right) = 7y^2 - 4y + 10$

3) $\left(2g^2 + g - 9\right) - \left(g^3 + 3g^2 + 3\right) = -g^3 - g^2 + g - 12$