Name_____

Like Terms & the Basics of Polynomials

Warm-up Problems

1. Fill in the blanks:

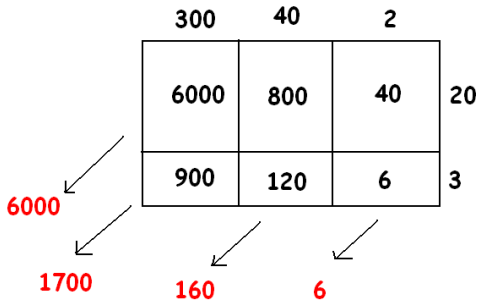
$$8{,}943 = \_\_\_\_\_ \times 1000 + \_\_\_\_\_ \times 100 + \_\_\_\_\_ \times 10 + \_\_\_\_\_ \times 1$$

$$= \_\_\_\_\_ \times 10^3 + \_\_\_\_\_ \times 10^2 + \_\_\_\_\_ \times 10 + \_\_\_\_\_ \times 1$$

2. Fill in the blanks:

$$8{,}943 = \_\_\_\_\_ \times 20^3 + \_\_\_\_\_ \times 20^2 + \_\_\_\_\_ \times 20 + \_\_\_\_\_ \times 1$$

3. Gisella computed 342×23 as follows:



Can you explain what she is doing? What is her final answer?

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Like Terms & the basics of Polynomials

Lesson Summary

A *monomial* is a polynomial expression generated using only the multiplication operator (__×__). Thus, it does not contain + or – operators. Monomials are written with numerical factors multiplied together and variable or other symbols each occurring one time (using integer exponents to condense multiple instances of the same variable)

Examples:

A *polynomial* is the sum (or difference) of monomials.

Examples:

The *degree* of a monomial is the sum of the exponents of the variable symbols that appear in the monomial.

Examples:

The *degree* of a polynomial is the degree of the monomial term with the highest degree.

Examples:

To *simiplify* a polynomial, distribute and combine *like terms* (terms with same variable expressions).

Examples:

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Classwork Problems

1. Celina says that each of the following expressions is actually a binomial in disguise:

   i. $5abc - 2a^2 + 6abc$

   ii. $5x^3 \cdot 2x^2 - 10x^4 + 3x^5 + 3x \cdot (-2)x^4$

   iii. $(t+2)^2 - 4t$

   iv. $5(a-1) - 10(a-1) + 100(a-1)$

   v. $(2\pi r - \pi r^2)r - (2\pi r - \pi r^2) \cdot 2r$

   For example, she sees that the expression in (i) is algebraically equivalent to $11abc - 2a^2$, which is indeed a binomial. (She is happy to write this as $11abc + (-2)a^2$, if you prefer.)

   Is she right about the remaining four expressions?

2. Janie writes a polynomial expression using only one variable, x, with degree 3. Max writes a polynomial expression using only one variable, x, with degree 7.

   a. What can you determine about the degree of the sum of Janie and Max's polynomials?

   b. What can you determine about the degree of the difference of Janie and Max's polynomials?

3. Suppose Janie writes a polynomial expression using only one variable, x, with degree of 5 and Max writes a polynomial expression using only one variable, x, with degree of 5.

   a. What can you determine about the degree of the sum of Janie and Max's polynomials?

   b. What can you determine about the degree of the difference of Janie and Max's polynomials?

4. The expression $10x^2 + 6x^3$ is the result of applying the distributive property to the expression $2x^2(5+x)$. It is also the result of the applying the distributive property to $2(5x^2 + 3x^3)$ or to $x(10x + 6x^2)$, for example, or even to $1 \cdot (10x^2 + 6x^3)$!

   For (i) to (x) below, write down an expression such that if you applied the distributive property to your expression it will give the result presented. Give interesting answers!

   i. $6a + 14a^2$

   ii. $2x^4 + 2x^5 + 2x^{10}$

   iii. $6z^2 - 15z$

   iv. $z^2(a+b) + z^3(a+b)$

   v. $\frac{3}{2}s^2 + \frac{1}{2}$

   vi. $15p^3r^4 - 6p^2r^5 + 9p^4r^2 + 3\sqrt{2}p^3r^6$

   vii. $(4x+3)(x^2+x^3) - (2x+2)(x^2+x^3)$

5. Sammy wrote a polynomial using only one variable, x, of degree 3. Myisha wrote a polynomial in the same variable of degree 5. What can you say about the degree of the product of Sammy and Myisha's polynomials?

6. Find a polynomial that, when multiplied by $2x^2 + 3x + 1$, gives the answer $2x^3 + x^2 - 2x - 1$.

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Skills Practice

1. Find each sum or difference by combining the parts that are alike.

   a. $(2p + 4) + 5(p - 1) - (p + 7)$

   b. $(7x^4 + 9x) - 2(x^4 + 13)$

   c. $(6 - t - t^4) + (9t + t^4)$

   d. $(5 - t^2) + 6(t^2 - 8) - (t^2 + 12)$

   e. $(8x^3 + 5x) - 3(x^3 + 2)$

   f. $(12x + 1) + 2(x - 4) - (x - 15)$

   g. $(13x^2 + 5x) - 2(x^2 + 1)$

   h. $(9 - t - t^2) - \frac{3}{2}(8t + 2t^2)$

   i. $(4m + 6) - 12(m - 3) + (m + 2)$

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2. Use the distributive property to write each of the following expressions as the sum of monomials.

a. $3a(4+a)$

b. $x(x+2)+1$

c. $\frac{1}{3}(12z+18z^2)$

d. $4x(x^3-10)$

e. $(x-4)(x+5)$

f. $(2z-1)(3z^2+1)$

g. $(10w-1)(10w+1)$

h. $(-5w-3)w^2$

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Challenges

$$3xz(9xy + z) - 2yz(x + y - z)$$

$$(t - 1)(t + 1)(t^2 + 1)$$