Name: Key Date: _____
Algebra

Chapter 7 Review

7.1 – Multiplying Monomials

- Rule #1: Product of Powers
  - Example: $w^3 \cdot w^5 = w^{3+5} = w^8$
- Rule #2: Power of a Power
  - Example: $(x^2)^5 = x^{2 \cdot 5} = x^{10}$
- Rule #3: Power of a Product
  - Example: $(3x^4)^2 = 3^2 \cdot x^{4 \cdot 2} = 9x^8$

- Directions: Simplify the following expressions:

1) $(a^6)(a^4)(a)$

a^{6+4+1}

a^{11}

2) $(-3c^4d)(-cd^2)$

$3c^5d^3$

3) $(p^2)^{11}$

$p^{2(11)}$

p^{22}

4) $(4pr^3)^2$

$4^2p^2r^6$

$16p^2r^6$

7.2 – Dividing Monomials

- Rule #1: Quotient of Powers
  - Example: $\frac{w^8}{w^3} = w^{8-3} = w^5$
- Rule #2: Power of a Quotient
  - Example: $\left(\frac{m}{4}\right)^2 = \frac{m^2}{4^2} = \frac{m^2}{16}$
- Zero Exponent Rule: Anything to the zero power equals 1!
  - Example: $4^0 = 1$
  - Example: $2abc^0 = 2ab$
  - Example: $\left(\frac{xyz}{456}\right)^0 = 1$
- Negative Exponent Rule: We DO NOT LIKE negative exponents! So if they are in the numerator, move to the denominator. If they are in the denominator, move to the numerator.
- Directions: Simplify the following expressions. Assume the no denominator equals zero:

1) $\frac{3^5}{3^2}$

$3^3 = 27$

2) $(\frac{a^4b^3}{a^4b})^2$

$\frac{a^8b^6}{a^8b^2} = b^4$

3) $(\frac{16p^5w^2}{2p^3w^3})^0$

1

4) $(\frac{4}{3})^{-2}$

$\left(\frac{3}{4}\right)^2 = \frac{3^2}{4^2} = \frac{9}{16}$

5) $(k^{-1})(l^{-6})(m^3)$

$\frac{m^3}{k^1 l^6}$

6) $\frac{-10s^0t^{-2}}{2t^3}$

$\frac{-10}{2t^5} = \frac{-5}{t^5}$

7.4 – Polynomials

- Know the difference between a monomial, binomial, trinomial and polynomial.
  - Examples: Determine whether the following terms are a monomial (one term), binomial (two terms), trinomial (three terms) or a polynomial (four or more terms).
    1) $2w + 10$ binomial
    2) $-m^2 + 6m - 9$ trinomial
    3) -11 monomial
    4) $3x^3 - x^2 + 5x - 4$ polynomial

- Know how to find the degree (highest exponent) of a polynomial.
  - Examples: Find the degree of each polynomial.
    1) 21 0
    2) $6r^4$ 4
    3) $a + 8$ 1
    4) $abc - 12b^2 + 13$ 3

- Know how to write a polynomial in standard form (largest to smallest exponent) and identify the leading coefficient (the number in front).
  - Examples: Write each polynomial in standard form. Then identify the leading coefficient.
    1) $x + 7 - 4x^2$ $-4x^2 + x + 7$ L.C. $= -4$
    2) $6x^2 - 1 + x^3 + x$ $x^3 + 6x^2 + x - 1$ L.C $= 1$

7.5 – Adding and Subtracting Polynomials

- Recall that you can either add or subtract horizontally or vertically.
- YOU ONLY HAVE TO SOLVE USING ONE METHOD, NOT BOTH!
- Recall that if you do not like subtraction signs, distribute the negative or change it to plus a negative.
    - Examples: Find each sum or difference.

1) $(3b + 5) + (-10b + 1)$

$3b+5$
$-10b+1$
$\boxed{-7b+6}$

2) $(-5x^2 + 13x) - (4x - 12x^2)$

$+(-4x+12x^2)$

$-5x^2+13x+0$
$12x^2-4x+0$
$\boxed{7x^2+9x}$

3) $(6x^2 - x + 1) - (-4 + 2x^2 + 8x)$

$+(4-2x^2-8x)$

$6x^2-x+1$
$-2x^2-8x+4$
$\boxed{4x^2-9x+5}$

4) $(2x + 6y - 3z) + (4x + 6z - 8y) - (x - 3y + z)$

$+(-x+3y-z)$

$2x+6y-3z$
$4x-8y+6z$
$+\ -x+3y-z$
$\boxed{5x+y+2z}$

7.6 – Multiplying a Monomial by a Polynomial

- Multiplying by a number.
  - Example: $3(2x^2 - 6x + 10)$

    $6x^2 - 18x + 30$
- Multiplying by a variable.
  - Example: $x(-4x - 12)$

    $-4x^2 - 12x$
- Multiplying by a number and a variable.
  - Example: $4x^2(2x^4 - 6x^3 + 2x^2 - 8x)$

    $8x^6 - 24x^5 + 8x^4 - 32x^3$
- Distribute and then add or subtract.
  - Example: $w(3w + 2) + 5w$

    $3w^2 + 2w + 5w$

    $\boxed{3w^2 + 7w}$
  - Example: $4b(-5b - 3) - 2(b^2 - 7b - 4)$

    $-20b^2 - 12b - 2b^2 + 14b + 8$

    $\boxed{-22b^2 + 2b + 8}$
- Solve the equation.
  - Example: $2(4x + 2) - 8 = 4(x + 3)$

    $8x + 4 - 8 = 4x + 12$

    $8x - 4 = 4x + 12$

    $4x - 4 = 12$

    $4x = 16$

    $\boxed{x = 4}$
- Know the formulas for:
  - The area of a rectangle. $A = lw$
  - The area of a triangle. $A = \frac{1}{2}bh$

7.7 – Multiplying Polynomials by Polynomials

- Multiply a binomial by a binomial
  - Remember there are three methods you can pick from:
    - FOIL
    - Distribute
    - Box Method
  - Example: $(a+5)(a-6)$

F $a \cdot a = a^2$
O $a \cdot -6 = -6a$
I $5 \cdot a = 5a$
L $5 \cdot -6 = -30$

$a^2 - a - 30$

  - Example: $(4m+6)(m-4)$

F $4m \cdot m = 4m^2$
O $4m \cdot -4 = -16m$
I $6 \cdot m = 6m$
L $6 \cdot -4 = -24$

$4m^2 - 10m - 24$

- Multiply a binomial by a trinomial
  - Remember there are two methods you can pick from:
    - Distribute
    - Box Method
  - Example: $(t+3)(t^2+4t+7)$

$t(t^2+4t+7) + 3(t^2+4t+7)$

$t^3 + 4t^2 + 7t + 3t^2 + 12t + 21$

$t^3 + 7t^2 + 19t + 21$

- Multiply a trinomial by a trinomial
  - Remember there are two methods you can pick from:
    - Distribute
    - Box Method
  - Example: $(2c^2+c+3)(4c^2+2c-2)$

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

$8c^4 + 4c^3 - 4c^2 + 4c^3 + 2c^2 - 2c + 12c^2 + 6c - 6$

$8c^4 + 8c^3 + 10c^2 + 4c - 6$

7.8 – Special Products

- **Product of a Sum and Difference:** $(a+b)(a-b) = a^2 - b^2$
  - Example: $(x+9)(x-9)$

    $x^2 - 81$

  - Example: $(2a-6)(2a+6)$

    $4a^2 - 36$

  - Example: $(4x-2y)(4x+2y)$

    $16x^2 - 4y^2$

- **Product of a Sum:** $(a+b)^2 = a^2 + 2ab + b^2$
  - Example: $(x+4)^2$

    $x^2 + 8x + 16$

  - Example: $(3x+5)^2$

    $9x^2 + 30x + 25$

  - Example: $(5x+2y)^2$

    $25x^2 + 20xy + 4y^2$

- **Product of a Difference:** $(a-b)^2 = a^2 - 2ab + b^2$
  - Example: $(w-6)^2$

    $w^2 - 12w + 36$

  - Example: $(4z-2)^2$

    $16z^2 - 16z + 4$

  - Example: $(-3g-3h)^2$

    $9g^2 - -18gh + 9h^2$.

    $9g^2 + 18gh + 9h^2$