Name: KEY Hour: _____ Date: _____

NOTES: Section 5.3 – Add, Subtract, and Multiply Polynomials

Goals: #1 - I can add and subtract polynomials.

#2 - I can multiply polynomials.

#3 - I can multiply special polynomials.

Homework: Lesson 5.3 Worksheet

Notes:

To add or subtract polynomials, simply combine like terms.

Example #1: Find the sum or difference.

1. $(3y^3 - 7y - 2y^2) + (2y - 5 - 4y^2)$

$3y^3 - 2y^2 - 4y^2 - 7y + 2y - 5$

$\boxed{3y^3 - 6y^2 - 5y - 5}$

2. $(3x^3 + 2x^2 - x + 7) - (8x^3 - x^2 - 5x + 1)$

$3x^3 - 8x^3 + 2x^2 + x^2 - x + 5x + 7 - 1$

$\boxed{-5x^3 + 3x^2 + 4x + 6}$

You practice: Find the sum or difference.

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

$t^2 + 5t^2 - 6t - t + 2 - 8$

$\boxed{6t^2 - 7t - 6}$

2. $(8d - 3 + 9d^3) - (d^3 - 13d^2 - 4)$

$9d^3 - d^3 + 13d^2 + 8d - 3 + 4$

$\boxed{8d^3 + 13d^2 + 8d + 1}$

Notes:

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To multiply polynomials, simply DISTRIBUTE!.

Example #2: Find the product of the polynomials.

1. $(y-2)(-2y^2+3y-6)$

$y(-2y^2+3y-6)-2(-2y^2+3y-6)$

$-2y^3+3y^2-6y+4y^2-6y+12$

$\boxed{-2y^3+7y^2-12y+12}$

2. $(x-5)(x+1)(x+3)$

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

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

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

$x^3-4x^2-5x+3x^2-12x-15$

$\boxed{x^3-x^2-17x-15}$

You practice: Find the product of the polynomials.

1. $(3x^2-2x+4)(x+3)$

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

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

$3x^3-2x^2+4x+9x^2-6x+12$

$\boxed{3x^3+7x^2-2x+12}$

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

$\boxed{28x^3-21x^2}$

Notes:

There are special product patterns we can look for!

Sum and Difference

$(a+b)(a-b)=a^2-b^2$

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

$(x+4)(x-4)=x^2-16$

Square of a Binomial

$(a+b)^2=a^2+2ab+b^2$

$(a-b)^2=a^2-2ab+b^2$

$(y)^2+2(y)(3)+(3)^2$

$(y+3)^2=y^2+6y+9$

$(3z^2)^2-2(3z^2)(-5)+(5)^2$

$(3z^2-5)^2=9z^4-30z^2+25$

Cube of a Binomial

$(a+b)^3=a^3+3a^2b+3ab^2+b^3$

$(a-b)^3=a^3-3a^2b+3ab^2-b^3$

$(x)^3+3(x)^2(2)+3(x)(2)^2+(2)^3$

$(x+2)^3=x^3+6x^2+12x+8$

$(p)^3-3(p)^2(3)+3(p)(3)^2-(3)^3$

$(p-3)^3=p^3-9p^2+27p-27$

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1. $(3t + 4)(3t - 4)$

$(3t)^2 - (4)^2$

$9t^2 - 16$

2. $(8x - 3)^2$

$(8x)^2 - 2(8x)(3) + (3)^2$

$64x^2 - 48x + 9$

3. $(pq + 5)^3$

$(pq)^3 + 3(pq)^2(5) + 3(pq)(5)^2 + (5)^3$

$p^3q^3 + 15p^2q^2 + 75pq + 125$

You practice: Find the product of the polynomials.

1. $(xy - 4)^3$

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

$x^3y^3 - 12x^2y^2 + 48xy - 64$

2. $(5y - 3)(5y + 3)$

$(5y)^2 - (3)^2$

$25y^2 - 9$

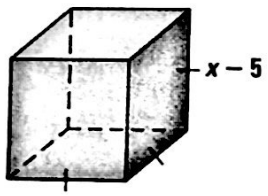
3. $(4a + 7)^2$

$(4a)^2 + 2(4a)(7) + (7)^2$

$16a^2 + 56a + 49$

Example #4: Write the figure's volume as a polynomial in standard form.

1. $V = s^3$

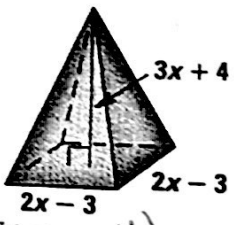


$V = (x - 5)^3$

$V = (x)^3 - 3(x)^2(5) + 3x(5)^2 - (5)^3$

$V = x^3 - 15x^2 + 75x - 125$

2. $V = \frac{1}{3}Bh$



$V = \frac{1}{3}(2x - 3)^2(3x + 4)$

$= \frac{1}{3}((2x)^2 - 2(2x)(3) + (3)^2)(3x + 4)$

$= \frac{1}{3}(4x^2 - 12x + 9)(3x + 4)$

$= \frac{1}{3}(3x(4x^2 - 12x + 9) + 4(4x^2 - 12x + 9))$

$= \frac{1}{3}(12x^3 - 36x^2 + 27x + 16x^2 - 48x + 36)$

$= \frac{1}{3}(12x^3 - 20x^2 - 21x + 36)$

$V = 4x^3 - \frac{20}{3}x^2 - 7x + 12$