Name:

UNIT 4 LEARNING GUIDE – POLYNOMIALS

INSTRUCTIONS:

Using a pencil, complete the following questions as you work through the related lessons. Show ALL of your work as is explained in the lessons. Do your best and always ask questions if there is anything that you don't understand.

4.1 POLYNOMIALS

1. Circle the coefficient(s) in each example.

   a. $3n - 1$ b. $6 + 4x - 5y + x^3$ c. $5x^2 + 8y - 4xyz$

2. How many terms are in each polynomial?

   a. $3n - 1$ b. $6 + 4x - 5y + x^3$ c. $2x^2 + 8y - 4xyz$

3. In your own words, explain why the terms in **bold** are called constants.

   $$4x - \mathbf{3} + 5y + \mathbf{21}$$

   _____

4. How many variables are found in each polynomial? *Reminder: Even if the same variable appears more than once in a polynomial, it would only count as one variable.*

   a. $3n - 1$ b. $6 + 4x - 5y + x^3$ c. $2x^2 + 8y - 4x$

5. Determine the degree of each **term**. *Reminder: A variable with no exponent has a degree of 1.*

   Ex. $3xy^3$ ***4th degree*** b. r^3s^5 d. $2a^2bc^2$

   a. $10w$ c. 4 e. $7x^{11}$

6. Determine the degree of each **polynomial**. *Reminder: The degree of a polynomial comes from the term with the highest degree.*

   a. $3n - 1$ b. $6 + 4x - 5y + x^3$ c. c. $2x^2 + 8y - 4xyz$

7. Fill in the chart.

	Polynomial	# of Terms	Name	Co-efficient(s)	Constant(s)	Variable(s)	Degree of Polynomial
a.	$12h - 63$					h	
b.	$x - 2y^4 + 5xy^6$		Trinomial				7
c.	$2r^2 - 6r + 1$			2, -6			
d.	$ab + 9 - c^3 + d$	4					
e.	$7w^2hd^4l$				none		

8. Rewrite the following polynomials in Standard Form. *<u>Reminder</u>: In standard form, terms of a polynomial are listed from highest to lowest degree.*
   a. $6r - 5 + r^2$

   b. $33 - 5ab + a^2b^2$

   c. $ab + 9 - c^3 + d$

   d. $10x - 9y^5 + 4z^2 - 2x^3y^2z + 1$

4.2 Simplify Polynomials

1. Find the like terms to the term that is given.

Ex.	$\boldsymbol{3a^2b}$	$-a^2b$	~~$4ab^2$~~	~~$3ab$~~	~~$3a^2$~~	$6a^2b$
a.	$\boldsymbol{-7xy}$	$40xy$	yx	-7	xy	$-12yx$
b.	$\boldsymbol{-8}$	$-8x$	$-x$	16	1	$-8x^2$
c.	$\boldsymbol{r^2s^3t^2}$	r^2s^3t	$-15r^2s^3t^2$	r^2	$25s^3r^2t^2$	$2rs^3t^2$

2. Combine the like terms in order to simplify each polynomial to one term.

Ex. $4x^2y + 5x^2y - yx^2$

$\boldsymbol{4 + 5 - 1 \rightarrow 8x^2y}$

a. $7w - 5w + 3w$

b. $-pq^2 - 15pq^2 + 4pq^2 - 2pq^2$

c. $50x^2y^3 + 25x^2y^3 - y^3x^2$

3. Simplify the polynomials by combining like terms. *<u>Reminder</u>: Always write your answer in standard form.*

Ex. $4xy + 8y^2 - 7 + 3xy$

$\boldsymbol{8y^2 + 7xy - 7}$

a. $10 - 6a^2b - 15 + ab$

b. $-5h^2 - 8h + 4 - 2h$

c. $5xy - x^3 + 2 - 2xy$

d. $-5r^2 + 7 - r^2 + 6r^2$

e. $9m^3n^2 + 2mn - 4m + 6m^3n^2$

4. Simplify the polynomials by combining like terms.

a. $16mn + 9 - 8m^2n^2 + 2 - 7mn$

b. $-20s + 4s^2 + 12s - 4 + 7s^2$

c. $ab + 5ba - a^2b + 5a^2b - 15ab$

d. $-1 + 3z - z^2 + 14z - 12 + 6z^2$

e. $5xy + 12x^2y - 2xy + 7xy^2 - 14x^2y + 12$

f. $21d^2 + 3d^3 - 14d + 8 - 6d^3 + 13d^2 - 10d^3 - 4$

5. Use the polynomial and its solution below to answer the following questions.

Solve $5x + 6x^2 - 3x + 4 - 5x^2$ if $x = 7$.

Solution:
$$5(7) + 6(7)^2 - 3(7) + 4 - 5(7)^2$$
$$5(7) + 6(49) - 3(7) + 4 - 5(49)$$
$$35 + 294 - 21 + 4 - 245$$
$$67$$

a. Is the solution to this polynomial correct? _____

b. What could have been done to reach the answer more easily?

_____

c. Re-evaluate the polynomial above using the technique that you identified in #5a.

6. Evaluate the following polynomials. *<u>Reminder</u>: Simplify the polynomial before replacing the value of the variable(s). Don't forget about Order of Operations (BEDMAS).*

a. $19f + 6f^2 - 11 - 21f + 3 - 3f^2$ if $f = 4$

b. $5y^2 - 7 + 6y - 4y^2 + 2y$ if $y = 5$

c. $13a - 35 + 5a^3 - 10a - 4a^3$ if $a = 3$

d. $-4xy + 12x^2 - 10y^2 - 10x^2 + 9y^2$ if $x = 3$ and $y = 6$

4.3 ADD/SUBTRACT POLYNOMIALS

1. Simplify the following polynomials. *Reminder: Always put your answers in Standard Form.*

Ex. $(x^3 + 7x^2 - 4x + 2) + (4x^3 - x + 8)$

$$x^3 + 7x^2 - 4x + 2 + 4x^3 - x + 8$$

$$x^3 + 4x^3 + 7x^2 - 4x - x + 2 + 8$$

$$5x^3 + 7x^2 - 5x + 10$$

a. $(10n^2 - 6n + 7) + (2n^2 + 4n)$

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

c. $(3ab + 4b^2 - 8a^2) + (7b^2 - 2ab + a^2)$

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

2. Add the following polynomials using the vertical method.

Ex. $(3y^2 - 2xy + x + 5) + (8y^2 - 6xy - 1) + (3xy + 4x - 2)$

$$\begin{array}{rl} & 3y^2 - 2xy + x + 5 \\ & 8y^2 - 6xy - 1 \\ + & \quad 3xy + 4x - 2 \\ \hline & \mathbf{11y^2 - 5xy + 5x - 2} \end{array}$$

a. $(2r^3 + 6r^2 - 4r - 2) + (4r^3 - 5r + 7) + (4r^2 + 8r - 1)$

b. $(-6a^4 + 5a^3 - 7a + 14) + (12a^3 - 8a^2 + 3) + (10a^4 - 6a + 5)$

c. $(20x - 15 + 35x^2) + (6 + 14x - 16x^2) + (7x^2 - 11x + 3)$

3. Rewrite each polynomial by distributing the negative sign. *Reminder: Always write your answers in standard form.*

Ex. $-(4x - 2)$

$\mathbf{-4x + 2}$

a. $-(y - 7)$

b. $-(-5c + 5)$

c. $-(10 + 3a - 9a^2)$

d. $-(-4b - 6b^2 - 22)$

e. $-(8f^4 - 15f + 3f^2)$

4. Simplify. *Hint: First, distribute the negative sign, then combine like terms.*

a. $(6x^2 + 2x - 5) - (3x^2 - x + 2)$

b. $(-4y^2 - 5y + 10) - (2y - 7y^2 + 1)$

c. $(9m^2 - 3mn + 7n) - (-m^2 + 2n - 8)$

d. $(3a^3 + 4a^4 - 1) - (5a^3 - 2a + 2) - (-6a^2 + a)$

5. Use all of the skills that you have learned so far to solve these polynomials.

   a. $(5x^2 - 6x + 2) - (-3x + 5) + (x^2 + 10)$ if $x = 3$

   b. $-(8xy - 3y^2) + (7x^2 + 5xy) - (-3y^2 + 9x^2)$ if $x = 4$ and $y = 6$

UNIT 4 – ANSWER KEY

SECTION 4.1

1. a. 3 b. 4, -5, 1 c. 5, 8, -4
2. a. 2 b. 4 c. 3
3. The terms are called constants because their value is not affected when the value of the variable changes.
4. a. 1 b. 2 c. 3
5. a. 1 b. 8 c. 0 d. 5 e. 11
6. a. 1 b. 3 c. 3
7.

	Polynomial	# of Terms	Name	Co-efficient(s)	Constant(s)	Variable(s)	Degree of Polynomial
a.	$12h - 63$	**2**	**Binomial**	**12**	**-63**	*h*	**1**
b.	$x - 2y^4 + 5xy^6$	**3**	Trinomial	**1, -2, 5**	**none**	***x, y***	7
c.	$2r^2 - 6r + 1$	**3**	**Trinomial**	2, -6	**1**	***r***	**2**
d.	$ab + 9 - c^3 + d$	4	**Polynomial**	**1, -1**	**9**	***a, b, c, d***	**3**
e.	$7w^2hd^4l$	**1**	**Monomial**	**7**	none	***w, h, d, l***	**8**

8. a. $r^2 + 6r - 5$ b. $a^2b^2 - 5ab + 33$ c. $-c^3 + ab + d + 9$
   d. $-2x^3y^2z - 9y^5 + 4z^2 + 10x + 1$

SECTION 4.2

1. a. $40xy,\ yx,\ xy,\ -12yx$ b. $16, 1$ c. $-15r^2s^3t^2,\ 25s^3r^2t^2$
2. a. $5w$ b. $-14pq^2$ c. $74x^2y^3$
3. a. $-6a^2b + ab - 5$ b. $-5h^2 - 10h + 4$ c. $-x^3 + 3xy + 2$ d. 7
   e. $15m^3n^2 + 2mn - 4m$
4. a. $-8m^2n^2 + 9mn + 11$ b. $11s^2 - 8s - 4$ c. $4a^2b - 9ab$ d. $5z^2 + 17z - 13$

e. $-2x^2y + 7xy^2 + 3xy + 12$ f. $-13d^3 + 34d^2 - 14d + 4$

5. a. Yes b. Simplify by combining like terms prior to solving. c. $x^2 + 2x + 4 = 67$
6. a. 32 b. 58 c. 1 d. -90

SECTION 4.3

1. a. $12n^2 - 2n + 7$ b. $3y^3 - 2y^2 + 3y + 4$ c. $-7a^2 + 11b^2 + ab$ d. $-3x + 5$
2. a. $6r^3 + 10r^2 - r + 4$ b. $4a^4 + 17a^3 - 8a^2 - 13a + 22$ c. $26x^2 + 23x - 6$
3. a. $-y + 7$ b. $5c - 5$ c. $9a^2 - 3a - 10$ d. $6b^2 + 4b + 22$ e. $-8f^4 - 3f^2 + 15f$
4. a. $3x^2 + 3x - 7$ b. $3y^2 - 7y + 9$ c. $10m^2 - 3mn + 5n + 8$
   d. $4a^4 - 2a^3 + 6a^2 + a - 3$
5. a. 52 b. 112