The Asian International School
Unit Backward Design
Mathematics, Pre-Intermediate, 2018-2019
Chpater 1, Unit 1: Polynomials

Stage 1 - Desired Results

Established Goal(s):

At the end of the unit, students will be able to:
- identify polynomials
- classify polynomials as monomial, binomial, trinomial and multinomial
- perform addition and subtraction of polynomials

Understanding(s):	**Essential Question(s):**
Students will understand that… • polynomials can be classified as monomial, binomial, trinomial or multinomial • addition or subtraction of polynomials can only be done for similar polynomials	• What are the uses of polynomials in our real life? • How is knowledge on polynomials help in solving real-life problems?
Knowledge:	**Skills:**
Students will know … • polynomial expressions • monomial, binomial, trinomial and multinomial • similar polynomials	*Student will be able to:* • classify monomial, binomial, trinomial • add or subtract polynomials

Stage 2 - Assessment Evidence

Performance Task(s):	**Other Evidence:**
• Make a game board involving addition and subtraction of polynomials.	• Homework • Mini-Tests

Stage 3 – Learning Plan

Learning Activities:

Key Ideas

Polynomial – an algebraic expression that contains finite number of terms with combination of variables, whole number exponents of variables and constants

Degree of a polynomial – the highest exponent of its monomial
Term – expressions separated by + or − operations
Monomial – a polynomial expression with only one term
Binomial – a polynomial expression with two terms
Trinomial – a polynomial expression with three terms
Standard form – polynomial expression written in decreasing degree of its term

Tell whether the given expression is polynomial or not.

1. 2xy

2. $-4x^2$

3. 3x + 4

4. $(x+3)^{-2}$

5. $(15)^{-2}$

6. $2x^3 - 8$

7. $\frac{3}{2}x - 1$

8. $\frac{2}{x}$

9. $\frac{x+1}{4}$

10. $(2x - 3)(4xy)$

Classify the following polynomials as monomial, binomial, or trinomial.

1. 2x + 1

2. 4xy

3. 5 + 2x −3y

4. −5x + 7y

5. 3(2x+1)

6. $(4x - 1)^2$

7. 8x + 4y + 1

8. $\frac{7x+1}{4}$

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

10. $9x^2 - (9 - x)^2$

Determine the degree of the following polynomials

1. $4x^2y^2 + x^4y + 3$

2. $8xyz - 6x^2 + 12y^2 + z$

3. $17a^3b^2 + a^3b^4 - 15$

4. $5m^2 + 3m - 4$

5. $18n + 9n^2 - 14n^4 + 14n^6$

6. $(2x^2y^2z)^2$

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

8. $(2x)^0$

9. -8

10. $2^2x^3y - 5x^4y + 2xy^2 - 5xy$

Add or subtract the following polynomials.

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

2. $(4 - 5n^3) - (4n^3 + 3)$

3. $(5a + 3) + (2a - 4)$

4. $(12m^4 + 9m^5 + 6m^2 + 4) - (3m^5 + 9m^4 - 4m^2 - 6)$

5. $(-3k^4 + 8k^3 + k + 4) - (4k^2 + 5k^3 - 2k - 4)$

6. $(6 - 4n^3 - 11n) - (2n^3 + 8 + 14n^3)$

7. $4 - (8 + 3t^4 - 5t^2 - 5t)$

8. $(3m^2n + 3) + (5mn^2 + 8) - (6m^2n^2 + 15)$

9. $(7mn + 8m^2n - 5mn^2) + (6mn^2 - 8mn + 7m^2n) + (9m^2n^2 + 3mn - mn^2)$

10. $(2a + 3a^2 - 5a^3) + (14a^2 - 5a + 7a^3) + (8a^2 + 3a - a^3)$

Stage 1 - Desired Results

Established Goal(s):

At the end of the unit, students will be able to:
- multiply polynomials

Understanding(s):
Students will understand that…

- rules of exponents are used in multiplying polynomials

Essential Question(s):

- What are the real-life applications of multiplying materials?

Knowledge:
Students will know …

- the set of rational numbers and the set of irrational numbers are disjoint set,
- irrational numbers cannot be expressed as a ratio between two numbers and cannot be written as a simple fraction.

Skills:
Student will be able to:

- compute unit rates
- simplify square roots
- estimate square roots

- identify positions of irrational number in the real number line

Stage 2 - Assessment Evidence

Performance Task(s):

- Using the concept of irrational numbers, you are going to design a board game for the class. The game must include the application of irrational numbers in real life. Your grade will be based on how much information on irrational numbers will be used to play the game.

Other Evidence:

- Homework

- Mini-Tests

Stage 3 – Learning Plan

Learning Activities:
Multiply with monomials

$$a^m \cdot a^n = a^{m+n}$$

Examples:

1. $(x^3)(x^2) = x^{3+2}$

$= x^5$

2. $(4xy^2)(2x^2y) = (4)(2)(x^{1+2})(y^{2+1})$

$$= 8x^3y^3$$

3. $(-6x^2y^4)(8x^4y^4) = (-6)(8)(x^{2+4})(y^{4+4})$

$$= -48x^6y^8$$

Monomial by binomial or trinomial

   a (b + c) = ab + ac   **a (b + c + d) = ab + ac + ad**

Examples:

1. $2(x + y) = 2x + 2y$

2. $2x^2 (3x + 4) = (2x^2)(3x) + (2x^2)(4)$

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

$$= 6x^3 + 8x^2$$

3. $5xy (4x + 3y + 5) = (5xy)(4x) + (5xy)(3y) + (5xy)(5)$

$$= (5)(4)(x^{1+1})(y) + (5)(3)(x)(y^{1+1}) + (5)(5)(x)(y)$$

$$= 20x^2y + 15xy^2 + 25xy$$

Binomial by binomial

   (a + b) (c + d) = ac + ad + bc + bd   **(a+b) (c+d+e) = ac+ad+ae+bc+bd+be**

Examples:

1. $(x+3)(x+2) = (x)(x) + (x)(2) + (3)(x) + (3)(2)$

$$= x^2 + 2x + 3x + 6$$

$$= x^2 + 5x + 6$$

2. $(x^2 + 3)(x + 1) = (x^2)(x)+(x^2)(1)+(3)(x)+(3)(1)$

$$= x^3 + x^2 + 3x + 3$$

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

$$= 2x^3 + (-3x^2) + x + 4x^2 + (-6x) + 2$$

$$= 2x^3 + x^2 - 5x + 2$$

- Give practice exercises for this lesson.

- Introduce special products.

Special Products

Distributive law : $\qquad$ $a(b + c) = ab + bc$

Square of Binomial (SOB) : $\qquad$ $(a + b)^2 + a^2 + 2ab + c^2$ $\qquad$ $(a - b)^2 + a^2 - 2ab + c^2$

Difference of Two Squares (DOTS) : $(a + b)(a - b) = a^2 - b^2$

Cube of Binomial (COB) : $\qquad$ $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

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

Simplify the following expressions.

1. $4x(2x+3) =$

2. $-8x(6 - 2x) =$

3. $12xy(2x + 3y) =$

4. $(-7x + 2y)(-4xy) =$

5. $(8 + 3x)(-6x^2y)$

6. $(3x + 1)(3x + 1) =$

7. $(-2x - 4)(2x + 4) =$

8. $(4x + 1)(4x - 1) =$

9. $(5 - 3x)(3x + 5) =$

10. $(8x + 3)(8x - 3) =$