Math 2
Unit 2 – Quadratic Functions
Lesson 4 – Operations with Polynomials

Name_____
Date_____ Pd____

- A **POLYNOMIAL** is a monomial or the sum of two or more monomials.
- A polynomial is in simplest form when there are no parentheses and no like terms.

  - Operations with Polynomials
    - **Addition**: Combine Like Terms
    - **Subtraction**: Distribute (-1) and then combine like terms
    - **Multiplication**: FOIL or Box Multiplication or Distribute and then combine like terms
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- EXAMPLES:

1. **Add:**

$(4x^3 + 2x^2 + 5x + 8) + (3x^3 - 4x^2 - 9x + 2)$

$7x^3 - 2x^2 - 4x + 10$

2. **Add:**

$(7p^2 - 4p) + (3p^2 + 2p - 5)$

$10p^2 - 2p - 5$

3. **Subtract:**

$(4x^3 + 2x^2 + 5x + 8) - (3x^3 + 4x^2 + 9x - 2)$

$x^3 + 6x^2 + 14x + 6$

4. **Subtract:**

$(7p^2 - 4p) - (3p^2 - 2p + 5)$

$4p^2 - 6p + 5$

5. **Multiply:**

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

$x^2 + 3x - 2x - 6$

$x^2 + x - 6$

6. **Multiply:**

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

$6x^2 + 2x - 15x - 5$

$6x^2 - 13x - 5$

7. **Multiply:**

$(4x - 1)(4x - 1)$

$16x^2 - 4x - 4x + 1$

$16x^2 - 8x + 1$

8. **Multiply:**

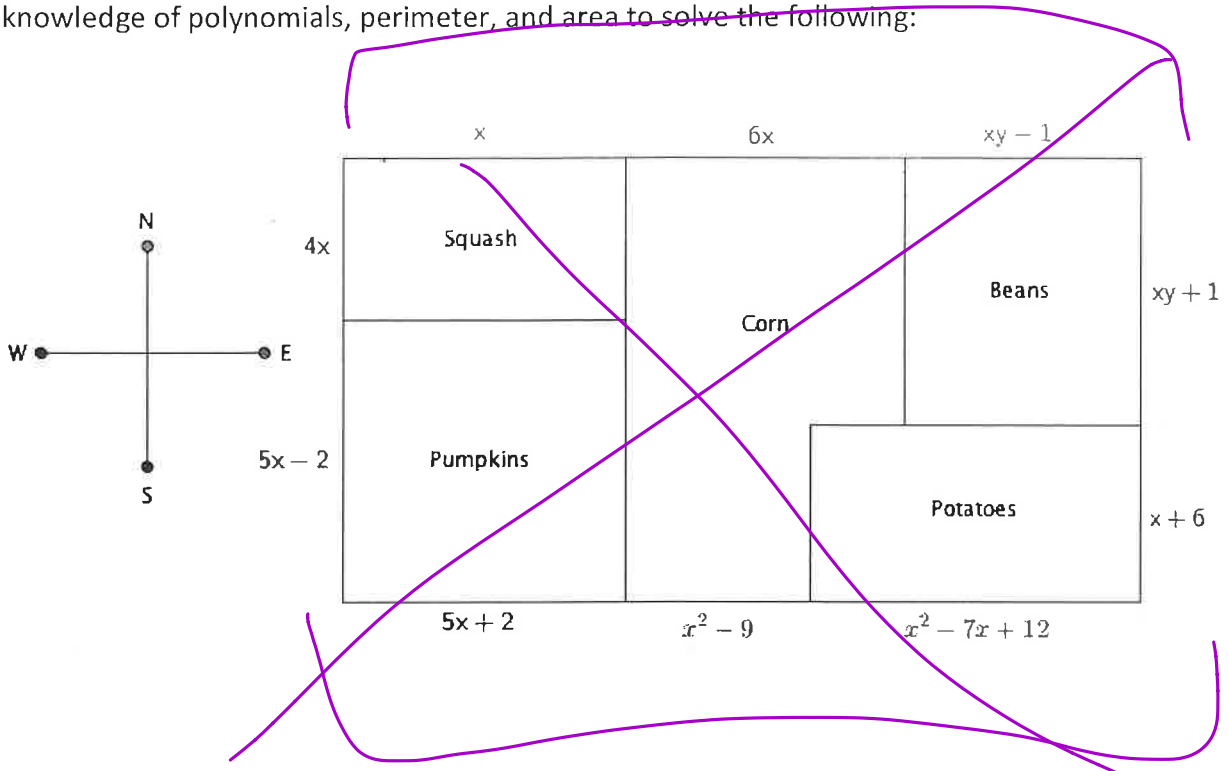
$(3x - 1)(2x^2 + 5x - 2)$

$6x^3 + 15x^2 - 6x - 2x^2 - 5x + 2$

$6x^3 + 13x^2 - 11x + 2$

➢ **Applications of Polynomials:**

1. Farmer Bob is planting a garden this spring. He wants to plant squash, pumpkins, corn, beans, and potatoes. His plan for the field layout in feet is shown in the figure below. Use the figure and your knowledge of polynomials, perimeter, and area to solve the following:



a. Write a polynomial expression in simplest form that represents the length of the south side of the field.

b. Write a polynomial expression in simplest form that represents the perimeter of the pumpkin field.

c. Write a polynomial expression in simplest form that represents the area of the potato field.

d. Write a polynomial expression in simplest form that represents the area of the bean field.

e. Write a polynomial expression in simplest form that represents the perimeter of the entire garden.

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Perform the indicated operation:

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

2. $(7y^3 - 6y^2 + 3y - 9) + (-8y^3 + y^2 + 4)$

3. $(x^3 + 5x^2 - 7x + 3) + (4x^3 - 2x^2 + 3x - 11)$

4. $(-6p^3 + 9pq^2 - 7q^3) + (-5p^3 - 13p^2q + 12q^3)$

5. $(p^2 - 7p + 5) - (10p^2 - 7p + 8)$

6. $(7y^3 - 6y^2 + 3y - 9) - (+8y^3 + y^2 + 4)$

$15y^3 - 7y^2 + 3y - 13$

7. $(2q^2 - q - 15) + (q^2 + 3q + 11)$

$q^2 - 4q - 4$

8. $(x^3 - 3x^2) + (3x^3 - 5x - 12) - (-x^3 - 8x^2 + 4x - 9)$

9. $(2x - 1)(5x + 3)$

$10x^2 + 6x - 5x - 3$

$10x^2 + 1x - 3$

10. $(3x + 1)(3x - 1)$

11. $(3x - 7)^2$

12. $(4 - 7x^3)^2$

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

$16 - 28x^3 - 28x^3 + 49x^6$

$16 - 56x^3 + 49x^6$

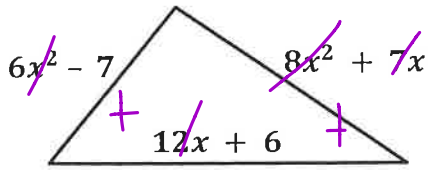
$49x^6 - 56x^3 + 16$

13. $(3c + 5d)(2c - 7d)$

14. $(x - 4)(x^2 + 4x + 16)$

15. For a rectangle with length of $3x + 4$ and width of $10x + 18$, what is the area width of the rectangle?

16. Find the perimeter of the triangle:



$14x^2 + 19x + 4$