

# Unit 2 Lesson 5

Operations With Polynomials

Socratic Warm-Up

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$x\text{-int } (6,0)$   $y\text{-int } (0,10)$

$y = a(x - \text{int})(x - \text{int})$

$y = a(x - 6)(x - 6)$

$y = \frac{5}{18}(x - 6)^2$

$10 = a(0 - 6)(0 - 6)$


$f(x) = .2\bar{7}(x - 6)(x - 6)$

$10 = a(-6)(-6)$

$10 = 36a$

$\frac{10}{36} = \frac{36a}{36}$

$\frac{5}{18} = a$

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### Lesson 5 – Operations with Polynomials

- 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

➤ EXAMPLES:

<p>1. <math>(4x^3 + 2x^2 + 5x + 8) + (3x^3 - 4x^2 - 9x + 2)</math></p> <p><math>7x^3 - 2x^2 - 4x + 10</math></p>	<p>2. <math>(7p^2 - 4p) + (3p^2 + 2p - 5)</math></p> <p><math>10p^2 - 2p - 5</math></p>
<p>3. <math>(4x^3 + 2x^2 + 5x + 8) - (3x^3 - 4x^2 - 9x + 2)</math></p> <p><math>4x^3 + 2x^2 + 5x + 8 - 3x^3 + 4x^2 + 9x - 2</math></p> <p><math>x^3 + 6x^2 + 14x + 6</math></p>	<p>4. <math>(7p^2 - 4p) - (3p^2 + 2p - 5)</math></p> <p><math>4p^2 - 6p + 5</math></p>
<p>5. <math>(x - 2)(x + 3)</math></p> <p><math>x^2 + 3x - 2x - 6</math></p> <p><math>x^2 + x - 6</math></p>	<p>6. <math>(2x - 5)(3x + 1)</math></p> <p><math>6x^2 + 2x - 15x - 5</math></p> <p><math>6x^2 - 13x - 5</math></p>

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7.  $(4x - 1)^2$

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

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

$$16x^2 - 8x + 1$$

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

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

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

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➤ **Classwork:**

1.  $f(x) = 3p^2 - 2p + 3$  and  $g(x) = p^2 - 7p + 7$

Sum:  $4p^2 - 9p + 10$       Difference:  $2p^2 + 5p - 4$

2.  $f(x) = 3x^3 + 5x - 7$  and  $g(x) = 4x^3 - 2x^2 + 4x - 3$

Sum:  $7x^3 - 2x^2 + 9x - 10$       Difference:  $-x^3 + 2x^2 + x - 4$

3.  $f(x) = 2x - 5$  and  $g(x) = 4x + 1$

Product:  $8x^2 - 18x - 5$        $(2x-5)(4x+1) = 8x^2 + 2x - 20x - 5$

4.  $f(x) = (3x + 4)^2$  and  $g(x) = 2x$

Product:  $18x^3 + 48x^2 + 32x$        $(3x+4)(3x+4)(2x) = (9x^2 + 24x + 16)(2x)$

5.  $f(x) = 2x - 3$  and  $g(x) = 2x^2 + 3x - 5$

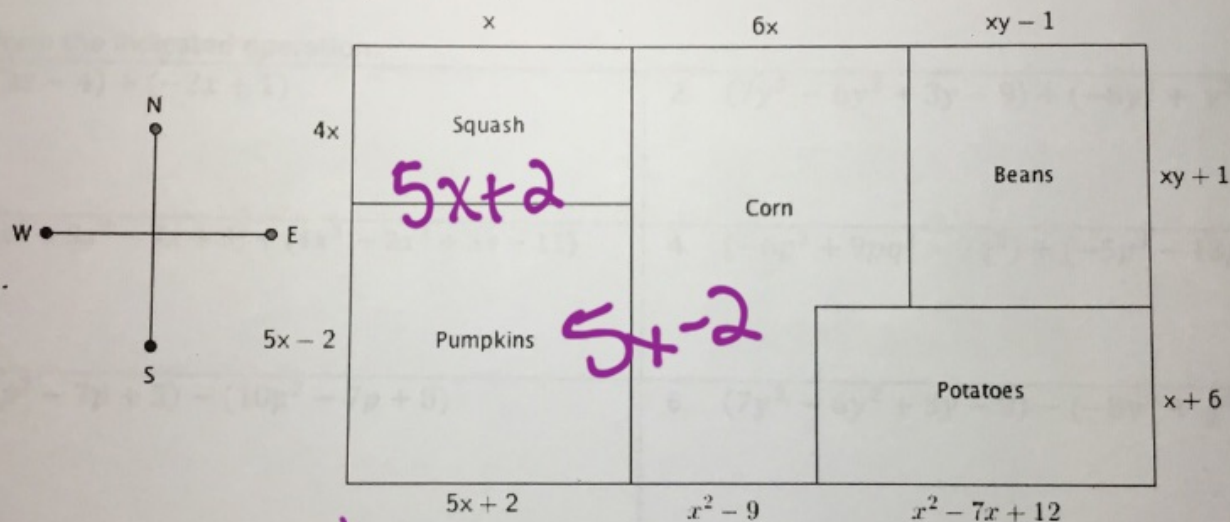
Sum:  $2x^2 + 5x - 8$       Difference:  $-2x^2 - x + 2$

Product:  $4x^3 - 19x + 15$        $(2x-3)(2x^2+3x-5)$

~~$4x^3 + 6x^2 - 10x - 6x^2 - 9x + 15$~~

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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.

$$(5x - 2) + (x^2 - 9) + (x^2 - 7x + 12) = 2x^2 - 2x + 5$$

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

$$2(5x - 2) + 2(5x + 2) = 10x - 4 + 10x + 4 = 20x$$

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

$$(x^2 - 7x + 12)(x + 6) = x^3 - 7x^2 + 12x + 6x^2 - 42x + 72 = x^3 - x^2 - 30x + 72$$



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

$$(xy-1)(xy+1) = x^2y^2 + xy - xy - 1 = x^2y^2 - 1$$

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

$$2x^2 - 2x + 5 + x + 6 + xy + 1 + xy - 1 + 6x + x + 4x + 5x - 2$$

$$2x^2 + 15x + 9 + 2xy$$

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2. If the base of a triangle has a length of  $8x$  units, and the height is  $x + 6$  units, write a simplified algebraic expression for the area of the triangle in terms of  $x$ .

$$\frac{1}{2} b \cdot h$$

$$\frac{1}{2} l \cdot h$$

$$\frac{l \cdot h}{2} = \frac{(8x)(x+6)}{2}$$

$$l = 8x$$
$$h = x + 6$$

$$\frac{1}{2} (8x)(x+6)$$

$$\frac{8x^2 + 48x}{2}$$

$$(4x)(x+6)$$

$$4x^2 + 24x$$

$$= 4x^2 + 24x$$

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3. A square has a side length of  $k$ . If the length of the square is increased by 6 units, and the width of the square is increased by 4 units, to create a new, larger rectangle, write a simplified algebraic expression for the area of the new rectangle in terms of  $k$ .

Pg. 28

$$l = k + 6$$

$$w = k + 4$$

$$(k+6)(k+4)$$

$$k^2 + 10k + 24$$

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Pages 29 #10-18

30 All

## Study for Quiz

- Chart + pg. 17 + 18
- Graph from vertex form 5 coordinates pg. 17 + 19
- Last 3 page 21
- Page 22 (warm-up today 2/19)

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$$10. \quad 2[-3x - 7(4 - x)] - 8[x - (2x - 5)]$$

$$2[-3x - 28 + 7x]$$

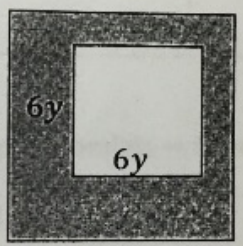
$$-6x - 56 + 14x - 8[x - 2x + 5]$$

$$~~-6x - 56 + 14x - 8x + 16x - 40~~$$

$$16x - 96$$

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A)  B)

$121y^2 - 36y^2 = 85y^2$

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