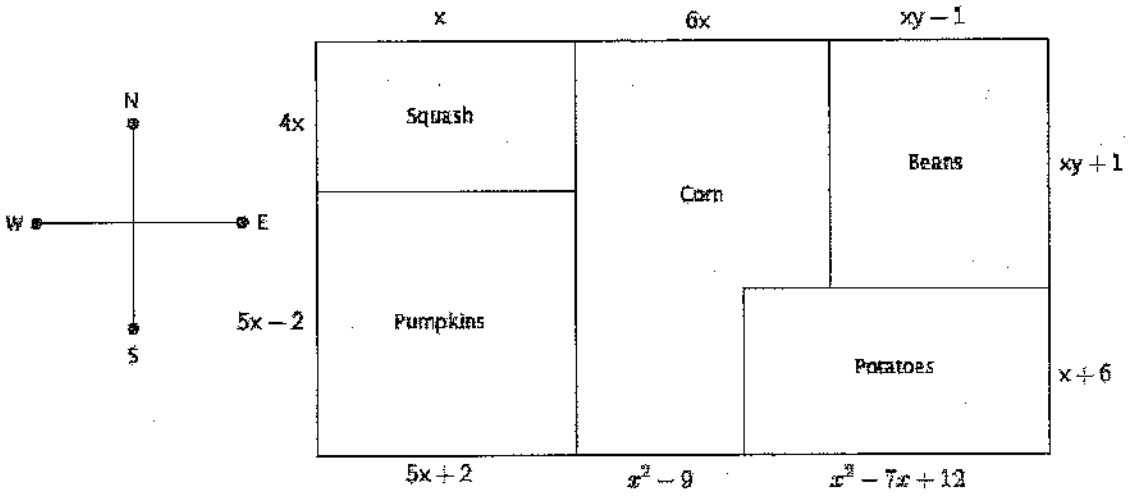
Performance Task – Expressions & Operations
A.2bc Polynomial Farm

Names: _____
Date: _____ Block: _____

Directions: 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:



1. Write an expression that represents the length of the south side of the field.

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

2. Simplify the polynomial expression that represents the south side of the field.

Combine Like Terms → $2x^2 - 2x + 5$

3. Write a polynomial expression that represents the perimeter of the pumpkin field.

$(5x-2) + (5x-2) + (5x+2) + (5x+2)$ OR

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

4. Simplify the polynomial expression that represents the perimeter of the pumpkin field. State one reason why the perimeter would be useful to Farmer Bob.

$5x-2$
$5x-2$
$5x+2$
$5x+2$
→ $20x$

might be useful if Bob wanted to put a FENCE around the pumpkin field.

5. Write a polynomial expression that represents the area of the potato field.

$(x+6)(x^2-7x+12)$

6. Simplify the polynomial expression that represents the area of the potato field. State one reason why the calculated area would be useful to Farmer Bob.

$x^2-7x+12$ | $x+6$

$6x^2-42x+72$

x^3-7x^2+12x

$x^3-13x^2+54x-72$ | $x^3-x^2-30x+72$

might be useful if he needed to decide how many potato plants to purchase to seed the field

7. Write and simplify the polynomial expression that represents the area of the bean field if $x = 3$ and $y = 7$. What unit would the area of Bob's bean field have?

$\text{AREA} = (xy-1)(xy+1)$ | $\text{AREA} = (3\cdot7-1)(3\cdot7+1)$

$= (20)(22) =$ 440 ft.^{2}

8. The farmer would like his bean plants to grow to a height of $(x+3)$. Write a polynomial expression to find the volume of the bean plants if they reach a height of $(x+3)$.

$V = (xy-1)(xy+1)(x+3)$

9. Simplify the polynomial expression that represents the volume of the bean plants if they reach a height of $(x+3)$ feet.

$xy-1$

$(x)\ xy+1$

$xy-1$

x^2y^2-xy

x^2y^2-1

x^2y^2-1

$(x)\ x+3$

$3x^2y^2-3$

$-x+x^3y^2$

$x^3y^2+3x^2y^2-x-3$

10. Farmer Bob would like to plant three additional fields of produce. ~~Using your graphing calculator~~, find the dimensions of each field given the area. By factoring FACTOR EACH EXPRESSION.

a. The area of the strawberry field is $16x^2+4x$. $4x(4x+1)$

b. The area of the cucumber field is $x^2-4x-21$. $(x-7)(x+3)$

c. The area of the tomato field is x^2-36. $(x+6)(x-6)$

11. Farmer Bob realized he forgot to include a zucchini field into his field layout. He plans to use half the length and half the width of the squash field in order to plant zucchini. Write a polynomial expression that represents the area of the new zucchini field.

$\text{AREA} = \left(\frac{x}{2}\right)\left(\frac{4x}{2}\right) =$

12. Simplify the polynomial expression that represents the area of the newly added zucchini field.

$\left(\frac{x}{2}\right)\left(\frac{4x}{2}\right) = \frac{4x^2}{4} =$ x^2

13. Extra Credit: Write and simplify polynomial expressions that represent the perimeter and area of the cornfield.

$P = 6x + (4x+5x-2) + (x^2-9) + (x+6) + 6x - (x^2-9) + (xy+1)$

$6x+4x+5x-2+x^2-9+x+6+6x-x^2+9+xy+1$

$22x+5+xy$

$A = 6x(xy+1) + (x+6)(x^2-9)$

$6x^2y+6x+x^3-9x+6x^2-54$

$x^3+6x^2+6x^2y-3x-54$