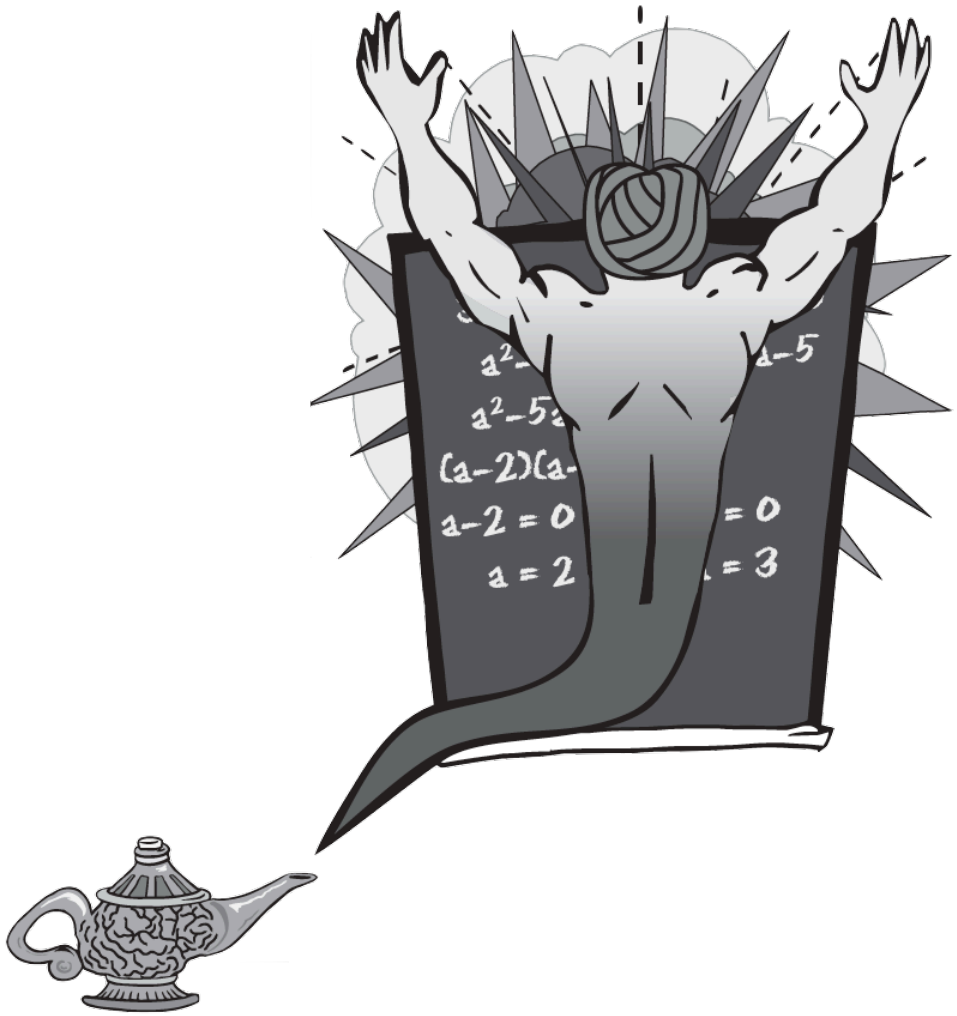
Ultimate Cosmic Power:

In An Itty-Bitty Thinking Space

Algebraic Reasoning for OK-MAP, June 2017



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@MathProjects

#OKMAP2017

MPJ

Ultimate Cosmic Power
in an Itty-Bitty Thinking Space

OK-MAP, June 2017,
Chris Shore, shore@mathprojects.com

- **What is your Million Dollar Talent?** They are that _____!

  We are that _____!

- **What is algebraic reasoning?**

- **Why teach algebraic reasoning?**

- **How could you best teach algebraic reasoning?**

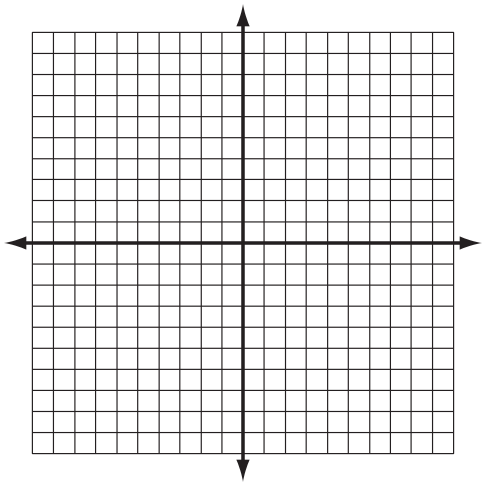
- **What lessons and techniques will you use to teach algebraic reasoning?**

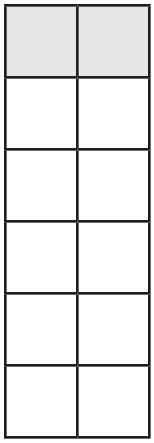
- **Your Call to Action:**

"With the faith that they can learn it, and that we can teach it to them."

4 × 4 From Scenarios/Words

1)



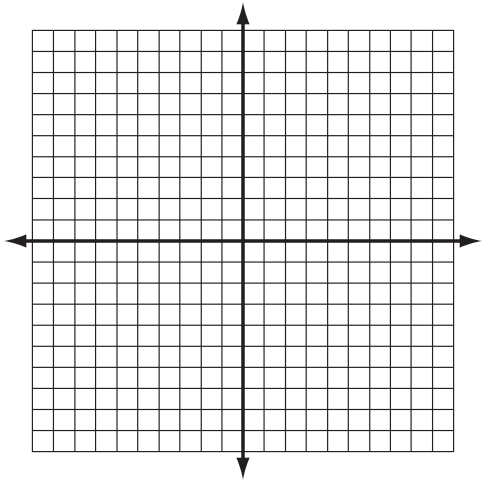


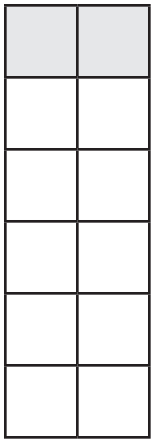
Equation:

_____

Scenario: **Fred moves into town with no friends, and makes one new friend every day.**

2)



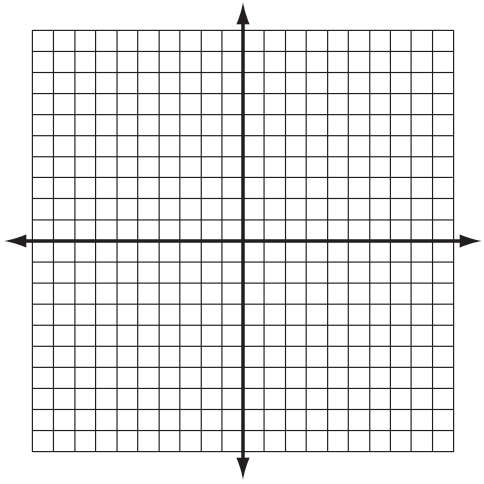


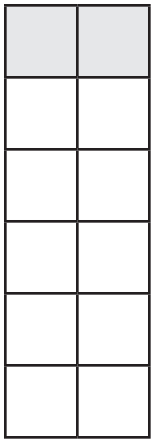
Equation:

_____

Scenario: **Jamie spent $5 to start his lemonade stand and made $3 every hour.**

3)





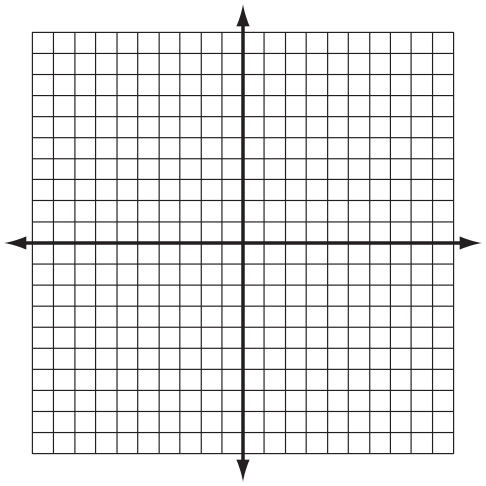
Equation:

_____

Scenario: **Ali has $10 and he spends $5 every two days.**

4 × 4 From Data

4)



X	Y
-1	1
0	0
1	-1
2	-2

Equation:

_____

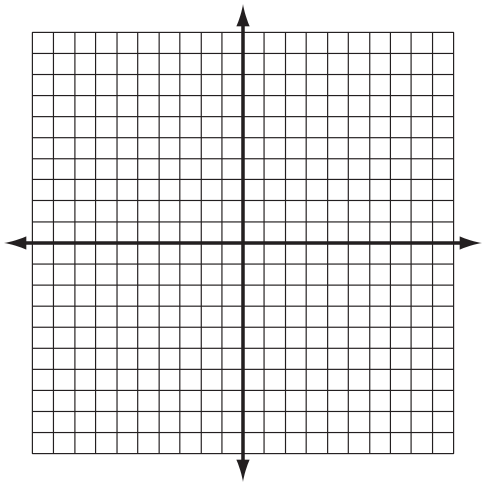
Scenario:

_____

_____

_____

5)



X	Y
-1	-3
0	-1
1	1
2	3

Equation:

_____

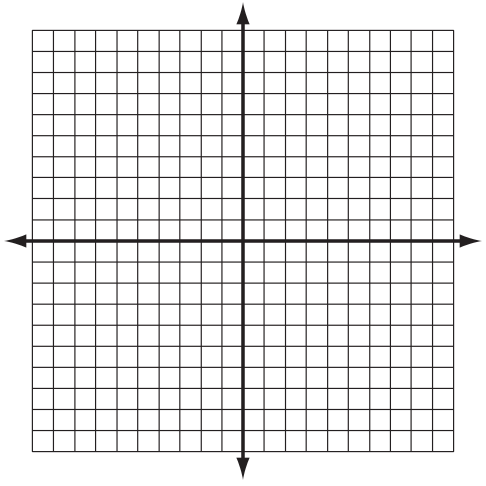
Scenario:

_____

_____

_____

6)



X	Y
-2	8
-1	6.5
0	5
1	3.5
2	2

Equation:

_____

Scenario:

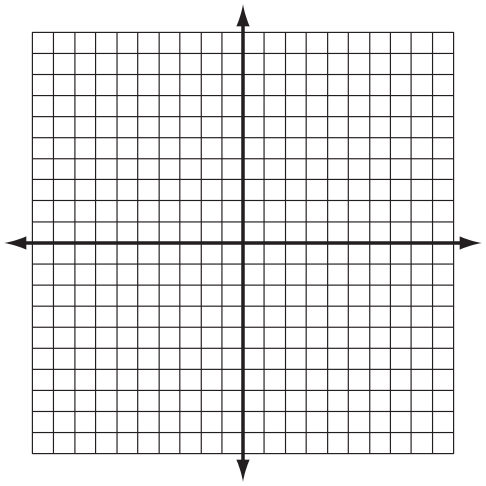
_____

_____

_____

4 × 4 From Equations

7)



X	Y

Equation: $y = 3x + 2$

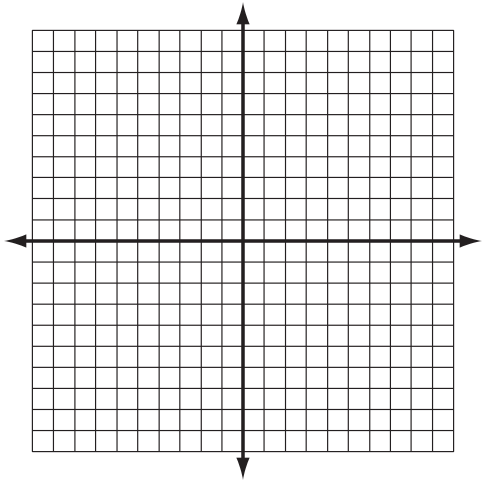
Scenario:

_____

_____

_____

8)



X	Y

Equation: $y = -\frac{1}{2}x + 1$

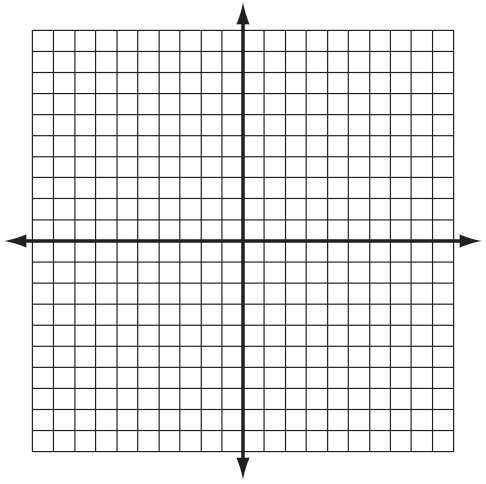
Scenario:

_____

_____

_____

9)



X	Y

Equation: $y = \frac{3}{4}x - 5$

Scenario:

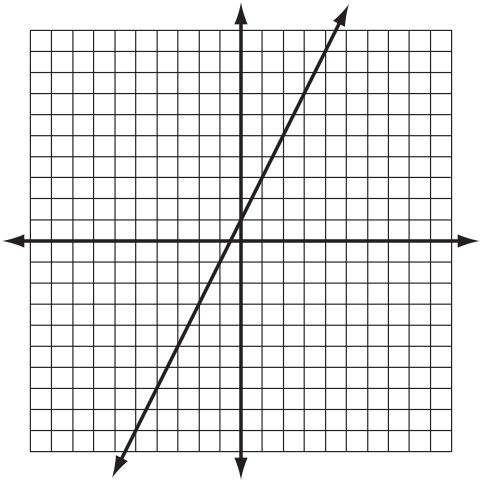
_____

_____

_____

4 × 4 From Graphs

10)



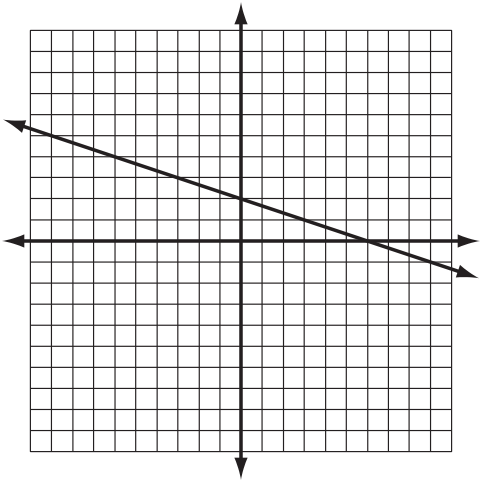
Equation: _____

Scenario: _____

_____

_____

11)



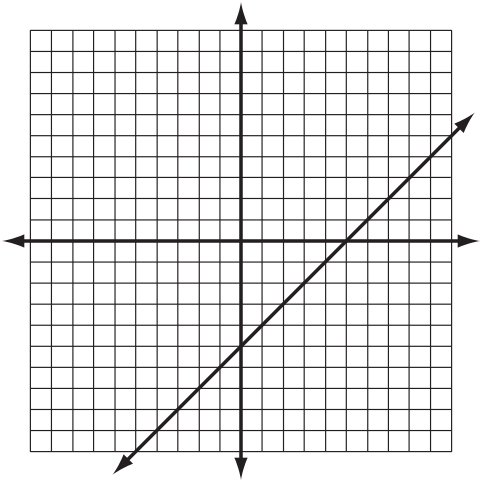
Equation: _____

Scenario: _____

_____

_____

12)



Equation: _____

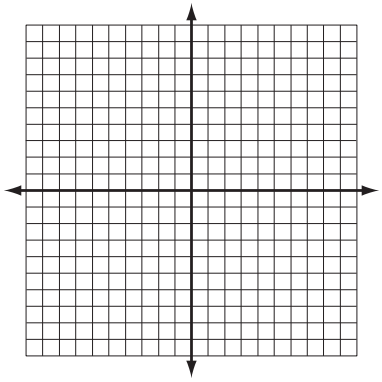
Scenario: _____

_____

_____

4 x 4 Assessment

1)



X	Y
-2	-3
0	1
2	5

Equation: _____

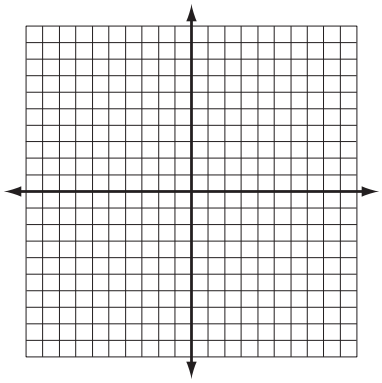
Scenario:

_____

_____

_____

2)



X	Y
-1	
0	
1	

Equation: **y = 2x + 1**

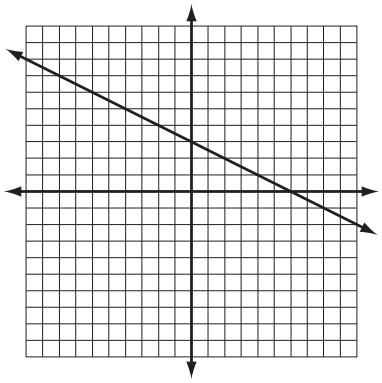
Scenario:

_____

_____

_____

3)



Equation: _____

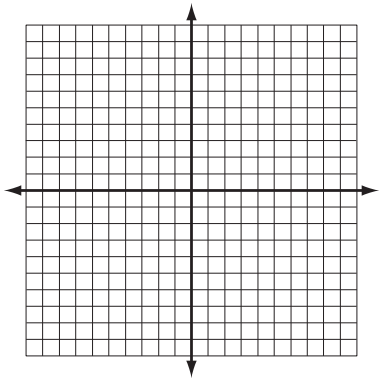
Scenario:

_____

_____

_____

4)

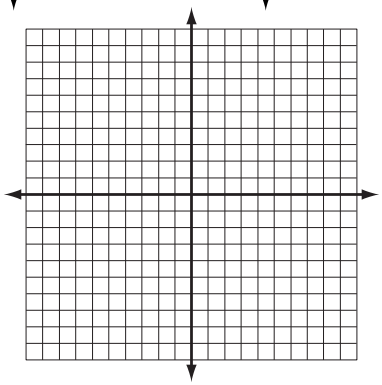


Equation: _____

Scenario: **Suzie enters her school with no friends, and makes 3 new friends every week.**

4 × 4 Standard Form

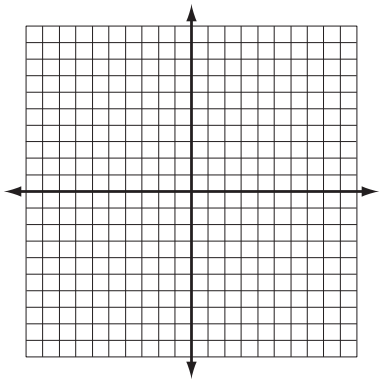
1)



X	Y
0	
	0

Equation: **3x + 2y = 18**
y-intercept: (,)
x-intercept: (,)
Scenario:
_____
_____

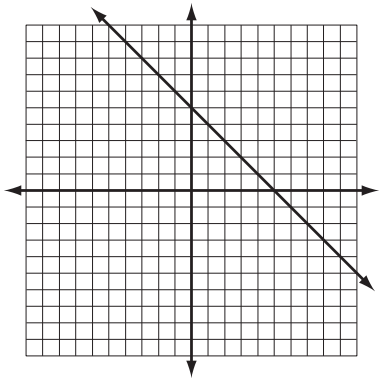
2)



X	Y
0	3
-4	0

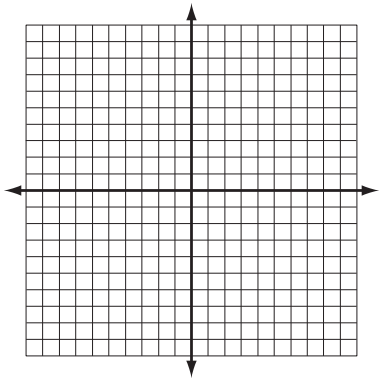
Equation: _____ = _____
y-intercept: (,)
x-intercept: (,)
Scenario:
_____
_____

3)



Equation: _____ = _____
y-intercept: (,)
x-intercept: (,)
Scenario:
_____
_____

4)



Equation: _____ = _____
y-intercept: (,)
x-intercept: (,)
Scenario: **Jasmine gets paid $2 for every cupcake and $1 for every brownie. She receives a total of $10.**

The Clothesline

Name: _____
Date: _____

For each set, record the given values, expressions or drawings. After the discussion of their placement on the clothesline, record them on the number line.

1. _____, _____, _____

2. _____, _____, _____

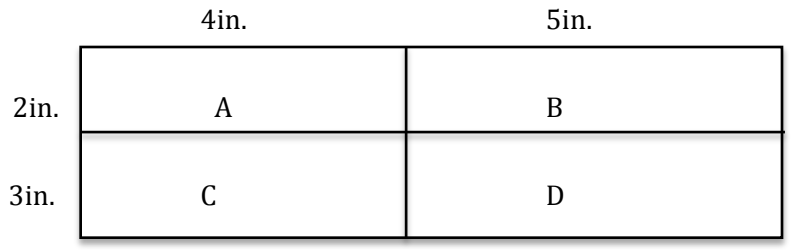
3. _____, _____, _____

Algebra 1 Names: _____
TVUSD **Date:**_____ **Period:** _____

Polynomial Farm

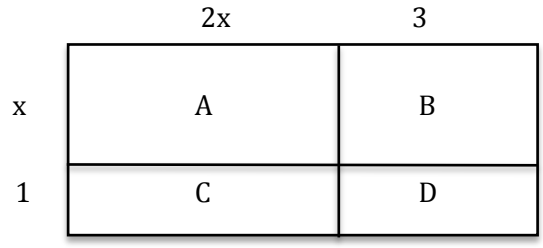
Part I (Intro & Investigate)

1. Find the perimeter and area of each small rectangle (A, B, C and D). Find the perimeter and area of the large rectangle composed of A, B, C and D.



	Perimeter	Area
A		
B		
C		
D		
Large Rectangle		

2. Find the perimeter and area of each small rectangle (A, B, C and D). Find the perimeter and area of the large rectangle composed of A, B, C and D. All measures given are in inches.



	Perimeter	Area
A		
B		
C		
D		
Large Rectangle		

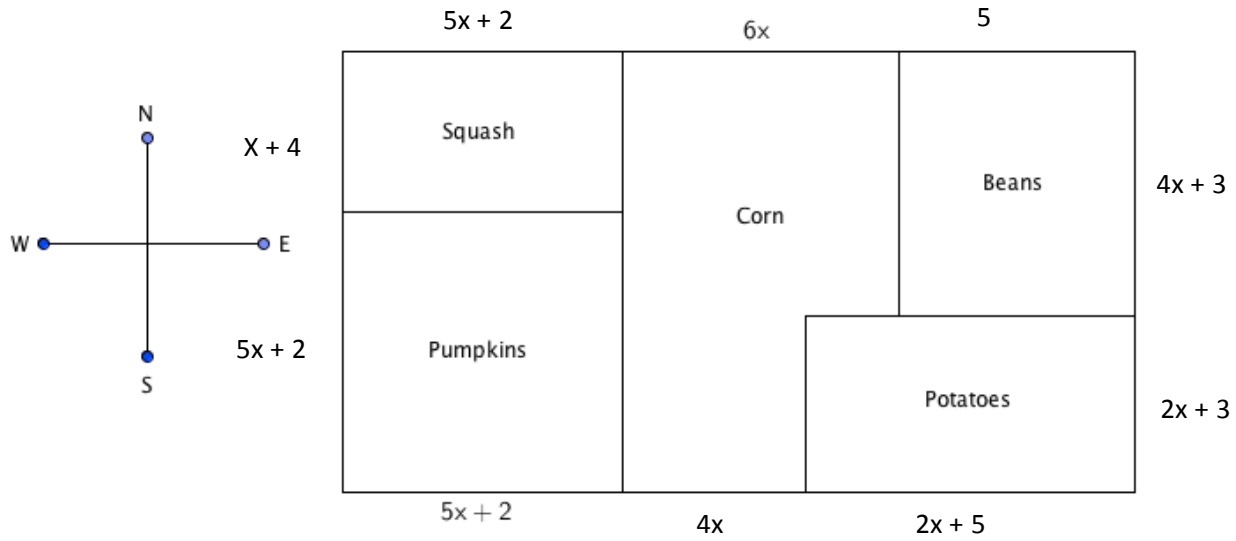
Algebra 1 Names: _____

TVUSD **Date:**_____ **Period:** _____

Polynomial Farm

Part II (Apply)

Directions: Farmer Bob is planting a field of crops 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:



3. Write a simplified expression that represents the length of the south fence line.

4. Find the perimeter of the pumpkin field.

5. Find the area of the squash field.

6. Find the perimeter and area of each section of the Field.

	Perimeter	Area
Squash		
Pumpkin		
Beans		
Potatoes		
Corn		
Entire Field		

Extension: a) In this field scenario, is x a variable or an unknown quantity? _____

b) If it is variable, explain. If it is an unknown quantity, use equivalent lengths to find x.

Polynomial Farm

Part III (Practice & Generalize)

7. Multiply and simplify

a) $(x + 5)(x + 2)$

b) $(3x + 1)(2 x + 7)$

c) $(x + 9)(x – 6)$

d) $(x – 10)(x – 4)$

e) $(x + 6)(x – 6)$

f) $(x + 6)^2$

g) $(3x + 5)(3x – 5)$

h) $(3x + 5)^2$

8. $(a + b)(c + d) =$ $(a + b)(a – b) =$ $(a + b)^2=$

Names: _____
Date:_____ **Period:** _____

Polynomial Farm

Part IV (Extend & Generalize)

9. Multiply and simplify

a) $(x + 5)(x^2 + 2)$

b) $(x^3 + 4)(x^2 + 5x)$

c) $(x + 4)(x^2 + 5x + 8)$

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

e) $3(x - 7) + (x + 6)(x + 4)$

f) $2x(x + 4) + (x + 5)(3x - 2)$

g) $(x^3 - 2x)(x^4 + 5x)$

h) $(x^4 - 2)(x^2 - 4x + 1)$

i) $(x^2 - 6x + 8)(-5 - 9x)$

j) $\frac{1}{2}(4x + 8) + (x + 3)(x - 7)$

Algebra 2 Name _____
TVUSD

Optimum Bait

My brother Matt owns Optimum Bait Company. Optimum Bait Company manufactures fishing lures. The monthly cost to run the factory is $4200 and the cost of producing each lure is an additional $0.25 per lure.

If he produces 1000 lures in one month, what is the average production cost per lure?

Create a function, C(x), that models the average production cost per lure.

Calculate the average production cost per lure if he produces 4000 lures in one month? 8000 lures? 12000 lures? 420000 lures?

As he produces more lures what price does the average cost of production approach? Why?

If he wants the average cost of production to be $1, how many lures would he have to produce in one month?

If he wants to make a profit of at least $4000 per month, what is the minimum number of lures he would have to produce if he sells every lure he produces for $4?