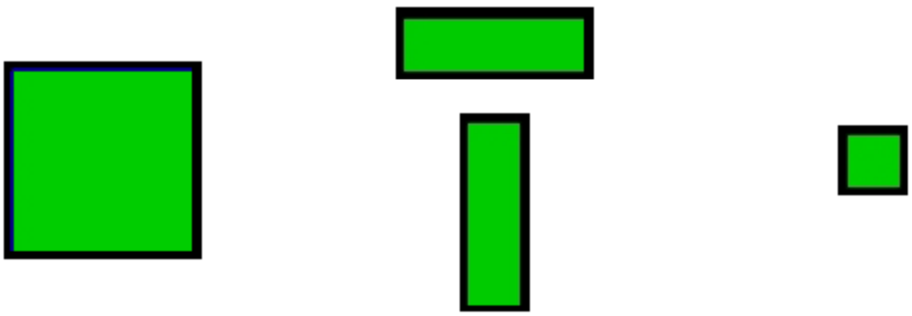
Algebra 2 Name:

Completing the Square Activity

Goal: *Given a quadratic equation in standard form* $\left(x^2+bx+c\right)$, *we will rewrite it in vertex form* $\left((x-h)^2+k\right)$.

Part 1

We will be working with algebra tiles. The value of the tile is its area…

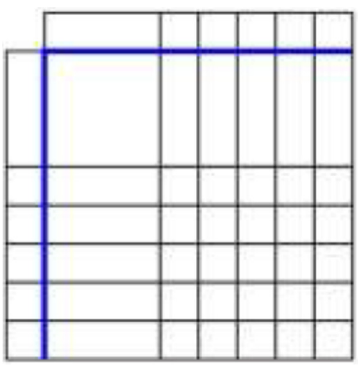


x^2 Tile
Area = x • x = x^2 units

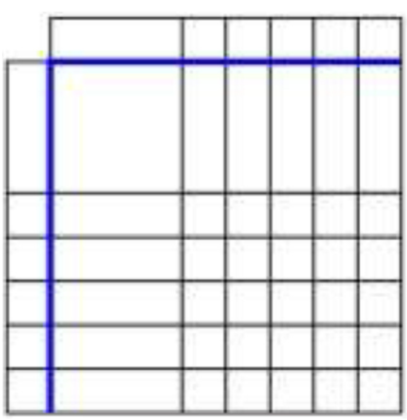
x Tile
Area = 1 • x = x units

Unit Tile
Area = 1 • 1 = 1 unit

Example x^2+6x+9



1: Create a partial square with the algebra tiles to represent x^2+2x+___.



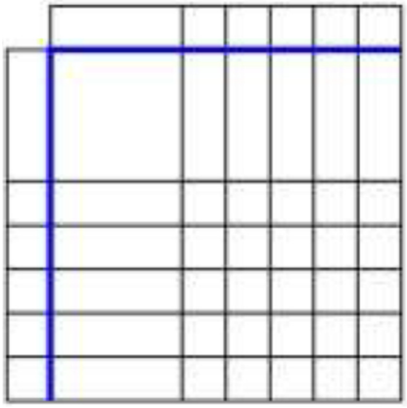
- How many unit tiles do you need to complete the square?
- What are the dimensions of the completed square?

  L = W =

- Replace c and h with numbers to make the statement true:

  $x^2+2x+c=(x-h)^2$ ____________________________

2: Create a partial square with the algebra tiles to represent x^2+4x+___.



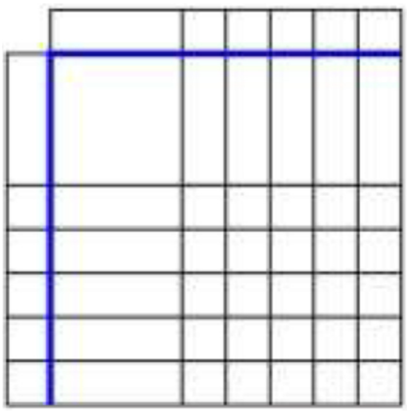
- How many unit tiles do you need to complete the square?
- What are the dimensions of the completed square?

  L = W =

- Replace c and h with numbers to make the statement true:

  $x^2+4x+c=(x-h)^2$ ______________________

3: Create a partial square with the algebra tiles to represent x^2-6x+___.



- How many unit tiles do you need to complete the square?
- What are the dimensions of the completed square?

  L = W =

- Replace c and h with numbers to make the statement true:

  $x^2-6x+c=(x-h)^2$ ______________________

4. What is the relationship between the coefficient of x and the number of x's you have down one side of your algebra tile diagram?

5. What is the relationship between the number of x's down one side of the algebra tile diagram and the h in your perfect square?

6. What is the relationship between the coefficient of the x and the h in your perfect square?

7. In the expression $y=x^2+bx+c$, how do you use b to find the value of c to form a perfect square and the h to rewrite as a perfect square? Use the examples above to explain your answer.

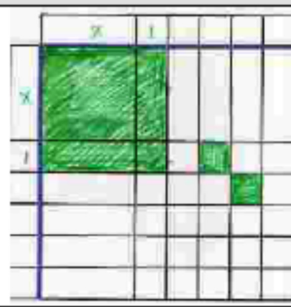
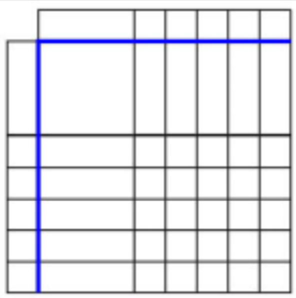
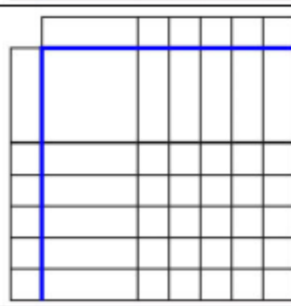
8. Try these problems – Fill in the missing "c" and them rewrite the trinomial as a perfect square binomial.

$x^2-10x+c$	x^2-4x+c	$x^2+12x+c$
$x^2-12x+c$	x^2+7x+c	x^2+bx+c

Part 2

Represent each expression using algebra tiles. Try to create a square of tiles. When doing so keep the following rules in mind:

- You may only use ONE x^2-tile in each square.
- You must use ALL the x^2 and x-tiles. Unit tiles are the only ones that can be leftover or borrowed.
- If you need more unit tiles to create a square, you have to "borrow" them. The number you borrow will be a negative quantity.

Standard Form	Number of x^2 Tiles	Number of x Tiles	Number of Unit Tiles	Sketch of the Square	Length of the Square	Area of the Square $(\text{Length})^2$	Unit Tiles Left Over (+) Borrowed (-)	Expression Combining Previous Two Columns
$x^2 + 2x + 3$	1	2	3		x+1	$(x+1)^2$	2	$(x+1)^2 + 2$
$x^2 + 4x + 1$								
$x^2 + 6x + 10$								

9. What is the name of the form written in the last column?

10. Convert the following equations from standard form to vertex form by completing the square.

$y = x^2 - 8x + 11$	$y = x^2 + 6x + 1$	$y = x^2 - 2x - 5$
$y = x^2 + 8x - 3$	$y = x^2 + 16x + 14$	$y = x^2 + 2x - 12$
$y = x^2 + 10x - 3$	$y = x^2 - 6x + 2$	$y = x^2 - 12x + 25$
$y = x^2 - 20x + 3$	$y = x^2 - 30x + 200$	$y = x^2 - 3x - 10$