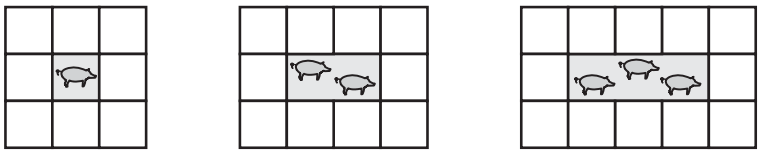
Pig Pen Algebra

Farmer John is making a pig pen. He is short on materials so he is making the pen out of bales of hay. These bales are shaped as cubes. Farmer John likes to keep things simple, so whenever he gets another pig, he just extends the pen as shown below. Your job is to help Farmer John write a formula to tell him how many bales of hay he will need for a given number of pigs.



1. How would you move the existing bales to make room for another pig?

2. In the space above, draw pens that would hold 4 and 5 pigs respectively.

3. How many bales of hay must be added to an existing pen, to make room for the next pig?

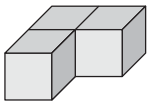
4. Without anymore drawings, complete the chart below for P number of pigs and B number of bales.

P (pigs)	1	2	3	4	5	6	7	8	9	10	20	50
B (bales)	8	10	12									

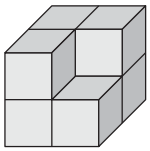
5. How did you figure out your answers for 20 and 50 pigs?

6. According to the pattern in the chart, how many bales would you predict are needed for no pigs?

7. Write an equation that represents the number of bales B needed to pen P number of pigs.



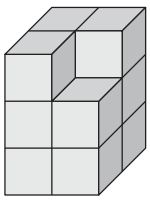
8. Show how to use your new equation to find how many bales are needed for 100 pigs.



9. How many pigs could be penned by 96 bales of hay?

ASSIGNMENT

A tower is built up as shown on the right. Write an equation that represents the number of blocks T needed to build a tower S stories tall.



Kaleidoscope

Design a kaleidoscope image using your first name and its transformations.

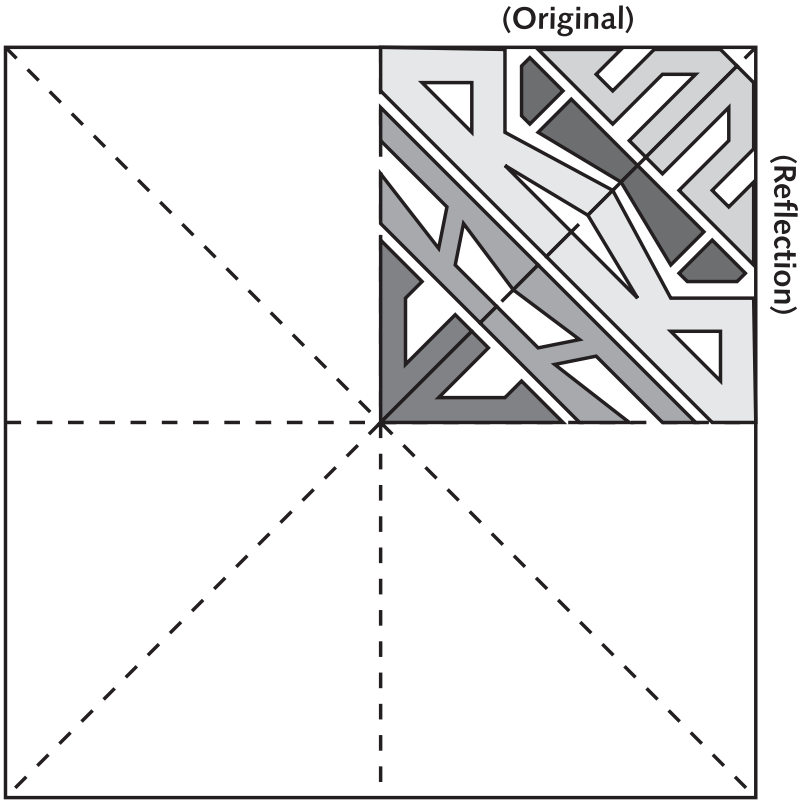
1. Begin with a square sheet of paper (trim an 8.5" x 11" to a square). Create a fold along the paper horizontally, vertically, and along each diagonal, so that eight triangular regions are formed.

2. In one of the regions, place an artistic rendition of your first name. Use some kind of block or puffy letters so that your name fills the entire region, and the borders of the letters actually touch the borders of the region.

3. Then reflect your letters through one of the folds to fill the next region. (see diagram below). Continue to do this all the way around the page until all regions are full. Keep the color scheme of each letter consistent throughout the design. (e.g. "C" below is orange through the design, while "H" is always green.)

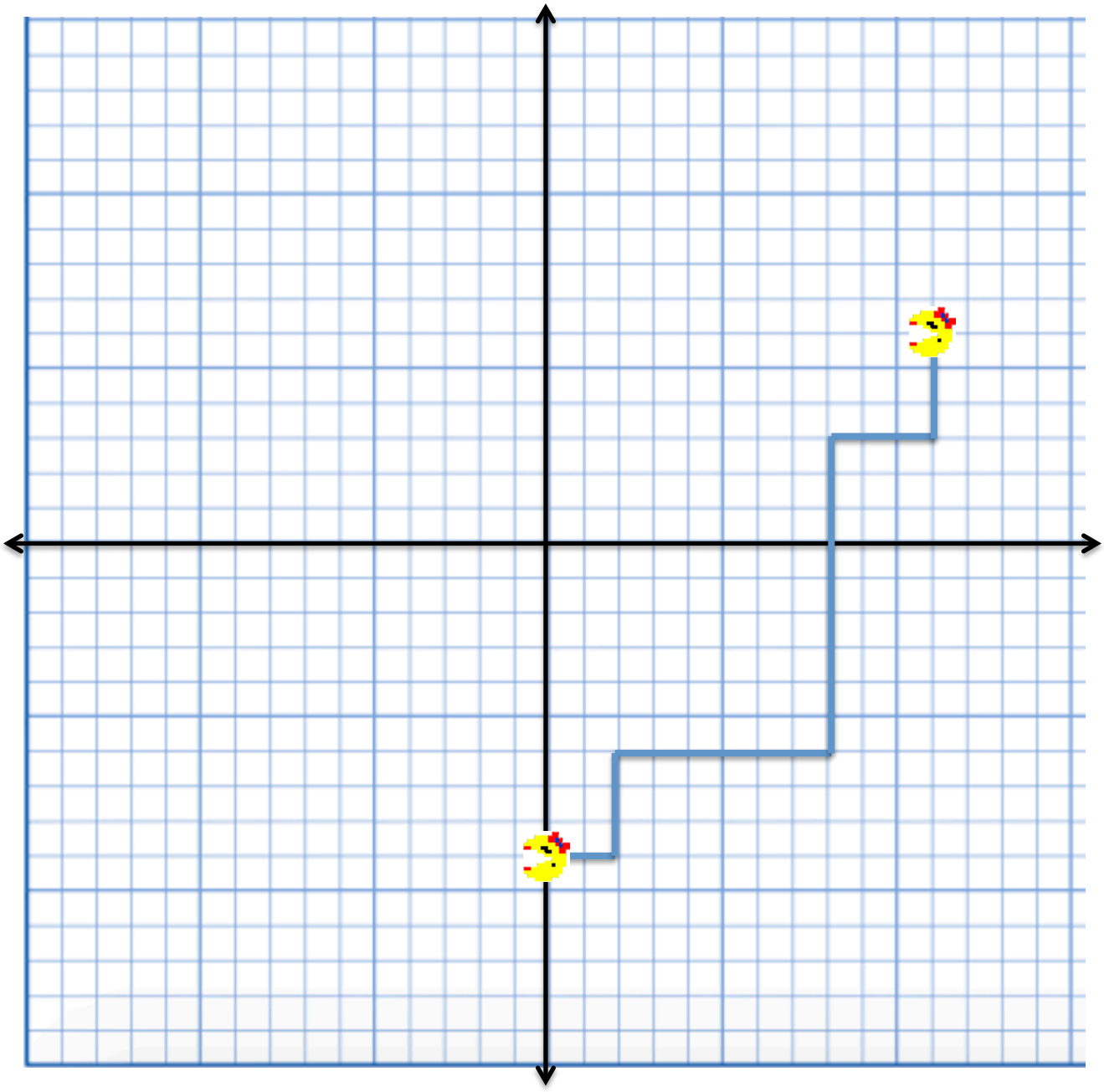
4. On the backside of the original region, write the word "original." On the backside of the first reflected region, write the word "reflection." On the back of each of the other regions, write whether that region is a reflection, translation, rotation, or glide reflection in regards to the original.

For example:



Geometry Name _____

Ms. Pac Man



http://bit.ly/MsPacManMath

Ms. Pac Man

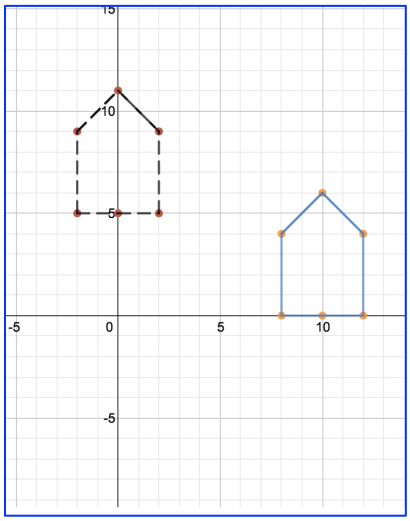
Description	Rule
1. Start at (0, -9)	1. _____
2. Reflect across x = _____	2. _____
3. _____	3. _____
4. _____	4. _____
5 _____	5. _____
6. _____	6. _____
7. _____	7. _____
8. _____	8. _____
9. _____	9. _____
10. _____	10. _____
11. _____	11. _____
12. _____	12. _____
13. _____	13. _____
14. _____	14. _____
_____	_____

1. Start at (0, -9)
2. Reflection across line x = 0
3. Translation 2 units right to (2, -9)
4. Rotation 90° counterclockwise
5. Translation 3 units up to (2, -6)
6. Rotation 90° clockwise
7. Translation 6 units right to (8, -6)
8. Rotation 90° counterclockwise
9. Translation 9 units up to (8, 3)
10. Rotation 90° clockwise
11. Translation 3 units right to (11, 3)
12. Rotation 90° counterclockwise
13. Translation 3 units up to (11, 6)
14. Four possibilities (UP THEN LEFT)
    1. Reflection across line x = 11 AND Rotation 90° counterclockwise
    2. Rotation 90° clockwise AND Reflection across line x = 11
    3. Reflection over y = 6 AND Rotation 90° clockwise
    4. Rotation 90° counterclockwise AND Reflection over y = 6

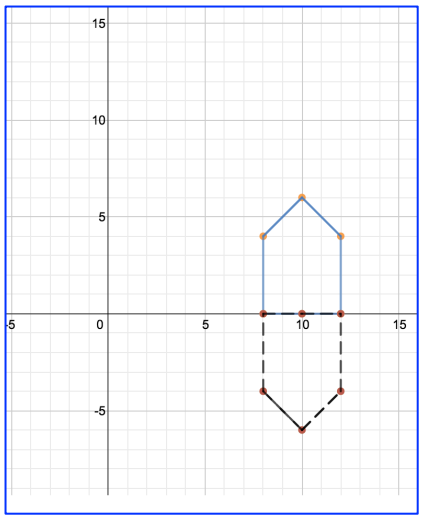
Geometry Name _____

Bend the Rules ... of Transformations
Discovery

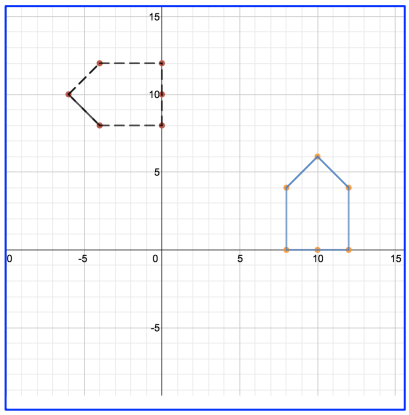
http://bit.ly/BendRules



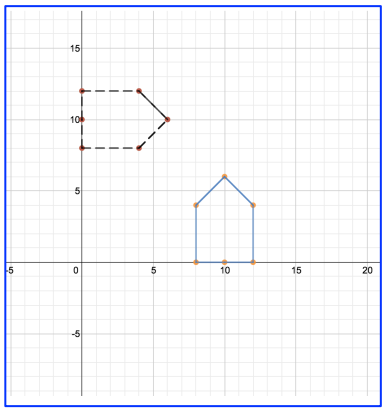
$(x,y) \mapsto (\square, \square)$



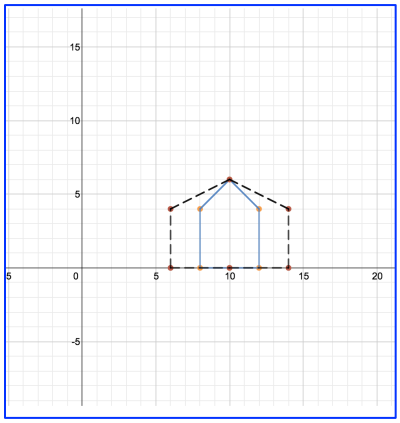
$(x,y) \mapsto (\square, \square)$



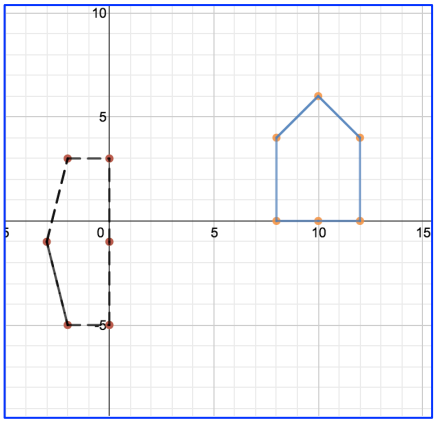
$(x,y) \mapsto (\square, \square)$



$(x,y) \mapsto (\square, \square)$



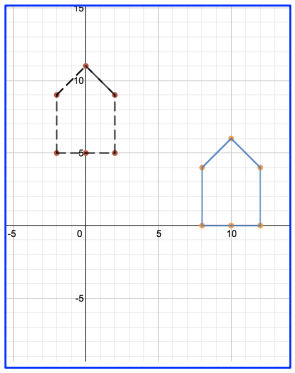
$(x,y) \mapsto (\square, \square)$



$(x,y) \mapsto (\square, \square)$

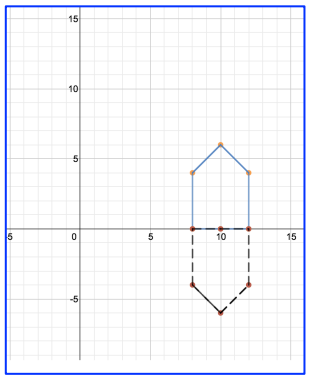
Bend the Rules ... of Transformations

Generalizations



Type: _____

General Rule: (x, y) -> (,)



Type: _____

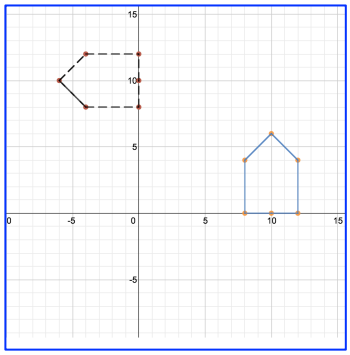
General Rule for a:

_____over the x-axis:

(x, y) -> (,)

_____over the y-axis:

(x, y) -> (,)



Type: _____

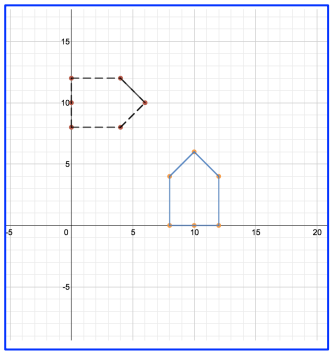
General Rule for a:

90° _____clockwise:

(x, y) -> (,)

90°_____ counterclockwise:

(x, y) -> (,)



Type: _____

General Rule for a:

_____over the line y = x:

(x, y) -> (,)

_____over the line y = -x:

(x, y) -> (,)

Take-Aways

Why change to a 21st Century math education?

What is a 21st Century math education?

How do you teach for 21st Century math education?

Call to Action

What will you do first to develop your 21st Century math class?

When, within the first two weeks of school will you do this?

What transformation will you communicate to your students on the first day of school?