Foundations Of Math II Name________________________________

* subject to change

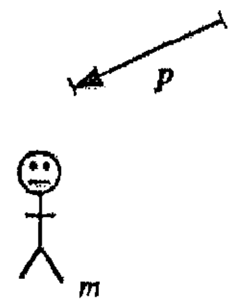
UNIT 1: Transformations Fall 2017		HOMEWORK
8/28 Monday	**Vocabulary &Translations Pages 1-5** Obj: Use coordinates to develop function rules modeling translations centered at the origin EQ: How do you construct the image of a figure under a translation?	
8/29 Tuesday	**Translations Pages 6-8** Obj: Use coordinates to develop function rules modeling translations centered at the origin EQ: How do you construct the image of a figure under a translation?	
8/30 Wednesday	**Reflections Pages 9-14** Obj: Use coordinates to develop function rules modeling reflections centered at the origin EQ: How do you construct the image of a figure under a reflection? ***Begin Geometry STEM Project (due Sept. 22nd)**	
8/31 Thursday	**Reflections Pages 15-19** Obj: Use coordinates to develop function rules modeling reflections centered at the origin EQ: How do you construct the image of a figure under a reflection?	
9/1 Friday	**Rotations Pages 20-23** ***QUIZ*** Obj: Use coordinates to develop function rules modeling rotations centered at the origin EQ: How do you construct the image of a figure under a rotation?	
9/4 Monday	**Labor Day Holiday**	
9/5 Tuesday	**Rotations Pages 24-26** Obj: Use coordinates to develop function rules modeling rotations centered at the origin EQ: How do you construct the image of a figure under a rotation?	
9/6 Wednesday	**Geometry STEM Project**	
9/7 Thursday	**Compositions Pages 27-31** Obj: Explore the concept of function composition using successive application of two transformations EQ: How do you construct the image of a figure under a composition?	
9/8 Friday	**Dilations Pages 32-35** ***QUIZ*** Obj: Use coordinates to develop function rules modeling dilations centered at the origin EQ: How do you construct the image of a figure under a dilation?	
9/11 Monday	**Test Review** **Pages 36 - 40**	
9/12 Tuesday	**Test**	
9/13 Wednesday	**Geometry STEM Project**	

Vocabulary Word	Definition	Characteristics	Picture and/or Symbol	Real Life Examples
congruence motion				
image				
preimage				
reflection				
rotation				

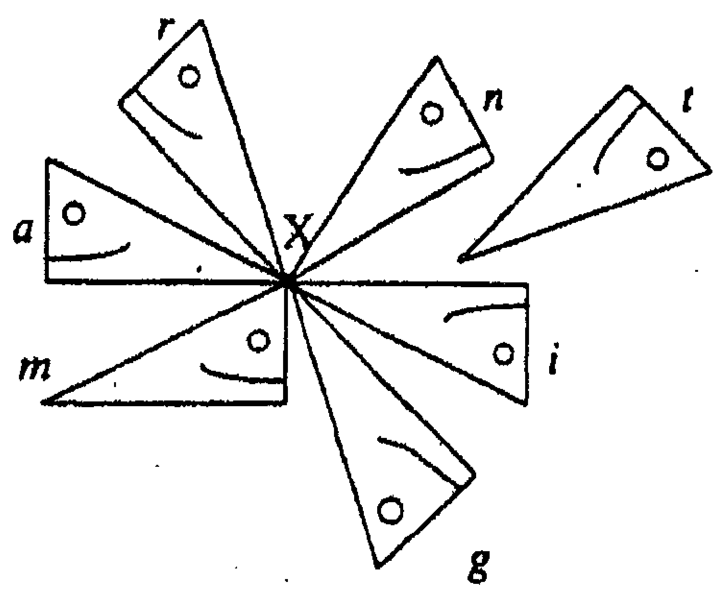
Vocabulary Word	Definition	Characteristics	Picture and/or Symbol	Real Life Examples
tessellation				
transformation				
translation				

2.1 Warm Up

1. Draw the image of stick-man *m* when translated using arrow *p*. What motion will take stick-man *m'* back onto man *m*?



2. Which of the figures shown is the image of figure *a*, if figure *a* were rotated using center X? Explain why or why not for each figure.



Adapted from *Geometry: A Moving Experience* developed by the Curriculum Research & Development Group, College of Education at the University of Hawaii

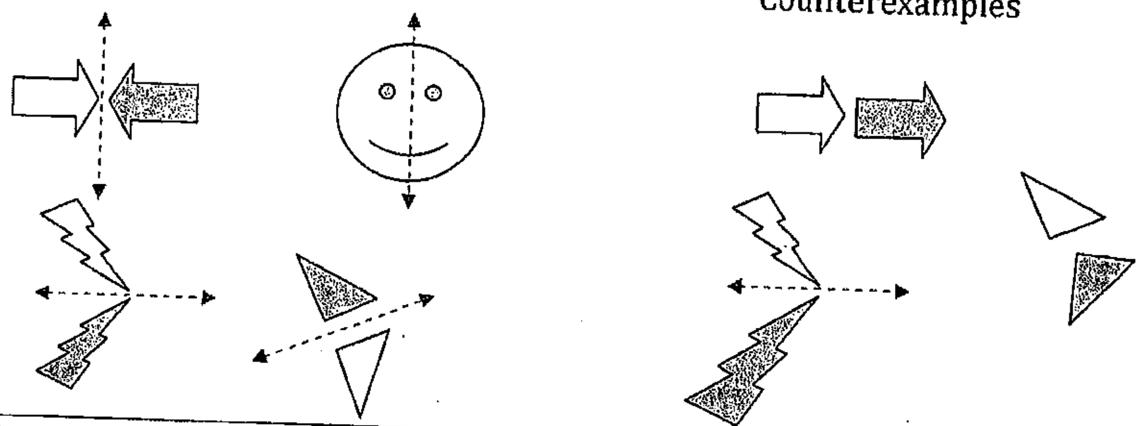
Transformations: Examples and Counterexamples

The images are indicated using gray.

1. Reflection

Examples

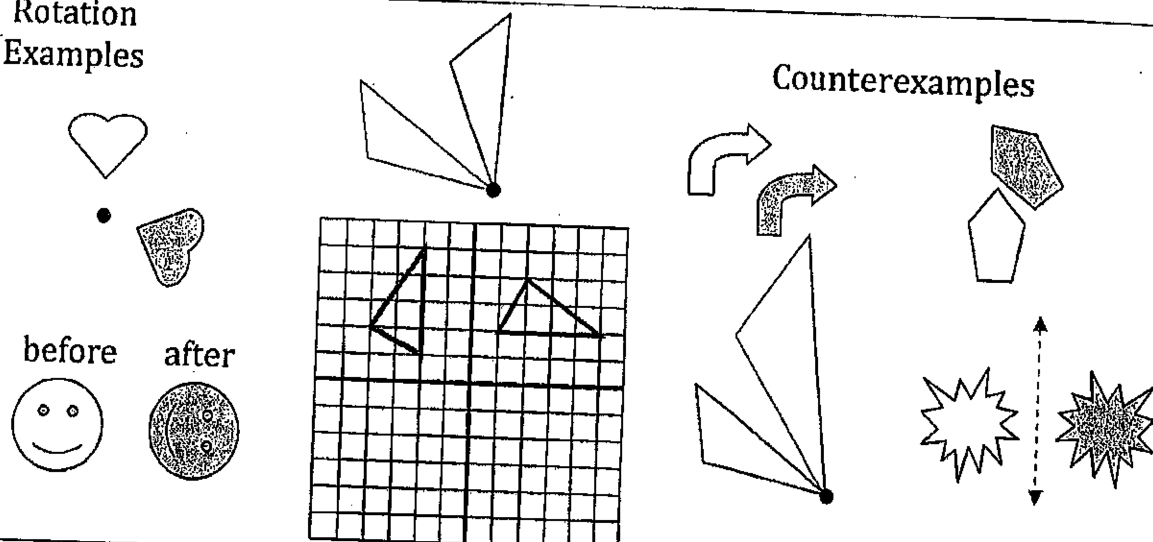
Counterexamples



2. Rotation

Examples

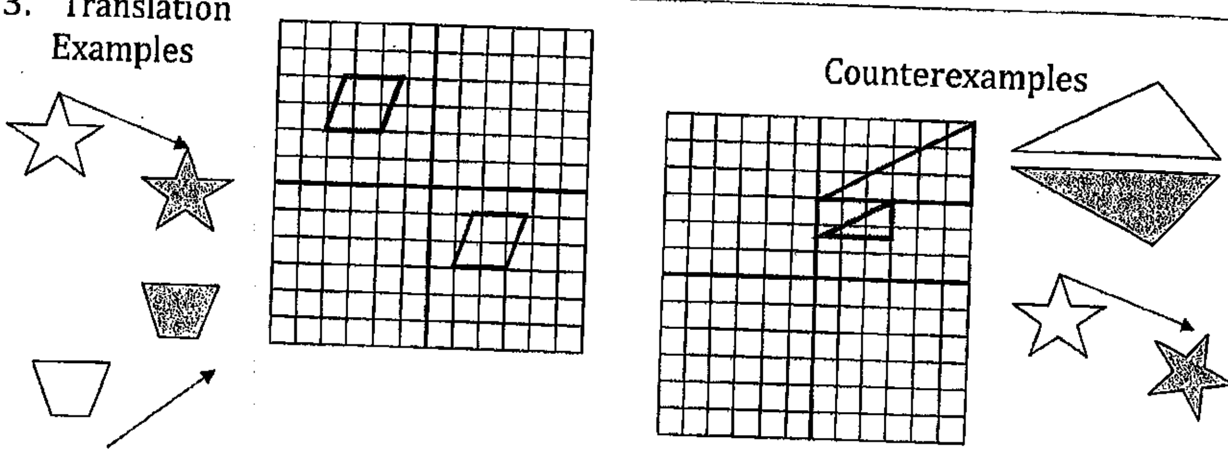
Counterexamples



3. Translation

Examples

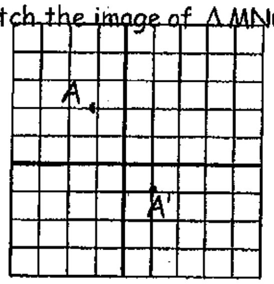
Counterexamples

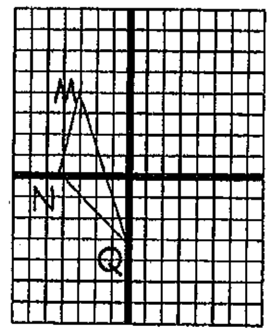


Translation - ______________________________

- A translation may be thought of as a "slide".
- Translations preserve ______________________________.
- notation: $T:(x, y) \rightarrow (x + 2, Y - 1)$ means ______________________.

Example: Sketch the image of $\triangle MNQ$ under the translation T that maps A to A'.





T: $(x, y) \rightarrow$ (_____, _____)

True or False, if false, explain why.

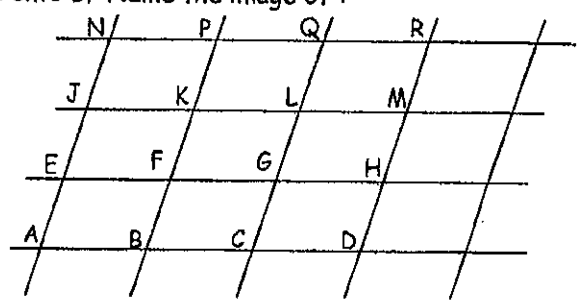
_________1. A translation is a transformation.______________________________

_________2. Translations preserve angle measure.______________________________

_________3. Translations reverse orientation.______________________________

_________4. The image of a square under a translation is a square.______________________________

5. In the tessellation to the right, a translation maps A onto B. Name the image of :



a. E c. $\angle EFK$

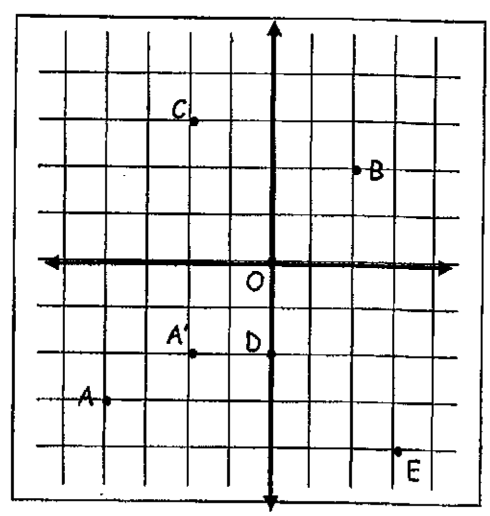
b. K d. $\overline{AE}$

6. Using the same diagram. in a translation that maps A onto F, name the image of:

a. B c. $\angle EFK$

b. K d. ▱ BCGF

In 7-10, refer to the graph. A translation maps A onto A'. Name the coordinates of the translation image of each of the following points.



7. O _____ 9. C _____

8. B _____ 10. D _____

11. Consider the translation $T: (x, y) \rightarrow (x + 7, y - 1)$.

What is the image of (0, 3)?__________

What is the preimage of (-2, 4)?__________

9–2 Translations

MAIN IDEAS

- Draw translated images using coordinates.
- Draw translated images by using repeated reflections.

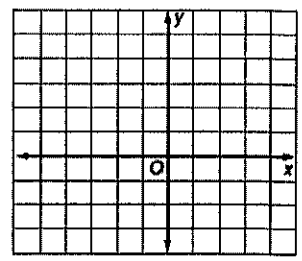
BUILD YOUR VOCABULARY (pages 220–221)

A translation is a transformation that moves all points of a figure the same distance in the same ______.

EXAMPLE Translations in the Coordinate Plane

1 COORDINATE GEOMETRY

Parallelogram *TUVW* has vertices $T(-1, 4)$, $U(2, 5)$, $V(4, 3)$, and $W(1, 2)$. Graph *TUVW* and its image for the translation $(x, y) \longrightarrow (x - 4, y - 5)$.



This translation moved every point of the preimage 4 units left and 5 units down.

$T(-1, 4) \longrightarrow T'$ ______ or T' ______

$U(2, 5) \longrightarrow U'$ ______ or U' ______

$V(4, 3) \longrightarrow V'$ ______ or V' ______

$W(1, 2) \longrightarrow W'$ ______ or W' ______

Plot and then connect the translated vertices $T'U'V'$ and W'.

Check Your Progress Parallelogram *LMNP* has vertices $L(-1, 2)$, $M(1, 4)$, $N(3, 2)$, and $P(1, 0)$. Graph *LMNP* and its image for the translation $(x, y) \longrightarrow (x + 3, y - 4)$.

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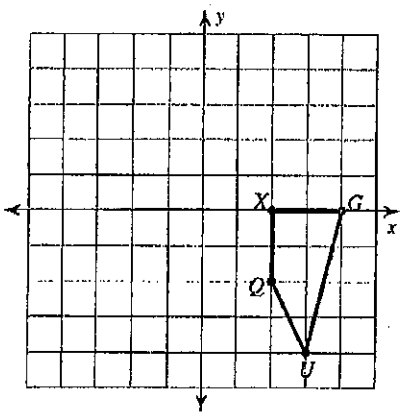
Name________________________

Translations of Shapes

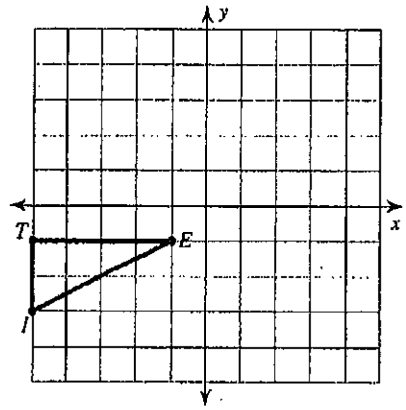
Date________________ Period___

Graph the image of the figure using the transformation given.

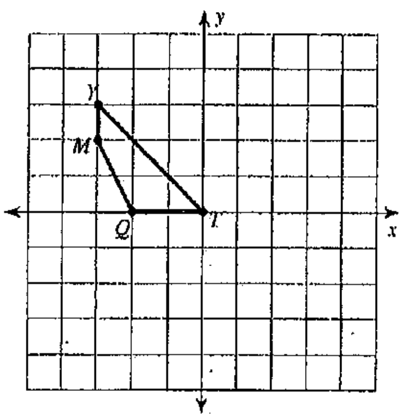
1) translation: 1 unit left



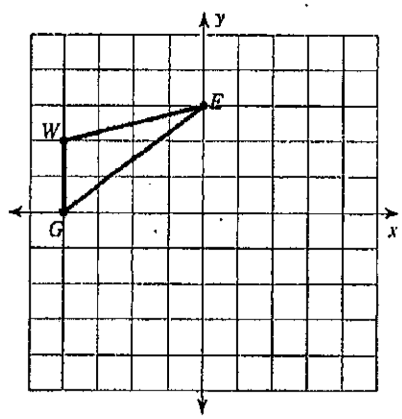
2) translation: 1 unit right and 2 units down



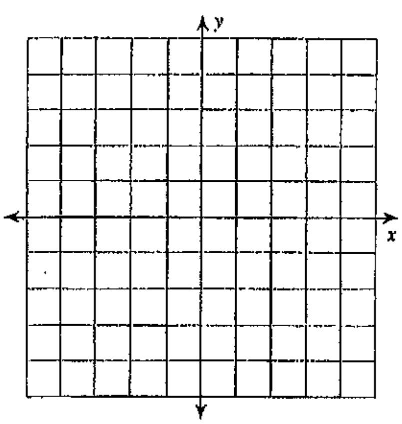
3) translation: 3 units right



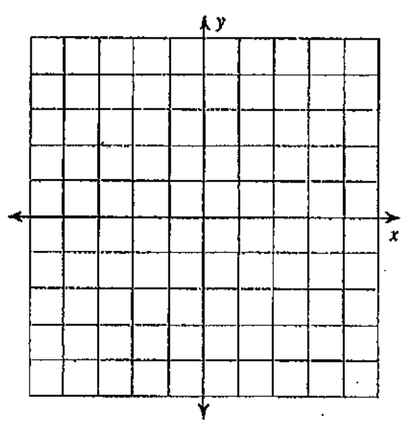
4) translation: 1 unit right and 2 units down



5) translation: 5 units up
$U(-3, -4)$, $M(-1, -1)$, $L(-2, -5)$



6) translation: 3 units up
$R(-4, -3)$, $D(-4, 0)$, $L(0, 0)$, $F(0, -3)$



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Find the coordinates of the vertices of each figure after the given transformation.

7) translation: 2 units left and 1 unit down
$Q(0, -1)$, $D(-2, 2)$, $V(2, 4)$, $J(3, 0)$

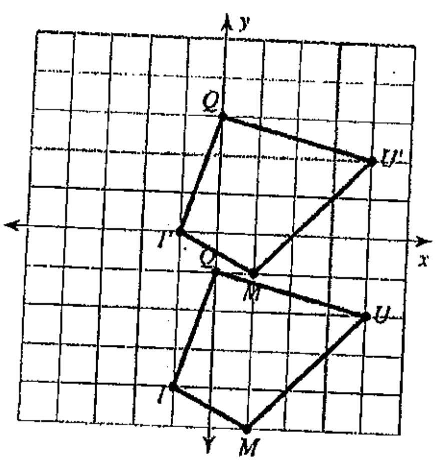
8) translation: 2 units down
$D(-4, 1)$, $A(-2, 5)$, $S(-1, 4)$, $N(-1, 2)$

9) translation: 4 units left and 4 units up
$J(-1, -2)$, $A(-1, 0)$, $N(3, -3)$

10) translation: 3 units right and 4 units up
$Z(-4, -3)$, $I(-2, -2)$, $V(-2, -4)$

Write a rule to describe each transformation.

11)



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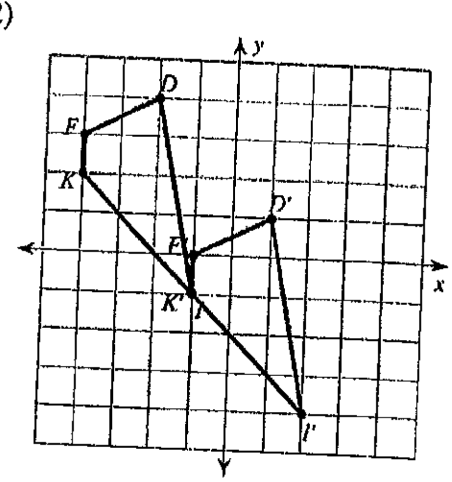

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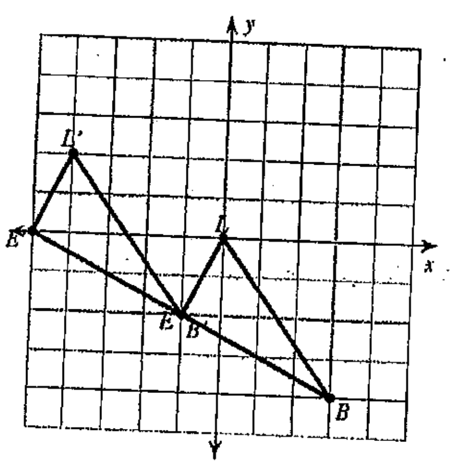

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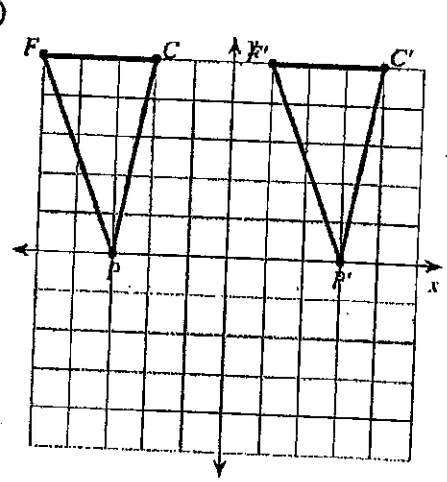

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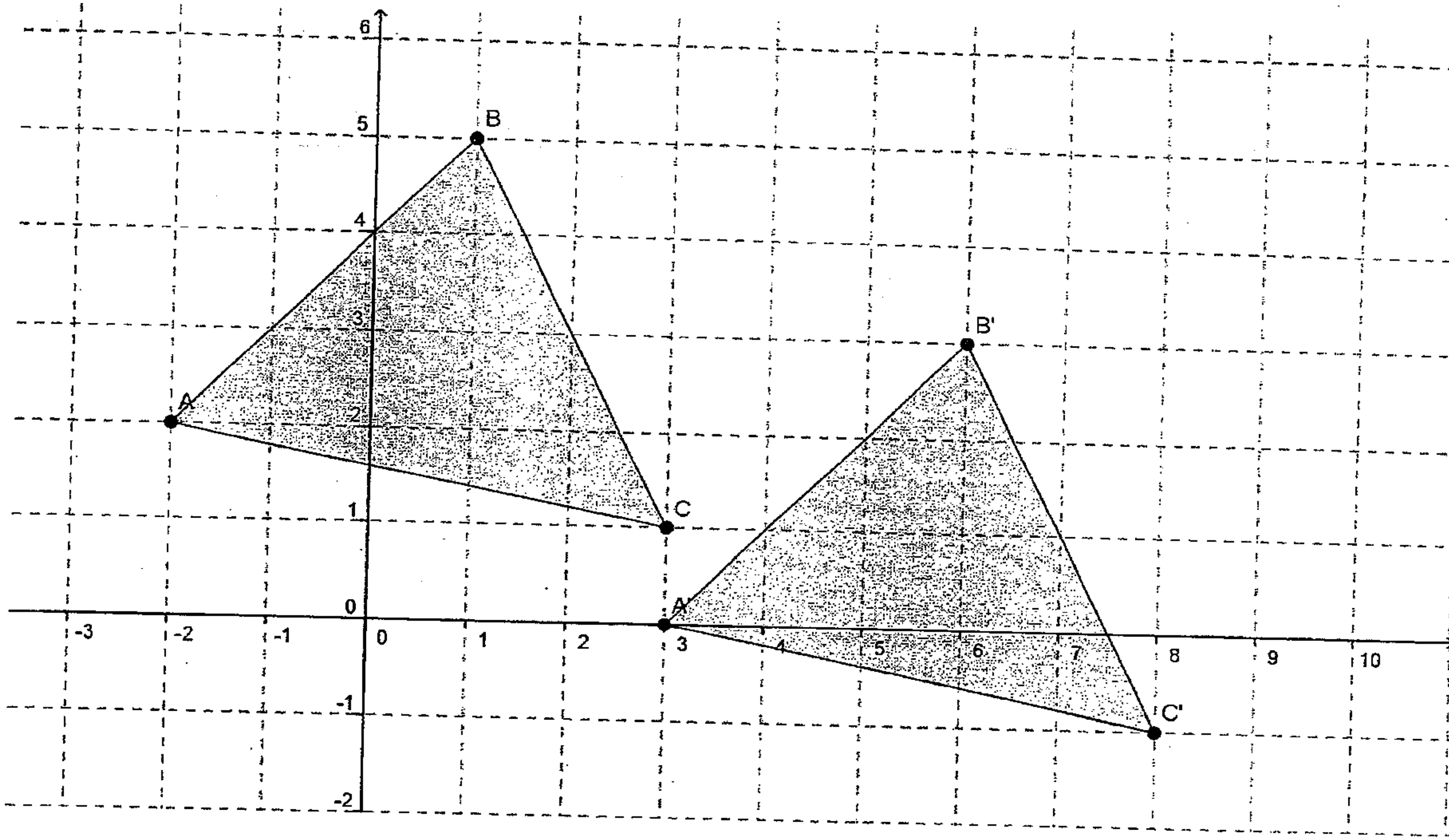
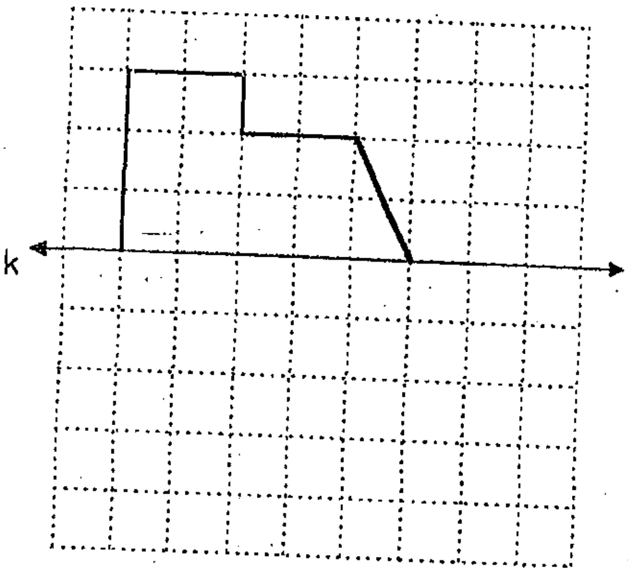
2.2 Worksheet 1



9

Reflections

For each figure, draw the image by reflecting over line k.



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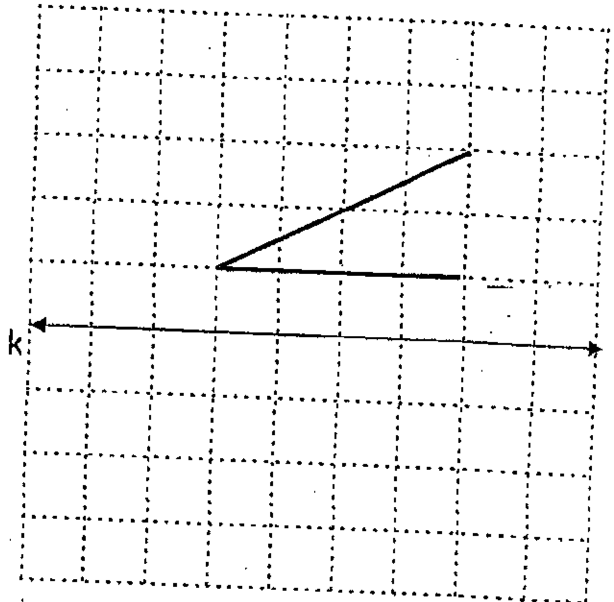

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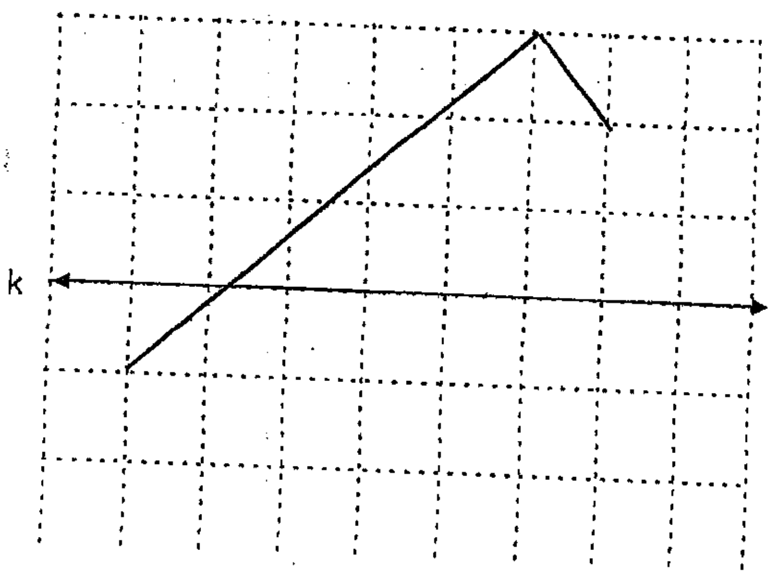

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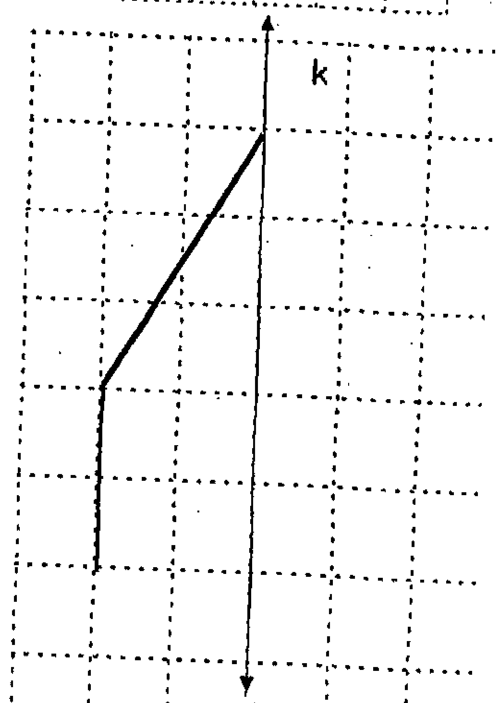

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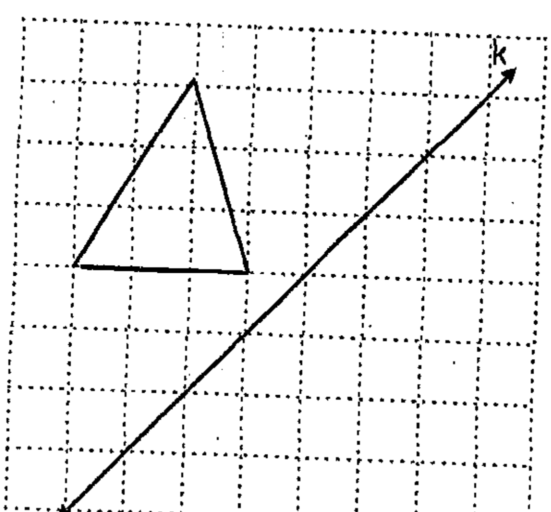

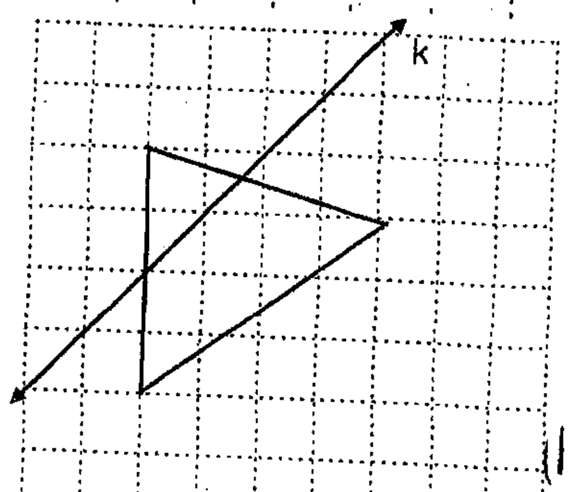

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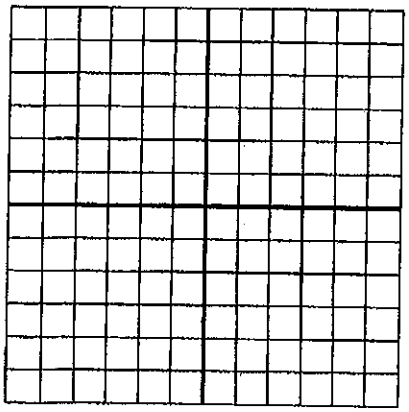
2.3 Worksheet 4

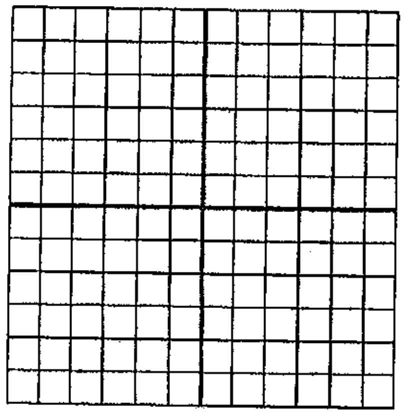
Graph the points to form a figure. Reflect each figure over the x-axis. Draw the image in a different color. Then write the coordinates of the image points. What pattern do you notice?

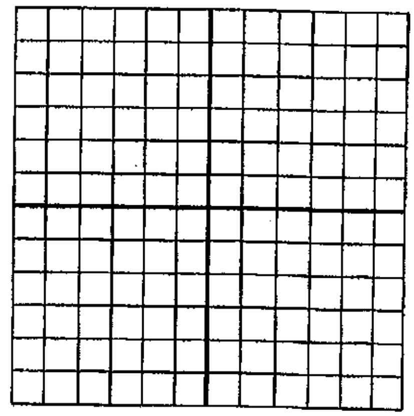
x	y
2	3
1	5
3	4

x	y
-3	4
-2	0
-6	2

x	y
-2	-3
3	5
4	-2







x	y

x	y

x	y

Write the algebraic rule for a reflection over the x-axis:

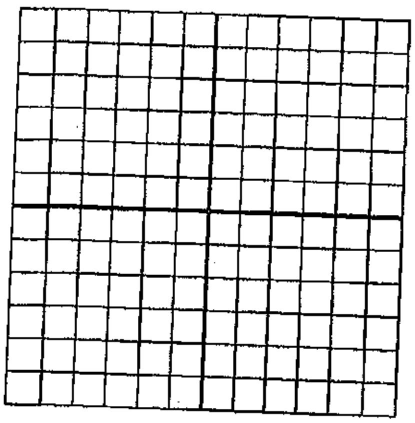
____

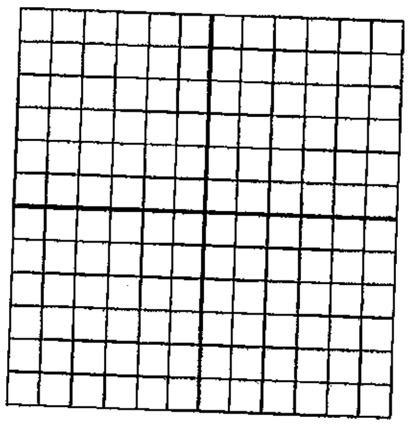
Graph the points to form a figure. Reflect each figure over the y-axis. Draw the image in a different color. Then write the coordinates of the image points. What pattern do you notice?

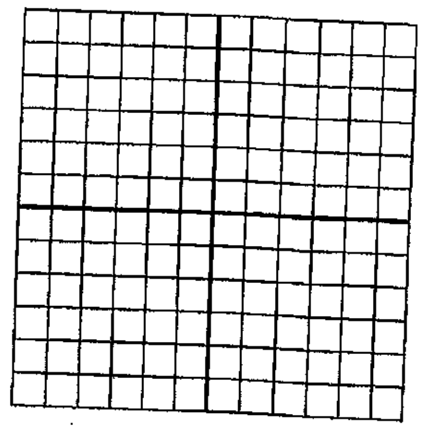
x	y
3	1
2	6
5	3

x	y
0	2
-3	2
-5	-3

x	y
1	2
-3	5
4	-2







x	y

x	y

x	y

Write the algebraic rule for a reflection over the y-axis:

____

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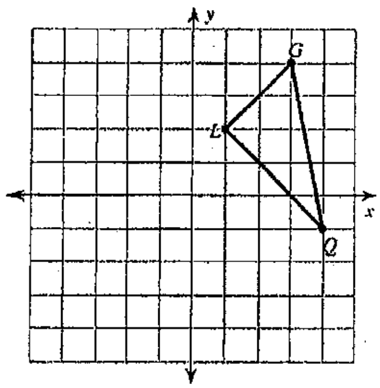
Name______________________________________

Reflections of Shapes

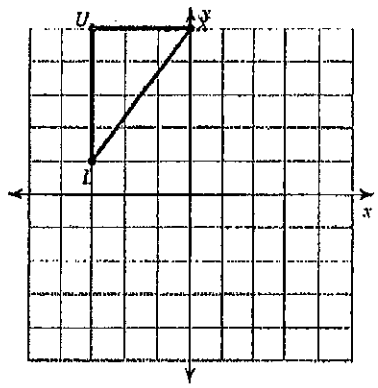
Date____________________ Period____

Graph the image of the figure using the transformation given.

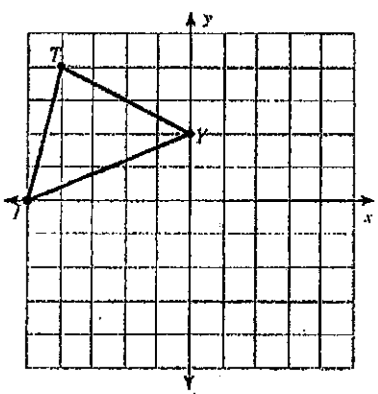
1) reflection across the x-axis



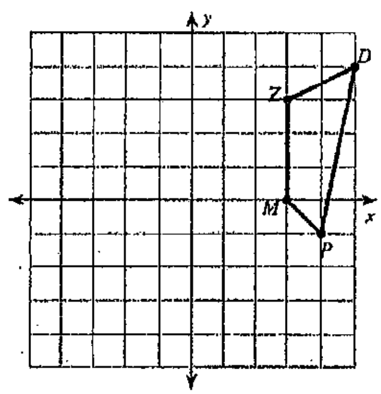
2) reflection across $y = 3$



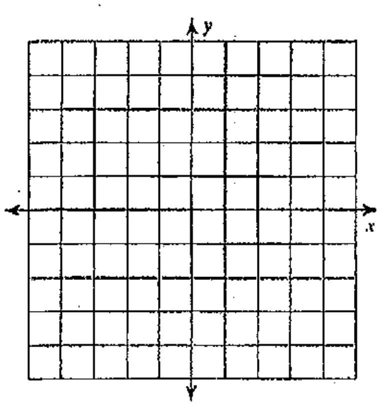
3) reflection across $y = 1$



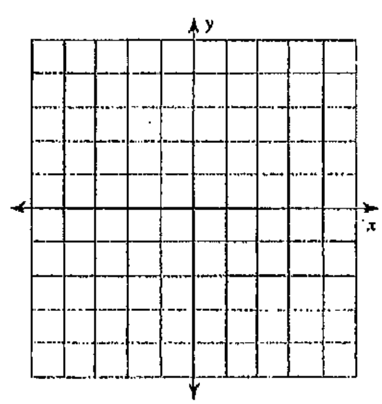
4) reflection across the x-axis



5) reflection across the x-axis
$T(2, 2)$, $C(2, 5)$, $Z(5, 4)$, $F(5, 0)$



6) reflection across $y = -2$
$H(-1, -5)$, $M(-1, -4)$, $B(1, -2)$, $C(3, -3)$



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Find the coordinates of the vertices of each figure after the given transformation.

7) reflection across the x-axis
$K(1, -1)$, $N(4, 0)$, $Q(4, -4)$

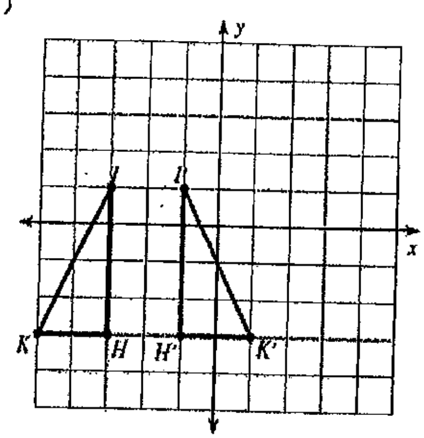
8) reflection across $y = -1$
$R(-3, -5)$, $N(-4, 0)$, $V(-2, -1)$, $E(0, -4)$

9) reflection across $x = 3$
$F(2, 2)$, $W(2, 5)$, $K(3, 2)$

10) reflection across $x = -1$
$V(-3, -1)$, $Z(-3, 2)$, $G(-1, 3)$, $M(1, 1)$

Draw the line of reflection. Describe the reflection (for example, "reflect across the line y = 3").

11)



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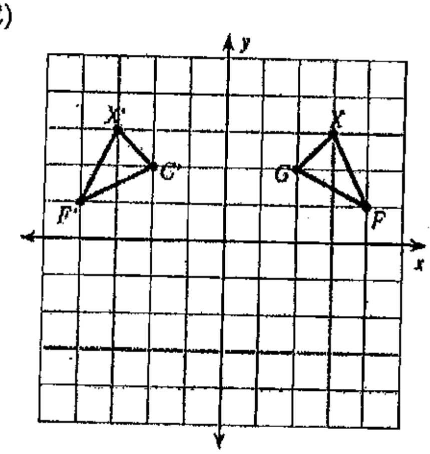

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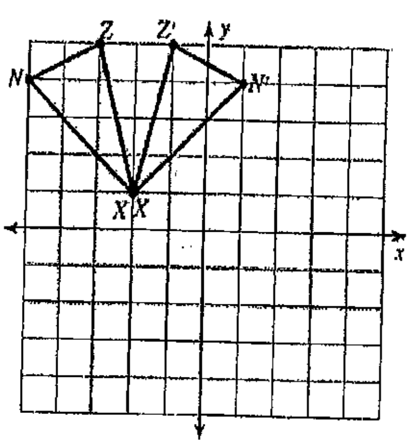

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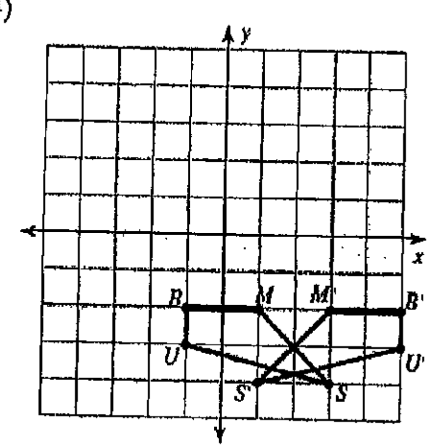


Challenge: Write the algebraic rule that describes each reflection.

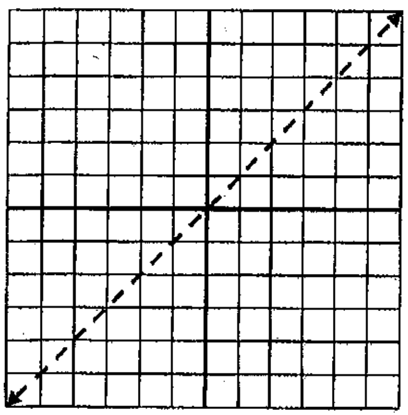
2.4 Worksheet 1

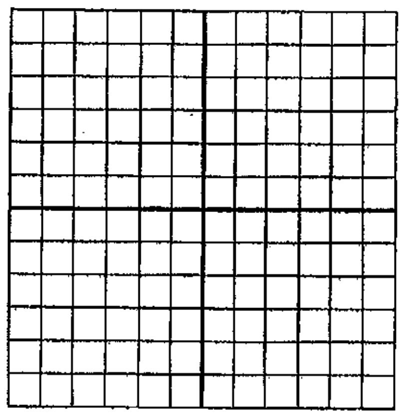
Graph the points to form a figure. Reflect each figure over the line y = x (drawn for you on the first graph). Draw the image in a different color. Then write the coordinates of the image points. What pattern do you notice?

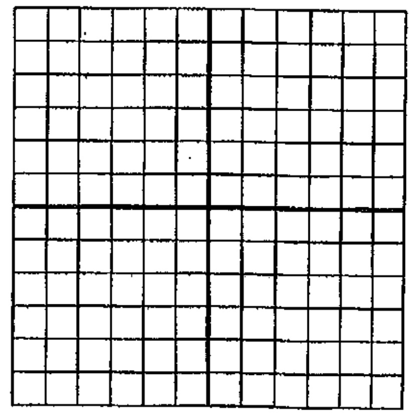
x	y
2	3
1	5
3	4

x	y
-3	4
-2	0
-6	2

x	y
-2	-3
3	5
4	-2







x	y

x	y

x	y

Write the algebraic rule for a reflection over the line y = x:

____

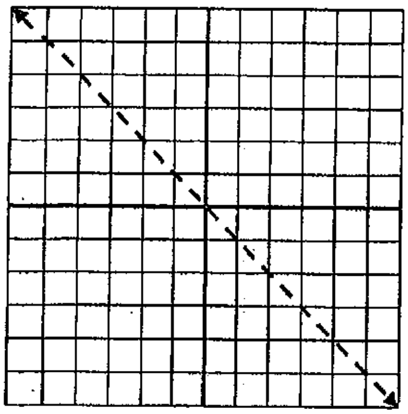
15

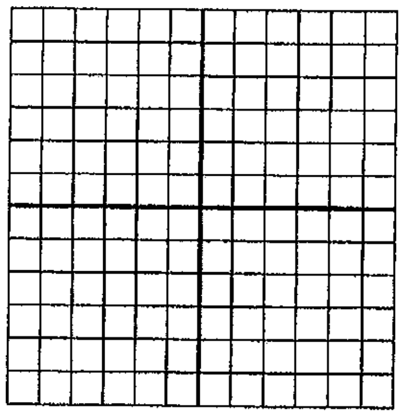
Graph the points to form a figure. Reflect each figure over the line y = -x (drawn for you on the first graph). Draw the image in a different color. Then write the coordinates of the image points. What pattern do you notice?

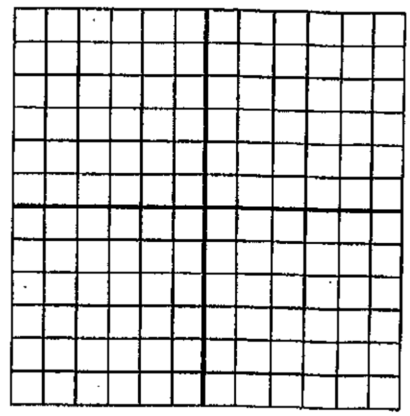
x	y
3	1
2	6
5	3

x	y
0	2
-3	2
-5	-3

x	y
1	2
-3	5
4	-2







x	y

x	y

x	y

Write the algebraic rule for a reflection over the line y = -x:

____

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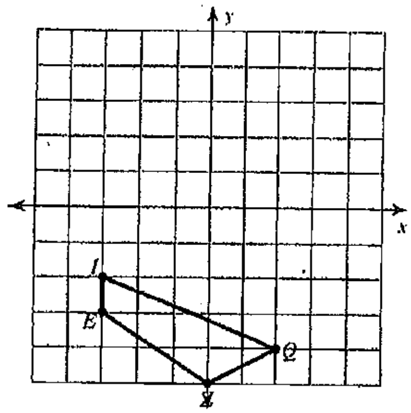
Name________________________

Reflections

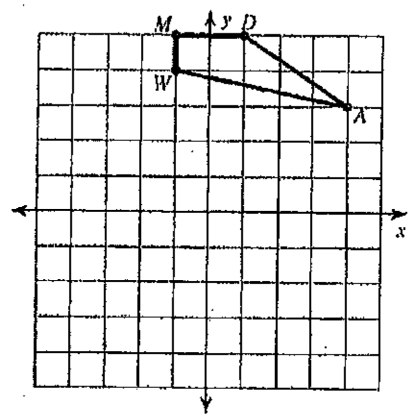
Date________________ Period___

Graph the image of the figure using the transformation given.

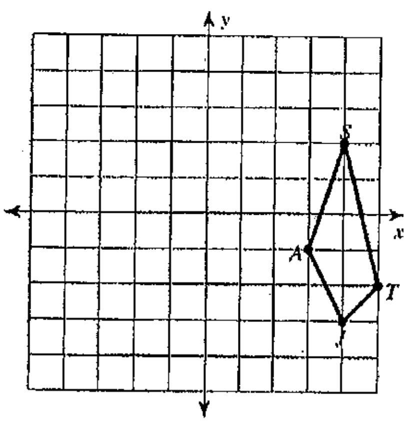
1) reflection across $y = -2$



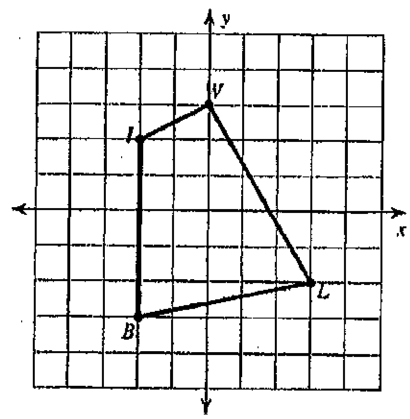
2) reflection across the x-axis



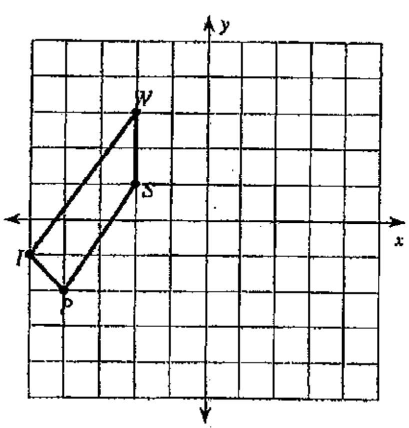
3) reflection across $y = -x$



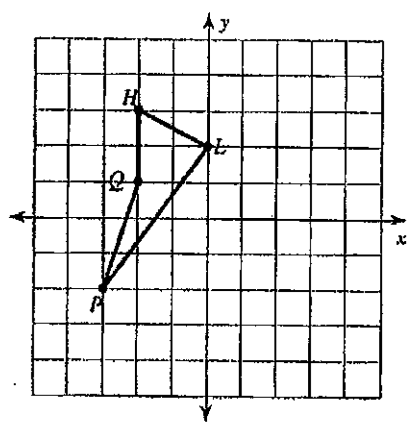
4) reflection across $y = -1$



5) reflection across $x = -3$



6) reflection across $y = x$



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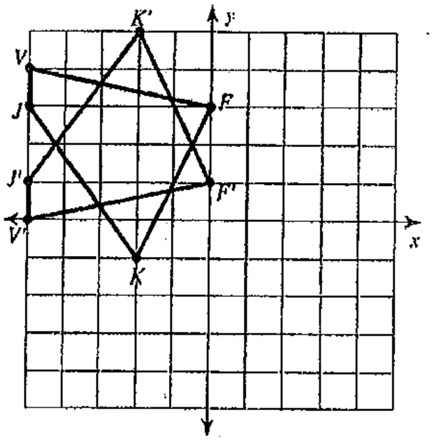
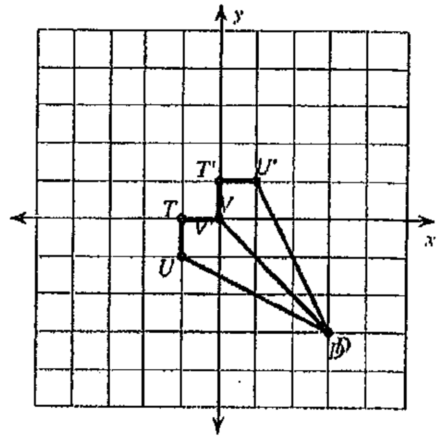
Draw the line of reflection. Describe the reflection (for example, "reflect across the line y = 3").

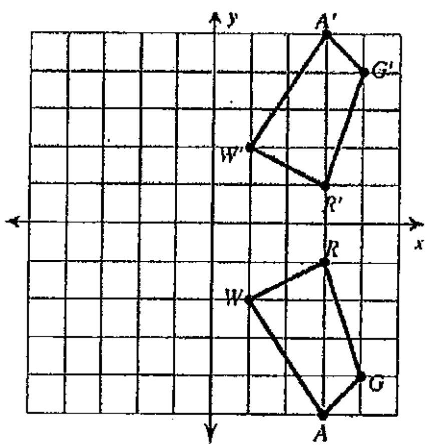
7)

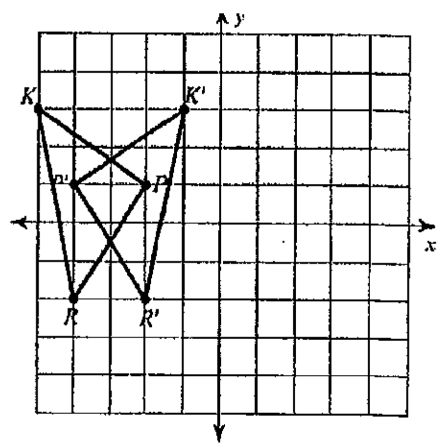


8)

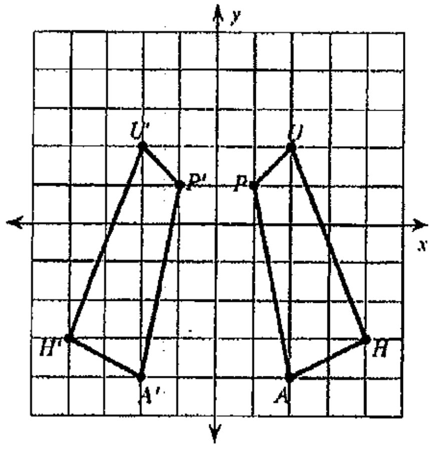


Draw the line of reflection. Describe the reflection (for example, "reflect across the line y = 3").

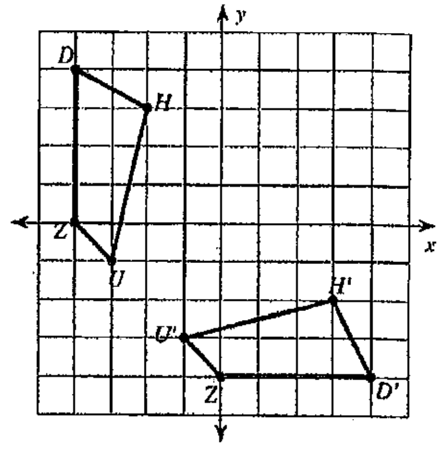




11)



12)



Challenge: Write the algebraic rule that describes each reflection.

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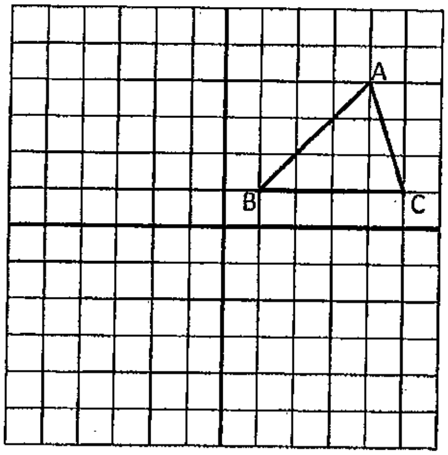
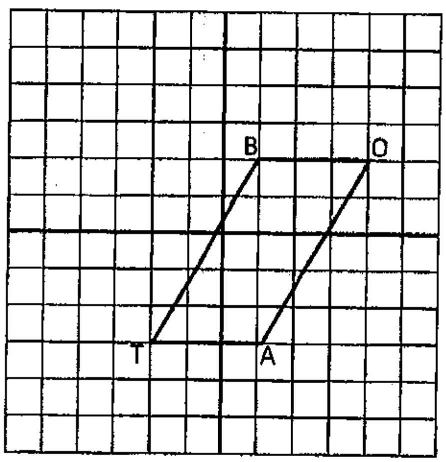
2.3 Show What You Know!

Graph the image of the figure using the indicated reflection.

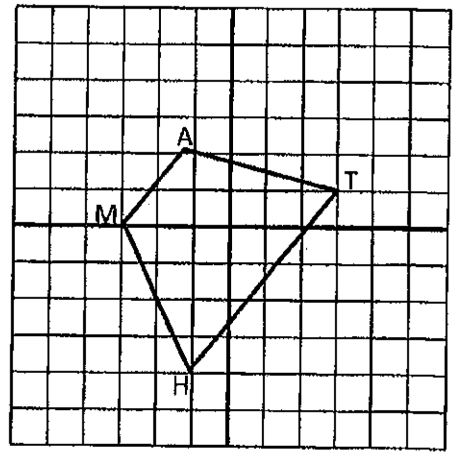
1. across the x-axis



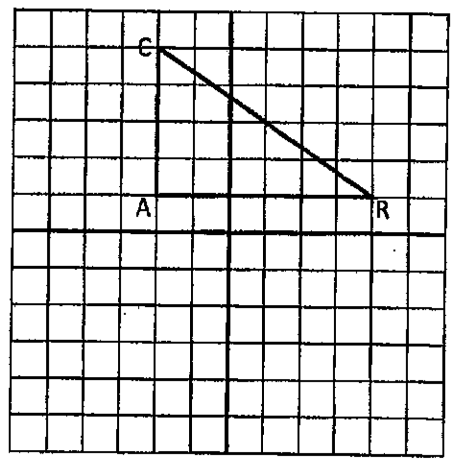
2. across the y-axis



3. across the y-axis



4. across the x-axis



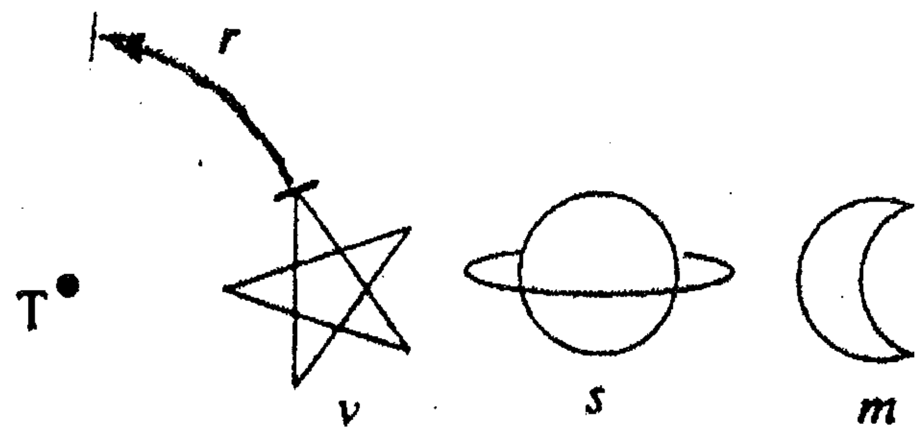
Use the algebraic rule to find the coordinates of the vertices of the image of each figure after the given reflection.

5. D(2, -3), E(1, 4), N(9, -12); over the y-axis

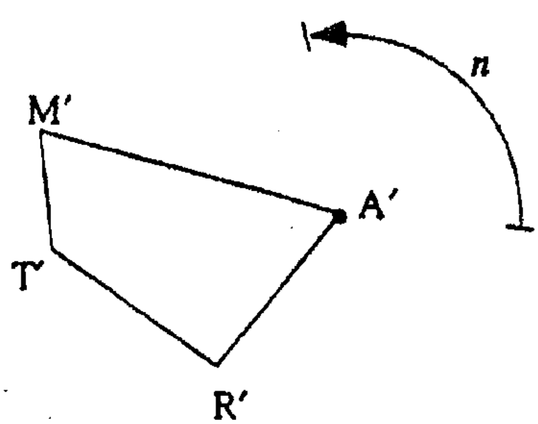
6. T(-4, 19), H(3, 13), A(5, -6), W(-6, -8); over the x-axis

2.2 Warm Up

1. Carrie is watching a display of the solar system. She notices that the figures rotate around center T as shown by the given arrow *r*. Draw the following using a single drawing:
   a. Draw the image of figure *v* when rotated around center T using arrow *r*. Label your image.
   b. Draw the image of figure *s* when rotated around center T using arrow *r*. Label your image.
   c. Draw the image of figure *m* when rotated around center T using arrow *r*. Label your image.
   d. Which figure rotated most? Explain your answer.



2. Quadrilateral M'A'R'T' is the image of quadrilateral MART when rotated using center A' and arrow *n*. Draw quadrilateral MART.



Adapted from *Geometry: A Moving Experience* developed by the Curriculum Research & Development Group, College of Education at the University of Hawaii

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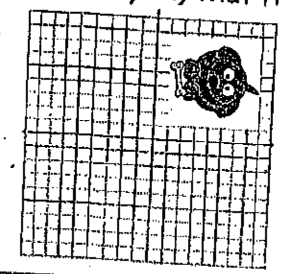
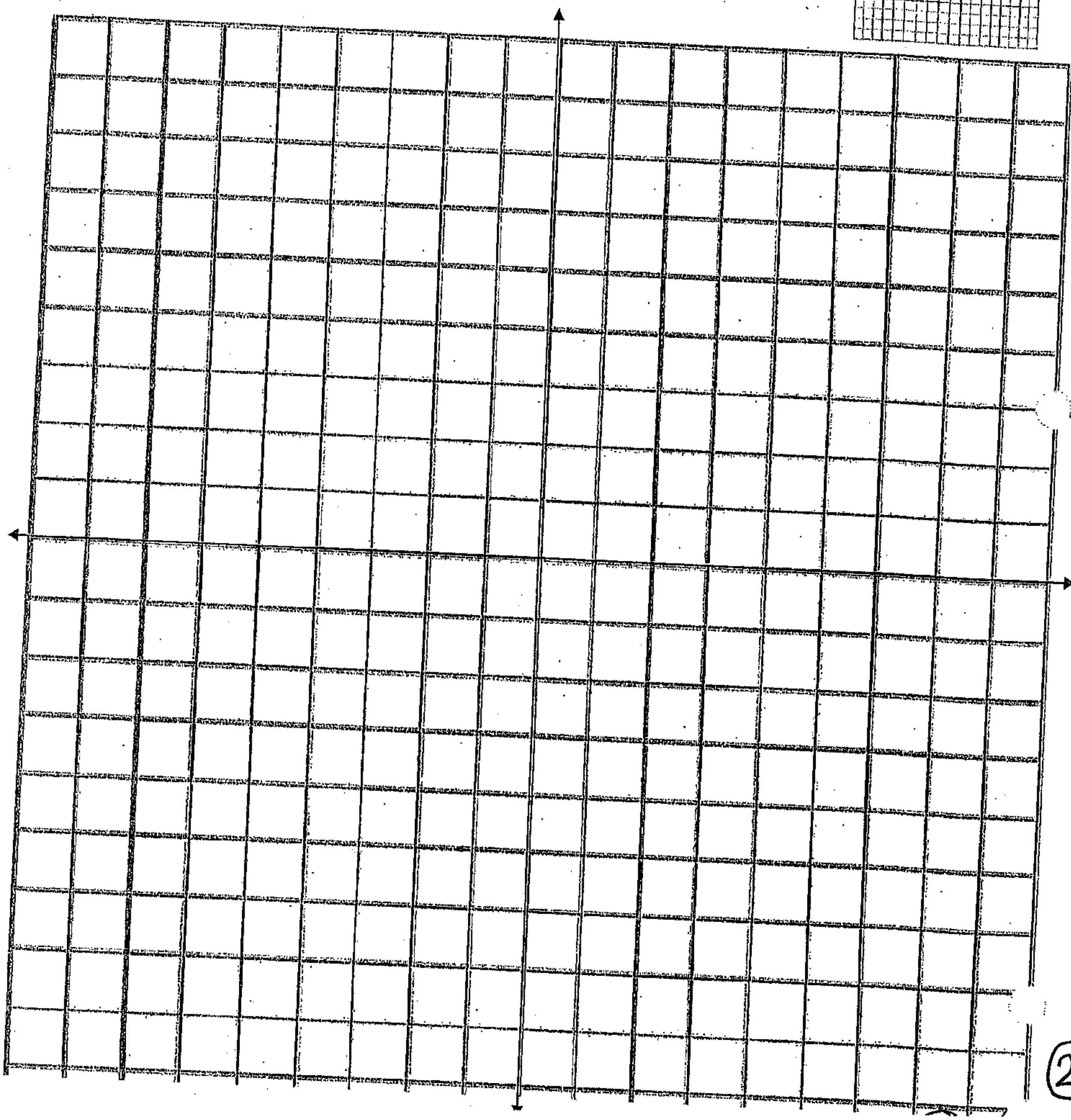
Photo Rotation: As you are uploading your pictures on your computer, you notice that one of your pictures is not in the correct orientation (like shown below). You would like to rotate your photo so that your friends can view it. Step 1: Draw your own original picture (something that symbolizes you) that fits into the first quadrant. You will draw your picture facing to the right (like shown).





Kuta Software - Infinite Pre-Algebra

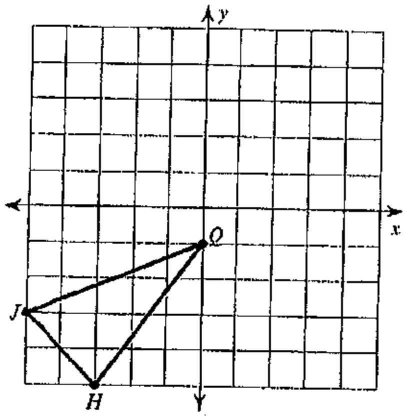
Name________________________

Rotations of Shapes

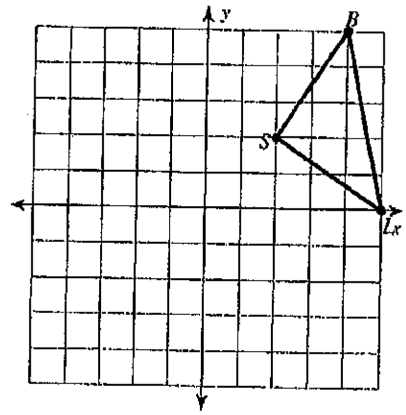
Date________________ Period_

Graph the image of the figure using the transformation given.

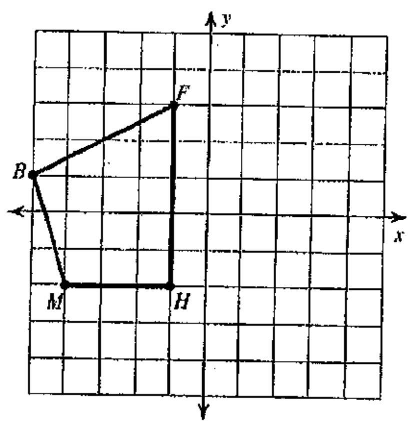
1) rotation 180° about the origin



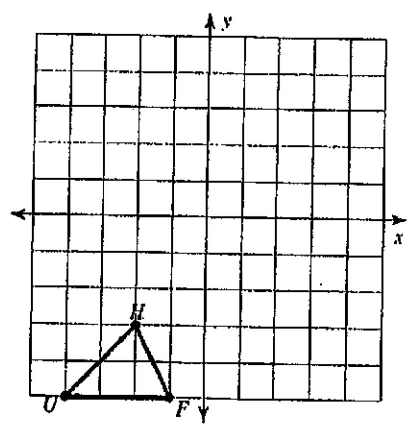
2) rotation 90° counterclockwise about the origin



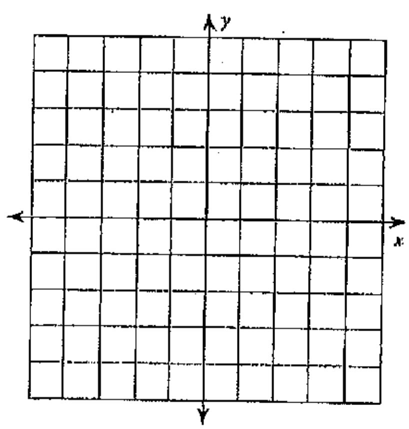
3) rotation 90° clockwise about the origin



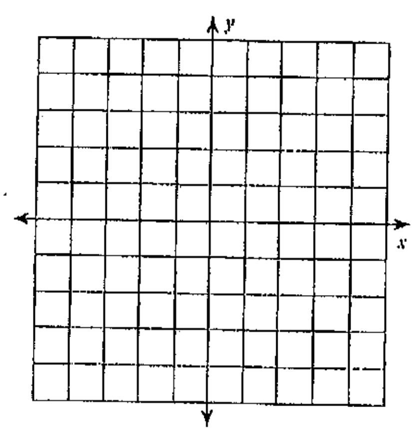
4) rotation 180° about the origin



5) rotation 90° clockwise about the origin
$U(1, -2)$, $W(0, 2)$, $K(3, 2)$, $G(3, -3)$



6) rotation 180° about the origin
$V(2, 0)$, $S(1, 3)$, $G(5, 0)$



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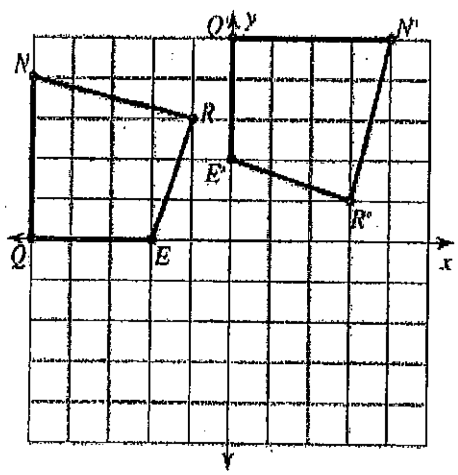
Find the coordinates of the vertices of each figure after the given transformation.

7) rotation 180° about the origin
$Z(-1, -5)$, $K(-1, 0)$, $C(1, 1)$, $N(3, -2)$

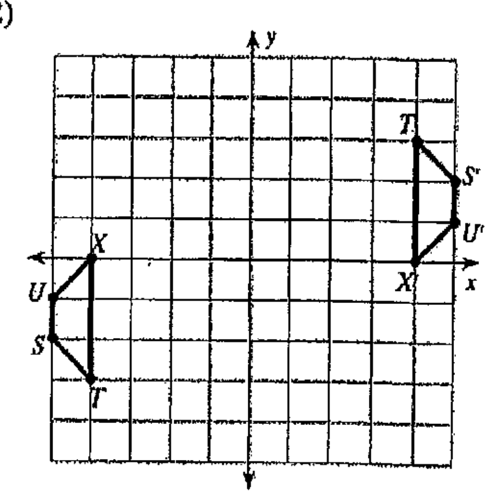
8) rotation 180° about the origin
$L(1, 3)$, $Z(5, 5)$, $F(4, 2)$

Describe each transformation verbally (e.g. rotate 90° CCW).

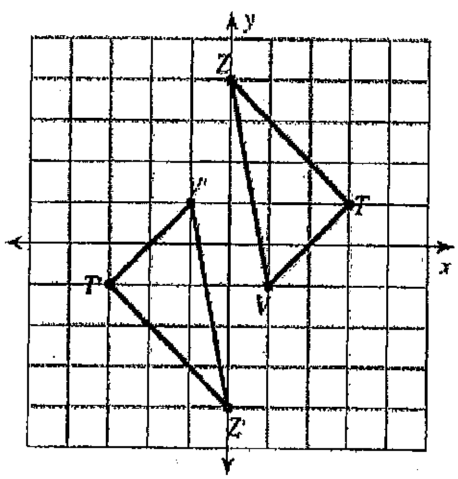
11)



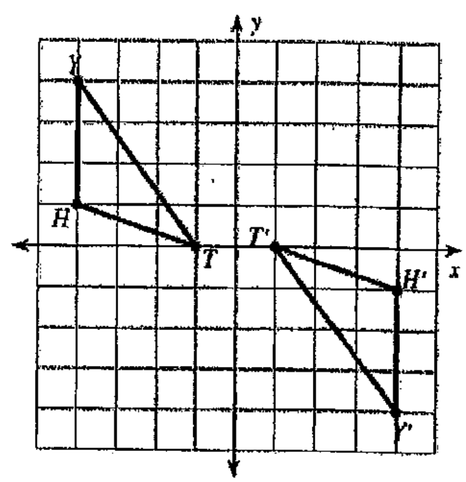
12)



13)

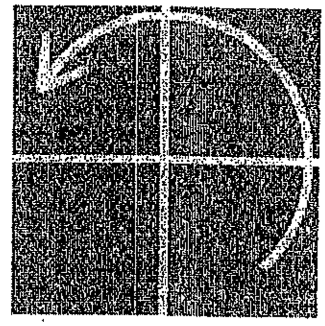


14)

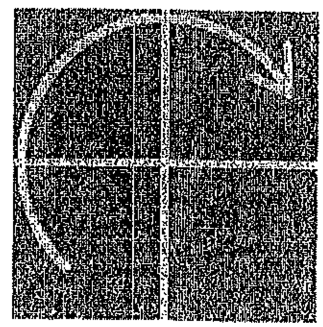


2.6 Activity 1

1. On a clean sheet of graph paper, each group member should draw a triangle.
2. Record the coordinates of the vertices of the triangle in the table below.
3. Trace the figure with patty paper and rotate 90° counter-clockwise.
4. Record the coordinates of the vertices of the image in the table.
5. Look at the coordinates of corresponding vertices. What patterns do you notice?
6. Discuss your findings with your group members. Check to see if the same pattern works for each group member's figure.
7. Write an algebraic rule for a 90° counter-clockwise rotation.



8. Now rotate the figure 90° clockwise.
9. Record the coordinates of the vertices of the image in the table.
10. Look at the coordinates of corresponding vertices. What patterns do you notice?
11. Discuss your findings with your group members. Check to see if the same pattern works for each group member's figure.
12. Write an algebraic rule for a 90° clockwise rotation.



Preimage		90° counter-clockwise rotation		90° clockwise rotation	
x	y	x	y	x	y

Algebraic Rules:

90° counter-clockwise rotation $(x, y) \rightarrow$ ____________

90° counter-clockwise rotation $(x, y) \rightarrow$ ____________

Kuta Software - Infinite Geometry

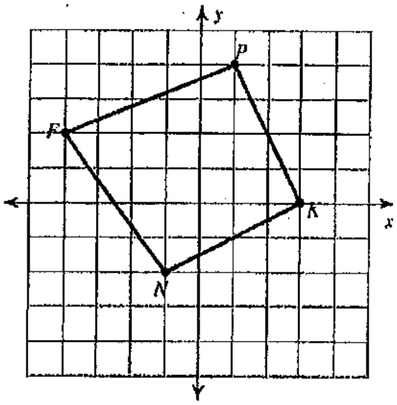
Name________________________

Rotations

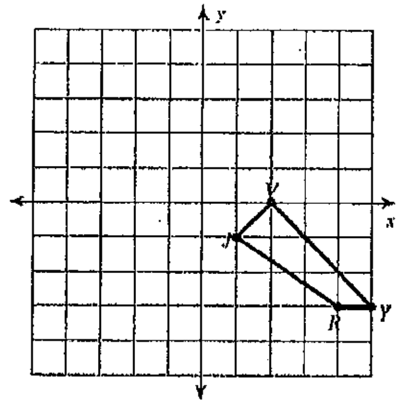
Date________________ Period____

Graph the image of the figure using the transformation given.

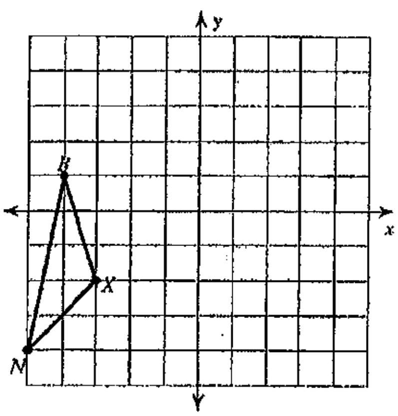
1) rotation 180° about the origin



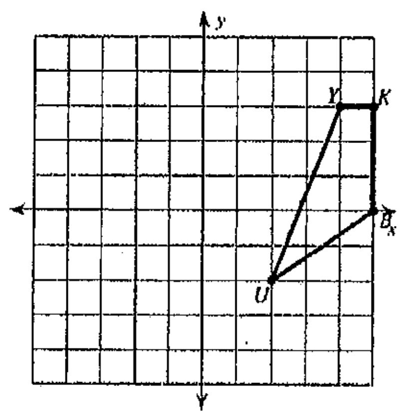
2) rotation 180° about the origin



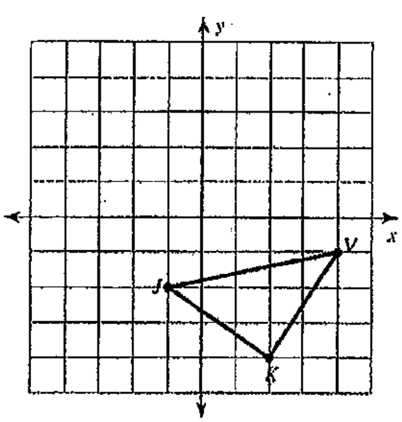
3) rotation 90° counterclockwise about the origin



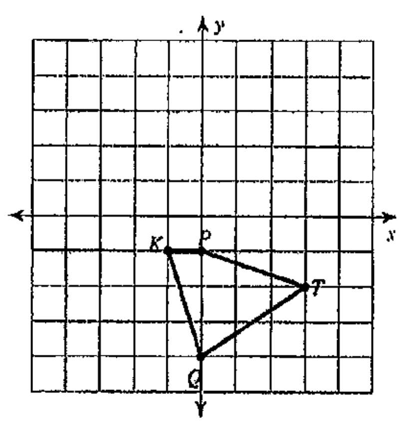
4) rotation 90° clockwise about the origin



5) rotation 90° clockwise about the origin



6) rotation 180° about the origin



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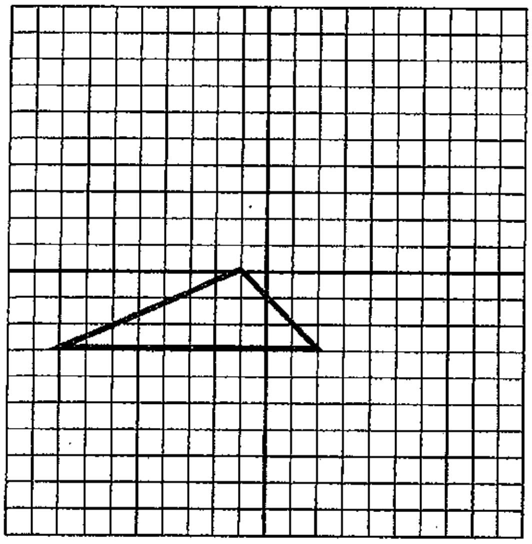
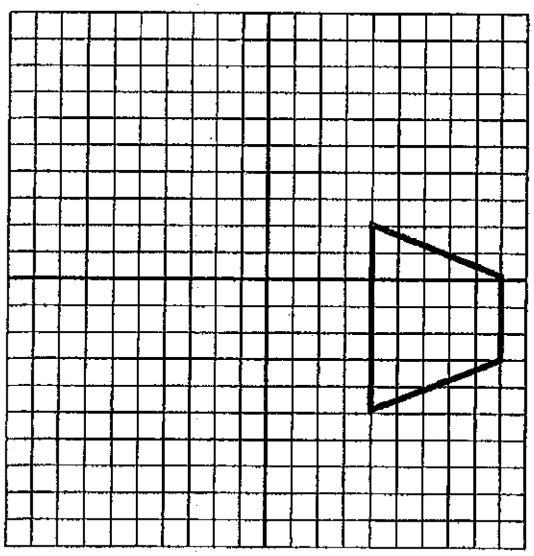
2.6 Show What You Know!

Perform the given rotation for each figure.

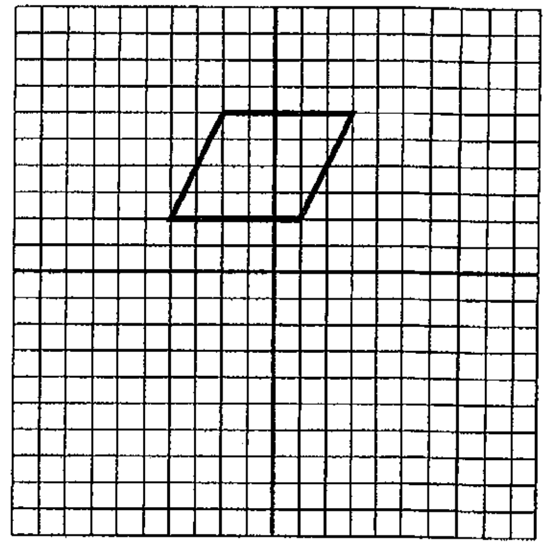
1. rotate 90° clockwise



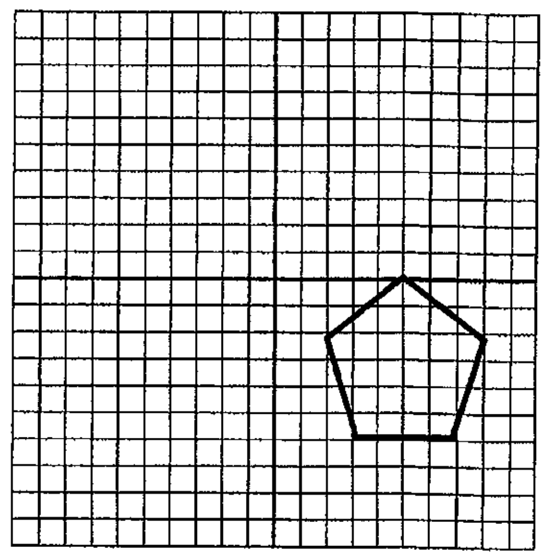
2. rotate 180° clockwise



3. rotate 90° counterclockwise

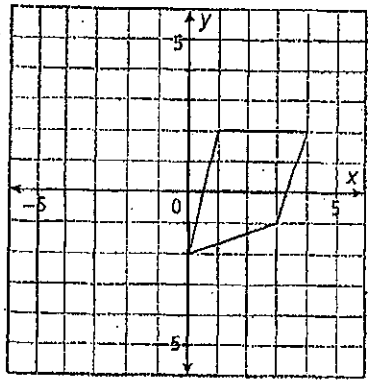


4. rotate 90° clockwise

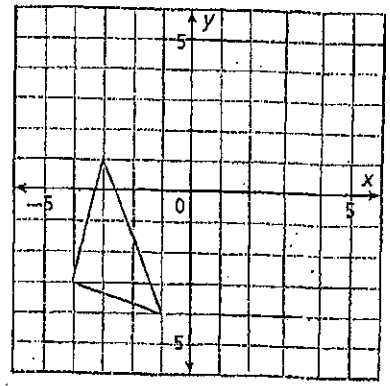


Draw the image of the figure after the given rotation.

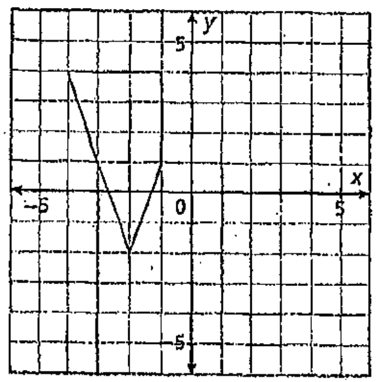
5. 180°



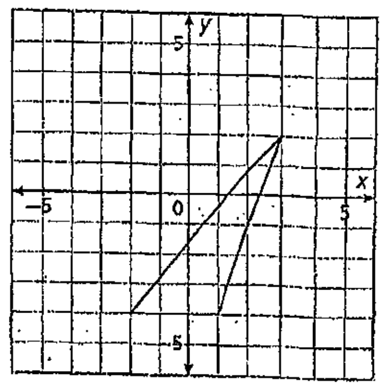
6. 90°



7. 270°



8. 180°



9. **a.** Reflect $\triangle JKL$ across the x-axis. Then reflect the image across the y-axis. Draw the final image of the triangle and label it $\triangle J'K'L'$.

b. Describe a single rotation that maps $\triangle JKL$ to $\triangle J'K'L'$.

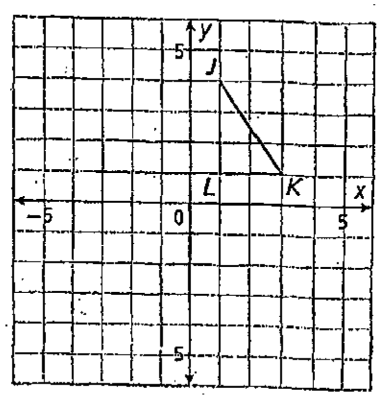
____

c. Use coordinate notation to show that your answer to part **b** is correct.

____

____

____



10. Error Analysis A student was asked to use coordinate notation to describe the result of a 180° rotation followed by a translation 3 units to the right and 5 units up. The student wrote this notation: $(x, y) \rightarrow (-[x + 3], -[y + 5])$. Describe and correct the student's error.

____

____

____

26B

Summarize the Mathematics

In this investigation, you developed coordinate rules relating points and their images under different rigid transformations: translations, rotations about the origin, and line reflections.

a A translation is determined by a single point and its image.

- **i.** Suppose a translation slides the point $O(0, 0)$ to the point $A(a, b)$. Write a symbolic rule $(x, y) \rightarrow (\_\_, \_\_)$ that describes this translation.
- **ii.** Suppose a translation slides the point $A(a, b)$ to the point $B(c, d)$. Write a symbolic rule $(x, y) \rightarrow (\_\_, \_\_)$ that describes this translation.

b Summarize the coordinate rules for these rotations about the origin.

- **i.** For a rotation of 90° counterclockwise: $(x, y) \rightarrow (\_\_, \_\_)$
- **ii.** For a rotation of 180° counterclockwise: $(x, y) \rightarrow (\_\_, \_\_)$
- **iii.** For a rotation of 270° counterclockwise: $(x, y) \rightarrow (\_\_, \_\_)$
- **iv.** For a rotation of 270° clockwise: $(x, y) \rightarrow (\_\_, \_\_)$

c Summarize the coordinate rules for line reflections:

- **i.** Across the x-axis: $(x, y) \rightarrow (\_\_, \_\_)$
- **ii.** Across the y-axis: $(x, y) \rightarrow (\_\_, \_\_)$
- **iii.** Across the line $y = x$: $(x, y) \rightarrow (\_\_, \_\_)$
- **iv.** Across the line $y = -x$: $(x, y) \rightarrow (\_\_, \_\_)$

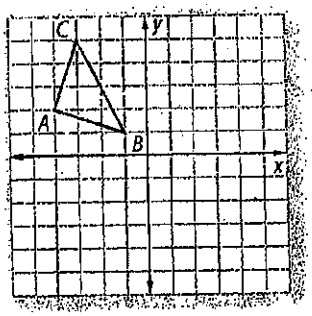
Be prepared to explain your coordinate rules and strategies you could use to remember or redevelop them.

On Your Own

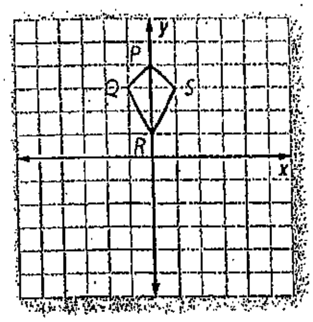
Applications

1. Copy each polygon below on a separate coordinate grid. Draw and label the transformed image according to the given rule. Identify as precisely as you can the type of transformation.

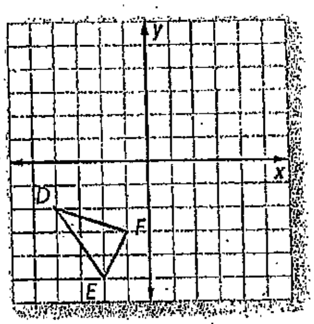
   a. $(x, y) \rightarrow (x + 2, y - 3)$



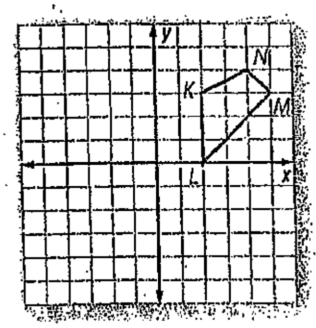
   b. $(x, y) \rightarrow (-y, x)$



   c. $(x, y) \rightarrow (-x, y)$



   d. $(x, y) \rightarrow (-x, -y)$



2. $\triangle ABC$ has vertices as follows: $A(1, 2)$, $B(4, 4)$, and $C(3, 6)$.

   a. Draw $\triangle ABC$ on a coordinate grid. Then draw and label the image of $\triangle ABC$ under each of the following transformations.

      i. Translation with horizontal component 5 and vertical component -4

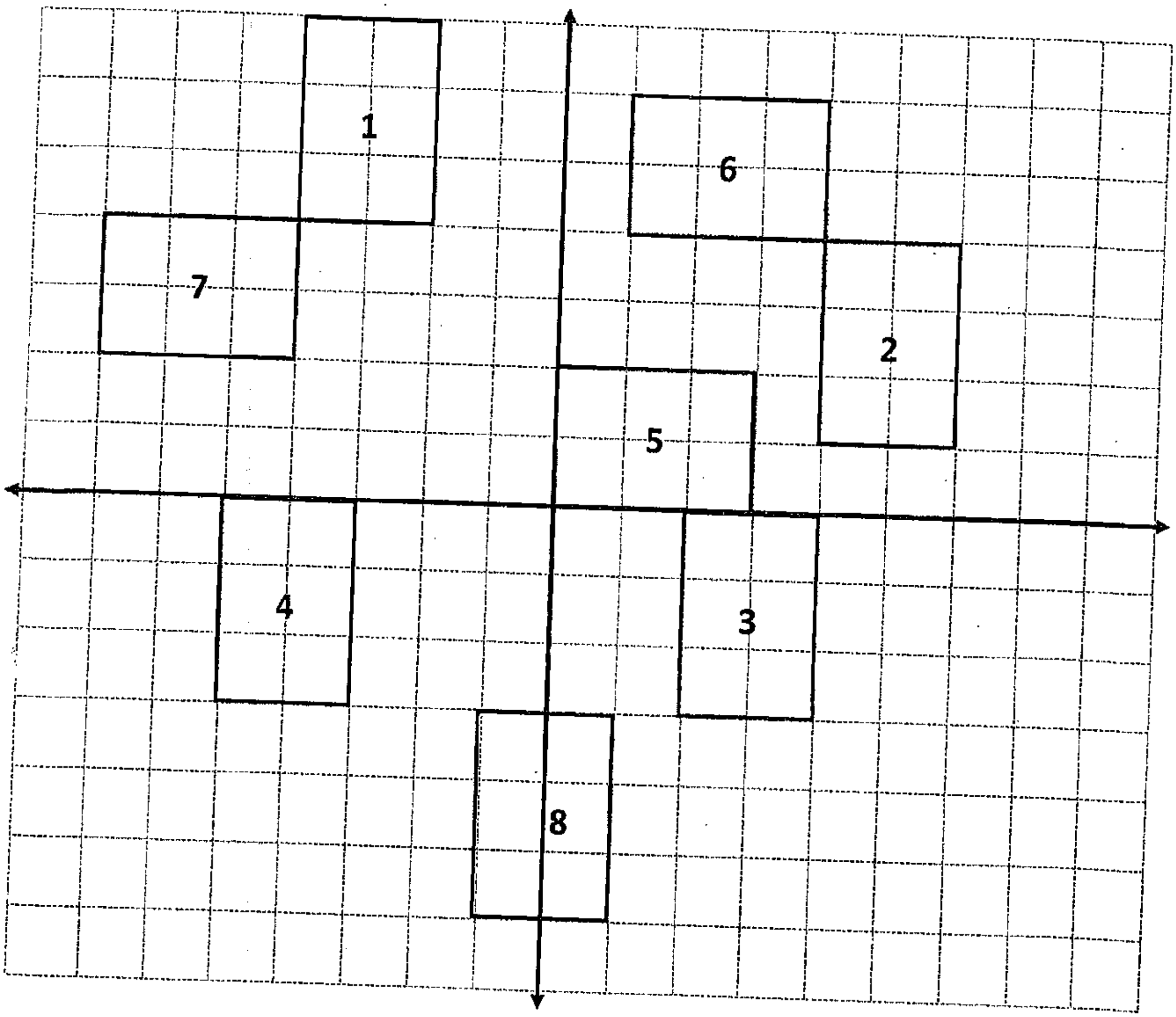
      ii. Horizontal translation 7 units to the left

      iii. Translation that maps the origin to the point $(-3, -6)$

   b. Choose one of the image triangles in Part a and verify that it is congruent to $\triangle ABC$.

The Basics of Transformations

All rectangles in the grid below are congruent. Follow the instructions and then write the number of the rectangle that matches the figure you moved.



1) Reflect Rectangle 1 over the y-axis. Then translate down three units and rotate 90° counterclockwise around the point (3, 1). (Hint: redraw the axes so that the origin corresponds to (3, 1).) Which rectangle is the final image?

2) Translate Rectangle 2 down one unit and reflect over the x-axis. Then reflect over the line $x = 4$. Which rectangle is the final image?

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3) Reflect Rectangle 3 over the y-axis and then rotate 90° clockwise around the point (-2, 0). Finally, glide five units to the right. Which rectangle is the final image?

4) Rotate Rectangle 4 90° clockwise around the point (-3, 0). Reflect over the line y =2 and then translate one unit left. Which rectangle is the final image?

5) Translate Rectangle 5 left five units. Rotate 90° clockwise around the point (-2, 2) and glide up two spaces. Which rectangle is the final image?

6) Rotate Rectangle 6 90° clockwise around the point (4, 4) and translate down three units. Which rectangle is the final image?

7) Rotate Rectangle 7 90° clockwise around (-4, 4) and reflect over the line x = -4. Which rectangle is the final image?

8) Reflect Rectangle 8 over the x-axis. Translate four units left and reflect over the line y = 1.5. Which rectangle is the final image?

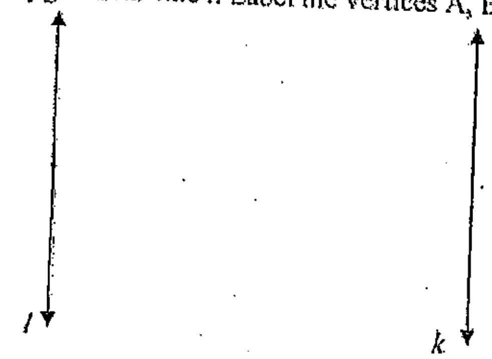
Adapted from *Geometry Teacher's Activities Kit* by Muschla & Muschla

Composition of Motion

Name:____________________

Reflections over Two Lines

1. a. Lines *l* and *k* below are a pair of parallel lines. On the left of line *l*, draw a small polygon near line *l*. Label the vertices A, B, C, etc.



b. Use the Mira™ to reflect the figure over line *l*. Label the corresponding vertices of the image A', B', C', etc.

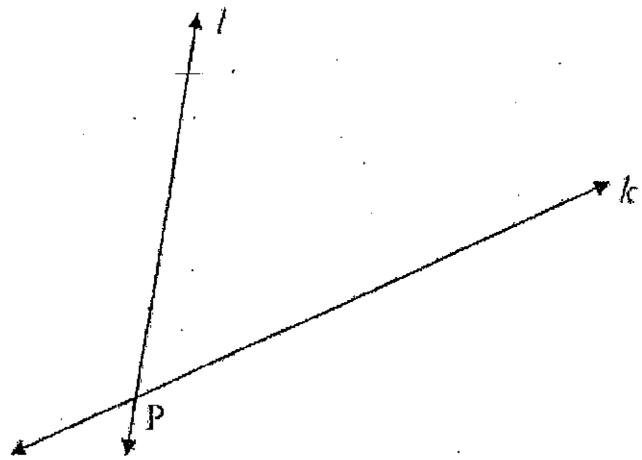
c. Now use the Mira™ to reflect the image over line *k*. Label the new image corresponding vertices as A", B", C", etc.

d. Draw the segment connecting vertices A and A". Draw the segment connecting B and B". Draw the segment connecting another pair of corresponding vertices. Compare the lengths of each segment drawn.

e. Write a statement comparing the size of the figures, positions relative to the lines of reflection, and orientation of the figure and its second image.

Reflections over Two Lines (Continued)

2. a. Lines l and k intersect at point P. On the left of line l, draw a small polygon near line l. Label the vertices A, B, C, etc.



b. Use the Mira™ to reflect the figure over line l. Label the corresponding vertices of the image A', B', C', etc.

c. Now use the Mira™ to reflect the image over line k. Label the new image corresponding vertices as A", B", C", etc.

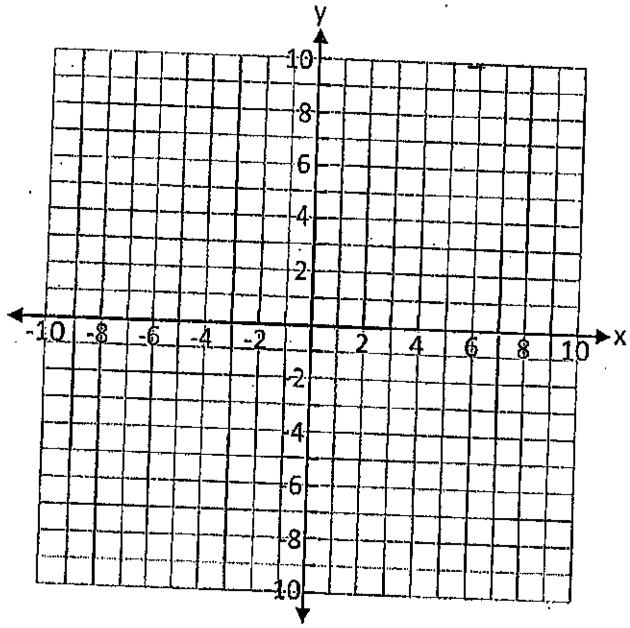
d. Draw the segment connecting vertices A and A". Draw the segment connecting B and B". Draw the segment connecting another pair of corresponding vertices. Compare the lengths of each segment drawn.

e. Write a statement comparing the size of the figures, positions relative to the lines of reflection, and orientation of the figure and its second image.

Dilation Activity Sheet

Name ______________________________ Date __________________

1. Graph and connect these points: (2,2) (3,4) (5,2) (5,4).



2. Graph a new figure on the same coordinate plane by applying a scale factor of 2. When applying a scale factor of 2, multiply both the x and the y coordinate of each ordered pair by 2. Compare the original figure to the dilated figure, Including coordinate pairs.

____

3. Graph a new figure on the same coordinate plane by applying a scale factor of $\frac{1}{2}$ to your original coordinates. Compare the original figure to the rotated figure, including coordinate pairs.

____

4. What happens when you apply a scale factor greater than 1 to a set of coordinates?

____

5. What happens when you apply a scale factor less than 1 to a set of coordinates?

____

6. Predict what would happen if you applied a scale factor of 1 to a set of coordinates.

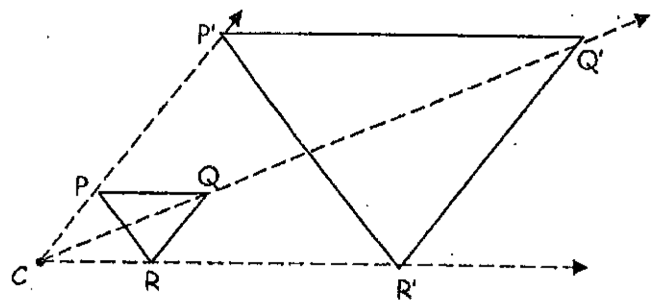
____

Common Core Math II
Dilations Notesheet

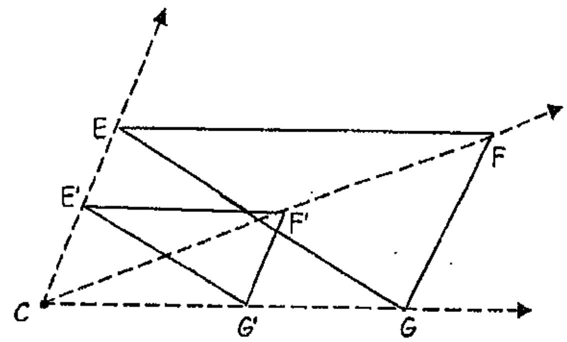
Def: Let C be a point and k a positive real number. A ____________ is a transformation that maps each point of a plane to an image point so that:

1. C is its own ______________ .
2. For any point P, other than C, the image of P is the point P', on $\overrightarrow{CP}$ for which CP' = ______ .

C is called the ___________ of the dilation and k is called the ____________________________.



Center _____, scale factor = _______



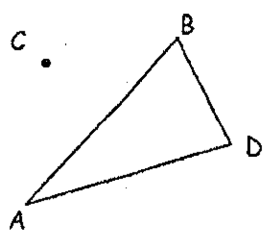
Center _____, scale factor = _______

K > 1, the figure is stretched and the dilation is an ____________________________.
K < 1 , the figure is shrunk and the dilation is a ______________________________.
K = 1, the dilation is the __________________ transformation (remains the same).

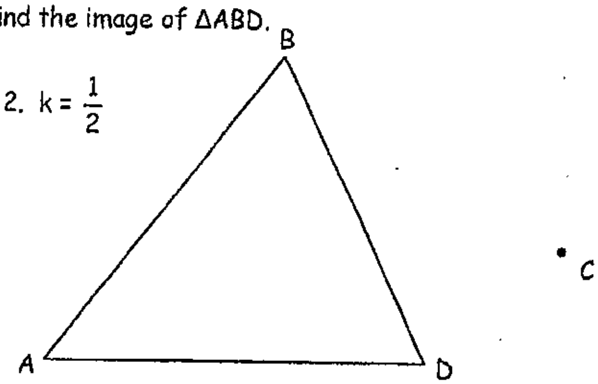
Dilations preserve: __________________, ______________________, and ______________________.

Examples: C is the center of a dilation. For each k, find the image of ΔABD.

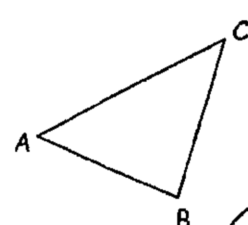
1. k = 2



2. $k = \frac{1}{2}$



3. B is the center of a dilation. K = 2. Find the image of ΔABC.



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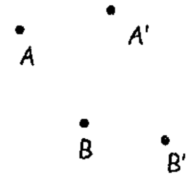
4. Find the center of the dilation that maps A to A' and B to B'.



5. Name the image of A under a dilation with center O and scale factor k.

________a. $k = 2$

________b. $k = 1$

________c. $k = \frac{1}{2}$

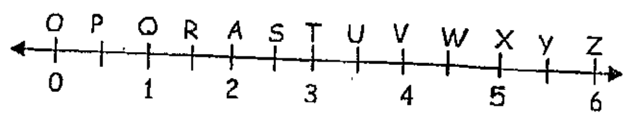
________d. $k = 3$

________e. $k = \frac{3}{4}$

________f. $k = \frac{3}{2}$

________g. $k = \frac{5}{2}$

________h. $k = \frac{5}{4}$



For 6 - 11, a dilation with center C and scale factor 5 maps P onto P', Q onto Q', and R onto R'.

6. If $CP = 3$, then $CP' =$ ________.

7. If $P'R' = 20$, then $PR =$ ________.

8. If Q is between P and R, then ________ is between ________ and ________.

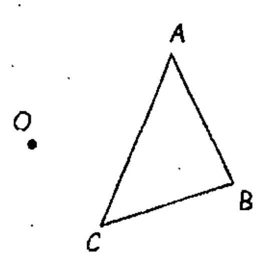
9. State the image of $\overline{PQ}$. ________

10. If $m\angle PQR = 70$, then $m\angle P'Q'R' =$ ________.

11. Δ QPR ________ Δ Q'P'R'

For 12 and 13, find the image of ΔABC under a dilation with:

12. center O and scale factor 2.



13. center A and scale factor $\frac{1}{2}$

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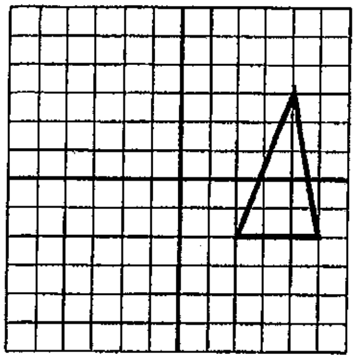
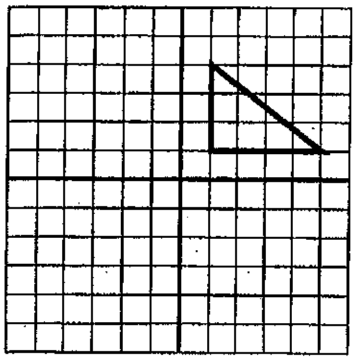
2.7 Practice

Draw and label the image after each transformation. Write a rule for each transformation.

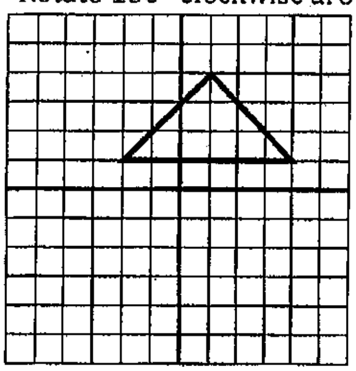
1. Translate 5 units left.



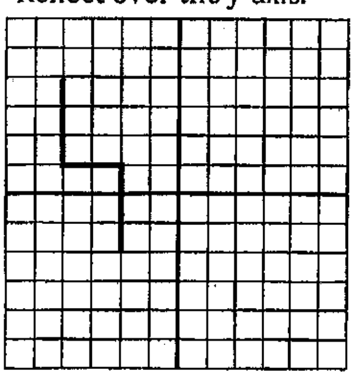
2. Reflect over the x-axis.



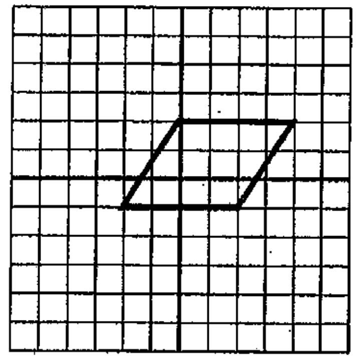
3. Rotate 180° clockwise around the origin.



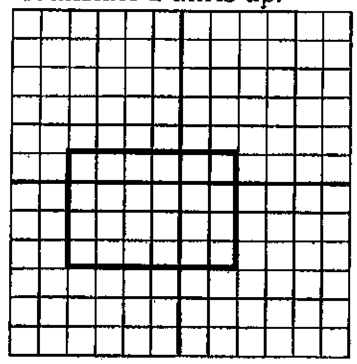
4. Reflect over the y-axis.



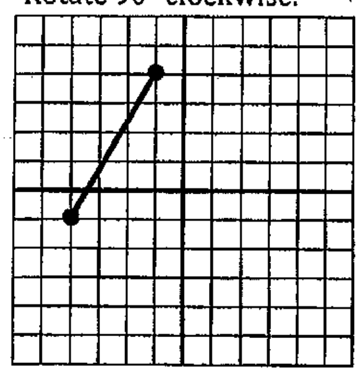
5. Rotate 90° counter-clockwise.



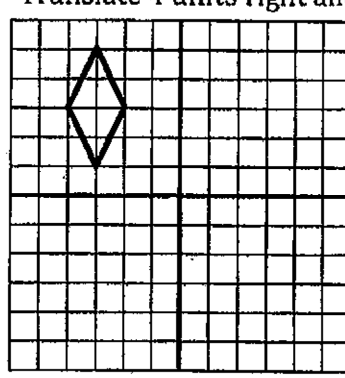
6. Translate 2 units up.



7. Rotate 90° clockwise.



8. Translate 4 units right and 7 units down.



2.7 Show What You Know! Practice Quiz

Part 1: Vocabulary

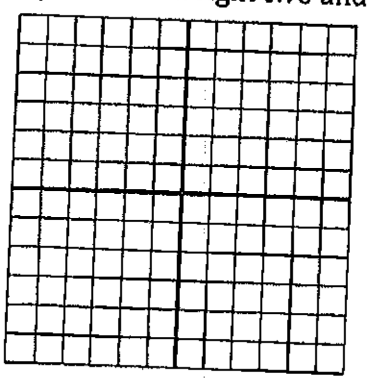
Fill in the blank with the appropriate term.

1. A(n) ____________________ is a change in position, orientation, or size of a figure.
2. A(n) ____________________ is a transformation in which all points of a figure move the same distance in the same direction.
3. A(n) ____________________ is a transformation in which the preimage and the image are congruent.
4. A(n) ____________________ is a transformation in which a figure and its image have opposite orientations.
5. A(n) ____________________ is a transformation in which a figure is turned around a fixed point.

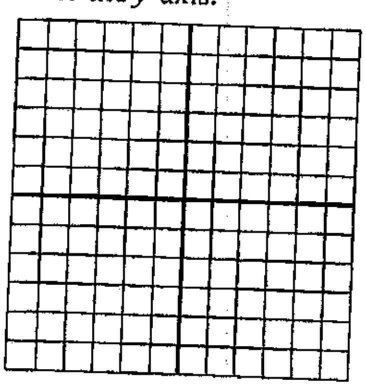
Part 2: Graphing Transformations on the Coordinate Plane

Graph each figure. Then find the image after the given transformation.

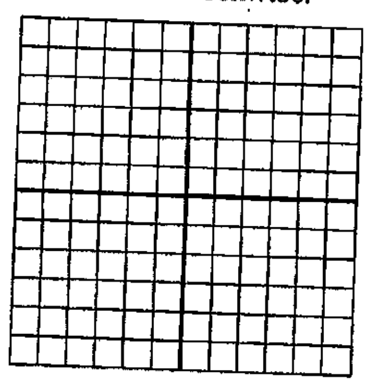
1. ΔHIJ with vertices H(-2, 1), I(2, 3), and J(0, 0) translated right two and up four.



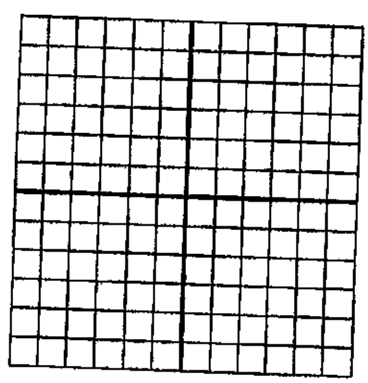
2. Quadrilateral QRST with vertices Q(1, 0), R(2, -3), S(0, -3), and T(-3, -1) reflected over the *y*-axis.



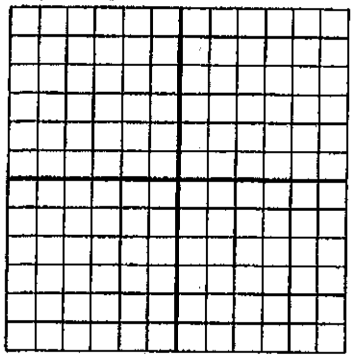
3. $\overline{JK}$ with endpoints J(-3, -2) and (2, 4) rotated 90° clockwise.



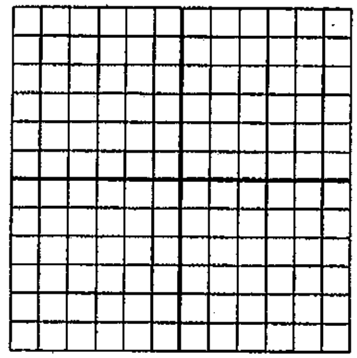
4. ΔABC with vertices A(-4, -2), B(-1, -4), C(2, -2) reflected over the *x*-axis.



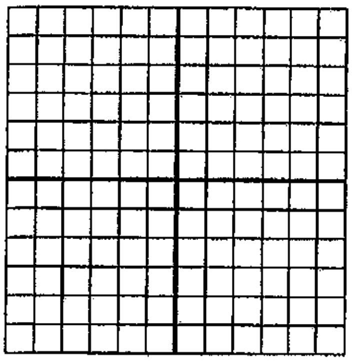
5. ΔSTR with vertices S(-2, 0), T(0, -1), and R(-3, -3) rotated 180° clockwise.



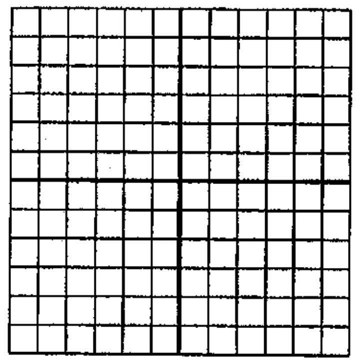
7. $\overline{PQ}$ with endpoints P(4, 2) and Q (-1, 5) reflected across the line $y = x$.



6. ΔEFG with vertices E(2, 0), F(-1, -1), and G(1, 3) translated left three and up one.



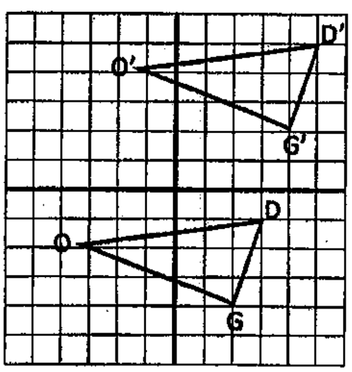
8. ΔTAM with vertices T(0, 5), A(4, 1) and M(3, 6) rotated 90° counter-clockwise.



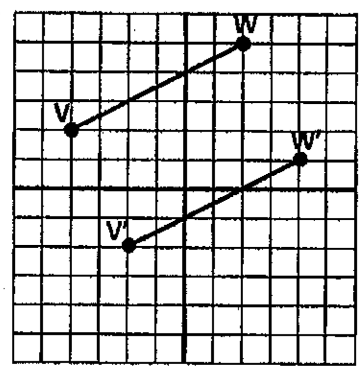
Part 3: Writing a Rule

1. Write a rule to describe each translation.

a.

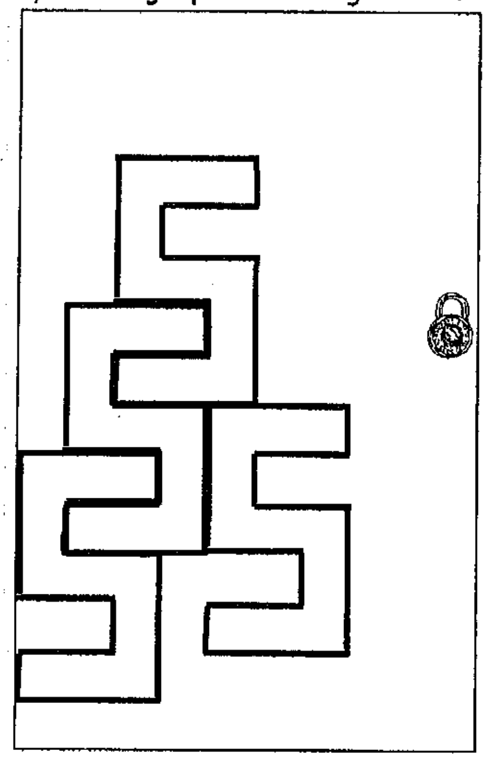


b.

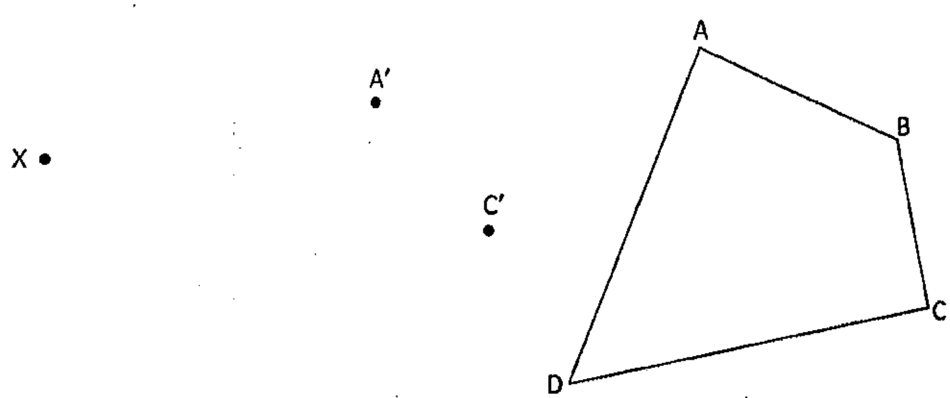


2.8 Warm Up

1. Sammy cuts out S-shaped pieces of paper to cover his locker, as shown below.
   a. Describe his pattern.
   b. Help Sammy finish covering his locker by adding several more S's to his pattern.
   c. One of Sammy's friends decides to cover her locker with her initial as well. Show what she may have done by creating a pattern using another initial.



2. Complete the image of quadrilateral ABCD below. Explain your method.

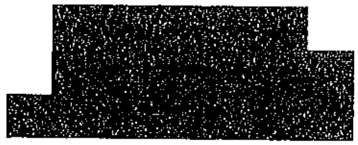


   a) Describe the motion as precisely as you can.
   b) Make at least four observations about the image.

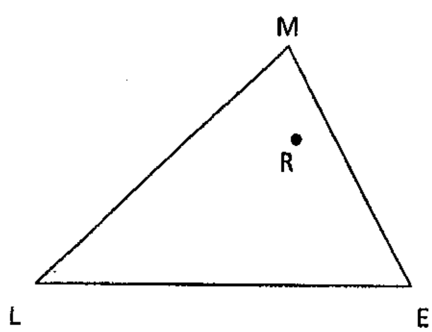
Adapted from *Geometry: A Moving Experience* developed by the Curriculum Research & Development Group, College of Education at the University of Hawaii

2.10 Warm Up

1. Draw a tessellation using this tile. Describe the motions you used to make your tessellation.



2. Draw an image of ΔMEL using a dilation with center R. Explain your method. What scale factor did you use?



a) Draw a different image of ΔMEL using a dilation with center R. What scale factor did you use?

b) Draw a very different image of ΔMEL using a dilation with center R. What scale factor did you use?

Adapted from *Geometry: A Moving Experience* developed by the Curriculum Research & Development Group, College of Education at the University of Hawaii

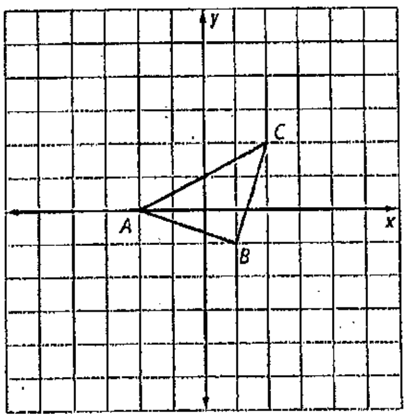
Name ______________________

Date ______________________

Transformations

Applications Task 8

8. a. $(x, y) \rightarrow (3x, 3y)$

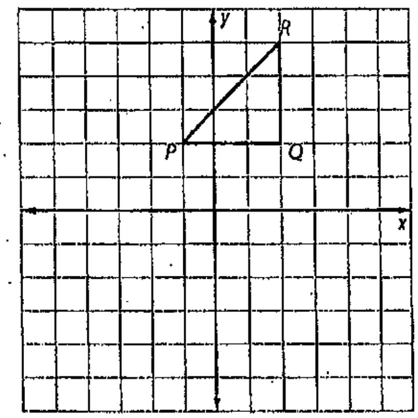


Type of Transformation:

____

____

b. $(x, y) \rightarrow (-x + 8, y)$

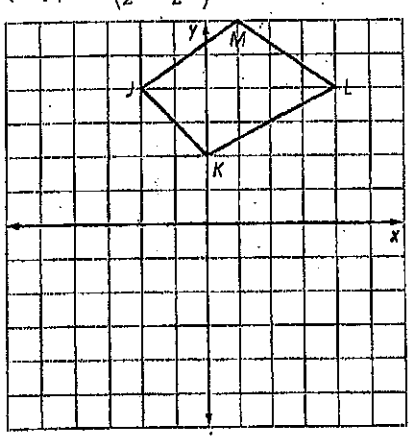


Type of Transformation:

____

____

c. $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$

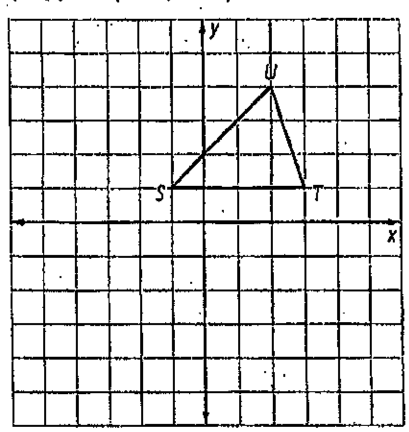


Type of Transformation:

____

____

d. $(x, y) \rightarrow (x, -y - 4)$



Type of Transformation:

____

____

(39B)

3 $\triangle PQR$ has vertices as follows: $P(3, -2)$, $Q(6, -1)$, and $R(4, 3)$.

a. On separate coordinate grids, draw $\triangle PQR$ and its image under each of the following transformations. Label the vertices of the images.

i. Rotation of 180° about the origin

ii. Rotation of 90° counterclockwise about the origin

iii. Rotation of 90° clockwise about the origin

b. Choose one of the image triangles in Part a and verify that it is congruent to $\triangle PQR$.

4 Consider $\square ABCD = \begin{array}{c} \begin{array}{cccc} A & B & C & D \end{array} \\ \begin{bmatrix} 1 & 2 & 6 & 5 \\ -1 & 2 & 2 & -1 \end{bmatrix} \end{array}$

a. On separate coordinate grids, draw $\square ABCD$ and its image under each of the following transformations. Label the vertices of the images.

i. Reflection across the x-axis

ii. Reflection across the line $y = x$

iii. Reflection across the y-axis

b. Choose one of the image quadrilaterals in Part a and verify that it is a parallelogram.

c. What is the perimeter of $\square ABCD$? How do you know that each of the image parallelograms in Part a will have the same perimeter?

5 Consider $\triangle PQR = \begin{array}{c} \begin{array}{ccc} P & Q & R \end{array} \\ \begin{bmatrix} -2 & 2 & 0 \\ -1 & 1 & 5 \end{bmatrix} \end{array}$.

a. What kind of triangle is $\triangle PQR$? How do you know?

b. What is the area of $\triangle PQR$?

c. On separate coordinate grids, draw $\triangle PQR$ and its image under each of the following transformations. Label the vertices of the images.

i. Translation that maps the origin to the point $(-2, -2)$

ii. Counterclockwise rotation of 270° about the origin

iii. Reflection across the line $y = -x$

d. What kind of triangle is each of the three image triangles in Part c? How do you know?

e. Find and compare the areas of the three image triangles in Part c.