

Name: _____

Date: _____

M8-U3: Notes #1 – Transformational Geometry -Translations Class: _____

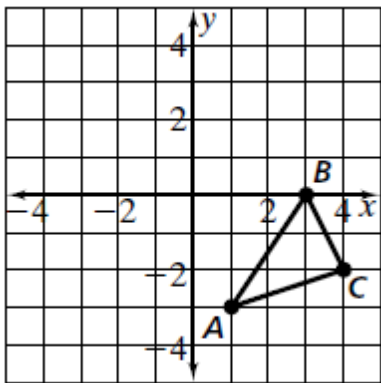
A **transformation** is a change in the _____, _____, or _____ of a figure.

A **translation** is a transformation which _____ each point of a figure the same _____ and in the same _____.

The resulting figure after a transformation is called the _____ of the original figure.

EXAMPLE 1:

$\triangle ABC$ is translated 1 unit right and 4 units up. Draw the image $\triangle A'B'C'$.



What are the coordinates of:

A (1, -3) → A' _____

B (3, 0) → B' _____

C (4, -2) → C' _____

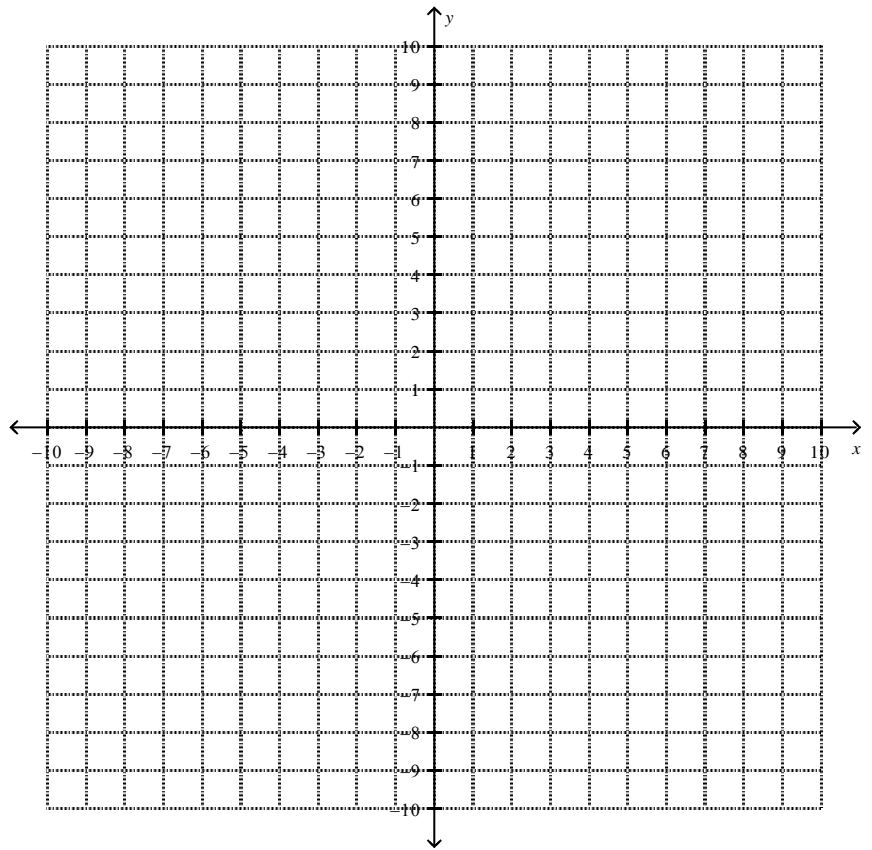
From EXAMPLE 1, $\triangle ABC \rightarrow \triangle A'B'C'$

As a general rule this translation could be written as $(x, y) \rightarrow (x + \underline{\hspace{1cm}}, y + \underline{\hspace{1cm}})$.

EXAMPLE 2:

$\triangle JKL$ has coordinates $J(0,2)$, $K(3,4)$, and $L(5,1)$.

- Draw $\triangle JKL$.
- Draw the image $\triangle J'K'L'$ after a translation of 4 units to the left and 5 units up. Label the triangle.



What are the coordinates of:

J (0, 2) \rightarrow J' _____

K (3, 4) \rightarrow K' _____

L (5, 1) \rightarrow L' _____

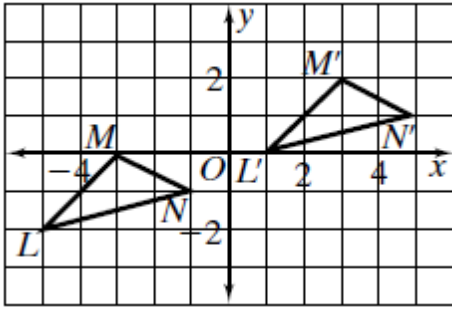
Rule: $(x, y) \rightarrow (\quad , \quad)$

Tell me more about this figure, is it congruent or similar? Explain how you know.

Translation Location		
	Add	Subtract
x coordinate		
y coordinate		

EXAMPLE 3:

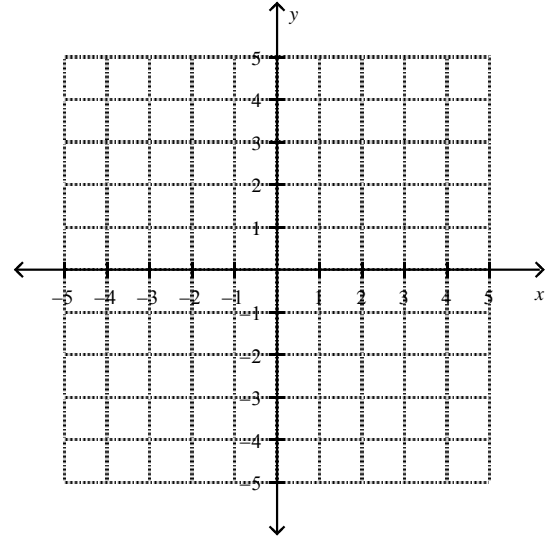
Write a general rule which describes the translation shown below. $\triangle LMN$ is the original triangle.



$(x, y) \rightarrow (\quad , \quad)$

EXAMPLE 4:

- a) Graph points $T(0,3)$, $U(2, 4)$ and $V(5, -1)$ and connect the points to make a triangle.
- b) Translate $\triangle TUV$ using the rule $(x, y) \rightarrow (x - 3, y - 1)$.
- c) In words, describe what the rule is asking you to do.



- d) Draw the image $\triangle T'U'V'$.
- e) Identify the coordinates of $\triangle T'U'V'$.

T' _____
 U' _____
 V' _____

- f) Using the image of $\triangle T'U'V'$ perform an additional translation using the rule $(x, y) \rightarrow (x + 3, y - 3)$. State the new coordinates of $\triangle T''U''V''$. Is this new image congruent or similar to the original figure?

Practice:

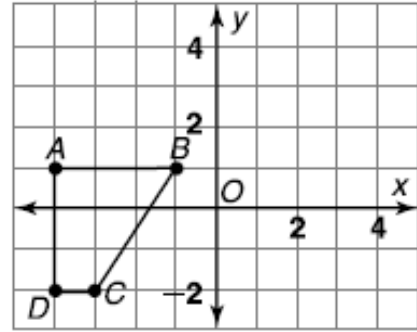
1) a) Use arrow notation to write a rule for the given translation.

b) Graph and label the image after the translation.
 c) Name the coordinates of the image.

A' _____ B' _____

C' _____ D' _____

right 5 units, up 1 unit



2) a) Use arrow notation to write a rule for the given translation.

b) Graph and label the image after the translation.
 c) Name the coordinates of the image.

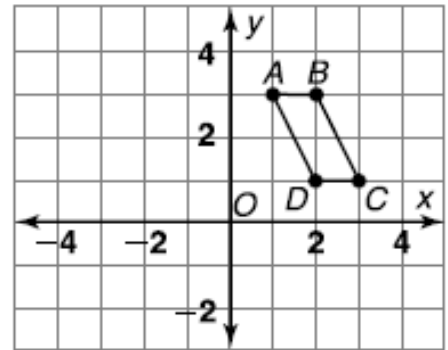
A' _____

B' _____

C' _____

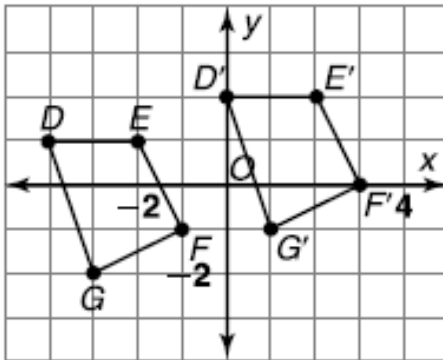
D' _____

left 3 units, down 2 units

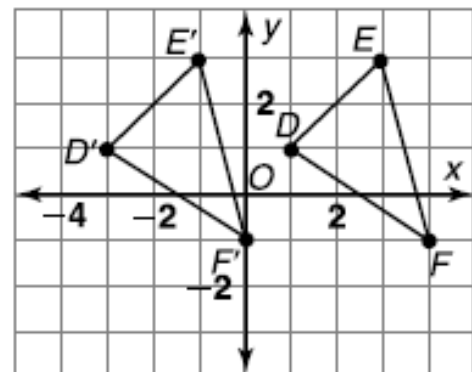


In questions 3 and 4 below, use arrow notation to write a rule that describes the translation shown on the graph.

3)



4)



5) MULTIPLE CHOICE:

Write a description of the rule $(x, y) \rightarrow (x - 7, y + 4)$.

- (a) translation 7 units to the right and 4 units up
- (b) translation 7 units to the left and 4 units down
- (c) translation 7 units to the right and 4 units down
- (d) translation 7 units to the left and 4 units up

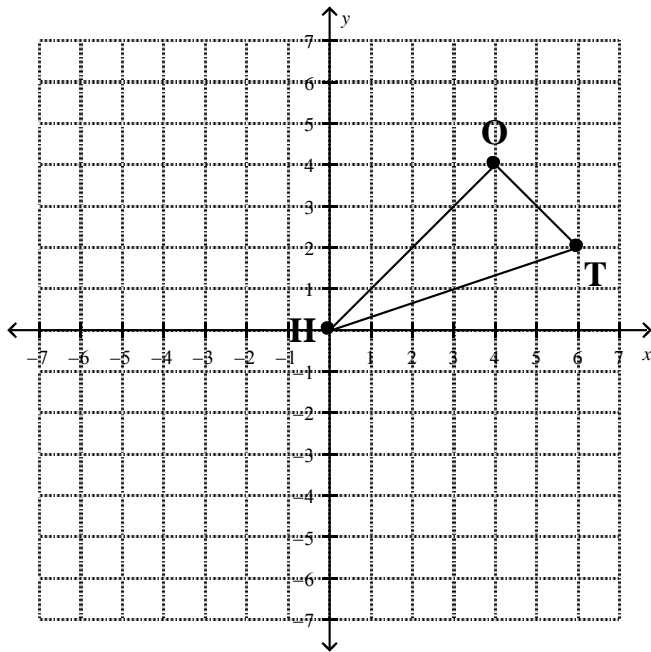
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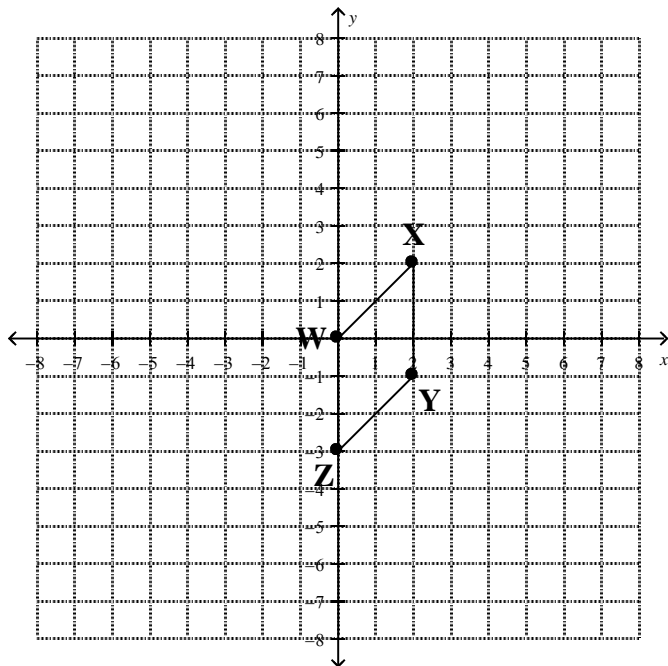
M8-U3: HW #1 – Translations

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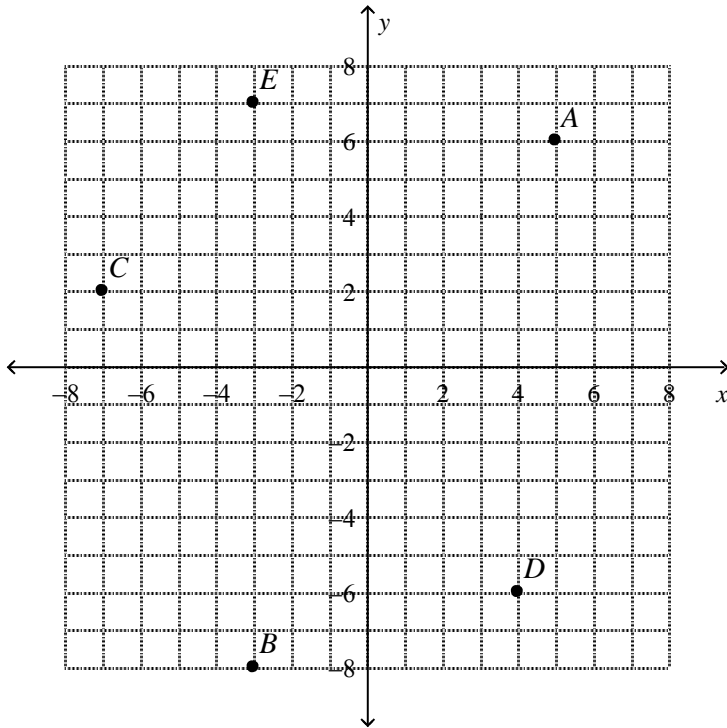
1. Draw the translation of the triangle HOT six units left and one unit down. Label the image $H'O'T'$. Is the image similar or congruent? How do you know?



2. Find the translation of the quadrilateral $WXYZ$ under the rule $(x, y) \rightarrow (x - 2, y + 4)$.



Use the grid below to answer questions 3 through 5.

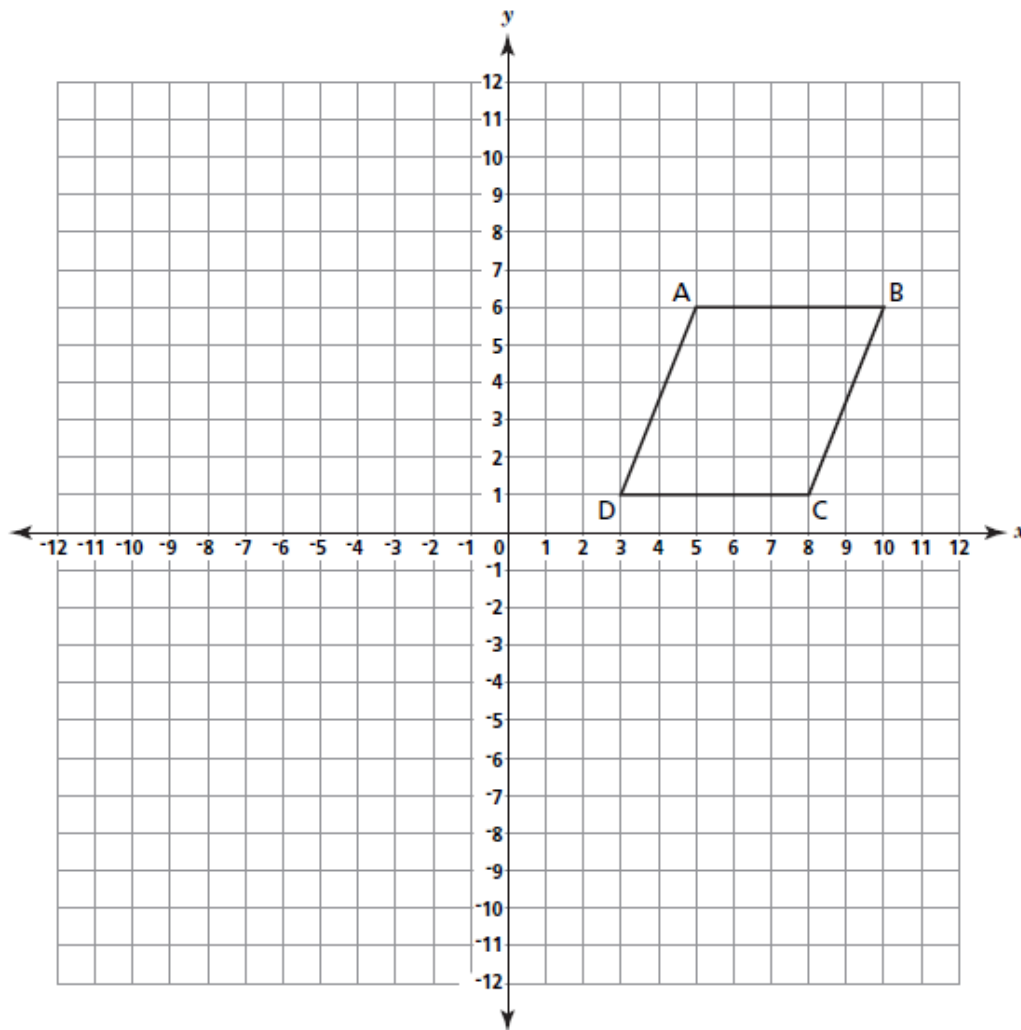


3. Find the rule to describe the translation from point *A* to point *B*.
4. Find the rule to describe the translation from point *C* to point *D*.
5. Find the rule to describe the translation from point *E* to point *A*.

6. Quadrilateral $ABCD$ is plotted on the grid below.

Part A

On the graph, draw the translation of polygon $ABCD$ eight units to the left and seven units down. Label the image $A'B'C'D'$.

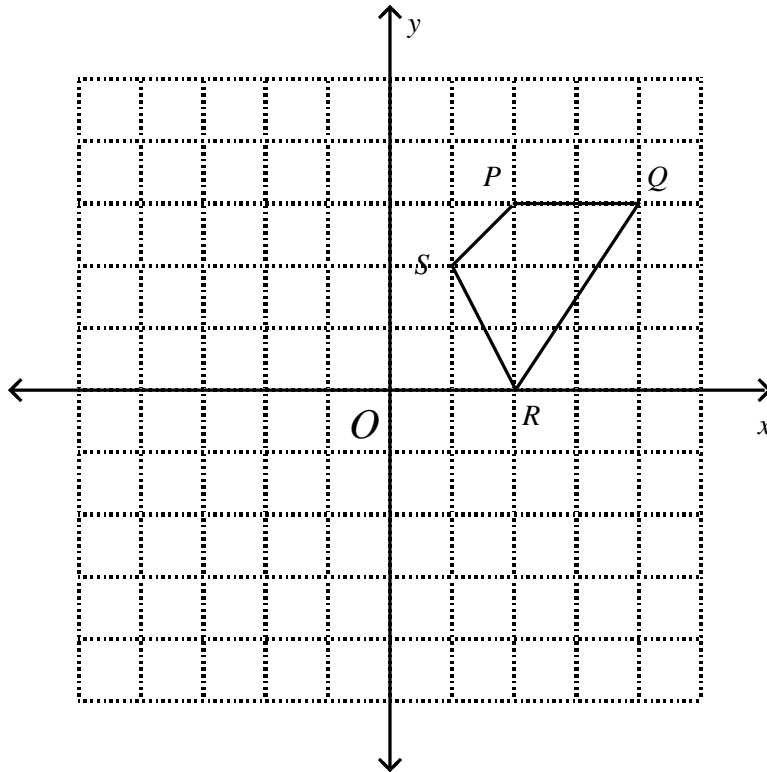


Part B

On the lines below, explain how you determined the location of A' .

7. Quadrilateral $PQRS$ is plotted on the grid below.

On the graph, draw the translation of polygon $PQRS$ three units to the left and four units down. Label the image $P'Q'R'S'$.



Now create polygon $P''Q''R''S''$ by translating polygon $P'Q'R'S'$ using the rule $(x, y) \rightarrow (x + 2, y + 1)$. What will be the coordinates of point Q'' ?

Answer _____

On the lines below, write a single translation rule from polygon $PQRS$ to polygon $P''Q''R''S''$.

Spiral:

Solve the equations. If appropriate write *identity* or *no solution*. Show all work

8. $\frac{3}{4}t - \frac{5}{6} = \frac{2}{3}t$

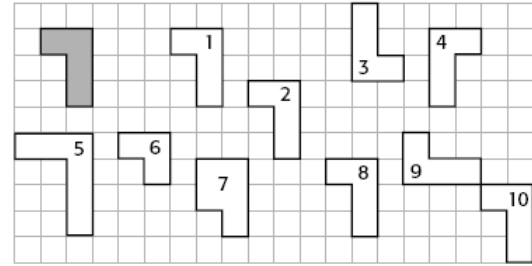
9. Denise's cell phone plan is \$29.95 per month plus \$0.10 per minute of call time. Denise's cell phone bill is \$99.95. For how many minutes was she billed?

Name: _____ **Homework Problems Translations**

1. The coordinates of **WXYZ** are **W(-6, -1), X(-5, -3), Y(-2, 3), and Z(-3, 1)**. After a translation 8 units right and 3 units down, the coordinates of the image are

W' (_____ , _____), **X'** (_____ , _____), **Y'** (_____ , _____), and **Z'** (_____ , _____)

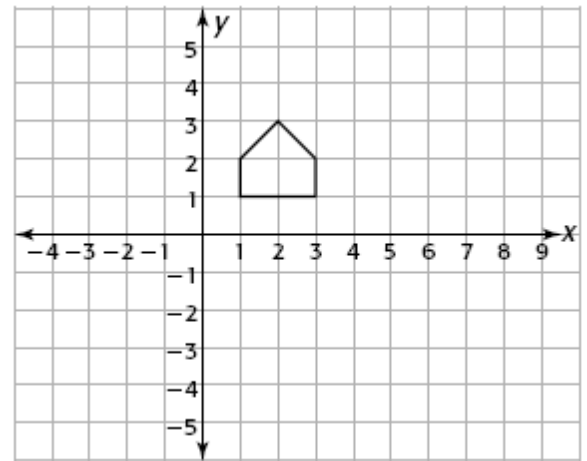
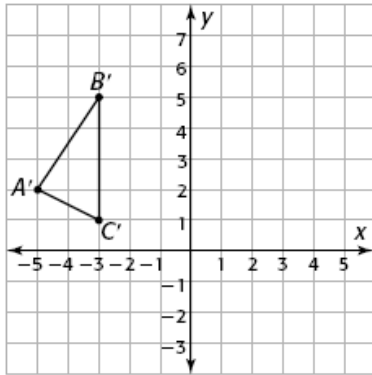
2. Which of the number figures are translations of the shaded figure?



3. Graph the image of the figure on the same set of axes after each translation.

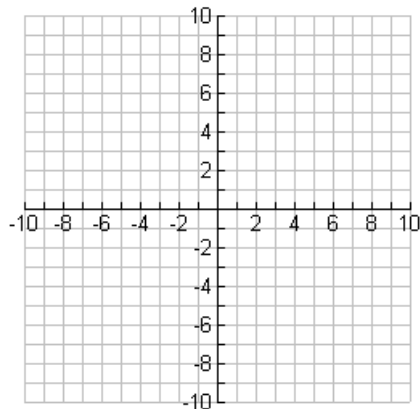
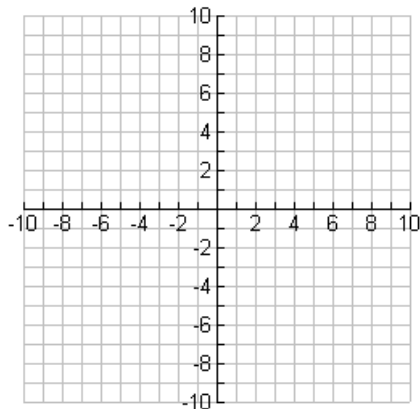
- a) 5 units right and 3 units down.
- b) 4 units left and 2 units up
- c) $(x, y) \rightarrow (x + 2, y - 6)$

4. $\triangle A'B'C'$ is the image of $\triangle ABC$ after a translation 7 units left and 3 units up. Graph $\triangle ABC$ before the translation.



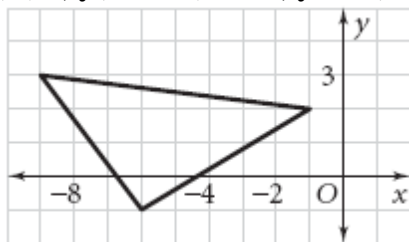
5. The coordinates of **MNOP** are **M(0,6), N(2,6), O(7,2), and P(2,2)**.

- a) Give the coordinates of the image after a translation 4 units left and 3 units up
- b) Graph **MNOP** and **M'N'O'P'** on the axis below and left.

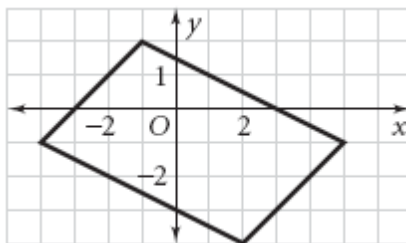


6. The coordinates of $\triangle ABC$ are $A(2, 3)$, $B(6, 6)$, and $C(7, 2)$. After a translation, the image of vertex A is $A'(-6, 1)$.
- Give the coordinates of B' and C' after the same translation.
 - Graph $\triangle ABC$ and $\triangle A'B'C'$ on the graph above and to the right.
7. The coordinates of $DEFG$ are $D(2, -1)$, $E(5, -2)$, $F(4, -5)$, and $G(1, -4)$.
- Describe in coordinate mapping notation a translation that will move vertex E to the origin.
 $(x, y) \rightarrow (\underline{\hspace{2cm}}, \underline{\hspace{2cm}})$
 - Give the coordinates of D' , E' , F' , and G' after the translation described in part a).
8. Find the image of each figure under the given translation. (Use your own graph paper for b, c, and d.)

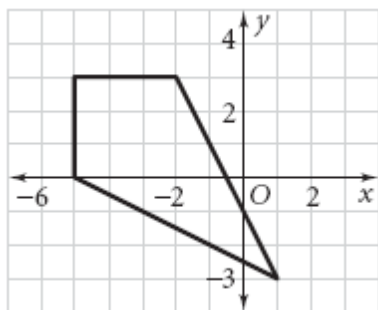
a) $(x, y) \rightarrow (x + 3, y + 2)$



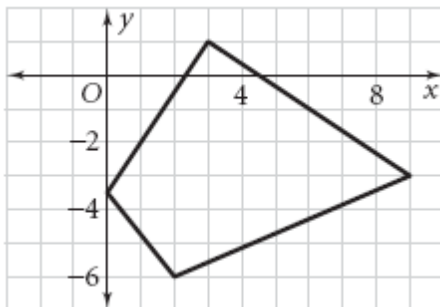
b) $(x, y) \rightarrow (x + 5, y - 1)$



c) $(x, y) \rightarrow (x - 2, y + 5)$



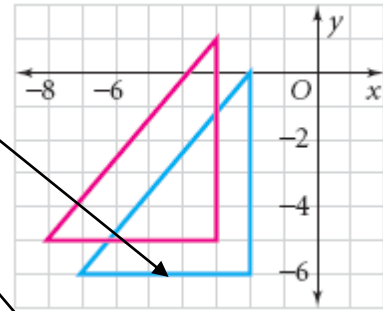
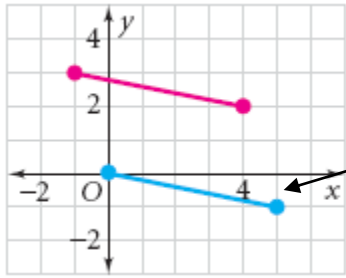
d) $(x, y) \rightarrow (x - 4, y + 3)$



9. Write a rule to describe each translation.

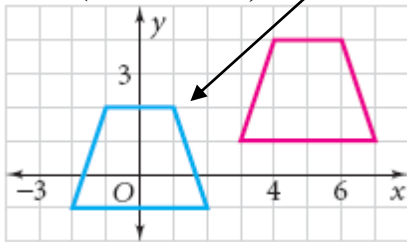
a) $(x, y) \rightarrow (\underline{\hspace{2cm}}, \underline{\hspace{2cm}})$

b) $(x, y) \rightarrow (\underline{\hspace{2cm}}, \underline{\hspace{2cm}})$

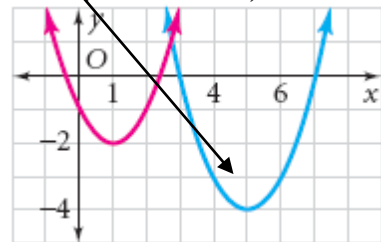


image

c) $(x, y) \rightarrow (\quad , \quad)$



d) $(x, y) \rightarrow (\quad , \quad)$



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M8-U3: Notes #2 – Reflections

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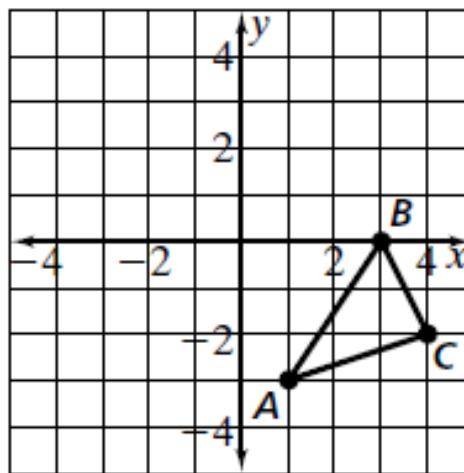
A **reflection** is a transformation which _____ the figure over a _____.

This line is called the _____.

Example 1:

$\triangle ABC$ is being reflected over the x -axis.

Draw and label the image $\triangle A'B'C'$.



We can use an arrow to describe this reflection.

$$\triangle ABC \rightarrow \triangle A'B'C'$$

What are the coordinates of:

A _____ \rightarrow A' _____

B _____ \rightarrow B' _____

C _____ \rightarrow C' _____

Write a general rule for an x -axis reflection:

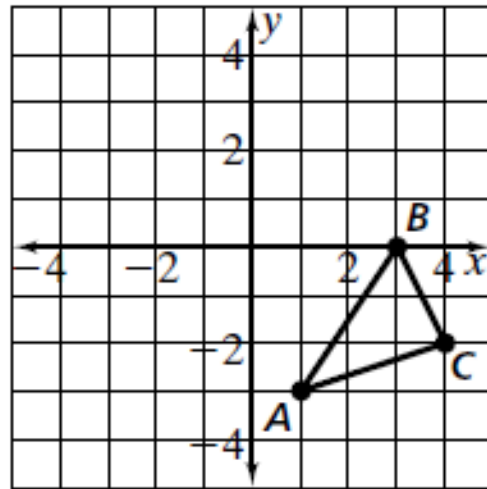
$$(x, y) \rightarrow (\quad , \quad).$$

Tell me more about this figure, is it congruent or similar? Explain how you know.

Example 2:

$\triangle ABC$ is reflected over the y -axis.

Draw the image $\triangle A'B'C'$.



What are the coordinates of:

A _____ \rightarrow A' _____

B _____ \rightarrow B' _____

C _____ \rightarrow C' _____

Write a general rule for a y -axis reflection:

$$(x, y) \rightarrow (\text{_____}, \text{_____}).$$

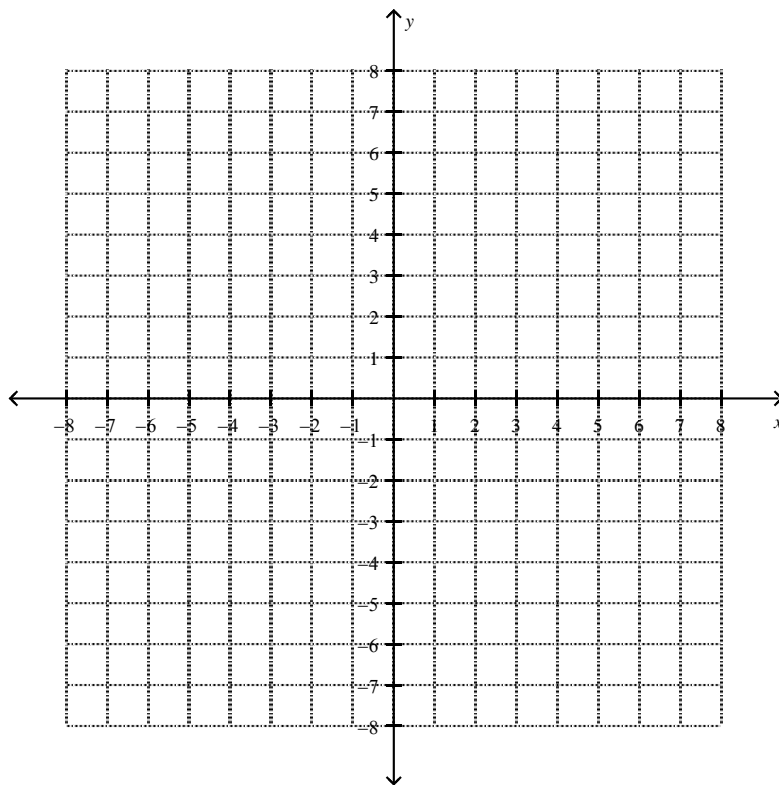
Example 3:

- a) Draw $\triangle JKL$ which has coordinates $J(0,2)$, $K(3,4)$, and $L(5,1)$.
- b) Draw the image $\triangle J'K'L'$ after a reflection of $\triangle JKL$ over the x -axis.
- c) List the coordinates of $J'K'L'$.

J (0, 2) \rightarrow J' _____

K (3, 4) \rightarrow K' _____

L (5, 1) \rightarrow L' _____



- d) Draw the image $\triangle J''K''L''$ after a reflection of $\triangle J'K'L'$ over the y -axis.

- e) List the coordinates of $J''K''L''$.

J'' _____ \rightarrow J'' _____

K'' _____ \rightarrow K'' _____

L'' _____ \rightarrow L'' _____

- f) Describe a different combination of two reflections that would move $\triangle JKL$ to $\triangle J''K''L''$.

- g) Is this new image congruent or similar to the original figure?

Example 4:

a) Draw $\triangle ABC$ which has coordinates $A(0,1)$, $B(3,4)$, and $C(5,1)$.

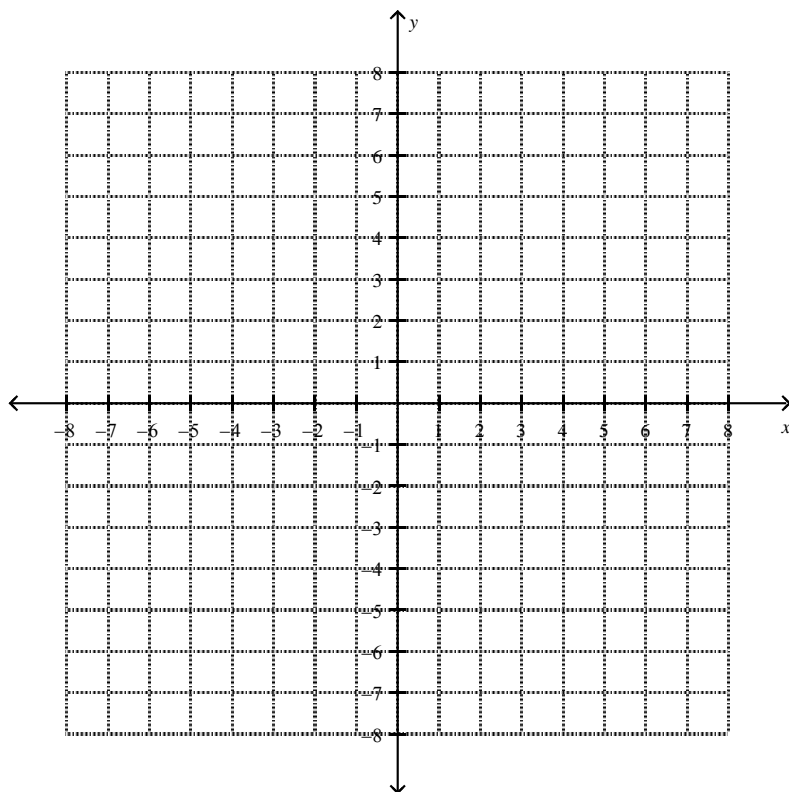
b) Draw the image $\triangle A'B'C'$ after a reflection of $\triangle ABC$ over $x = -1$.

c) List the coordinates of $A'B'C'$.

A (0, 1) \rightarrow A' _____

B (3, 4) \rightarrow B' _____

C (5, 1) \rightarrow C' _____

**Example 5:**

a) Draw $\triangle ABC$ which has coordinates $A(0,1)$, $B(3,4)$, and $C(5,1)$.

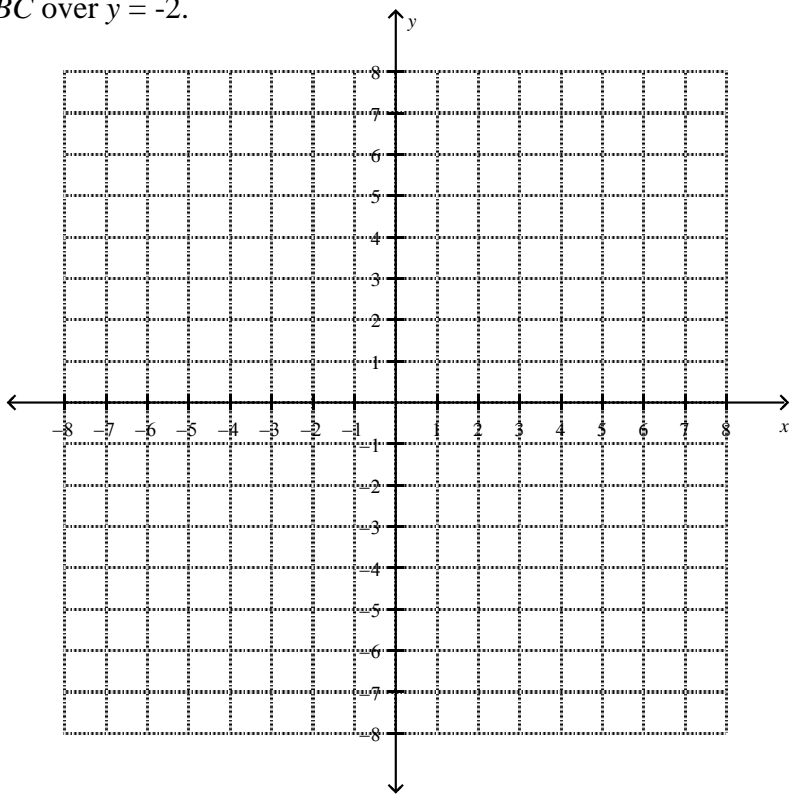
b) Draw the image $\triangle A'B'C'$ after a reflection of $\triangle ABC$ over $y = -2$.

c) List the coordinates of $A'B'C'$.

A (0, 1) \rightarrow A' _____

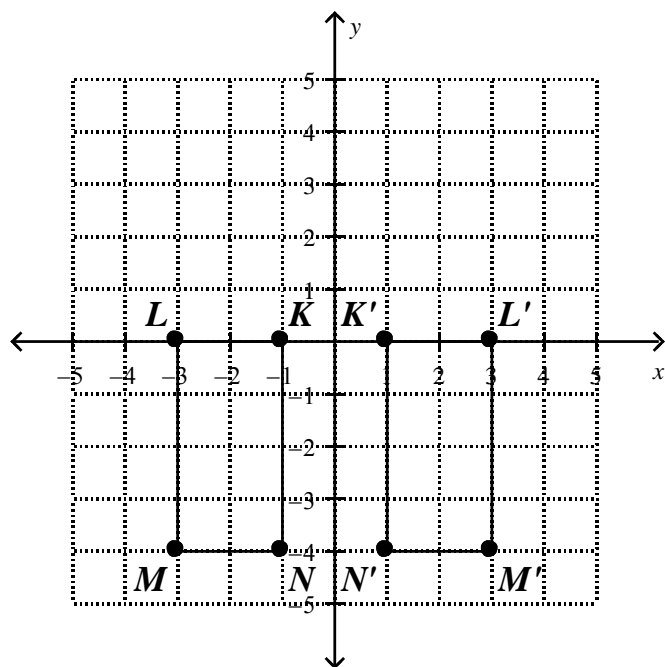
B (3, 4) \rightarrow B' _____

C (5, 1) \rightarrow C' _____



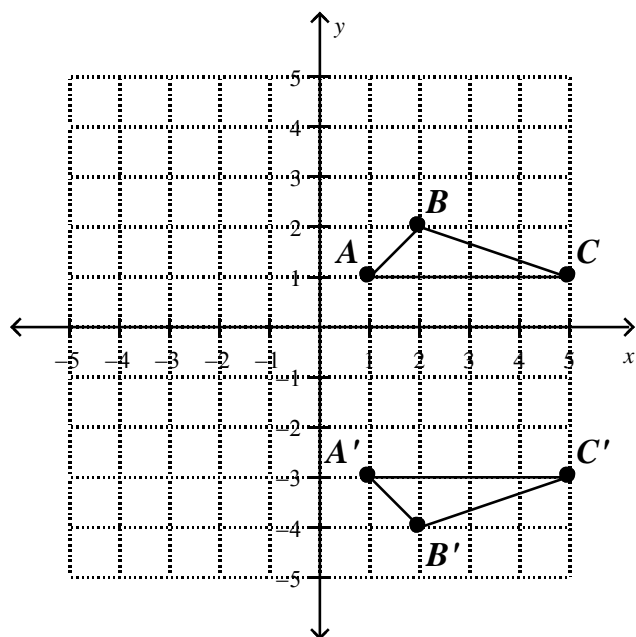
Example 6:

Draw the line of reflection which caused rectangle $KLMN$ to reflect onto rectangle $K'L'M'N'$. What is the equation of the line of reflection?



Example 7:

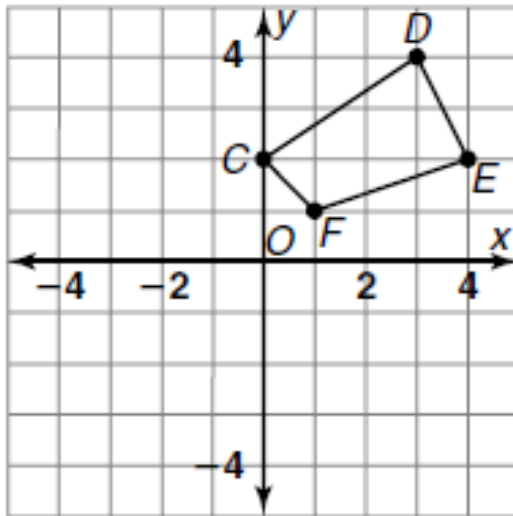
Draw the line of reflection which caused triangle ABC to reflect onto triangle $A'B'C'$. What is the equation of the line of reflection?



Example 8:

Quadrilateral $CDEF$ is plotted on the grid below.

On the graph, draw the reflection of polygon $CDEF$ over the x -axis. Label the image $C'D'E'F'$.

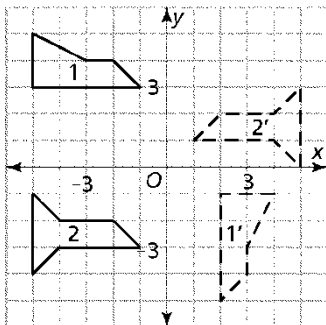


Now create polygon $C''D''E''F''$ by translating polygon $C'D'E'F'$ three units to the left and up two units. What will be the coordinates of point C'' ?

Answer _____

Example 9:

Describe how you could move shape 2 to exactly match shape 2' by using one translation and one reflection.



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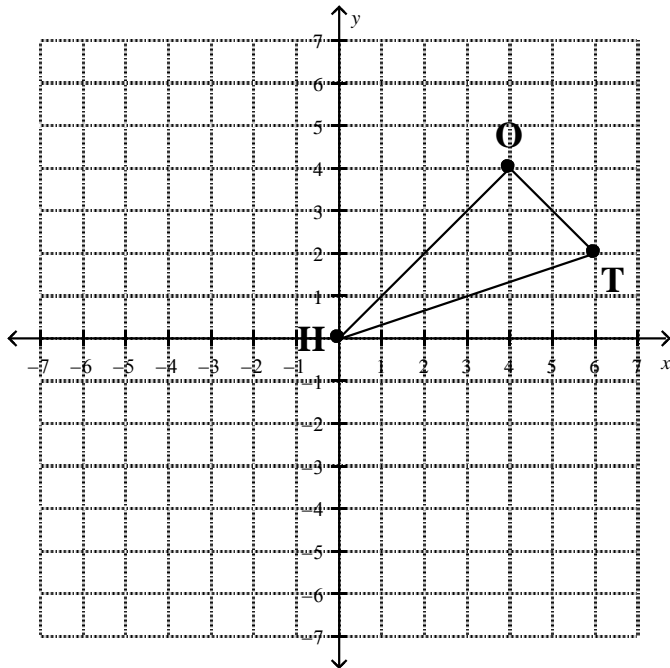
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M8-U3: HW #2 – Reflections

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1. Find the reflection of the triangle HOT over the x -axis.

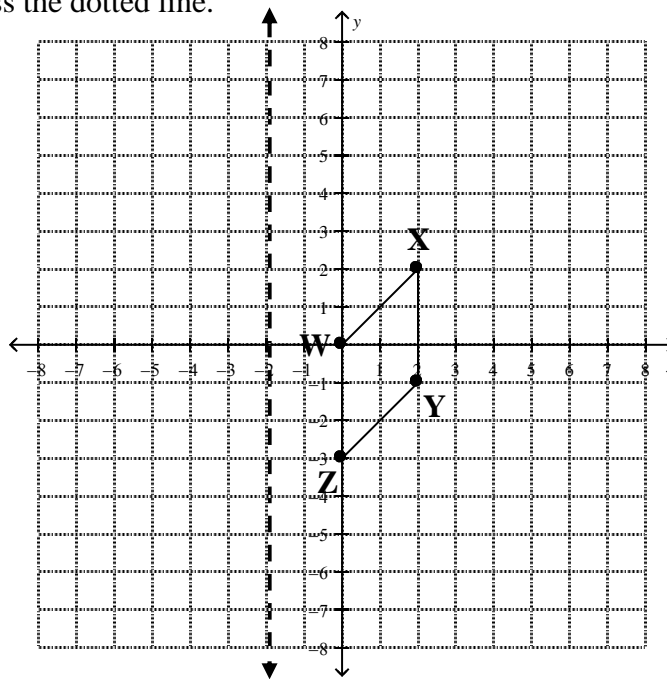
Write the coordinates of $H'O'T'$. Is the image similar or congruent? How do you know?



2. Find the reflection of the quadrilateral $WXYZ$ across the dotted line.

What is the equation of the dotted line?

Label the image $W'X'Y'Z'$.



3. The table below shows the coordinates of triangle PQR .

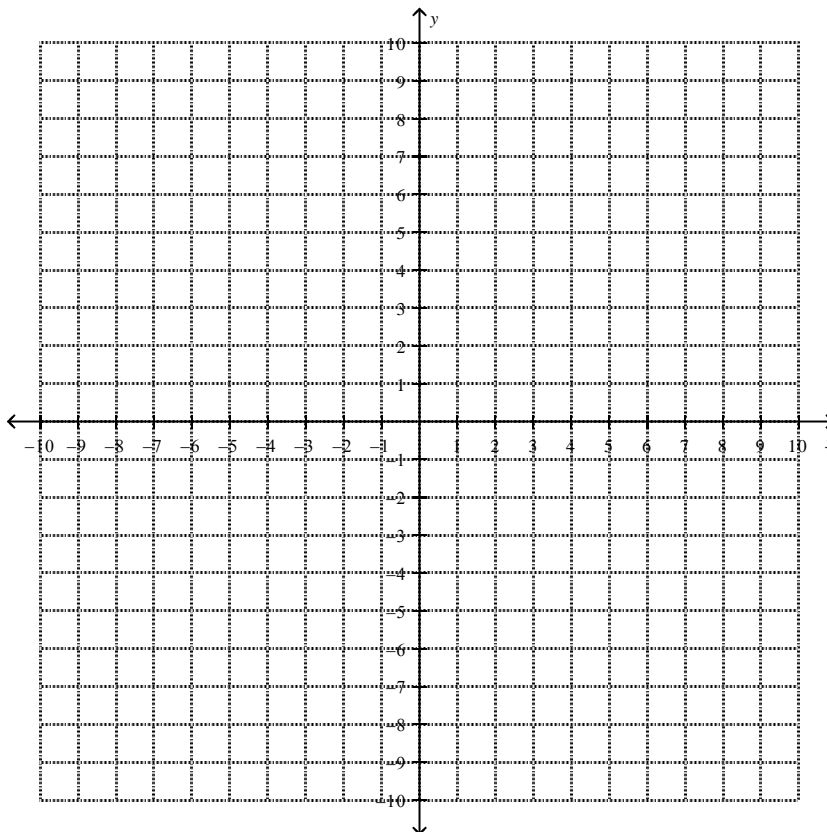
Triangle PQR		Triangle $P'Q'R'$	
P	$(-3, 2)$	P'	
Q	$(-3, 6)$	Q'	
R	$(-7, 7)$	R'	

Part A

Fill in the table above for the coordinates of P' , Q' , and R' after a reflection over the y -axis.

Part B

On the grid below, draw triangle PQR and triangle $P'Q'R'$.

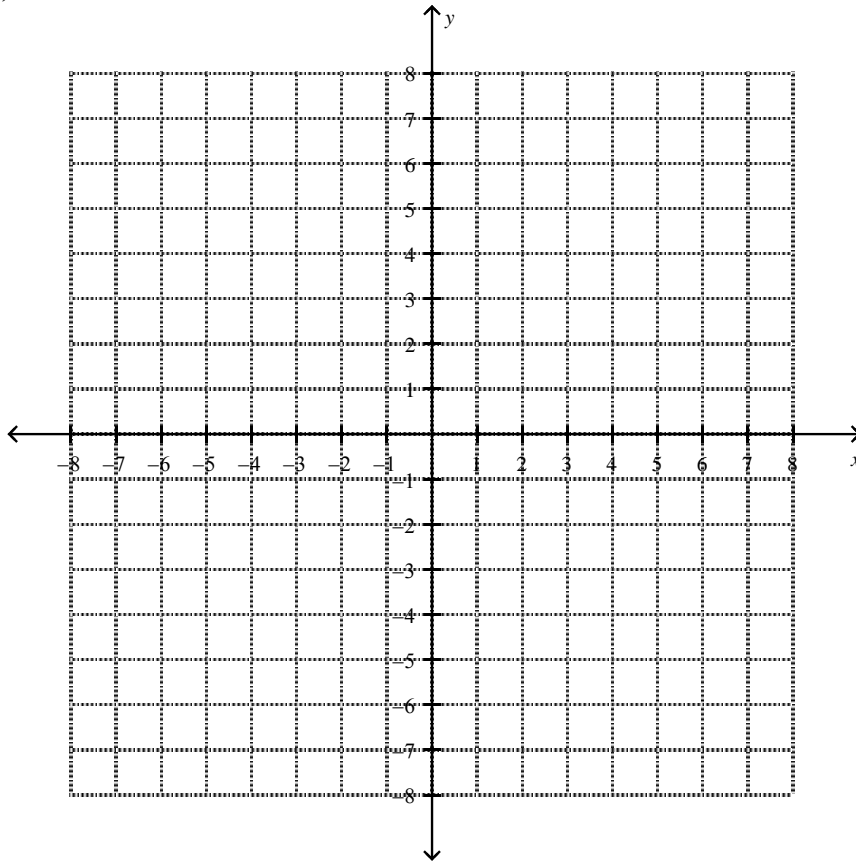


Part C

On the lines below, explain how you determined the location of R' .

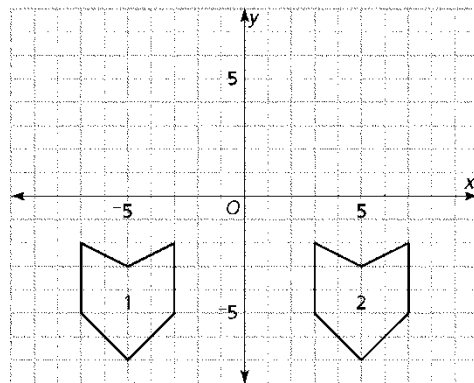
4. Triangle XYZ has vertices $X(2, 1)$, $Y(6, 1)$, and $Z(4, 4)$.

On the graph, draw the image of triangle XYZ after a translation two to the left. Label the image $X'Y'Z'$

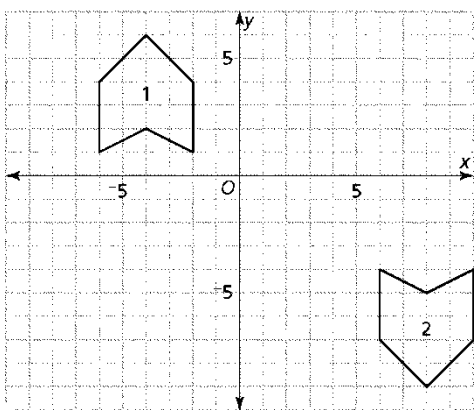


Now create triangle $X''Y''Z''$ by reflecting triangle $X'Y'Z'$ over the x -axis. What will be the coordinates of triangle $X''Y''Z''$? Is the new image similar or congruent?

5. Describe a reflection that would move shape 1 to match shape 2.



6. Refer to the grid below:



- a) Describe how you could move shape 1 to exactly match shape 2 by using one translation and one reflection.
- b) Are there other sequences of transformations that would move shape 1 to exactly match shape 2? If so, describe the steps you would perform.

Spiral:

7. Solve and check: $-2(m - 30) = -6m$

8. Solve: $8z - 22 = 3(3z + 11) - z$

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M8-U3: Notes# 4 – Rotations

Date: _____

Rotation - turning a figure about a fixed point

How can we turn objects?

- 1.
- 2.

We need to know the two “D’s” of rotations:

- 1.
- 2.

After a rotation has been performed, is the image going to be similar or congruent? Explain.

Example:

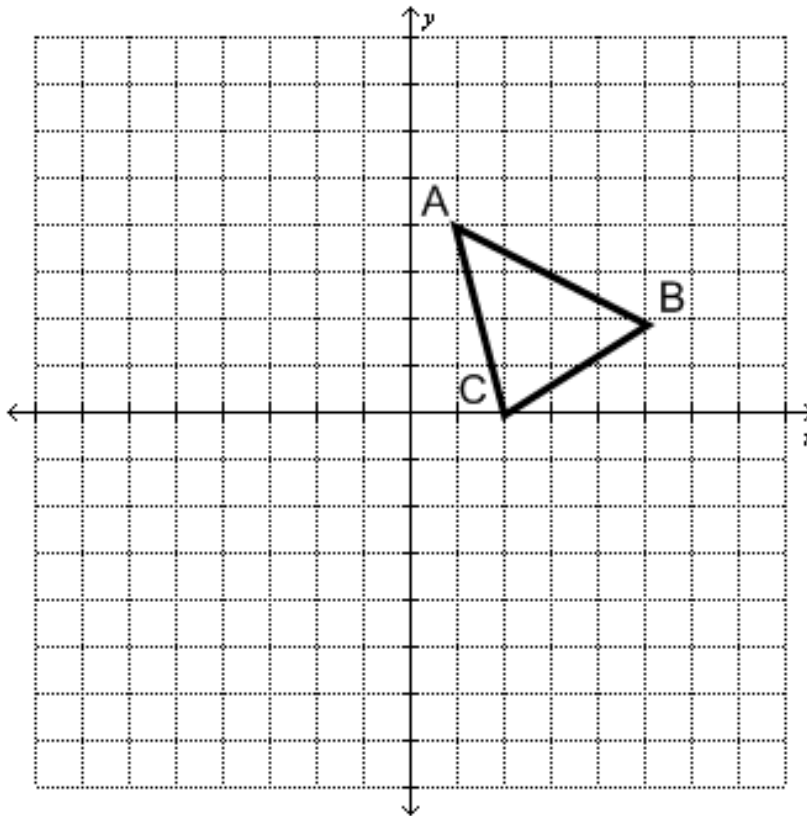


1. Triangle ABC is labeled on your graph below.

a) Rotate Triangle ABC , 90° counterclockwise. Label the triangle $A' B' C'$.

b) Rotate Triangle ABC , 180° counterclockwise. Label the triangle $A'' B'' C''$.

c) Rotate Triangle ABC , 270° counterclockwise. Label the triangle $A''' B''' C'''$.



2. Organize your results from Part A in the table.

Starting Point	90° Rotation CC	180° Rotation CC	270° Rotation CC	360° Rotation CC
A (1, 4)				
B (5, 2)				
C (2, 0)				

3. Complete each rule for finding the image of any point (x, y) under the given rotation.

a) 90° rotation about the origin: $(x, y) \rightarrow (\quad , \quad)$

b) 180° rotation about the origin: $(x, y) \rightarrow (\quad , \quad)$

c) 270° rotation about the origin: $(x, y) \rightarrow (\quad , \quad)$

d) 360° rotation about the origin: $(x, y) \rightarrow (\quad , \quad)$

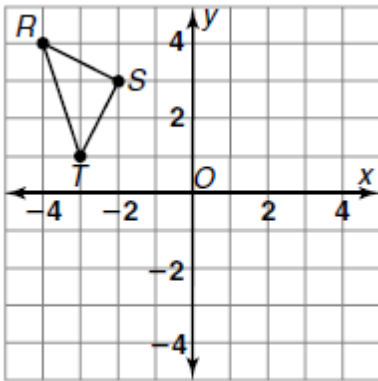
4. What are the coordinates of $(3, -2)$ under a 90° counterclockwise rotation about the origin?

5. What are the coordinates of $(-5, 4)$ under a 180° counterclockwise rotation about the origin?

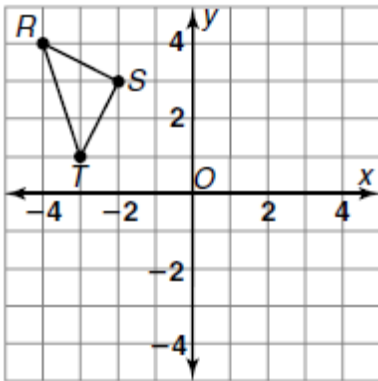
6. What are the coordinates of $(3, 2)$ under a 90° **clockwise** rotation about the origin?

7.

- a. Draw the final image created by rotating triangle RST 90° counterclockwise about the origin and then reflecting the image in the x -axis.

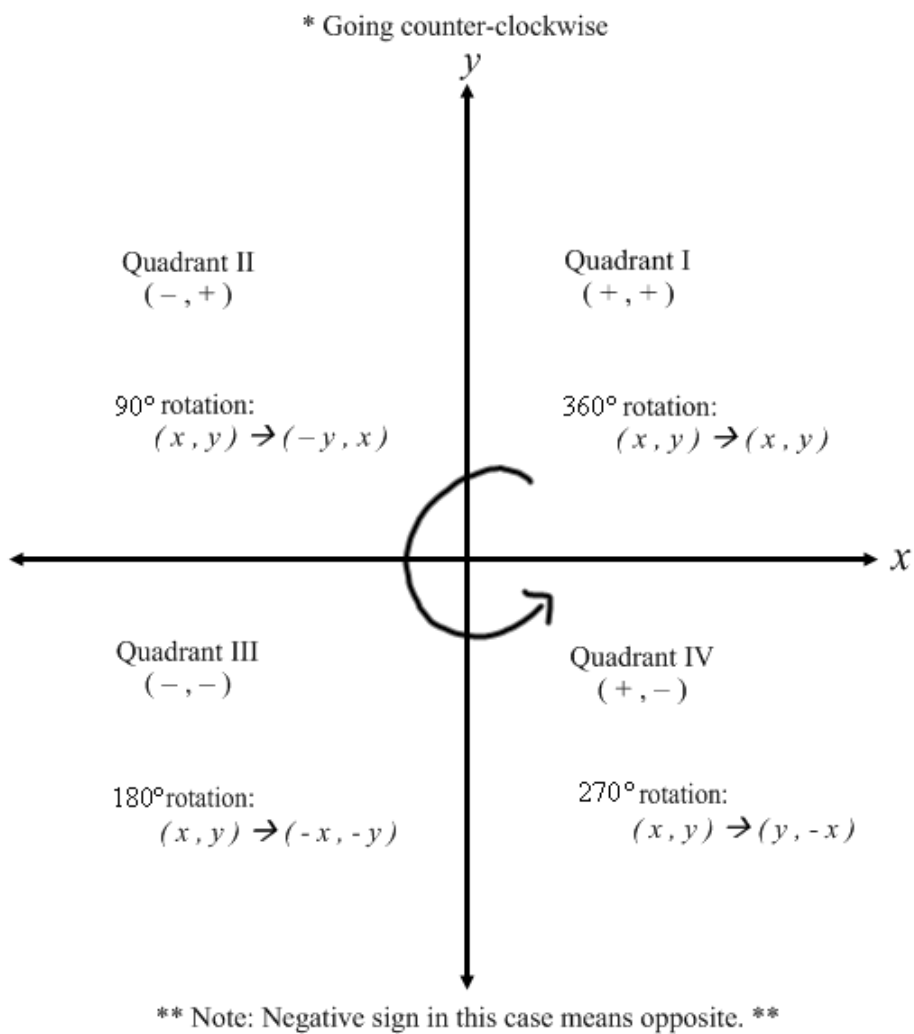


- b. Draw the final image created by reflecting triangle RST in the x -axis and then rotating the image 90° counterclockwise about the origin.



- c. Are the final images in parts (a) and (b) the same? Why or why not?

Rotation Summary



Name: _____

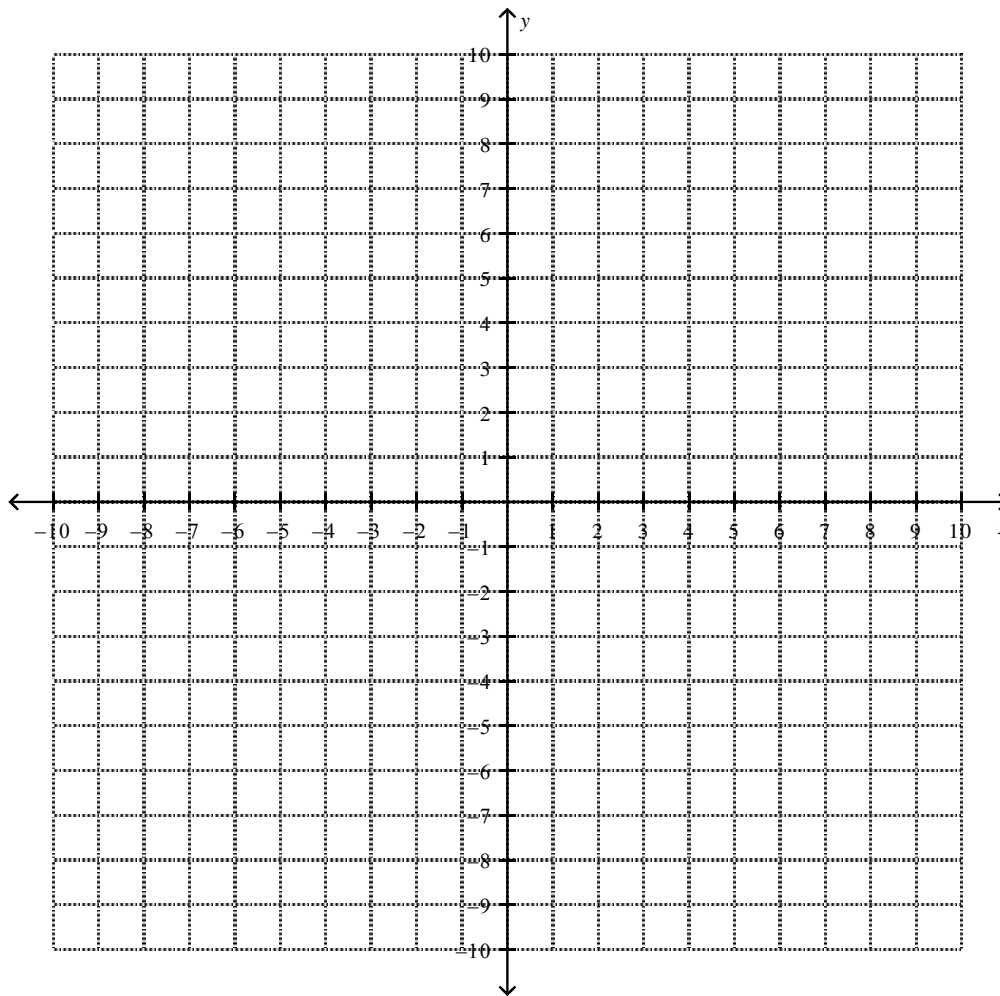
Class: _____

M8-U3: HW# 4 – Rotations

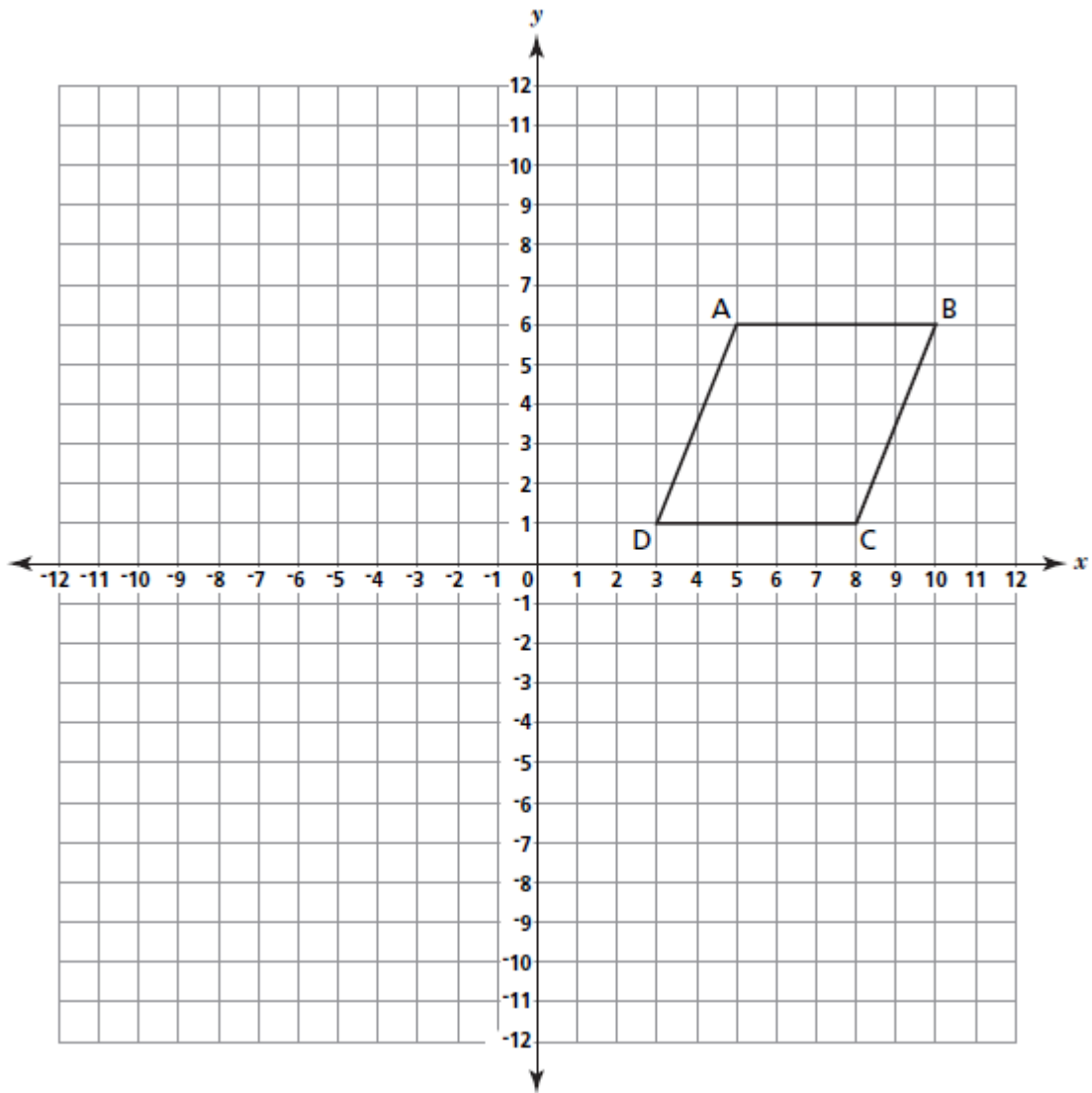
Date: _____

1. a) Graph Triangle RST with vertices R(2, 3), S(5, 4), and T(4, 8).

b) Using the rule for a rotation of 90° counterclockwise, graph Triangle $R'S'T'$ on the graph below and write the new coordinates.



2. Quadrilateral $ABCD$ is plotted on the grid below.



Part A

On the graph, draw the image of quadrilateral $ABCD$ after a counterclockwise rotation of 180° about the origin. Label the image $A'B'C'D'$.

Part B

On the lines below, explain how the coordinates of A changed to the coordinates of A' .

3. Point $A(3, 6)$ is rotated 270° counterclockwise about the origin, what is the coordinate of A' ? *Circle the best answer.*

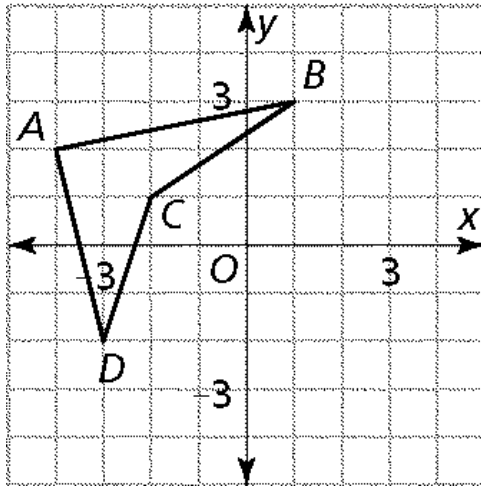
(a) $(-6, 3)$

(c) $(6, -3)$

(b) $(3, 6)$

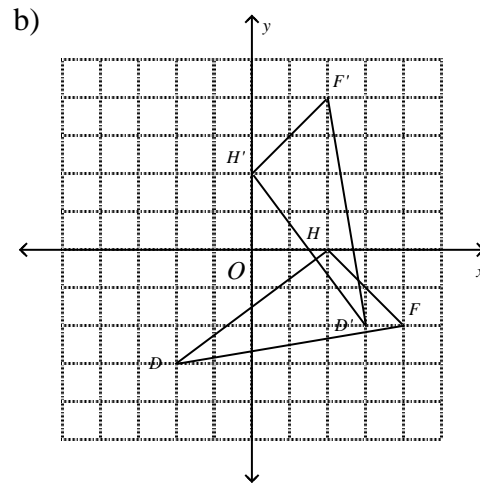
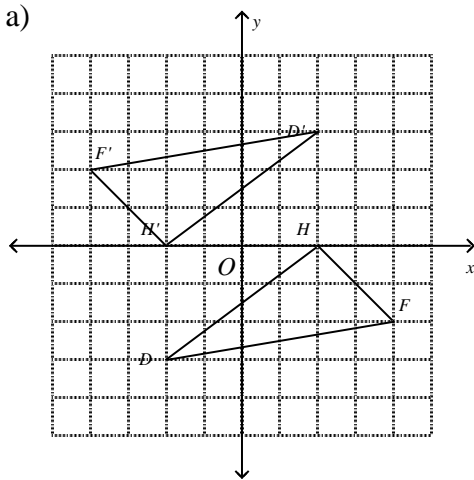
(d) $(-3, -6)$

4. Draw the final image created by rotating polygon $ABCD$ 90° counterclockwise about the origin and then reflecting the image in the x -axis.

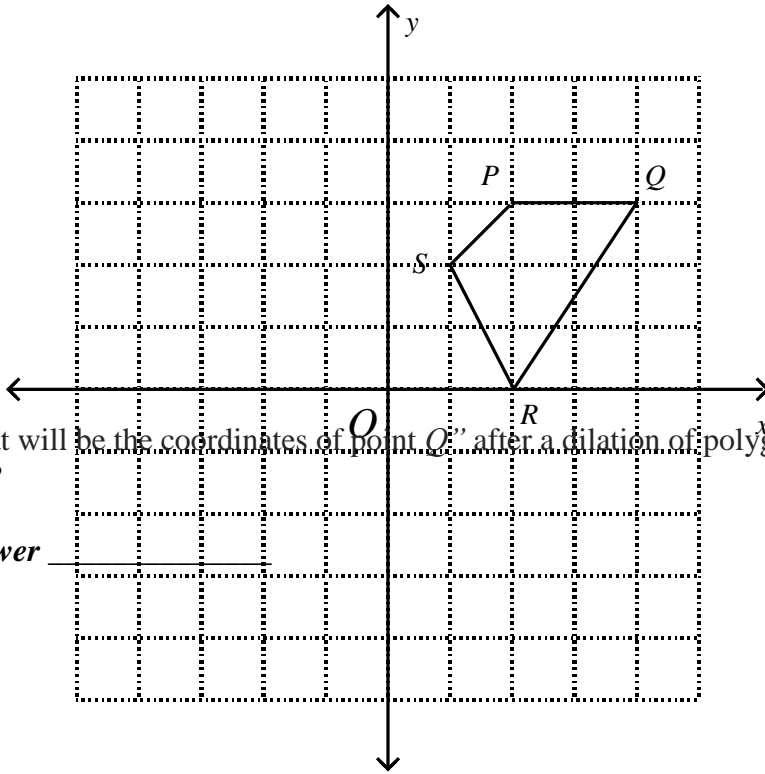


Is the resulting image similar or congruent? How do we know?

5. Determine the transformation that produced the following images:



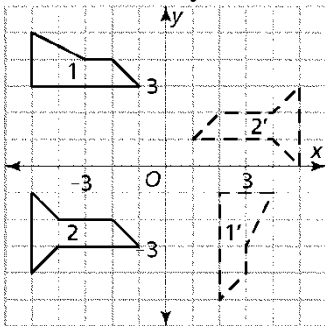
6. Quadrilateral $PQRS$ is plotted on the grid below.
 On the graph, draw the image of polygon $PQRS$ after a 90° clockwise rotation. Label the image $P'Q'R'S'$.



What will be the coordinates of point Q' after a dilation of polygon $P'Q'R'S'$ using a scale factor of two?

Answer _____

7. Describe how you could move shape 1 to exactly match shape 1' by using series of transformations?



Spiral:

8. The image of $(2, -1)$ after a translation of $(x, y) \rightarrow (x-1, y+3)$ is _____.
9. A dilation of $(x, y) \rightarrow (2x, 2y)$ will make the coordinates of the image _____ times larger than the original.
10. The only transformation that changes the size of the original figure is a _____.

Name: _____

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M8-U3: Notes# 3 – Dilations

Date: _____

Dilation - transformation that produces an image that is the _____ as the original but _____.

- A dilation is _____ to the original figure.
- Dilations are centered around the origin (0, 0), unless otherwise stated.

Scale factor – is $\frac{\text{image length}}{\text{pre-image length}}$, which is a _____.

- If the scale factor is greater than 1, the figure becomes _____.
- If the scale factor is between 0 and 1, the figure becomes _____.

Rule: $(x, y) \rightarrow (fx, fy)$ where f represents the scale factor.

Example 1: If the scale factor is 3, how would you write the rule?

Example 2:

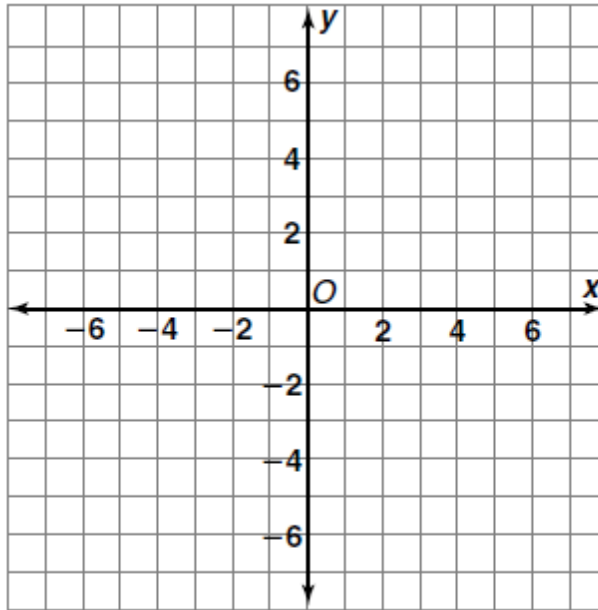
Triangle ABC has vertices $A(0, 2)$, $B(4, 4)$, and $C(-1, 4)$.

What are the vertices of its *image* with a scale factor of 4?

Example 3:

Quadrilateral $PQRS$ has vertices $P (-2, 4)$, $Q (4, 4)$, $R (4, -2)$, and $S (-4, -4)$. It is dilated by a scale factor of $\frac{1}{2}$.

- a) What are the coordinates of the image? Graph them.



- b) Demonstrate these quadrilaterals are similar by comparing the ratios of the lengths.

- c) What do you notice about the angle measurements of the two figures?

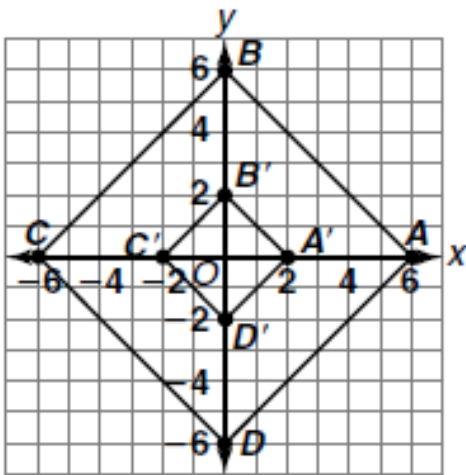
Example 4:

If the scale factor is $\frac{5}{2}$, how would you write the general rule?

Is this an enlargement or a reduction?

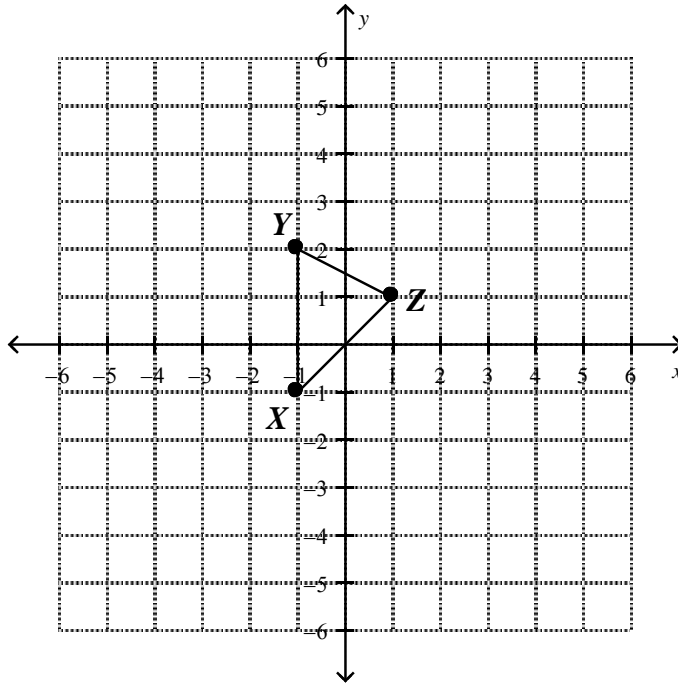
Example 5:

Quadrilateral $A'B'C'D'$ is a dilation of quadrilateral $ABCD$. Find the scale factor. Classify the dilation as an enlargement or a reduction.



Example 6:

Triangle XYZ is graphed below. Draw and label Triangle $X'Y'Z'$ after a dilation using a scale factor of two.



What will be the coordinates of point Y'' after a reflection of polygon $X'Y'Z'$ over the x -axis?

Answer _____

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M8-U3: HW# 3 – Dilations

Date: _____

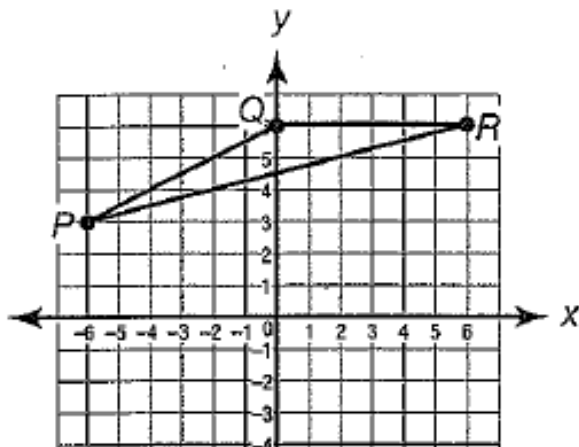
Multiple Choice:

1. Which of the following describes the image of a figure after a dilation that has a scale factor between zero and one?
 - a) It has a different shape from the original figure and is smaller than the original figure.
 - b) It has the same shape as the original and is larger than the original figure.
 - c) It has the same shape as the original and is smaller than the original figure.
 - d) It has the same shape and same size as the original figure.

2. Which of the following describes the image of a square after a dilation that has a scale factor of 6?
 - a) Its sides are 6 units longer than those of the original square.
 - b) Its sides are $\frac{1}{6}$ as long as those of the original square.
 - c) Its sides are 6 times as long as those of the original square.
 - d) Its sides are 6 units shorter than those of the original square.

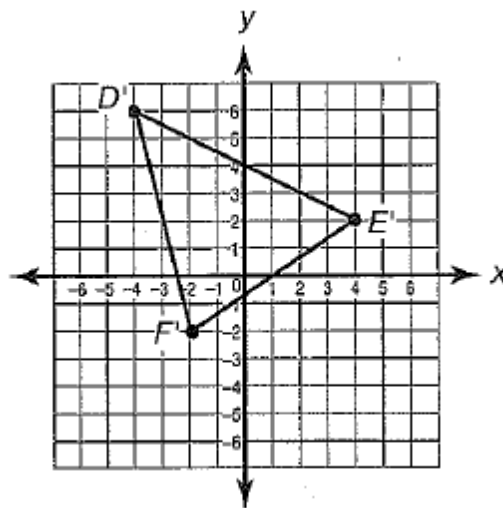
3. Which of the following describes the image of a triangle after a dilation that has a scale factor of $\frac{5}{6}$?
 - a) Each angle has $\frac{5}{6}$ of the measure of its corresponding angle in the original triangle.
 - b) Each angle has $\frac{6}{5}$ of the measure of its corresponding angle in the original triangle.
 - c) Each angle has the same measure as its corresponding angle in the original triangle.
 - d) Each angle is $\frac{1}{6}$ larger than the measure of its corresponding angle in the original triangle.

4. What are the coordinates of ΔPQR after a dilation with a scale factor of $\frac{2}{3}$?



- a) $P'(-2,1), Q'(0,2), R'(2,2)$ b) $P'(-4,2), Q'(0,4), R'(4,4)$
 c) $P'(-4,2), Q'(4,0), R'(4,2)$ d) $P'(-12,6), Q'(0,12), R'(12,12)$

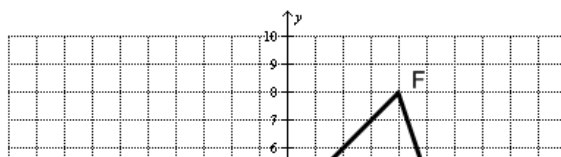
5. $\triangle D'E'F'$ is the image of $\triangle DEF$ after a dilation with a scale factor of 2. What are the coordinates of the vertices of $\triangle DEF$?



- a) $D(-8,-12), E(8,4), F(-4,-4)$ b) $D(-6,4), E(-2,0), F(-4,-4)$
 c) $D(-2,8), E(6,4), F(0,0)$ d) $D(-2,3), E(2,1), F(-1,-1)$

Short Answer:

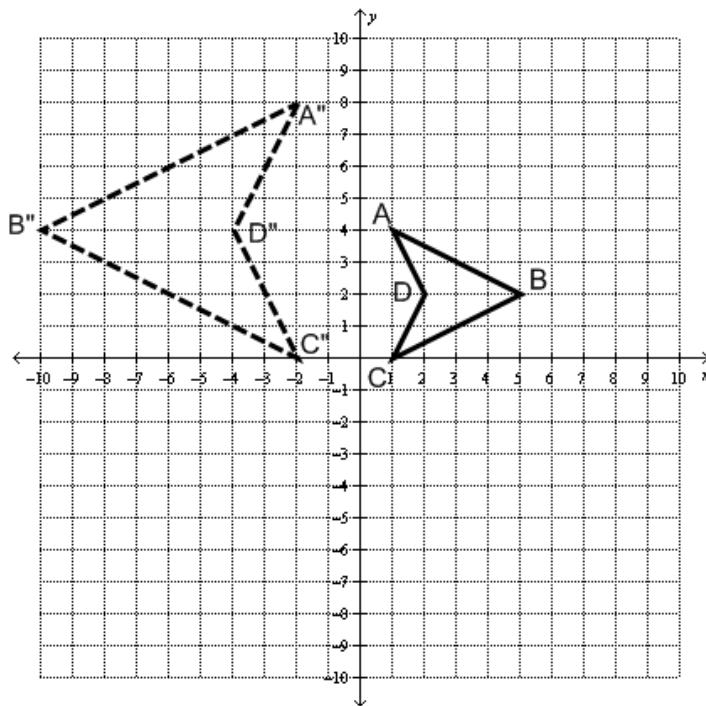
6. Triangle PQR has coordinates $P(2,4), Q(-2,4), R(0,-6)$. Write the coordinates of the vertices of the image of a triangle after a dilation of 1.5.
7. How does the size of an image compare to the original figure when the original figure undergoes a dilation with a scale factor of one?
8. On the grid below, draw the image of $\triangle FGH$ after a dilation with a scale factor of $\frac{1}{2}$.



What will be the coordinates of point F'' after a translation of polygon $F'G'H'$ two units to the left and four units up?

Answer _____

9. Describe a sequence of transformations to get from polygon $ABCD$ to polygon $A''B''C''D''$.

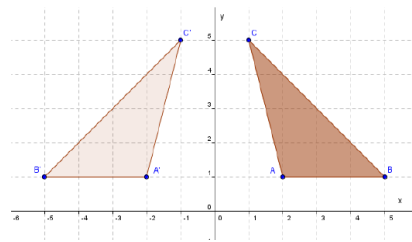


Spiral:

10. Solve: $6(2k + 5) - 3k = 66$

Multiple Choice

1. Which describes the transformation of the triangle?
 a. reflection over the x-axis
 b. reflection over the y-axis
 c. rotation 90° CW about the origin
 d. rotation 180° CW about the origin

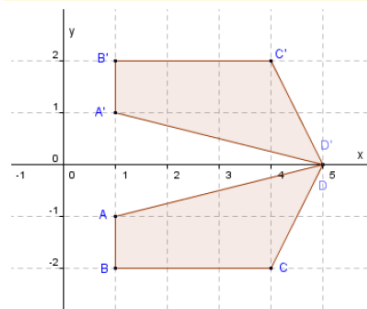


2. Which transformation will result in an image which is similar, but not congruent, to the pre-image?
 a. dilation b. glide reflection c. rotation d. translation
3. A figure is located entirely in the third quadrant. If it is reflected over the y-axis, what will the signs of the coordinates be?
 a. both positive b. both negative c. x is positive, y is negative d. y is positive, x is negative
4. $\triangle QRS$ is translated by the following vector: $\langle -4, 2 \rangle$. The vertices are as follows: $Q(1, 3)$, $R(5, 1)$, and $S(3, 5)$. Which ordered pair is a vertex of the translated image?
 a. $(-1, 3)$ b. $(1, -3)$ c. $(1, 3)$ d. $(3, 1)$

5. Which of these transformations occurs when the blades of a fan turn?
 a. dilation
 b. reflection
 c. rotation
 d. translation



6. Which of the following describes the transformation shown?
 a. dilation with a scale factor of 2
 b. rotation of 90° CCW
 c. reflection over the x-axis
 d. translation up 2 units



7. $\triangle JKL$ has vertices $J(2, 4)$, $K(3, 1)$, and $L(3, 3)$. A translation maps the point J to $J'(5, 5)$. What are the coordinates of K' ?
 a. $(-3, 1)$ b. $(2, 2)$ c. $(3, 2)$ d. $(4, 0)$
8. Which of the following transformations has the same result as a rotation of 90° CW?
 a. dilation of scale factor of 9 c. reflection about a horizontal line
 b. rotation of 270° CCW d. translation down and to the right

9. Which transformation best describes the image of an object viewed through a microscope?
 a. dilation b. reflection c. rotation d. translation

10. A rectangular photo with dimensions of 1.5 inches wide by 2 inches long is enlarged to a length of 8 inches. What is the width of the enlarged print?

- a. 4 inches b. 6 inches c. 8 inches d. 10 inches

11. The vertex of a figure is located at (2, 4). The figure is rotated and the image of the vertex is located at (-4, -2). Which of these describes the transformation?

- a. 180° CCW b. 90° CCW c. 270° CCW d. reflection across $y = -x$

Free Response

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

12. reflection across $y = -x$ R(2, -4), M(1, -2), N(3, 0), V(4, -4)

R' (____,____) M' (____,____) N' (____,____) V'(____,____)

13. rotation 180° about the origin V(-3, 1), Y(0, 4), M(-1, 0)

V'(____,____) Y'(____,____) M'(____,____)

14. Rotation 270° CCW W(-2, -3) G(1, 1) K(1, -4)

W'(____,____) G'(____,____) K' (____,____)

15. Underline the transformations that result in an isometry.

- a. rotation b. dilation c. reflection d. translation

16. Dilate the figure by a scale factor of $\frac{1}{3}$.

