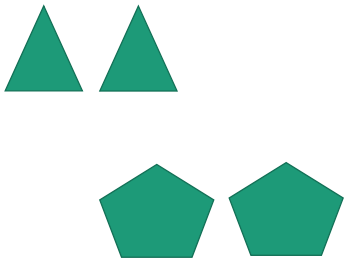
2.1-2.5

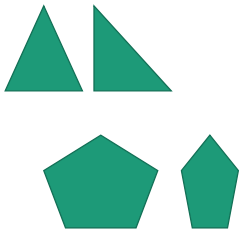
CONGRUENT & SIMILAR FIGURES

Do Now

These pairs of shapes are congruent.



These pairs of shapes are NOT congruent.



In your own words, what does congruent mean?

_____

_____

_____

_____

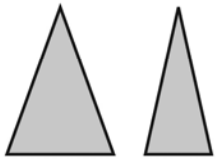
NEW WORD!

CONGRUENT

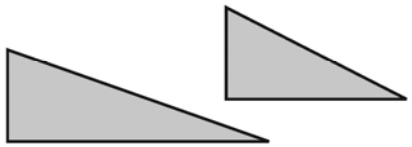
Objects that have the _____ or _____ _____.

Tell whether the triangles are *congruent* or *not congruent*.

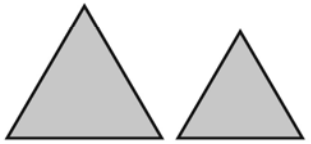
1.



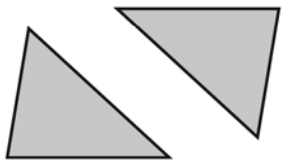
2.



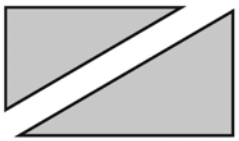
3.



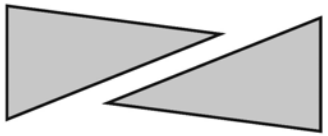
4.



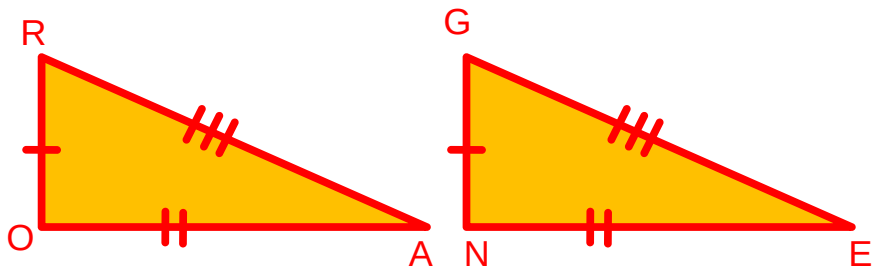
5.



6.

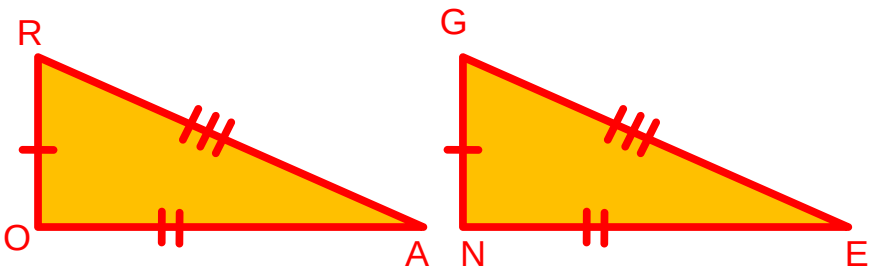


What about congruent shapes?



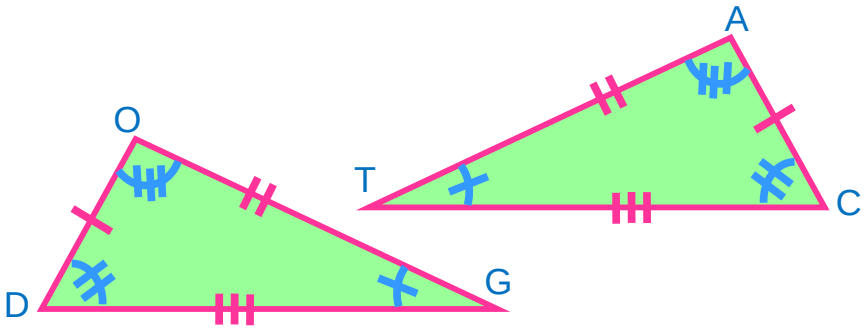
- Same shape and same size
- *Corresponding* sides are congruent
- *Corresponding* angles are congruent

Corresponding Parts of Congruent Figures



Corresponding Angles **Corresponding Sides**

Corresponding Parts of Congruent Figures



Corresponding Angles **Corresponding Sides**

ACTIVITY

Create FOUR pairs of congruent shapes on the Geo Board

- **Create the congruent shapes**
- **Screenshot it**
- **Put the pictures on Notability**
- **Showbie your activity**

The Four Pairs of Congruent Shapes

1) First Pair - Normal side-by-side
2) Second Pair - One has to be flipped backwards
3) Third Pair – One has to be upside-down
4) Fourth Pair – Rotated 90 degrees

Using Cross Products to Solve Proportions

With simplifying

1) $\frac{x}{25} = \frac{6}{10}$

Using Cross Products to Solve Proportions

2) $\frac{2}{9} = \frac{3}{d}$

Using Cross Products to Solve Proportions

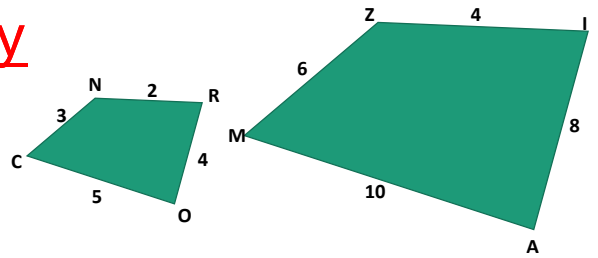
Solve for the missing variable.

3) $\frac{b}{8} = \frac{15}{20}$

4) $\frac{10}{a} = \frac{15}{18}$

Similarity

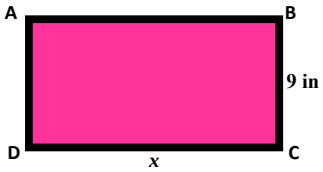
CORN ~ MAIZ

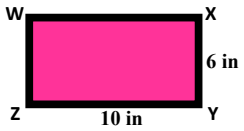


List 3 properties of similar shapes:

- **Same shape, different size**
- **Corresponding angles are congruent**
- **Corresponding sides are proportional**

FIND MISSING SIDES

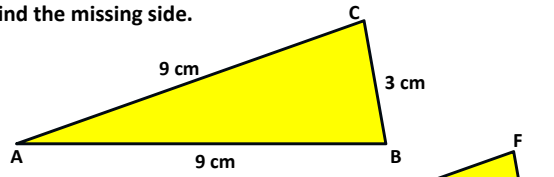




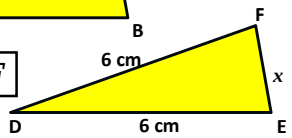
$ABCD \sim WXYZ$

PRACTICE

Find the missing side.



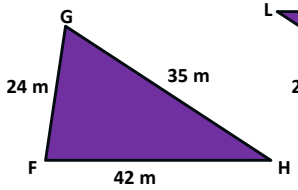
$\Delta ABC \sim \Delta DEF$

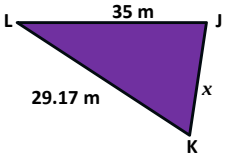


PRACTICE

$\Delta FGH \sim \Delta JKL$

Find the missing side.

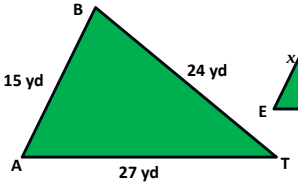


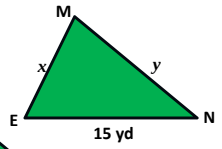


PRACTICE

$\Delta BAT \sim \Delta MEN$

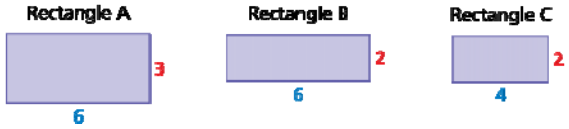
Find the missing sides.





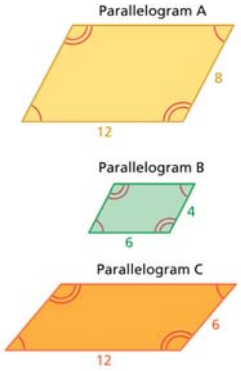
Understanding Similarity and Proportions

Which rectangle is similar to Rectangle A? Explain and show work.



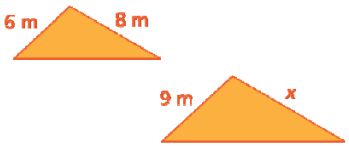
Practice

Which rectangle is similar to Parallelogram A? Explain and show work.



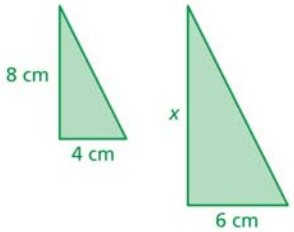
Review – Finding Missing Sides

The triangles are similar. Find *x*.



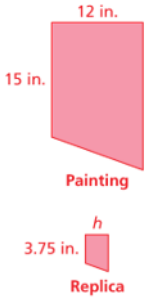
Review – Finding Missing Sides

The triangles are similar. Find *x*.



Applying Similarity and Proportion Concepts

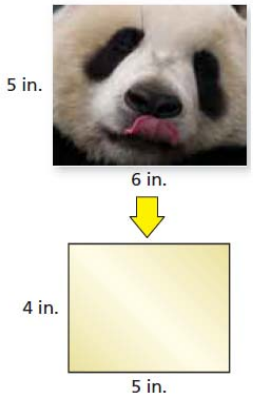
An artist draws a replica of a painting that is on the Berlin Wall. The painting includes a red trapezoid. The shorter base of the similar trapezoid in the replica is 3.75 inches. What is the height h of the trapezoid in the replica?



Applying Similarity and Proportion Concepts

Work with a partner. You are trying to reduce the photograph to the indicated size for a nature magazine. Can you reduce the photograph to the indicated size without distorting or cropping? Explain your reasoning.

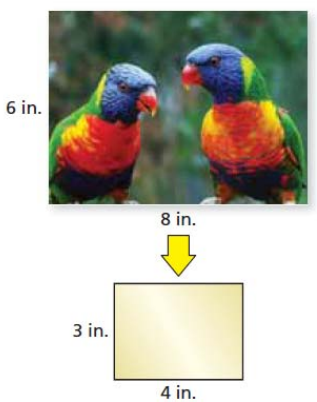
a.



Applying Similarity and Proportion Concepts

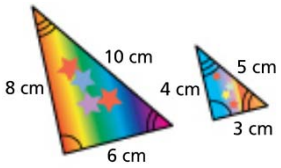
Work with a partner. You are trying to reduce the photograph to the indicated size for a nature magazine. Can you reduce the photograph to the indicated size without distorting or cropping? Explain your reasoning.

b.

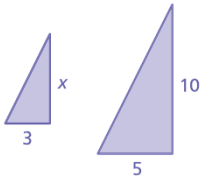


Exit Card

1) Are the two triangles similar? Explain.



2) The two triangles are similar. Find x.



2.2
Translations

Warm Up - Review

Solve.

1. $x - 7 = -13$

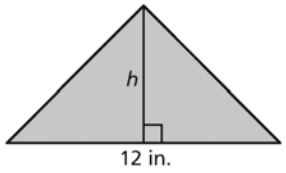
2. $15 - 3c = 3$

Warm Up - Review

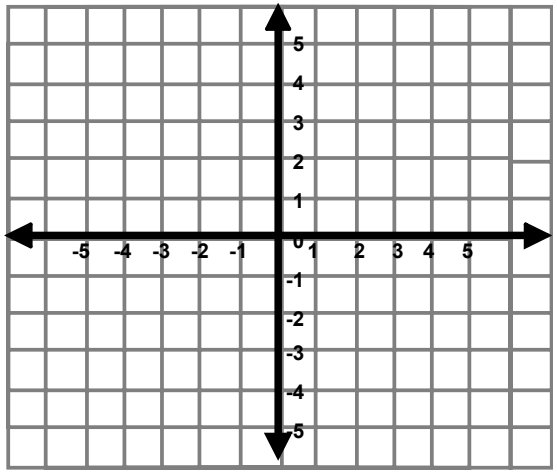
4. a. Write the formula for the area of a triangle.

b. Solve the formula for h.

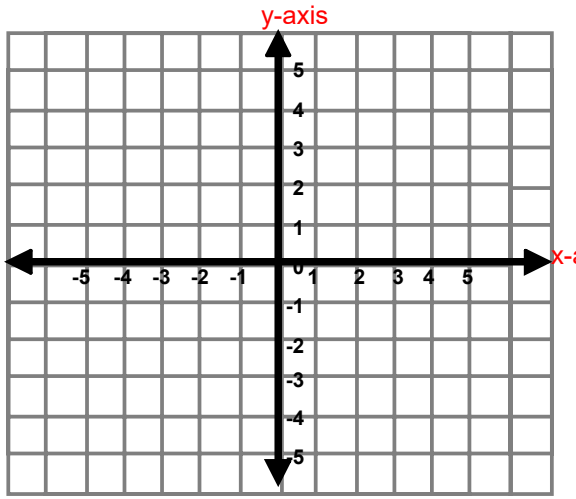
c. The area of a triangle is 36 square inches. Use the new formula to find the height of the triangle in inches



COORDINATE PLANE



COORDINATES



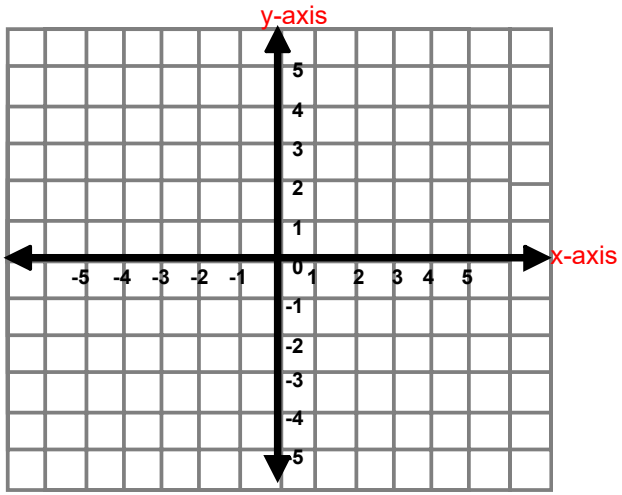
A(4,3)

B(-5,1)

C(2,-4)

D(3,0)

PLOTTING POINTS

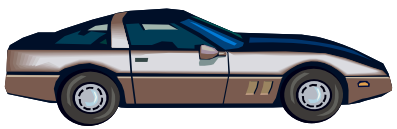


A(5,2)
B(-3,-4)
C(-1,5)
D(3,-5)
E(4,6)
F(0,0)
G(4,0)
H(0,-3)

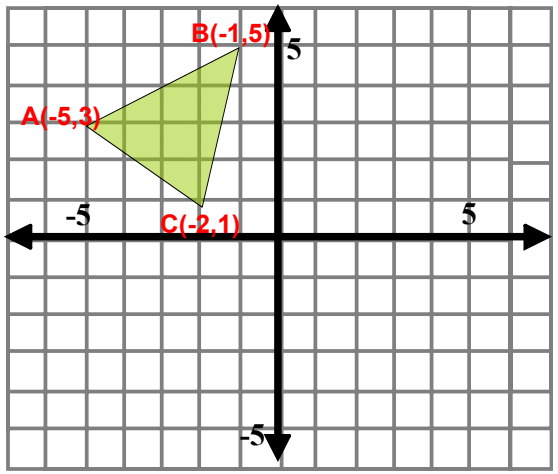
Vocabulary

Translation

Sliding a figure from one place to another



Translations on a Coordinate Plane



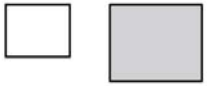
Rule:

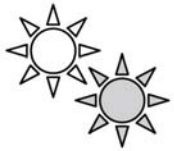
(x,y)→(x+6, y-5)

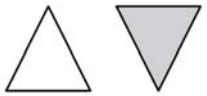
(x,y)→(x-8, y-2)

Practice

Tell whether the shaded figure is a translation of the nonshaded figure.

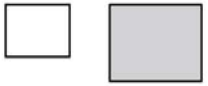
1. 

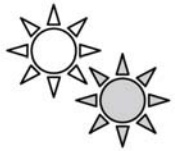
2. 

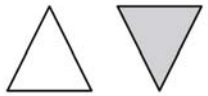
3. 

Practice

Tell whether the shaded figure is a translation of the nonshaded figure.

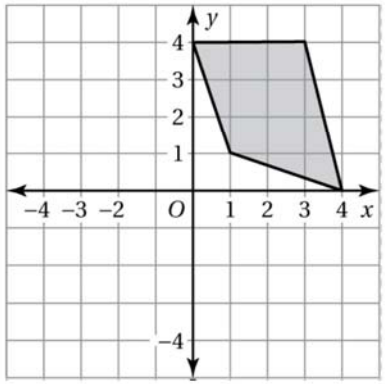
1. 

2. 

3. 

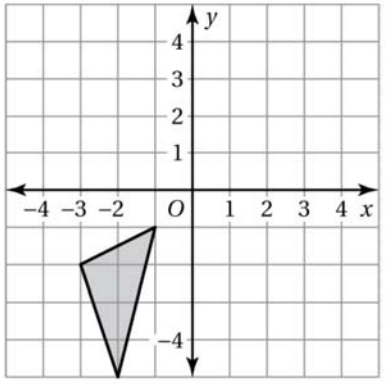
Practice

4. Translate the figure 4 units left and 1 unit down. What are the coordinates of the image?



Practice

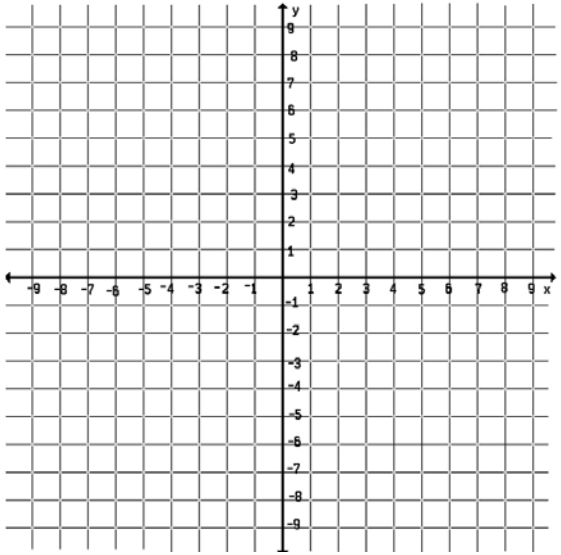
5. Translate the triangle 5 units right and 4 units up. What are the coordinates of the image?



Practice

The vertices of a triangle are $A(-2, 0)$, $B(0, 3)$, and $C(2, 2)$. Draw the figure and its image after the translation.

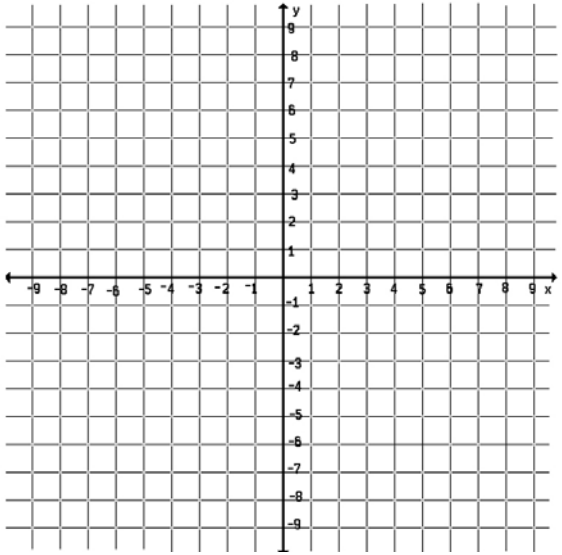
6. 4 units down



Practice

The vertices of a triangle are $A(-2, 0)$, $B(0, 3)$, and $C(2, 2)$. Draw the figure and its image after the translation.

7. 2 units right and 1 unit up

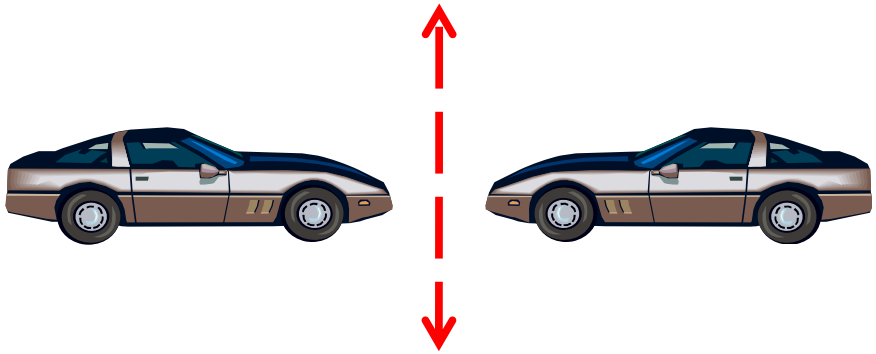


2.3 Reflections

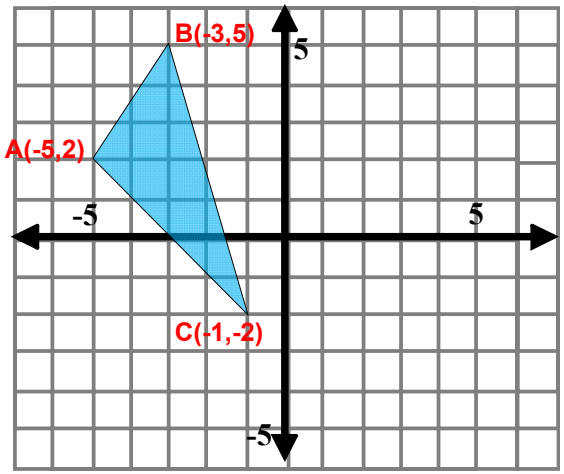
Vocabulary

Reflection

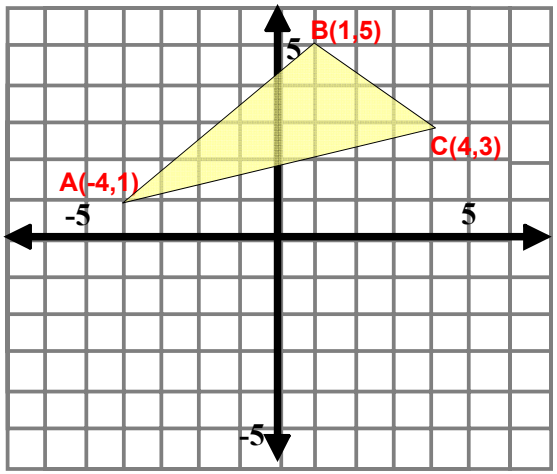
Mirror image of an object across a line or a point



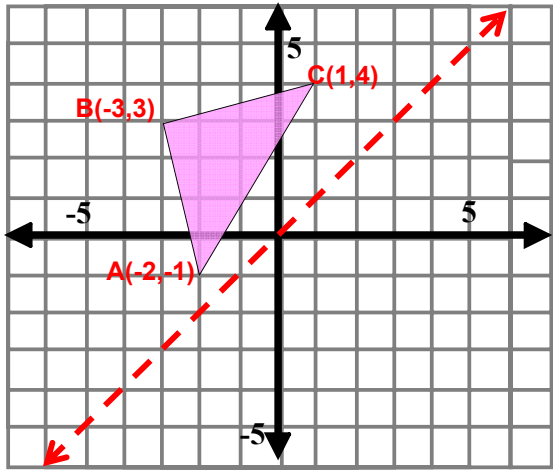
Reflections on a Coordinate Plane



Reflections on a Coordinate Plane



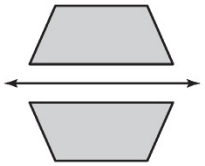
Reflections on a Coordinate Plane



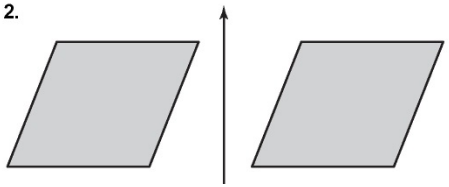
Practice

Tell whether one figure is a reflection of the other figure.

1.



2.



Practice

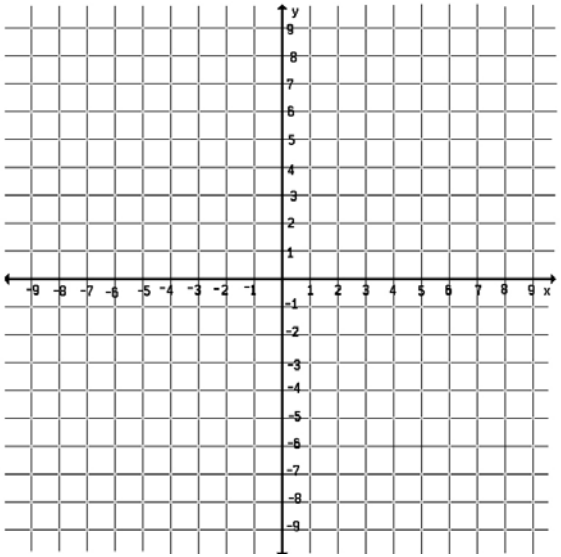
Draw the figure and its reflection in the *x*-axis. Identify the coordinates of the image.

3. $E(0, 2), F(3, 1), G(4, 3)$

4. $H(-3, 2), I(-1, 5), J(2, 1)$

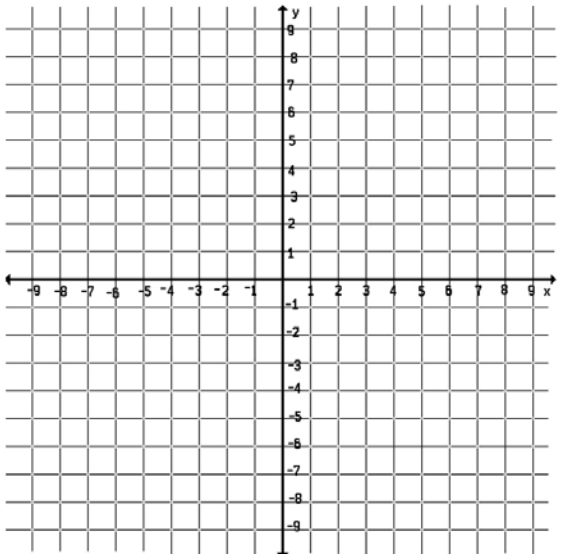
Draw the figure and its reflection in the *x*-axis. Identify the coordinates of the image.

3. $E(0, 2), F(3, 1), G(4, 3)$



Draw the figure and its reflection in the *y*-axis. Identify the coordinates of the image.

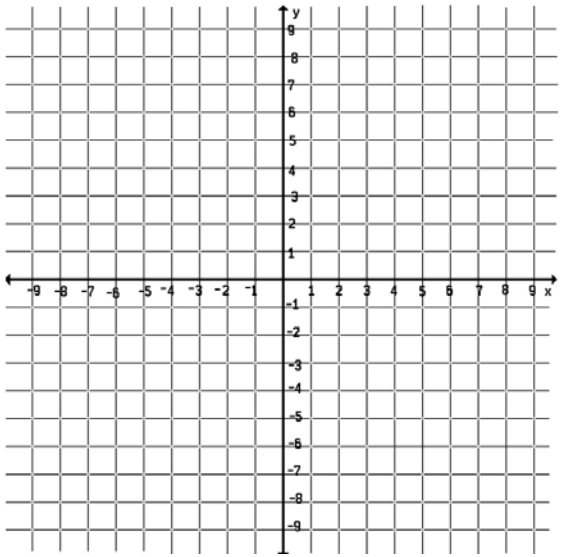
5. $X(0, -1), Y(2, 3), Z(4, -2)$



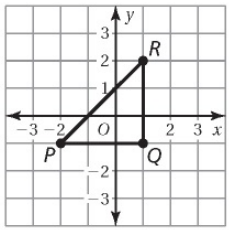
The coordinates of a point and its image are given. Is the reflection in the *x*-axis or *y*-axis?

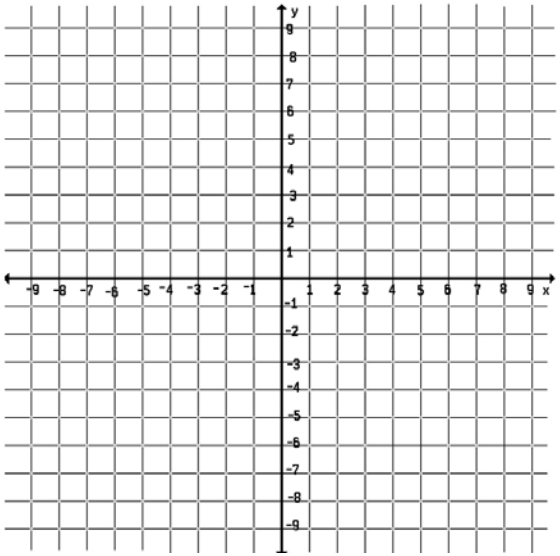
8. $(-5, 2) \rightarrow (5, 2)$

9. $(4, 3) \rightarrow (4, -3)$



10. Translate the triangle 2 units left and 1 unit up. Then reflect the image in the *x*-axis. Graph the resulting triangle.





Name_____ Date_____

2.4 – Exploring Rotations

In this assignment, you need to use the sketch located at my website. Access the website by clicking on the "G" at my Math 8 website. Remember to stay on task on this assignment. Make sure you pay very close attention to the directions and questions.

Your goal is to make very good observations. Many of your comments and answers will look like the following:

- "Switch *x*-coordinate and *y*-coordinate."
- "Change the second number to the opposite."
- "Change the first and second numbers to the opposite"

Investigation 1 - Rotating 90° Counter-clockwise (Rotating 270° Clockwise).

For the original figure, what are its coordinates?

A(,) , B(,) , C(,)

At the top left, move the slider so the angle of rotations is at 90°. For the new image, what are its coordinates?

A'(,) , B'(,) , C'(,)

From your observation, what do you notice is the relationship between the original figure and the image? (For help refer to the above comments and answers)

- Switch the ____ coordinate and the ____ coordinate.
- Change the first number to the _____ .

Rule for Rotating 90° counter-clockwise (Rotating 270° clockwise).

Move any point on the original and move it around. Does your hypothesis regarding the coordinates still hold true when a new figure is formed? (Circle one) YES NO

Investigation 2 - Rotating 180 Degrees.

For the original figure, what are its coordinates?

A(,) , B(,) , C(,)

At the top left, move the slider so the angle of rotations is at 180°. For the new image, what are its coordinates?

A'(,) , B'(,) , C'(,)

From your observation, what do you notice is the relationship between the original figure and the image? (For help refer to the above comments and answers)

- Change the first and second number to the _____ .

Rule for Rotating 180°

Move any point on the original and move it around. Does your hypothesis regarding the coordinates still hold true when a new figure is formed? (Circle one) YES NO

Investigation 3 - Rotating 270° Counter-clockwise (Rotating 90° Clockwise).

For the original figure, what are its coordinates?

A(,) , B(,) , C(,)

At the top left, move the slider so the angle of rotations is at 270°. For the new image, what are its coordinates?

A'(,) , B'(,) , C'(,)

From your observation, what do you notice is the relationship between the original figure and the image? (For help refer to the above comments and answers)

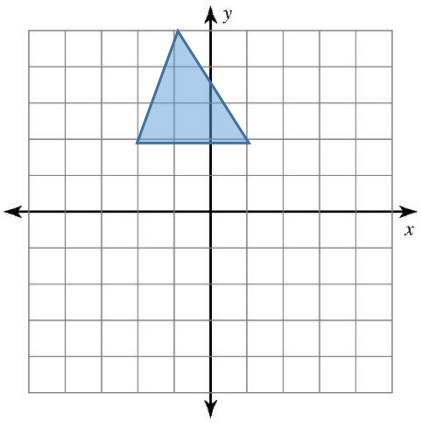
- Switch the ____ coordinate and the ____ coordinate.
- Change the second number to the _____ .

Rule for Rotating 270° counter-clockwise (Rotating 90° clockwise).

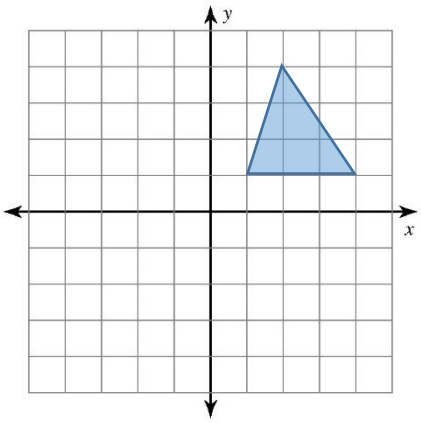
Move any point on the original and move it around. Does your hypothesis regarding the coordinates still hold true when a new figure is formed? (Circle one) YES NO What rule can you come up with?

Graph the image of the figure using the given transformation.

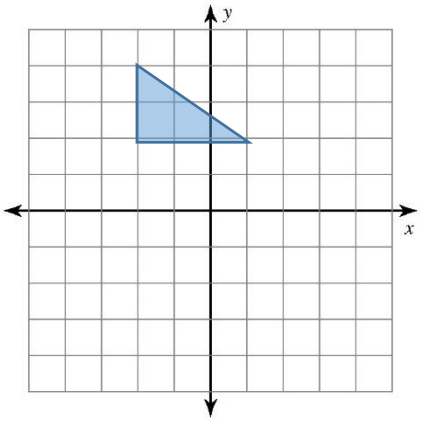
1) rotation 180° about the origin



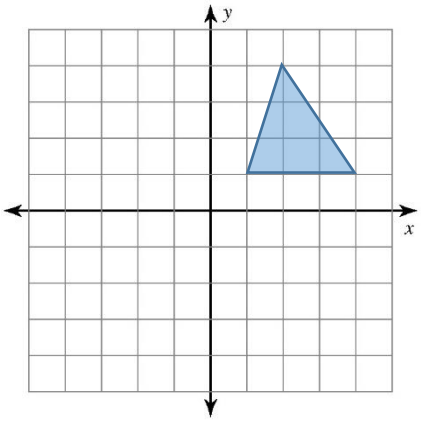
2) rotation 90° counter-clockwise about the origin



3) rotation 270° counter-clockwise about the origin



4) rotation 180° about the origin

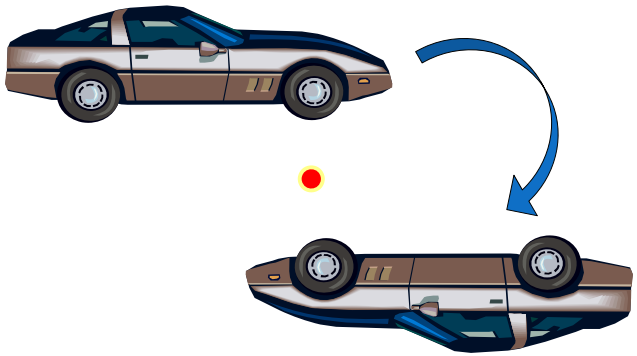


2.4
Rotations (Day 1)

Vocabulary

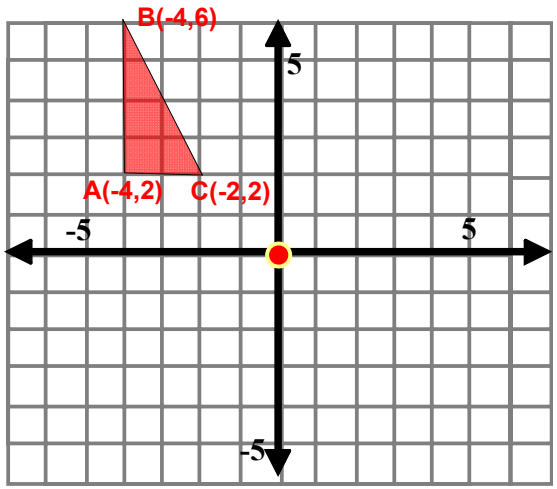
Rotation

Rotating a figure around a point



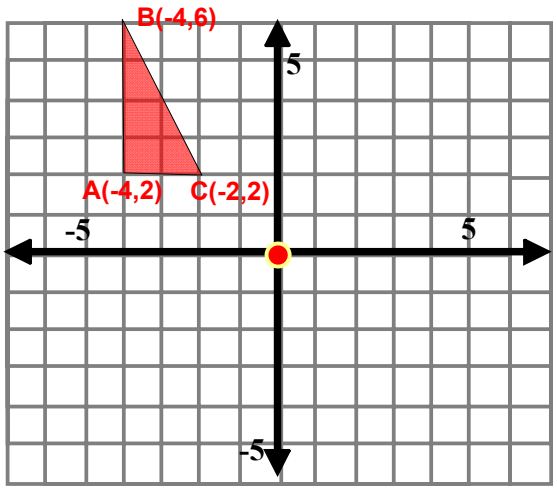
Rotation on a Coordinate Plane

Rotate the figure 180° around the origin



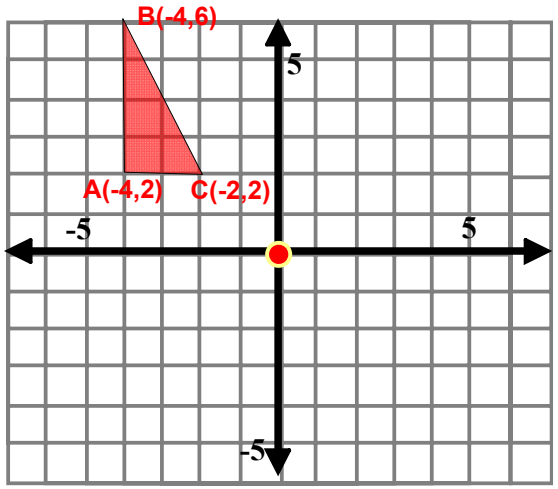
Rotation on a Coordinate Plane

Rotate the 90° clockwise around the origin



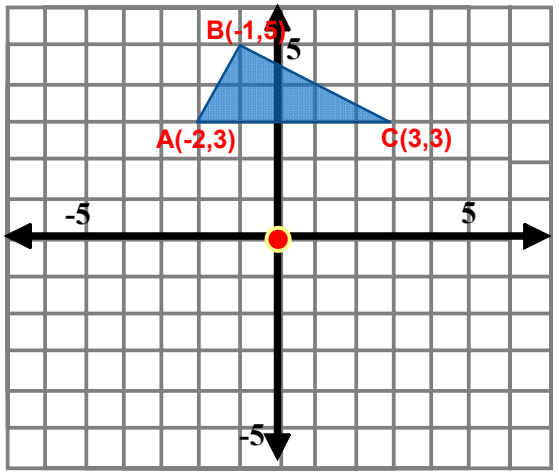
Rotation on a Coordinate Plane

Rotate the 90° counter-clockwise around the origin



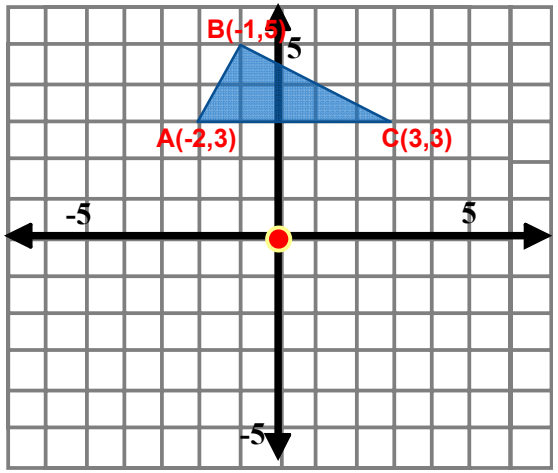
Rotation on a Coordinate Plane

Rotate the figure 180° around the origin



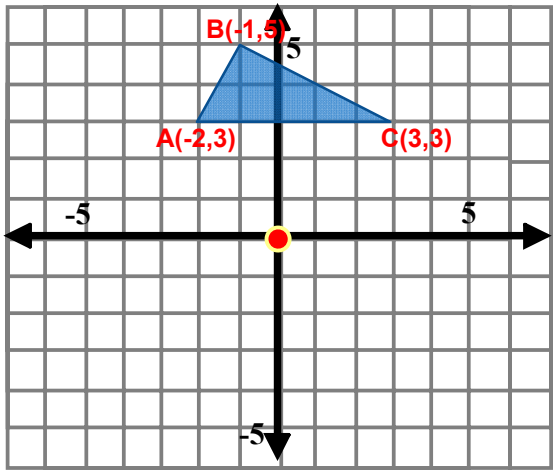
Rotation on a Coordinate Plane

Rotate the figure 90° counter-clockwise around the origin



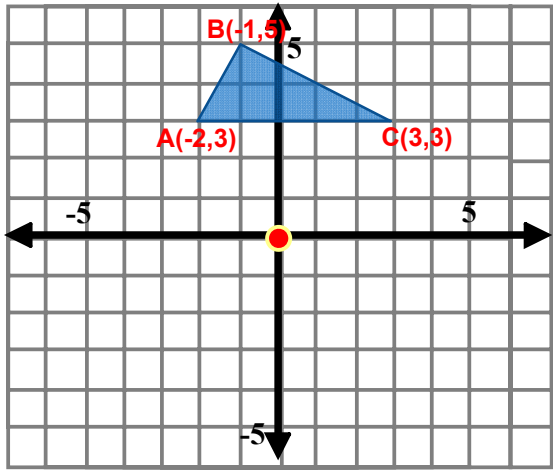
Rotation on a Coordinate Plane

Rotate the figure 270° counter-clockwise around the origin



Rotation on a Coordinate Plane

Rotate the figure 90° clockwise around the origin



2.4

Rotations (Day 2)

Rotations CC 90° (C 270°)

- Switch the ____ coordinate and the ____ coordinate.
- Change the first number to the _____ .

Rotations 180°

- Change the first and second number to the _____ .

Rotations CC 270° (C 90°)

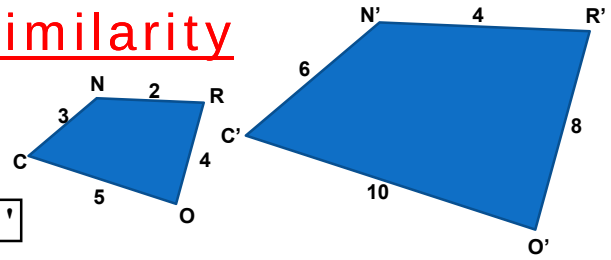
- Switch the ____ coordinate and the ____ coordinate.
- Change the second number to the _____ .

2.7
Dilations

What is a Dilation????

A dilation is a type of transformation that produces a _____ figure by either _____ or _____ the size of the figure.

Review: Similarity



$CORN \sim C'O'R'N'$

List 3 properties of similar shapes:

- _____
- _____
- _____

Scale Factor

Scale factor is how much we are enlarging or reducing a figure

Original or "Pre-image" of Igor

"Image" of Igor

What do you think is the scale factor of the image of Igor?

Scale Factor

Scale factor is how much we are enlarging or reducing a figure

Original or
"Pre-image" of Jack

"Image" of Jack

What do you think is the scale factor of the image of Jack?

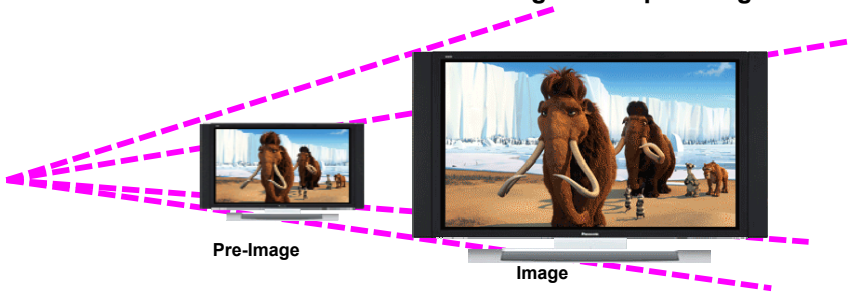
Scale Factor

If the scale is greater than 1, we are _____ the figure.

If the scale is less than 1 but greater than 0, we are _____ the figure.

Center of Dilation

- **The center of dilation is where we reference how we stretched or shrunk a figure.**
- **This can be in the middle or outside the original or "pre-image".**



Pre-Image

Image

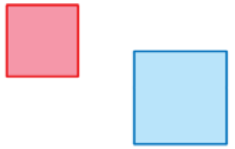
Where is the center of dilation this?

Practice

Tell whether the blue figure is a dilation of the red figure. Explain.

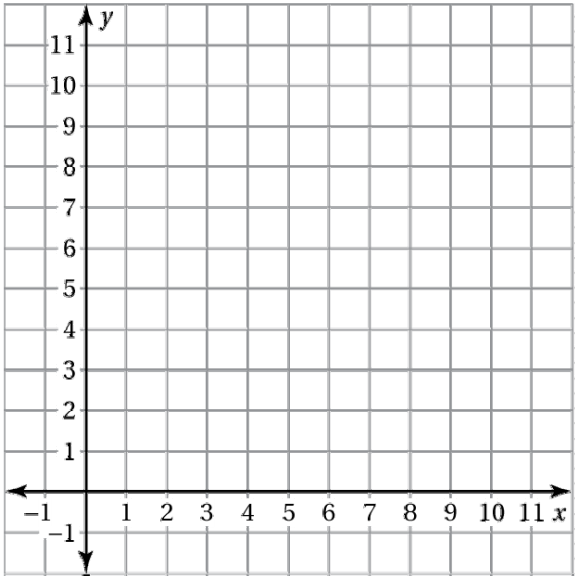
1.

2.



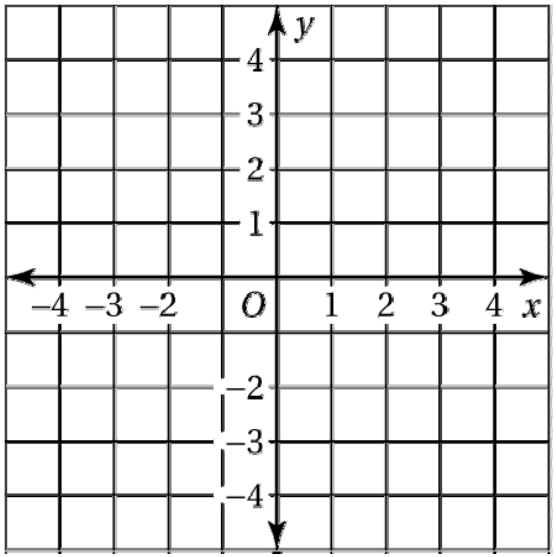
Practice

3) The vertices of a triangle are D (1, 4), E (1, 1), ad F (3, 1). Draw the triangle and its image after a dilation with a scale factor of 2. Identify the type of dilation.



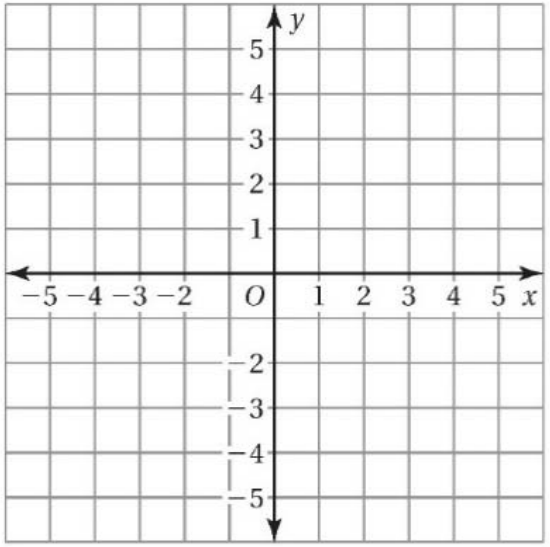
Practice

4) The vertices of a rectangle are J (− 4, 2) K (4, 2), L (4, − 2) and M (− 4, − 2). Draw the rectangle and its image after a dilation with a scale factor of 0.5. Identify the type of dilation.



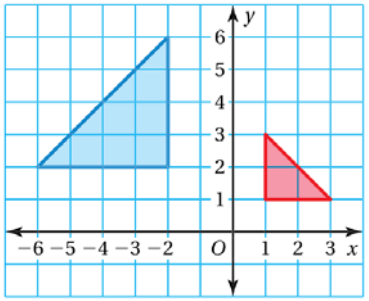
Practice

5) The vertices of a trapezoid are A(−4, 0), B (−2, 4), C (2, 4), and D (6, 0). Dilate the trapezoid with respect to the origin using a scale factor of 0.5. Then translate it 2 units right and 3 units down. What are the coordinates of the image?



Practice

6) The red figure is similar to the blue figure. Describe a sequence of transformations in which the blue figure is the image of the red figure.

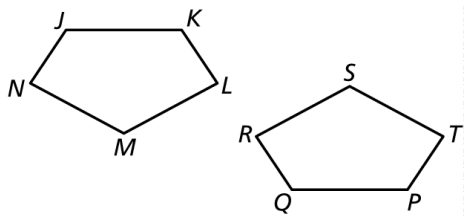


Name_____ Date_____

Chapter 2 – Review

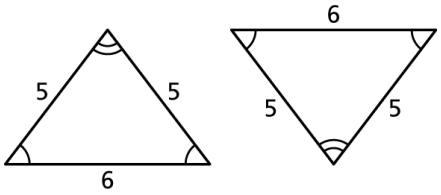
The figures are congruent. Name the corresponding angles and the corresponding sides.

1)

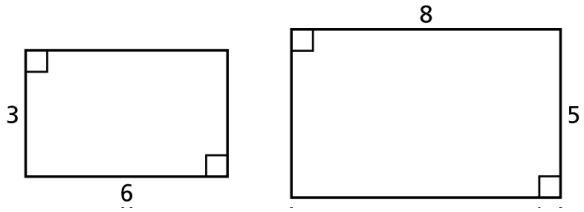


Tell whether the two figures are congruent. Explain your reasoning.

2)



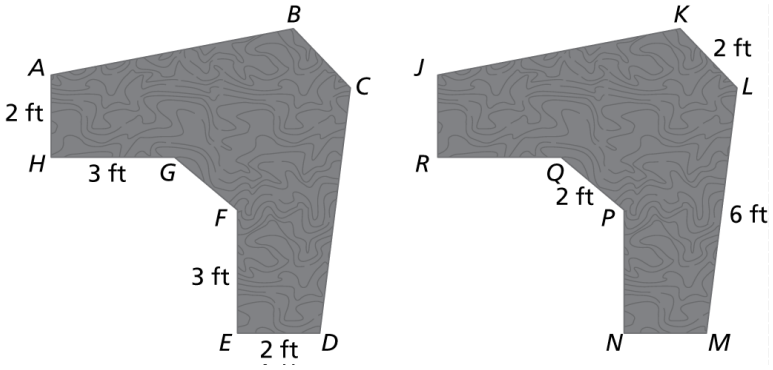
3)



4) The tops of the desks are identical.

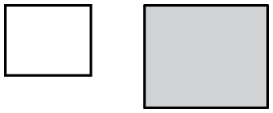
a. What is the length of side *NP*?

b. Side *AB* is congruent to side *CD*. What is the length of side *AB*?

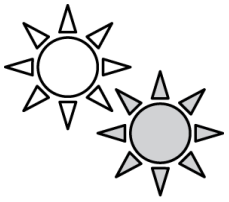


Tell whether the shaded figure is a translation of the nonshaded figure. Explain your reasoning.

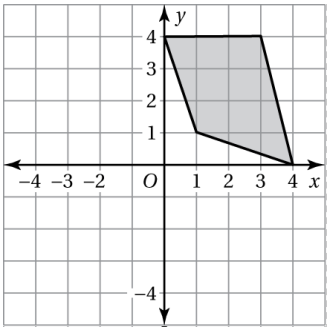
5)



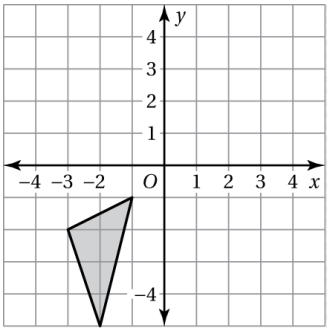
6)



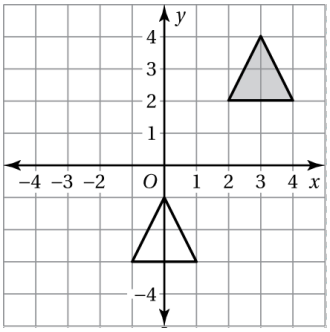
7) Translate the figure 4 units left and 1 unit down. What are the coordinates of the image?



8) Translate the triangle 5 units right and 4 units up. What are the coordinates of the image?

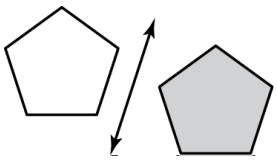


9) Describe the translation from the shaded figure to the nonshaded figure.

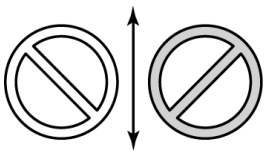


Tell whether the shaded figure is a reflection of the nonshaded figure. Explain your reasoning.

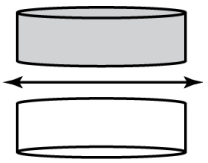
10)



11)

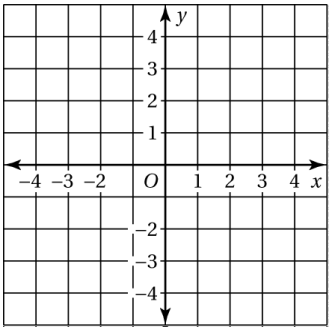


12)

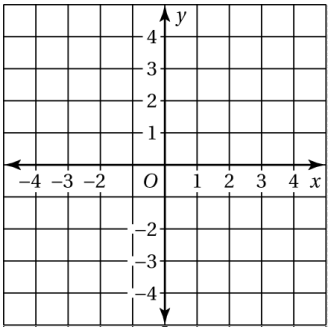


Draw the figure and its reflection in the *x*-axis. Identify the coordinates of the image.

13) $A(1, 2), B(3, 2), C(1, 4)$

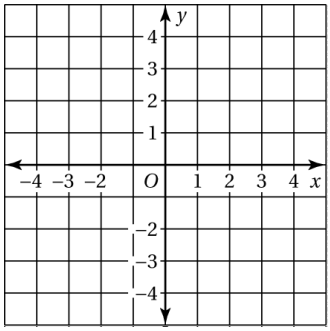


14) $W(3, 1), X(3, 4), Y(1, 4), Z(1, 1)$

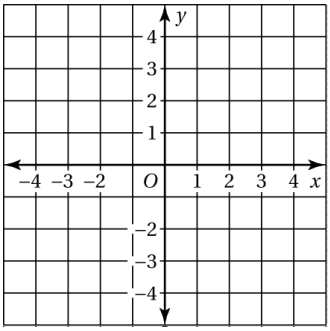


Draw the figure and its reflection in the *y*-axis. Identify the coordinates of the image.

15) $J(3, 4)$, $K(3, 0)$, $L(2, 4)$

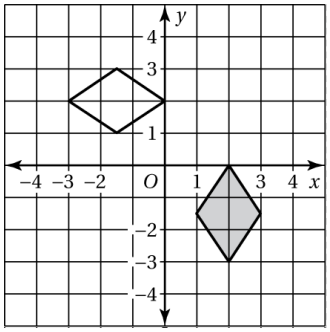


16) $M(2, 2)$, $N(2, 3)$, $P(3, 3)$, $Q(4, 1)$

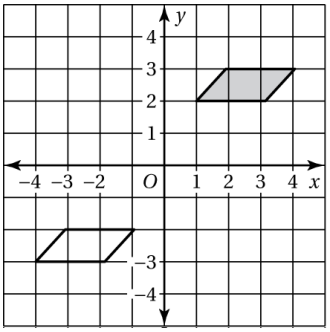


Tell whether the shaded figure is a rotation of the nonshaded figure about the origin. **If so, give the angle and the direction of rotation.**

17)

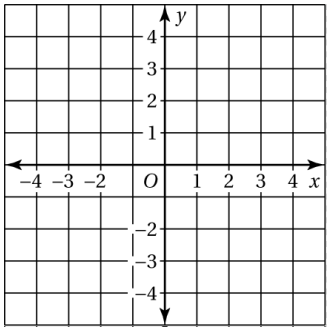


18)

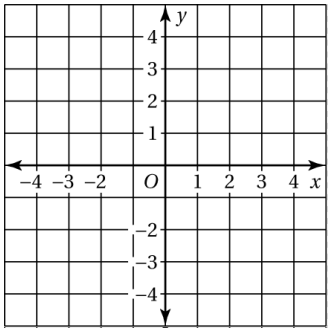


The vertices of a triangle are $A(1, 1)$, $B(3, 1)$, and $C(3, 4)$. Rotate the triangle as described. Find the coordinates of the image.

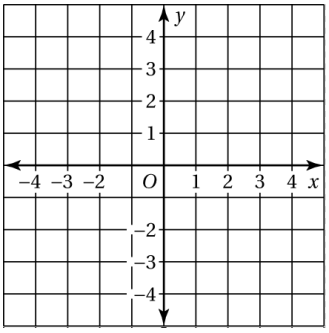
19) 90° clockwise about the origin



20) 180° about the origin

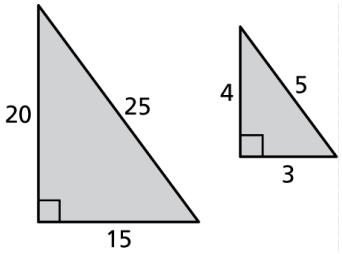


21) The vertices of a triangle are $(-4, -4)$, $(-2, -4)$, and $(-3, -1)$.
Rotate it 180° about the origin, AND then reflect it in the *x*-axis.
What are the vertices of the final triangle?

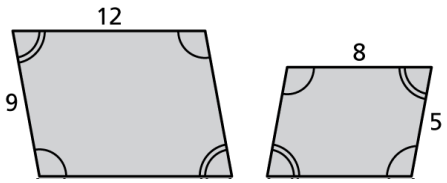


Tell whether the two figures are similar. Explain your reasoning.

22)



23)



24) In your classroom, a dry erase board is 8 feet long and 4 feet wide. Your teacher makes individual dry erase boards for you to use at your desk that are 11.5 inches long and 9.5 inches wide. Are the boards similar? Explain.

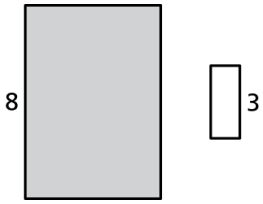
25) You have a 4 x 6 photo of you and your friend.

a. You order a 5 x 7 print of the photo. Is the new photo similar to the original? Explain.

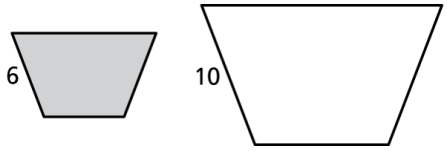
b. You enlarge the original photo to three times its size on your computer. Is the new photo similar to the original? Explain.

The two figures are similar. Find the ratios (shaded to nonshaded) of the perimeters and of the areas.

26)



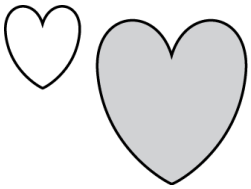
27)



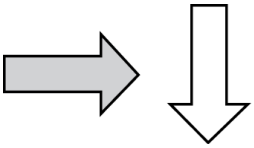
28) You buy two picture frames that are similar. The ratio of the corresponding side lengths is 4 : 5. What is the ratio of the areas?

Tell whether the shaded figure is a dilation of the nonshaded figure.

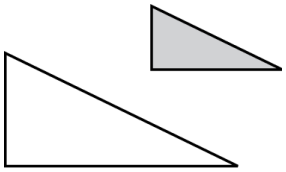
29)



30)

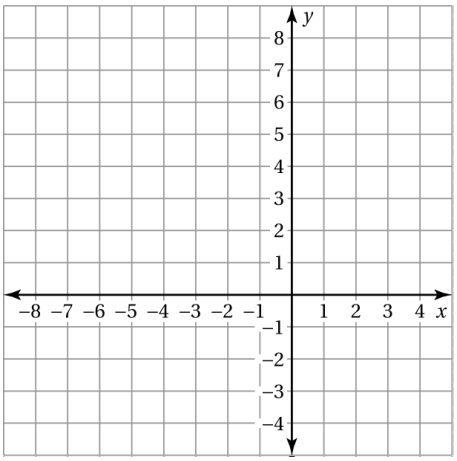


31)



The vertices of a figure are given. Draw the figure and its image after a dilation with the given scale factor. Identify the type of dilation.

32) $A(-2, 2), B(1, 2), C(1, -1); k = 3$



33) $D(4, 2), E(4, 8), F(8, 8), G(8, 2); k = \frac{1}{2}$