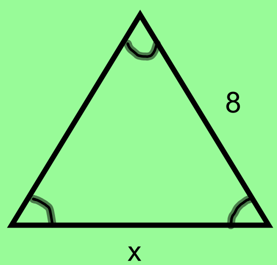
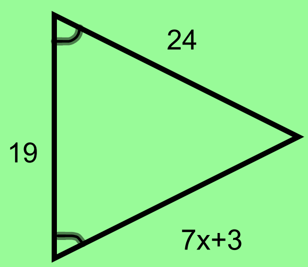
Bellwork
10/31/2011

Find the value of x.

1.



2.



Geometry
4.8 Perform Congruence Transformations
Standard(s): 3,10

Vocabulary:

1. Transformation: An operation that moves or changes a geometric figure in some way to produce a new figure.
2. Image: The new figure produced from a transformation.
3. Translation: Moves every point of a figure the same distance in the same direction.
4. Reflection: Mirrors the image of the original figure over a line of reflection.
5. Rotation: Turns a figure around a fixed point (center of rotation). NOTE: Origin (0,0)
6. Congruence Transformation: A change of the position of the figure without changing its size and shape.

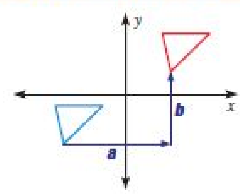
KEY CONCEPT *For Your Notebook*

Coordinate Notation for a Translation

You can describe a translation by the notation

$(x, y) \rightarrow (x + a, y + b)$

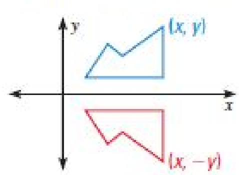
which shows that each point (x, y) of the blue figure is translated horizontally a units and vertically b units.



KEY CONCEPT *For Your Notebook*

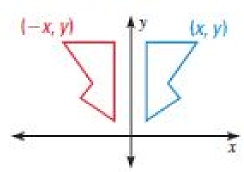
Coordinate Notation for a Reflection

Reflection in the x-axis



Multiply the y-coordinate by −1.
$(x, y) \rightarrow (x, -y)$

Reflection in the y-axis

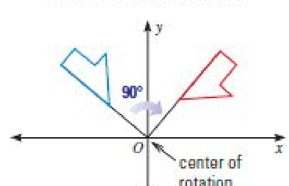


Multiply the x-coordinate by −1.
$(x, y) \rightarrow (-x, y)$

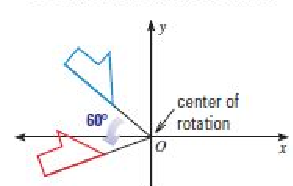
ROTATIONS In this lesson, if a rotation is shown in a coordinate plane, the center of rotation is the origin.

The direction of rotation can be either *clockwise* or *counterclockwise*. The *angle of rotation* is formed by rays drawn from the center of rotation through corresponding points on the original figure and its image.

90° clockwise rotation



60° counterclockwise rotation

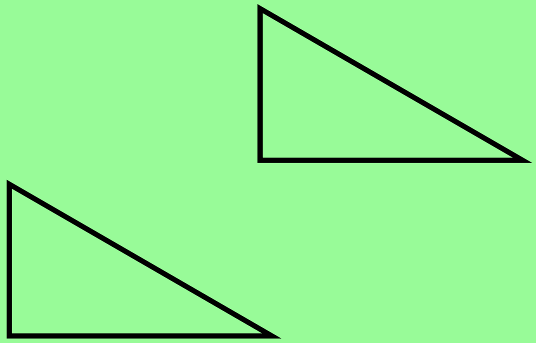


Notice that rotations preserve distances from the center of rotation. So, segments drawn from the center of rotation to corresponding points on the figures are congruent.

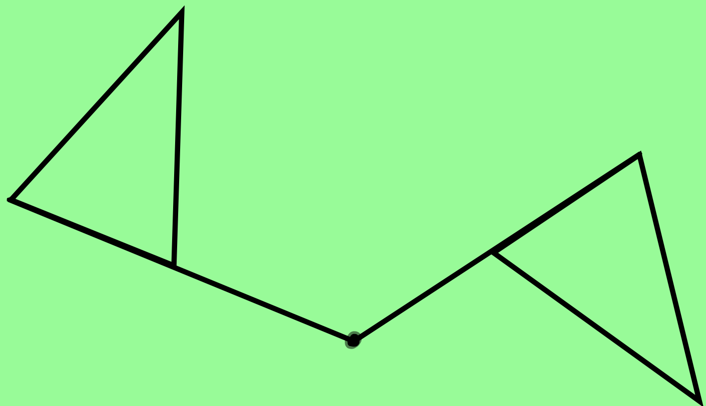
Identify Transformations

Name the type of transformation demonstrated in each picture.

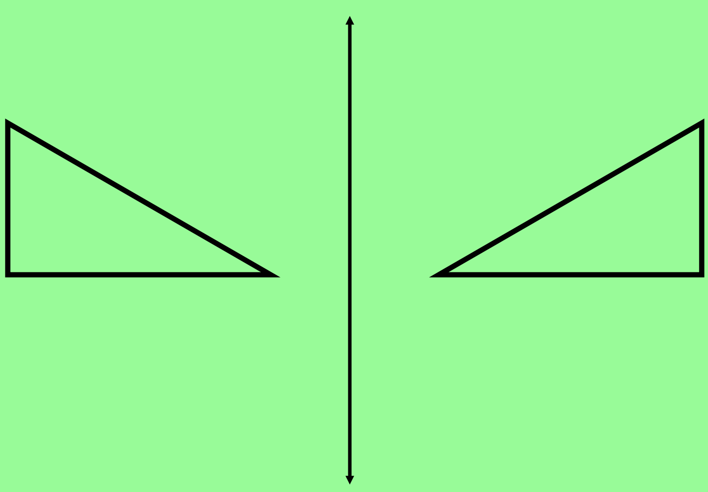
A.



B.

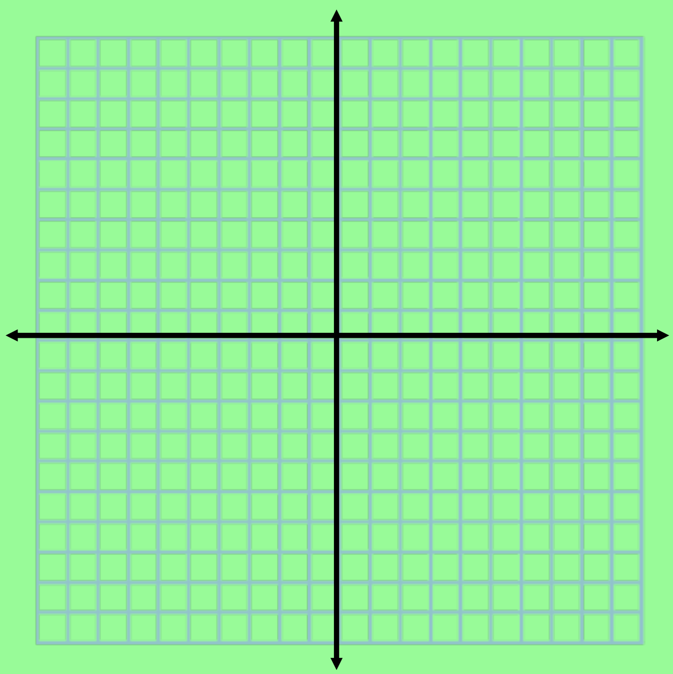


C.



Translate a Figure in the Coordinate Plane

Figure WXYZ has the vertices W(-1,2), X(2,3), Y(5,0), and Z(1,-1).
Sketch WXYZ and its image after the translation $(x,y) \longrightarrow (x-1, y+3)$.



Coordinate Notation

Use coordinate notation to describe the translation.

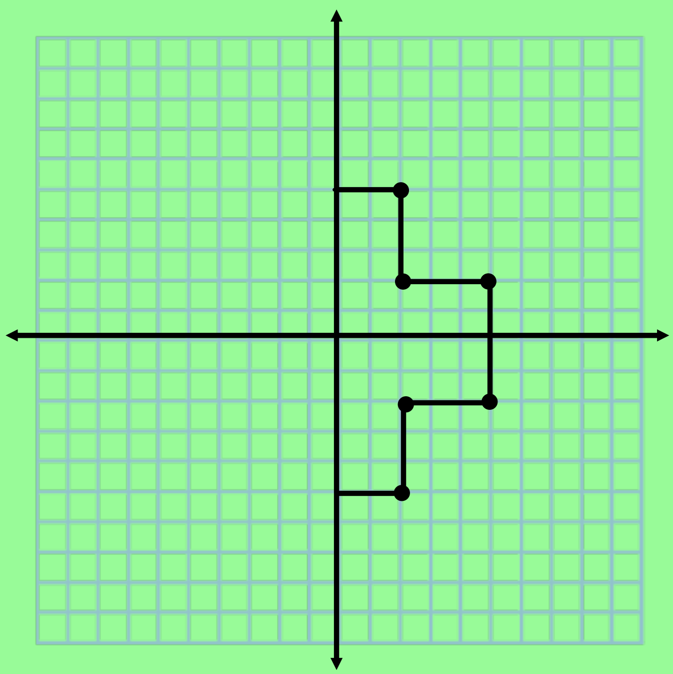
2 units to the right, 1 unit down

7 units to the left, 9 units up

Reflect over y axis, 4 units down

Reflect Over y-axis

Draw the reflection over the y-axis.



Homework Assignment
(Part 1)

Pg. 276
#1, 3-5, 9-19

Pop Quiz.
Get out a scrap sheet of paper.

Vocabulary:

1. What is reflection?

2. What is an image?

3. What is rotation?

Geometry
4.8 Continued

Vocabulary:

1. **Transformation: An operation that moves or changes a geometric figure in some way to produce a new figure.**

2. **Image: The new figure produced from a transformation.**

3. **Translation: Moves every point of a figure the same distance in the same direction.**

4. **Reflection: Mirrors the image of the original figure over a line of reflection.**

5. **Rotation: Turns a figure around a fixed point (center of rotation).** NOTE: Origin (0,0)

6. **Congruence Transformation: A change of the position of the figure without changing its size and shape.**

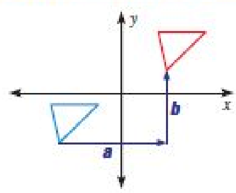
KEY CONCEPT *For Your Notebook*

Coordinate Notation for a Translation

You can describe a translation by the notation

$(x, y) \rightarrow (x + a, y + b)$

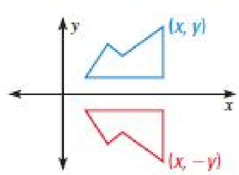
which shows that each point (x, y) of the blue figure is translated horizontally a units and vertically b units.



KEY CONCEPT *For Your Notebook*

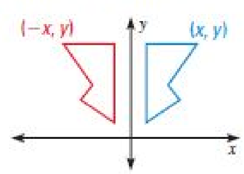
Coordinate Notation for a Reflection

Reflection in the x-axis



Multiply the y-coordinate by -1.
$(x, y) \rightarrow (x, -y)$

Reflection in the y-axis

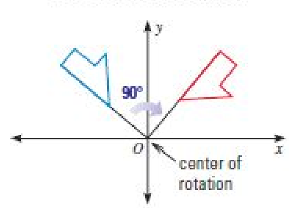


Multiply the x-coordinate by -1.
$(x, y) \rightarrow (-x, y)$

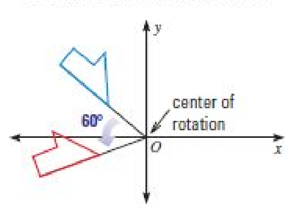
ROTATIONS In this lesson, if a rotation is shown in a coordinate plane, the center of rotation is the origin.

The direction of rotation can be either *clockwise* or *counterclockwise*. The *angle of rotation* is formed by rays drawn from the center of rotation through corresponding points on the original figure and its image.

90° clockwise rotation



60° counterclockwise rotation



Notice that rotations preserve distances from the center of rotation. So, segments drawn from the center of rotation to corresponding points on the figures are congruent.

Point on Image

A point on an image and a transformation are given. Find the corresponding point on the original figure.

Change the operations!

x y

Point on image: (4,0); transformation: $(x, y) \rightarrow (x+2, y-3)$

$(x-2, y+3)$

$(4-2, 0+3)$

$(2, 3)$ ✓

x y

Point on image: (6, -9); transformation: $(x, y) \rightarrow (x-7, y-4)$

$(x+7, y+4)$

$(6+7, -9+4)$

$(13, -5)$ ✓

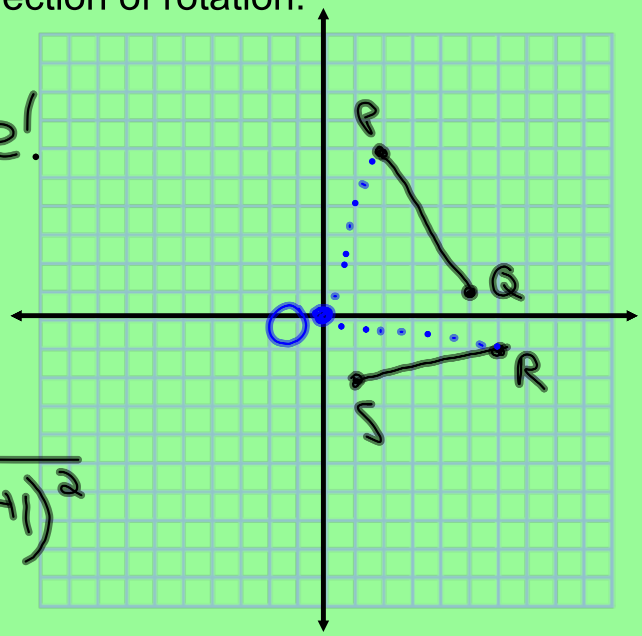
Identify a Rotation

Graph $\overline{PQ}$ and $\overline{RS}$. Tell whether $\overline{RS}$ is a rotation of $\overline{PQ}$ about the origin. If so, give the angle and direction of rotation.

NOTE: Rotation preserves distance!

A. P(2,6), Q(5,1), R(6,-1), S(1,-2)

O(0,0)



$\overline{OP} \cong \overline{OR}$? X

$\sqrt{40}$ $\quad \sqrt{(0-6)^2+(0+1)^2}$

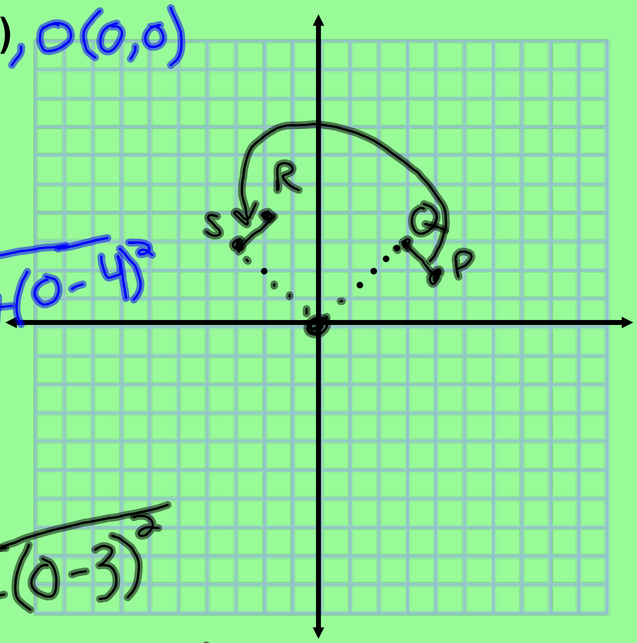
$\sqrt{36+1}$

$\sqrt{37}$

No!

B. P(4,2), Q(3,3), R(-2,4), S(-3,3), O(0,0)

$\overline{PQ}$ $\quad \overline{RS}$



$\overline{OP} \cong \overline{OR}$? ✓

$\sqrt{(0-4)^2+(0-2)^2}$ $\quad \sqrt{(0+2)^2+(0-4)^2}$

$\sqrt{20}$ $\quad \sqrt{20}$

$\overline{OQ} \cong \overline{OS}$? ✓

$\sqrt{(0-3)^2+(0-3)^2}$ $\quad \sqrt{(0+3)^2+(0-3)^2}$

$\sqrt{18}$ $\quad \sqrt{18}$

Rotation Counter Clockwise 90°

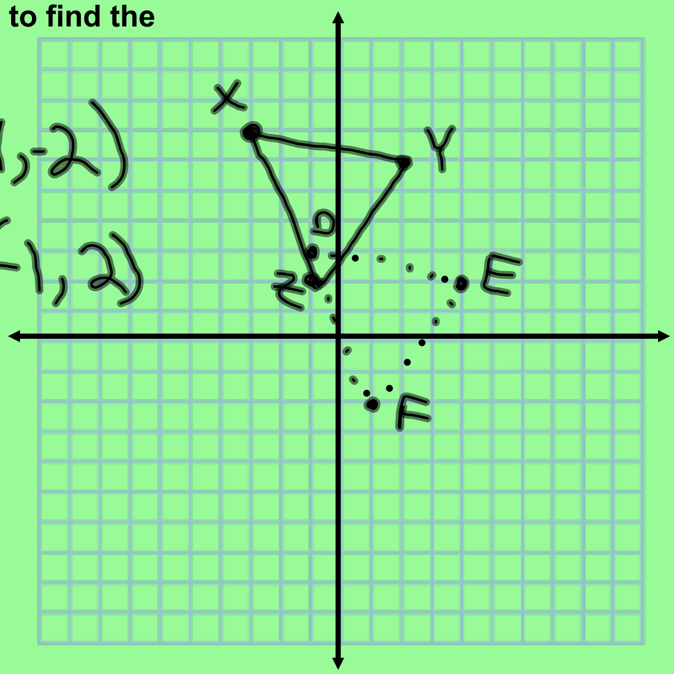
Verify Congruence

The vertices of ΔDEF are D(-1,3), E(4,2), and F(1,-2). The rule (x,y) ⟶ (x-2,y+4) was used to translate ΔDEF to ΔXYZ. Show that ΔDEF ≅ ΔXYQ to verify that the translation is a congruence transformation.

NOTE: Graph the transformation to find the "image's" vertices.

D(-1,3), E(4,2), F(1,-2)

X(-3,7), Y(2,6), Z(-1,2)



DE = → XY =

EF = → YZ =

FD = → ZX =

SSS Postulate

ΔDEF ≅ ΔXYZ

Homework Assignment

Worksheet 4.8B