

- 1) Bell Ringer: translation review
- 2) Go over homework
- 3) Lesson 2: What is a reflection?
- 4) Homework: pages 24a and 24b

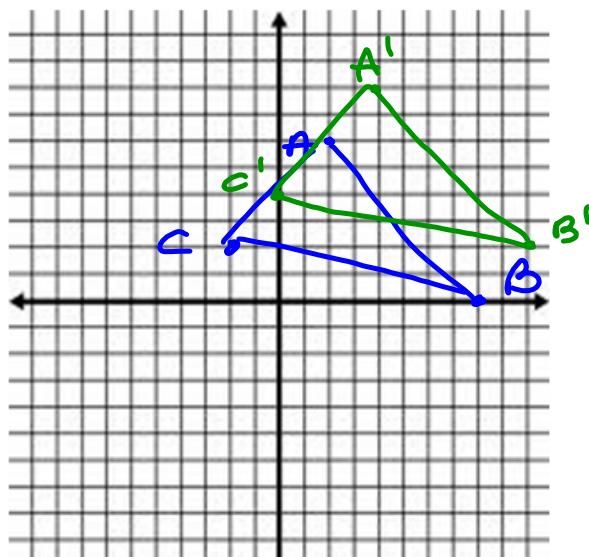
1

## TRANSFORMATIONS REVIEW

right 2, up 2

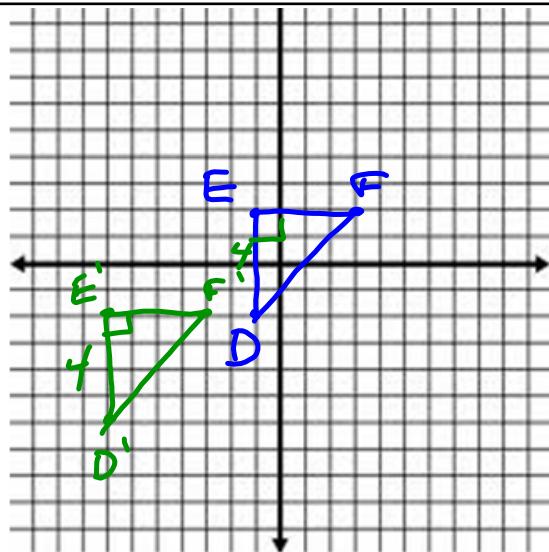
1) Plot triangle ABC and  
translate it  $T_{2,2}$

$$\begin{array}{ll} A(2, 6) & A'(4, 8) \\ \cancel{+2} \cancel{+2} & \\ B(8, 0) & B'(10, 2) \\ \cancel{-2} \cancel{-2} & \\ C(-2, 2) & C'(0, 4) \\ \cancel{+2} \cancel{+2} & \end{array}$$



2) Plot triangle DEF and translate it  $T_{-6, -4}$ . left 6, down 4

$$\begin{array}{ll} D (-1, -2) & D' (-7, -6) \\ \underline{-6} \quad \underline{-4} & \underline{-6} \quad \underline{-4} \\ E (-1, 2) & E' (-7, -2) \\ \underline{-6} \quad \underline{-4} & \\ F (3, 2) & F' (-3, -2) \\ \underline{-6} \quad \underline{-4} & \end{array}$$



3) What 2 properties stay the same Under a translation?

1. distance

2. angle measurements

shape      size

## Reflection Symmetry

### Reflection Symmetry

Reflection Symmetry (sometimes called *Line Symmetry* or *Mirror Symmetry*) is easy to recognise, because one half is the reflection of the other half.

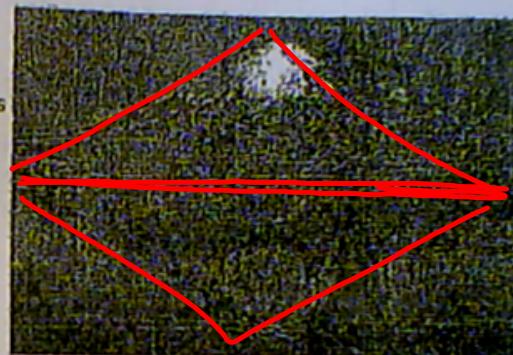


Here my dog "Flame" has her face made perfectly symmetrical with a bit of photo magic.

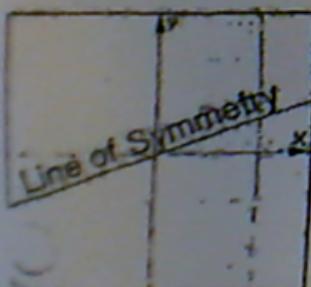
The white line down the center is the Line of Symmetry  
(also called the "Mirror Line")

The reflection in this lake also has symmetry, but in this case:

- the **Line of Symmetry** is the horizon
- it is not perfect symmetry, because the image is changed a little by the lake surface.



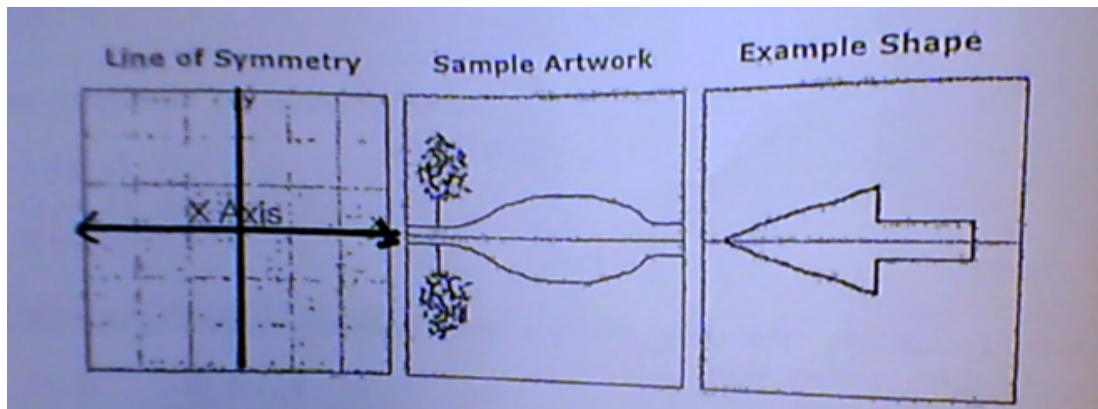
### Line of Symmetry



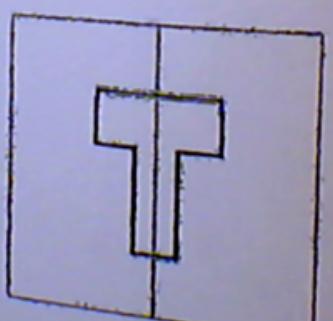
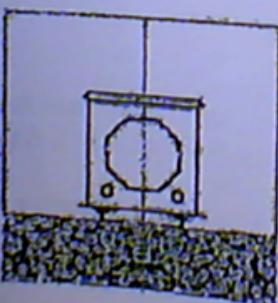
The Line of Symmetry (also called the Mirror Line) does not have to be up-down or left-right; it can be in any direction.

But there are four common directions, and they are named for the line they make on the standard XY graph.

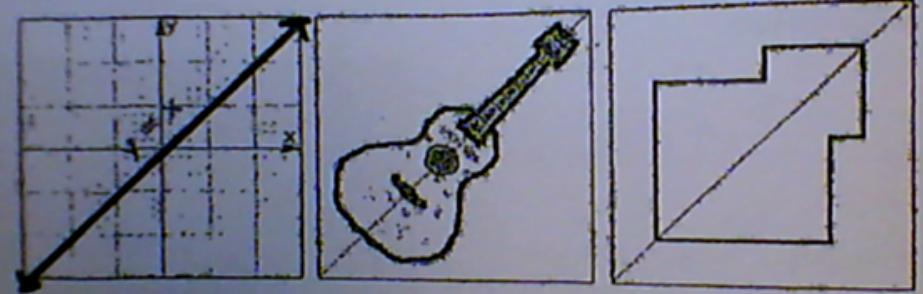
See these examples (the artwork was made using [Symmetry Artist](#)) :



- - B - - C

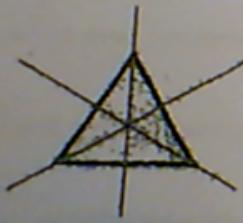


A - B - C J O  
line

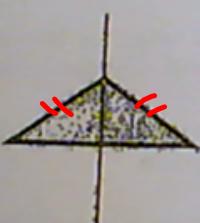


### Plane Shapes

Not all shapes have lines of symmetry, or they may have several lines of symmetry. For example, a triangle can have 3, or 1 or no lines of symmetry:



**Equilateral Triangle**  
(all sides equal,  
all angles equal)



**Isosceles Triangle**  
(two sides equal,  
two angles equal)



**Scalene Triangle**  
(no sides equal,  
no angles equal)

3 Lines of Symmetry    1 Line of Symmetry    No Lines of Symmetry

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**REFLECTIONS** are defined as a flip in the coordinate plane. The entire figure is the mirror image across a line of reflection.

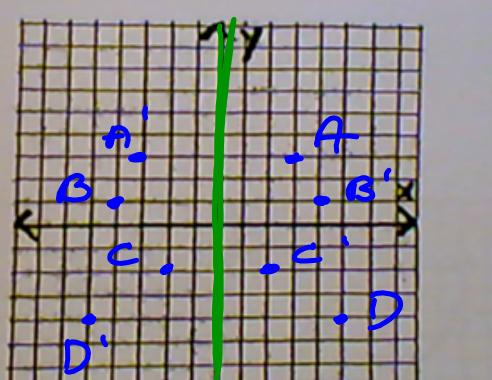
- The original figure is flipped over the line of reflections to produce an image.
- Line of Reflection is the line used to reflect the image.
- The original and the image are said to be symmetrical.
- Symmetry is when a picture or shape can be divided into 2 identical parts.
- Corresponding points will be the same distance from the line of reflection but on opposite sides.
- Preserves distance, size and shape of a figure.

**Drawing a Reflection:**

- ❶ Identify the line of reflection.. Draw it as a dotted line if is not the x-axis or the y-axis.
- ❷ Count the number of unit from the original point to the line of reflection.
- ❸ Count the same number of units over the line of reflection and plot the image.

Ex: Reflect the following points over the y-axis.

- |            |             |
|------------|-------------|
| A (3, 3)   | A' (-3, 3)  |
| B (-4, 1)  | B' (4, 1)   |
| C (-2, -2) | C' (2, -2)  |
| D (5, -4)  | D' (-5, -4) |



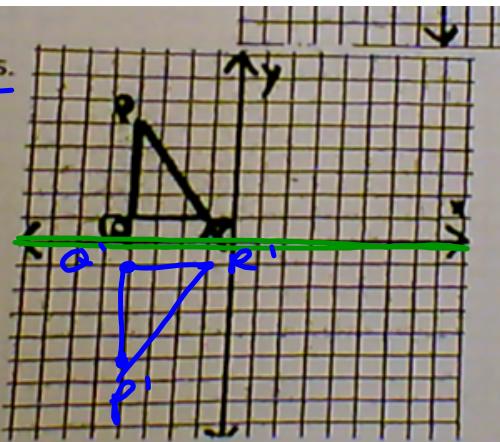
$$(x, y) \rightarrow (-x, y)$$

2) EX: Reflect  $\triangle PRQ$  over the x-axis.

$$P(-4, 5) \rightarrow P'(-4, -5)$$

$$Q(-4, 1) \rightarrow Q'(-4, -1)$$

$$R(-1, 1) \rightarrow R'(-1, -1)$$



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

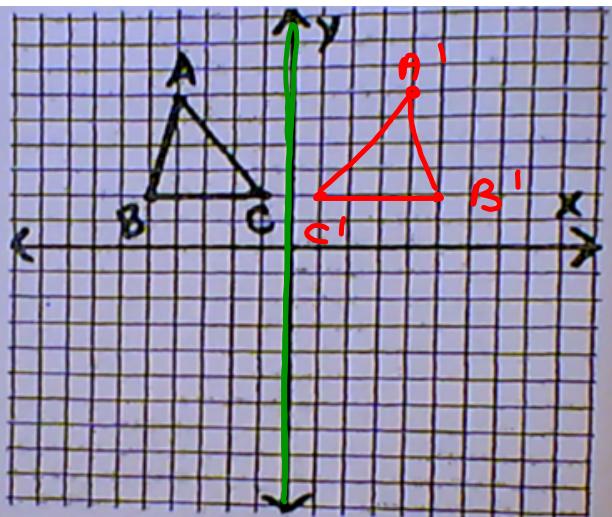
$$(x, y) \rightarrow (-x, y)$$

EX: Reflect  $\triangle ABC$  over the y axis.

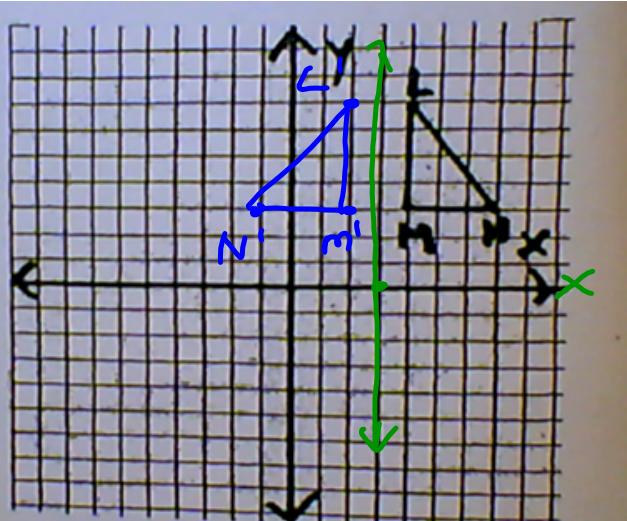
$$A(-4, 6) \rightarrow A'(4, 6)$$

$$B(-5, 2) \rightarrow B'(5, 2)$$

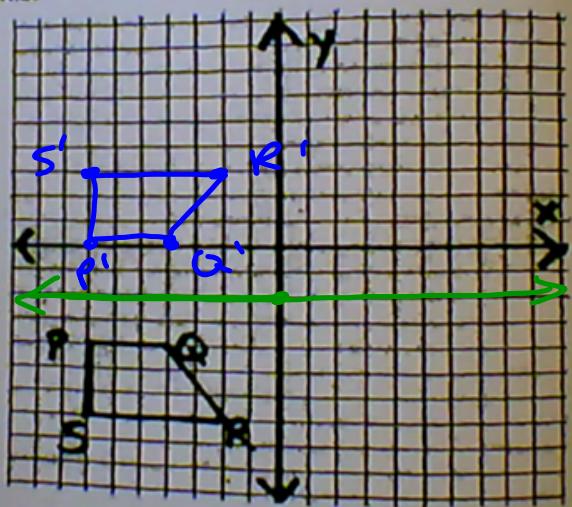
$$C(-1, 2) \rightarrow C'(1, 2)$$



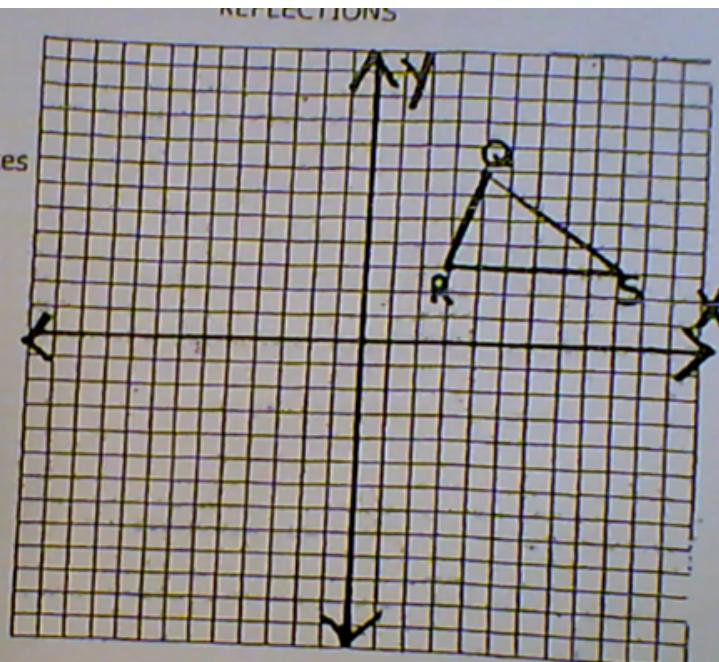
EX: Reflect  $\triangle LMN$  over the line  $x = 3$ .  
 $x = 3$  is vertical and parallel to the y-axis.



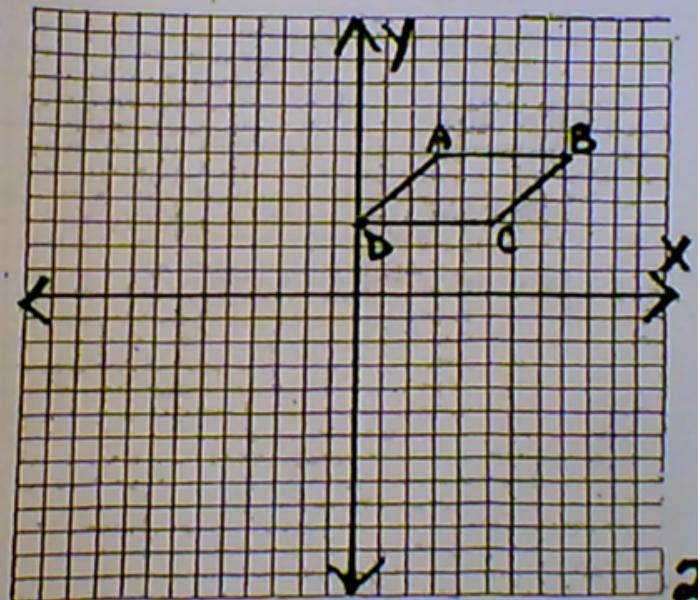
- 5) EX: Reflect PQRS over the line  $y = -2$ .  
 $y = -2$  is horizontal and parallel to the x-axis.



- o Reflect  $\triangle QRS$  over the x-axis.  
Label the image and name the coordinates  
of the vertices of the image.



- Reflect the parallelogram ABCD over the y-axis. Label the image and name the coordinates of the vertices of the image.



① Draw  $\triangle XYZ$  with the vertices:

X (-2, 1)

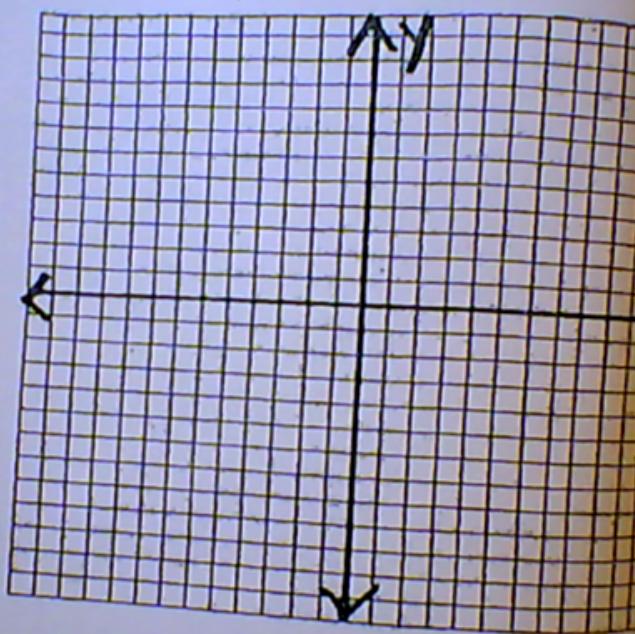
Y (-4, 1)

Z (-2, 5)

Draw the line  $x = 2$ .  
(vertical and // with y-axis)

Reflect  $\triangle XYZ$  over the line  $x = 2$ .

Name the vertices of the image.



① Draw  $\triangle ABC$  with the vertices:

A (-1, -1)

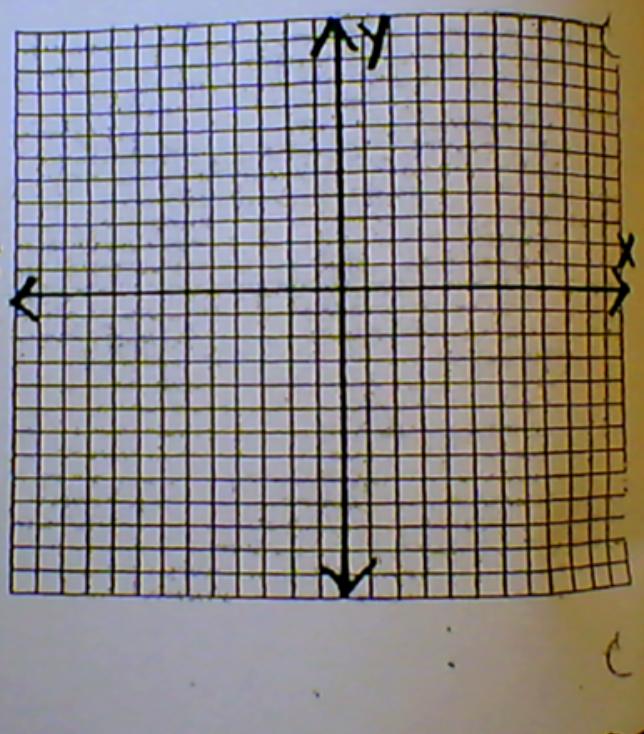
B (3, 1)

C (5, 0)

Draw the line  $y = 3$ .  
(horizontal and // with x-axis)

Reflect  $\triangle ABC$  over the line  $y = 3$ .

Name the vertices of the image.



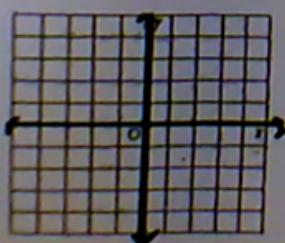
**Draw Reflections In The Coordinate Plane** Reflections can be performed in the coordinate plane. Each point of the image and its corresponding point on the preimage must be the same distance from the line of reflection.

To reflect a point in the  $x$ -axis, multiply its  $y$ -coordinate by  $-1$ .

- To reflect a point in the  $y$ -axis, multiply its  $x$ -coordinate by  $-1$ .
- To reflect a point in the line  $y = x$ , interchange the  $x$ -and  $y$ -coordinates.

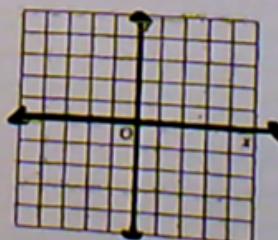
1) Draw:

$\triangle ABC$  with vertices  $A(-3, 2)$ ,  $B(0, 1)$ , and  $C(-2, -3)$  in the line  $y = x$



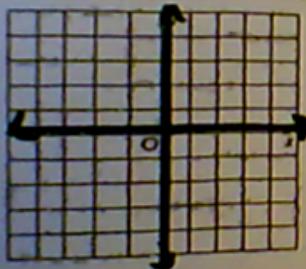
2) Draw:

$\triangle FGH$  with vertices  $F(-3, -1)$ ,  $G(0, 4)$ , and  $H(3, -1)$  in the line  $y = x$



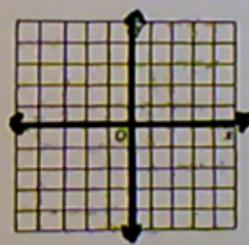
3) Draw:

quadrilateral ABCD with vertices  
 $A(-3, 3)$ ,  $B(1, 4)$ ,  $C(4, 0)$ , and  
 $D(-3, -3)$  in the line  $y = x$



4) Draw:

parallelogram RSTU with vertices  
 $R(-2, 3)$ ,  $S(2, 4)$ ,  $T(2, -3)$  and  
 $U(-2, -4)$  in the line  $y = x$



## Homework day 1: translations

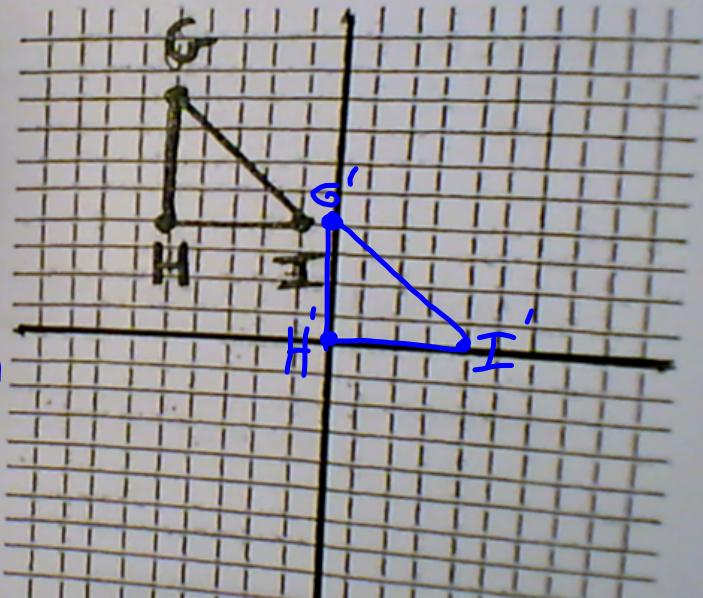
Algebraically show the points of the image. Then draw and label the image.

- Translate  $\triangle GHI$  using the rule:

right down

$$(x, y) \rightarrow (x + 5, y - 4)$$

$$\begin{array}{ll} G(-5, 8) & G'(0, 4) \\ H(-5, 4) & H'(0, 0) \\ I(-1, 4) & I'(4, 0) \end{array}$$



• Translate ABCD using the rule:

$$(x, y) \rightarrow \begin{matrix} \text{left} \\ (x - 3, y + 3) \end{matrix}$$

$$A \begin{pmatrix} 4, 4 \\ -3, +3 \end{pmatrix}$$

$$A' \begin{pmatrix} 1, 7 \\ -3, +3 \end{pmatrix}$$

$$B \begin{pmatrix} 8, 4 \\ -3, +3 \end{pmatrix}$$

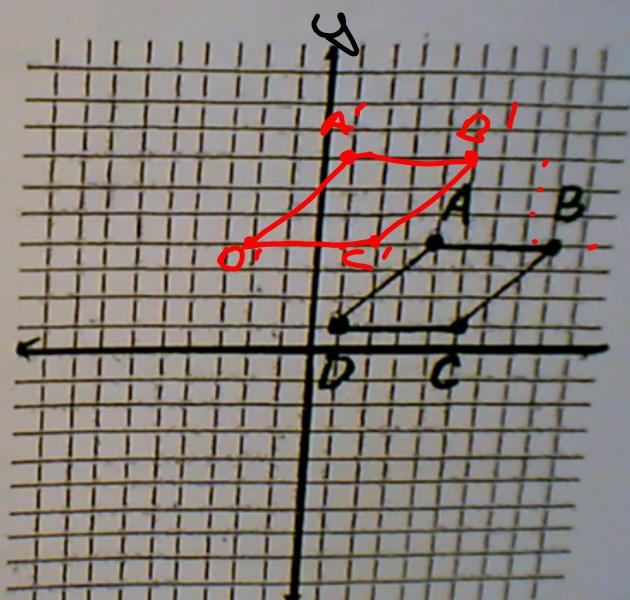
$$B' \begin{pmatrix} 5, 7 \\ -3, +3 \end{pmatrix}$$

$$C \begin{pmatrix} 5, 1 \\ -3, +3 \end{pmatrix}$$

$$C' \begin{pmatrix} 2, 4 \\ -3, +3 \end{pmatrix}$$

$$D \begin{pmatrix} 1, 1 \\ -3, +3 \end{pmatrix}$$

$$D' \begin{pmatrix} -2, 4 \\ -3, +3 \end{pmatrix}$$



- Draw  $\triangle PQR$  with the following vertices:

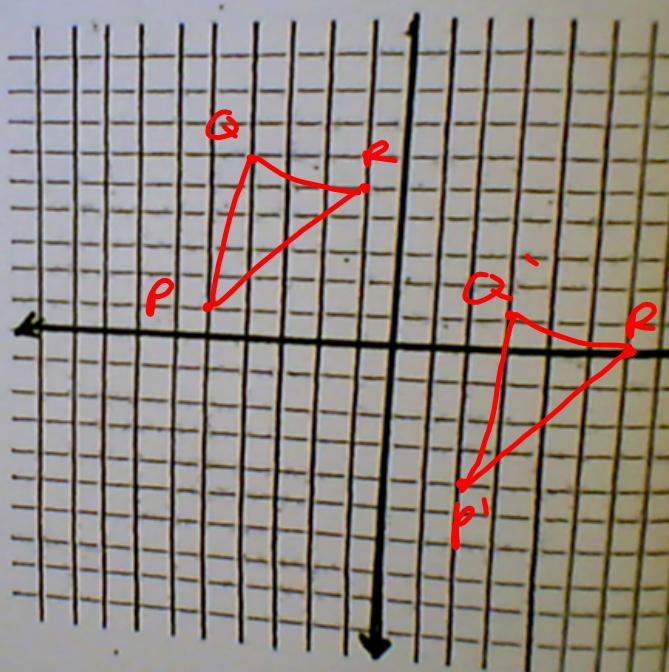
P (-5, 1)  
Q (-4, 6)  
R (-1, 5)

Translate  $\triangle PQR$  using the rule:

$$(x, y) \rightarrow (x + 7, y - 5)$$

$$P(-5, 1) \rightarrow P'(2, -4)$$

$$Q(-4, 6) \rightarrow Q'(3, 1)$$



- ② Draw the hexagon LMNPQR with the following vertices:

L (-1, -2)  
M (1, -2)  
N (2, -4)  
P (1, -6)  
Q (-1, -6)  
R (-3, -4)

Translate the hexagon using the rule:  
 $(x, y) \rightarrow (x - 4, y + 6)$

