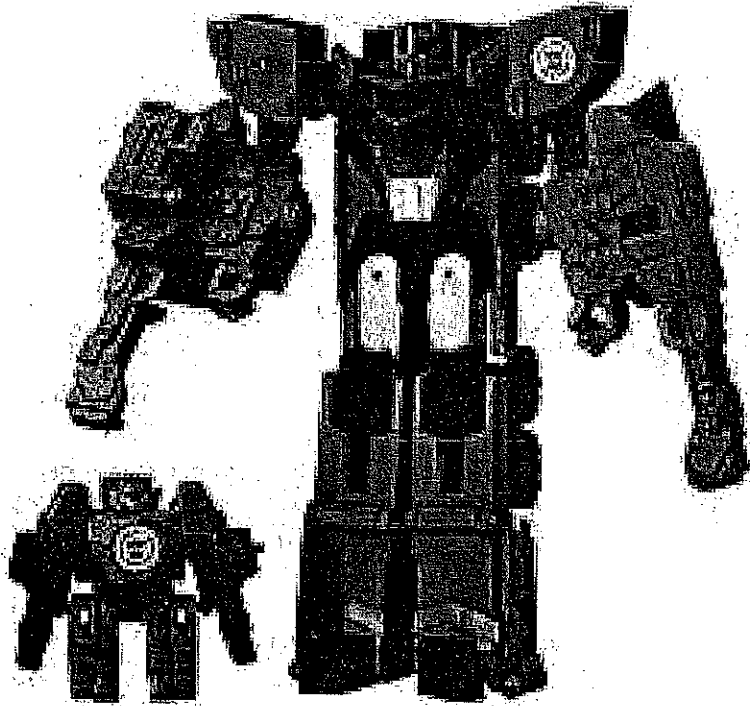


Math 8

Transformations

Packet



Name _____

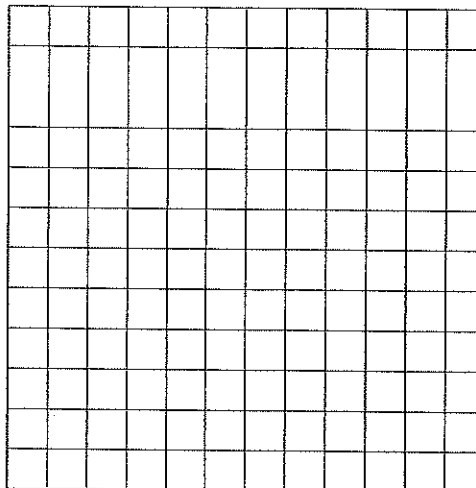
COORDINATE PLANE

Let's label the axes, quadrants, and signs on the following grid:

The x-axis is the _____ axis.

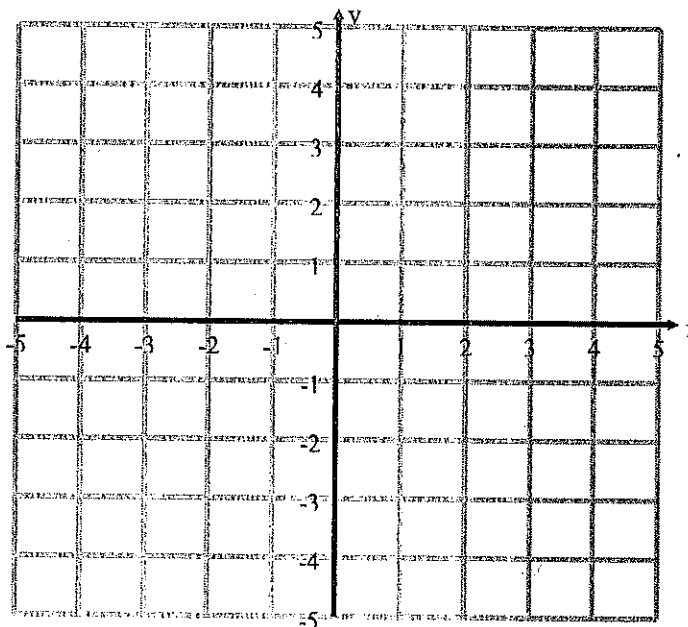
The y-axis is the _____ axis.

Another name for the point (0, 0) is the _____.



Using the grid below, let's plot the following points and label them with the letter:

- a) (2, 1)
- b) (0, 0)
- c) (-4, 3)
- d) (-2, -5)
- e) (1, -3)
- f) (0, 4)
- g) (-5, 1)
- h) (-2, 0)



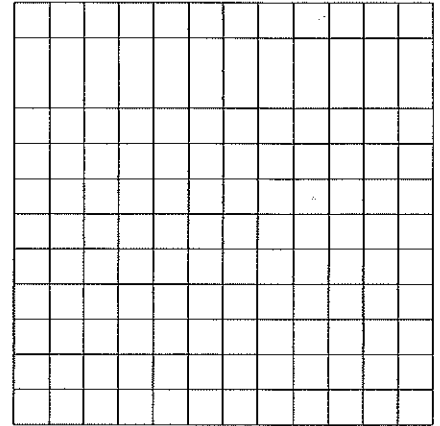
Give the **quadrant** each set of coordinates lies in:

- a) (1, 5) _____ b) (-2, 4) _____ c) (-3, 2) _____ d) (4, -4) _____

Classwork:

1. Graph each point on a coordinate plane. Label the points A-D.

A (2, 5) B (0, 4) C (-1, 2) D (2, -3)



2. Give the coordinates of the following points:

A (,)

B (,)

C (,)

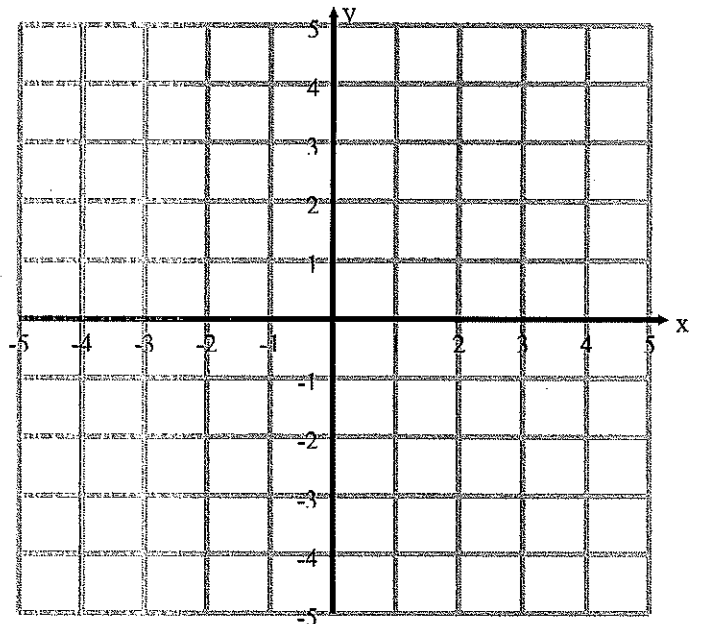
D (,)

E (,)

F (,)

G (,)

H (,)



3. Give the quadrant that the following points lie in:

a) (2, -7) _____

d) (1, 4) _____

b) (-6, -5) _____

e) (-3, 2) _____

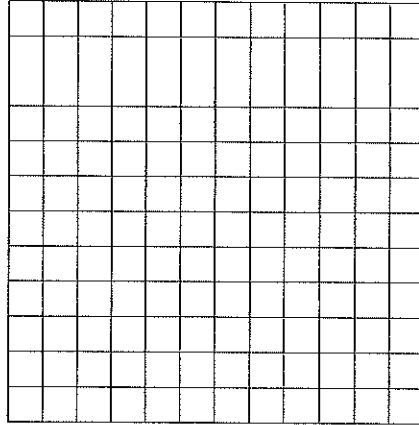
c) (2, 5) _____

f) (10, -15) _____

Name _____

Date _____
HW#1

1. Setup the given grid with axes and labels. Label all the quadrants.



2. Setup the graph with the axes. Graph the following points and label them on the graph with the given letter.

I (0 , 0)

L (3 , 4)

O (-6 , 4)

V (3 , -2)

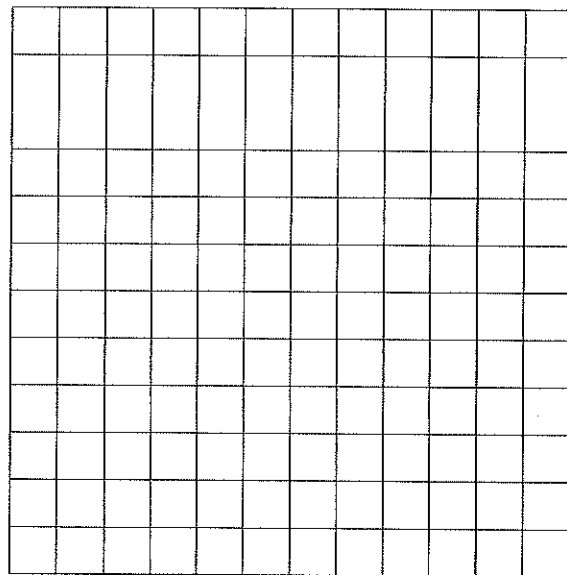
E (0 , 5)

M (-2 , -1)

A (-3 , 0)

T (1 , 1)

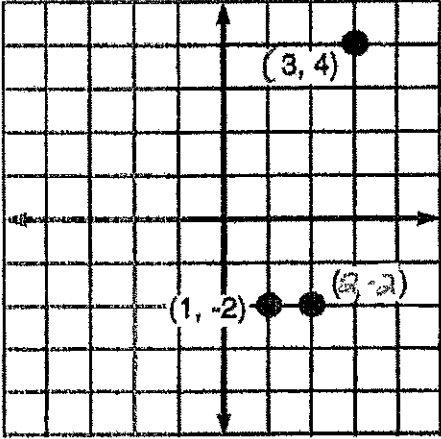
H (0 , -2)



Turn over and complete other side →

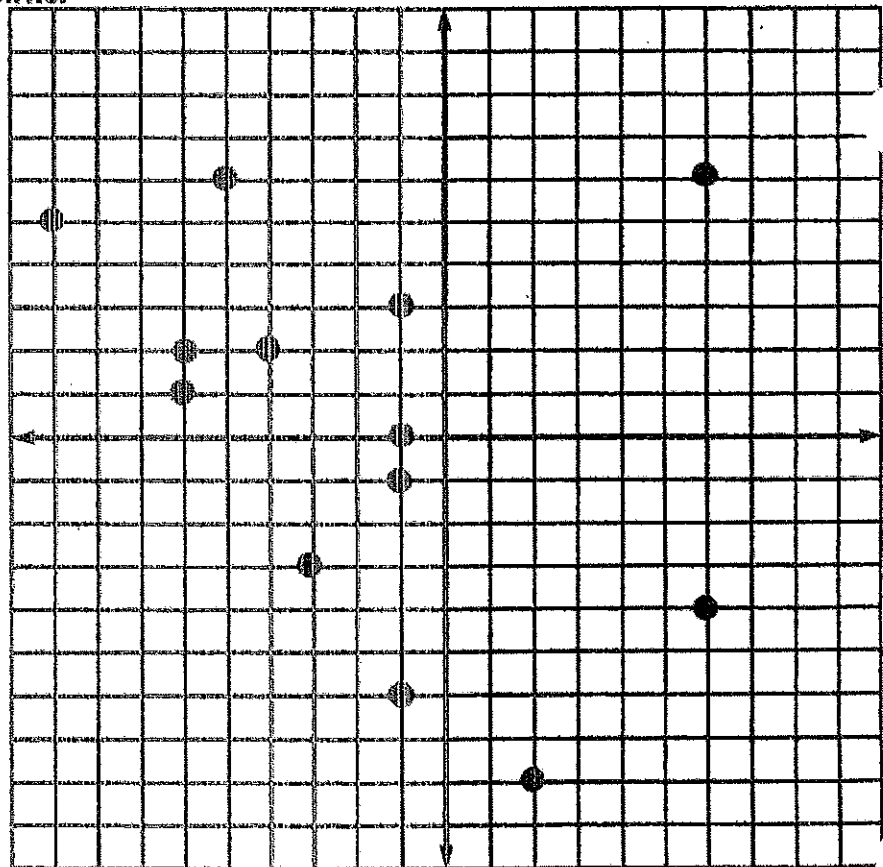
Graphing Ordered Pairs -

$(x,y) = (1, -2)$ Over 1 and down 2
 $(x,y) = (-3, 4)$ Over 3 and up 4
 $(x,y) = (2, -2)$ Over 2 and down 2



Label the following points.

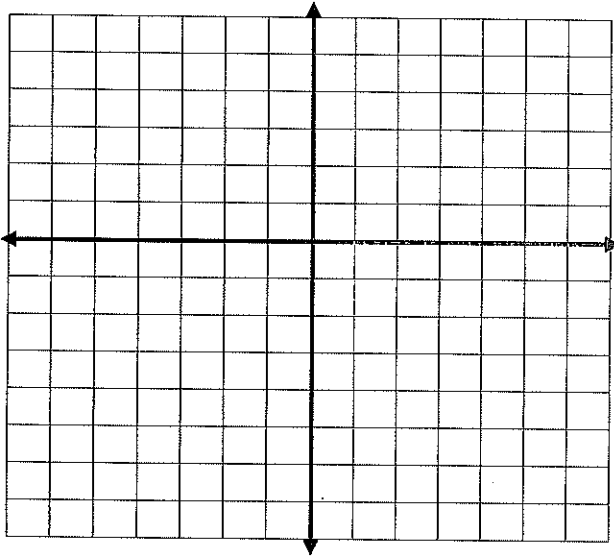
- A (-1, -6)
- B (-3, -3)
- C (-6, 1)
- D (-4, 2)
- E (-6, 2)
- F (-5, 6)
- G (-1, 3)
- H (2, -8)
- I (6, -4)
- J (-9, 5)
- K (-1, -1)
- L (-1, 0)
- M (6, 6)



CONNECTING POINTS TO MAKE FIGURES

Sometimes, when you connect points, they make a figure, like a square, rectangle, triangle, etc.! Let's try...

- 1) a) Plot the following points on the grid below: $A(3, 2)$, $B(-3, 2)$, $C(-3, -2)$, and $D(3, -2)$.



b) Now, connect them.

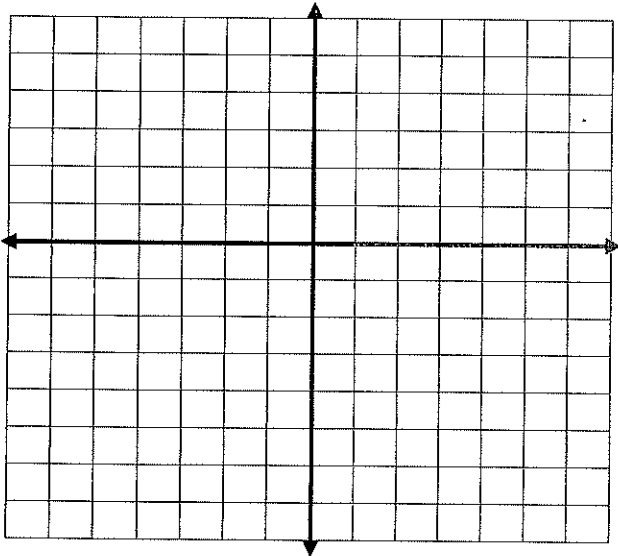
c) What kind of shape do they make?

Note: Points A and B have the same _____-coordinate.

Also, Points A and D have the same _____-coordinate.

d) Can you find the **area** of this figure?

- 2) a) Plot the following points on the grid below: $A(4, 1)$, $B(1, 5)$, and $C(-2, 1)$.



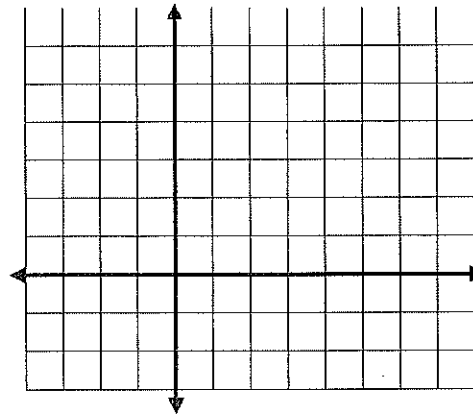
b) Now, connect them.

c) What type of **polygon** do they make?

d) Find the **area** of this figure:

3) Graph the points A(1, 1), B(5, 1), C(5, 4). What must be the coordinates of point D if ABCD is a **rectangle**?

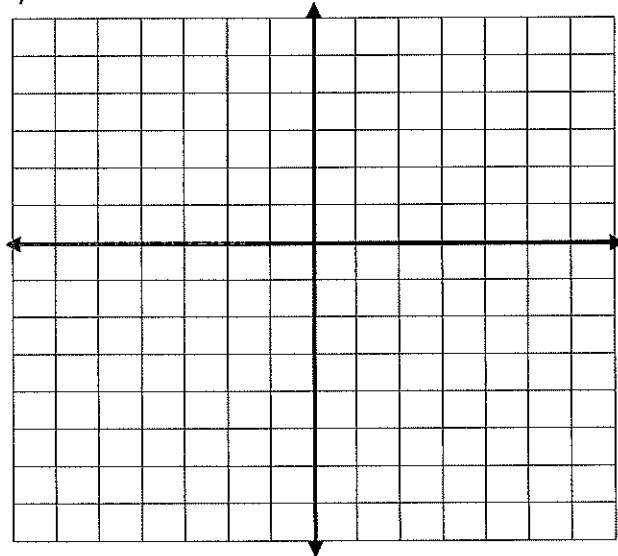
D(,)



4) Graph the points P(-2,-4) and Q(2,-4). What are the coordinates of R and S if PQRS is a **square**? (Two answers are possible).

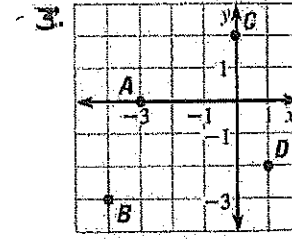
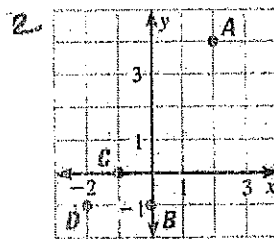
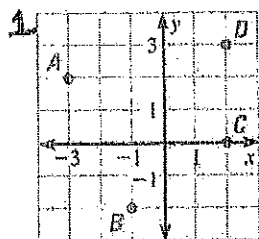
R(,)

S(,)



Review:

Write the ordered pairs that correspond to the points labeled A, B, C, and D in the coordinate plane.



1)	A(,)
	B(,)
	C(,)
	D(,)

2)	A(,)
	B(,)
	C(,)
	D(,)

3)	A(,)
	B(,)
	C(,)
	D(,)

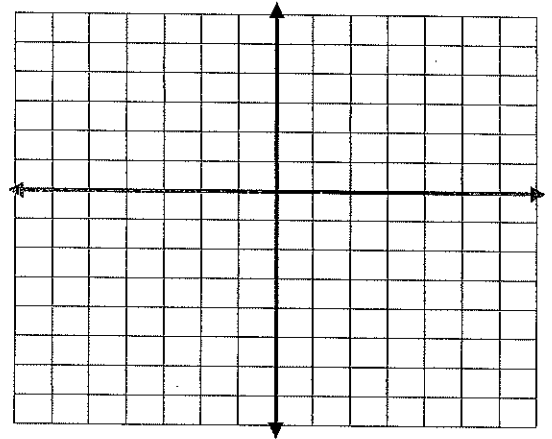
Name _____

Date _____
HW#2

Question 1:

Which is true of all points in the **second** quadrant?

- (1) positive x-coordinate; positive y-coordinate
- (2) negative x-coordinate; negative y-coordinate
- (3) negative x-coordinate; positive y-coordinate
- (4) positive x-coordinate; negative y-coordinate



Question 2:

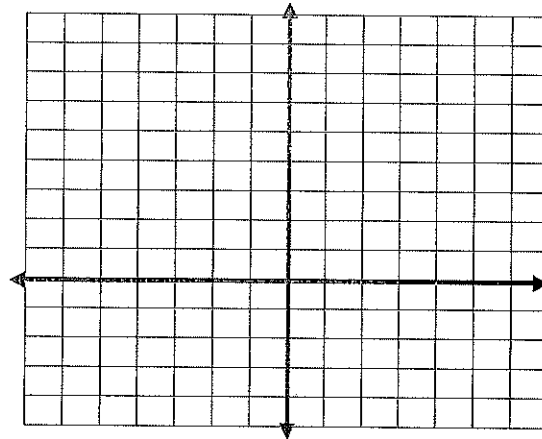
Which point lies in the **third** quadrant?

- (1) P(0,-5)
- (2) Q(-5,-11)
- (3) R(-5,0)
- (4) T(-5,11)

Question 3:

- a) Graph and connect the given points: A(1,7), B(1,2), and C(5,2).
- b) Identify the figure (shape):

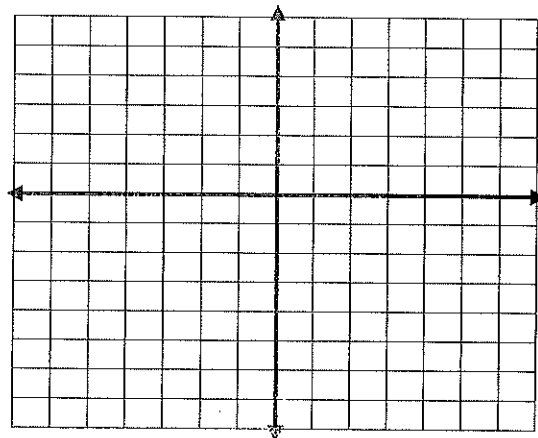
- c) Find the **area** of the figure:



Question 4:

- a) Graph and connect the given points: P(-1,3), Q(5,3), R(5,-2), and S(-1,-2).
- b) Identify the figure (shape):

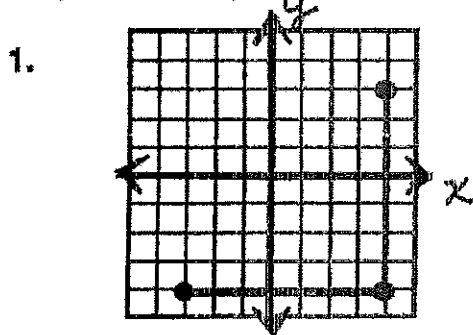
- c) Find the **area** of the figure:



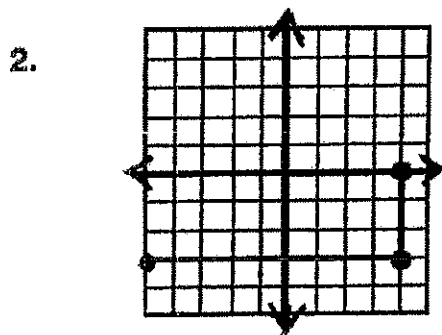
Applications for the Coordinate System — Problem Solving

Find the missing point.

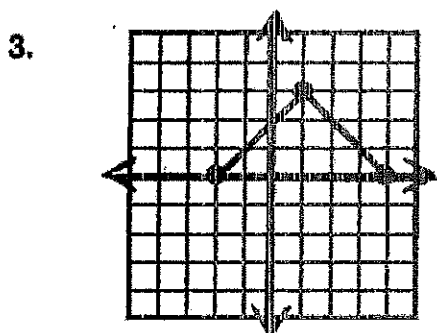
Write the names of the missing points. The first shape is supposed to be a square. There are only three points on the graph. How many points would you need to draw a square? A square has four corners. So the graph needs one more point to finish the square. Connect the points already on the graph to begin drawing the square. Where should the fourth point be placed to make the fourth corner? Each graph has part of a shape. Finish the shape. Write the names of the missing points.



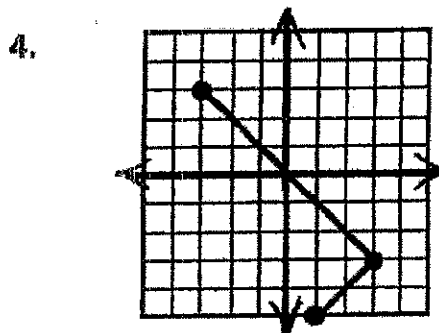
Shape: Square
Missing Point: (_____, _____)



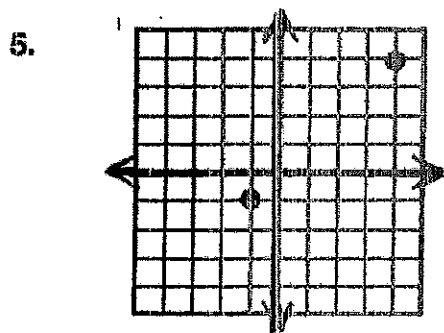
Shape: Rectangle
Missing Point: (_____, _____)



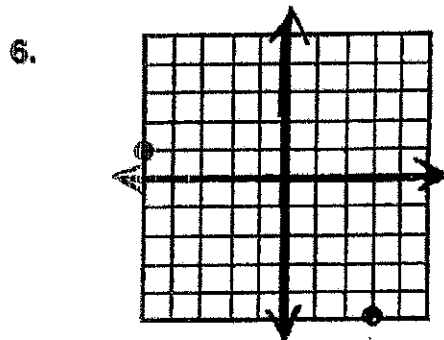
Shape: Square
Missing Point: (_____, _____)



Shape: Rectangle
Missing Point: (_____, _____)



Shape: Square
Missing Points: (_____, _____)
(_____, _____)



Shape: Rectangle
Missing Points: (_____, _____)
(_____, _____)

Transformation Terms

1) Preimage - _____

2) Image - _____

3) Transformation - _____

4) Translation - _____

5) Reflection - _____

6) Dilation - _____

7) Congruent - _____

Symmetry Terms

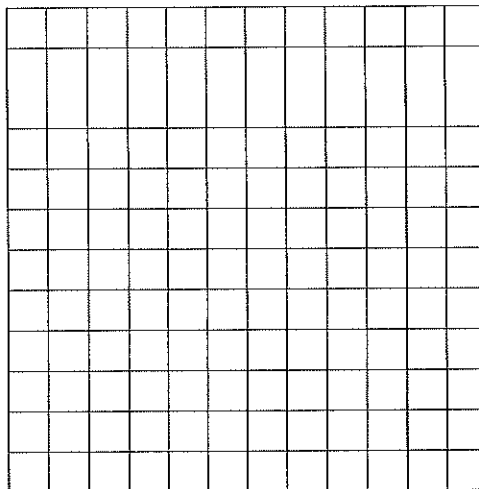
1) Line Symmetry - _____

2) Point Symmetry - _____

Translation: a "slide" of the figure

-every point shifts the same distance, in the same direction

1. a. On the graph, draw and label $\triangle ABC$, whose vertices have the coordinates $A(1, 1)$, $B(6, 2)$, and $C(4, 4)$.



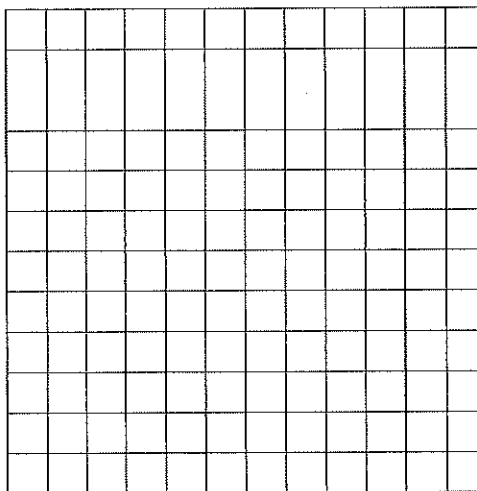
- b. Under the translation $(x, y) \rightarrow (x - 4, y + 2)$, on the same graph, draw and label $\triangle A'B'C'$.

- c. Map the Translation
 $A(1, 1) \rightarrow$
 $B(6, 2) \rightarrow$
 $C(4, 4) \rightarrow$

Another way of notating a translation is with a capital T :

RULE: $T_{a,b}(x, y) = (x + a, y + b)$

2. a. Graph the original triangle and the image of $\triangle DEF$ under the translation $T_{3, -1}$.



- b. Rewritten as:

- c. Map the translation:

- $D(0, 2) \rightarrow$
 $E(1, -3) \rightarrow$
 $F(3, -1) \rightarrow$

3. Rewrite the translation in a different form:

- a. $T_{-2,5}$ - _____ b. $(x, y) \rightarrow (x + 4, y - 1)$ - _____

4. Does the image remain congruent after a translation? Explain your answer.

5. The rule for the translation so the image of A is A' is: $A(2, 5) \rightarrow A'(-1, 1)$

a) $T_{1, -4}$

b) $T_{-3, -4}$

c) $T_{3, 4}$

d) $T_{-1, 4}$

6. Which point is the image of $P(4, -3)$ under the translation $P(x, y) \rightarrow P'(x - 4, y)$?

a) $P'(-8, 0)$

b) $P'(8, -3)$

c) $P'(0, -3)$

d) $P'(0, 0)$

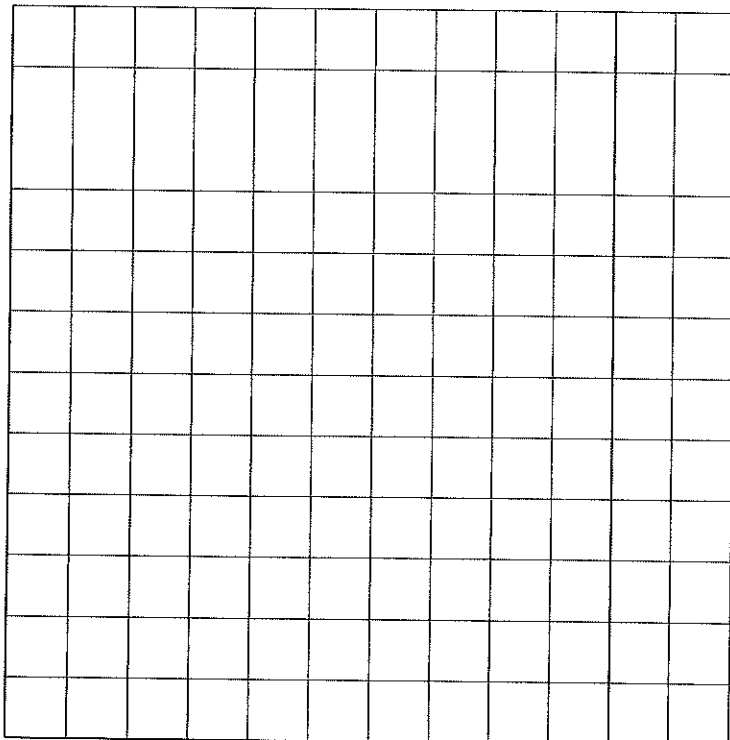
7. a. Graph

b. $T_{2, -3}$

H $(-2, 0) \rightarrow$

O $(0, 0) \rightarrow$

T $(0, 4) \rightarrow$



Name _____

Date _____

HW#3

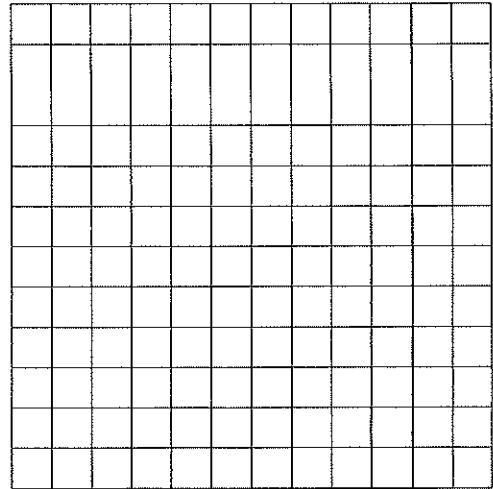
1. a. The coordinates of $\triangle ABC$ are $A(0, -2)$, $B(3, 1)$, and $C(4, -3)$.

Graph and label these points.

- b. Under the translation

$(x, y) \rightarrow (x + 1, y - 3)$, draw and label $\triangle A'B'C'$.

- c. Map the Translation



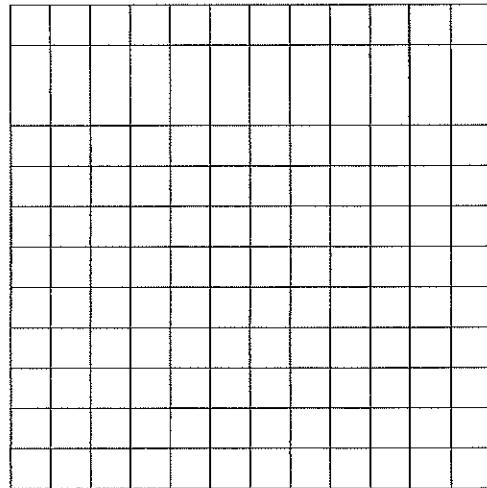
2. a. Graph the image of $\triangle BUG$ under the translation $T_{-2, 4}$.

- b. Map the translation:

$B(-2, -3) \rightarrow$

$U(1, 0) \rightarrow$

$G(3, -4) \rightarrow$



3. Which of the following is the rule of the translation in which every point moves 6 units to the right on a graph?

a) $(x, y) \rightarrow (x, y + 6)$

b) $(x, y) \rightarrow (x + 6, y)$

c) $(x, y) \rightarrow (x + 6, y + 6)$

d) $(x, y) \rightarrow (x - 6, y)$

4. Which quadrant does the point $(-2, 4)$ lie in? _____

REFLECTIONS ["Flips" or "Mirror"]

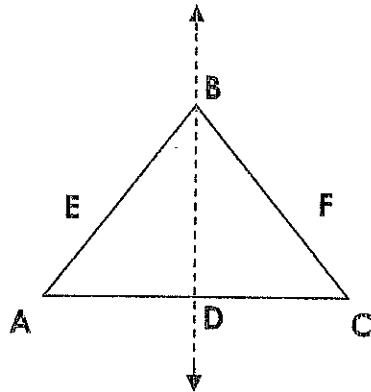
LINE REFLECTION:

Pre-image to Image

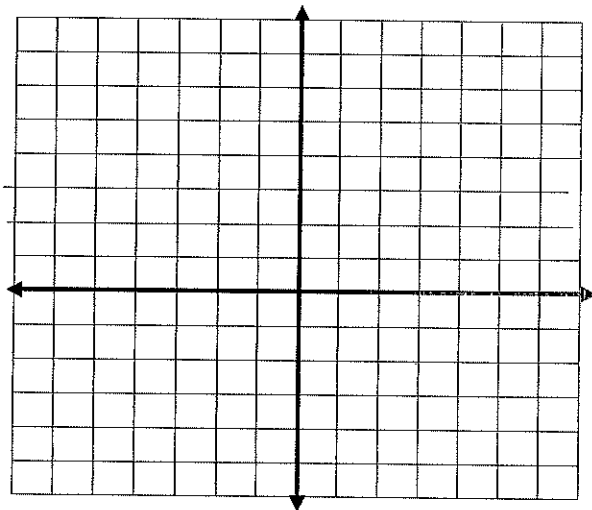
A → _____

E → _____

D → _____



Reflection in the Y-axis:



Plot the following points and connect them, making a triangle.

A (1,2) → A' ()

B (3,4) → B' ()

C (1,5) → C' ()

The ____-coordinate stays the same, while the ____-coordinate is the opposite.

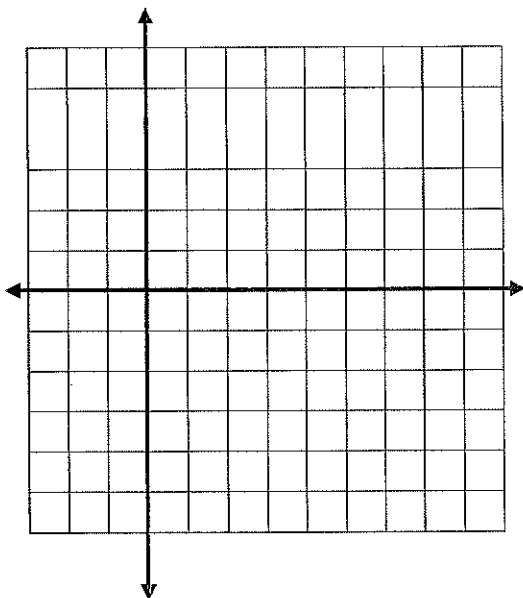
NOTE:

- A reflection like this can also be written as **r_{y-axis}**.

Is a shape congruent after a reflection? _____

****Reflection in the X-axis****:

Plot the following points and connect them, making a triangle.



A (1,2) → A' ()

B (3,4) → B' ()

C (1,5) → C' ()

The ____-coordinate stays the same, while the ____-coordinate is the opposite.

NOTE:

- A reflection like this can also be written as **$r_{x\text{-axis}}$** .

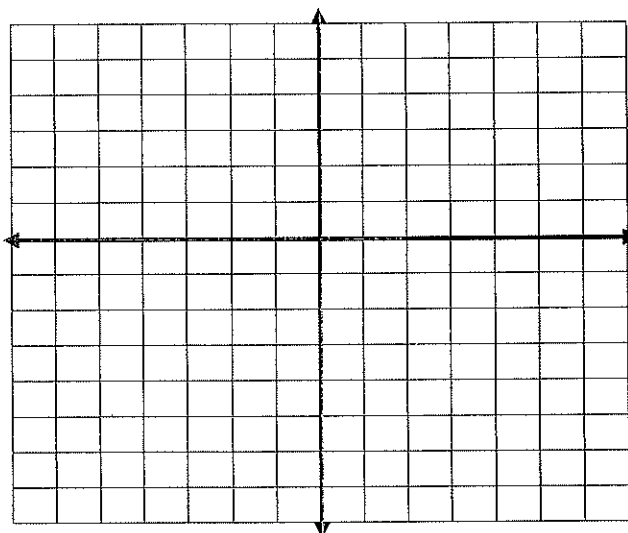
Practice Exercise: On the grid below:

Label all points on graph!!!

- Plot A (3,-1).
- Plot A', the image of A under a reflection in the **y-axis**, and write its coordinates.
- Plot B (-2, -5).
- Plot B', the image of B under the reflection in the **x-axis**, and write its coordinates.

A' (,)

B' (,)

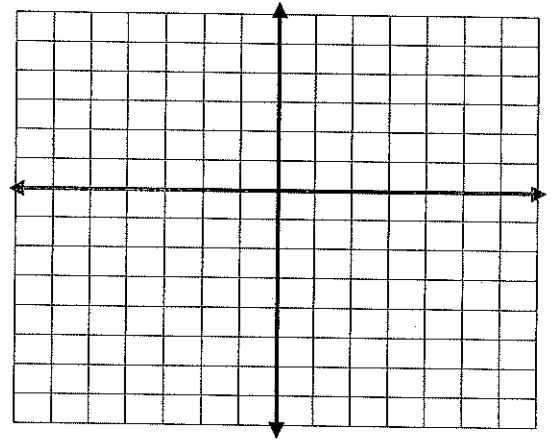


Name _____

Date _____
HW#4

1. Graph and write the coordinates of the image of point $P(5,-4)$ under each transformation:

- a) a reflection in the x-axis: (,)
- b) a reflection in the y-axis: (,)
- c) a *translation* that moves the point 3 units to the left and 6 units up: (,)
[Review from yesterday]



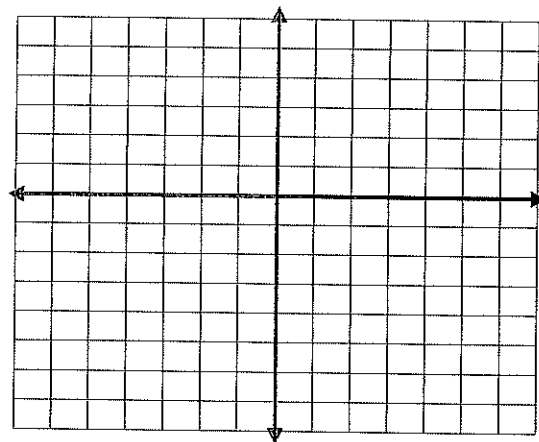
2. On the grid below, draw $\triangle ABC$ whose vertices are $A(1, 1)$, $B(7, 1)$, and $C(4, 5)$.

- a) Draw $\triangle A'B'C'$, the image of $\triangle ABC$ under a reflection in the y-axis.
- b) Write the coordinates of A' , B' , and C' :

A' ()

B' ()

C' ()



More on next page →

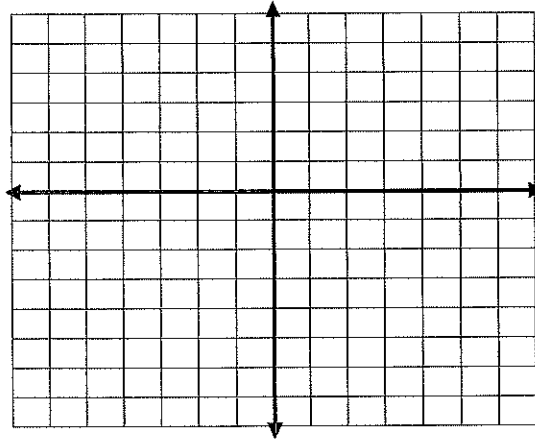
3. Draw rectangle PQRS whose vertices are $P(-5,-2)$, $Q(5,-2)$, $R(5,-6)$, and $S(-5,6)$. What are the coordinates of the vertices of rectangle $P'Q'R'S'$, the image of the original rectangle after a reflection in the x-axis? **[Hint: Take each point one at a time!!!]**

P' ()

Q' ()

R' ()

S' ()



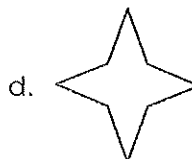
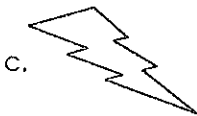
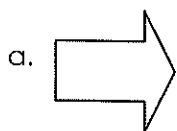
4. Another word for the point $(0,0)$ is the _____.
5. a. A short hint word to describe translations is a "_____".
 b. A short hint word to describe reflections is a "_____".
6. Another way of writing "reflection in the y-axis" is _____.
7. A shortcut way of writing the following translation: $(x, y) \rightarrow (x-1, y+2)$ is _____.
8. True or False (circle one): Translations preserve congruence of the original image.
9. True or False (circle one): Reflections preserve congruence of the original image.

BONUS:

$$P(1, 5) \xrightarrow{r_{x-axis}} P'(\quad) \xrightarrow{T_{3,-2}} P''(\quad) \xrightarrow{r_{y-axis}} P'''(\quad)$$

Line Symmetry

1. Can you draw one straight line or many straight lines of symmetry through each picture so that it looks the same on both sides of the line? (It is also possible to have zero lines of symmetry).



How many lines of symmetry does each one have? a. ___ b. ___ c. ___ d. ___

2. Use the letters of the alphabet displayed here to answer the following questions:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a. Which letters have vertical line symmetry? _____

b. Which letters have horizontal line symmetry? _____

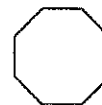
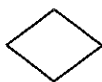
c. Which letters have both vertical and horizontal line symmetry? _____

d. Which letters have neither? _____

Point Symmetry

*Figures with point symmetry look exactly the same when flipped completely upside-down.

1. Which shapes have point symmetry? _____



2. Circle the ones below that have point symmetry! Challenge: Do any of these words also have line symmetry? _____

WOW

OTTO

un

SOS

OHHO

pop

mom

SWIMS

Name _____

Date _____
HW#5

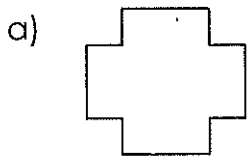
1. Which letter has point symmetry?

- a) A b) N c) L d) W

2. Which letter has line symmetry but not point symmetry?

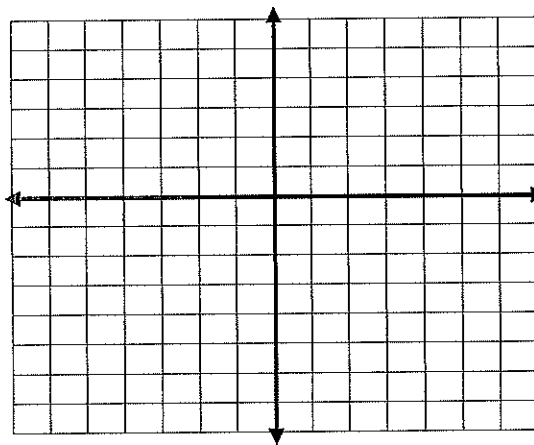
- a) H b) J c) K d) R

3. Draw all lines of symmetry on the figures below.



4. Graph the following points on the given graph.

- A (-3, 0)
- B (6, 5)
- C (0, 0)
- D (-3, 3)
- E (0, -2)



5. Which quadrant does the point (15, 26) lie in? _____

6. Rewrite $(x, y) \rightarrow (x - 5, y)$ in another form: _____

7. What does $r_{x\text{-axis}}$ stand for when working with transformations? _____

DILATIONS

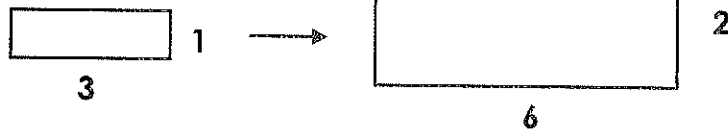
Translations and reflections are transformations that do _____ change the size or shape of a figure [the image is _____ to the pre-image].

A **dilation** is a transformation that changes the size, but **not** the shape, of a figure. A dilation can "enlarge" or "reduce" a figure.

Examples: The eye doctor may put drops in your eyes to dilate your pupils.

Scale Factor: Describes how much a figure is *enlarged* or *reduced*. This number is *multiplied* by the original coordinates (or measurements) to come up with the new coordinates. [See Examples 1 and 2 below.]

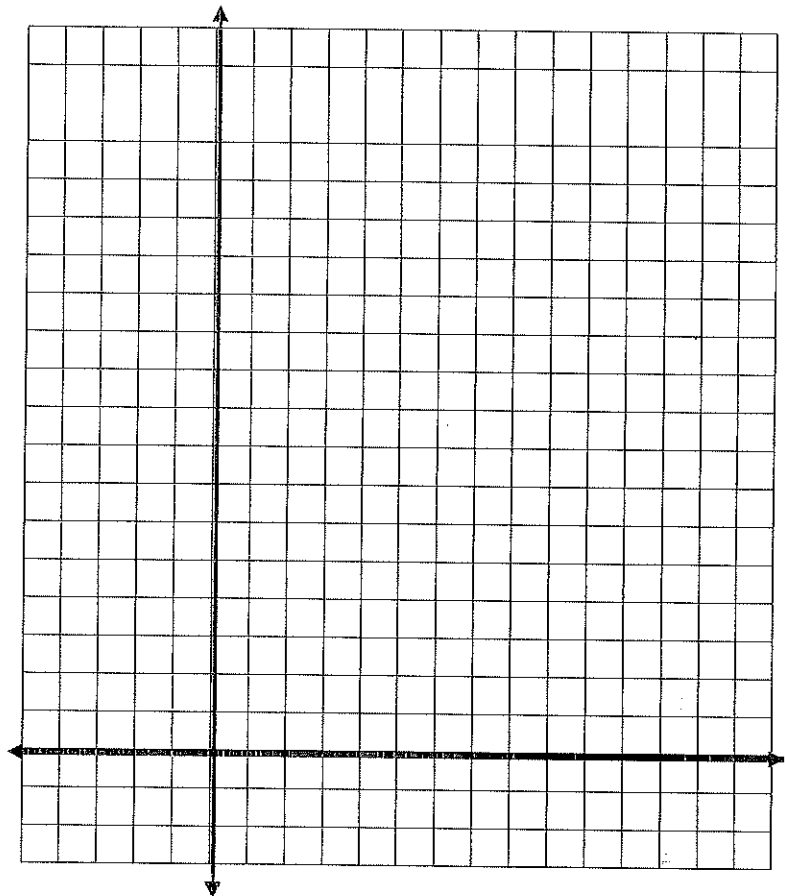
Simple Example:



What is the **scale factor** here? _____

EXAMPLE 1: Enlargement (Scale Factor is greater than 1):

1. a. Plot and connect the following points to make $\triangle ABC$:
A(4, 8), B(3, 2), and C(5, 2).
- b. Dilate the figure by a scale factor of 2 [notated as D_2].
- c. List the vertices of the image:
 A(4, 8) \rightarrow A' ()
 B(3, 2) \rightarrow B' ()
 C(5, 2) \rightarrow C' ()



EXAMPLE 2: Reduction (Scale Factor is less than 1; it is a fraction):

2. a. Plot and connect the following points to make $\triangle ABC$:
A(6, 10), B(8, 6), and C(10, 8).

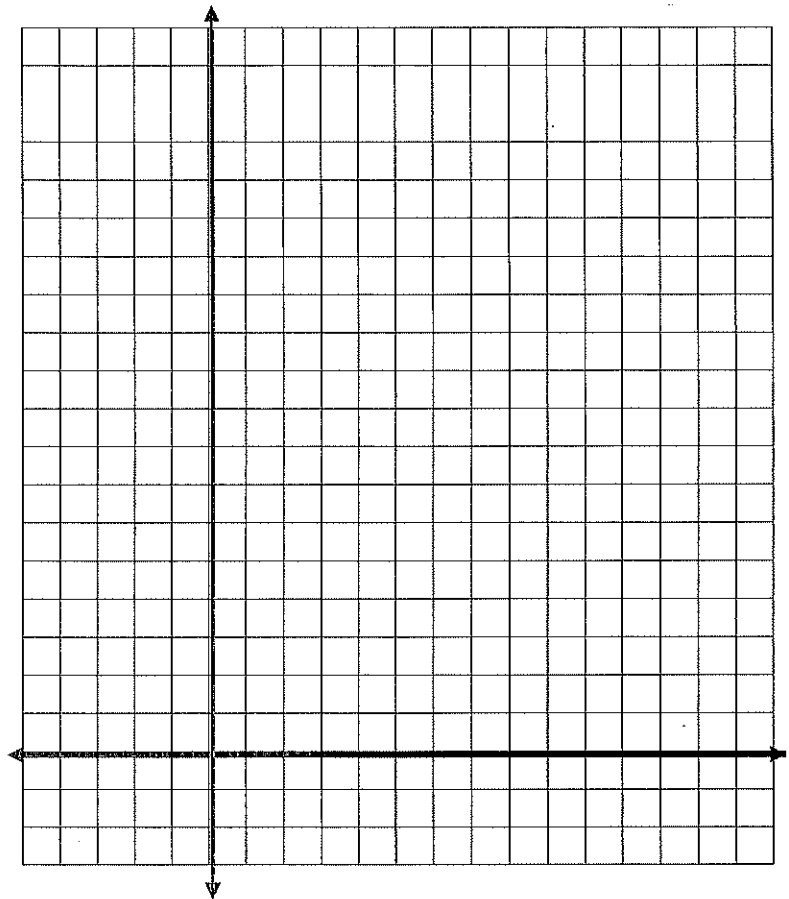
b. Dilate the figure by a scale factor of $\frac{1}{2}$.

c. List the vertices of the image:

A(6, 10) \rightarrow A' ()

B(8, 6) \rightarrow B' ()

C(10, 8) \rightarrow C' ()



3. Is the image congruent to the pre-image? Explain your answer.

4. Dilate the following points by the scale factors given:

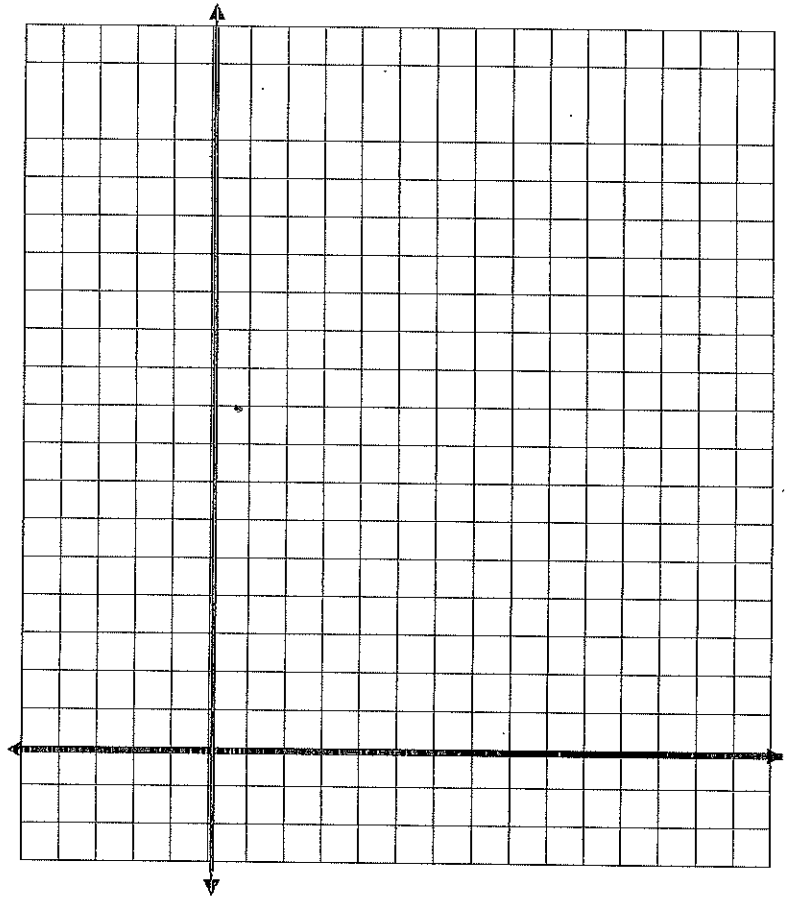
D_4
A(5, -1) \rightarrow
B(0, -1) \rightarrow
C(-2, -3) \rightarrow

$D_{\frac{1}{3}}$
A(6, 3) \rightarrow
B(-9, 0) \rightarrow
C(12, 15) \rightarrow

Name _____

Date _____
HW#6

- a. Graph a rectangle with the vertices of A (2,1), B(2,5), C(5,5) and D(5,1).
b. State the coordinates after a dilation with a scale factor of 3 [D_3].
c. Map the transformation.



- The perimeter of a square is 16cm. If the square is dilated by a scale factor of 2, what is the length of each side of the new square?
Hint: A square has four equal sides. So, try to figure out the length of each side of the original square first. **SHOW YOUR WORK AND DRAW PICTURES!!!**

- a) 3 cm b) 4 cm c) 16cm d) 8 cm

3. **Review:**

If a point moves **4 units to the right** and **2 units down**, how would you write the rule to this translation? [There are two ways to write it]