Dilation Investigation Date _____

Today we will be working with a new type of transformation. List the three previous transformations we have studied. For each transformation, explain what it does in "everyday language".

- translation - "slide"
- reflection - "flip"
- rotation - "turn"

These three transformations are known as *rigid transformations* or *rigid motions*. What do these transformations have in common that would lead us to call them *rigid transformations*?

The image is the same size and shape as preimage.

Now we will explore transformations that are **not** rigid transformations.

Square ABCD is graphed with point A at the origin. For each of the following mappings (transformations), graph and label the image on the coordinate plane. **Then tell how the image compares to the preimage.**

1. M: (x, y)→ (5x, y)

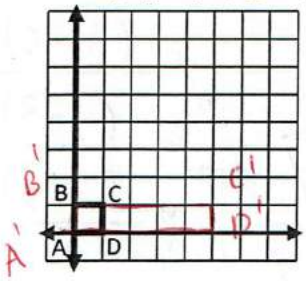


Image is a horizontal stretch by a factor of 5.

A(0,0) A'(0,0)
B(0,1) B'(0,1)
C(1,1) C'(5,1)
D(1,0) D'(5,0)

2. M: (x, y)→ (x, 5y)

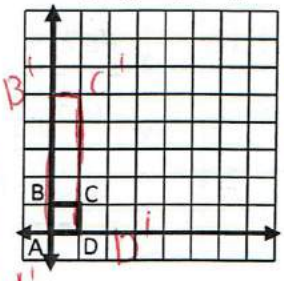


Image is a vertical stretch by a factor of 5.

A(0,0) A'(0,0)
B(0,1) B'(0,5)
C(1,1) C'(1,5)
D(1,0) D'(1,0)

3. M: (x, y)→ (5x, 5y)

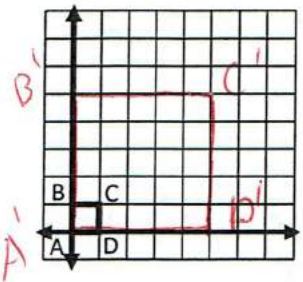


Image is both a horizontal and vertical stretch by a factor of 5.

A'(0,0) C'(5,5)
B'(0,5) D'(5,0)

4. How is #3 different from #1 and #2?

#3 grew proportionally
#1 and #2 did not.
So #3 preserved the shape.

Dilation – a transformation that preserves the shape of a geometric figure, but not necessarily the size. It can enlarge or reduce a figure.

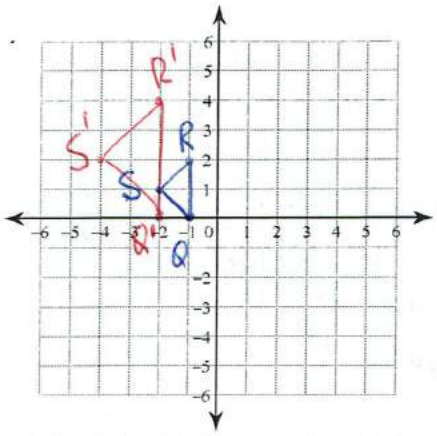
If you dilate by a magnitude < 1 (and > 0), the image is a reduction.

If you dilate by a magnitude > 1, the image is an enlargement.

Dilations Practice **Name:** _____

Graph and label each **figure** and its **image** under the given dilation. **Then name the new coordinates.**

1) Dilate ΔQRS if Q(-1, 0), R(-1, 2), S(-2, 1) by a magnitude of 2 from the origin.

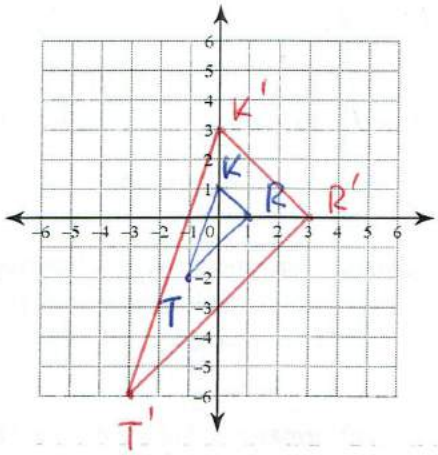


Q' (-2, 0)

R' (-2, 4)

S' (-4, 2)

2) Dilate ΔTRK if T(-1, -2), R(1, 0), K(0, 1) by a magnitude of 3 from the origin.

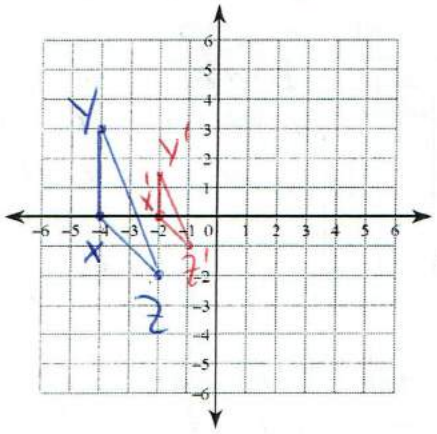


T' (-3, -6)

R' (3, 0)

K' (0, 3)

3) Dilate ΔXYZ if X(-4, 0), Y(-4, 3), Z(-2, -2) by a magnitude of $\frac{1}{2}$ from the origin.

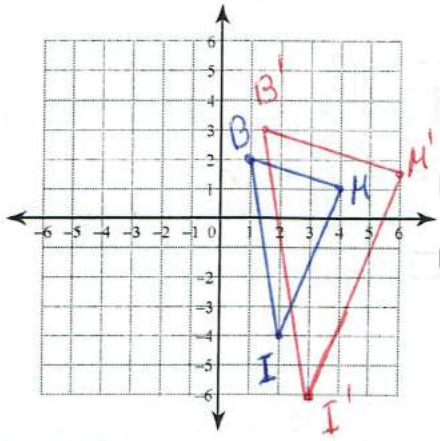


X' (-2, 0)

Y' $(-2, \frac{3}{2})$

Z' (-1, -1)

4) Dilate ΔIBM if I(2, -4), B(1, 2), M(4, 1) by a magnitude of $\frac{3}{2}$ from the origin.



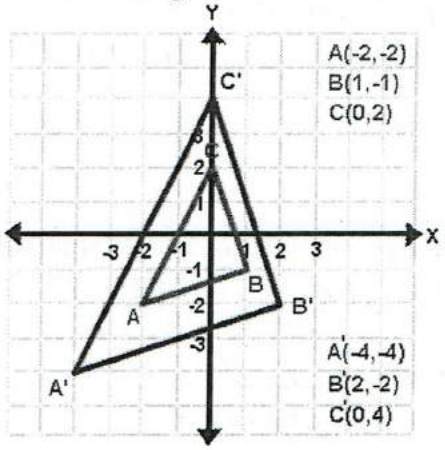
I' (3, -6)

B' $(\frac{3}{2}, 3)$

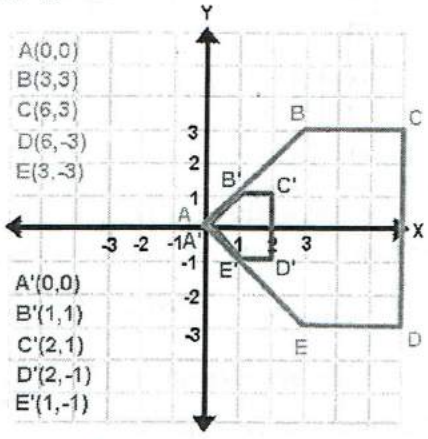
M' (6, $\frac{3}{2}$)

Determine the magnitude that was used to dilate the following figures.

5)



Magnitude: 2



Magnitude: $\frac{1}{3}$

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Kuta Software - Infinite Geometry

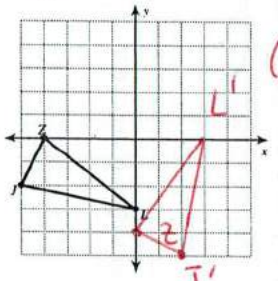
Name_____

All Transformations

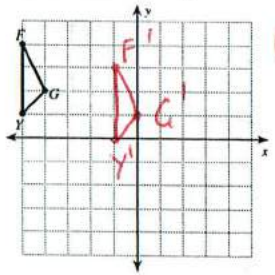
Date_____ Period____

Graph the image of the figure using the transformation given.

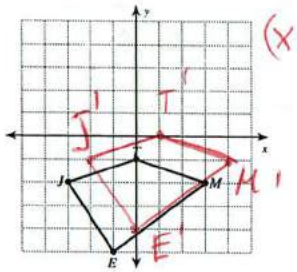
1) rotation 90° counterclockwise about the origin



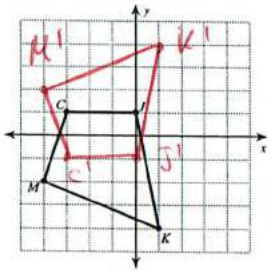
2) translation: 4 units right and 1 unit down



3) translation: 1 unit right and 1 unit up

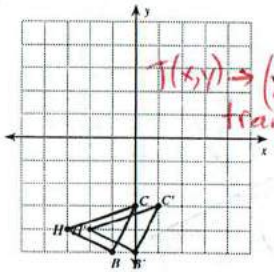


4) reflection across the x-axis

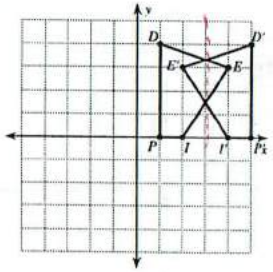


Write a rule to describe each transformation.

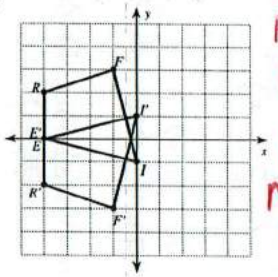
5)



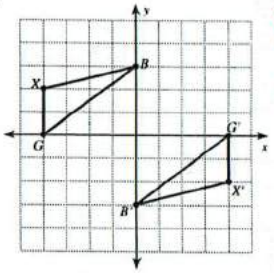
6)



7)

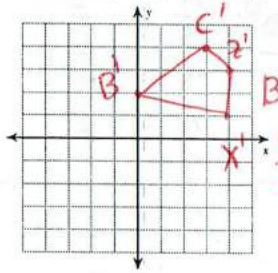


8)

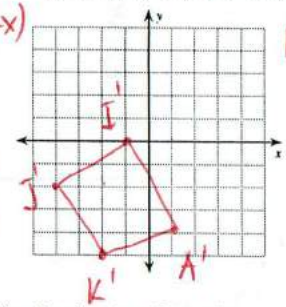


Graph the image of the figure using the transformation given.

9) rotation 90° clockwise about the origin
$B(-2, 0)$, $C(-4, 3)$, $Z(-3, 4)$, $X(-1, 4)$



10) reflection across $y = x$
$K(-5, -2)$, $A(-4, 1)$, $I(0, -1)$, $J(-2, -4)$



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

11) rotation 180° about the origin
$E(2, -2)$, $J(1, 2)$, $R(3, 3)$, $S(5, 2)$

(-x,-y)
E'(-2,2), J'(-1,-2)
R'(-3,-3), S'(-5,-2)

12) ~~reflection across $y = 2$~~
$J(1, 3)$, $D(0, 5)$, $R(1, 5)$, $C(3, 2)$

13) translation: 7 units right and 1 unit down
$J(-3, 1)$, $F(-2, 3)$, $N(-2, 0)$

(x+7, y-1)
J'(4,0)
F'(5,2)
N'(5,-1)

14) translation: 6 units right and 3 units down
$S(-3, 3)$, $C(-1, 4)$, $W(-2, -1)$

(x+6, y-3)
S'(3,0)
C'(5,1)
W'(4,-4)

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Lesson 1

SET

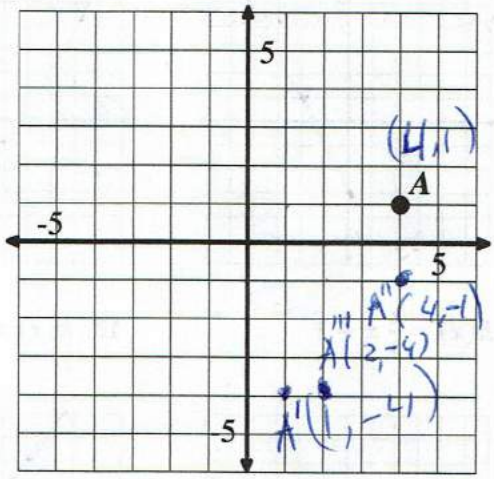
Topic: Transformations.

Transform points as indicated in each exercise below.

7a. Rotate point A around the origin 90° clockwise, label as A' $(y, -x)$

b. Reflect point A over x-axis, label as A" $(x, -y)$

c. Apply the rule $(x - 2, y - 5)$, to point A and label A'''



8a. Reflect point B over the line $y = x$, label as B' (y, x)

b. Rotate point B 180° about the origin, label as B" $(-x, -y)$

c. Translate point B the point up 3 and right 7 units, label as B''' $(x + 7, y + 3)$