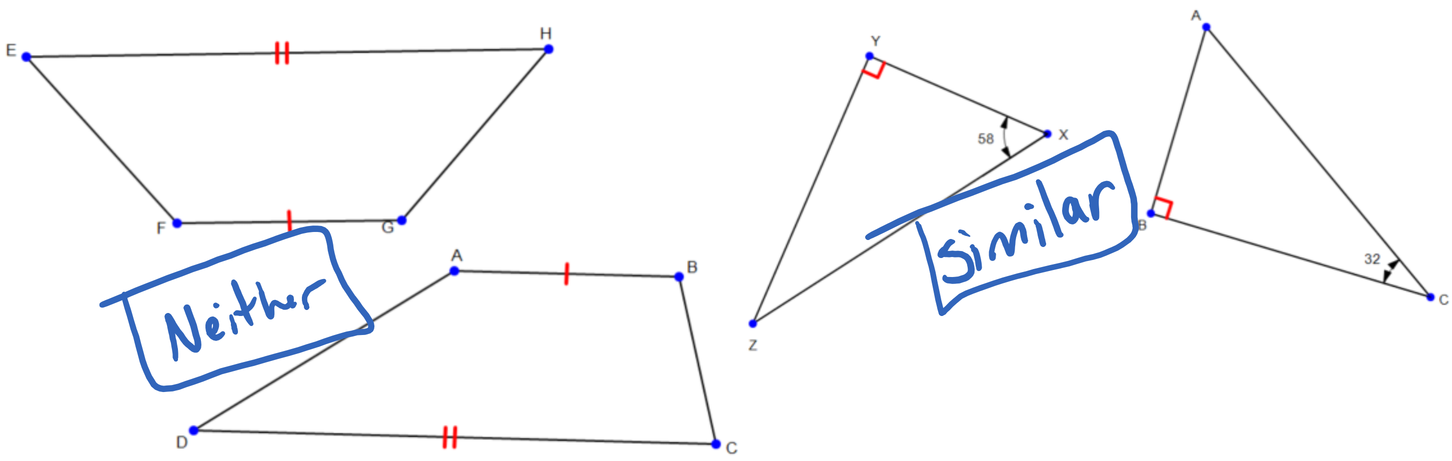
Warm Up

Are the following objects congruent or similar or neither?



Essential Question

What makes a transformation a similarity transformation? What is the relationship between a preimage and the image resulting from a similarity transformation?

Needed Vocab:

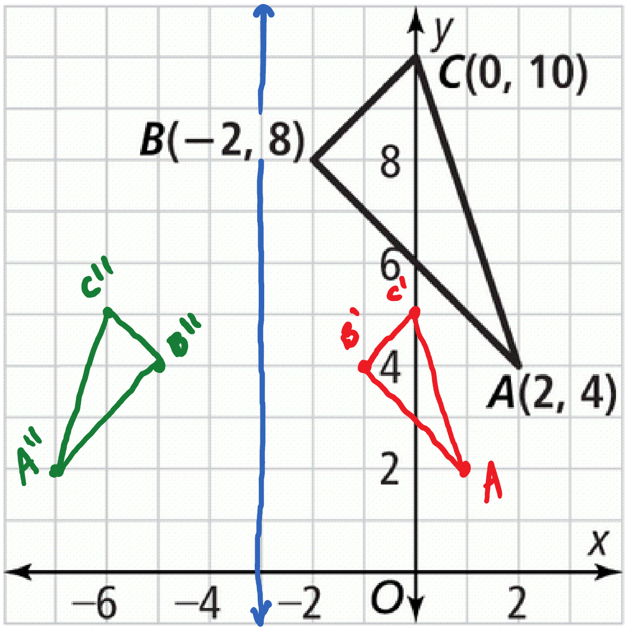
- **Similarity Transformation**

Goal: "I can...

Determine whether figures are similar."

Example 1

If line m is represented by the equation $x = -3$, what is a graph of the image $(R_m \circ D_{0.5})(\triangle ABC)$?



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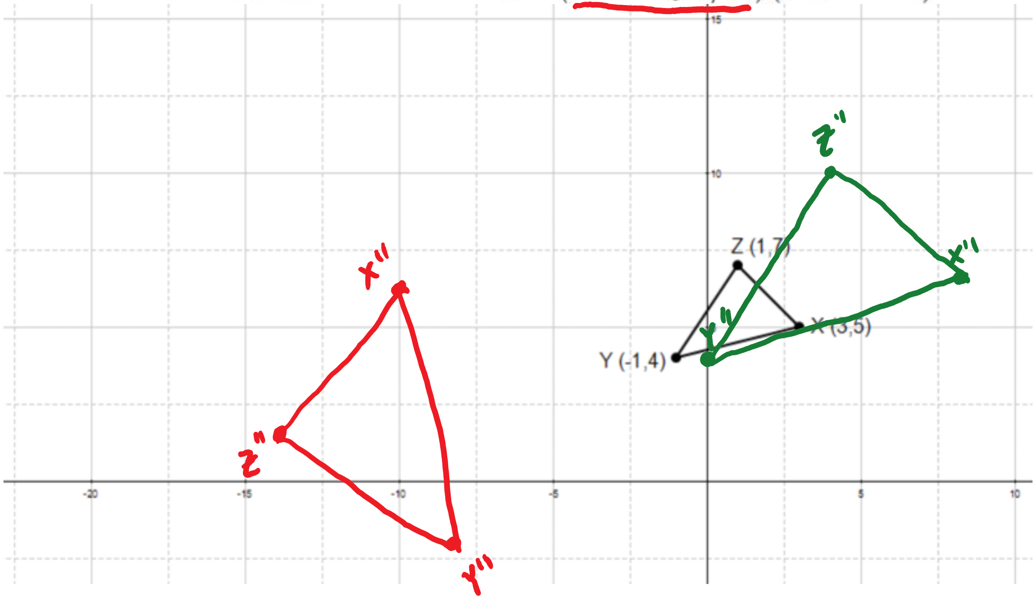
1. The vertices of $\triangle XYZ$ are $X(3, 5)$, $Y(-1, 4)$, and $Z(1, 7)$.

a. What is the graph of the image $(D_2 \circ T_{\langle 1, -2 \rangle})(\triangle XYZ)$?

b. What is the graph of the image $(D_3 \circ r_{(90^\circ, O)})(\triangle XYZ)$?

$X'(4,3)\cdot 2$ $X''(8,6)$
$Y'(0,2)\cdot 2$ $Y''(0,4)$
$Z'(2,5)\cdot 2$ $Z''(4,10)$

$X'(-5,3)\cdot 2$ $X''(-10,6)$
$Y'(-4,-1)\cdot 2$ $Y''(-8,-2)$
$Z'(-7,1)\cdot 2$ $Z''(-14,2)$

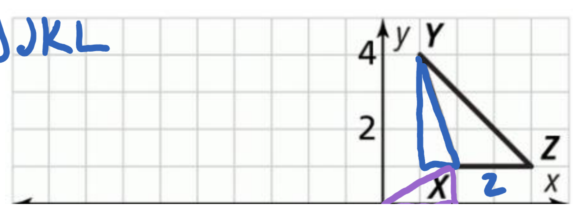


Example 2

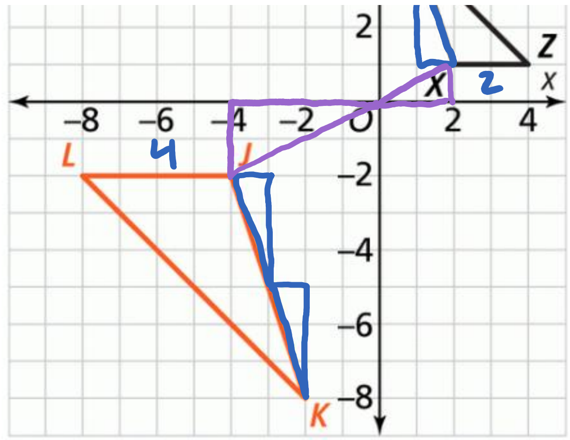
Is there a composition of transformations that maps $\triangle XYZ$ to $\triangle JKL$? Explain.

$(D_2 \circ R_{180^\circ})(\triangle XYZ) = \triangle JKL$

- Rotate 180° about origin
- Dilate by K=2 w/ ¢ of



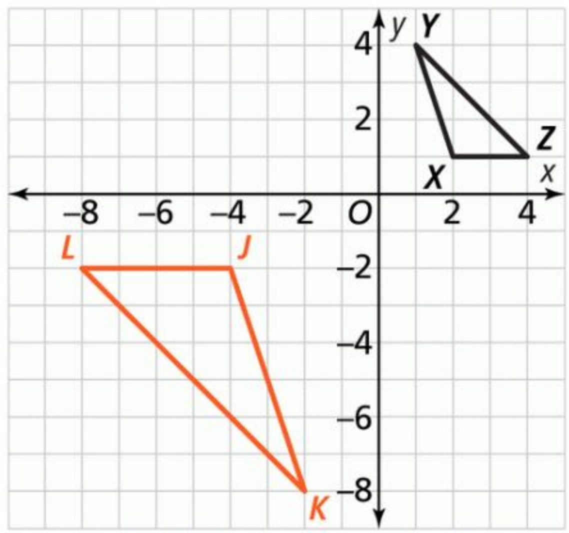
– Rotate 180° about origin
– Dilate by K=2 w/ ¢ of dilation @ origin



2. Triangle *XYZ* can be rotated 180° and then dilated by a scale factor of 2 to obtain △*JKL*. If these transformations are performed in the reverse order, are the results the same? Do you think your answer holds for all compositions of transformations? Explain.

– yes

– No. Since translations are also transformations and depending on the order you'll get different results.



Example 3

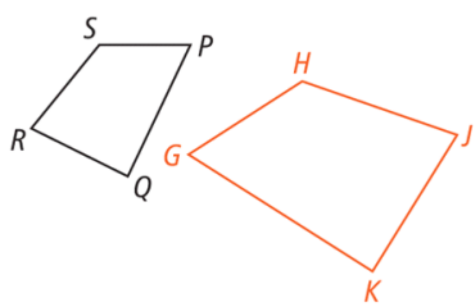
Why is *PQRS* similar to *GKJH*?

– Translate PQRS so that P maps to G

– Rotate around point P so that PQ lies on GK.

– Reflect across PQ

– Enlarge by same scale factor K so that PQ·K = GK.



– Enlarge by some scale factor K so that PQ·K = QK.

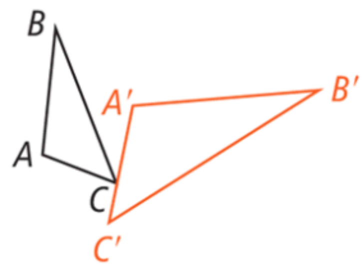
A **similarity transformation** is a composition of one or more rigid motions and a dilation. A similarity transformation results in an image that is similar to the preimage.

Describe a possible similarity transformation for the pair of similar figures shown, and then write a similarity statement.

– Translate ΔABC so that C maps to C'.

– Rotate ΔABC around C so that BC lies on B'C'.

– Enlarge ΔABC by some scale factor K so that $BC \cdot K = B'C'$.



Example 4

Can the artist copy her sketch to cover an entire wall measuring 15 ft high by 20 ft wide so her wall mural is similar to her sketch? Explain.

$15' = 180''$

$20' = 240''$

$\frac{180}{11} \approx 16.36$

$14 \cdot 16.36 \approx 229$.

$229 < 240$ ∴ Can not work.

Find the needed scale factor and see if it works for both L and W.

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4. Suppose the artist cuts 2 inches from the width of her sketch. How much would she cut from the height so she can copy a similar image to cover the wall?

$20' = 240''$ $\quad$ $15' = 180''$

$\frac{240}{12} = 20$

$x \cdot 20 = 180$

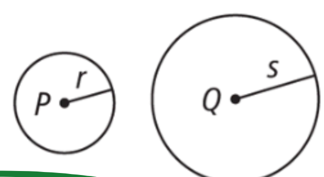
$x = 9$ $\quad$ cut 2" off the height

EXAMPLE 5

when doing this type of proof it's all about the similarity transformation.

Given: $\odot P$ with radius r, $\odot Q$ with radius s

Prove: $\odot P \sim \odot Q$



$\odot P$ w/radius r
$\odot Q$ w/radius s
Given

→

Translate $\odot P$ so P' maps to Q
Translation prop.

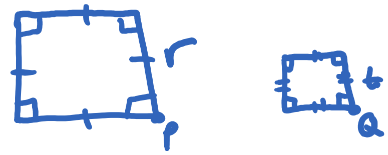
→

Dilate $\odot P$ by some scale factor K so that $r \cdot K = s$
Dilation prop.

→

$\odot P \sim \odot Q$
Similarity trans. exists.

5. Write a proof that any two squares are similar.



Square r has point P and square t has point Q. By translating square r so that P coincides w/point Q, then by reducing square r by scale factor K so that $r \cdot K = t$. Since the similarity transformation exists, square r is similar to square t.

https://tinyurl.com/wpo744e

Homework

Pg. 315
9, 15, 17, 19, 23, 28