4.6 Similarity and Transformations

Solve. Round to the nearest tenth, if necessary.

1. $\frac{n}{17} = \frac{14}{25}$

$238 = 25n$

$9.5 = n$

2. $\frac{w}{12} = \frac{3}{2}$

$36 = 2w$

$18 = w$

3. $\frac{x}{5} = \frac{31}{35}$

$35x = 155$

$x = 4.4$

4. $\frac{13}{2} = \frac{y}{19}$

$247 = 2y$

$123.5 = y$

Essential Question

Since a dilation preserves shape but not size, then it is considered a *non-rigid motion.*

A **similarity transformation** is a dilation or a composition of rigid motions and dilations.

Similar figures have the same shape but not the same size. Two geometric figures are **similar figures** iff there is a similarity transformation that maps one of the figures onto the other.

Nov 14-6:11 PM

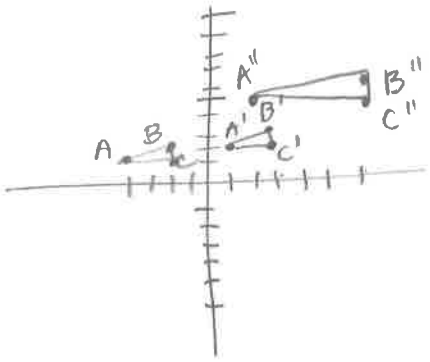
1. Graph $\triangle ABC$ with vertices $A(-4, 1)$, $B(-2, 2)$, and $C(-2, 1)$ and its image after the similarity transformation.

Translation: $(x, y) \rightarrow (x + 5, y + 1)$

Dilation: $(x, y) \rightarrow (2x, 2y)$

$A'(1, 2)$
$B'(3, 3)$
$C'(3, 2)$

$A''(2, 4)$
$B''(6, 6)$
$C''(6, 4)$



2. Graph $\overline{CD}$ with endpoints $C(-2, 2)$ and $D(2, 2)$ and its image after the similarity transformation.

Rotation: 90° about the origin $(a, b) \rightarrow (-b, a)$

Dilation: $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right) \rightarrow \frac{1}{2}(-2, -2)\ \frac{1}{2}(-2, 2)$

$C'(-2, -2)$
$D'(-2, 2)$

$C''(-1, -1)$
$D''(-1, 1)$

3. Graph $\triangle FGH$ with vertices $F(1, 2)$, $G(4, 4)$, and $H(2, 0)$ and its image after the similarity transformation.

Reflection: in the x-axis $\rightarrow (a, -b)$

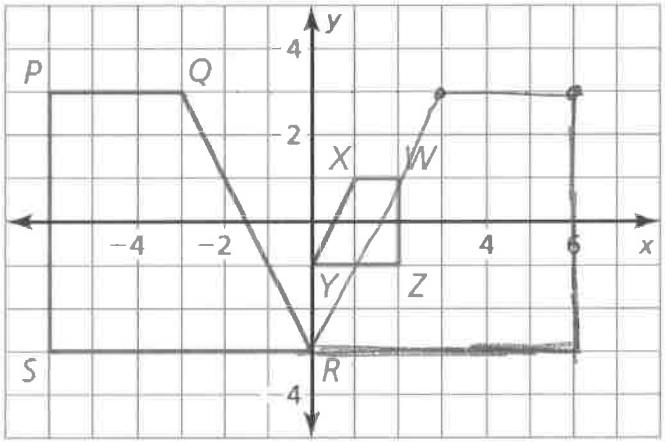
Dilation: $(x, y) \rightarrow (1.5x, 1.5y)$

$F'(1, -2)$
$G'(4, -4)$
$H'(2, 0)$

$F''(1.5, -3)$
$G''(6, -6)$
$H''(3, 0)$

Example 1

Describe a similarity transformation that maps trapezoid *PQRS* to trapezoid *WXYZ*.



(#1) reflection over the y-axis

(#2) Dilation of $\frac{1}{3}$

$(6, -3)$

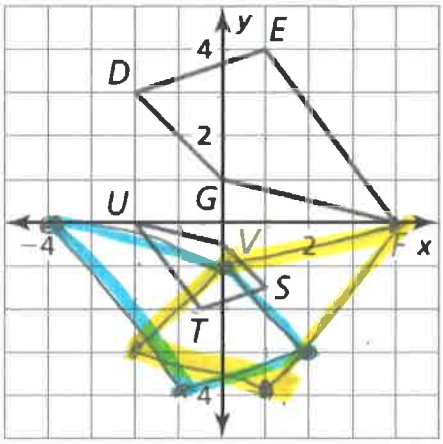
$\downarrow$

$(2, -1)$

$k = \frac{1}{3}$

Example 2

4. Describe a similarity transformation that maps quadrilateral *DEFG* to quadrilateral *STUV*.



#1 reflection over X-axis

#2 reflection over y-axis

#3 Dilation of $\frac{1}{2}$

$(-1, -4) \cdot \frac{1}{2}$

$(-\frac{1}{2}, -2)$

Homework:

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