4.6 Similarity & Transformations
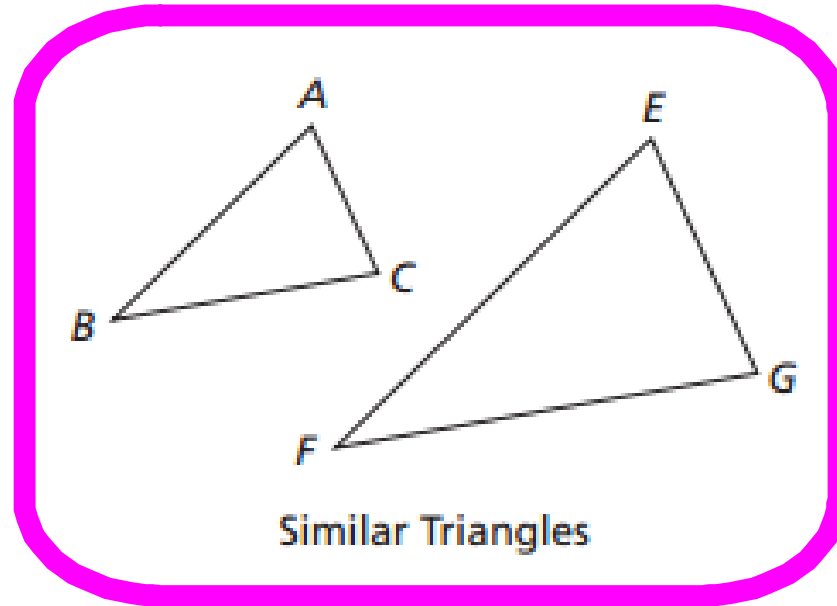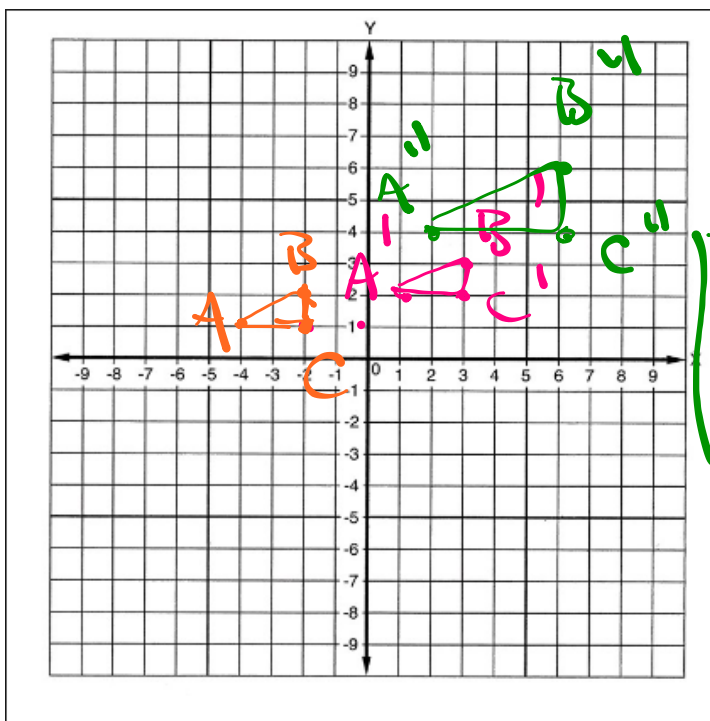

Similar Triangles

Two figures are *similar figures* if they have the same shape but not necessarily the same size. A dilation is a transformation that preserves shape but not size. A similarity transformation includes dilations.
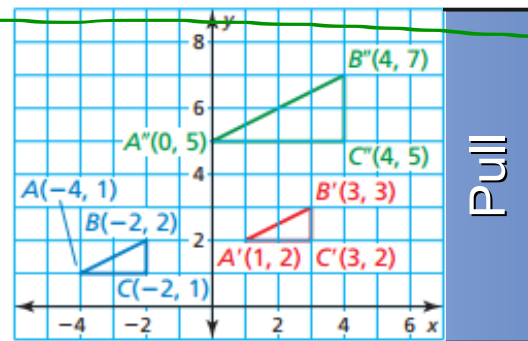
A similarity transformations is like a composition of transformations, but it includes at least one dilation.

Example: Performing a Similarity Transformation

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

$$\rightarrow 5u \quad \uparrow 1y$$
$$(x, y) \Rightarrow (x + 5, y + 1)$$
$$A'(1, 2) \; B'(3, 3) \; C'(3, 2)$$
$$(x, y) \Rightarrow (2x, 2y)$$
$$A''(2, 4) \; B''(6, 6) \; C''(6, 4)$$

Pull

Practice: Similarity Transformations

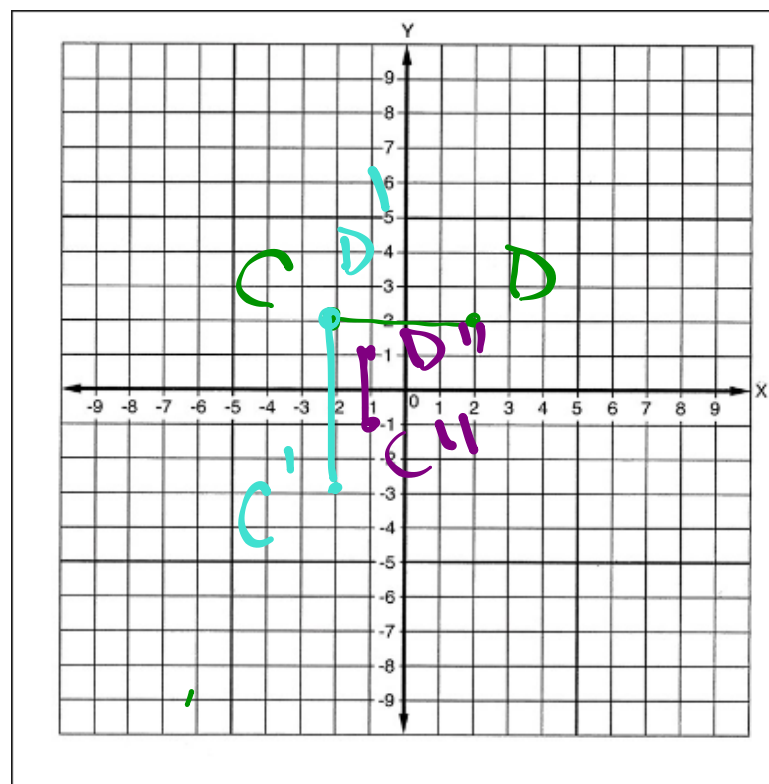1. Graph $\overline{CD}$ with endpoints C(-2, 2) & D(2, 2) and its image after the similarity transformation.

Rotation 90° counterclockwise about the origin

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

$(x, y) \Rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$

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

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

2. Graph $\triangle$FGH with vertices F(1, 2), G(4, 4), & H(2, 0) and its image after the similarity transformation.
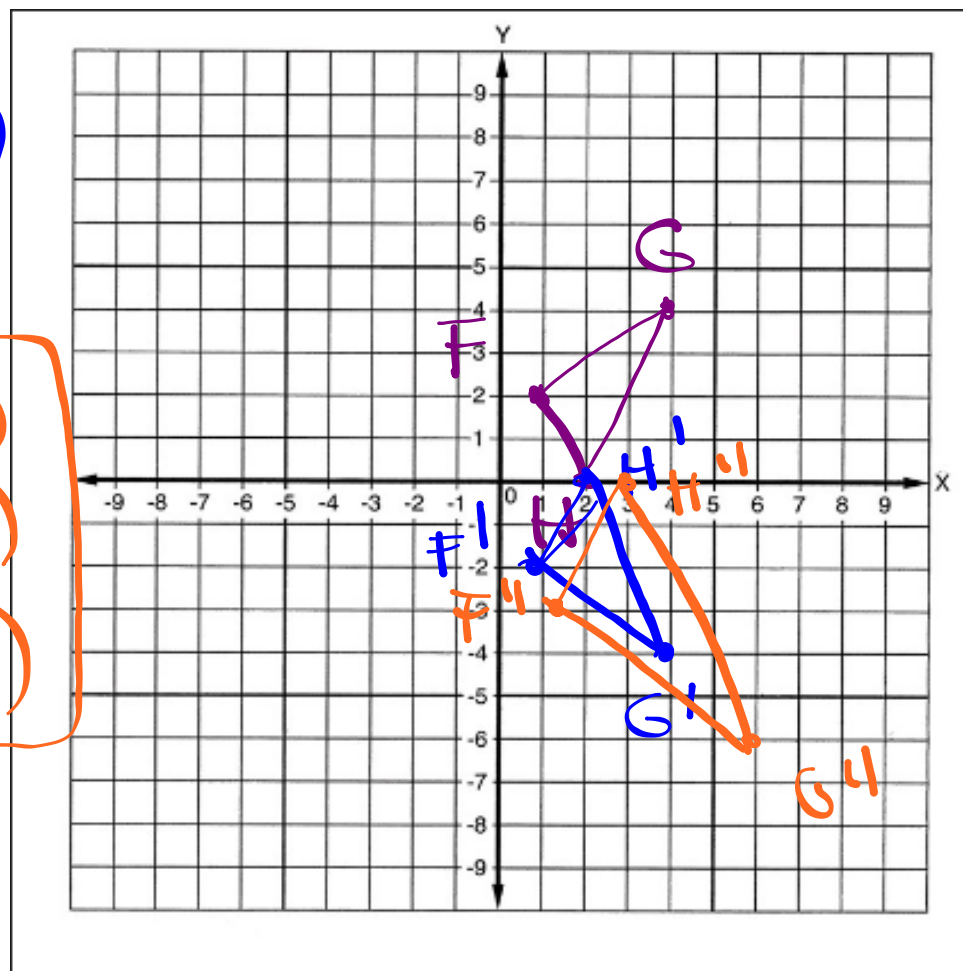
$R_x \ (x, y) \rightarrow (x, -y)$

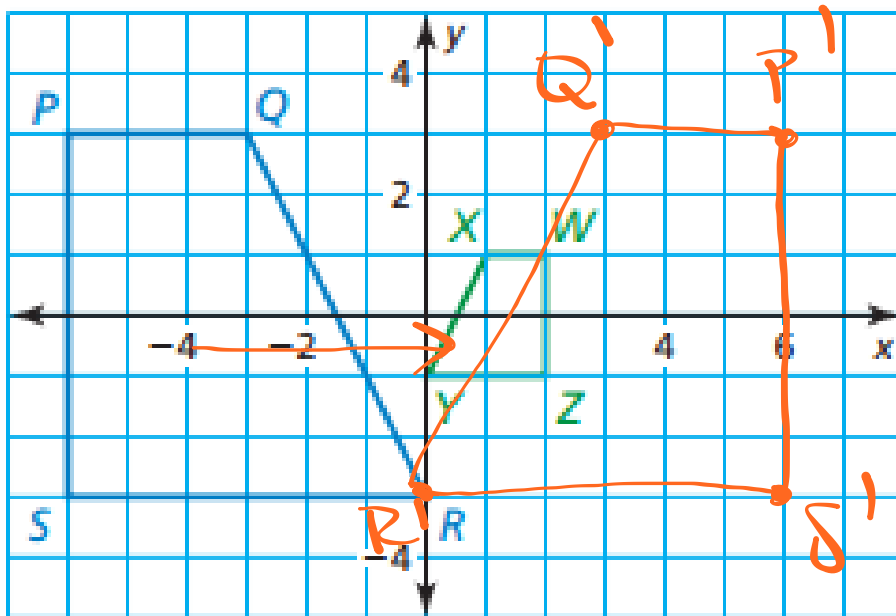$(x, y) \Rightarrow (1.5x, 1.5y)$

$F'(1, -2)$ $F''(1.5, -3)$
$G'(4, -4)$ $G''(6, -6)$
$H'(2, 0)$ $H''(3, 0)$

Example: Describing a Similarity Transformation

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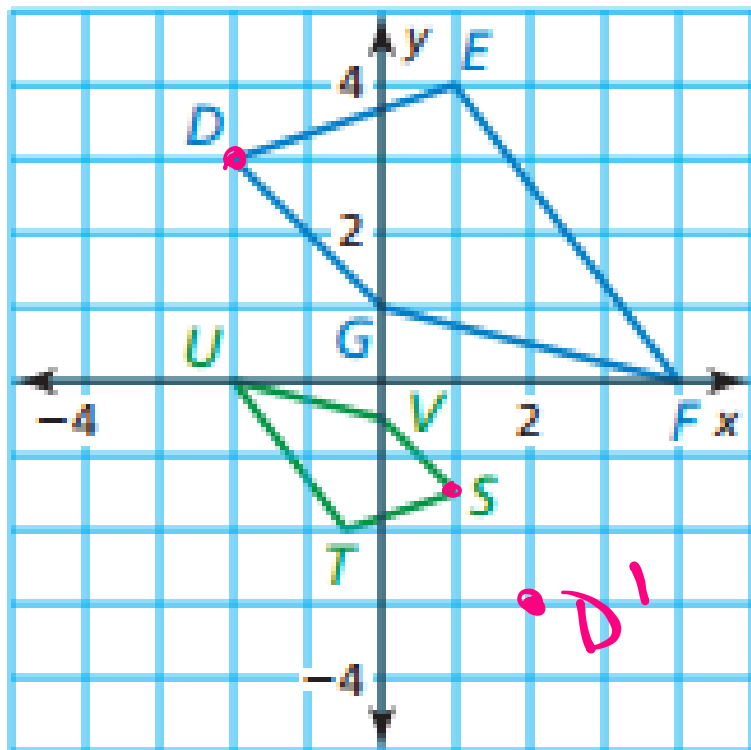

R_y

$P(-6, 3)$
$P'(6, 3)$
$W(2, 1)$

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

Practice: Describe the Mapping

Map from quadrilateral DEFG to quadrilateral STUV

$R_{180°}$ $(x, y) \rightarrow (-x, -y)$

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

$D(-2, 3) \rightarrow D'(2, -3)$

$S(1, -1.5)$

ACT Practice:

Which of the following is equivalent to $(2x + 3)(x - 7)$?

F. $2x^2 - 21$

G. $2x^2 - 11x - 21$

H. $2x^2 + 11x - 21$

J. $2x^2 + 17x - 21$

K. $2x^2 + 17x + 21$

$$2x^2 - 11x - 21$$

$$2x^2 - 14x + 3x - 21$$

$$2x^2 - 11x - 21$$

HW: Pg. 219: 3 - 11 (o), 23 - 26