Combined Transformations

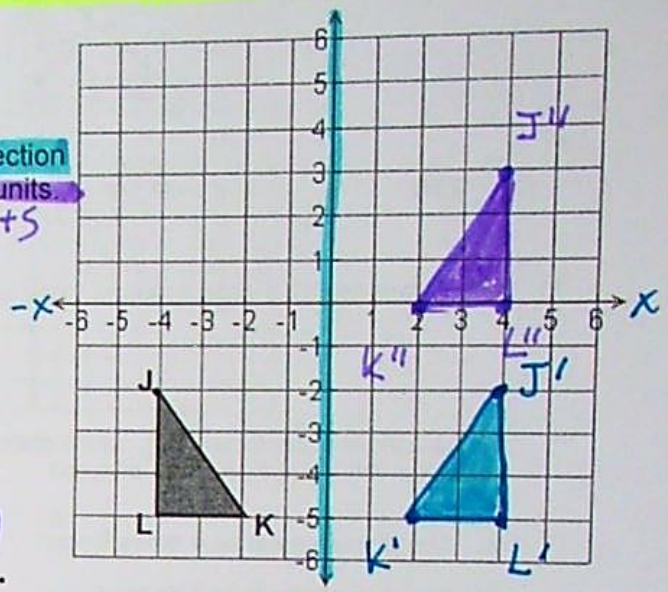
A combined transformation is just a series of two or more transformations performed on the same figure.

EXAMPLES of Double Transformations

1. Using triangle JKL, find each point of reflection over the y-axis and then a translation up 5 units.

J	(-4, -2)	J'	(4, -2)	J"	(4, 3)
K	(-2, -5)	K'	(2, -5)	K"	(2, 0)
L	(-4, -5)	L'	(4, -5)	L"	(4, 0)

= Y+5



Draw triangle J'K'L' and J"K"L"

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

$(x, y) \rightarrow (x, y+5)$

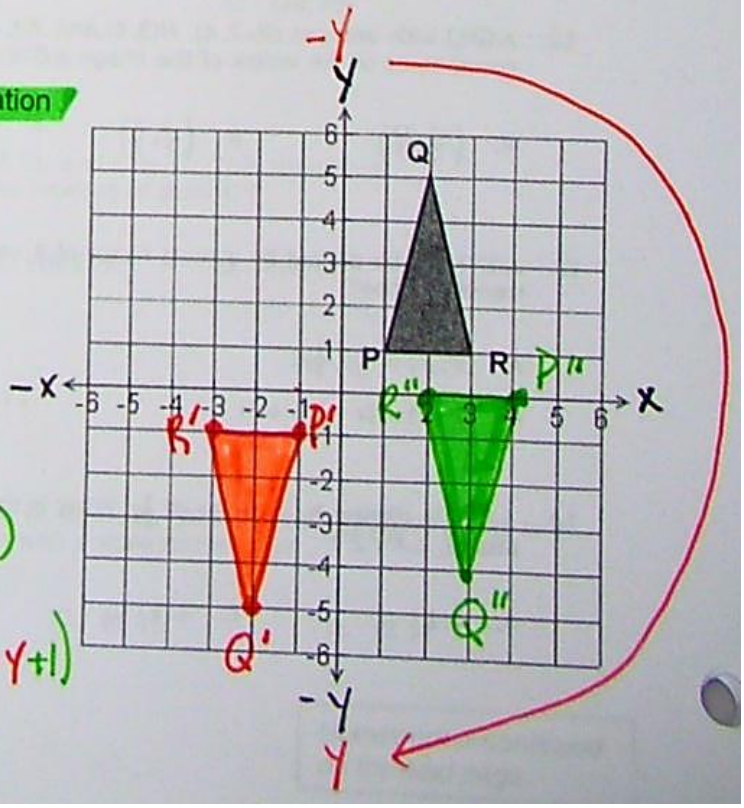
In one-step

Combined rule: $(x, y) \longrightarrow (-x, y+5)$

2. Using figure PQR, find each point for a rotation 180° about the origin and a translation right 5 units and up 1 units.

x+5 y+1

P	(1, 1)	P'	(-1, -1)	P"	(4, 0)
Q	(2, 5)	Q'	(-2, -5)	Q"	(3, -4)
R	(3, 1)	R'	(-3, -1)	R"	(2, 0)



Draw triangle P'Q'R' and P"Q"R"

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

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

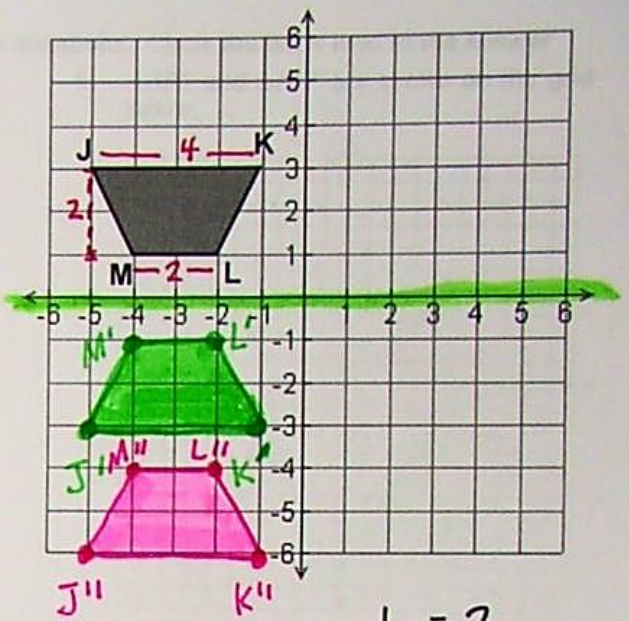
In one-step

Combined Rule: $(x, y) \longrightarrow (-x+5, -y+1)$

Homework on Combined Transformations

1. Using figure JKLM, find each point for a reflection over the x-axis and a translation down 3 units.

J (-5,3) J' (-5,-3) J" (-5,-6)
K (-1,3) K' (-1,-3) K" (-1,-6)
L (-2,1) L' (-2,-1) L" (-2,-4)
M (-4,1) M' (-4,-1) M" (-4,-4)
(x,y) → (x,-y) (x, y-3)



In one step

Draw figure J'K'L'M' and J"K"L"M"

combined rule

$(x,y) \longrightarrow (x,-y-3)$

Find the area of figure JKLM. Show all work.

$A = \frac{1}{2}(b_1+b_2)h$

$b_1 = 2$
$b_2 = 4$
$h = 2$

$\frac{1}{2}(2+4)(2)$

$\frac{1}{2}(6)(2)$

$\frac{1}{2}(12) = \boxed{6}$

Area: $6u^2$

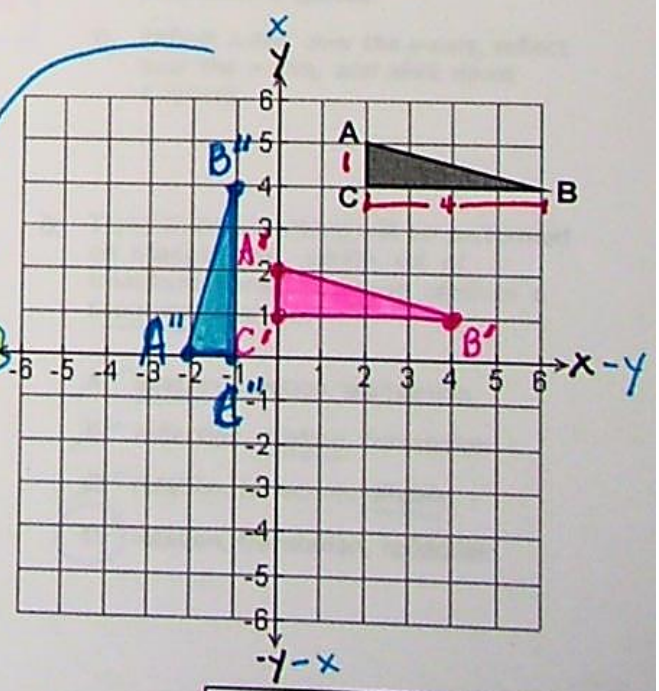
2. Using figure ABC, find each point for a translation left 2 and down 3 and then a rotation of 90°counterclock wise.

A (2,5) A' (0,2) A" (-2,0)
B (6,4) B' (4,1) B" (-1,4)
C (2,4) C' (0,1) C" (-1,0)
(x,y) → (x-2, y-3) (-y, x)

rotation rule

Draw triangle A'B'C' and A"B"C"

LOOK Y-X



Find the area of figure ABC. Show all work.

$A = \frac{1}{2}bh$
$= \frac{1}{2}(1)(4)$
$= \frac{1}{2}(4)$
$= \boxed{2}$

$b = 1$
$h = 4$

Area: $2u^2$

Homework is continued on the next page.