21-Sep-15

Translate point *P*. State the coordinates of *P′*.

1. $P(-4, 4)$; 2 units down, 2 units right

y changes −2 X changes +2

$P'(-2, 2)$

2. $P(-3, -2)$; 3 units right, 3 units up

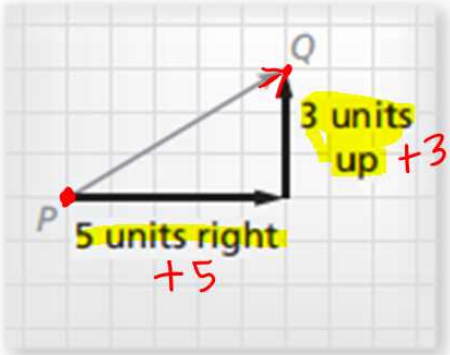
+3 +3 x y

$P'(0, 1)$

Vectors SJ pg. 95

21-Sep-15

The diagram shows a vector. The **initial point**, or starting point, of the vector is *P*, and the **terminal point**, or ending point, is *Q*. The vector is named $\overrightarrow{PQ}$, which is read as "vector *PQ*." The **horizontal component** of $\overline{PQ}$ is 5, and the **vertical component** is 3. The **component form** of a vector combines the horizontal and vertical components. So, the component form of $\overline{PQ}$ is $\langle 5, 3 \rangle$.



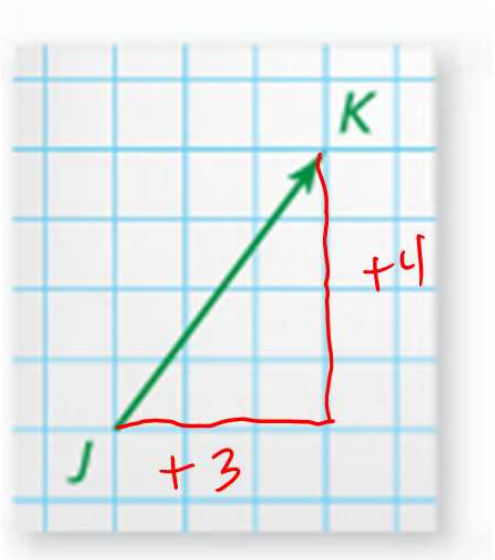
21-Sep-15

In the diagram, name the vector and write its component form.

The vector is $\overrightarrow{JK}$.

3 units right and
4 units up.

$\langle 3, 4 \rangle$

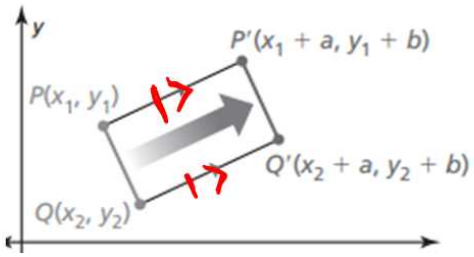


Translations

21-Sep-15

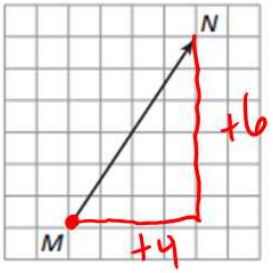
A translation moves every point of a figure the same distance in the same direction. More specifically, a translation *maps*, or moves the points P and Q of a plane figure along a vector $\langle a, b \rangle$ to the points P' and Q', so that one of the following statements is true.

- $PP' = QQ'$ and $\overline{PP'} \parallel \overline{QQ'}$, or
- $PP' = QQ'$ and $\overline{PP'}$ and $\overline{QQ'}$ are collinear.



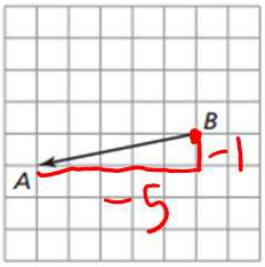
Extra Practice

In Exercises 1–3, name the vector and write its component form.

1. 

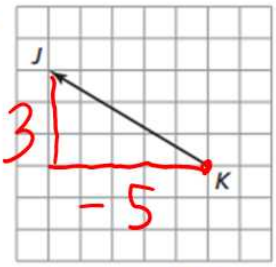
$\overrightarrow{MN}$

$\langle 4, 6 \rangle$

2. 

$\overrightarrow{BA}$

$\langle -1, -5 \rangle$

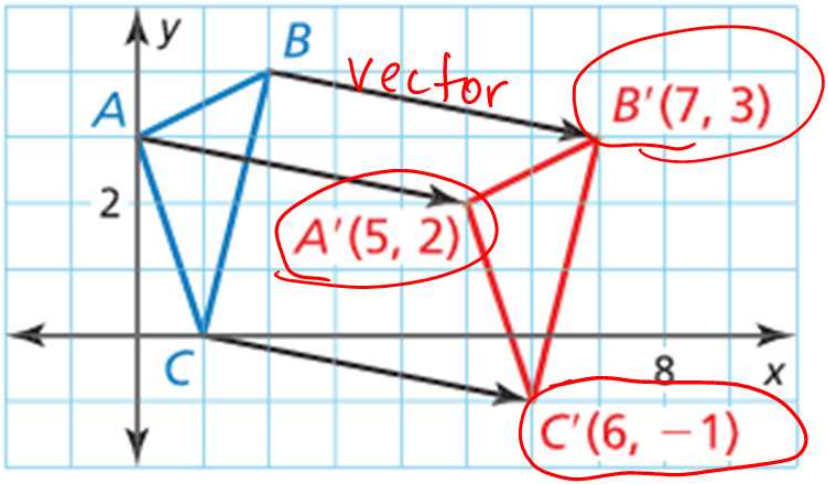
3. 

$\overrightarrow{KJ}$

$\langle -5, 3 \rangle$

The vertices of $\triangle ABC$ are $A(0, 3)$, $B(2, 4)$, and $C(1, 0)$. Translate $\triangle ABC$ using the vector $\langle 5, -1 \rangle$. +5 -1 +5 -1 +5 -1

SOLUTION Just state the coordinates of the translated triangle.



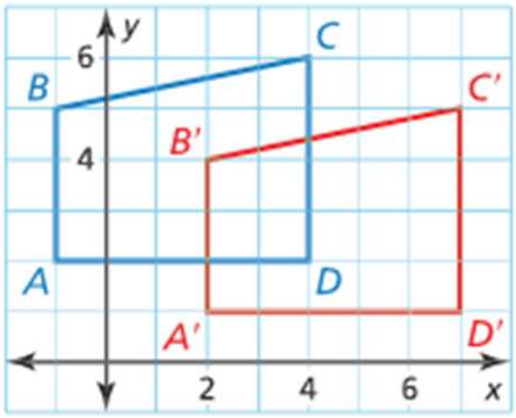
Graph quadrilateral $ABCD$ with vertices $A(-1, 2)$, $B(-1, 5)$, $C(4, 6)$, and $D(4, 2)$ and its image after the translation $(x, y) \rightarrow (x + 3, y - 1)$.

$\langle 3, -1 \rangle$

$A'(2, 1)$ $B'(2, 4)$

Just state the coordinates of the translated quadrilateral.

$C'(7, 5)$ $D'(7, 1)$



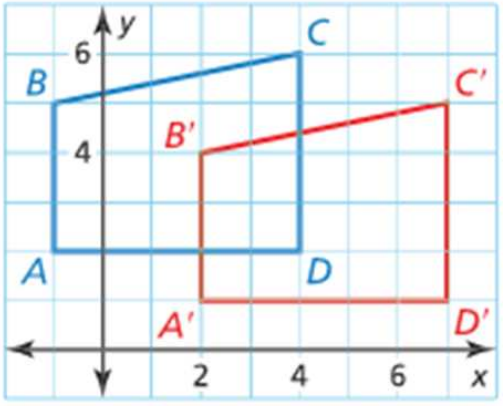
Graph quadrilateral $ABCD$ with vertices $A(-1, 2)$, $B(-1, 5)$, $C(4, 6)$, and $D(4, 2)$ and its image after the translation $(x, y) \rightarrow (x + 3, y - 1)$.

$\langle 3, -1 \rangle$

$A'(2, 1)$ $B'(2, 4)$

Just state the coordinates of the translated quadrilateral.

$C'(7, 5)$ $D'(7, 1)$



$$(x, y) \rightarrow (x + 3, y - 1)$$

$A(-1, 2) \rightarrow A'(2, 1)$

$B(-1, 5) \rightarrow B'(2, 4)$

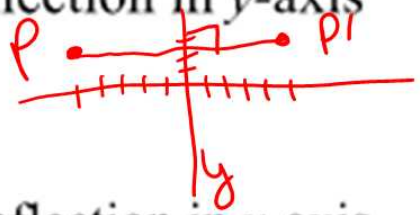
$C(4, 6) \rightarrow C'(7, 5)$

$D(4, 2) \rightarrow D'(7, 1)$

Reflect point *P*. State the coordinates of *P'*.

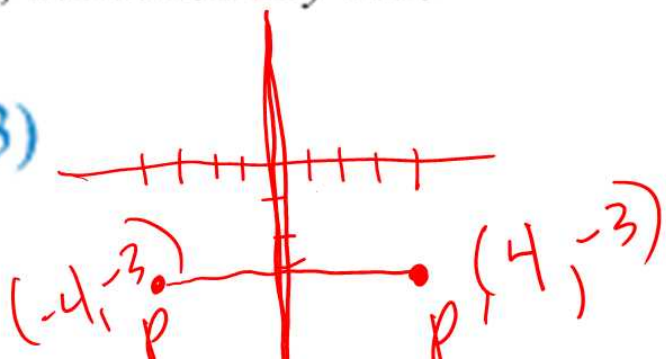
1. $P(-5, 3)$; reflection in y-axis

$P'(5, 3)$



2. $P(-4, -3)$; reflection in y-axis

$P'(4, -3)$



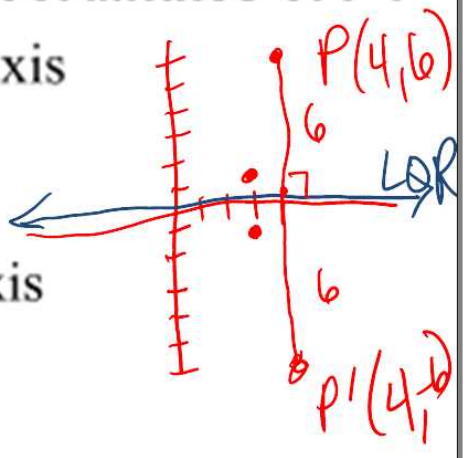
Reflect point *P*. State the coordinates of *P'*.

5. $P(4, 6)$; reflection in x-axis

$P'(4, -6)$

6. $P(5, 1)$; reflection in x-axis

$P'(5, -1)$



Coordinate Rules for Reflections

P(5,1) P'(5,-1)

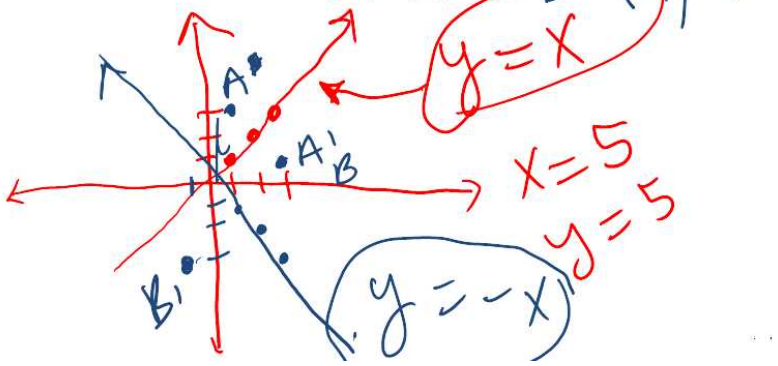
- If (a, b) is reflected in the x-axis, then its image is the point $(a, -b)$.
- If (a, b) is reflected in the y-axis, then its image is the point $(-a, b)$.

P(5,1) P'(-5,1)

- If (a, b) is reflected in the line $y = x$, then its image is the point (b, a).

A(1,3) A'(3,1) B(3,1) B'(-1,-3)

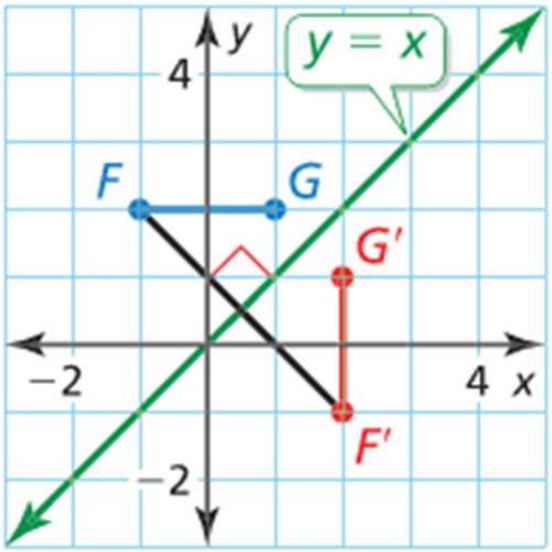
- If (a, b) is reflected in the line $y = -x$, then its image is the point $(-b, -a)$.



Graph $\overline{FG}$ with endpoints $F(-1, 2)$ and $G(1, 2)$ and its image after a reflection in the line $y = x$.

F'(2,-1) G'(2,1)

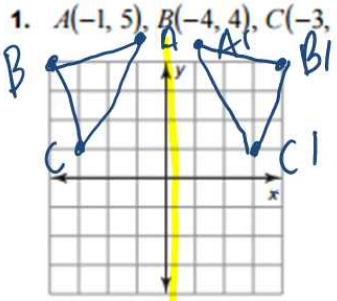
SOLUTION



SJ pg. 100

In Exercises 1–4, graph $\triangle ABC$ and its image after a reflection in the given line.

1. $A(-1, 5)$, $B(-4, 4)$, $C(-3, 1)$; y-axis

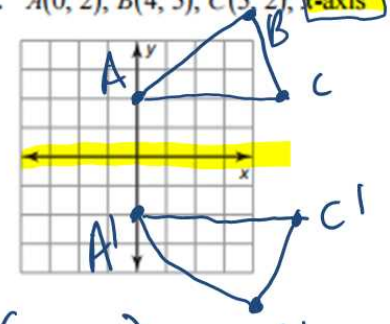


$A'(1, 5)$

$B'(4, 4)$

$C'(3, 1)$

2. $A(0, 2)$, $B(4, 5)$, $C(5, 2)$; x-axis

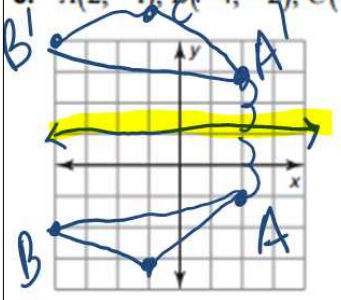


$A'(0, -2)$

$B'(4, -5)$

$C'(5, -2)$

3. $A(2, -1)$, $B(-4, -2)$, $C(-1, -3)$; $y = 1$



C

$A'(2, 3)$

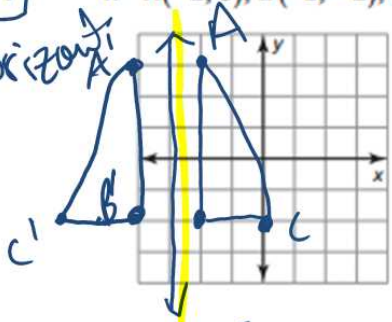
$B'(4, 4)$

$C'(-1, 5)$

4. $A(-2, 3)$, $B(-2, -2)$, $C(0, -2)$; $x = -3$

horizontal

Vert.



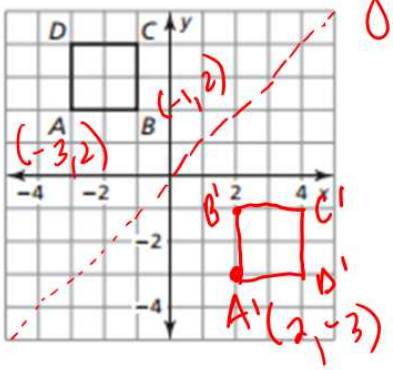
$A'(-4, 3)$

$B'(-4, -2)$

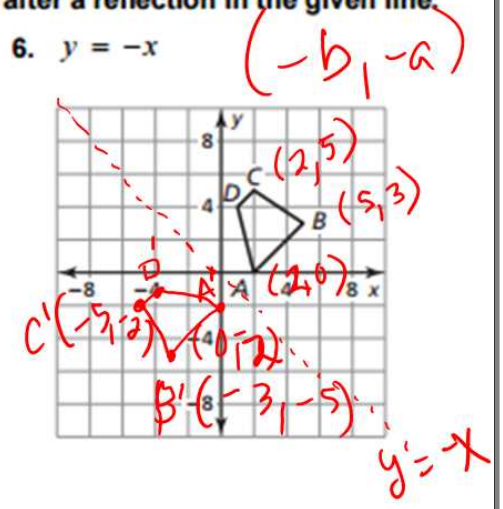
$C'(-6, -2)$

In Exercises 5 and 6, graph the polygon's image after a reflection in the given line.

5. $y = x$



6. $y = -x$



Homework

Pg. 178 # 3, 6, 10, 13 – 16

Pg. 186 # 3-6, 7 – 9, 11