You will need the handout from the front table.

Translations

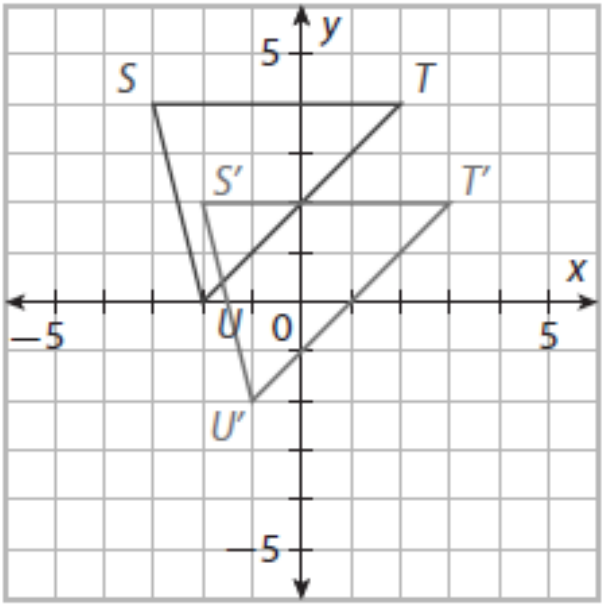
Ex. Find the coordinates of the preimage and image points, and then write the coordinate rule for the transformation.

$(x, y) \rightarrow (x+1, y-2)$

$S(-3, 4)$ $S'(-2, 2)$

$T(2, 4)$ $T'(3, 2)$

$U(-2, 0)$ $U'(-1, -2)$



This transformation is called a translation because the preimage is "shifted" to get the image.

In the last example, the coordinate notation was $(x, y) \rightarrow (x + 1, y - 2)$.

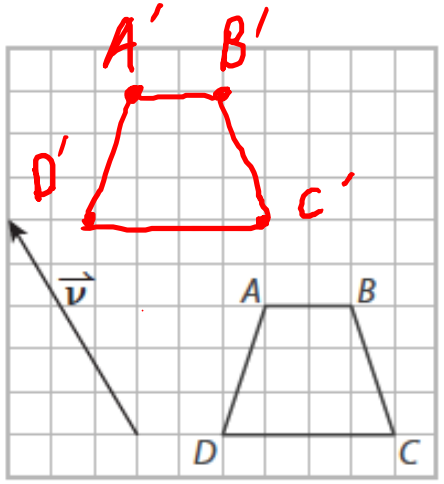
→ The preimage was shifted 1 unit right and 2 units down

Ex. Describe the transformation $(x, y) \rightarrow (x + 4, y + 7)$

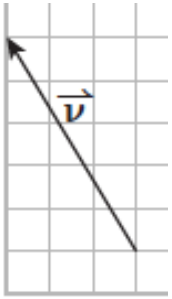
right 4, up 7

A convenient way to describe a translation is with a vector, which is an arrow that shows the direction and distance of the shift.

Ex. Draw the image of $ABCD$ under a translation along vector v.

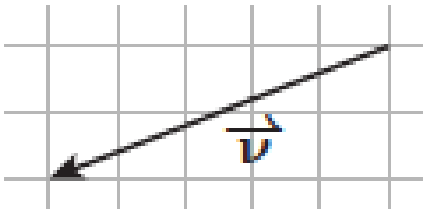


Since vector v goes left 3 units and up 5 units, it's simpler to write the vector in the <u>component form</u> $\langle -3,5 \rangle$



Since vector v goes left 3 units and up 5 units, this transformation can be described using the coordinate notation $(x, y) \rightarrow (x - 3, y + 5)$

<u>All of these describe the same thing:</u>



- Translate along vector v
- Translate along the vector $\langle -5, -2 \rangle$
- Translate using coordinate notation $(x, y) \rightarrow (x - 5, y - 2)$
- Translate left 5 units and down 2 unit

Ex. Consider preimage coordinates $A(3,0)$, $B(2,-2)$, and $C(4,-2)$ and vector $\langle -2,3 \rangle$.

add 3 to y's

sub. 2 from x's

a) Find the image coordinates after translating along the vector.

b) Graph the image coordinates.

c) Write the transformation in coordinate notation.

equations

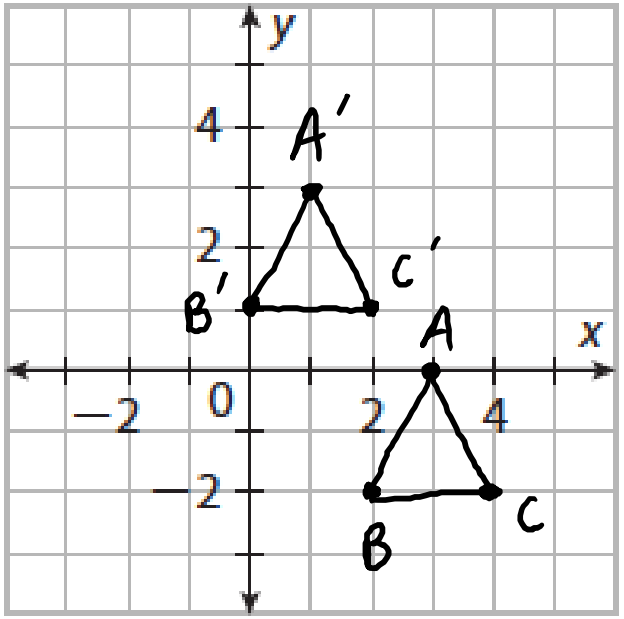
$(x,y) \rightarrow (\quad , \quad)$

$A(3,0)$ $A'(1, 3)$

$B(2,-2)$ $B'(0, 1)$

$C(4,-2)$ $C'(2, 1)$

$(x,y) \rightarrow (x-2, y+3)$



Ex. Consider preimage coordinates $P(2,-1)$, $Q(2,-3)$, and $R(4,-3)$ and vector $\langle -4, 1 \rangle$.

add 1 to y's

sub. 4 from x's

a) Find the image coordinates after translating along the vector.

b) Graph the image coordinates.

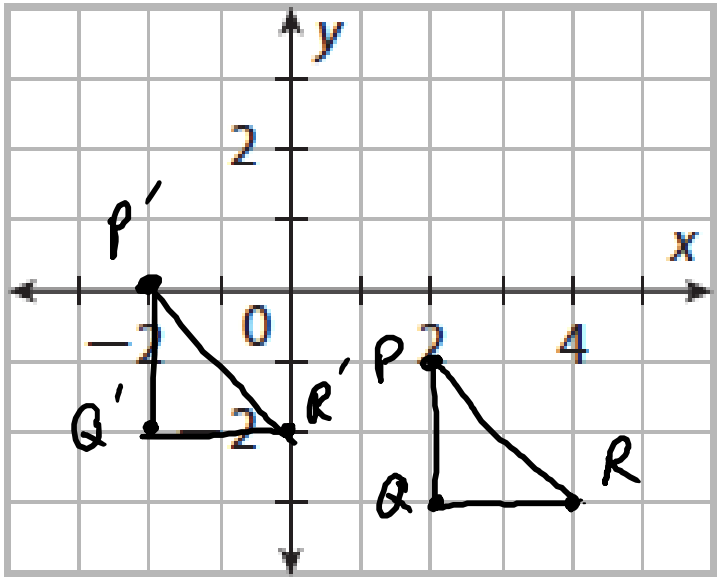
c) Write the transformation in coordinate notation.

$P(2,-1)$ $\quad P'(-2,0)$

$Q(2,-3)$ $\quad Q'(-2,-2)$

$R(4,-3)$ $\quad R'(0,-2)$

$(x,y) \rightarrow (x-4, y+1)$



Ex. Consider the translation shown.

a) Identify the vector used for the translation. $\langle 5, 3 \rangle$

b) Write the transformation in coordinate notation.

$(x, y) \rightarrow (x+5, y+3)$