Warm Up

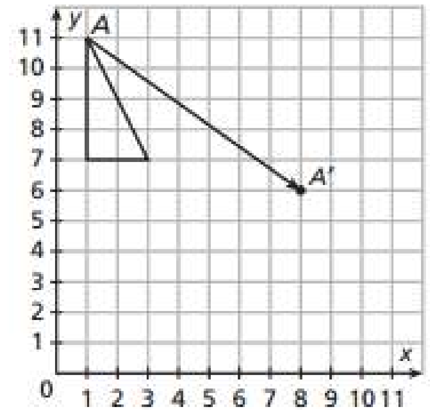
1. Give the new coordinates if the point (3, -2) is reflected over the x-axis.
2. Give the new coordinates if the point (3, -2) is reflected over the y-axis.

Translations

MCC8.G.3

1 EXPLORE Applying Translations

The triangle is the preimage (input). The arrow shows the motion of a translation and how point *A* is translated to point *A′*.



A Trace the triangle on a piece of paper. Slide point *A* of your traced triangle down the arrow to model the translation.

B Sketch the image (output) of the translation.

C Describe the motion modeled by the translation.

Move ______ units right and ______ units down.

D Complete the ordered pairs to describe the effect of the translation on point *A*.

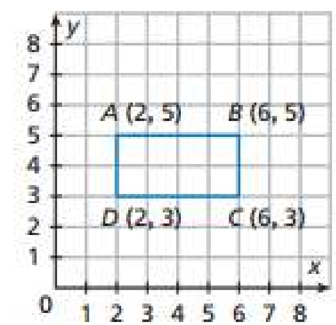
(1, 11) becomes $\left(1 + \boxed{}, 11 + \boxed{}\right) = \left(\boxed{}, \boxed{}\right)$

E You can give a general rule for a translation by telling the number of units to move up or down and the number of units to move left or right. Complete the ordered pairs to write a general rule for this transformation.

$(x, y) \rightarrow \left(x + \boxed{}, y + \boxed{}\right)$

TRY THIS!

1. Apply the translation $(x, y) \rightarrow (x - 2, y + 3)$ to the figure shown. Give the coordinates of the vertices of the image. (The image of point *A* is point *A′*.)



A′: (______, ______)

B′: (______, ______)

C′: (______, ______)

D′: (______, ______)

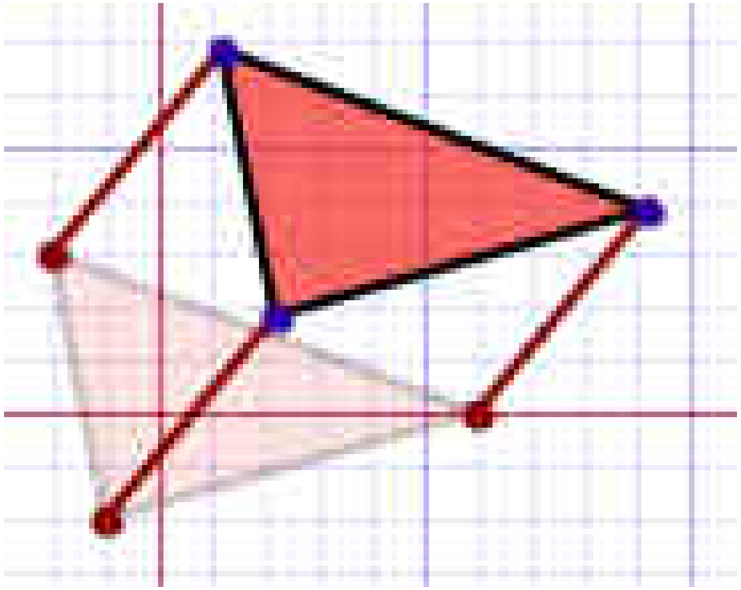
Translation

- In Geometry, "Translation" simply means **Moving** ...
- **... without rotating, resizing or anything else, just moving.**

- Every point of the shape must move:
- the **same distance**
- in the **same direction.**

INTRO

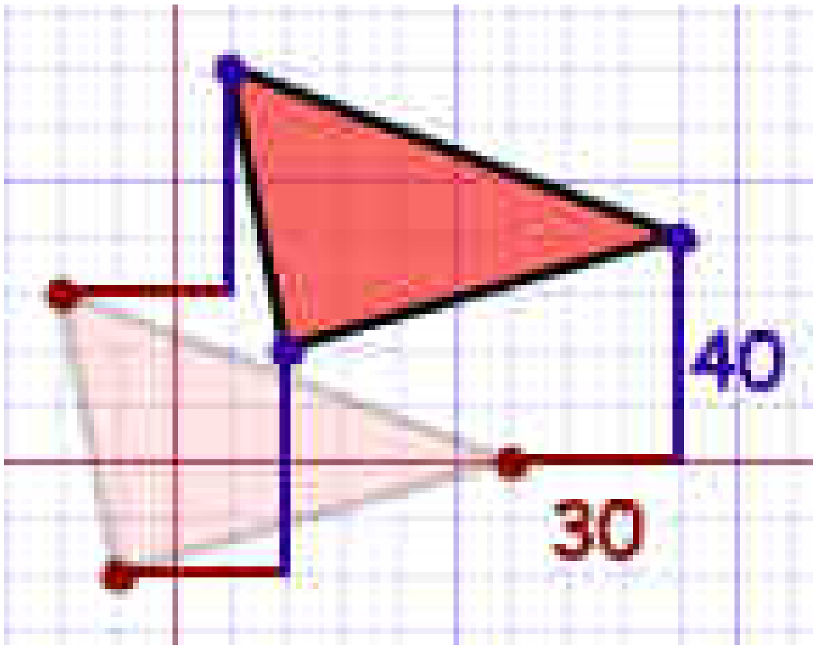
VIDEO

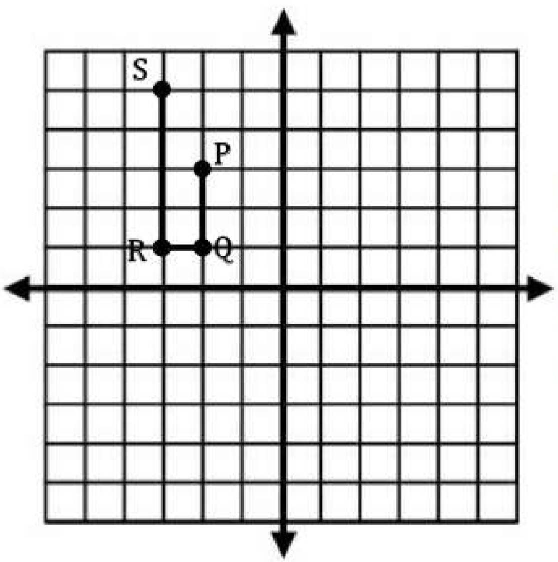


TRANSLATIONS	
Type	**Rule**
Move right a units	Add a to each x-coordinate: $(x, y) \to (x + a, y)$
Move left a units	Subtract a from each x-coordinate: $(x, y) \to (x - a, y)$
Move up b units	Add b to each y-coordinate: $(x, y) \to (x, y + b)$
Move down b units	Subtract b from each y-coordinate: $(x, y) \to (x, y - b)$

Writing it down

- **Example**: if we want to say that the shape gets moved 30 Units in the "X" direction, and 40 Units in the "Y" direction, we can write:
- This says "all the x and y coordinates will become x+30 and y+40"





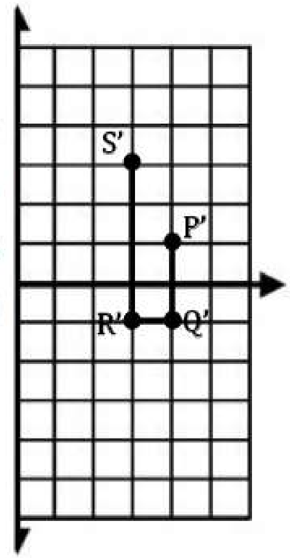
$PQRS \rightarrow P'Q'R'S'$

$P(\quad) \rightarrow P'(\quad)$

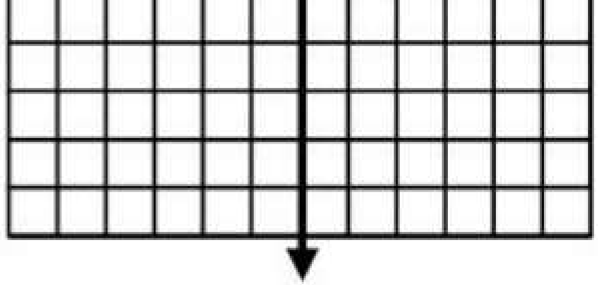
$Q(\quad) \rightarrow Q'(\quad)$

$R(\quad) \rightarrow R'(\quad)$

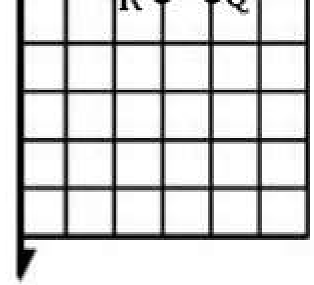
$S(\quad) \rightarrow S'(\quad)$



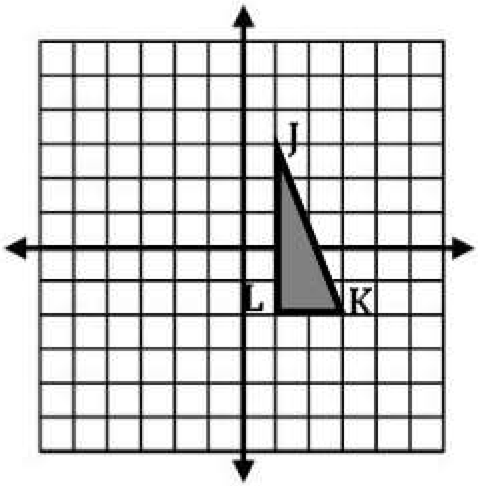
$$(x, y) \longrightarrow (x + 6, y - 2)$$

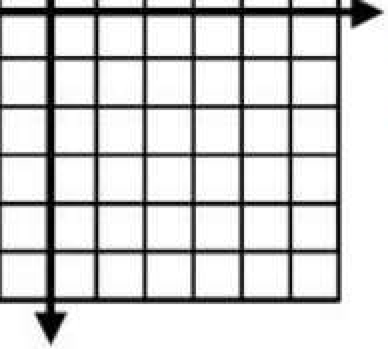


$S(\quad) \rightarrow S'(\quad)$



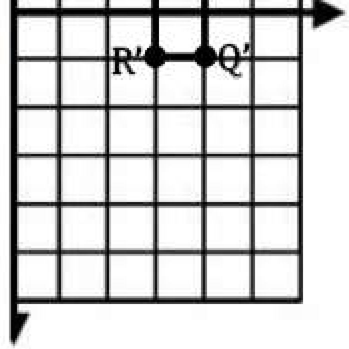
Translate ΔJKL left 3 units and up 4 units.





$R(\quad) \rightarrow R'(\quad)$

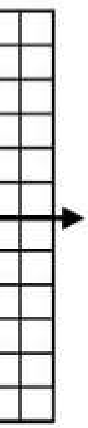
$S(\quad) \rightarrow S'(\quad)$



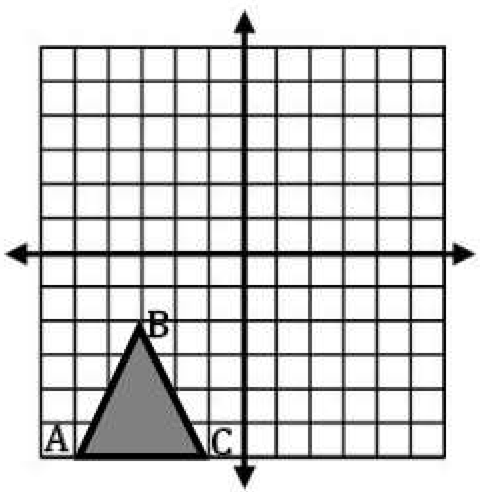
$+ 6, y - 2)$

3

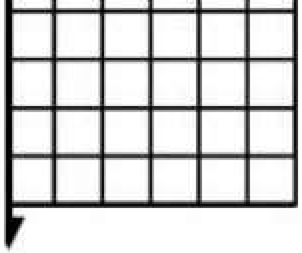
.



Translate ΔABC right 5 units and up 3 units.

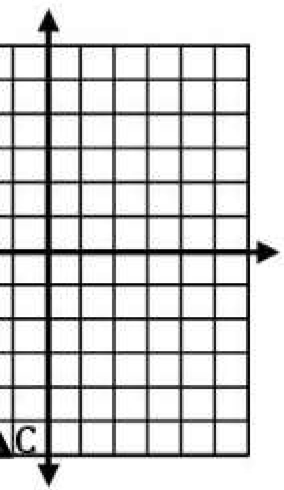


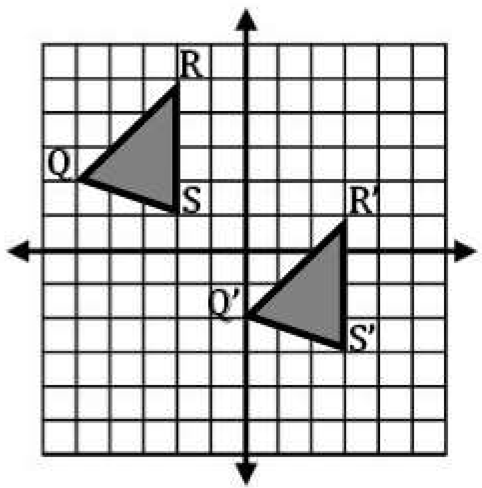
) → S'(   )



6, $y - 2$)

te ΔABC right
and up 3 units.



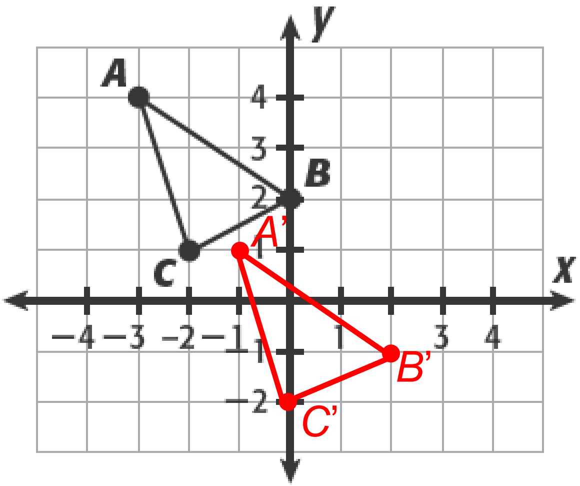


Describe a translation that maps ΔQRS to $\Delta Q'R'S'$

Additional Example 1: Graphing Translations on a Coordinate Plane

Graph the translation of triangle *ABC* 2 units right and 3 units down.

Add 2 to the *x*-coordinate of each vertex, and subtract 3 from the *y*-coordinate of each vertex.

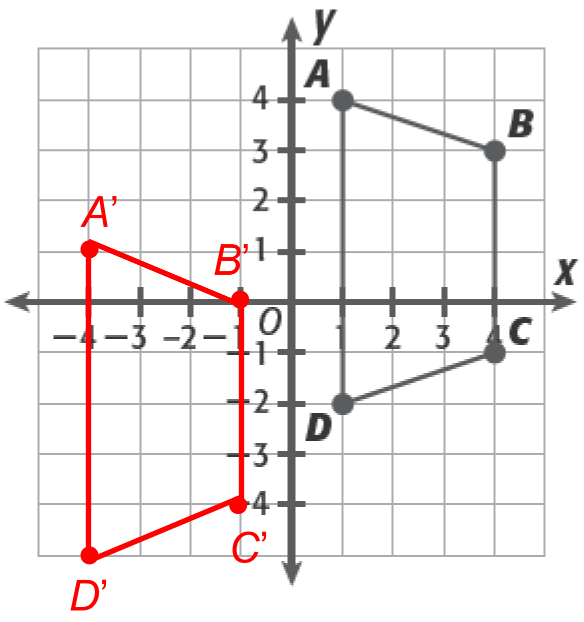


Rule	Image
$A(-3, 4) \rightarrow A'(-3 + 2, 4 - 3)$	$A'(-1, 1)$
$B(0, 2) \rightarrow B'(0 + 2, 2 - 3)$	$B'(2, -1)$
$C(-2, 1) \rightarrow C'(-2 + 2, 1 - 3)$	$C'(0, -2)$

Check It Out: Example 1

Graph the translation of the quadrilateral *ABCD* 3 units down and 5 units left.

Subtract 5 from the *x*-coordinate of each vertex, and subtract 3 from the *y*-coordinate of each vertex.



Rule	Image
A(1, 4)→*A*′ (1 – 5, 4 – 3)	*A*′(−4, 1)
B(4, 3)→*B*′ (4 – 5, 3 – 3)	*B*′(−1, 0)
C(4, −1)→*C*′ (4 – 5, −1 – 3)	*C*′(−1, −4)
C(1, −2)→*D*′ (1 – 5, −2 – 3)	*D*′(−4, −5)