

Horizontal and Vertical Translations

Translations

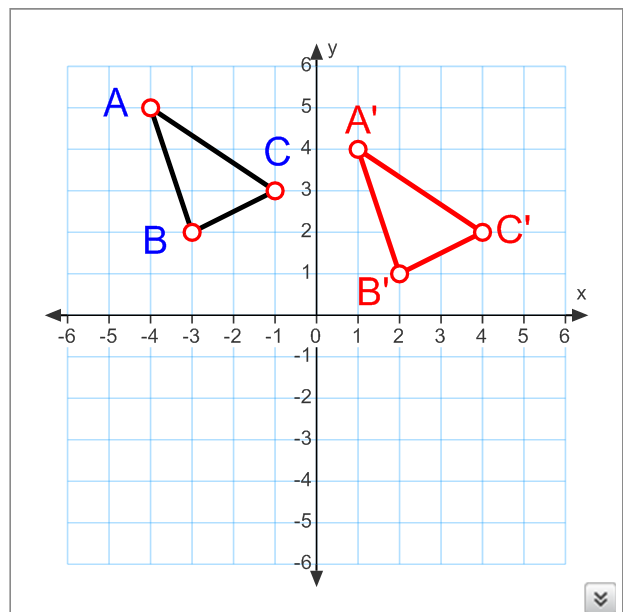
A _____ alters a graph by altering its _____, _____, and/or _____.

A _____ is a type of transformation that alters the position of a graph. The shape and orientation do not change.

Example 1

Triangle ABC has undergone a translation 5 units to the right and 1 unit down.

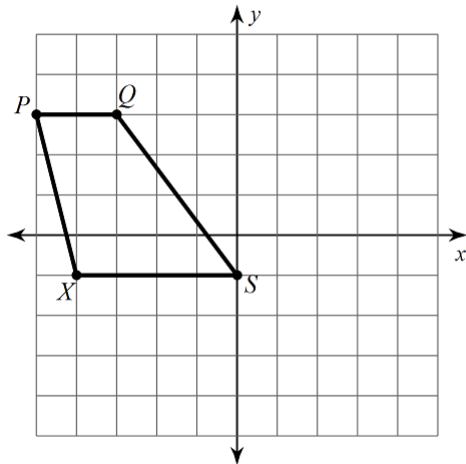
We can express this translation in _____ as follows.



Practice Questions

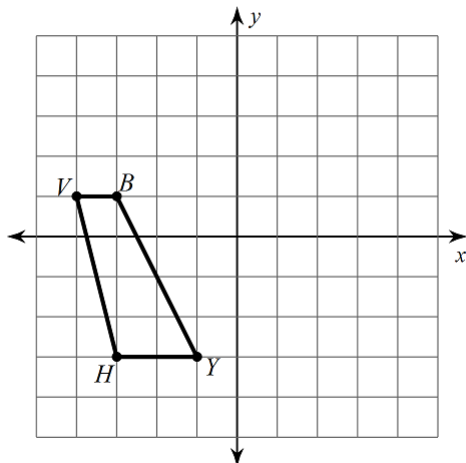
Graph the image of the figure using the transformation given.

translation: 2 units right and 1 unit up

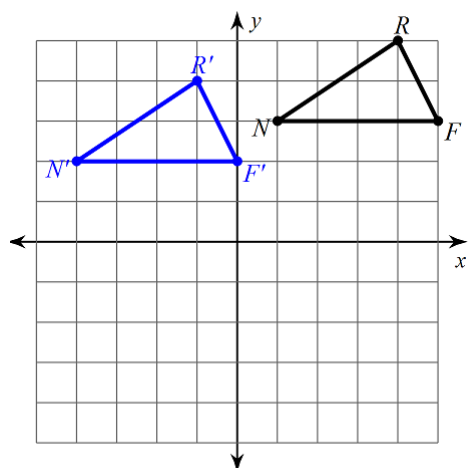


Graph the image of the figure using the transformation given.

translation: $(x, y) \rightarrow (x + 6, y + 1)$

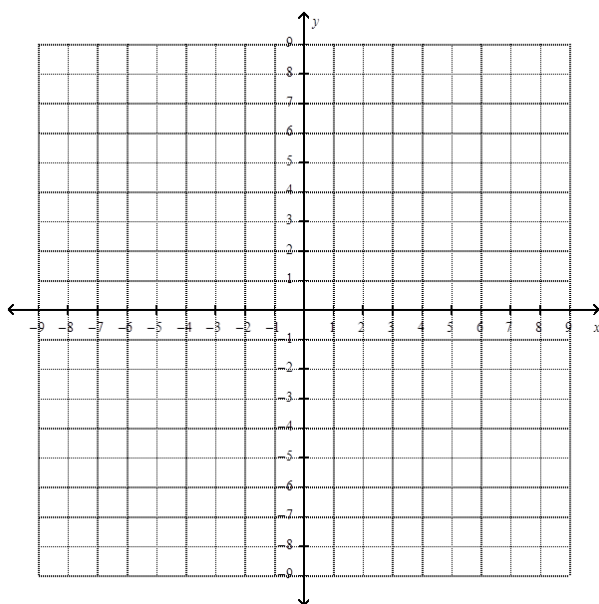


Describe a rule for the following translation using mapping notation.

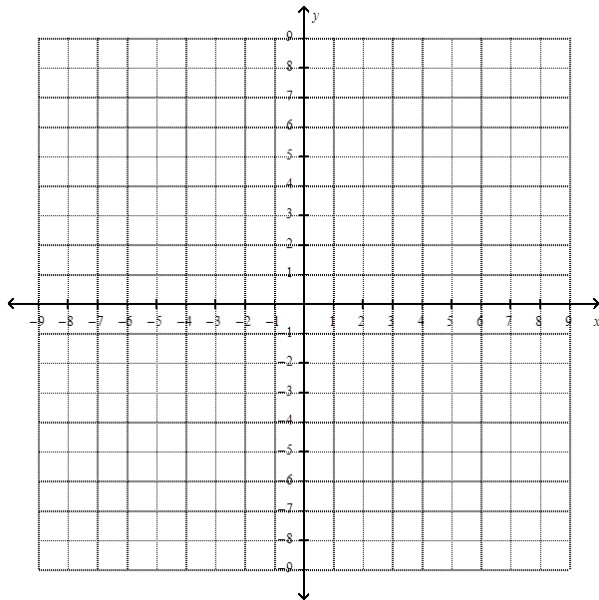


Vertical Shifts (Translations)

Graph the function $y = x^2$, $y = x^2 + 3$, $y = x^2 - 4$ on the same graph. What do you notice?



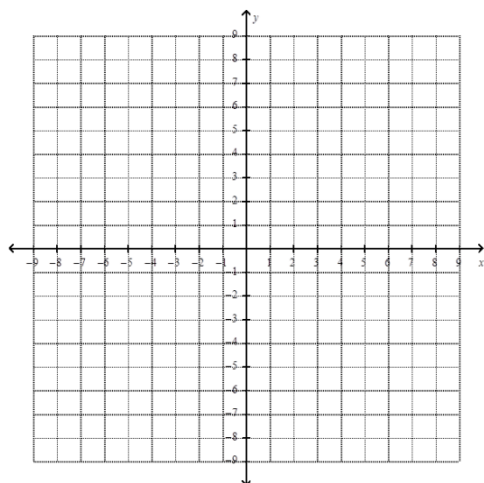
Graph the function $y = |x|$, $y = |x| - 1$, $y = |x| + 2$ on the same graph.
What do you notice?



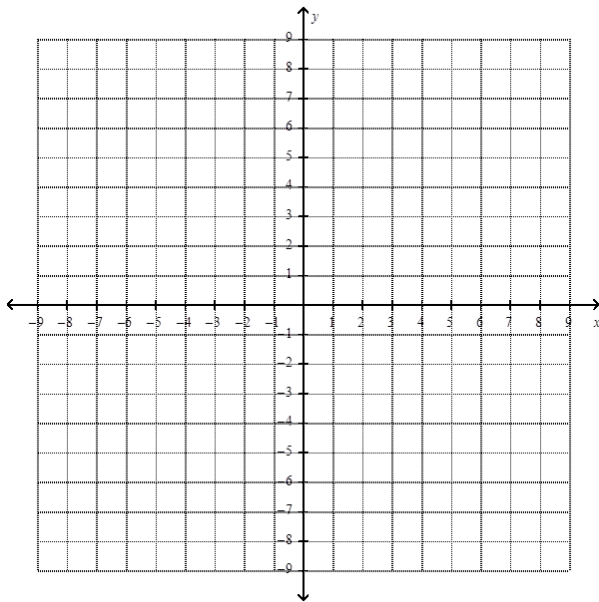
In general $y - k = f(x)$ or $y = f(x) + k$ represents a vertical translation of the graph of the function $y = f(x)$. If $k > 0$, then the graph is translated k units up. If $k < 0$, then the graph is translated $|k|$ units down.

Horizontal Shifts (Translations)

Graph the function $y = x^2$, $y = (x - 3)^2$, $y = (x + 4)^2$ on the same graph.
What do you notice?



Graph the function $y = |x|$, $y = |x + 1|$, $y = |x - 2|$ on the same graph.
What do you notice?



In general $y = f(x - h)$ represents a horizontal translation of the graph of the function $y = f(x)$. If $h > 0$, then the graph is translated h units to the right. If $h < 0$, then the graph is translated $|h|$ units to the left.

Example 2

Given the graph of $y = f(x)$ sketch the graph of the transformed function $y = f(x - 2) + 1$.

