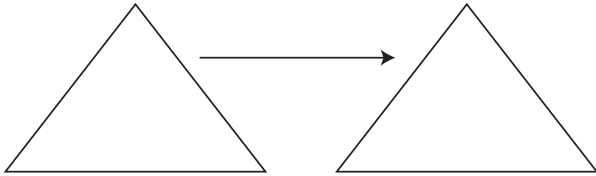


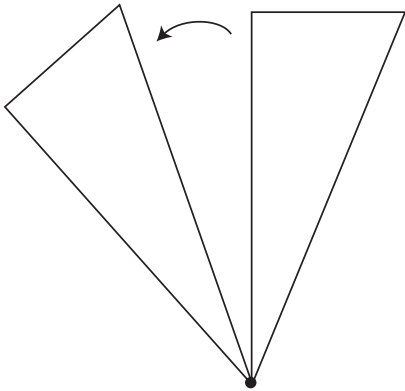
Transformation of Shapes

Sketch a planar figure that is the result of two or more transformations.

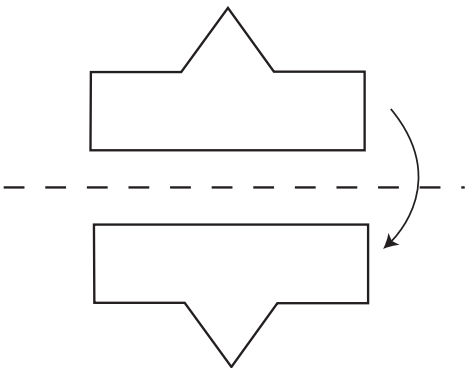
A transformation of a planar figure is a rule that assigns each point of the figure to a different point (or possibly to the same point). A rule that moves the figure without changing its size or shape is called a rigid transformation. Several types of rigid transformations are given special names. A translation is a rule that moves a figure along a straight line.



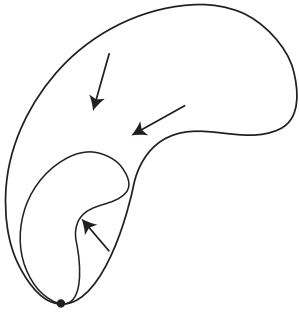
A rotation is a movement of a figure around a turning point, or vertex.



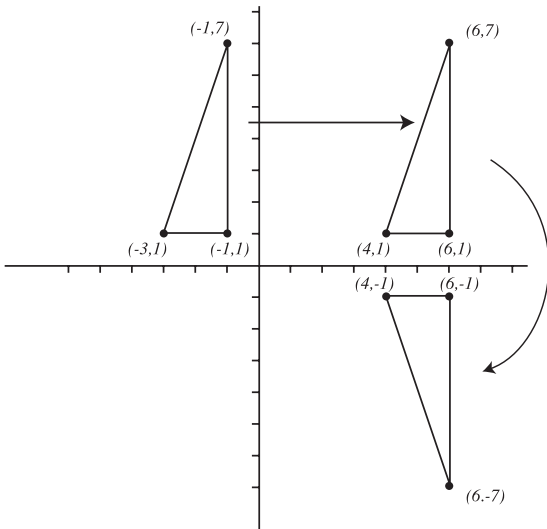
A reflection is performed when a figure is flipped over a given line.



A dilation is a transformation that changes the size of a figure, but not its shape. A dilation, therefore, is not a rigid transformation.



When a planar figure is subjected to two transformations, one after the other, the figure that results can be found by applying the first transformation to the original figure and then applying the second transformation to the resulting figure after the first transformation. For example, consider the triangle with vertices at $(-3, 1)$, $(-1, 1)$ and $(-1, 7)$. Suppose this figure is first translated 7 units horizontally to the right, and then reflected across the x -axis. The graph below shows the original figure, the intermediate figure, and the final resulting figure.

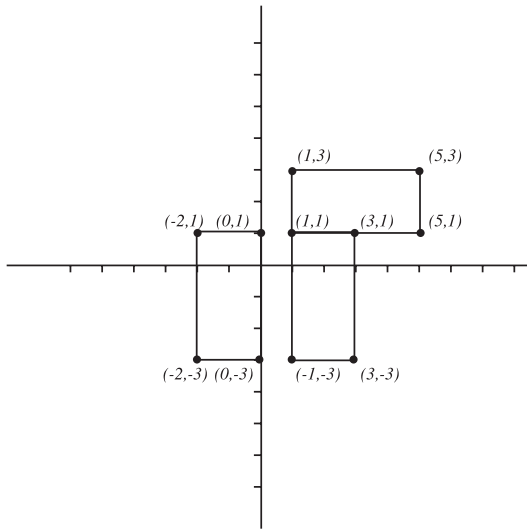


Example 1:

The rectangle with vertices at $(1, 1)$, $(1, 3)$, $(5, 1)$, and $(5, 3)$ is rotated 90° clockwise around the point $(1, 1)$, and then translated 3 units horizontally left. Find the coordinates of the resulting figure.

Solution:

As the diagram below shows, the resulting figure has coordinates $(-2, 1)$, $(0, 1)$, $(-2, -3)$, and $(0, -3)$.



Example 2:

The square with coordinates $(-1, 1)$, $(-2, 1)$, $(-2, 2)$, and $(-1, 2)$ is reflected across the y -axis and the result is reflected across the x -axis. What are the coordinates of the resulting figure?

Solution:

As the diagram below shows, the resulting figure has coordinates $(1, -1)$, $(2, -1)$, $(1, -2)$, and $(2, -2)$.

