Math 191 Fundamentals of Mathematics II
14.1 Reflections, Translations and Rotations and 14.2 Symmetry
March 24, 2014

Transformations of the Plane

A _____ (also known as a _____) of a plane across a given line called a *line of reflection* is a transformation of the plane which acts on each point as follows. For a point P, draw the _____ passing through P that is _____ to the _____. Then move the point P to the point on this line that is the _____ from line of reflection.

Note: In a reflection, the points on the line of reflection _____.

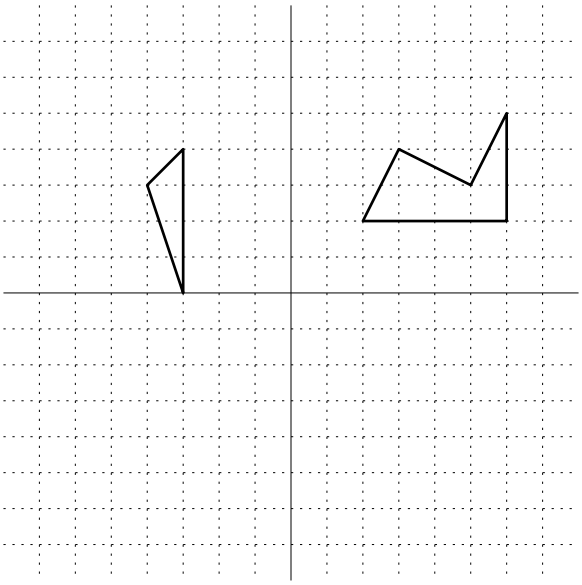
A _____ (also known as a _____ of a plane by a _____ in a _____ is a transformation of a plane where every point _____ _____.

A _____ (also know as a _____) about a point through a given _____ is a transformation of a plane where every point _____ _____.

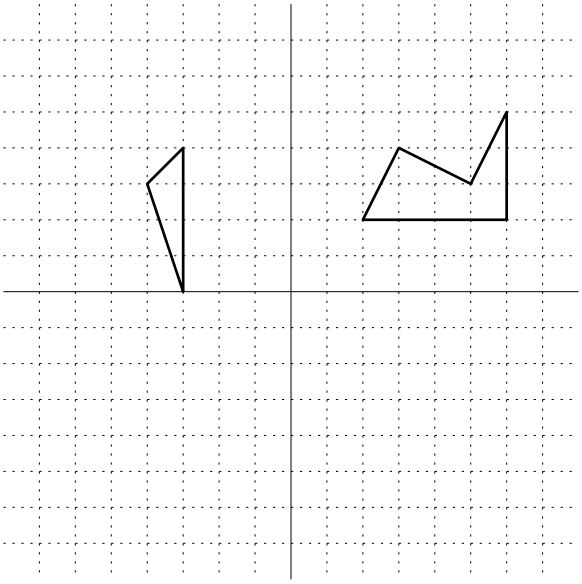
A _____ is a transformation of a plane that is a combination of a _____ and then a _____ in the direction of the _____.

Reflections, translations, rotations, and glide reflections are special because they do not change _____ or _____. All transformations of the plane that preserve _____ and _____ are combinations of reflections, translations, rotations, and glide reflections.

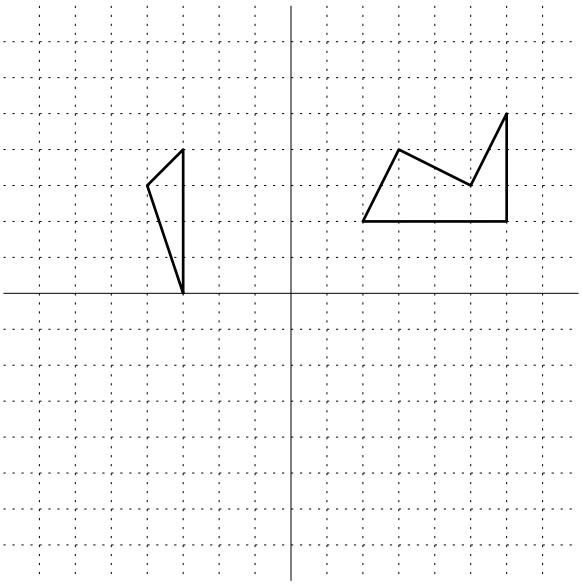
Draw the result of reflecting the shapes across the x-axis (the horizontal axis).



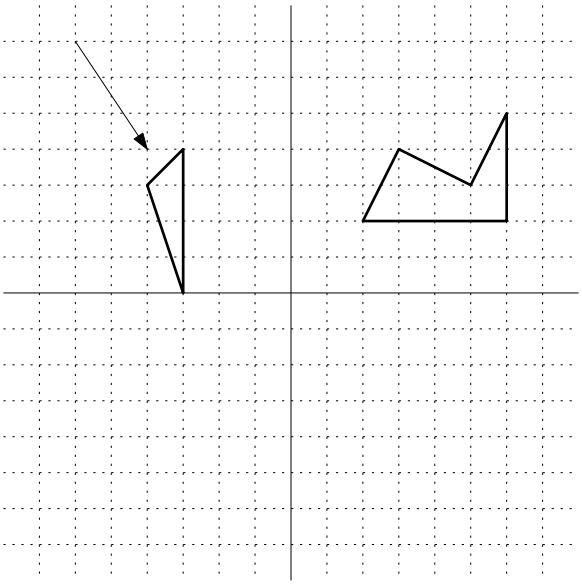
Draw the result of rotating the shapes about the origin through a 180° angle.



Draw the result of rotating the shapes about the origin through a 90° angle.



Draw the result of translating the shapes according to the direction and distance indicated by the arrow.



Symmetry

Symmetry can be used to make beautiful patterns and can be found in art, architecture, and nature. There are _____ kinds of symmetry.

A shape or design has _____ or _____ if there is a _____ in the plane such that the shape is _____ (as a whole) by a _____ across that line. This line is called the _____. Another way of explaining this kind of symmetry is to say that if you were to _____ the shape along the line, the two sides of the shape would _____.

A design has _____ if there is a _____ of the plane that _____ the design as a whole. This kind of symmetry occurs only when the design extends _____.

A shape or design has _____ if there is a _____ of the plane of more than _____ but less than _____ that _____ the shape or design as a whole. We say a shape has _____ if it is preserved by a rotation of _____.

A design or pattern has _____ if there is a _____ and a _____ that _____ the design or pattern.

Of course, many shapes and designs have more than one kind of symmetry.