Geometry Info Sheet #18

Transformations in Coordinate Planes; Reflections and Symmetry

Definitions

Transformation: A function that moves or changes a figure in some way to produce a new figure

Pre-Image: An object or figure before it is transformed

Image: An object or figure after undergoing a transformation

Rigid Transformation: A transformation that does not change the size or the shape of a figure

Dilation: A transformation that changes the size, but not the shape, of a figure; the size of the transformed image may be larger or smaller than the original image

Reflection: A rigid transformation which involves flipping a figure over a line

In a reflection, a line plays the role of a mirror, and every point in a figure is flipped across the line. That line is called the **line of reflection**.

Glide Reflection: A combination of a translation and a reflection (in any order); switching the order of the two transformations, while still creating a glide reflection, may result in the final image being in a different location

Reflectional Symmetry (sometimes called line symmetry or mirror symmetry) occurs when one half of an image or figure is an exact (or nearly exact) reflection of the other half. The line of reflection (or mirror line) is called the **axis of symmetry** (or line of symmetry). A figure can have multiple axes of symmetry.

Transformation Rules for Coordinate Planes

Translation a units horizontally and b units vertically: $T(x, y) \rightarrow (x+a,\ y+b)$

Reflection across x-axis: $T(x, y) \rightarrow (x, -y)$

Reflection across y-axis: $T(x, y) \rightarrow (-x,\ y)$

Reflection across $y = x$: $T(x, y) \rightarrow (y,\ x)$

Reflection across $y = -x$: $T(x, y) \rightarrow (-y, -x)$