

Geometry Info Sheet #17

Transformations in Coordinate Planes; Vectors and Translations

Definitions

The word **transform** means "to change". In geometry, a **transformation** involves changing the position (and sometimes the orientation and size) of a figure or image in a coordinate plane. In other words, a shape is moved from one place to another.

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

Image: An object or figure after undergoing a transformation

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

Rigid Transformation: Also known as a **rigid motion** or an **isometry**; a transformation that does not change the size or the shape of a figure

Vector: A quantity that has direction and magnitude (size/length); it can be represented in a coordinate plane by a directed line segment (a segment with an arrow at one end), indicating the direction of movement

A vector has an **initial point** (starting point) and a **terminal point** (ending point), and can be written in **component form**, which combines the **horizontal component** and **vertical component** of the vector.

For example, the vector $\langle 5, -3 \rangle$ indicates movement five units right and three units down.

Translation: A rigid transformation which involves shifting or sliding a figure in any direction

In a translation, every point in a figure moves in a straight line, and all points move the same distance and in the same direction. This can be indicated by a vector. The paths of the points are parallel.

Composition of Transformations: A combination of two or more consecutive transformations, each performed on the previous image.

Transformation Rules for Coordinate Planes

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