Rules of Transformations

Line Reflections

A reflection is a flip. It is an opposite isometry - the image does not change size but the lettering is reversed.

Reflection in the ***x*-axis:**	When you reflect a point across the x-axis, the x-coordinate remains the same, but the y-coordinate is transformed into its opposite. $P(x,y) \rightarrow P'(x,-y)$ or $r_{x-axis}(x,y) = (x,-y)$
Reflection in the ***y*-axis:**	When you reflect a point across the y-axis, the y-coordinate remains the same, but the x-coordinate is transformed into its opposite. $P(x,y) \rightarrow P'(-x,y)$ or $r_{y-axis}(x,y) = (-x,y)$
Reflection in $y = x$:	When you reflect a point across the line $y = x$, the x-coordinate and the y-coordinate change places. $P(x,y) \rightarrow P'(y,x)$ or $r_{y=x}(x,y) = (y,x)$
Reflection in $y = -x$:	When you reflect a point across the line $y = -x$, the x-coordinate and the y-coordinate change places and are negated (the signs are changed). $P(x,y) \rightarrow P'(-y,-x)$ or $r_{y=-x}(x,y) = (-y,-x)$

Point Reflections

A point reflection exists when a figure is built around a single point called the center of the figure. It is a direct isometry.

Reflection in the **Origin:**	While any point in the coordinate plane may be used as a point of reflection, the most commonly used point is the origin. $P(x,y) \rightarrow P'(-x,-y)$ or $r_{origin}(x,y) = (-x,-y)$

Rotations

(assuming center of rotation to be the origin)

A rotation turns a figure through an angle about a fixed point called the center. A positive angle of rotation turns the figure counterclockwise, and a negative angle of rotation turns the figure in a clockwise direction. It is a direct isometry.

Rotation of **90°:**	$R_{90^\circ}(x,y) = (-y,x)$
Rotation of **180°:**	$R_{180^\circ}(x,y) = (-x,-y)$ (same as point reflection in origin)
Rotation of **270°:**	$R_{270^\circ}(x,y) = (y,-x)$

Dilations

A dilation is a transformation that produces an image that is the same shape as the original, but is a different size. **NOT an isometry.** Forms similar figures.

Dilation of scale factor **k**:	The center of the dilation is assumed to be the origin unless otherwise specified. $D_k(x,y) = (kx,ky)$

Translations

A translation "slides" an object a fixed distance in a given direction. The original object and its translation have the same shape and size, and they face in the same direction. It is a direct isometry.

Translation of **h, k:**	$T_{h,k}(x,y) = (x+h, y+k)$