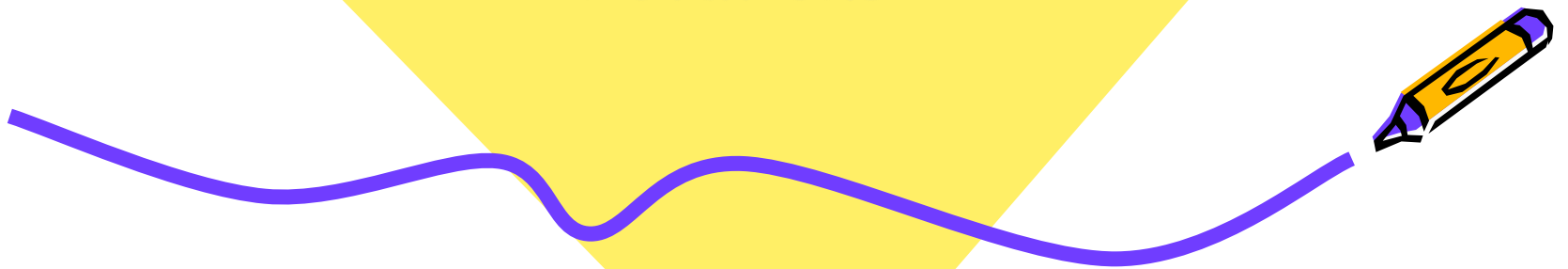


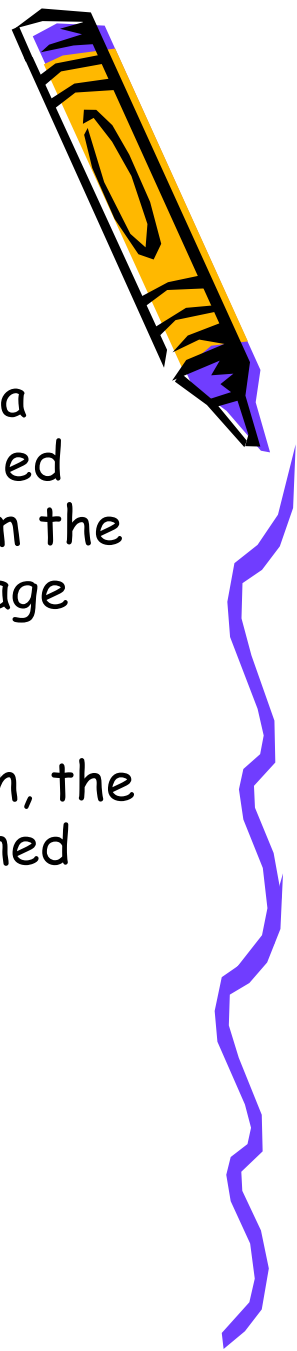


Geometry

Rotations



Vocabulary



Rotation

A rotation is a transformation in which a figure is turned about a fixed point called the center of rotation. Rays drawn from the center of rotation to a point and its image form the angle of rotation.

The center of rotation can be the origin, the center of the figure, or any other defined point.



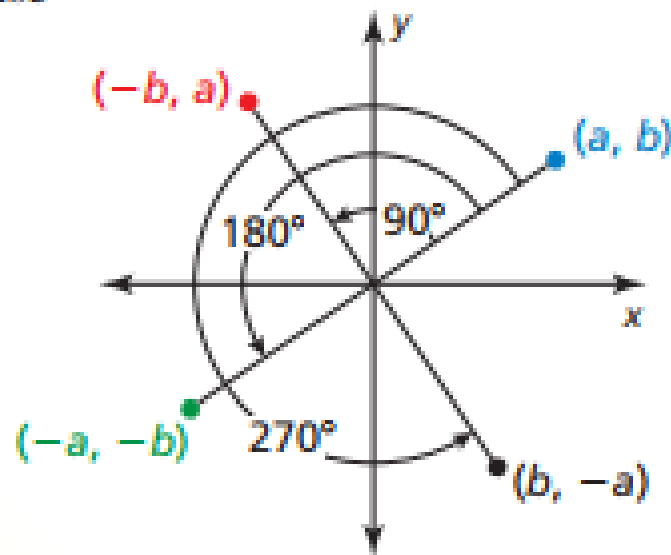
Rotations



Coordinate Rules for Rotations about the Origin

When a point (a, b) is rotated counterclockwise about the origin, the following are true.

- For a rotation of 90° ,
 $(a, b) \rightarrow (-b, a)$.
- For a rotation of 180° ,
 $(a, b) \rightarrow (-a, -b)$.
- For a rotation of 270° ,
 $(a, b) \rightarrow (b, -a)$.

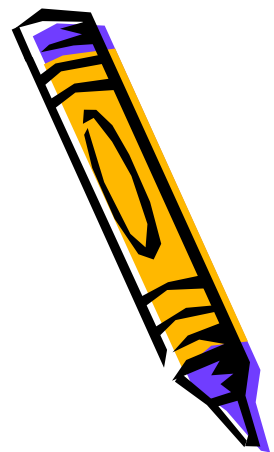


Rotations

A rotation indicated by a positive degree value, indicates a counterclockwise rotation.

A rotation indicated by a negative degree value, indicates a clockwise rotation.

1. A rotation of -90° is the same as a rotation of 270° .
2. A rotation of -180° is the same as a rotation of 180° .
3. A rotation of -270° is the same as a rotation of 90° .



Rotation



<https://www.youtube.com/watch?v=NhtTKhP3d6s>

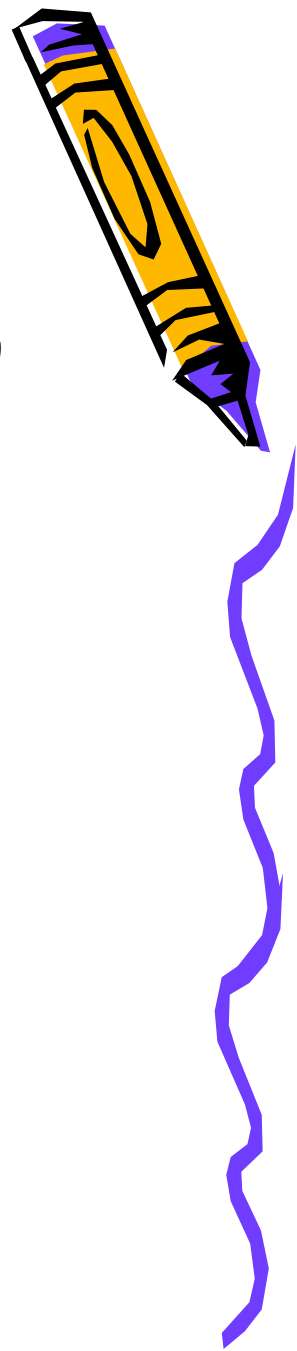
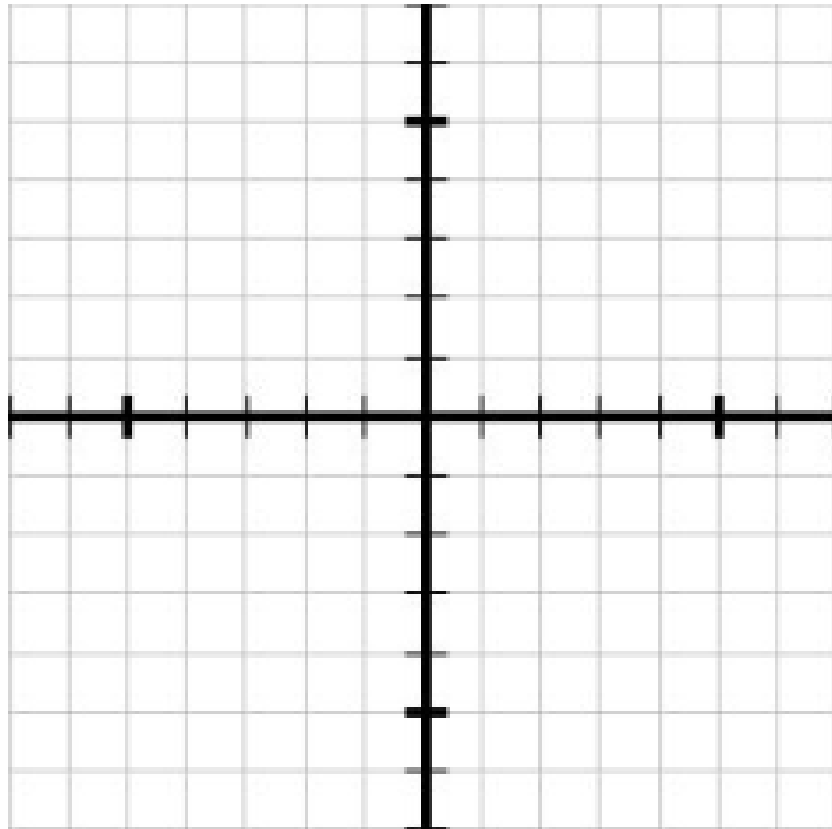
Animated video about Rotation



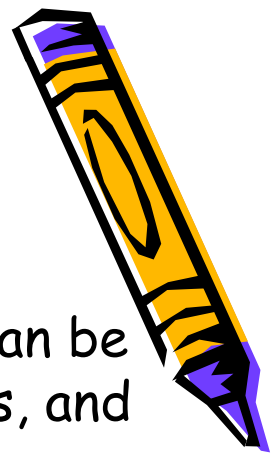
Rotations

Using the coordinate plane below:

1. Graph $\triangle JKL$ with vertices $J(2, 3)$, $K(1, -1)$, $L(-1, 0)$
2. Graph the translation: $(x, y) \rightarrow (x - 4, y - 4)$
3. Graph the rotation: 270° about the origin



Vocabulary



Rotational Symmetry

Rotational Symmetry is when a figure can be rotated about its center by 180° or less, and the resulting image maps directly to the original. Note: Even if rotational symmetry occurs at rotation values greater than 180° , we only denote the intervals of 180° or less.

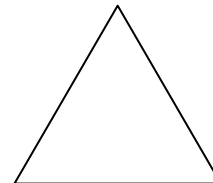
A rectangle has rotational symmetry at 180° :



A square has rotational symmetry at 90° and 180° :



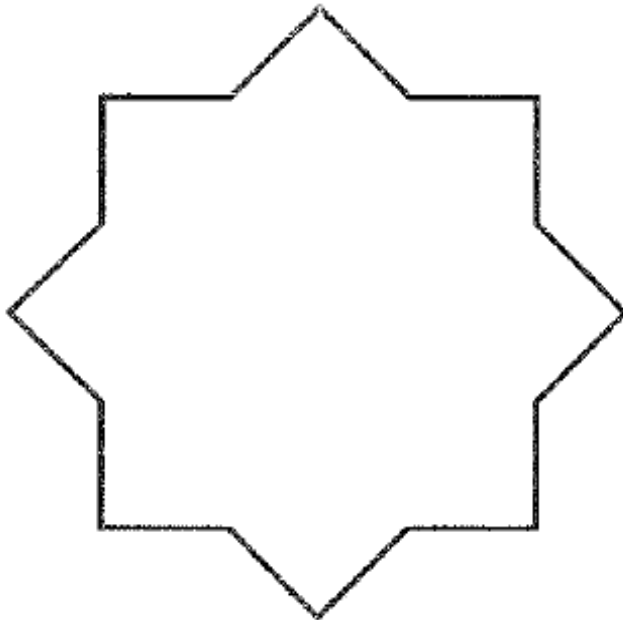
An equilateral triangle has rotational symmetry at 120° :



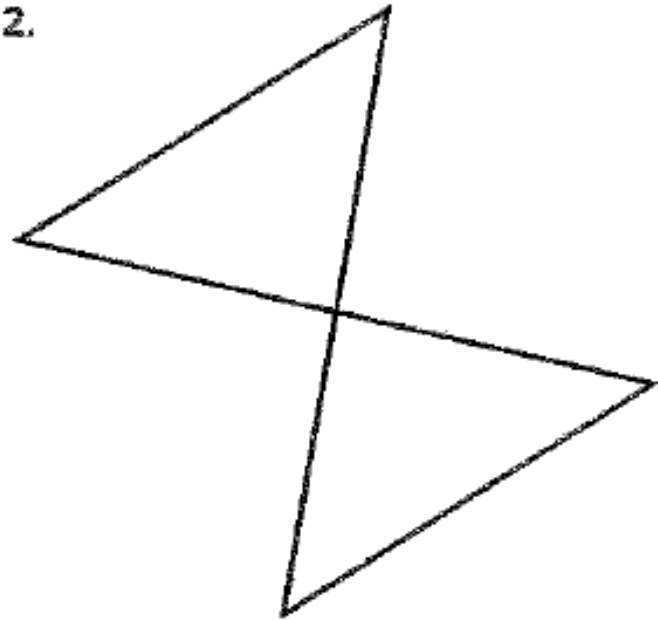
Rotational Symmetry

Determine if each figure has rotational symmetry and state the degree of rotational symmetry.

1.



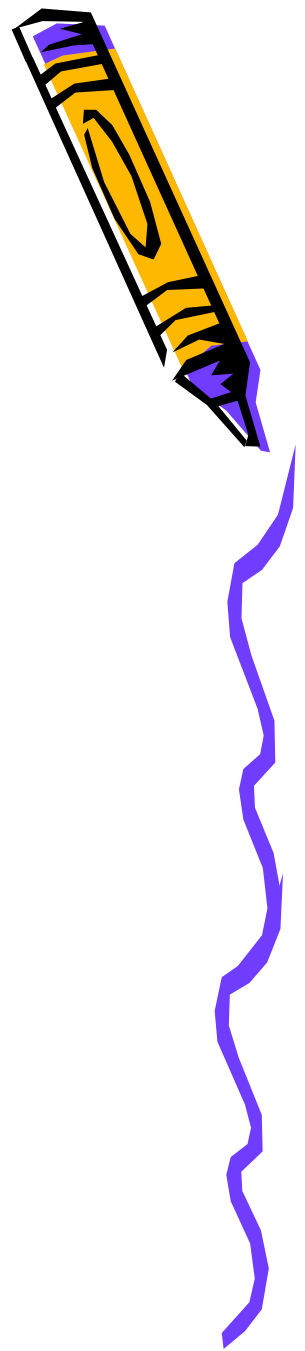
2.



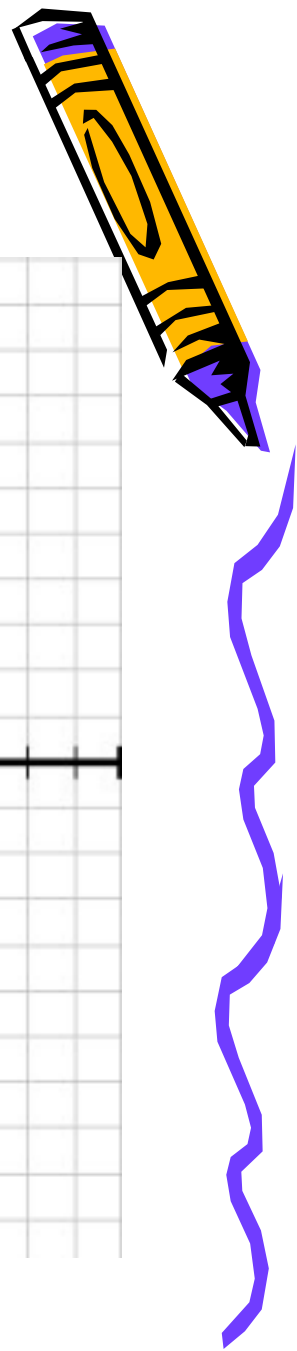
Rotations

Standard rotation (90, 180, 270) about any point:

1. Perform a translation so that the given point of rotation lands at the origin (translate all points of the figure accordingly).
2. Perform the given rotation for all points of the figure.
3. Perform the opposite translation from step 1 returning to the original point of reflection (translate all points of the figure accordingly).



Rotations



Using the coordinate plane:

1. Graph $\triangle JKL$ with vertices $J(5, 5)$, $K(10, 5)$, $L(10, 0)$
2. Graph the rotation: 180° about the point $(8, -2)$

