Acc. Algebra I/Geometry A Unit 7
Transformations in the Coordinate Plane

References

Textbook Connection

HMH Acc. Coordinate Algebra I/Geom. A
Unit 5: Modules 16-17

Online Textbook Access:
http://my.hrw.com

Ask your teacher for log in directions.

Helpful Links:

http://www.mathwarehouse.com/transformations/

http://www.gradeamathhelp.com/transformation-geometry.html

http://www.onlinemathlearning.com/transformation-in-geometry.html

http://mathbitsnotebook.com/Geometry/Transformations/TRRigidTransformations.html

http://cms.gavirtualschool.org/Shared/Math/GSECoordinateAlgebra/Transformations/index.html

Dear Parents

In this unit students will take a closer look at translations, rotations, and reflections on the coordinate plane. Students will develop a better understanding of transformations by using a variety of tools.

Concepts Students will Use & Understand

- Know precise definitions of geometric figures
- Represent transformations in the plane and describe as functions
- Describe the rotations/reflections given a rectangle, parallelogram, trapezoid or regular polygon that carry it onto itself
- Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments
- Given a geometric figure and a rotation, reflection or translation, draw the transformed figure- specify a sequence of transformations that will carry a given figure onto another.

Vocabulary

- **Angle:** A figure created by two distinct rays that share a common endpoint (also known as a vertex). $\angle ABC$ or $\angle B$ or $\angle CBA$ indicate the same angle with vertex B.
- **Angle of Rotation:** The amount of rotation (in degrees) of a figure about a fixed point such as the origin.
- **Bisector:** A point, line or line segment that divides a segment or angle into two equal parts.
- **Circle:** The set of all points equidistant from a point in a plane.
- **Congruent:** Having the same size, shape and measure. $\angle A \cong \angle B$ indicates that angle A is congruent to angle B.
- **Corresponding angles:** Angles that have the same relative position in geometric figures.
- **Corresponding sides:** Sides that have the same relative position in geometric figures.
- **Endpoint:** The point at each end of a line segment or at the beginning of a ray.
- **Image:** The result of a transformation.
- **Intersection:** The point at which two or more lines intersect or cross.
- **Isometry:** a distance preserving map of a geometric figure to another location using a reflection, rotation or translation. $M \rightarrow M'$ indicates an isometry of the figure M to a new location M'. M and M' remain congruent.
- **Line:** One of the undefined terms of geometry that represents an infinite set of points with no thickness and its length continues in two opposite directions indefinitely. $\overleftrightarrow{AB}$ indicates a line that passes through points A and B.
- **Line segment:** A part of a line between two points on the line. $\overline{AB}$ indicates the line segment between points A and B.
- **Parallel lines:** Two lines are parallel if they lie in the same plane and do not intersect. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ indicates that line AB is parallel to line CD.
- **Perpendicular lines:** Two lines are perpendicular if they intersect to form right angles. $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ indicates that line AB is perpendicular to line CD.
- **Point:** One of the basic undefined terms of geometry that represents a location. A dot is used to symbolize it and it is thought of as having no length, width or thickness.
- **Pre-image:** A figure before a transformation has taken place.
- **Ray:** A part of a line that begins at a point and continues forever in one direction. $\overrightarrow{AB}$ indicates a ray that begins at point A and continues in the direction of point B indefinitely.
- **Reflection:** A transformation of a figure that creates a mirror image, "flips," over a line.

- **Reflection Line (or line of reflection):** A line that acts as a mirror so that corresponding points are the same distance from the mirror.
- **Rotation:** A transformation that turns a figure about a fixed point through a given angle and a given direction, such as 90° clockwise.
- **Segment:** See line segment.
- **Transformation:** The mapping, or movement, of all points of a figure in a plane according to a common operation, such as translation, reflection or rotation.
- **Translation:** A transformation that slides each point of a figure the same distance in the same direction.
- **Vertex:** The location at which two lines, line segments or rays intersect.

Try http://intermath.coe.uga.edu/dictnary/homepg.asp or http://www.amathsdictionaryforkids.com/ for further examples.

Example 1

Skill-based Task

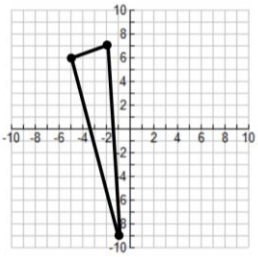
Which of the following preserves distance and which does not?

$(x, y) \rightarrow (x + 1, y + 2)$

$(x, y) \rightarrow (x^2, y + 1)$

Example 2

Translation $(x, y) \rightarrow (x + 4, y - 2)$. Rotation 180° about the origin. Reflection about the line $y = -x$.



Example 3

Identify the coordinates of point (-7, -6) under the rotation of 90º clockwise about the origin?

a. (7, 6)

b. (6, -7)

c. (-6, 7)

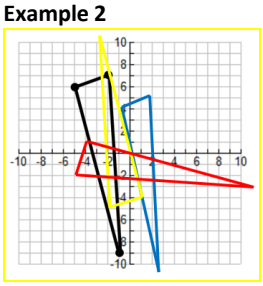
d. (-7, 6)

Key

Example 1

The first one preserves distance since it is a translation with adding and subtracting. The second one has a quadratic applied, so the distance is not constant.

Example 2



Black to blue to yellow to red.

Example 3

C