ATLANTA PUBLIC SCHOOLS
Making A Difference

Coordinate Algebra: Unit 5
Transformations in the Coordinate Plane

Parent Guide

Learning Targets: I can…

- Define angles, circles, perpendicular lines, parallel lines, rays, and line segments precisely using the undefined terms and "if-then" and "if-and-only-if" statements. .
- Draw transformations of reflections, rotations, translations, and combinations of these using graph paper, transparencies, and /or geometry software.
- Determine the coordinates for the image (output) of a figure when a transformation rule is applied to the preimage (input).
- Calculate the number of lines of reflection symmetry and the degree of rotational symmetry of any regular polygon.
- Draw a specific transformation when given a geometric figure and a rotation, reflection, or translation.
- Predict and verify the sequence of transformations (a composition) that will map a figure onto another.

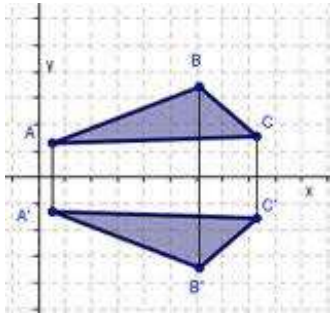
Vocabulary

angle – is the figure formed by two rays, called the **sides** of the angle, sharing a common endpoint.

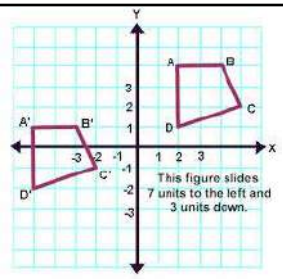
rigid transformation: is one in which the pre-image and the image both have the exact same size and shape (congruent).
transformation: The mapping, or movement, of all the points of a figure in a plane according to a common operation.
reflection: A transformation that "flips" a figure over a line of reflection.
rotation: A transformation that turns a figure about a fixed point through a given angle and a given direction.
translation: A transformation that "slides" each point of a figure the same distance in the same direction.
coordinates – a set of two or more numbers used to determine the position of a point, line, curve, or plane in a space of a given dimension with respect to a system of lines or other fixed references.
Image – a shape that results from a transformation of a figure known as the preimage.
undefined terms – a basic figure that is not defined in terms of other figures. The undefined terms in geometry are point, line, and plane.

Important Understandings and Concepts

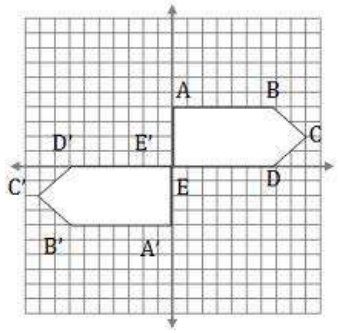
Transformational geometry is about the effects of rigid motions, rotations, reflections and translations on figures. A reflection is a flip over a line. Reflections have the same shape and size as the original image.



A translation or "slide" is moving a shape, without rotating or flipping it. The shape still looks exactly the same, just in a different place.



A rotation is a circular movement. There is a central point that stays fixed and everything else moves around that point in a circle. A full rotation is 360 degrees.



Coordinate Algebra: Unit 5
Transformations in the Coordinate Plane

Parent Guide

Sample Problems	How Can You Help Your Student?
Sample Problem 1: How many different names can be written for a line that has four labeled points? *Solution: 12. Student can get to this answer by listing all the combination of two letters. Recommend that they make the list in an orderly way so they do not leave out any possibilities. This exercise is good practice for counting techniques learned in probability.* **Sample Problem 2:** *True or False:* A ray can have a measure *Solution: False. A ray extends infinitely on one direction, so it does not have a length.* **Sample Problem 3:** Does it make sense for a line to have a midpoint? *Solution: No, a line is infinite in one dimension, so there is not a distinct middle.* **Sample Problem 4:** Which of the following preserves distance and which does not? How do you know? (CO2) $(x, y) \rightarrow (x + 1, y + 2)$ $(x, y) \rightarrow (x^2, y + 1)$ *Solution:* *(x, y) → (x + 1, y + 2) – preserves distance* *(x, y) → (x^2, y + 1) – doesn't preserve distance* *The first transformation is a slide, nothing changes but the location or position of x and y. The second transformation is a dilation and changes the size of x. Linear transformations that preserve all distances ensure that the size and shape of any object remains unaltered by the transformation. Only its position can change.*	Playing games is a wonderful way to practice skills at home in a fun environment. *Stack-n-Pack* books contain several math games covering math concepts from Kindergarten through High School. *Stack-n-Pack* card games may be checked out from your school (contact your school's Parent Liaison) or purchased online: Stack-n-Pack Mathematics Card Games for K-HS . Stack-n-Pack Geometry • *Geometry Fundamentals* game • *Transformations* game • Geometry Vocabulary Online • NCTM Illuminations – Algebraic Transformations: This applet allows you to transform a plus sign in eight different ways: rotate it ¼, ½, ¾, or a full turn, or flip it vertically, horizontally, or diagonally. http://illuminations.nctm.org/ActivityDetail.aspx?ID=193 • NCTM Illuminations: Mirror Tool -Use this tool to investigate symmetry. You can rotate, flip, or reflect a figure across a line. http://illuminations.nctm.org/ActivityDetail.aspx?ID=24 Learn Zillion Videos • Understand the importance of precise definitions • Define geometric terms precisely • Understand why "point" and "line" are undefinable terms • Understand how reflections and rotations change coordinates • Understand how translations change coordinates • Graph a dilated image using coordinates