MATH NEWS

Grade 8, Module 2, Topic A

LAFAYETTE PARISH SCHOOL SYSTEM

8th Grade Math

Module 2: The Concept of Congruence

Math Parent Letter

This document is created to give parents and students a better understanding of the math concepts found in Eureka Math (© 2013 Common Core, Inc.) that is also posted as the Engage New York material which is taught in the classroom. Module 2 of Eureka Math (Engage New York) focuses on translations, reflections, and rotations in the plane and precisely defines the concept of *congruence*.

Focus Area Topic A:

Definitions and Properties of Basic Rigid Motions

Words to Know:

Transformation – a rule, to be denoted by F, that assigns each point P of the plane a unique point which is denoted by $F(P)$.

Basic Rigid Motion – a basic rigid motion is a rotation, reflection, or translation of the plane.

Translation – a basic rigid motion that moves a figure long a given vector.

Rotation – a basic rigid motion that moves a figure around a point, d degrees.

Reflection – a basic rigid motion that moves a figure across a line.

Vector – a Euclidean vector (or directed segment) $\overrightarrow{AB}$ is the line segment AB together with a direction given by connecting an initial point A to a terminal point B.

Transversal – given a pair of lines L and M in a plane, a third line T is a transversal if it intersects L at a single point and intersects M at a single but different point.

☑Check out these videos on transformations:

✇✇The following is an animation of a translation: http://www.harpercollege.edu/~skoswatt/RigidMotions/translation.html

✇✇The following is an animation of a reflection: http://www.harpercollege.edu/~skoswatt/RigidMotions/reflection.html

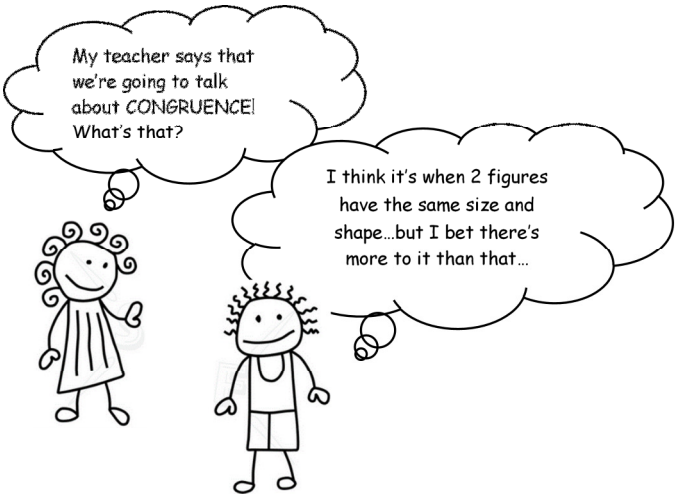
✇✇The following two videos focus on rotations: http://www.harpercollege.edu/~skoswatt/RigidMotions/rotateccw.html http://www.harpercollege.edu/~skoswatt/RigidMotions/rotatecw.html

Strategy: Have students use transparency film, tracing paper or patty paper to experiment with transformations.

Focus Area Topic A:

Definitions and Properties of Basic Rigid Motions

The goal of this module is to arrive at a clear understanding of the concept of *congruence*.

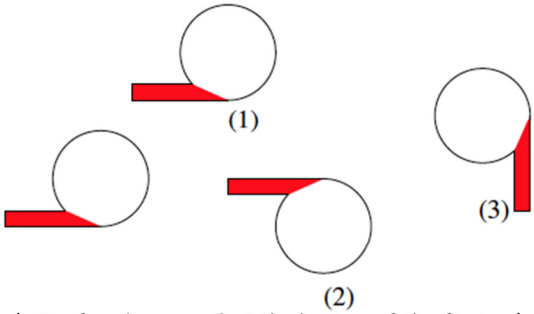


Why Move Things Around?

Students learn about the *mathematical needs* for rigid motions and begin by exploring the *possible* effects of rigid motions. The study of basic rigid motions will not be limited to reflections, translations, and rotations. Instead, students will explore the geometric implications of having an abundance of these basic rigid motions in the plane and the impact that this has on the shape's angles and line segments.

EXPLORATORY CHALLENGE

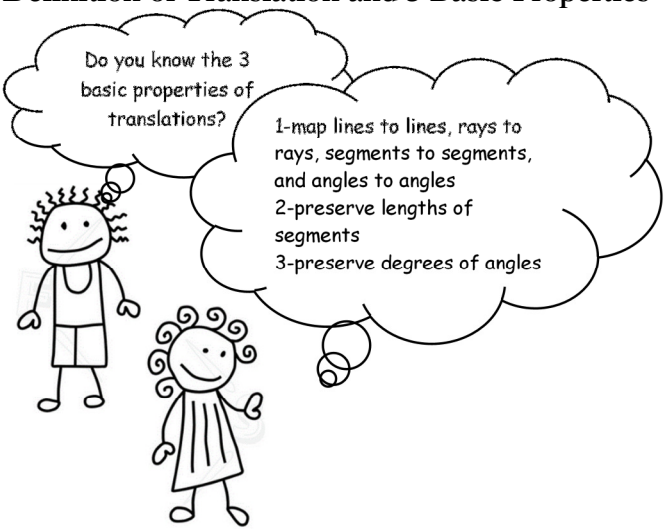
Intuitively describe how to move the figure on the left to each of the new locations.



(solution found on page 2 at the bottom of the first column)

REMEMBER: To distinguish the original (pre-image) from the copy (image), the original is usually denoted with a letter like S and the copy with the letter S' (read as "S prime"); a second copy would be denoted as S"(read as "S double prime").

Definition of Translation and 3 Basic Properties



Students learn the basics of translation by translating points, lines, and figures along a vector, and experimentally verify that translations map lines to lines, segments to segments, rays to rays, and angles to angles. Through experimentation, they confirm that translations preserve length and angle measure.

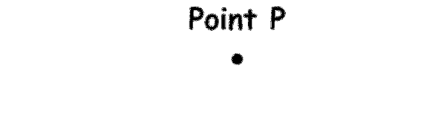
→slide→→slide→→slide→→slide→→slide→→slide→slide→

Translating Lines

ALERT!

FUNDAMENTAL ASSUMPTION:
Given line *L* and point *P* not lying on *L*, there is at **MOST ONE LINE** passing through *P* and parallel to *L*.

How many lines can pass through point P and run parallel to line L?



ANSWER: one

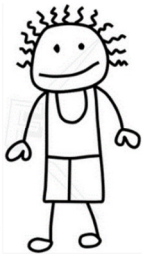
→←↑↓↖↘↗↙→←↑↓↖↘↗↙→←↑↓↖↘↗↙→←↑↓↖↘↗↙→

ANSWER to EXPLORATORY CHALLENGE (from previous page):
Slide the original figure to the image (1) until they coincide. Slide the original figure to (2), then flip it so they coincide. Slide the original figure to (3), then turn it until they coincide.

Definition of Reflection and Basic Properties

Students experimentally verify that reflections are distance and degree-preserving.

Basic Properties of Reflections
1-map lines to lines, rays to rays, segments to segments, and angles to angles
2-preserve lengths of segments
3-preserve degrees of angles



Reflections will be performed with and without the use of the coordinate plane.

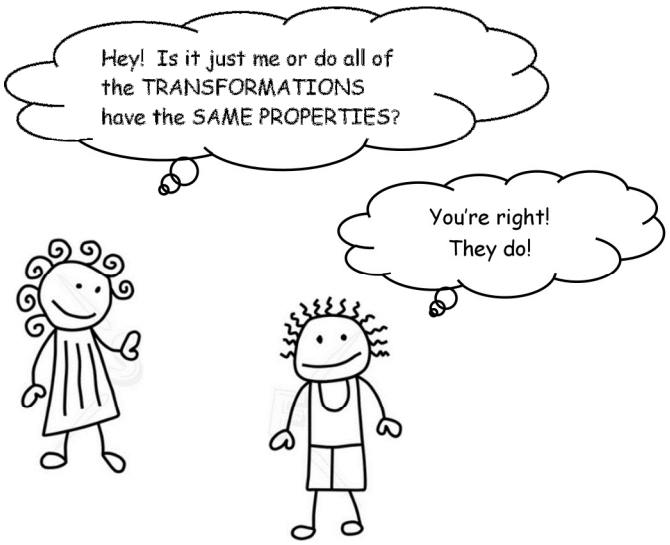
→reflect←→reflect←→reflect←→reflect←→reflect←→reflect

Definition of Rotation and Basic Properties

Students experimentally verify that rotations take lines to lines, etc. and are distance and degree-preserving. Rotations will be performed around a single point (or center), as well as around multiple points (or centers).

Basic Properties of Rotations
1-map lines to lines, rays to rays, segments to segments, and angles to angles
2-preserve lengths of segments
3-preserve degrees of angles

→rotate← rotate↑ rotate↓ rotate↘ rotate↗ rotate↘ rotate



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Rotations of 180 Degrees

Rotations of 180 Degrees

Students are provided proof that 180-degree rotations map a line to a parallel line and use that knowledge to prove that vertical angles are equal in measure.