MATH NEWS

Grade 8, Module 2, Topic B

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 B:

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 along 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.

Sequence (Composition) of Transformations – more than one transformation – given transformations G and F, $G \circ F$ is called the composition of F and G.

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.

Congruence – a sequence of basic rigid motions (rotations, reflections, translations of the plane.)

Familiar Terms and Symbols

Ray, line, line segment, angle
Parallel and perpendicular lines
Supplementary, complementary, vertical, and adjacent angles
Triangle, quadrilateral
Area and perimeter

☑Check out this video link to get an idea of what is meant by sequencing: http://youtu.be/O2XPy3ZLU7Y

Focus Area Topic B:

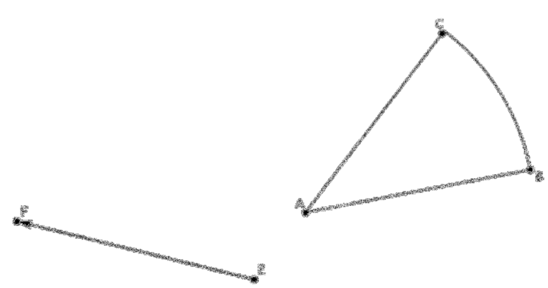
Sequencing the Basic Rigid Motions

The focus of Topic B is on sequencing basic rigid motions. It begins with the concept of composing translations and introduces the idea that translations can be undone. Through experimentation, students confirm that the basic properties of individual rigid motions remain intact. Students learn to describe with precision sequences of basic rigid motions. Finally, students perform translations, rotations, and reflections as a prelude to learning about congruence.

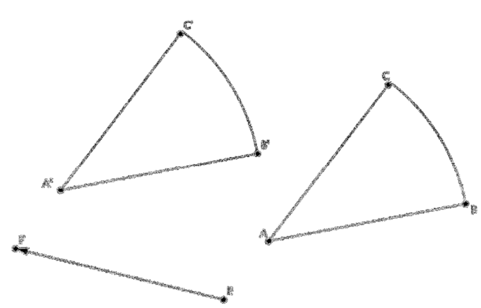
Sequencing Translations

The following in an example from **Lesson 7's Problem Set.**

- Translate the curved shape along the given vector. Label the image A'B'C'.



SOLUTION:



What vector would map the shape A'B'C' back onto ABC?

SOLUTION: Translating (sliding) the image along vector FE would map the image back onto its original position.

Focus Area Topic B:

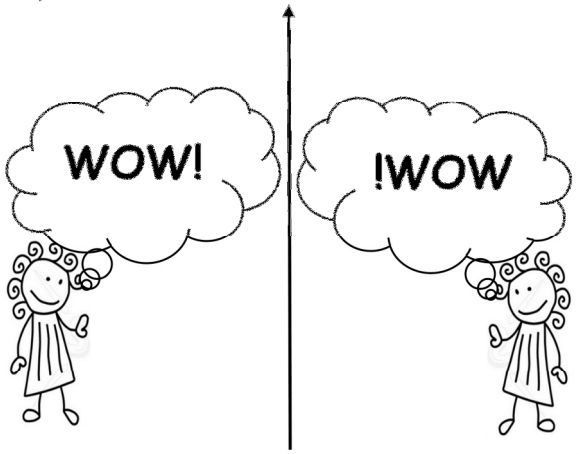
Sequencing the Basic Rigid Motions

Sequencing Reflections and Translations

Two key concepts are developed:

1. a reflection is its own inverse (in this context inverse refers to a mirror image of a figure).
2. a reflection followed by a translation ≠ (is not equal to) a translation followed by a reflection.

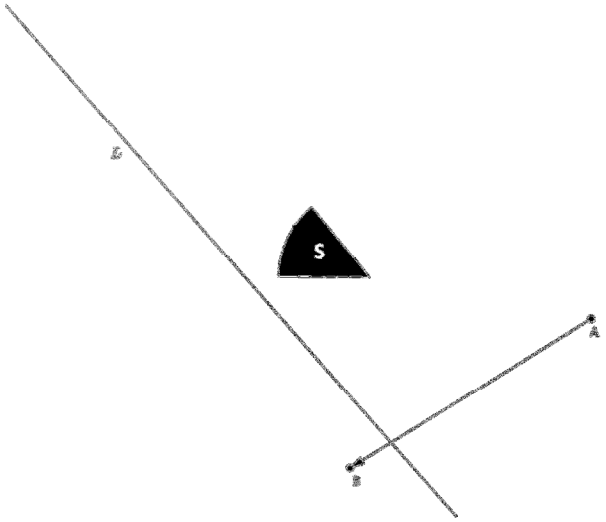
Did you know that a **reflection** is its own **inverse transformation**?



…So that's what it means to say that a **reflection** is its own **inverse transformation**…

The following in an example from **Lesson 8's Class Exercises.**

1. Translate Figure S along vector AB and then reflect Figure S across line L. Label the new image S'. (Remember S' is read as S prime.)



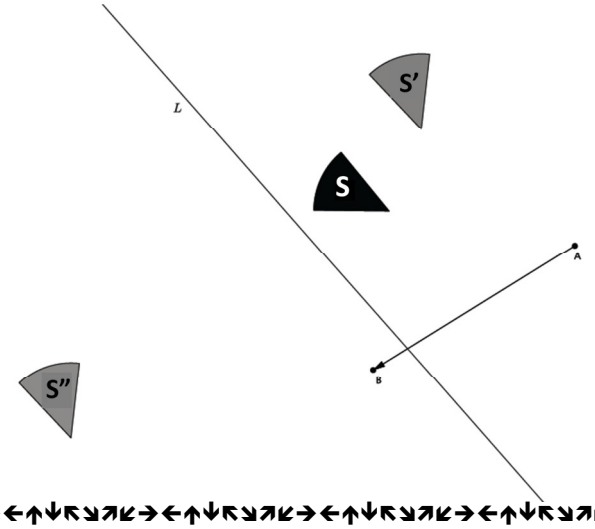
2. Now, reflect Figure S across line L and then translate Figure S along vector AB. Label as S". (S double prime)

??

Does the order in which we sequence rigid motions really matter? Is the result the same?

- Compare your work to the solution in column 2.

Solution: Yes. Order matters when sequencing translations and reflections. A translation followed by a reflection ≠ a reflection followed by a translation.



Sequencing Rotations

Does order matter when rotations are performed?

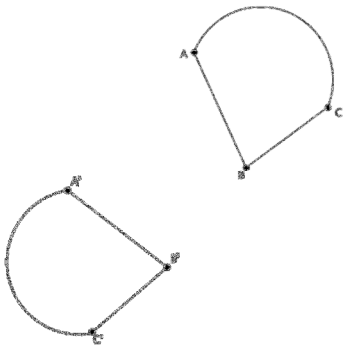
1-when a sequence of rotations is performed around the SAME center—ORDER DOES NOT MATTER

2-when a sequence is performed around DIFFERENT centers—ORDER MATTERS

Sequences of Rigid Motions

The following in an example from **Lesson 10's Class Exercises.**

- With clarity and precision, describe a sequence of rigid motions that will map Figure ABC onto Figure A'B'C'.



SOLUTION: (Possible sequence) Let there be a translation along vector BB'. Rotate around point B *d* degrees until point A coincides with A'. Reflect over segment AB so that point C and C' coincide.