

Eureka Math Parent Guide

A GUIDE TO SUPPORT PARENTS AS THEY WORK WITH THEIR STUDENTS IN MATH.

GRADE 8
MODULE 2

GRADE FOCUS

Eighth grade mathematics is about (1) formulating and reasoning about expressions and equations, with a special focus on linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

- Module 1: Integer Exponents and Scientific Notation
- » **Module 2: The Concept of Congruence**
- Module 3: Similarity
- Module 4: Linear Equations
- Module 5: Examples of Functions from Geometry
- Module 6: Linear Functions
- Module 7: Introduction to Irrational Numbers Using Geometry

LET'S CHECK IT OUT!

MODULE 2 FOCUS

In this 16-lesson module, students learn about translations, reflections, and rotations in the plane and how to use them to precisely define the concept of *congruence*. Up to this point, "congruence" has been taken to mean, intuitively, "same size and same shape." Because this module begins a serious study of geometry, this intuitive definition must be replaced by a precise definition. This module is a first step; its goal is to provide the needed intuitive background for the precise definitions that are introduced in this module for the first time. Students are also introduced to the Pythagorean Theorem.

MORE SPECIFICALLY, CHILDREN WILL LEARN HOW TO:

- Verify experimentally the properties of rotations, reflections, and translations:
 - » Lines are taken to lines, and line segments to line segments of the same length.
 - » Angles are taken to angles of the same measure.
 - » Parallel lines are taken to parallel lines.
- Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
- Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
- Understand and apply the Pythagorean Theorem.
 - » Explain a proof of the Pythagorean Theorem and its converse.
 - » Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

TOPIC OVERVIEW

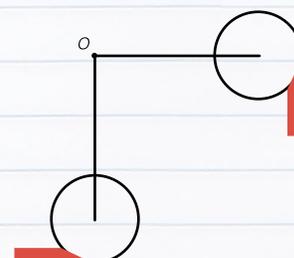
Topics are the lessons within a module that help children master the skills above. Here are the lessons that will guide your child through Module 2:

- Topic A: Definitions and Properties of the Basic Rigid Motions
- Topic B: Sequencing the Basic Rigid Motions
- Topic C: Congruence and Angle Relationships

WORDS TO KNOW

- **Transformation:** A rule that assigns each point P of the plane a unique point, which is denoted by (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.
- **Image of a point, image of a figure:** Image refers to the location of a point, or figure, after it has been transformed.
- **Sequence (Composition) of Transformations:** More than one transformation.
- **A Euclidean vector (or directed segment):** AB is the line segment AB together with a direction given by connecting an initial point A to a terminal point B .
- **Congruence:** A congruence is a sequence of basic rigid motions (rotations, reflections, translations) of the plane.
- **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.

Rotation



SAMPLE PROBLEMS

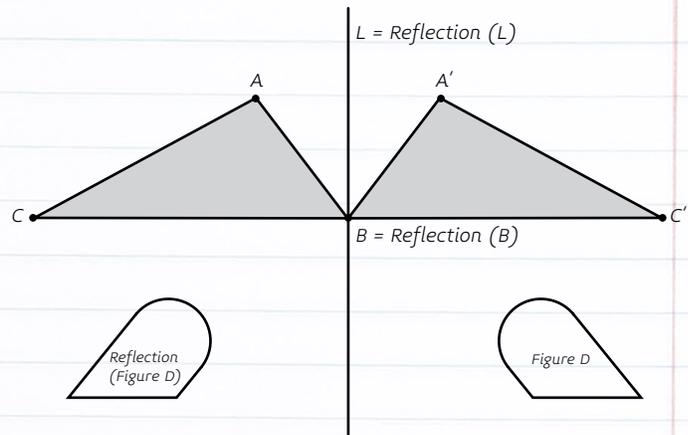
SAMPLE 1

Reflections

To the right are two examples of the type of problems involving reflections your child will see in this unit.

$\triangle ABC$ was reflected across line L . Notice how Point B and line L did not move in this transformation. Also, notice how the image was labeled and how this is different from the original figure.

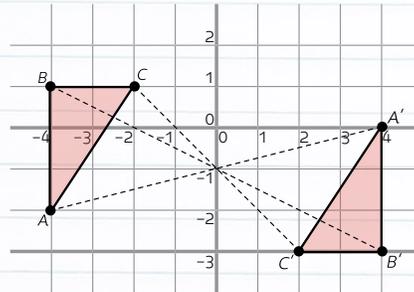
Figure D was also reflected across line L and is shown.



SAMPLE 2

Use the diagram to the right for problems 1-5.
Use your transparency, as needed.

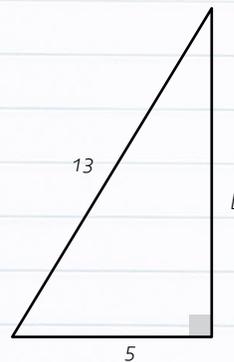
- Looking only at segment BC , is it possible that a 180° rotation would map BC onto $B'C'$? Why or why not?
It is possible because the segments are parallel.
- Looking only at segment AB , is it possible that a 180° rotation would map AB onto $A'B'$? Why or why not?
It is possible because the segments are parallel.
- Looking only at segment AC , is it possible that a 180° rotation would map AC onto $A'C'$? Why or why not?
It is possible because the segments are parallel.
- Connect point B to point B' , point C to point C' , and point A to point A' . What do you notice? What do you think that point is?
All of the lines intersect at one point. the point is the center of rotation, I checked by using my transparency.
- Would a rotation map triangle ABC onto triangle $A'B'C'$? If so, define the rotation (i.e., degree and center). If not, explain why not.
Let there be a rotation 180° around point $(0,-1)$. then Rotation $(\triangle ABC) = \triangle A'B'C'$.



SAMPLE 3

Pythagorean Theorem

Given a right triangle with a hypotenuse with length 13 units and a leg with length 5 units, as shown, determine the length of the other leg.



Solution:

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 5^2 + b^2 &= 13^2 \\ 5^2 - 5^2 + b^2 &= 13^2 - 5^2 \\ b^2 &= 13^2 - 5^2 \\ b^2 &= 169 - 25 \\ b^2 &= 144 \\ b &= 12 \end{aligned}$$

HOW YOU CAN HELP AT HOME

- Every day, ask your child what they learned in school and ask them to show you an example.
- Be excited to learn new ideas in math! Show your child that math is fun, even when it might be new and challenging!
- Ask your child to describe a translation; reflection and rotation in his/her own words.
- Watch the video posted below with your child and discuss each of the transformations:

<http://youtu.be/O2XPy3ZLU7Y>