

# Eureka Math Parent Guide

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

GRADE 8  
MODULE 3

## 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 3 FOCUS

In this 14-lesson module, students learn about dilation and similarity and apply that knowledge to a proof of the Pythagorean Theorem based on the Angle-Angle criterion for similar triangles. Students learn the definition of a dilation, its properties, and how to compose them. One overarching goal of this module is to replace the common idea of “same shape, different sizes” with a definition of similarity that can be applied to shapes that are not polygons, such as ellipses and circles.

### MORE SPECIFICALLY, CHILDREN WILL LEARN HOW TO:

- Use physical models, transparencies or geometry software to understand congruence and similarity.
- Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
- Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations.
- 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.
- Explain a proof of the Pythagorean Theorem and use the Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

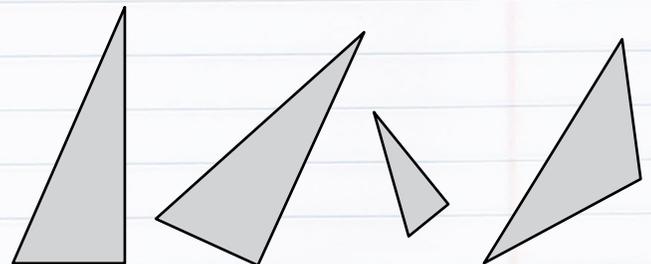
## TOPIC OVERVIEW

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 3:

- Topic A: Dilation
- Topic B: Similar Figures
- Topic C: The Pythagorean Theorem

## WORDS TO KNOW

- **Dilation:** Dilation is where the polygon grows or shrinks but keeps the same overall shape. It's a little like zooming in or out on a camera.
- **Similar:** Two geometrical objects are called similar if they both have the same shape, or one has the same shape as the mirror image of the other. More precisely, one can be obtained from the other by dilation (enlarging or shrinking), possibly with additional translation, rotation and reflection. This means that either object can be rescaled, repositioned, and reflected, so as to coincide precisely with the other object.
- **Congruence:** Two figures or objects are congruent if they have the same shape and size, or if one has the same shape and size as the mirror image of the other. In the picture below, the two triangles on the left are congruent, while the third is similar to them. The last triangle is neither similar nor congruent to any of the others because the angles are not the same. Note that congruence permits alteration of some properties, such as location and orientation, but leaves others unchanged, like distance and angles.



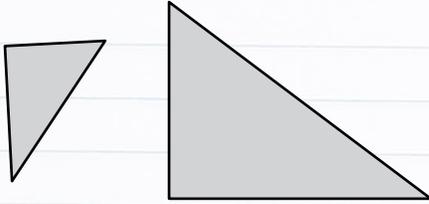
- **Pythagorean Theorem:** The Pythagorean Theorem states that the square of the hypotenuse of a right triangle (the side opposite the right angle) is equal to the sum of the squares of the other two sides. The theorem can be written as an equation relating the lengths of the sides  $a$ ,  $b$  and  $c$ , often called the “Pythagorean equation” or ( $a^2 + b^2 = c^2$ ). Here's a 2-minute [video](#) that demonstrates the proof for the Theorem.

## SAMPLE PROBLEMS

### SAMPLE 1

Two geometric figures are said to be similar if they have the same shape but not necessarily the same size. Using that informal definition, are the following pairs of figures similar to one another? Explain.

**Solution:**



Yes, these figures appear to be similar. They are the same shape but one is larger than the other is.

### SAMPLE 2

Two geometric figures are said to be similar if they have the same shape but not necessarily the same size. Using that informal definition, are the following pairs of figures similar to one another? Explain.

**Solution:**

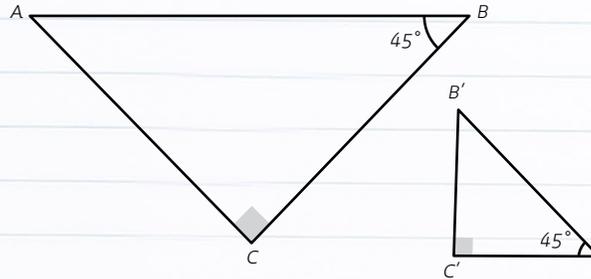


No, these figures do not appear to be similar. One looks like a square and the other like a rectangle.

### SAMPLE 3

Are the triangles shown below similar? Present an informal argument as to why they are or are not similar.

**Solution:**



Yes,  $\triangle ABC \sim \triangle A'B'C'$ . They are similar because they have two pairs of corresponding angles that are equal. You have to use the triangle sum theorem to find out that  $|\angle B'| = 45^\circ$  or  $|\angle A| = 45^\circ$ . Then you can see that  $|\angle A| = |\angle A'| = 45^\circ$ ,  $|\angle B| = |\angle B'| = 45^\circ$ , and  $|\angle C| = |\angle C'| = 90^\circ$ .

## HOW YOU CAN HELP AT HOME

- Every day, ask your child what they learned in school and ask them to show you an example.
- Ask your child why "same shape, different sizes" is not appropriate anymore when describing similarity.
- Ask your child to create an angle using a ruler. Have your child demonstrate how to measure that angle using a protractor.