

## KEY CONCEPT OVERVIEW

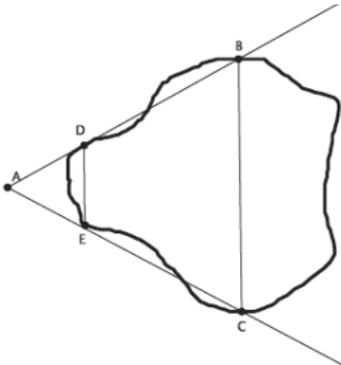
In Topic B, students formally define **similarity** and investigate the properties of similar objects. Looking specifically at triangles, students learn to tell whether two triangles are similar using techniques other than dilation or the basic rigid motions. After determining that two triangles are similar, students use equivalent ratios to find the unknown side lengths of a triangle. Finally, students apply their knowledge of similarity to real-world tasks, such as finding heights of buildings and determining distances that are too large to measure with a typical measuring tool.

You can expect to see homework that asks your child to do the following:

- Describe a dilation followed by a sequence of rigid motions that would map one shape onto another.
- Determine whether two objects are similar using **angle-angle criterion** or **proportional** side relationships.
- Use dilation and rigid motion to prove that similarity is **symmetric** and **transitive**.
- Given that two triangles are similar, solve for the unknown side length.
- Use similar triangle relationships to solve problems with real-world contexts.

## SAMPLE PROBLEM (From Lesson 12)

A geologist wants to determine the distance across the widest part of a nearby lake. The geologist marked off specific points around the lake so that the line containing segment  $DE$  would be parallel to the line containing segment  $BC$ . Segment  $BC$  is selected specifically because it is the widest part of the lake. Segment  $DE$  is selected specifically because it is a short enough distance to measure easily. The geologist sketched the situation, as shown below.



- a. Has the geologist done enough so far to use similar triangles to help measure the widest part of the lake? Explain your answer.

**Yes, based on the sketch, the geologist found a center of dilation at point A. The geologist marked points around the lake that, when connected, make parallel lines. The triangles are similar by the angle-angle (AA) criterion. Corresponding angles of parallel lines are equal in measure, and the measure of  $\angle DAE$  is equal to itself. Since there are two pairs of corresponding angles that are equal,  $\triangle DAE \sim \triangle BAC$ .**

- b. The geologist made the following measurements:  $|DE| = 5$  feet,  $|AE| = 7$  feet, and  $|EC| = 15$  feet. Does she have enough information to complete the task? If so, determine the length across the widest part of the lake. If not, state what additional information is needed.

**Yes, there is enough information about the similar triangles to determine the distance across the widest part of the lake using the AA criterion.**

**Let  $x$  represent the length of segment  $BC$ ; then,  $\frac{x}{5} = \frac{22}{7}$ .**

**We are looking for the value of  $x$  that makes the fractions equivalent. Therefore,  $7x = 110$  and  $x \approx 15.7$ . The distance across the widest part of the lake is approximately 15.7 feet.**

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at [GreatMinds.org](http://GreatMinds.org).

## HOW YOU CAN HELP AT HOME

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You can help at home in many ways. Here are some tips to help you get started.

- Similar triangles are often used to solve problems in the real world. Help your child master the information needed to determine whether two triangles are similar. Review facts about angle relationships from Grade 8 Module 2 Topic C, where students explored the angles created when a line (called a transversal) passes through parallel lines. Students should be familiar with corresponding, alternate interior, alternate exterior, and supplementary angles from Module 2.
- Play vocabulary games. Work with your child to create vocabulary and key concept cards using the Terms sections of this and previous Parent Tip Sheets. Write a term or concept on the front of each card and the definition on the back. Then take turns with your child drawing a card, defining the term or concept on the front, and checking the answer on the back. You might compete to be the first to provide five correct answers. You might also use the board from a favorite board game and advance around it by defining terms and concepts correctly.

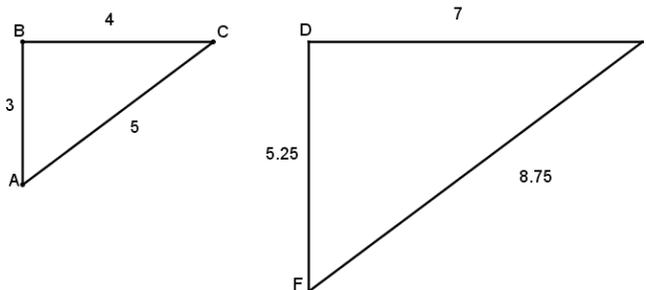
## TERMS

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**Angle-angle criterion:** Two triangles are similar if two angles of one triangle are congruent (equal in measure) to two angles from the other triangle.

**Proportional:** Two quantities (such as lengths or widths of objects) are proportional when they have the same relative size in relation to each other. Here is an example of the notation you could use to show that the side lengths of two shapes are proportional. If triangle  $ABC$  is similar to triangle  $FDE$ , then we can write the following:

$$\frac{|AB|}{|BC|} = \frac{|FD|}{|DE|}$$



**Similar/Similarity:** Two objects are similar if there is a dilation followed by a sequence of rigid motions that would map one object onto another. Similar shapes preserve angle measures, and the lengths of their sides are proportional. We use the symbol  $\sim$  to represent similarity.

**Symmetric property:** Similar in reasoning to the commutative properties of addition and multiplication, the symmetric property says that if  $A \sim B$  ( $A$  is similar to  $B$ ), then  $B \sim A$  ( $B$  is similar to  $A$ ).

**Transitive property of similarity:** This property states that one similar figure can be substituted for another similar figure. If  $A \sim B$  ( $A$  is similar to  $B$ ) and  $B \sim C$  ( $B$  is similar to  $C$ ), then  $A \sim C$  ( $A$  is similar to  $C$ ).