4.6 Congruent and Similar Figures

OBJECTIVE
- Students will identify figures as congruent or similar.

 VOCABULARY
- congruent figures geometric figures that have the same shape and same size
- similar figures geometric figures that have the same shape but a different size

PREPARATION
- Cut out 2 scalene triangles of equal shape and size. (Directed Instruction)
- Select CP 4.1 Geometry Figures or TM 4.1E Geometry Figures for display. (Directed Instruction)
- Obtain 1 protractor and 1 yardstick for pairs of students. (Directed Instruction)
- Print BLM 4.6A Congruent Figures Practice for each student. (Directed Instruction)

EXTENSION
- Share that the word congruent comes from the Late Latin word congruere. The word originally means to agree or to coincide. Congruence means agreement.
- Draw the following figure on the board. Have students use a systematic list to find the 6 different pairs of congruent rectangles. (a and b; a and c; a and d; b and c; b and d; c and d; a and b; c and d; ab and cd; ac and bd)

Worldview
Today’s lesson discusses the meaning of congruence. Congruence means to be exactly the same. Because of sin, people can never be exactly like Christ. However, those who believe in Him are being transformed into His image (2 Corinthians 3:18). First John 3:2b states, “We know that when Christ appears, we shall be like Him, for we shall see Him as He is.” Read Romans 12:2. God’s Word makes it clear that Christians should strive after the model that Jesus set. The goal should be congruence with Christ, not with the world.

Introduction
Discuss the word same. Ask students what it means if two things are the same. (Possible answers: identical, matching, copies) Have students give real-life examples. (Possible answers: The ceiling tiles are all the same; two students in the class have the same first name; two students have the same pair of shoes.) Then discuss the term similar and have students give definitions. (Possible answers: like; alike without being the same; resembling; close to; something like) Have them use the word similar to make some real-world comparisons. (Possible answers: A student is similar in looks to his brother; two students have a similar hairstyle.) Call up a group of three or four students to the front of the room who all have a similar feature, such as hair color, shirt color, or height. Have the rest of the class guess the similarity between the members of the group. Have students identify shapes in the room that are exactly the same and shapes that are similar.

Directed Instruction
1 Explain that shapes that are the same or are similar have geometric terms to describe them.

Define congruent figures and similar figures and discuss the differences between them. Reiterate that congruent figures have the same shape and same size; they are exactly the same. Similar figures have the same shape, but they are a different size.

To demonstrate this difference, show 2 cut-out scalene triangles of equal shape and size. Have the triangles turned at different angles. Ask students whether the figures are congruent. (Answers will vary.) Place one triangle on top of the other. Demonstrate that it is often necessary to rotate cut-out one shape in order for it to exactly fit the other shape. Explain that the two triangles are congruent because they have the same shape and the same size. Have a volunteer draw a triangle on the board that is similar to the cut-out triangle. Reiterate that for the drawn triangle to be similar, it must be the same shape and must be larger or smaller than the cut-out.

2 Display figure 6.1 from CP 4.1 Geometry Figures or TM 4.1E Geometry Figures. Have students name the figures and describe their characteristics. (Possible answer: Line segments A and B are the same length, D is a bit shorter, and C is the shortest.) Discuss congruence in relation to line segments. Reiterate that congruent line segments are the same length. Measure the line segments to show which are congruent.

Display figure 6.2 and explain that the congruence of a pair of angles depends upon the size of their openings. The angles in figure A are congruent, but the angles in B are not. Have students discuss with a partner whether they think the angles in figure C are congruent or not. Then have volunteers share their reasoning. (Answers will vary.) State that the angles are congruent because the size of their openings is the same. Teach that the lengths of the sides of an angle do not affect congruence.

Display figure 6.3 and ask students whether the triangles are congruent. (Answers will vary.) Demonstrate how tracing a figure and placing it on top of the second figure can show congruence. Explain that two figures are congruent if sliding, flipping, or turning one figure allows it to fit exactly on the other. Show this with the triangles used earlier in the lesson.
Lesson Review

If objects are the same shape, are they always congruent? (No; congruent objects are exactly the same shape and size.) What is the term used to describe two figures that are the same shape but not the same size? (Similar) How can you tell if two shapes are or are not congruent? (Measure the shapes or trace one shape and place it over the other.)

Notes

**Construct Meaning**

Congruent figures have the same shape and size. Similar figures have the same shape but a different size.

**Practice**

Match these shapes: White = congruent; gray = similar

1. a. congruent
   b. congruent
   c. congruent
   d. congruent

2. a. similar
   b. similar
   c. similar
   d. similar

3. a. congruent
   b. similar
   c. congruent
   d. congruent

4. a. congruent
   b. congruent
   c. congruent
   d. congruent

5. a. congruent
   b. similar
   c. similar
   d. congruent

6. a. congruent
   b. congruent
   c. similar
   d. similar

7. a. congruent
   b. congruent
   c. similar
   d. congruent

8. a. similar
   b. congruent
   c. congruent
   d. congruent

9. a. congruent
   b. similar
   c. congruent
   d. congruent

10. a. similar
    b. congruent

11. a. congruent
    b. congruent
    c. congruent
    d. congruent

12. a. congruent
    b. congruent
    c. congruent
    d. congruent

ANSWER KEY

13.  14. Drawings will vary but should be the same shape in a different size.

Enrichment

- Print and distribute BLM 4.6B Congruent Figures: Hexagon for students to practice identifying congruent figures within a hexagon.

Recovery

- Have students practice making congruent and similar figures on a simple computer program. Guide them to select a shape, copy it, and paste the copy next to the first. Have them rotate the copied shape in any direction and label it congruent. Then, direct students to make another copy of the first shape and to make the copy similar by resizing it. Have them label it similar. Allow students time to practice making congruent and similar figures with a variety of shapes.

The activities in the Recovery sidebar can be used for differentiated learning instruction or to supply extra practice for students who would benefit from more opportunity to learn the concepts taught.

The Enrichment sidebar lists activities that will challenge those students who have clearly understood the concepts presented and are ready to learn more.

The Answer Key lists the answers for the exercises on the student pages.