Learning Targets:
• Draw a triangle given measures of angles and/or sides.
• Recognize when given conditions determine a unique triangle, more than one triangle, or no triangle.

SUGGESTED LEARNING STRATEGIES: Create Representations, Graphic Organizer, Think-Pair-Share, Visualization

Triangles are rigid shapes. Structures, such as bridges and towers, are reinforced with triangles that give the structures added strength. Notice how triangles within triangles are used to support the bridge in the picture.

In the last lesson, you learned that three given side lengths determine a unique triangle. Other conditions can also determine a unique triangle.

1. Use a protractor to measure each angle in the triangles.
   a. 
   b. 
2. **Reason abstractly.** When a triangle is formed from three given angle measures, is the triangle a unique triangle, or can more than one triangle be formed using those same angle measures? Explain.

Two sides of a triangle form an angle called an **included angle**.

3. **a.** Use a ruler and protractor. Draw a triangle with two sides that measure 4 centimeters each and an included angle of $30^\circ$.

   b. Is there only one triangle that fits the description given in Part a? Explain.

An **included side** is the side between two angles.

4. **a.** Use a ruler and protractor. Draw a triangle with two angles that each measure $30^\circ$ and an included side that measures 5 centimeters.

   b. Is there only one triangle that fits the description given in Part a? Explain.
Lesson 14-2
Draw Triangles from Measures of Angles or Sides

5. **Construct viable arguments.** Decide if the given conditions create a unique triangle.
   a. When a triangle is formed from two side lengths and an included angle measure, is the triangle a unique triangle, or can more than one triangle be formed? Explain.

   b. When a triangle is formed using two given angle measures and an included side length, is the triangle a unique triangle, or can more than one triangle be formed? Explain.

Two known angle measures and the length of a non-included side also form a unique triangle. However, two given side lengths and the measure of a non-included angle may or may not form a unique triangle.

6. Two angles of a triangle measure 40° and 110°. The side opposite the 40° angle is 6 inches long. Can more than one triangle be drawn with these conditions? Explain.

7. Two sides of a triangle are 4 inches and 7 inches long. The included angle has a measure of 35°. Can more than one triangle be drawn with these conditions? Explain.

8. **Make use of structure.** Two angles of a triangle each measure 70° and 55°. The side adjacent to the 70° angle is 3 inches long. Can more than one triangle be drawn with these conditions? Justify your answer.
Lesson 14-2

Draw Triangles from Measures of Angles or Sides

Check Your Understanding

9. Is it possible to draw a unique triangle with angle measures of 35°, 65°, and 100°? Explain.

10. Is it possible to draw a unique triangle with two sides that are each 5 centimeters long and an included angle that measures 40°? Explain.

**LESSON 14-2 PRACTICE**

Determine whether the given conditions determine a unique triangle or more than one triangle. Justify your answers.

11. Two angles of a triangle measure 40° and 75°. The side between the angles is 3 feet long.

12. Two angles of a triangle each measure 55°. The side opposite one of the 55° angles is 2 meters long.

13. The angles of a triangle measure 40°, 60°, and 80°.

14. The sides of a triangle are 5 inches, 12 inches, and 13 inches long.

15. Two sides of a triangle are 10 centimeters and 13 centimeters long. One of the nonincluded angles measures 95°.

16. Two angles of a triangle measure 61° and 48°. One of the sides formed by the 48° angle is 15 millimeters long.

17. The two sides that form the right angle of a right triangle are 9 centimeters and 12 centimeters long.

18. **Look for and make use of structure.** If the measures of the angles of a triangle are known, is the length of one side of the triangle sufficient to determine if the triangle formed is a unique triangle? Explain.