2

Turning a One-Eighty!

Triangle Sum Theorem

WARM UP

For each of the terms below, describe the angle measure and sketch an example.

1. Acute angle

2. Right angle

3. Obtuse angle

4. Straight angle

LEARNING GOALS

- Establish the Triangle Sum Theorem.
- Explore the relationship between the interior angle measures and the side lengths of a triangle.

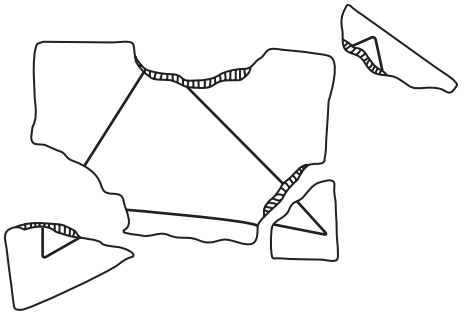
KEY TERM

- Triangle Sum Theorem

You already know a lot about triangles. What special relationships exist among the interior angles of a triangle and between interior and exterior angles of a triangle?

Rip 'Em Up

Draw any triangle on a piece of patty paper. Tear off the triangle's three angles. Arrange the angles so that they are adjacent angles.



1. What do you notice about these angles? Write a conjecture about the sum of the three angles in a triangle.

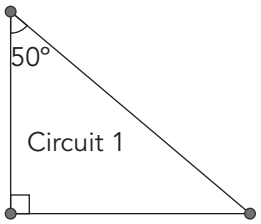
2. Compare your angles and your conjecture with your classmates'. What do you notice?

ACTIVITY
2.1 Analyzing Angles and Sides

In the previous activity, what you noticed about the relationship between the three angles in a triangle is called The *Triangle Sum Theorem*. The **Triangle Sum Theorem** states that the sum of the measures of the interior angles of a triangle is 180°.

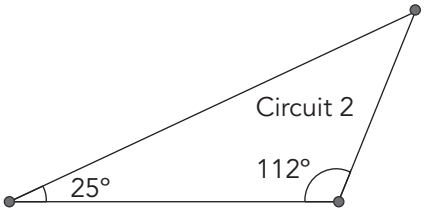
Trevor is organizing a bike race called the Tri-Cities Criterium. Criteriums consist of several laps around a closed circuit. Based on the city map provided to him, Trevor designs three different triangular circuits and presents scale drawings of them to the Tri-Cities Cycling Association for consideration.

1. Classify each circuit according to the type of triangle created.



2. Use the Triangle Sum Theorem to determine the measure of the third angle in each triangular circuit. Label the triangles with the unknown angle measures.

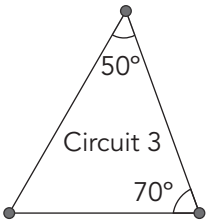
3. Measure the length of each side of each triangular circuit. Label the side lengths in the diagram.



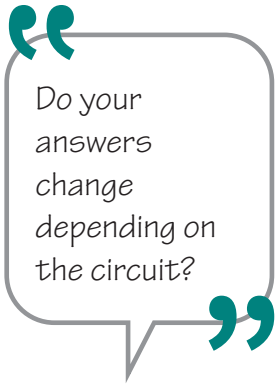
The sharper the angles on a race course, the more difficult the course is for cyclists to navigate.

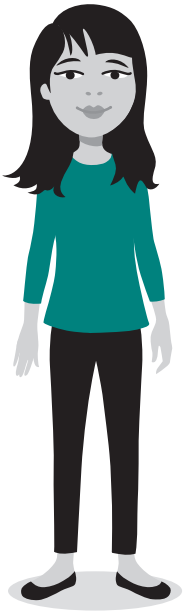
4. Perform the following tasks for each circuit.

a. List the angle measures from least to greatest.



b. List the side lengths from shortest to longest.



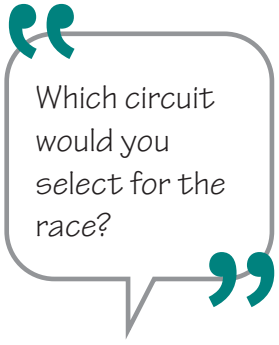


c. **Describe what you notice about the location of the angle with the least measure and the location of the shortest side.**

d. **Describe what you notice about the location of the angle with the greatest measure and the location of the longest side.**

5. **Traci, the president of the Tri-Cities Cycling Association, presents a fourth circuit for consideration. The measures of two of the interior angles of the triangle are 57° and 61°. Determine the measure of the third angle, then describe the location of each side with respect to the measures of the opposite interior angles without drawing or measuring any part of the triangle.**

   a. **measure of the third angle**

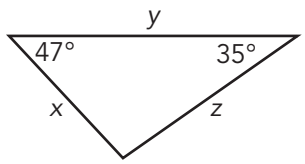


b. **longest side of the triangle**

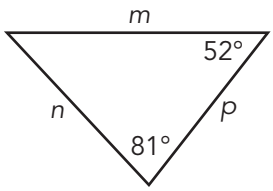
c. **shortest side of the triangle**

6. List the side lengths from shortest to longest for each diagram.

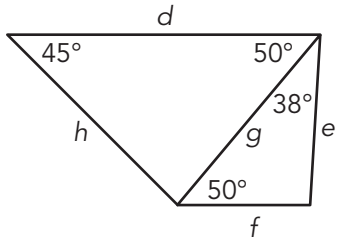
a.



b.



c.



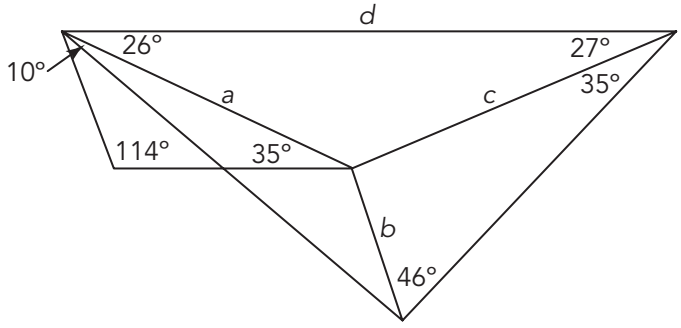
If two angles of a triangle have equal measures, what does that mean about the relationship between the sides opposite the angles?

NOTES

TALK the TALK

So Many Angles!

1. Consider the diagram shown.



a. Determine the measures of the eight unknown angle measures inside the figure.

b. List the labeled side lengths in order from least to greatest.