

5.1**Angles of Triangles**

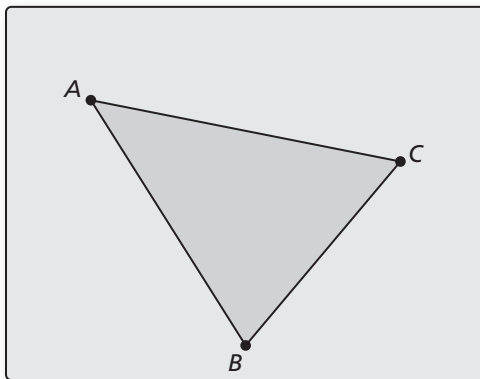
For use with Exploration 5.1

Essential Question How are the angle measures of a triangle related?**1 EXPLORATION:** Writing a ConjectureGo to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner.

- a. Use dynamic geometry software to draw any triangle and label it $\triangle ABC$.
- b. Find the measures of the interior angles of the triangle.
- c. Find the sum of the interior angle measures.

- d. Repeat parts (a)–(c) with several other triangles. Then write a conjecture about the sum of the measures of the interior angles of a triangle.

**Sample**

Angles

$$m\angle A = 43.67^\circ$$

$$m\angle B = 81.87^\circ$$

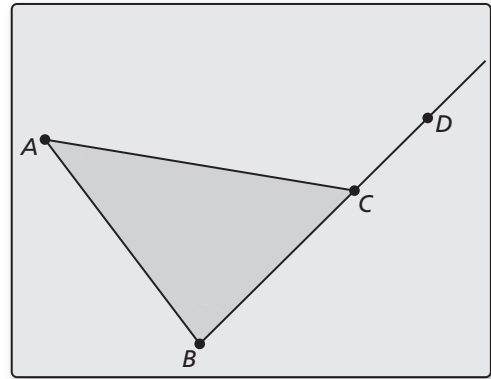
$$m\angle C = 54.46^\circ$$

5.1 Angles of Triangles (continued)**2 EXPLORATION: Writing a Conjecture**

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner.

- Use dynamic geometry software to draw any triangle and label it $\triangle ABC$.
- Draw an exterior angle at any vertex and find its measure.
- Find the measures of the two nonadjacent interior angles of the triangle.
- Find the sum of the measures of the two nonadjacent interior angles. Compare this sum to the measure of the exterior angle.
- Repeat parts (a)–(d) with several other triangles. Then write a conjecture that compares the measure of an exterior angle with the sum of the measures of the two nonadjacent interior angles.

**Sample Angles**

$$m\angle A = 43.67^\circ$$

$$m\angle B = 81.87^\circ$$

$$m\angle ACD = 125.54^\circ$$

Communicate Your Answer

- How are the angle measures of a triangle related?
- An exterior angle of a triangle measures 32° . What do you know about the measures of the interior angles? Explain your reasoning.

5.1**Notetaking with Vocabulary**

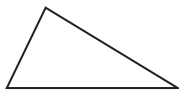
For use after Lesson 5.1

In your own words, write the meaning of each vocabulary term.

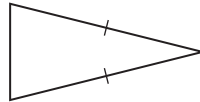
interior angles

exterior angles

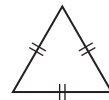
corollary to a theorem

Core Concepts**Classifying Triangles by Sides****Scalene Triangle**

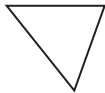
no congruent sides

Isosceles Triangle

at least 2 congruent sides

Equilateral Triangle

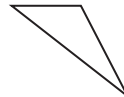
3 congruent sides

Classifying Triangles by Angles**Acute Triangle**

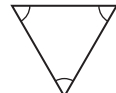
3 acute angles

Right Triangle

1 right angle

Obtuse Triangle

1 obtuse angle

Equiangular Triangle

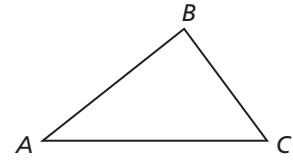
3 congruent angles

Notes:

5.1 Notetaking with Vocabulary (continued)**Theorems****Theorem 5.1 Triangle Sum Theorem**

The sum of the measures of the interior angles of a triangle is 180° .

Notes:

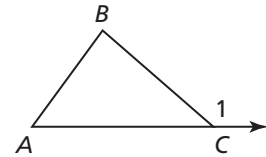


$$m\angle A + m\angle B + m\angle C = 180^\circ$$

Theorem 5.2 Exterior Angle Theorem

The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles.

Notes:

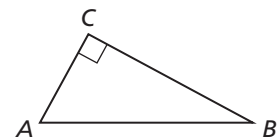


$$m\angle 1 = m\angle A + m\angle B$$

Corollary 5.1 Corollary to the Triangle Sum Theorem

The acute angles of a right triangle are complementary.

Notes:



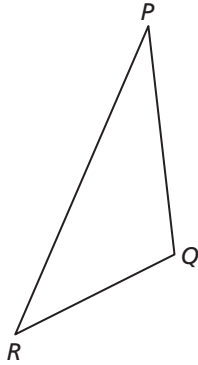
$$m\angle A + m\angle B = 90^\circ$$

5.1 Notetaking with Vocabulary (continued)

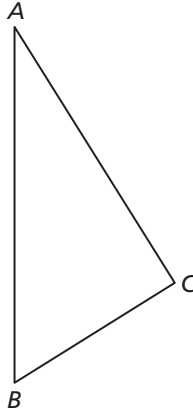
Extra Practice

In Exercises 1–3, classify the triangle by its sides and by measuring its angles.

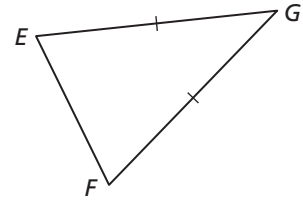
1.



2.



3.

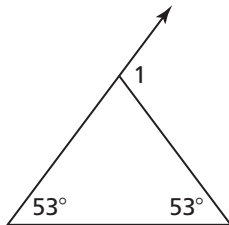


4. Classify $\triangle ABC$ by its sides. Then determine whether it is a right triangle.

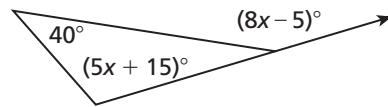
$A(6, 6)$, $B(9, 3)$, $C(2, 2)$

In Exercises 5 and 6, find the measure of the exterior angle.

5.



6.



7. In a right triangle, the measure of one acute angle is twice the sum of the measure of the other acute angle and 30. Find the measure of each acute angle in the right triangle.