Name _____ Date _____

LESSON 4.1

Study Guide

For use with pages 216–224

GOAL **Classify triangles and find measures of their angles.**

Vocabulary

A **triangle** is a polygon with three sides.

A **scalene triangle** has no congruent sides.

An **isosceles triangle** has at least two congruent sides.

An **equilateral triangle** has three congruent sides.

An **acute triangle** has three acute angles.

A **right triangle** has one right angle.

An **obtuse triangle** has one obtuse angle.

An **equiangular triangle** has three congruent angles.

When the sides of a polygon are extended, other angles are formed. The original angles are the **interior angles.** The angles that form linear pairs with the interior angles are the **exterior angles.**

Theorem 4.1 Triangle Sum Theorem: The sum of the measures of the interior angles of a triangle is 180°.

Theorem 4.2 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.

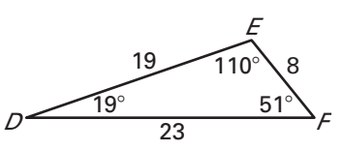
Corollary to the Triangle Sum Theorem: The acute angles of a right triangle are complementary.

LESSON 4.1

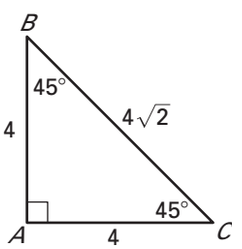
EXAMPLE 1 Classify triangles by sides and by angles

Classify the triangle by its sides and by its angles.

a.



b.



Solution

a. Triangle DEF has one obtuse angle and no congruent sides. So, $\triangle DEF$ is an obtuse scalene triangle.

b. Triangle ABC has one right angle and two congruent sides. So, $\triangle ABC$ is a right isosceles triangle.

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LESSON 4.1

Study Guide *continued*

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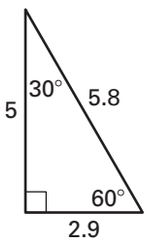
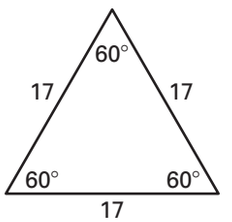
Exercises for Example 1

Classify the triangle by its sides and by its angles.

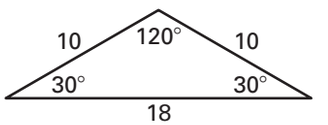
1.



2.

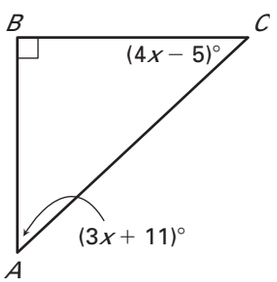


3.

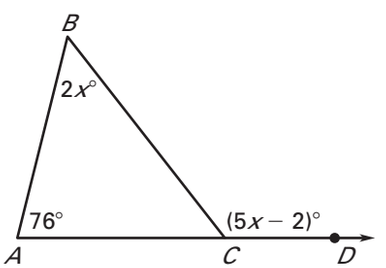


EXAMPLE 2 Find angle measures

a. Find $m\angle BAC$ and $m\angle BCA$.



b. Find $m\angle BCD$ and $m\angle ABC$.



Solution

a. $(4x - 5)^\circ + (3x + 11)^\circ = 90^\circ$ Use Corollary to the Triangle Sum Theorem.

$x = 12$ Solve for x.

So, $m\angle BCA = (4x - 5)^\circ = (4 \cdot 12 - 5)^\circ = 43^\circ$ and $m\angle BAC = (3x + 11)^\circ = (3 \cdot 12 + 11)^\circ = 47^\circ$.

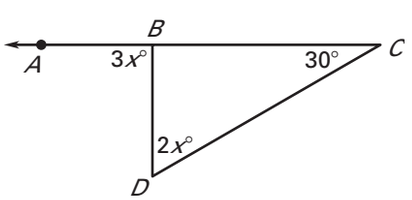
b. $(5x - 2)^\circ = 2x^\circ + 76^\circ$ Use Exterior Angle Theorem.

$x = 26$ Solve for x.

So, $m\angle BCD = (5x - 2)^\circ = (5 \cdot 26 - 2) = 128^\circ$ and $m\angle ABC = 2x^\circ = 2(26)^\circ = 52^\circ$.

Exercises for Example 2

4. Find $m\angle ABD$ and $m\angle BDC$.



5. Find $m\angle CAB$ and $m\angle CBA$.