LESSON 9.3

NAME _____ DATE _____

Reteaching with Practice

For use with pages 543–549

GOAL **Use the converse of the Pythagorean Theorem to solve problems and use side lengths to classify triangles by their angle measures**

Theorem 9.5 Converse of the Pythagorean Theorem
If the square of the length of the longest side of a triangle is equal to the sum of the squares of the lengths of the other two sides, then the triangle is a right triangle.

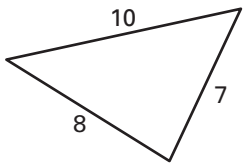
Theorem 9.6
If the square of the length of the longest side of a triangle is less than the sum of the squares of the lengths of the other two sides, then the triangle is acute.

Theorem 9.7
If the square of the length of the longest side of a triangle is greater than the sum of the squares of the lengths of the other two sides, then the triangle is obtuse.

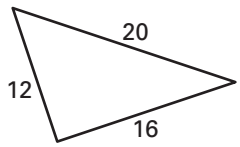
EXAMPLE 1 Verifying Right Triangles

The triangles below appear to be right triangles. Tell whether they are right triangles.

a.



b.



SOLUTION

Let c represent the length of the longest side of the triangle (you do not want to call this the "hypotenuse" because you do not yet know if the triangle is a right triangle). Check to see whether the side lengths satisfy the equation $c^2 = a^2 + b^2$.

a. $10^2 \stackrel{?}{=} 8^2 + 7^2$

$100 \stackrel{?}{=} 64 + 49$

$100 \neq 113$

The triangle is not a right triangle.

b. $20^2 \stackrel{?}{=} 12^2 + 16^2$

$400 \stackrel{?}{=} 144 + 256$

$400 = 400$

The triangle is a right triangle.

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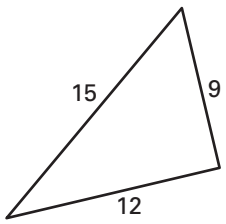
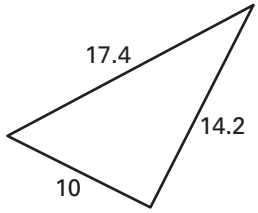
Exercises for Example 1

In Exercises 1–3, determine if the triangles are right triangles.

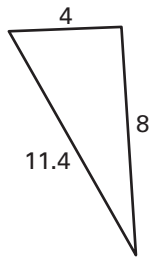
1.



2.



3.



EXAMPLE 2 Classifying Triangles

Decide whether the set of numbers can represent the side lengths of a triangle. If they can, classify the triangle as *right*, *acute*, or *obtuse*.

a. 58, 69, 80 **b.** 11, 30, 39

SOLUTION

You can use the Triangle Inequality to confirm that each set of numbers can represent the side lengths of a triangle.

Compare the square of the length of the longest side with the sum of the squares of the lengths of the two shorter sides.

a. $c^2 \stackrel{?}{} a^2 + b^2$ Compare c^2 with $a^2 + b^2$.

$80^2 \stackrel{?}{} 58^2 + 69^2$ Substitute.

$6400 \stackrel{?}{} 3364 + 4761$ Multiply.

$6400 < 8125$ c^2 is less than $a^2 + b^2$.

Because $c^2 < a^2 + b^2$, the triangle is acute.

b. $c^2 \stackrel{?}{} a^2 + b^2$ Compare c^2 with $a^2 + b^2$.

$39^2 \stackrel{?}{} 11^2 + 30^2$ Substitute.

$1521 \stackrel{?}{} 121 + 900$ Multiply.

$1521 > 1021$ c^2 is greater than $a^2 + b^2$.

Because $c^2 > a^2 + b^2$, the triangle is obtuse.

Exercises for Example 2

Decide whether the set of numbers can represent the side lengths of a triangle. If they can, classify the triangle as *right*, *acute*, or *obtuse*.

4. 5, $\sqrt{56}$, 9 **5.** 23, 44, 70 **6.** 12, 80, 87 **7.** 4, 7, 10