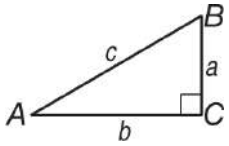
NAME _____ DATE_____ PERIOD _____

10-2 Study Guide and Intervention

The Pythagorean Theorem and Its Converse

The Pythagorean Theorem In a right triangle, the sum of the squares of the lengths of the legs equals the square of the length of the hypotenuse. If the three whole numbers a, b, and c satisfy the equation $a^2 + b^2 = c^2$, then the numbers a, b, and c form a **Pythagorean triple.**

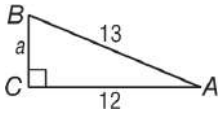


$\triangle ABC$ is a right triangle.

so $a^2 + b^2 = c^2$.

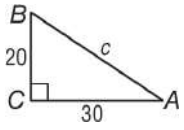
Example :

a. Find *a*.



$a^2 + b^2 = c^2$	Pythagorean Theorem
$a^2 + 12^2 = 132$	$b = 12$, $c = 13$
$a^2 + 144 = 169$	Simplify.
$a^2 = 25$	Subtract.
$a = 5$	Take the positive square root of each side.

b. Find *c*.

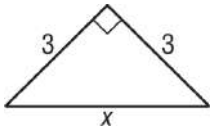


$a^2 + b^2 = c^2$	Pythagorean Theorem
$20^2 + 30^2 = c^2$	$a = 20$, $b = 30$
$400 + 900 = c^2$	Simplify.
$1300 = c^2$	Add.
$\sqrt{1300} = c$	Take the positive square root of each side.
$36.1 \approx c$	Use a calculator.

Exercises

Find *x*.

1.



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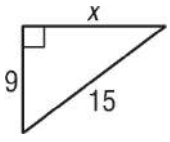

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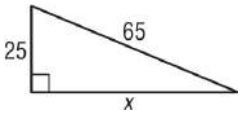

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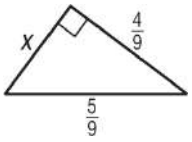

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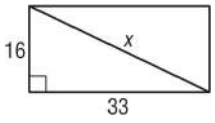

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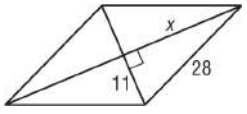
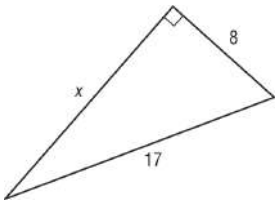


Use a Pythagorean Triple to find *x*.

7.



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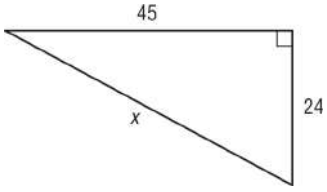

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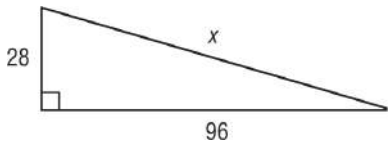

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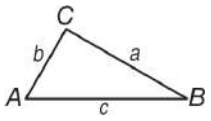
10-2 Study Guide and Intervention *(continued)*

The Pythagorean Theorem and Its Converse

Converse of the Pythagorean Theorem If the sum of the squares of the lengths of the two shorter sides of a triangle equals the square of the lengths of the longest side, then the triangle is a right triangle.



You can also use the lengths of sides to classify a triangle.

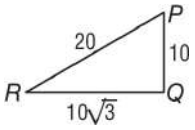
if $a^2 + b^2 = c^2$ then $\triangle ABC$ is a right triangle.

if $a^2 + b^2 > c^2$ then $\triangle ABC$ is acute.

if $a^2 + b^2 < c^2$ then $\triangle ABC$ is obtuse.

If $a^2 + b^2 = c^2$, then $\triangle ABC$ is a right triangle.

Example: Determine whether $\triangle PQR$ is a right triangle.



$a^2 + b^2 \stackrel{?}{=} c^2$	Compare c^2 and $a^2 + b^2$
$10^2 + (10\sqrt{3})^2 \stackrel{?}{=} 20^2$	$a = 10$, $b = 10\sqrt{3}$, $c = 20$
$100 + 300 \stackrel{?}{=} 400$	Simplify.
$400 = 400$✓	Add.

Since c^2 = and $a^2 + b^2$, the triangle is a right triangle.

Exercises

Determine whether each set of measures can be the measures of the sides of a triangle. If so, classify the triangle as *acute*, *obtuse*, or *right*. Justify your answer.

1. 30, 40, 50

2. 20, 30, 40

3. 18, 24, 30

4. 6, 8, 9

5. 6, 12, 18

6. 10, 15, 20

7. $\sqrt{5}, \sqrt{12}, \sqrt{13}$

8. $2, \sqrt{8}, \sqrt{12}$

9. 9, 40, 41