Lesson 11-4

Example 1 Find the Length of the Hypotenuse

Find the length of the hypotenuse of a right triangle if $a = 12$ and $b = 9$.

$c^2 = a^2 + b^2$	Pythagorean Theorem
$c^2 = 12^2 + 9^2$	$a = 12$ and $b = 9$
$c^2 = 225$	Simplify.
$c = \pm\sqrt{225}$	Take the square root of each side.
$c = \pm 15$	Disregard –15. Why?

The length of the hypotenuse is 15 units.

Example 2 Find the Length of a Side

Find the length of the missing side.

In the triangle $c = 37$ and $b = 19$ units.

$c^2 = a^2 + b^2$	Pythagorean Theorem
$37^2 = a^2 + 19^2$	$c = 37$ and $b = 19$
$1369 = a^2 + 361$	Evaluate squares.
$1008 = a^2$	Subtract 361 from each side.
$\pm\sqrt{1008} = a$	Use a calculator to evaluate $\sqrt{1008}$.
$31.75 \approx a$	Use the positive value.

To the nearest hundredth, the length of the leg is 31.75 units.

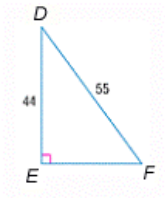
Example 3 Pythagorean Triples

Multiple-Choice Test Item

What is the perimeter of the triangle *DEF*?

A. 143 units **B. 99 units**

C. 121 units **D. 132 units**



Read the Test Item

The perimeter of a triangle is found by adding the lengths of all sides. Use the measure of the hypotenuse and the leg to find the length of the other leg.

Solve the Test Item

Step 1 Check to see if the measurements of this triangle are a multiple of a common Pythagorean triple. The hypotenuse is 11 • 5 units, and the leg is 11 • 4 units. This triangle is a multiple of a (3, 4, 5) triangle.

11 • 3 = 33

11 • 4 = 44

11 • 5 = 55

The missing side is 33 units.

Step 2 Find the perimeter of the triangle.

$P = a + b + c$	Perimeter of a triangle
$P = 33 + 44 + 55$	$a = 33$, $b = 44$, and $c = 55$
$P = 132$	Simplify.

The perimeter of the triangle is 132 units. Choice D is correct.

Example 4 Check for Right Triangles

Determine whether the following side measures form right triangles.

a. 14, 15, 19

Since the measure of the longest side is 19, let $c = 19$, $a = 14$, and $b = 15$.

Then determine whether $c^2 = a^2 + b^2$.

$c^2 = a^2 + b^2$	Pythagorean Theorem
$19^2 \stackrel{?}{=} 14^2 + 15^2$	$c = 19$, $a = 14$, and $b = 15$
$361 \stackrel{?}{=} 196 + 225$	Multiply.
$361 \neq 421$	Add.

Since $c^2 \neq a^2 + b^2$, the triangle is not a right triangle.

b. $\sqrt{17}$, 8, 9

Since the measure of the longest side is 9, let $c = 9$, $a = \sqrt{17}$, and $b = 8$.

Then determine whether $c^2 = a^2 + b^2$.

$c^2 = a^2 + b^2$	Pythagorean Theorem
$9^2 \stackrel{?}{=} (\sqrt{17})^2 + 8^2$	$c = 9$, $a = \sqrt{17}$, and $b = 8$
$81 \stackrel{?}{=} 17 + 64$	Multiply.
$81 = 81$	Add.

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