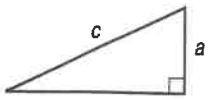
NAME _____ DATE _____ PERIOD ____

11-3 Study Guide and Intervention

The Pythagorean Theorem

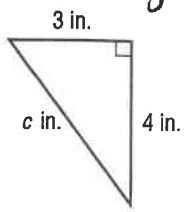
The sides of a right triangle have special names. The sides adjacent to the right angle are the **legs**. The side opposite the right angle is the **hypotenuse**. The **Pythagorean Theorem** describes the relationship between the length of the hypotenuse and the lengths of the legs. In a right triangle, the square of the length of the hypotenuse equals the sum of the squares of the lengths of the legs.

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



* C is always the longest side!
* C is always the hypotenuse of a right triangle.

EXAMPLE 1 **Find the missing measure of a right triangle if $a = 4$ inches and $b = 3$ inches.**



$c^2 = a^2 + b^2$	Pythagorean Theorem
$c^2 = 4^2 + 3^2$	Replace a with 4 and b with 3.
$c^2 = 16 + 9$	Evaluate 4^2 and 3^2.
$c^2 = 25$	Add.
$\sqrt{c^2} = \sqrt{25}$	Take the square root of each side.
$c = 5$	Simplify.

The length of the hypotenuse is 5 inches.

EXAMPLE 2 **Determine whether a triangle with side lengths of 6 meters, 9 meters, and 12 meters is a right triangle.**

$c^2 = a^2 + b^2$	Pythagorean Theorem
$12^2 \stackrel{?}{=} 6^2 + 9^2$	Replace a with 6, b with 9, and c with 12.
$144 \stackrel{?}{=} 36 + 81$	Simplify.
$144 \neq 117$	Add.

The triangle is *not* a right triangle.

EXERCISES

Find the missing measure of each right triangle. Round to the nearest tenth if necessary.

1. 9 in., 4 in., c in.

$c^2 = 4^2 + 9^2$
$c^2 = 16 + 81$
$c^2 = 97$
$c \approx 9.8$

2. 2.5 m, c m, 7.5 m

$c^2 = 5^2 + 7.5^2$
$c^2 = 25 + 56.25$
$c^2 = 81.25$
$c = 9.01$

3. a cm, 13 cm, 16 cm

$16^2 = a^2 + 13^2$
$256 = a^2 + 169$
$-169 \quad -169$
$87 = a^2$
$9.3 = a$

Determine whether each triangle with the given side lengths is a right triangle. Write *yes* or *no*.

4. 15 ft, 8 ft, 17 ft

a b c
$15^2 + 8^2 \stackrel{?}{=} 17^2$
$225 + 64 \stackrel{?}{=} 289$
$289 = 289$
yes

5. 5 in., 13 in., 17 in.

a b c
$5^2 + 13^2 \stackrel{?}{=} 17^2$
$25 + 169 \stackrel{?}{=} 289$
$194 \neq 289$
No

6. 9 yd, 40 yd, 41 yd

a b c
$9^2 + 40^2 \stackrel{?}{=} 41^2$
$81 + 1600 \stackrel{?}{=} 1681$
$1681 = 1681$
Yes

Lesson 11–3

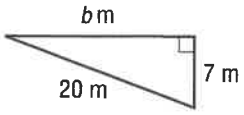
NAME _____ DATE _____ PERIOD ____

11-3 Practice: Skills

The Pythagorean Theorem

Find the missing measure of each right triangle. Round to the nearest tenth if necessary.

1.



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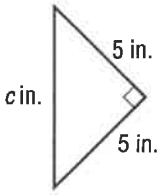

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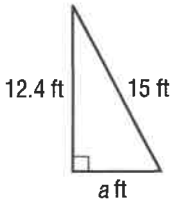

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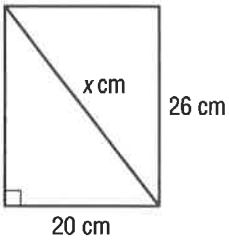

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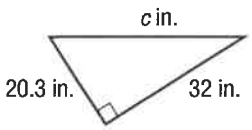

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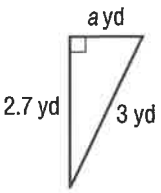

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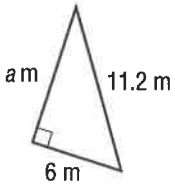

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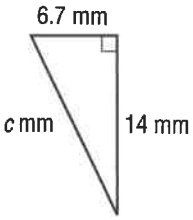

9. $a = 15$ cm, $b = 20$ cm

10. $a = 2$ yd, $b = 12$ yd

11. $a = 13$ in., $c = 16.5$ in.

12. $b = 8$ mm, $c = 17$ mm

13. $a = 1.3$ ft, $b = 4.6$ ft

14. $a = 14.7$ m, $c = 23$ m

Determine whether each triangle with the given side lengths is a right triangle. Write *yes* or *no*.

15. 10 ft, 24 ft, 26 ft

16. 5 in., 8 in., 9 in.

17. 6 cm, 9 cm, 12 cm

18. 4.5 mm, 6.0 mm, 7.5 mm