

Name _____ Date _____

Special Right Triangles (Pages 414–417)

Certain right triangles are called special because they have important relationships for their sides and angles.

Finding Measures in Special Right Triangles

- In a $30^\circ-60^\circ$ right triangle, the length of the hypotenuse is twice the length of the side opposite the 30° angle (the shortest side).
- In a $45^\circ-45^\circ$ right triangle, the lengths of the legs are equal.

EXAMPLE

The length of the hypotenuse of a $30^\circ-60^\circ$ right triangle is 15 inches. Find the lengths of the legs.

The length of the shorter leg (the one opposite the 30° angle) is always half the hypotenuse, so the shorter leg is 7.5 inches long. Use the Pythagorean Theorem to find the length of the other leg.

$$a^2 + b^2 = c^2 \quad \text{Pythagorean Theorem}$$

$$(7.5)^2 + b^2 = 15^2$$

$$56.25 + b^2 = 225$$

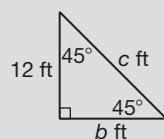
$$b^2 = 168.75$$

$$b = \sqrt{168.75}$$

$$b \approx 13.0 \quad \text{Round to the nearest tenth.}$$

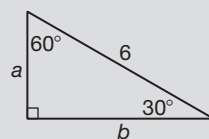
Try These Together

1. Find the missing lengths. Round decimal answers to the nearest tenth.



HINT: The legs have equal lengths.

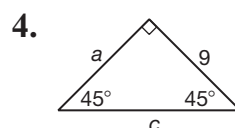
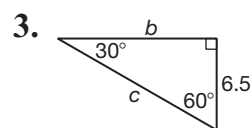
2. Find the missing lengths. Round decimal answers to the nearest tenth.



HINT: Find half of the length of the hypotenuse.

PRACTICE

Find the missing lengths. Round decimal answers to the nearest tenth.



5. **Standardized Test Practice** Your car has two $30^\circ-60^\circ$ right triangular windows. You need a new piece of glass to replace an old window. What are the lengths of the other sides of the window if the hypotenuse is 14 inches?

A 5 in. by 10 in.

B 7 in. by 10 in.

C 7 in. by 12 in.

D 6.5 in. by 12.1 in.

Answers: 1. $b = 12$ ft, $c \approx 17.0$ ft 2. $a = 3$, $b \approx 5.2$ 3. $b \approx 5.2$ 4. $a = 9$, $c \approx 12.7$ 5. C