Name: _____

Date: _____   Period: _____

5.6 Special Right Triangles

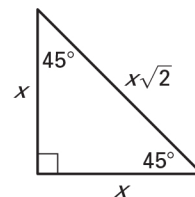**Goal** • Use the relationships among the sides in special right triangles.

Your Notes

The extended ratio of the side lengths of a 45°-45°-90° triangle is $1:1:\sqrt{2}$.
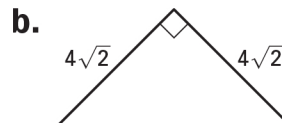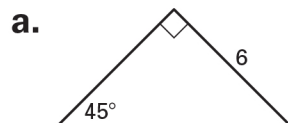
THEOREM 7.8: 45°-45°-90° TRIANGLE THEOREM

In a 45°-45°-90° triangle, the hypotenuse is _____ times as long as each leg.

hypotenuse = leg • _____

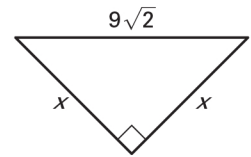**Example 1** *Find hypotenuse length in a 45°-45°-90° triangle*
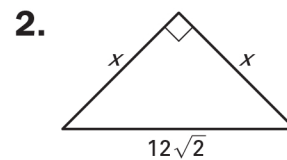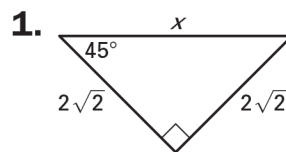
Find the length of the hypotenuse.

a.

b.

Example 2   *Find leg lengths in a 45°-45°-90° triangle*

Find the lengths of the legs in the triangle.

$9\sqrt{2}$

x x

✔ *Checkpoint* **Find the value of the variable.**

1.

$45°$ x

$2\sqrt{2}$ $2\sqrt{2}$

2.

x x

$12\sqrt{2}$

The extended ratio of the side lengths of a 30°-60°-90° triangle is $1 : \sqrt{3} : 2$.

THEOREM 7.9: 30°-60°-90° TRIANGLE THEOREM

In a 30°-60°-90° triangle, the hypotenuse is _____ as long as the shorter leg, and the longer leg is _____ times as long as the shorter leg.

hypotenuse = ____ • shorter leg

longer leg = shorter leg • _____

$60°$ $2x$

x $30°$

$x\sqrt{3}$
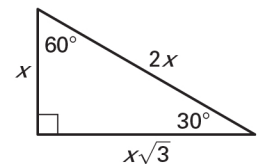
Example 3   *Find the height of an equilateral triangle*

Music You make a guitar pick that resembles an equilateral triangle with side lengths of 32 millimeters. What is the approximate height of the pick?
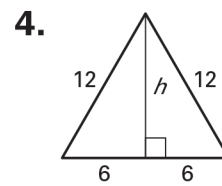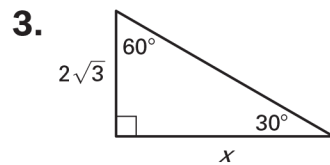
Remember that in an equilateral triangle, the altitude to a side is also the median to that side. So, altitude $\overline{BD}$ _____ $\overline{AC}$.

Example 4   *Find lengths in a 30°-60°-90° triangle*

Find the values of *x* and *y*. Write your answer in simplest radical form.
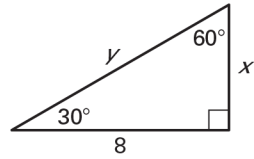
✔ *Checkpoint* **In Exercises 3 and 4, find the value of the variable.**

3.

4.

5. In Example 5, how far from the bottom of the windshield are the ends of the wipers if they make a 30° angle with the bottom of the windshield?