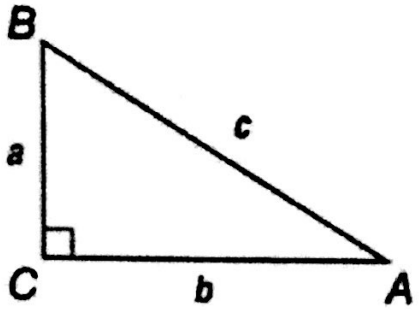
Name: Key Hour: _____ Seat: _____

Section 8.3: Special Right Triangles

Notecard addition:



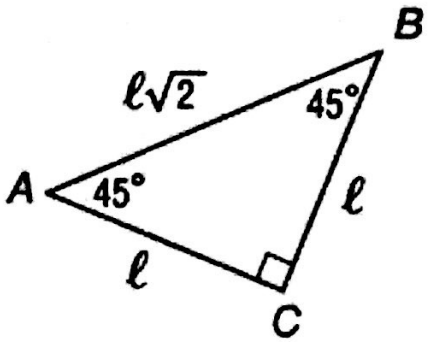
If $\triangle ABC$ is a right triangle with right angle C, then $a^2 + b^2 = c^2$.

Objectives

1. Use the properties of a 45°-45°-90° triangles
2. Use the properties of 30°-60°-90° triangles

Theorem 8.8 45°-45°-90° Triangle Theorem

In a 45°-45°-90° triangle, $\ell = \ell$ and $h = \ell\sqrt{2}$.



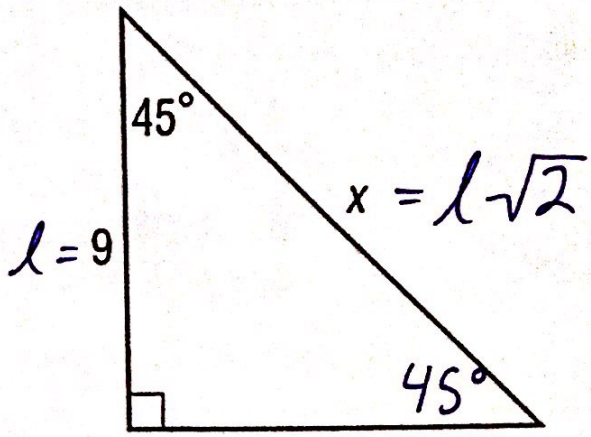
EXAMPLE 1 Find the Hypotenuse Length in a 45°-45°-90° Triangle

A. Find x.

$l = 9$

$hyp = x = l \cdot \sqrt{2}$

$= 9\sqrt{2}$



EXAMPLE 1 Find the Hypotenuse Length in a 45°-45°-90° Triangle

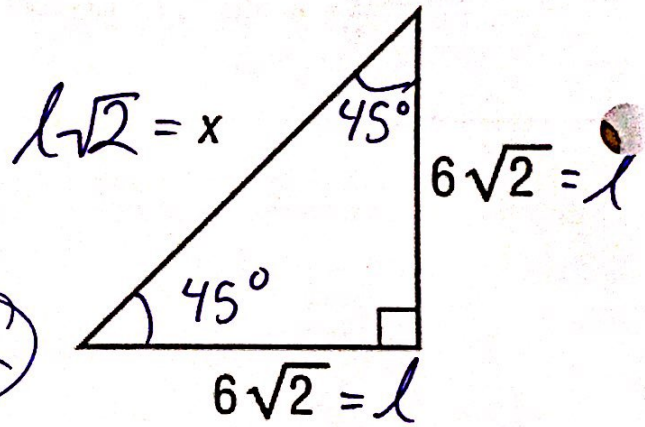
B. Find x.

$l = 6\sqrt{2}$

$x = l \cdot \sqrt{2} = (6\sqrt{2}) \cdot \sqrt{2}$

$= 6 \cdot \sqrt{2 \cdot 2}$

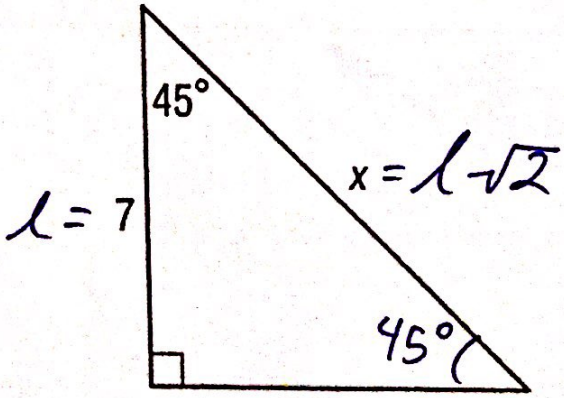
$= 6 \cdot \sqrt{4} = 6 \cdot 2 = 12$



EXAMPLE 1 ☑ Check Your Progress

A. Find x.

$x = l \cdot \sqrt{2} = (7)\sqrt{2}$



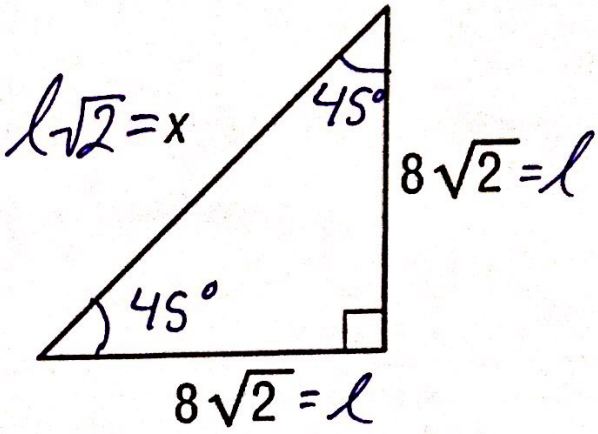
EXAMPLE 1 ✓ **Check Your Progress**

B. Find x.

$x = l\sqrt{2} = (8\sqrt{2})\cdot\sqrt{2}$

$= 8\cdot\sqrt{2\cdot 2} = 8\cdot\sqrt{4}$

$= 8\cdot 2 = 16$



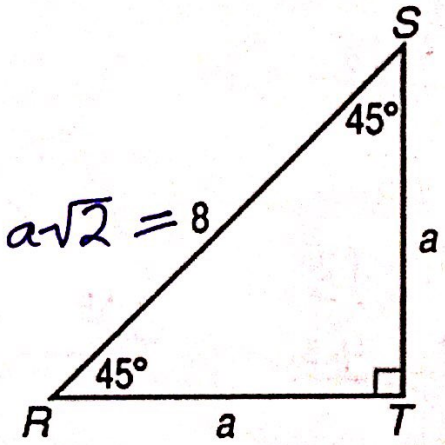
EXAMPLE 2 Find the Leg Lengths in a 45°-45°-90° Triangle

Find a.

$\frac{8}{\sqrt{2}} = \frac{a\sqrt{2}}{\sqrt{2}}$

$a = \frac{8}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{8\sqrt{2}}{2} = 4\sqrt{2} = a$



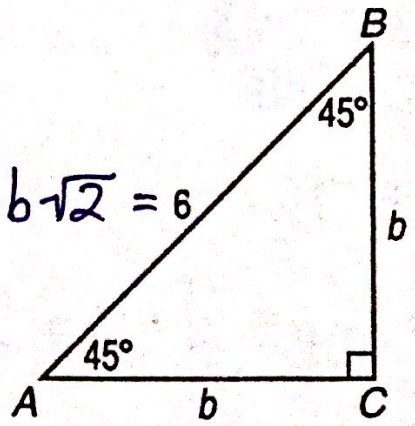
EXAMPLE 2 ✓ **Check Your Progress**

Find b.

$\frac{6}{\sqrt{2}} = \frac{b\sqrt{2}}{\sqrt{2}}$

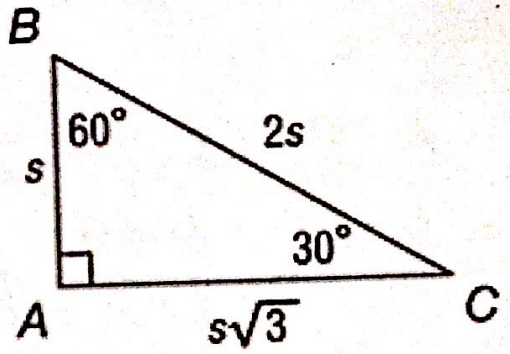
$b = \frac{6}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{6\sqrt{2}}{2} = 3\sqrt{2} = b$



Theorem 8.9 30°-60°-90° Triangle Theorem

In a 30°-60°-90° triangle, $h = 2s$ and $\ell = s\sqrt{3}$.



EXAMPLE 3 Find Lengths in a 30°-60°-90° Triangle

Reference Triangle

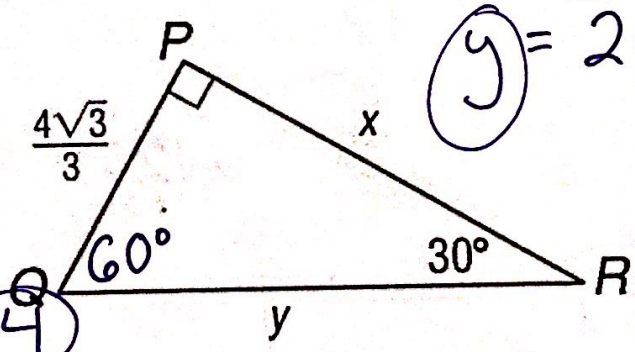
Find x and y.

$S = \frac{4\sqrt{3}}{3}$

$x = S \cdot \sqrt{3}$

$= \left(\frac{4\sqrt{3}}{3}\right)\sqrt{3}$

$= \frac{4\sqrt{9}}{3} = \frac{4 \cdot 3}{3} = 4$



$S = \frac{4\sqrt{3}}{3}$

$y = 2 \cdot S = \left(\frac{4\sqrt{3}}{3}\right) \cdot 2$

$= \frac{8\sqrt{3}}{3}$

EXAMPLE 3 ✓ **Check Your Progress**

Find BC.

$\frac{S\sqrt{3}}{\sqrt{3}} = \frac{4\sqrt{3}}{\sqrt{3}}$

$S = 4$

$BC = hyp = 2 \cdot S = 2 \cdot 4 = 8$