Name: Date: Period: 2

**Special Right Triangles**

*Lesson Objective* IWBAT find side lengths of special right Δs.

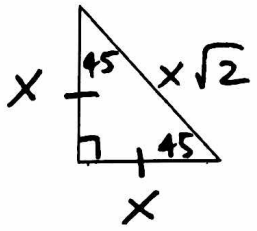
**45°-45°-90° Triangle Theorem**

In a 45°-45°-90° triangle, the hypotenuse is $\sqrt{2}$ times as long as each leg.

$x^2 + x^2 = hyp^2$

$\sqrt{2x^2} = \sqrt{hyp^2}$

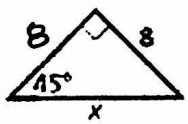
$x\sqrt{2} = hyp$




"hyp = leg $\sqrt{2}$"

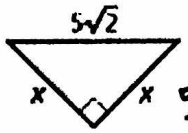
*Examples*

1. Find the value of x. Write your answer in simplest form.

a. 


hyp = leg $\sqrt{2}$

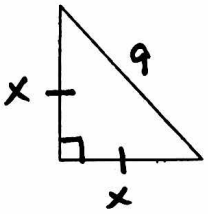
$x = 8\sqrt{2}$

b. 


hyp = leg $\sqrt{2}$

$5\sqrt{2} = x\sqrt{2}$

$x = 5$

c. 


hyp = leg $\sqrt{2}$

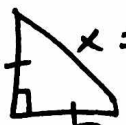
$9 = x\sqrt{2}$

$x = \frac{9}{\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right)$

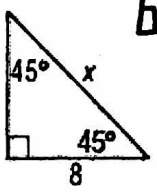
$= \frac{9\sqrt{2}}{\sqrt{4}}$

$= \boxed{\frac{9\sqrt{2}}{2}}$

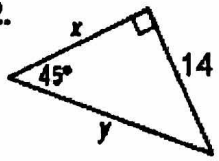
2. Find the value of x in the diagram.




$x = (7\sqrt{3})(\sqrt{2}) = \boxed{7\sqrt{6}}$

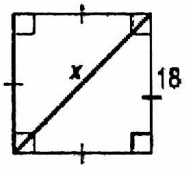
1. 


$x = 8\sqrt{2}$

2. 


$x = 14$

$y = 14\sqrt{2}$

3. 


$x = 18\sqrt{2}$

**30°-60°-90° Triangle Theorem**

"hyp = 2SL"

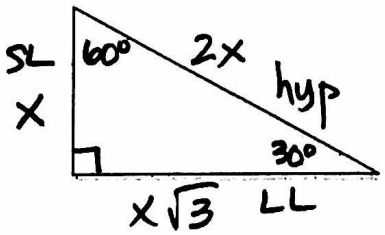
In a 30°-60°-90° triangle…

1. the hypotenuse is twice as long as the shorter leg

AND

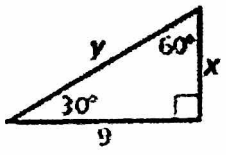
2. the longer leg is $\sqrt{3}$ times as long as the shorter leg

"LL = SL $\sqrt{3}$"



*Examples*:

3. Find the values of x and y. Write your answer in simplest form.




$LL = SL\sqrt{3}$

$9 = x\sqrt{3}$

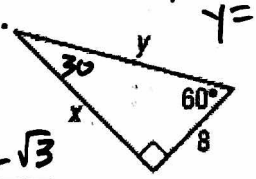
$x = \frac{9}{\sqrt{3}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right)$ → $x = \frac{9\sqrt{3}}{\sqrt{9}} = \frac{9\sqrt{3}}{3} = 3\sqrt{3}$

$hyp = 2SL \Rightarrow y = 2(3\sqrt{3})$

$y = 6\sqrt{3}$

4. Find the values of x and y in each of the triangles below.

1.



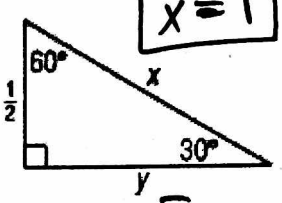

$hyp = 2SL$

$y = 2(8) = 16$

$LL = SL\sqrt{3}$

$x = 8\sqrt{3}$

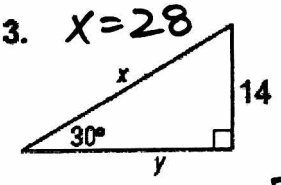
2.




$x = 1$

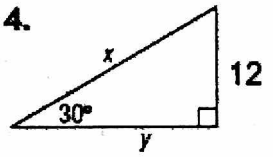
$y = \frac{\sqrt{3}}{2}$

3. $x = 28$



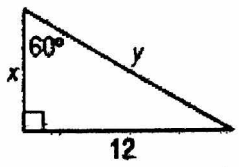

$y = 14\sqrt{3}$

4.



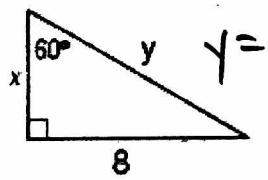

$x = 24, y = 12\sqrt{3}$

5.




$x = 4\sqrt{3}, y = 8\sqrt{3}$

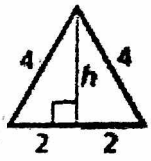
6.

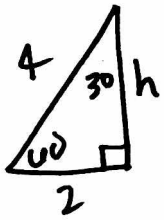



$y = \frac{16\sqrt{3}}{3}$

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

5. What is the altitude of the triangle below?

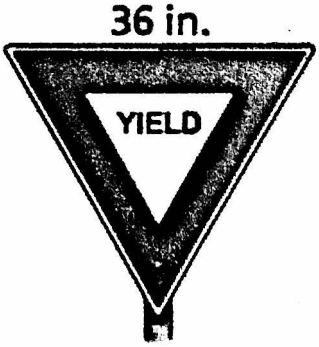


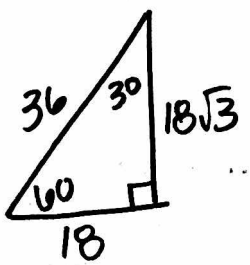




$LL = SL\sqrt{3}$

$h = 2\sqrt{3}$

6. A road sign is shaped like an equilateral triangle. Estimate the *area* of the sign by finding the area of the equilateral triangle. Round your answer to the nearest hundredth, if necessary.




$area = \frac{1}{2}bh$

$area = \frac{1}{2}(36)(18\sqrt{3})$

$= 324\sqrt{3}\ in^2$

$\approx 561.18\ in^2$