Secondary 2
lesson 11.2

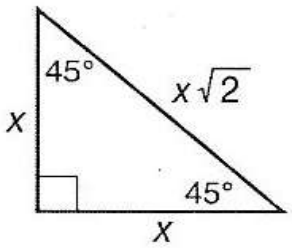
Special Right Triangles

Objectives:

Use the special properties of 45° - 45° - 90° triangles.
Use the special properties of 30° - 60° - 90° triangles.

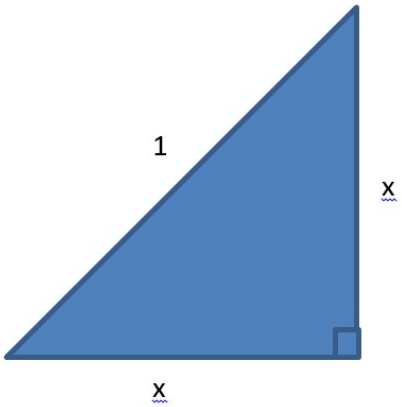
Special Right Triangles

45° - 45° - 90° Triangle Theorem: Both legs are congruent and the length of the hypotenuse is $\sqrt{2}$ times the length of a leg.

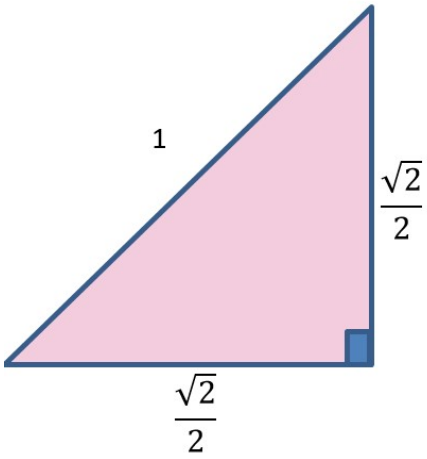


$$h = leg * \sqrt{2}$$

Showing ratios of 45-45-90 right triangle



Start with a right triangle that has a hypotenuse of length 1. If one of the other angles is 45° the other one is also. The legs of this triangle are the same. Use Pythagorean to find their length.



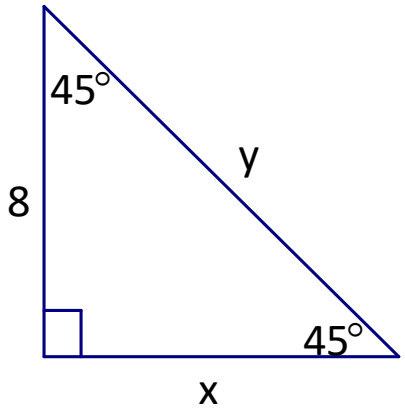
If we apply Pythagorean then we get: $x^2 + x^2 = 1^2$.

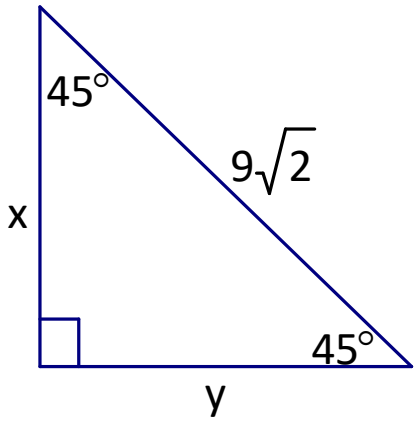
Solving for x we find the legs are $2x^2 = 1,\ x^2 = \frac{1}{2}$

$x = \sqrt{\frac{1}{2}}\ , x = \frac{\sqrt{1}}{\sqrt{2}}\ ,\ x = \frac{1}{\sqrt{2}}\ ,\ x = \frac{1\sqrt{2}}{\sqrt{2}\sqrt{2}}\ ,\ so\ \boldsymbol{x = \frac{\sqrt{2}}{2}}$

Example 3: Find the length of the hypotenuse of a 45° - 45° - 90° right triangle with legs the length of 9.

Example 4: Find the value of x and y.



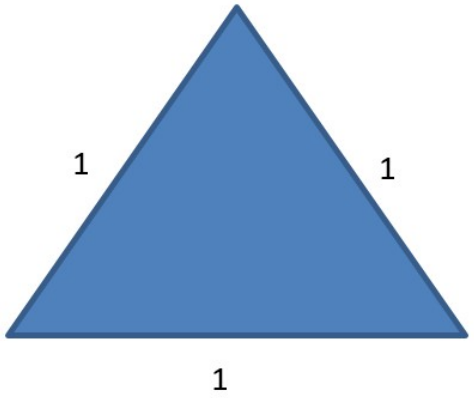


<u>30° - 60° - 90° Triangle Theorem</u>: The length of the hypotenuse is twice the length of the shorter leg. The length of the longer leg is $\sqrt{3}$ time the shorter leg.

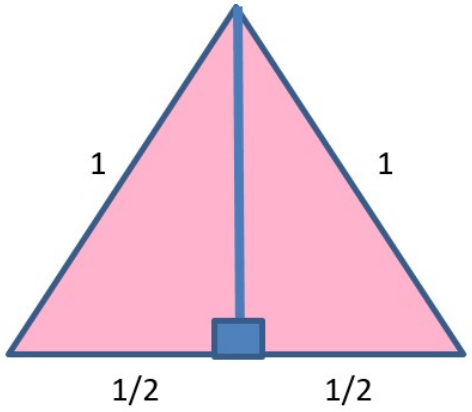
$$h = 2 * short$$

$$long = short*\sqrt{3}$$

Showing ratios of 30-60-90 right triangle

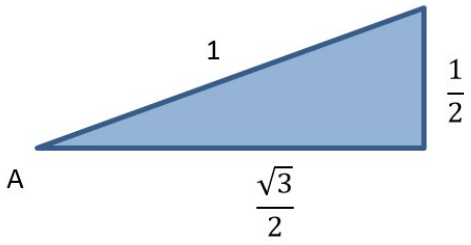


Start with an equilateral triangle that has sides of length 1. We know the angles are all the same. They are all 60 degrees.



If we bisect an angle we now have two triangles with sides 1, ½ , and something. The top angle is ½ of 60˚, or 30˚. The other two angles are 90˚ and 30˚. We have 30-60-90 triangles.

For the Unit Circle:

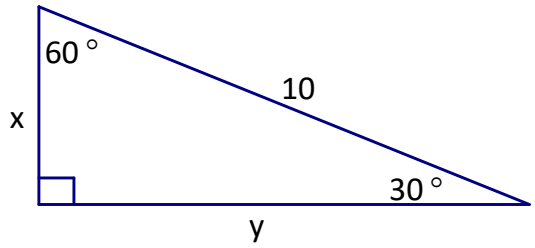


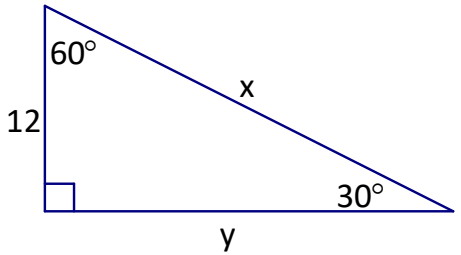
If we apply Pythagorean we get: $(\frac{1}{2})^2 + x^2 = 1^2$. Solving for x we find the third side is $\frac{\sqrt{3}}{2}$.

This is a 30-60-90 right triangle

Example 6: Find the lengths of the legs of a 30° - 60° - 90° triangle with hypotenuse of length $4\sqrt{3}$.

Example 7: Find the value of x and y.





XL type problem: The distance from one corner to the opposite corner of a square playground is 96 feet. To the nearest foot, how long is each side of the playground?

There will be other problems where you will need to solve quadratics. What is a quadratic? What are 3 ways to solve one?

Assignment:

Handout 11.2 and XL11.2