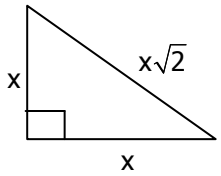
Math 1312
Section 5.5
Special Right Triangles

Note: Triangles in this section are always right triangles!

45-45-90 Triangles

Theorem 1: In a triangle whose angles measure 45^0, 45^0, and 90^0, the hypotenuse has a length equal to the product of $\sqrt{2}$ and the length of either leg.

The ratio of the sides of a 45-45-90 triangle are: $x : x : x\sqrt{2}$.



45-45-90

if this measure is given:	*and you want this measure:*	*then do this:*
the leg	hypotenuse	multiply the leg by $\sqrt{2}$
hypotenuse	the leg	divide hypotenuse by $\sqrt{2}$

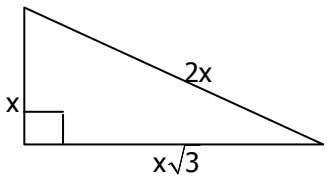
Note: The legs of a 45-45-90 are the same measure!

$$leg = \frac{hypotenuse}{\sqrt{2}} \qquad hypotenuse = leg\sqrt{2}$$

30-60-90 Triangles

Theorem 2: In a triangle whose angles measure 30^0, 60^0, and 90^0, the hypotenuse has a length equal to twice the length of the shorter leg, and the length of the longer leg is the product of $\sqrt{3}$ And the length of the shorter leg.

The ratio of the sides of a 30-60-90 triangle are: $x : x\sqrt{3} : 2x$.



Note: The short leg is always opposite the 30° angle!

It is best to find the measure of the short leg first (that is if it is not given).

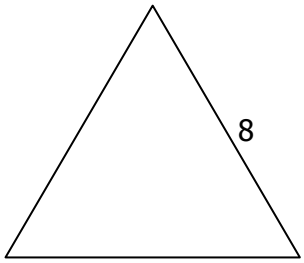
30-60-90

if this measure is given:	*and you want this measure:*	*then do this:*
short leg	hypotenuse	multiply short leg by 2
short leg	long leg	multiply short leg by $\sqrt{3}$
long leg	short leg	divide long leg by $\sqrt{3}$
hypotenuse	short leg	divide hypotenuse by 2

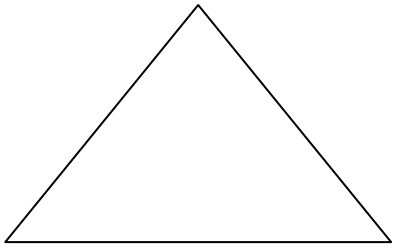
$$short\_leg = \frac{hypotenuse}{2} \qquad short\_leg = \frac{long\_leg}{\sqrt{3}}$$

$$hypotenuse = 2(short\_leg) \qquad long\_leg = \sqrt{3}(short\_leg)$$

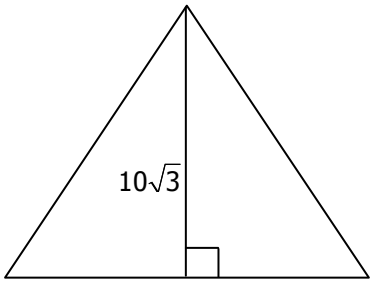
Example 1: Find the altitude of the following equilateral triangle.



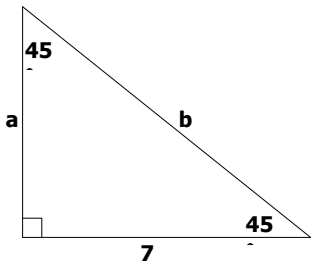
Example 2: Find the altitude of the following equilateral triangle.



Example 3: Find the length of the side of the following equilateral triangle.



Example 4: Find a and b.



Example 5: Find c and d.