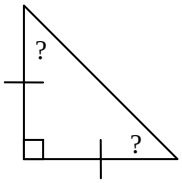
Special Right Triangles

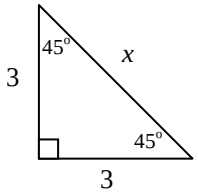
Before we begin to find the area of polygons, let us explore the properties of two types of special right triangles. They will be very useful to us later as we learn about area (and later, as we learn Trigonometry).

A. 45^o-45^o-90^o Triangles

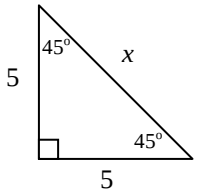
1. Below is an isosceles right triangle. What are the measures of each of its acute angles?_____



2. Use the Pythagorean Theorem to find x in simplest radical form.

a) 

x = _____

b) 

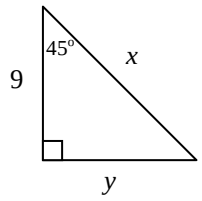
x = _____

Do you notice any patterns?

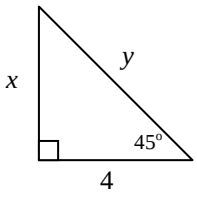
3. | Theorem: In a 45^o-45^o-90^o triangle, the legs are congruent, and the length of the hypotenuse is _____ times the length of either leg. |
|---|

So, to find the length of the hypotenuse when given the length of the leg, you should _____, and to find the length of the leg when given the length of the hypotenuse, you should _____.

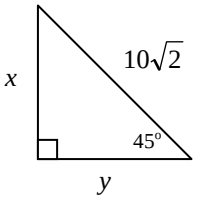
4. Examples: Find x and y by using the theorem above. (You do not need to use the Pythagorean Theorem again; use the new theorem instead!)

a) 

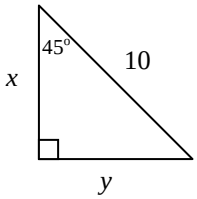
$x =$ _____
$y =$ _____

b) 

$x =$ _____
$y =$ _____

c) 

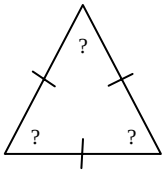
$x =$ _____
$y =$ _____

d) 

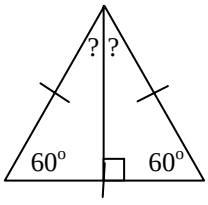
$x =$ _____
$y =$ _____

B. 30°-60°-90° Triangles

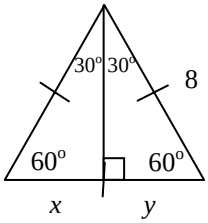
1. Below is an equilateral triangle. What are the measures of each of its angles?_____



2. We now will draw an altitude to the base of this equilateral triangle. Find the missing angle measurements.

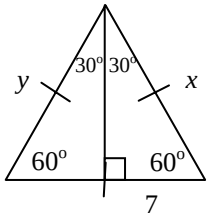


3. Find x and y in the figures below:

a) 

$x =$ _____

$y =$ _____

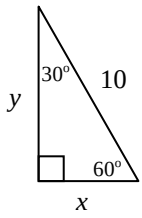
b) 

$x =$ _____

$y =$ _____

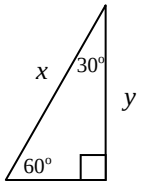
4. In the figures above, each equilateral triangle has been divided into two smaller triangles. They are known as 30^o-60^o-90^o triangles. How does the hypotenuse of the 30^o-60^o-90^o triangle compare to its shorter leg? _____

5. In the figures below, find x, and then use the Pythagorean Theorem to find y. Write y in simplest radical form.

a) 

$x =$ _____

$y =$ _____

b) 

$x =$ _____

$y =$ _____

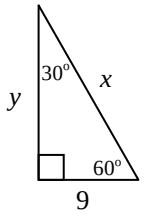
Show Pythagorean Theorem work below:

6.

Theorem:	In a 30^o-60^o-90^o triangle, the length of the hypotenuse is _____ times the length of the shorter leg, and the length of the longer leg is _____ times the length of the shorter leg.

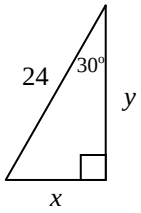
7. Examples: Find x and y by using the theorem above. (You do not need to use the Pythagorean Theorem again; use the new theorem instead!)

Hint: If the length of the shorter leg is not already given, find that first, since the theorem above is based on the length of the shorter leg.

1) 

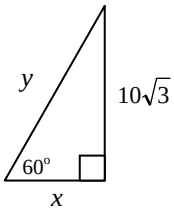
$x =$ _____

$y =$ _____

2) 

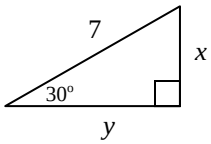
$x =$ _____

$y =$ _____

3) 

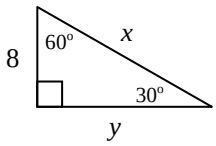
$x =$ _____

$y =$ _____

4) 

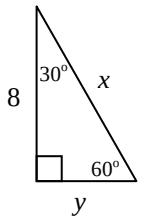
$x =$ _____

$y =$ _____

5) 

$x =$ _____

$y =$ _____

6) 

$x =$ _____

$y =$ _____

We will now use these triangles as we begin to learn about Area of Polygons…