Algebra 2B

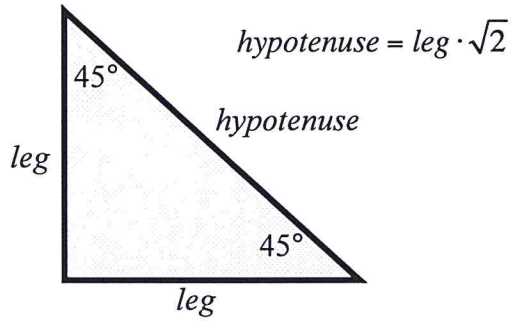
Special Right Triangles

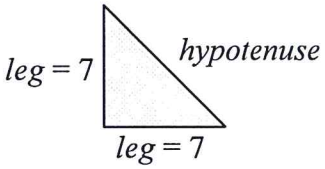
In this section we're going to learn about two special cases of right triangles. One of these special cases is when we have what is called a 30-60-90 triangle. The other special case is when we have a 45-45-90 triangle. As you can probably guess these numbers are the angles of the triangles.

What is so special about these two different types of triangles?

Well in the previous section we had to know two of the three sides in the triangle in order to solve for the remaining side. This is not the case with these special triangles. In each case we only have to know **one** side of the triangle and we can find all the rest of them.

45-45-90 Right Triangle





1. For every problem like this, start with a labeled picture:

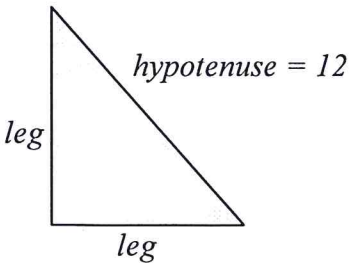
2. Since we are given the leg of the triangle, what are we trying to solve for?

3. Always start by writing out the general equation first. $hypotenuse = leg \cdot \sqrt{2}$

Now plug in the part you know, (the leg). $hypotenuse =$ __7__ $\cdot \sqrt{2}$

(Answer: hypotenuse = $7\sqrt{2}$)

4. What if we had been given the hypotenuse instead of a leg? How would we solve for the missing side then? For example what if the problem looked like the one below?



In order to go from *leg* ⇒ *hypotenuse* we multiplied by $\sqrt{2}$ thus, in order to go from *hypotenuse* ⇒ *leg* we should __divide__ by $\sqrt{2}$.

6. If you did not put the word divide up in the blank space below, hit yourself on the head, write it in, and continue reading.

Special Right Triangles

7. Now we must actually solve the problem. This involves getting the square root out of the bottom of the fraction. (Remember mathematicians don't like square roots in the bottom of fractions.)

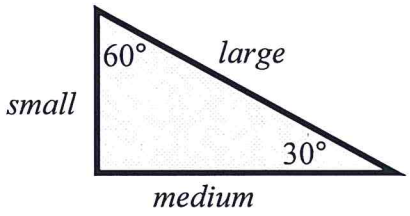
$$\frac{12}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{2} = 6\sqrt{2}$$

30-60-90 Right Triangle

The first thing that you should notice is that there are now two distinct legs. *How can we tell the difference between them?* I like to think of the three sides as: small, medium, and large. This means I can label the triangle and write the equations like this:

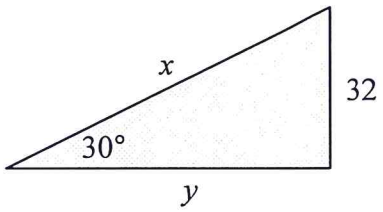
$$medium = small \cdot \sqrt{3}$$

$$large = 2(small)$$



To solve problems with 30-60-90 triangles:

1. Start with the picture that is given and add the labels of *small*, *medium*, and *large* to the picture:



2. Write down the two equations: $medium = small \cdot \sqrt{3}$ and $large = 2(small)$

3. Now solve for x (*large*) and y (*medium*). Make sure to show all your work below in the space provided.

large = 2 · small
= 2 · 32
large = 64

medium = small · $\sqrt{3}$
= 32 · $\sqrt{3}$
medium = $32\sqrt{3}$

When you are done, check your answers and ask for help if your answers don't match up.

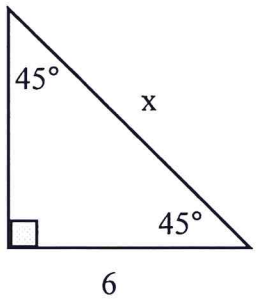
Assignment: Special Right Triangle Problems (Next Page) + Inverse Trig Functions Kuta Worksheet

Algebra 2B

Special Right Triangles

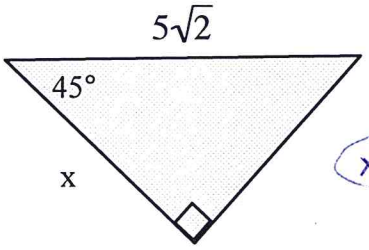
Solve for x and y.

1.



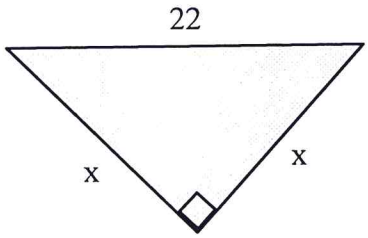
$x = 6\sqrt{2}$

2.



$x = 5$

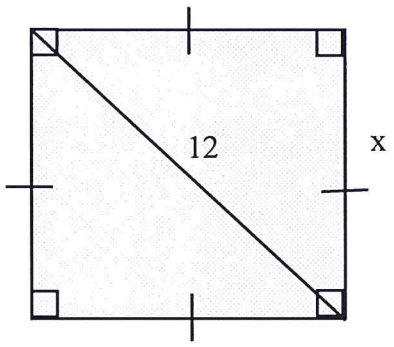
3.



$x = 11\sqrt{2}$

$\frac{22}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{22\sqrt{2}}{2} = 11\sqrt{2}$

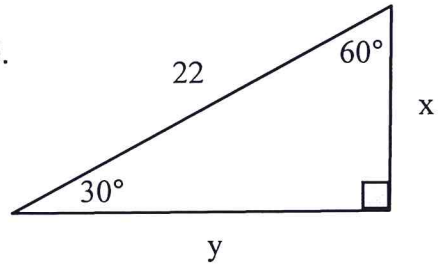
4.



$x = 6\sqrt{2}$

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

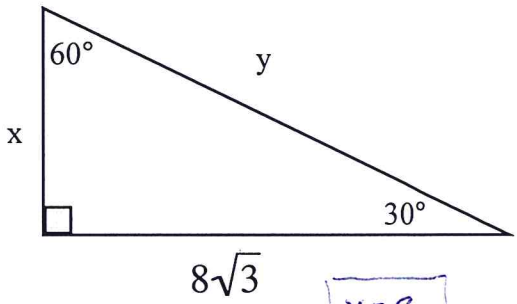
5.



$x = 11$

$y = 11\sqrt{3}$

6.

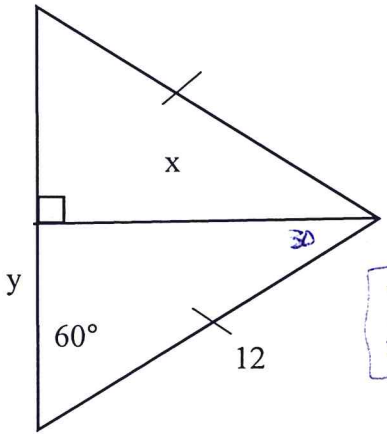


$8\sqrt{3}$

$x = 8$

$y = 16$

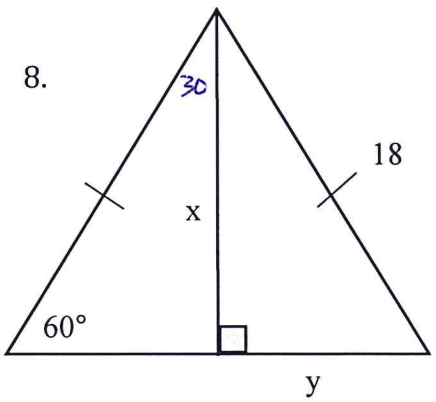
7.



$y = 6$

$x = 6\sqrt{3}$

8.



$y = 9$

$x = 9\sqrt{3}$

Kuta Software - Infinite Geometry

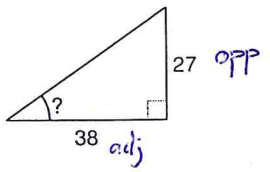
Name_____

Inverse Trigonometric Ratios

Date_____ Period____

Find the measure of the indicated angle to the nearest degree.

9)



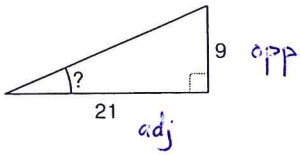
opp, adj

$\tan x = \frac{27}{38}$

$x = \tan^{-1}\left(\frac{27}{38}\right)$

$x = 35.4°$

10)



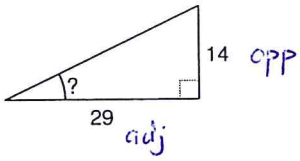
opp, adj

$\tan x = \frac{9}{21}$

$x = \tan^{-1}\left(\frac{9}{21}\right)$

$x = 23.2°$

11)



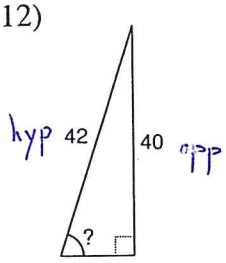
opp, adj

$\tan x = \frac{14}{29}$

$x = \tan^{-1}\left(\frac{14}{29}\right)$

$x = 25.8°$

12)



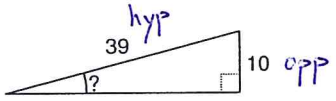
opp

$\sin x = \frac{40}{42}$

$x = \sin^{-1}\left(\frac{40}{42}\right)$

$x = 72.2°$

13)



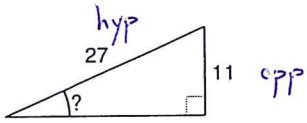
opp

$\sin x = \frac{10}{39}$

$x = \sin^{-1}\left(\frac{10}{39}\right)$

$x = 14.9°$

14)



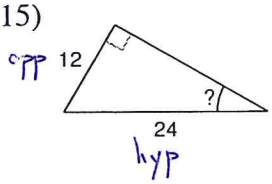
opp

$\sin x = \frac{11}{27}$

$x = \sin^{-1}\left(\frac{11}{27}\right)$

$x = 24.0°$

15)

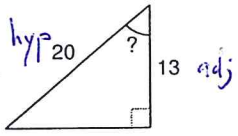


$\sin x = \frac{12}{24}$

$x = \sin^{-1}\left(\frac{12}{24}\right)$

$x = 30°$

16)

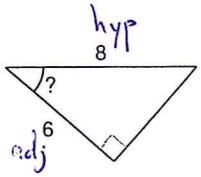


$\cos x = \frac{13}{20}$

$x = \cos^{-1}\left(\frac{13}{20}\right)$

$x = 49.5°$

17)

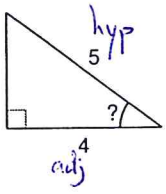


$\cos x = \frac{6}{8}$

$x = \cos^{-1}\left(\frac{6}{8}\right)$

$x = 41.4°$

18)

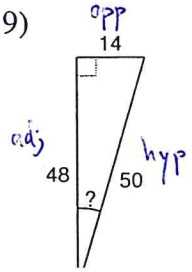


$\cos x = \frac{4}{5}$

$x = \cos^{-1}\left(\frac{4}{5}\right)$

$x = 36.9°$

19)

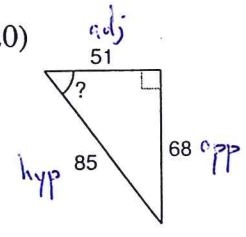


$\sin x = \frac{14}{50}$

$x = \sin^{-1}\left(\frac{14}{50}\right)$

$x = 16.3°$

20)



$\tan x = \frac{68}{51}$

$x = \tan^{-1}\left(\frac{68}{51}\right)$

$x = 53.1°$