Geometry
Notes - Intro to Trigonometry

KEY

Name_____
Date_____

Today we are going to start looking at trigonometric, or "trig" functions. There are buttons for each of these functions on your calculator and you have probably noticed them before. Sin, Cos, and Tan are the buttons on your calculator that stand for Sine, Cosine, and Tangent. You will learn how to use the calculator later on, but right now we are just going to write the trig ratios (fractions) by hand.

Each of the functions represents a fraction that you can write using the sides of the triangle. Before you can write the fraction, you need to figure out which sides of the triangle you need to use. This brings us to what SOHCAHTOA stands for:

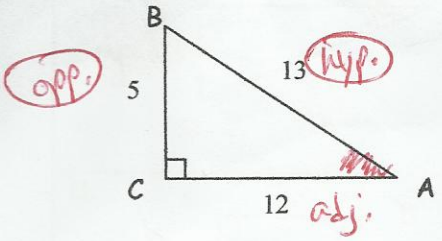
Sin Opposite Hypotenuse Cos Adjacent Hypotenuse Tan Opposite Adjacent

So how do we use this? SOHCAHTOA tells you which sides to use in relation to the angle you are looking at. There are a few steps to doing these problems.

1. Mark the angle you are looking at.
2. Label the sides *in relation to* the angle you are looking at. (opposite, adjacent, hypotenuse)
3. Circle the sides you are supposed to use to make that trig function (use SOHCAHTOA) to help you.
4. Decide which side goes on top of the fraction (numerator) and which goes on bottom of the fraction (denominator).
5. Write the fraction.

Here are a few examples:

EX 1 Find sin A.

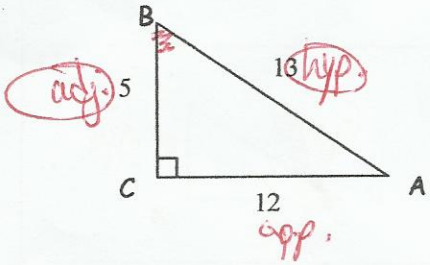


1. Mark angle A.
2. Label the sides in relation to angle A (opp, adj, hyp)
3. Circle the sides that we use for sin (opp, hyp)
4. Decide which side goes on top of the fraction (opp)
5. Write the fraction.

$\sin\theta = \frac{\text{opp.}}{\text{hyp.}}$

Sin A = $\frac{5}{13}$

EX 2 Find cos B

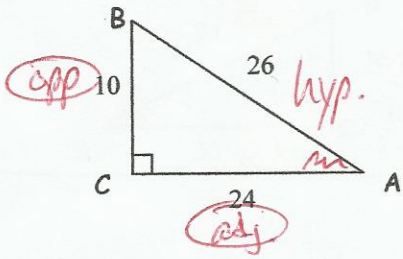


1. Mark angle B.
2. Label the sides in relation to angle B (opp, adj, hyp)
3. Circle the sides that we use for cos (adj, hyp)
4. Decide which side goes on top of the fraction (adj)
5. Write the fraction.

$\cos\theta = \frac{\text{adj.}}{\text{hyp.}}$

Cos B = $\frac{5}{13}$

EX 3 Find tan A

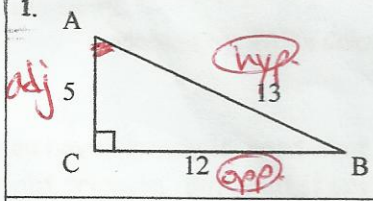


1. Mark angle A.
2. Label the sides in relation to angle A (opp, adj, hyp)
3. Circle the sides that we use for tan (opp, adj)
4. Decide which side goes on top of the fraction (opp)
5. Write the fraction – careful – make sure to reduce!

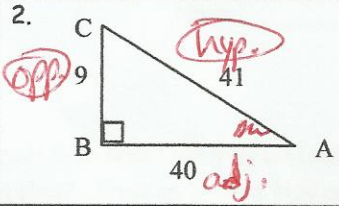
$\tan\theta = \frac{\text{opp.}}{\text{adj.}}$

Tan A = $\frac{10}{24} = \frac{5}{12}$

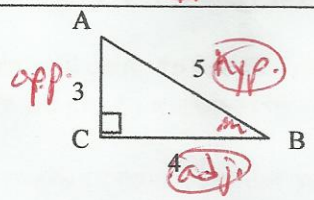
Now write each of these trig functions. Remember the 5 steps and look back at the examples on the front if you need help. And make sure to **reduce** your final answer!! Don't forget: **SOHCAHTOA**

1. 

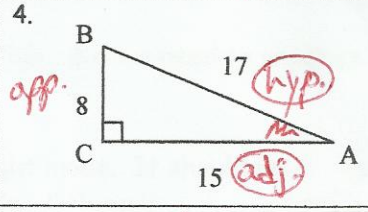
adj, hyp, opp
sin A = $\frac{12}{13}$

2. 

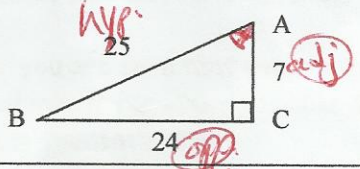
hyp, opp, adj
sin A = $\frac{9}{41}$

3. 

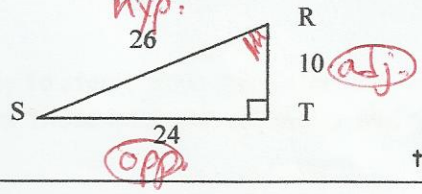
opp, hyp, adj
cos B = $\frac{4}{5}$

4. 

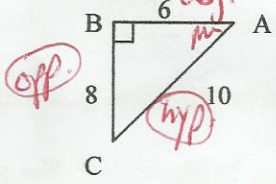
opp, hyp, adj
cos A = $\frac{15}{17}$

5. 

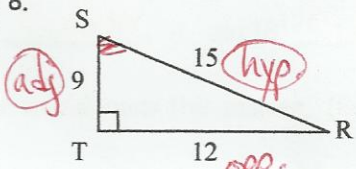
hyp, adj, opp
tan A = $\frac{24}{7}$

6. 

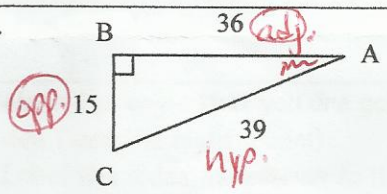
hyp, adj, opp
tan R = $\frac{12}{5}$

7. 

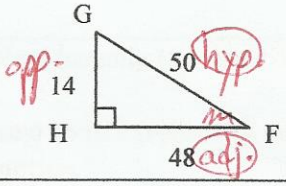
adj, opp, hyp
sin A = $\frac{4}{5}$

8. 

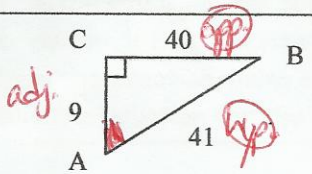
adj, hyp, opp
cos S = $\frac{3}{5}$

9. 

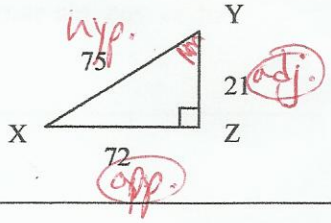
adj, opp, hyp
tan A = $\frac{5}{12}$

10. 

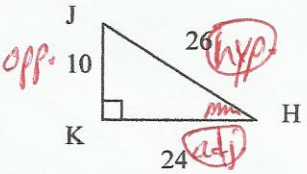
opp, hyp, adj
cos F = $\frac{24}{25}$

11. 

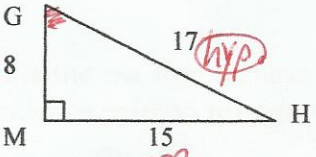
opp, adj, hyp
sin A = $\frac{40}{41}$

12. 

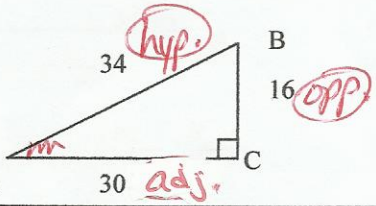
hyp, adj, opp
tan Y = $\frac{24}{7}$

13. 

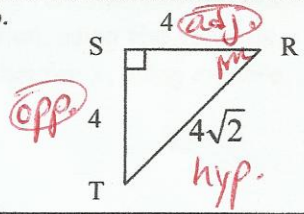
opp, hyp, adj
cos H = $\frac{12}{13}$

14. 

adj, hyp, opp
cos G = $\frac{8}{17}$

15. 

hyp, opp, adj
sin A = $\frac{8}{17}$

16. 

adj, opp, hyp
tan R = 1

Geometry
Notes – Trigonometry with a Calculator

Name_____
Date_____

You have already learned what sin, cos, and tan mean. Each is a fraction you can write using the sides of a right triangle. But what if you don't know one of those sides? That is where the calculator can help you.

We are still going to use **SOHCAHTOA** to help us with this. But we need to practice using the calculator before we get to working any problems.

First you need to check that your calculator is in the right mode. It should be in *degrees* mode. Try entering Sin 30. If you get 0.5 you are in the right mode. Otherwise you need to change it. I can show you how to do this on your calculator.

After you are sure that you are in degrees mode we are ready to start. Your calculator has information stored into it for every possible angle measure. Enter each of these into your calculator and round to the nearest thenth:

1. cos 45 0.7071 2. sin 36 0.5878 3. tan 18 0.3249 4. sin 18 0.3090

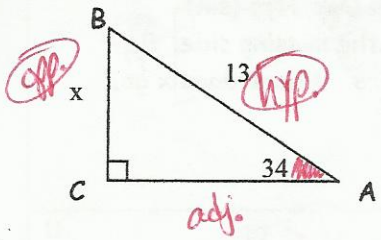
We could keep entering values all day and your calculator would know the answer. (But don't worry, we won't)

Now we will do a couple of examples of how to use the calculator to solve for a missing side. Here are the steps you need to use:

1. Mark the angle that you are going to use for this problem (usually the one that you are given – careful, don't use the right angle!)
2. Label the sides *in relation to* the angle that you are going to use (opposite, adjacent, hypotenuse)
3. Circle the sides you are going to use to make a trig function.
4. Decide which trig function you can make with those sides, either sin, cos, or tan.
5. Write the equation, using a variable for the missing side.
6. Solve the equation for the missing side. (using algebra steps)

Here are a few examples:

EX 1 Find x.



1. Mark angle A (since it is the one that we have a measure for)
2. Label the other two sides *in relation to* angle A (opp, hyp)
3. Circle these sides.
4. Decide which trig function you can make with Opp, Hyp (sin)
5. Write the equation, using the variable x for the missing side.
6. Solve the equation for x, using algebra.

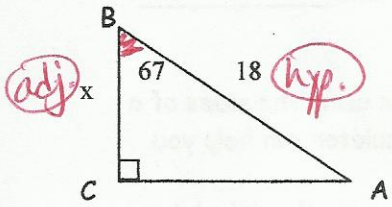
$\sin 34^\circ = \frac{x}{13}$

$13 \sin 34^\circ = x$

$x = 7.2695$

SOH CAH TOA

EX 2 Find x.



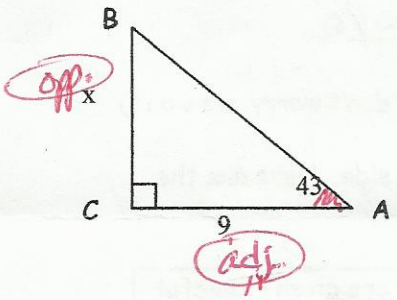
1. Mark angle B (since it is the one that we have a measure for)
2. Label the other two sides *in relation to* angle B (adj, hyp)
3. Circle these sides.
4. Decide which trig function you can make with Adj, Hyp (cos)
5. Write the equation, using the variable x for the missing side.
6. Solve the equation for x, using algebra.

$\cos 67° = \frac{x}{18}$

$18 \cos 67° = x$

$x = 7.0332$

EX 3 Find x.



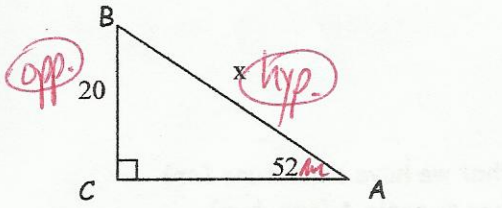
1. Mark angle A (since it is the one that we have a measure for)
2. Label the other two sides *in relation to* angle A (opp, adj)
3. Circle these sides.
4. Decide which trig function you can make with Opp, Adj (tan)
5. Write the equation, using the varialbe x for the missing side.
6. Solve the equaiton for x, using algebra.

$\tan 43° = \frac{x}{9}$

$9 \tan 43° = x$

$x = 8.3926$

EX 4 Find x. (this one is a little different!)



1. Mark angle A (since it is the one we have a measure for)
2. Label the other two sides *in relation to* angle A (opp, hyp)
3. Circle these sides.
4. Decide which trig function you can make with Opp, Hyp (sin)
5. Write the equation, using the variable x for the missing side. Be careful here, this is different than the others. Where does x go?
6. Solve the equation for x, using algebra.

$(x) \sin 52° = \frac{20}{x} (x)$

$x \sin 52° = 20$

$\frac{x \sin 52°}{\sin 52°} = \frac{20}{\sin 52°}$

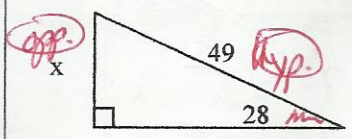
$x = 25.3804$

Geometry
WS – Trig with a Calculator

Name_____
Date_____

Solve for x in each of these problems. Remember to look at your example sheet to help you. Also, remember **SOHCAHTOA**. You can just round each of these to the nearest tenth (one decimal place).

1.

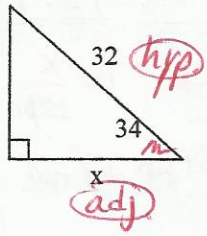


$\sin 28° = \frac{x}{49}$

$49 \sin 28° = x$

x= 23

2.

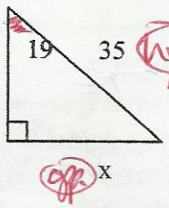


$\cos 34° = \frac{x}{32}$

$32 \cos 34° = x$

x= 26.5

3.

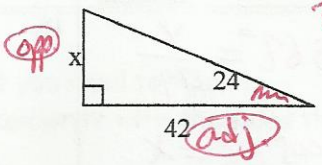


$\sin 19° = \frac{x}{35}$

$35 \sin 19° = x$

x = 11.4

4.

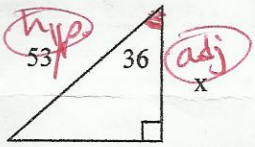


$\tan 24° = \frac{x}{42}$

$42 \tan 24° = x$

x = 18.7

5.

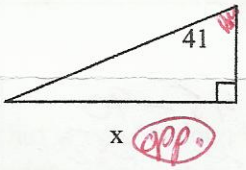


$\cos 36° = \frac{x}{53}$

$53 \cos 36° = x$

x = 42.9

6.

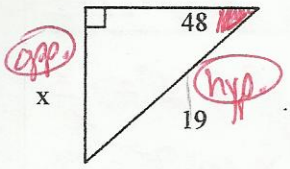


$\tan 41° = \frac{x}{27}$

$27 \tan 41° = x$

x = 23.5

7.

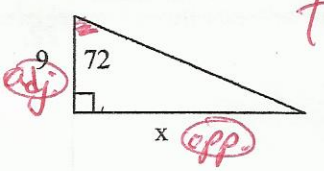


$\sin 48° = \frac{x}{19}$

$19 \sin 48° = x$

x = 14.1

8.

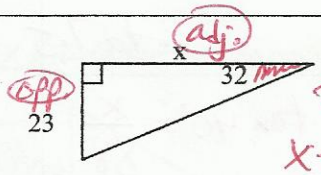


$\tan 72° = \frac{x}{9}$

$9 \tan 72° = x$

x= 27.7

9.



Careful!

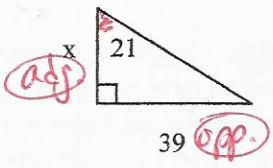
$\tan 32° = \frac{23}{x}$

$x \tan 32° = 23$

$\frac{x \tan 32°}{\tan 32°} = \frac{23}{\tan 32°}$

x = 36.8

10.



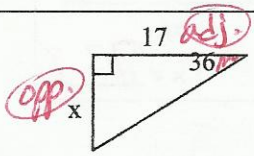
$\tan 21° = \frac{39}{x}$

$x \tan 21° = 39$

$\frac{x \tan 21°}{\tan 21°} = \frac{39}{\tan 21°}$

x= 101.6

11.

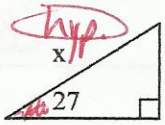


$\tan 36° = \frac{x}{17}$

$17 \tan 36° = x$

x = 12.4

12.



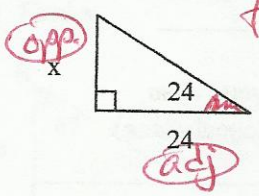
$\sin 27° = \frac{78}{x}$

$x \sin 27° = 78$

$\frac{x \sin 27°}{\sin 27°} = \frac{78}{\sin 27°}$

x= 171.8

13.



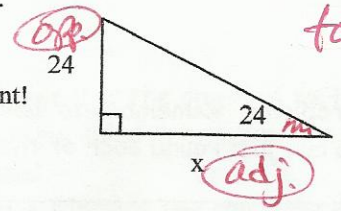
$\tan 24° = \frac{x}{24}$

$24 \tan 24° = x$

$x = 10.7$

Be careful! These problems are different!

14.



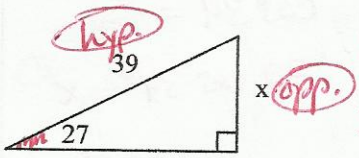
$\tan 24° = \frac{24}{x}$

$x \tan 24° = 24$

$\frac{x \tan 24°}{\tan 24°} = \frac{24}{\tan 24°}$

$x = 53.9$

15.

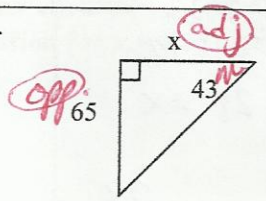


$\sin 27° = \frac{x}{39}$

$39 \sin 27° = x$

$x = 17.7$

16.



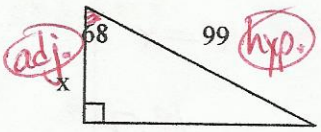
$\tan 43° = \frac{65}{x}$

$x \tan 43° = 65$

$\frac{x \tan 43°}{\tan 43°} = \frac{65}{\tan 43°}$

$x = 69.7$

17.

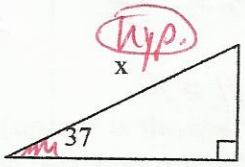


$\cos 68° = \frac{x}{99}$

$99 \cos 68° = x$

$x = 37.1$

18.



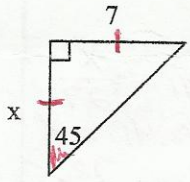
$\sin 37° = \frac{38}{x}$

$x \sin 37° = 38$

$\frac{x \sin 37°}{\sin 37°} = \frac{38}{\sin 37°}$

$x = 63.1$

19.



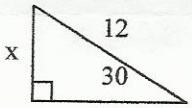
45 - 45 - 90

ℓ ℓ $\ell\sqrt{2}$

7 7 $7\sqrt{2}$

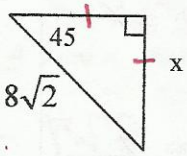
$x = 7$

20.



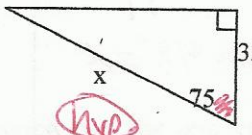
$x = 6$

21.



$x = 8$

22.



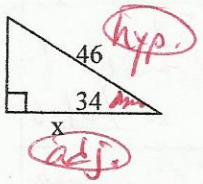
$\cos 75° = \frac{33}{x}$

$x \cos 75° = 33$

$\frac{x \cos 75°}{\cos 75°} = \frac{33}{\cos 75°}$

$x = 127.5$

23.

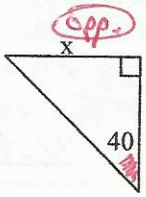


$\cos 34° = \frac{x}{46}$

$46 \cos 34° = x$

$x = 38.1$

24.



$\tan 40° = \frac{x}{88}$

$88 \tan 40° = x$

$x = 73.8$

Geometry
Notes – Finding an angle using Trigonometry

Name_____
Date_____

So far we have just used trig to find missing measures of sides. We can also use it to find missing angles when we know two of the sides. You are going to use your calculator a little differently to do this.

When we know the sides, but don't use the angle we have to tell our calculator that we want to know an angle measure. The way we do this is by pressing 2nd, then either sin, cos, or tan. Then the calculator tells us the degree measure. Here is how it works: (round to the nearest degree)

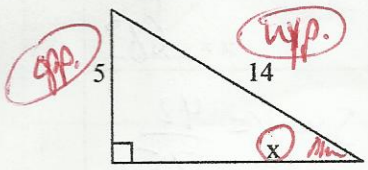
1. sin A = 0.4226 A = 25°
2. cos B = 0.6691 B = 48°
3. tan R = 0.2679 R = 15°
4. sin Z = 0.8290 Z = 56°

There are steps we need to use when we are looking for the missing angle measure in a problem.

1. Mark the angle that you are looking for.
2. Label the given sides *in relation to* the angle that you need to find.
3. Decide which trig function (sin, cos, or tan) you can write with the sides that you have been given.
4. Write out the trig function.
5. Use the 2nd sin, cos, or tan to tell you the missing angle.

Here are a few examples.

EX 1 Find the missing angle, "x"

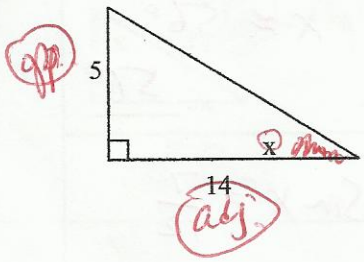


1. Mark the angle that we are looking for, x.
2. Label the given sides *in relation to* x. (opp, hyp)
3. Decide which trig function goes with Opp, Hyp (sin)
4. Write out the trig function.
5. Use your calculator to tell you the degree measure.

$\sin x^\circ = \frac{5}{14}$

$x = \sin^{-1}(5/14) \approx 21^\circ$

EX 2 Find the missing angle, "x"



1. Mark the angle that we are looking for, x.
2. Label the given sides *in relation to* x. (opp, adj)
3. Decide which trig function goes with Opp, Adj (tan)
4. Write out the trig function.
5. Use your calculator to tell you the degree measure.

$\tan x^\circ = 5/14$

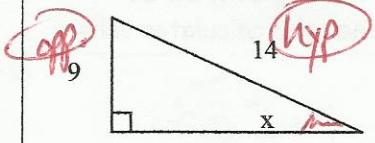
$x = \tan^{-1}(5/14) \approx 20^\circ$

Geometry
WS – Finding an Angle using Trig

Name_____
Date_____

Solve for x in each of these problems. Remember to look at your example sheet to help you. Also, remember **SOHCAHTOA**. You can just round each of these to the nearest degree (no decimal places).

1.

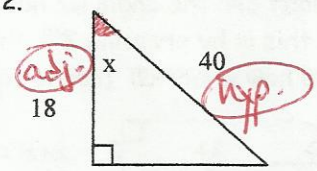


$\sin x^\circ = \frac{9}{14}$

$x^\circ = 40^\circ$

x= 40°

2.

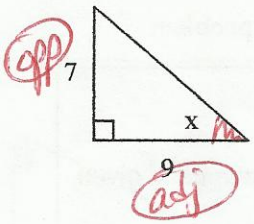


$\cos x^\circ = \frac{18}{40} = \frac{9}{20}$

$x \approx 63^\circ$

x= 63°

3.

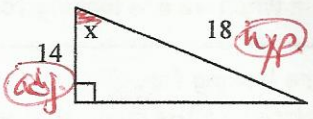


$\tan x^\circ = \frac{7}{9}$

$x \approx 38^\circ$

x = 38°

4.

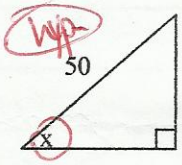


$\cos x^\circ = \frac{14}{18} = \frac{7}{9}$

$x \approx 39^\circ$

x = 39°

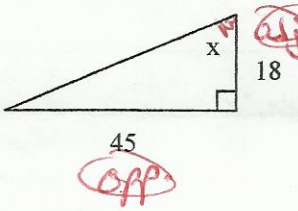
5.



$\sin x = \frac{25}{50} = \frac{1}{2}$

x = 30°

6.

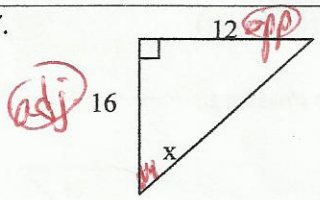


$\tan x^\circ = \frac{45}{18}$

$x \approx 68^\circ$

x = 68°

7.

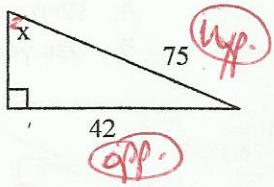


$\tan x^\circ = \frac{12}{16} = \frac{3}{4}$

$x \approx 37^\circ$

x = 37°

8.

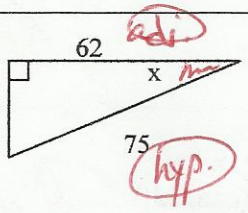


$\sin x = \frac{42}{75}$

$x \approx 34^\circ$

x= 34°

9.

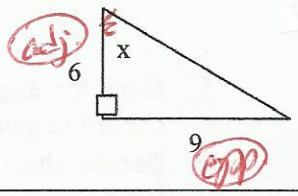


$\cos x^\circ = \frac{62}{75}$

$x \approx 34^\circ$

x = 34°

10.

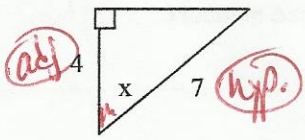


$\tan x^\circ = \frac{9}{6} = \frac{3}{2}$

$x \approx 56^\circ$

x= 56°

11.

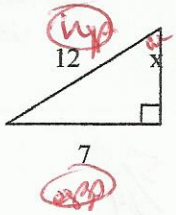


$\cos x^\circ = \frac{4}{7}$

$x \approx 55^\circ$

x = 55°

12.

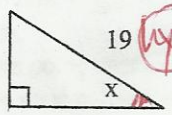


$\sin x^\circ = \frac{7}{12}$

$x^\circ \approx 36^\circ$

x= 36°

13.

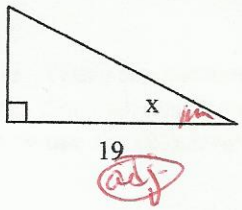


opp. hyp.

$\sin x^\circ = \frac{9}{19}$

x = 28°

14.

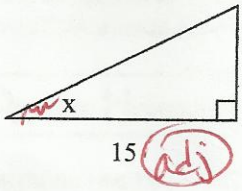


opp. adj.

$\tan x = \frac{9}{19}$

x = 25°

15.

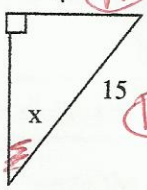


opp. adj.

$\tan x^\circ = \frac{4}{15}$

x = 15°

16.

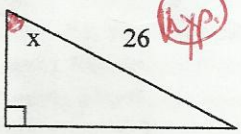


opp. hyp.

$\sin x = \frac{4}{15}$

x = 15°

17.

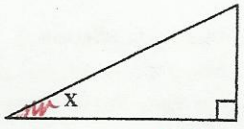


hyp. opp.

$\sin x^\circ = \frac{23}{26}$

x = 62°

18.

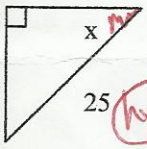


opp. adj.

$\tan x = \frac{12}{19}$

x = 32°

19.

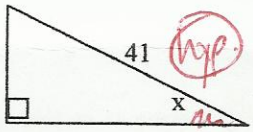


adj. hyp.

$\cos x^\circ = \frac{22}{25}$

x = 28°

20.

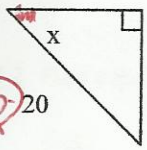


opp. hyp.

$\sin x = \frac{9}{41}$

x = 13°

21.

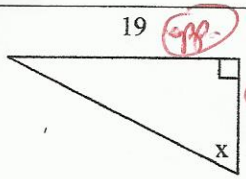


hyp. opp.

$\sin x^\circ = \frac{14}{20} = \frac{7}{10}$

x = 44°

22.

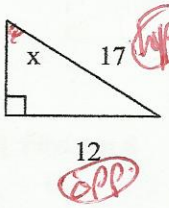


opp. adj.

$\tan x = \frac{19}{4}$

x = 78°

23.

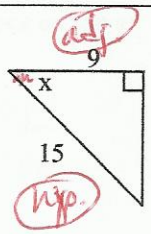


hyp. opp.

$\sin x^\circ = \frac{12}{17}$

x = 45°

24.



adj. hyp.

$\cos x = \frac{9}{15} = \frac{3}{5}$

x = 53°