

Warm-up

Simplify the radicals

1. $\sqrt{48}$

2. $\sqrt{28}$

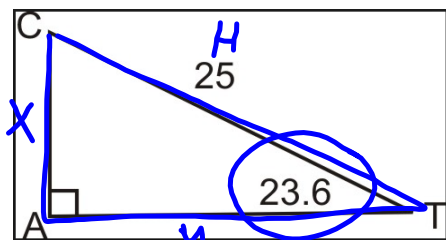
3. $4\sqrt{20}$

Warm-up

1. What is equal to $\sin 35^\circ = .5736$
 $A+B=90$ $\sin A = \cos B$ $= \cos 55^\circ$

2. Find the perimeter of

the given triangle.



$$\frac{\sin 23.6}{1} = \frac{x}{25}$$

$$x = 25 \cdot \sin 23.6$$

$$x = 10.01$$

$$\frac{\cos 23.6}{1} = \frac{y}{25}$$

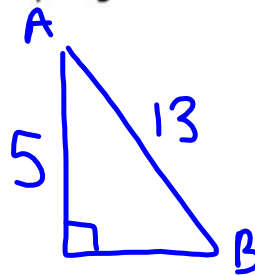
$$y = 25 \cdot \cos 23.6$$

$$y = 22.9$$

$$\begin{array}{r} 10.01 \\ 22.9 \\ \hline 25 \\ \hline 57.91 \end{array}$$

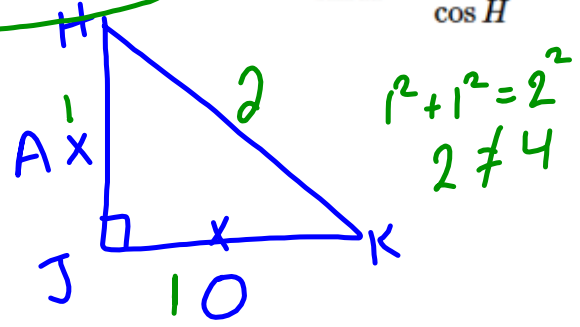
3. In right $\triangle ABC$, $\angle A$ and $\angle B$ are complementary angles. If $\cos A = \frac{5}{13}$, what is the value for $\sin B$?

- A. $\frac{5}{13}$ B. $\frac{13}{5}$ C. $\frac{12}{13}$ D. $\frac{13}{12}$



4. In a right triangle HJK, $\angle J = 90^\circ$ and $\tan H = 1$. Which statement about $\triangle HJK$ must be **TRUE**?

- A. ~~$\sin H = \frac{1}{2}$~~ B. ~~$\sin H = 1$~~ C. $\sin H = \cos H$ D. $\sin H = \frac{1}{\cos H}$



Homework answers

1. $x=15$

3. $r = 25.00$ and $s = 40.6$

5. $b = 35.9$ and $a = 26.65$

7. $d = 20.2$ and $c = 9.2$

9. $x = 7.6$

11. $x = 16$

13. $s = 11.0$ and $r = 20.3$

15. $x = 38.9$

17. $x = 12.3$

19. The billboard is 56 feet tall.

21. Your friend is 14 ft from you.

Solving for Missing Angle Measures

If you know the ratio or two side lengths of a trig function, you use **inverse** trig ratio operations to find the missing angle. You know inverse operations undo each other (addition undoes subtraction, squaring undoes square roots, etc....). There are three inverse trig ratio functions (\sin^{-1} , \cos^{-1} , and \tan^{-1}). Remember, any time you are working with trig ratios, your calculator must be in DEGREE mode. Inverse trig ratio functions can be written two ways:

 $\sin^{-1}\theta$ OR $\arcsin\theta$
 $\cos^{-1}\theta$ OR $\arccos\theta$
 $\tan^{-1}\theta$ OR $\arctan\theta$

Solving for a Side Length	Solving for an Angle
Sin	\sin^{-1}
Cos	\cos^{-1}
Tan	\tan^{-1}

Practice: Using your calculator, find the following angles:

a. $\sin \theta = 0.31$

b. $\tan \theta = 1$

c. $\cos \theta = (0.8)$

d. $\sin \theta = \left(\frac{9}{17}\right)$

e. $\tan \theta = 1.55$

$\theta = \sin^{-1}(.31)$ $\theta = \tan^{-1}(1)$ $\theta = \cos^{-1}(.8)$

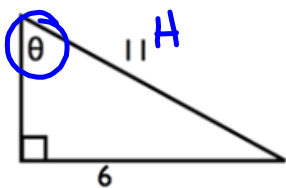
$\theta = 18.1^\circ$ $\theta = 45^\circ$ $\theta = 36.9^\circ$

$\theta = 31.97$
 $\theta = 32.0$

$\theta = 57.2^\circ$

Example: Find the missing angle measures.

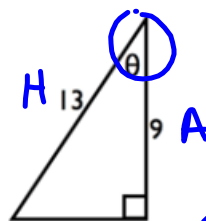
A. Theta



2nd

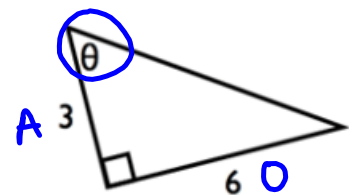
$\sin \theta = \frac{6}{11}$
 $\sin^{-1}\left(\frac{6}{11}\right) =$
 $\theta = 33.1$

B. Theta



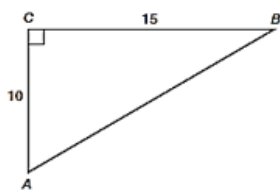
$\cos \theta = \frac{9}{13}$
 $\theta = \cos^{-1}\left(\frac{9}{13}\right)$
 $\theta = 46.2^\circ$

C. Theta



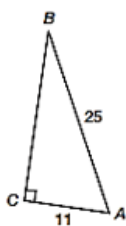
$\tan \theta = \frac{6}{3}$
 $\theta = \tan^{-1}\left(\frac{6}{3}\right)$
 $\theta = 63.4^\circ$

D. Angle A



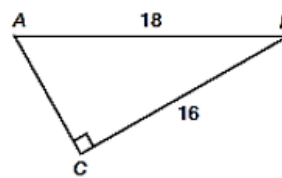
56.3°

E. Angle B

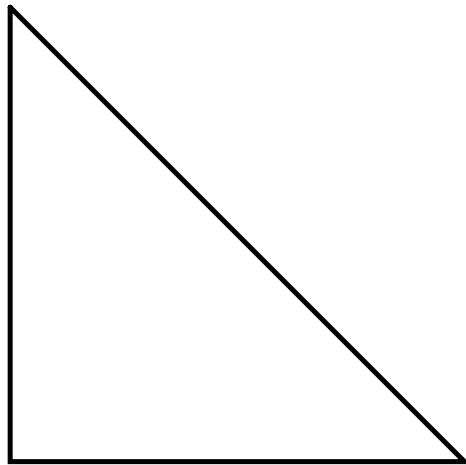


26.1°

F. Angle B



27.3°

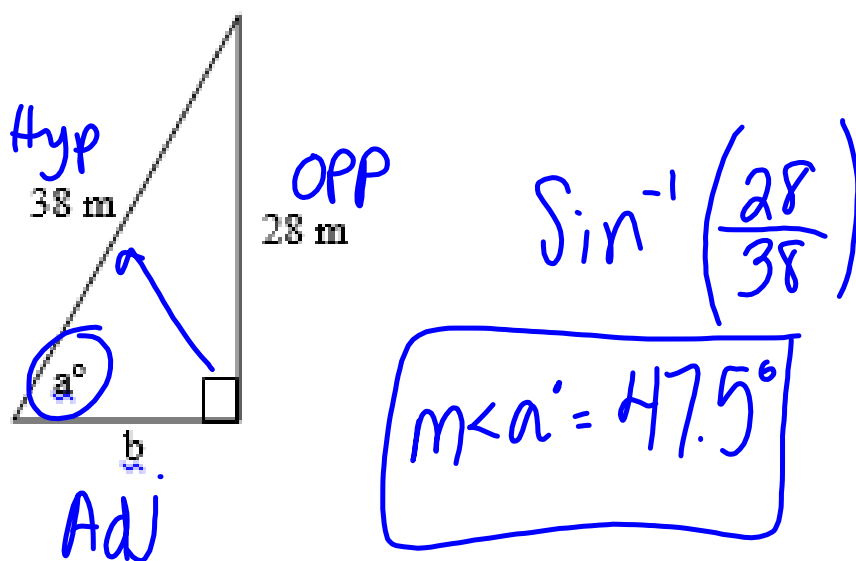


How to find the angles



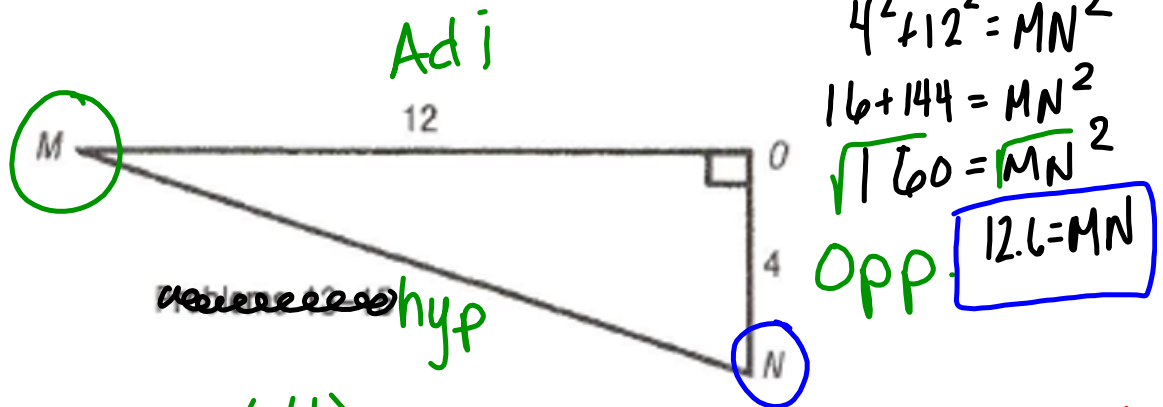
1. Label the sides
2. Pick the trig function
3. Use the inverse button of trig function with the ratio.

Find the $m\angle a$



Solve a triangle

Find the $m\angle M$, $m\angle N$, and MN



$$m\angle m = \tan^{-1}\left(\frac{4}{12}\right)$$

$$m\angle M = 18.4$$

$$18.4 + 90 + m\angle N = 180$$

$$108.4 + m\angle N = 180$$

$$m\angle N = 71.6$$

$$\left(\tan^{-1}\left(\frac{12}{4}\right)\right)$$

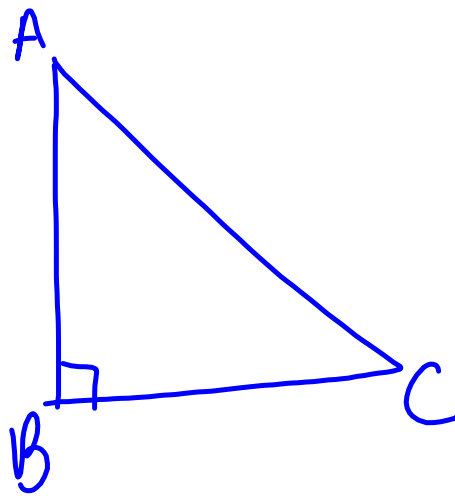
$$71.6$$

When to

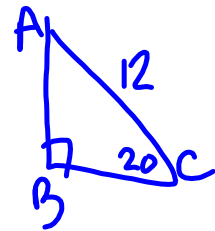
Just
Ratio

5/3

Sin
Cos (letter)
tan



One angle



Equation

$$\sin 20^\circ = \frac{AB}{12}$$

$$\cos 20^\circ = \frac{BC}{12}$$

No angle other than
Right

Sin⁻¹
Cos⁻¹
tan⁻¹

$$a^2 + b^2 = c^2$$

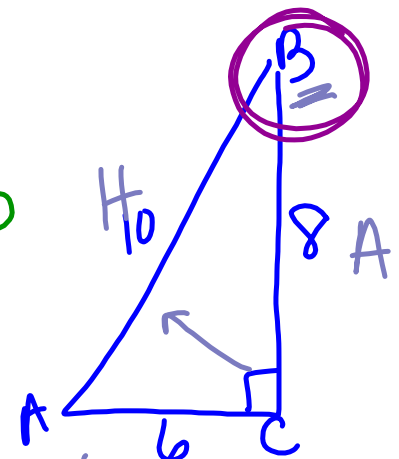
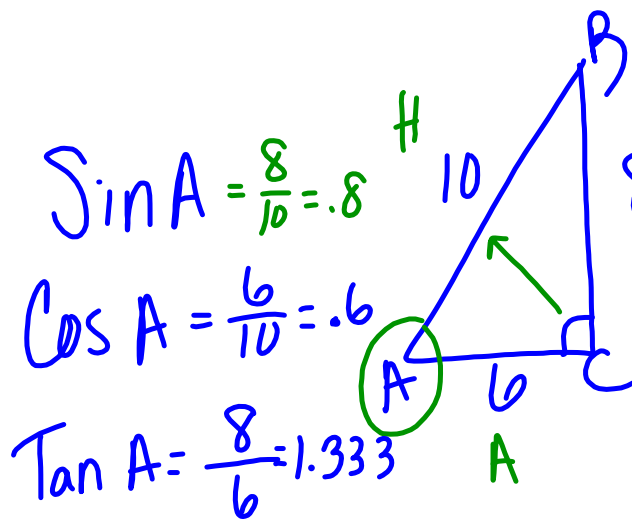
$$3^2 + 3^2 = x^2$$

$$\sqrt{18} = \sqrt{x^2}$$

$$\begin{array}{c} 29 \\ \textcircled{33} \end{array}$$

$$3\sqrt{2} = x$$

SOHCAHTOA



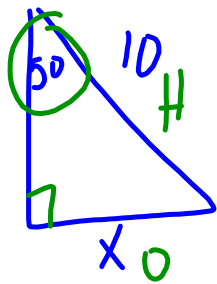
$\sin B = \frac{6}{10} = .6$
 $\cos B = \frac{8}{10} = .8$
 $\tan B = \frac{6}{8} = .75$

Solving

Sides

Equation

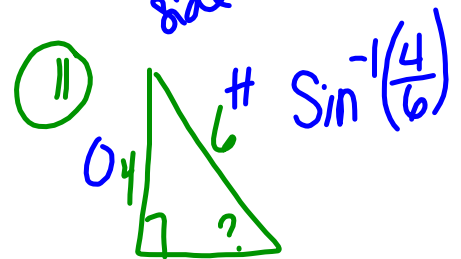
$$\text{trig}(\text{Angle}) = \frac{\text{Ratio}}{\frac{\text{Side}}{\text{Side}}}$$



$$\sin 50 = \frac{x}{10}$$

Angle

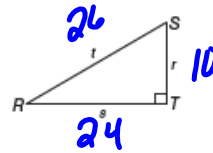
$$\text{trig}^{-1}\left(\frac{\text{Ratio}}{\frac{\text{side}}{\text{side}}}\right)$$



$$\sin^{-1}\left(\frac{4}{6}\right)$$

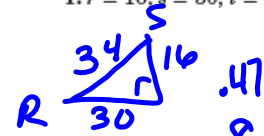
Trigonometry

Find $\sin R$, $\cos R$, $\tan R$, $\sin S$, $\cos S$, and $\tan S$.
Express each ratio as a fraction and as a decimal to the nearest hundredth.



1. $r = 16, s = 30, t = 34$

2. $r = 10, s = 24, t = 26$



$\sin R = \frac{16}{34} = \frac{8}{17} = .47$
 $\cos R = \frac{30}{34} = \frac{15}{17} = .88$
 $\tan R = \frac{16}{30} = \frac{8}{15} = .53$
 $\sin S = \frac{15}{17} = .88$
 $\cos S = \frac{8}{17} = .47$
 $\tan S = \frac{15}{8} = 1.875$

$\sin R = \frac{10}{26} = \frac{5}{13} = .38$
 $\cos R = \frac{24}{26} = \frac{12}{13} = .92$
 $\tan R = \frac{10}{24} = \frac{5}{12} = .42$
 $\sin S = .92$
 $\cos S = .38$
 $\tan S = \frac{12}{5} = 2.4$

Use a special right triangle to express each trigonometric ratio as a fraction and as a decimal to the nearest hundredth.

3. $\sin 30^\circ = \frac{1}{2}$

4. $\tan 45^\circ = 1$

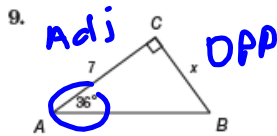
5. $\cos 60^\circ = \frac{1}{2}$

6. $\sin 60^\circ = \frac{\sqrt{3}}{2} = .866$

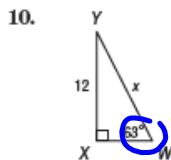
7. $\tan 30^\circ = \frac{\sqrt{3}}{3} = .577$

8. $\cos 45^\circ = \frac{\sqrt{2}}{2} = .71$

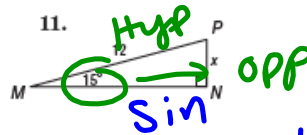
Find x .



$\tan x = 5.09$



$\sin x = 13.47$



$x = 3.12$

$\sin 15 = \frac{x}{12}$

$12 \cdot \sin 15 = x$

Use a calculator to find the measure of $\angle B$ to the nearest tenth.

