9-1 Right-Triangle Trigonometry

Objectives:

1. I can identify trigonometric functions
2. I can evaluate using trigonometric functions

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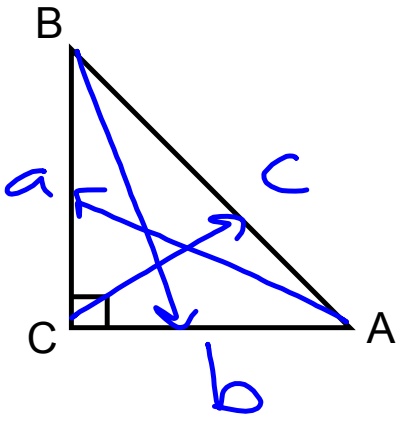
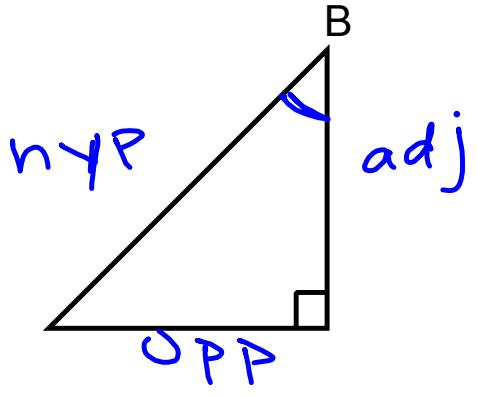
The angles are usually in capital letters with their opposite side in small letters. You only use acute angles with the trigonometric functions.

1. Label the sides (a, b, c)



2. Label the sides. (opp, adj, hyp)



A **trigonometric ratio** is a ratio of the lengths of two sides of a right triangle

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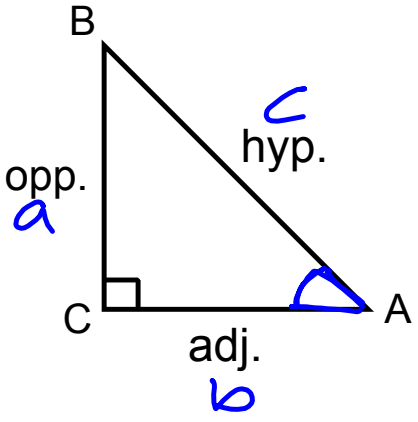
Write the ratio of the sides with their letter names.



Trigonometric Functions of

$$\sin A = \frac{opp.}{hyp.} = \frac{a}{c} \qquad \csc A = \frac{hyp.}{opp.} = \frac{c}{a}$$

cosecant

$$\cos A = \frac{adj.}{hyp.} = \frac{b}{c} \qquad \sec A = \frac{hyp.}{adj.} = \frac{c}{b}$$

secant

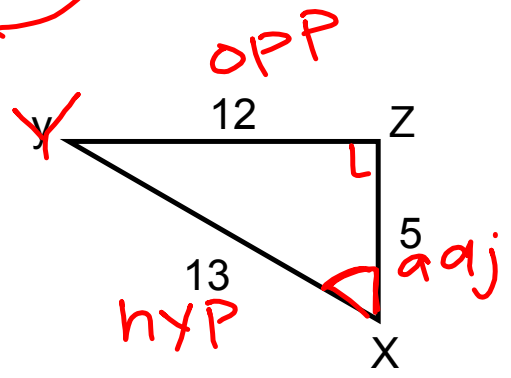
$$\tan A = \frac{opp.}{adj.} = \frac{a}{b} \qquad \cot A = \frac{adj.}{opp.} = \frac{b}{a}$$

cotangent

Reciporcal

Example 1. Find the values the trigonometric functions of $\angle X$ for ΔXYZ

all b



$\sin X = \frac{12}{13}$

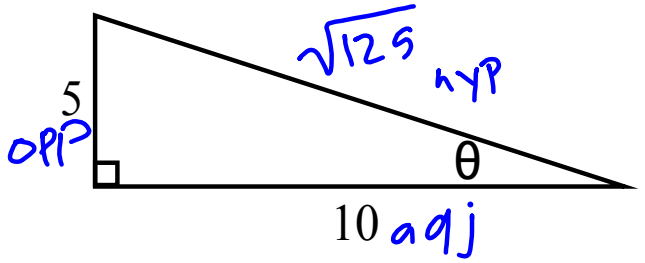
$\cos X = \frac{5}{13}$

$\tan X = \frac{12}{5}$

$\csc X = \frac{13}{12}$

$\sec X = \frac{13}{5}$

$\cot X = \frac{5}{12}$



Find all six trig ratios for the given triangle:

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

$5^2 + 10^2 = c^2$

$25 + 100 = c^2$

$\sqrt{125} = \sqrt{c^2}$

$\sqrt{125} = c$

$\sin\theta = \frac{5}{\sqrt{125}}$ $\csc\theta =$

$\cos\theta = \frac{10}{\sqrt{125}}$ $\sec\theta$

$\tan\theta = \frac{5}{10}$

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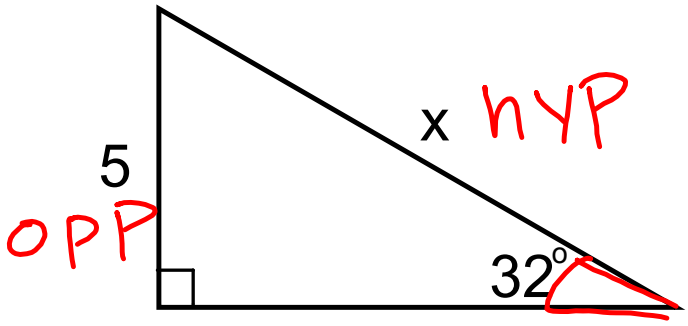
Opp Hyp Adj Hyp Opp Adj

$\cot\theta = \frac{10}{5}$

Solve for x



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$x \cdot \sin 32 = \frac{5}{x}$

$\frac{x \cdot \sin 32}{\sin 32} = \frac{5}{\sin 32}$

$x = \frac{5}{\sin 32} = 9.435$

$5 \cdot \csc 32 = \frac{x}{5} \cdot 5$

$5 \cdot \csc 32 = x$

Solve for p

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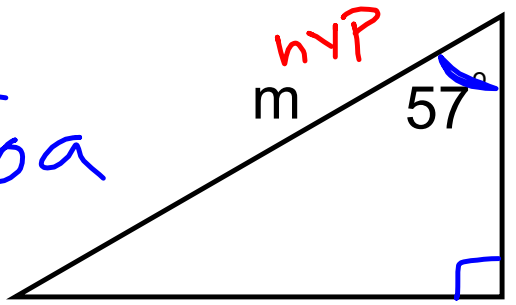


$p \tan 57 = \frac{12}{p} \cdot p$

$\frac{p \cdot \tan 57}{\tan 57} = \frac{12}{\tan 57}$

$p = 7.792$

FIND m

$m \cdot \sin 57 = \frac{12}{m} \cdot m$

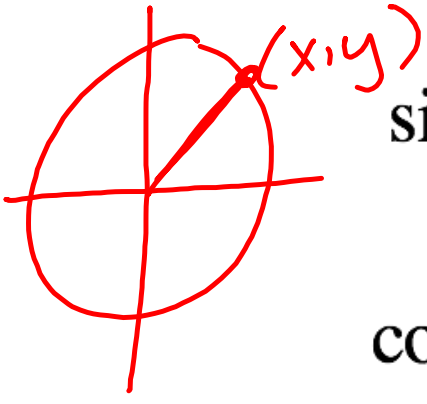
$\frac{m \cdot \sin 57}{\sin 57} = \frac{12}{\sin 57}$

$m = \frac{12}{\sin 57}$

$m = 14.308$

Evaluate the following on a calculator and round to 3 decimal places

$\sin 58^\circ$



$\sin 60^\circ$

$\cos 27^\circ$

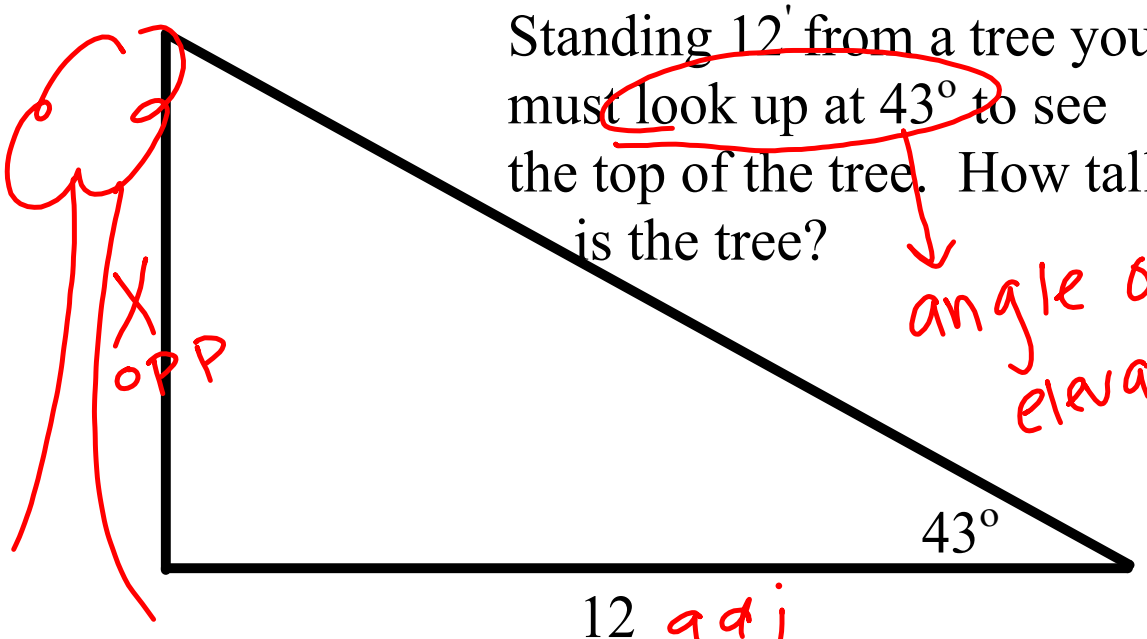
$\cos 120^\circ$

$\tan 123^\circ$

$\tan 315^\circ$

1 = feet

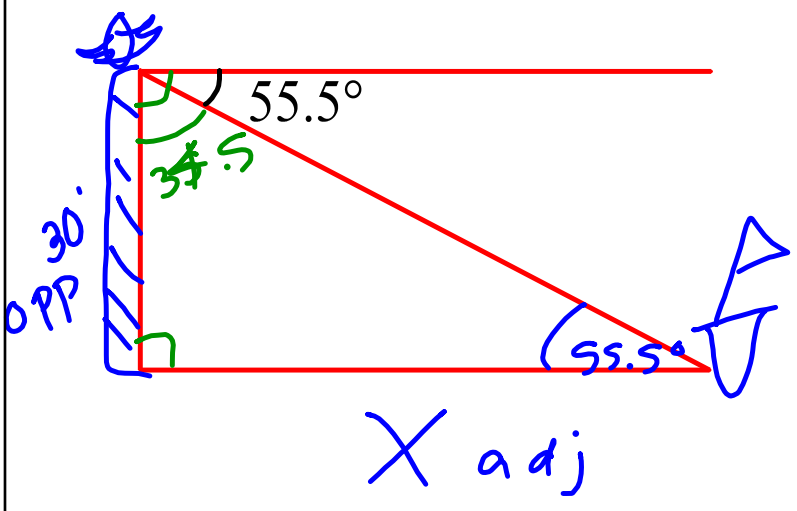
Standing 12' from a tree you must look up at 43° to see the top of the tree. How tall is the tree?



angle of elevation

$12 \cdot \tan 43 = \frac{x}{12}$

$x = 11.190 ft$

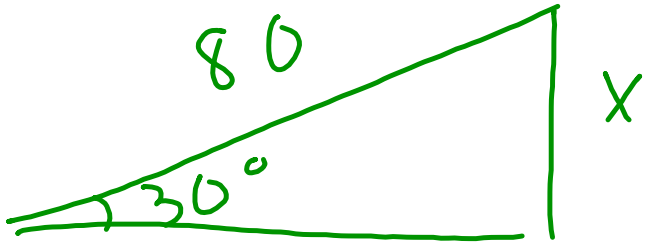


A bird sitting on a 30' tower looks at a boat from an angle of depression of 55.5°. How far is the boat from the tower?

$$\tan 55.5 = \frac{30}{x}$$

20.618 feet

A tipping platform is a ramp used to unload trucks. How high is the end of a 80 inch ramp when it is tipped by a 30º angle?



$\sin 30 = \frac{X}{80} \cdot 80$

$80 \sin 30 = x$ $\quad X = 40$ in