

Notes for Trigonometry

Trig Functions:

Sine

Cosine

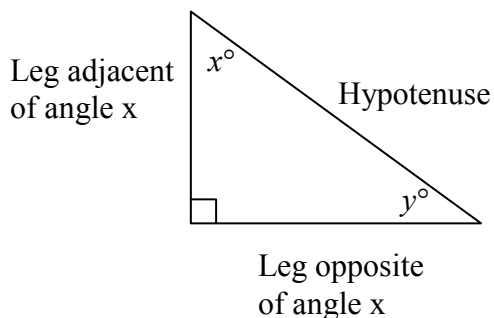
Tangent

All Trig functions are used for right triangles only. Each one is a proportion and when working the problem should be cross multiplied and solved.

$$\text{Sine } x^\circ = \frac{\text{length leg opposite of angle}}{\text{length of hypotenuse}}$$

$$\text{Cosine } x^\circ = \frac{\text{length of leg adjacent of angle}}{\text{length of hypotenuse}}$$

$$\text{Tangent } x^\circ = \frac{\text{length of leg opposite of angle}}{\text{length of leg adjacent of angle}}$$



If you use a different angle, then the adjacent and opposite legs reverse. You never use the right angle for trig and the hypotenuse never changes position.

Mnemonic for remember the trig functions

SOHCAHTOA

S-Sine

O-Opposite leg

H-Hypotenuse

C-Cosine

A-Adjacent leg

H-Hypotenuse

T-Tangent

O-Opposite leg

A-Adjacent leg

$$\text{Sin } x^\circ = \frac{\text{Opposite leg}}{\text{Hypotenuse}}$$

$$\text{Cos } x^\circ = \frac{\text{Adjacent leg}}{\text{Hypotenuse}}$$

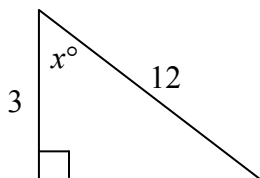
$$\text{Tan } x^\circ = \frac{\text{Opposite leg}}{\text{Adjacent leg}}$$

Since Trig is done with angles and angles are measured in degrees, then the calculator set in the right mode. If the calculator is not set to degree mode, then every answer will be wrong.

Calculators have 3 modes; grad, rad, and deg. The deg mode is the degree mode. In TI graphing calculators the mode is found using the mode key, and the second line you will find the deg. Select it by using the equals(enter) key. If you have a different calculator, then consult the manual or ask a math teacher to help you. Each calculator can be different, so it is always good to know how your calculator works.

There are two types of trig problems. One you find the missing side, the other you find the missing angle. Each one is worked a different way, so look at the examples carefully.

Example 1 Find the missing angle



Because the hypotenuse and side adjacent to the angle is given, the trig function using those pieces is cosine. This allows us to set up the following equation. Though it looks like a proportion, do not solve it like a proportion.

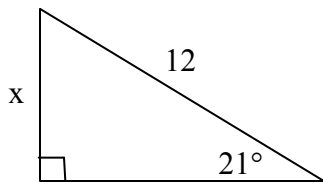
$$\cos x^\circ = \frac{3}{12}$$

To solve this find \cos^{-1} , then type in fraction $(3/12)$.

Hit enter, since answer is an angle round to nearest degree. $x = 76^\circ$

Example 2 Using Sine

Find x.



Because the hypotenuse and the side opposite the 21° angle is given, the trig function using those 2 pieces of information is sine. This allows use to set up the following equation. Once the equation is set, then solve the proportion.

$$\sin 21^\circ = \frac{x}{12}$$

Equation

$$x = 12 \cdot (\sin 21^\circ)$$

cross multiply

$$x = 12 \cdot (.3584)$$

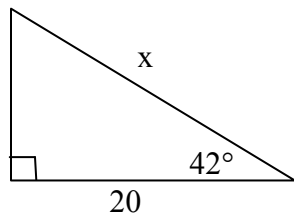
find sine of 21 degrees

$$x = 4.3004$$

multiply, round to the nearest ten thousandths

Example 3 Using Cosine

Find x.



Because the hypotenuse and the side adjacent the 42° angle is given, the trig function using those 2 pieces of information is cosine. This allows use to set up the following equation. Once the equation is set, then solve the proportion.

$$\cos 42^\circ = \frac{20}{x}$$

Equation

$$x(\cos 42^\circ) = 20$$

cross multiply

$$x = \frac{20}{(\cos 42^\circ)}$$

divide each side by cosine 42 degrees

$$x = \frac{20}{(.7431)}$$

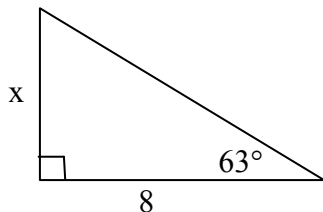
find cosine of 42 degrees

$$x = 26.9127$$

divide, round to the nearest ten thousandths

Example 4 Using Tangent

Find x.



Because the side opposite and the side adjacent to the 63° angle is given, the trig function using those 2 pieces of information is tangent. This allows use to set up the following equation. Once the equation is set, then solve the proportion.

$$\tan 63^\circ = \frac{x}{8}$$

Equation

$$x = 8 \cdot (\tan 63^\circ)$$

cross multiply

$$x = 8 \cdot (1.9626)$$

find tangent of 63 degrees

$$x = 15.7009$$

multiply, round to the nearest ten thousandths