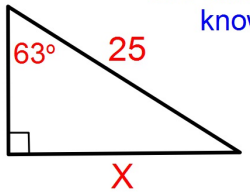
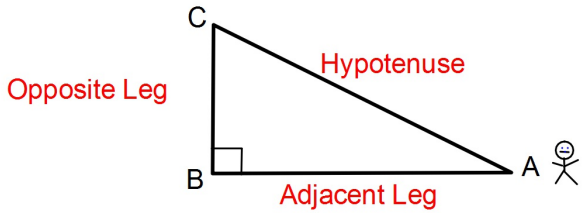
Could you use the Pythagorean Theorem to find the side labeled X? No, the Pythagorean Theorem uses two sides to find the third side and we only know one of the sides.



How could you find the side labeled X ?

Use Trigonometry

If you are standing at A, which of the sides are the...



Opposite means "across from"

Adjacent means "next to"

Trigonometry

Trigonometry is the study of triangles.

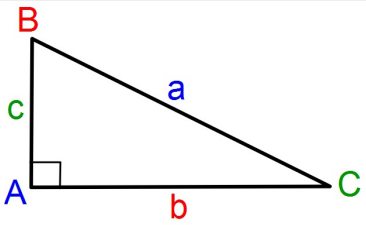
(The name comes from Greek trigonon "triangle" + metron "measure") .

Trigonometric Ratios:

The ratio of sides in a right triangle

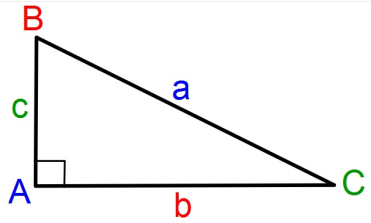
Sine, Cosine, & Tangent

SIN COS TAN



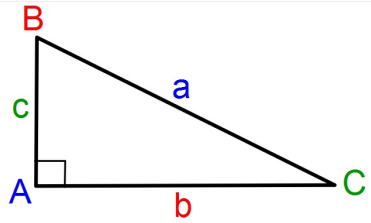
Sine

Sine of angle C ⟶ $\text{SinC} = \frac{\text{Leg Opposite C}}{\text{Hypotenuse}} = \frac{c}{a}$



Cosine

Cosine of angle C → CosC = $\frac{\text{Leg Adjacent C}}{\text{Hypotenuse}} = \frac{b}{a}$



Tangent

Tangent of angle C → TanC = $\frac{\text{Leg Opposite C}}{\text{Leg Adjacent C}} = \frac{c}{b}$

Remembering the trig ratios:

SOHCAHTOA

SOH

$\text{Sin} = \frac{\text{Opp}}{\text{Hyp}}$

CAH

$\text{Cos} = \frac{\text{Adj}}{\text{Hyp}}$

TOA

$\text{Tan} = \frac{\text{Opp}}{\text{Adj}}$

Find each trig ratio using right triangle PQR.

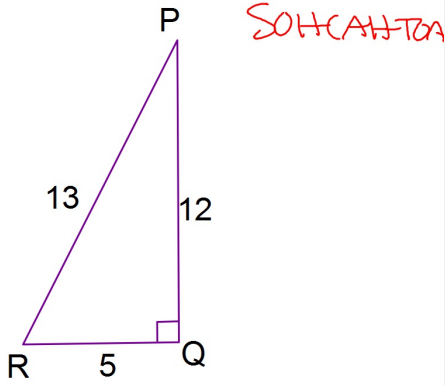
SOHCAHTOA

Sin R = $\frac{12}{13}$ Cos R = $\frac{5}{13}$

Tan R = $\frac{12}{5}$

Sin P = $\frac{5}{13}$ Cos P = $\frac{12}{13}$

Tan P = $\frac{5}{12}$

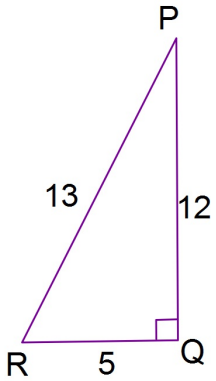


Why won't I ask you to find Sin, Cos, or Tan of the Right Angle?

Sin Q there is no opposite leg

Cos Q both legs are adjacent

Tan Q there is no opp leg and both legs are adj.



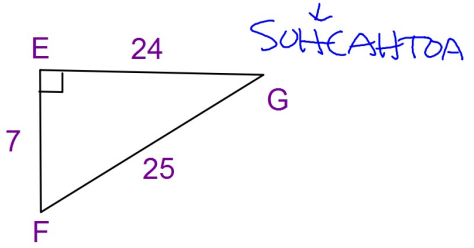
Use a white board

Find each trig ratio as a fraction.

~~Sin G =~~

Cos F = $\frac{7}{25}$

TanG = $\frac{7}{24}$



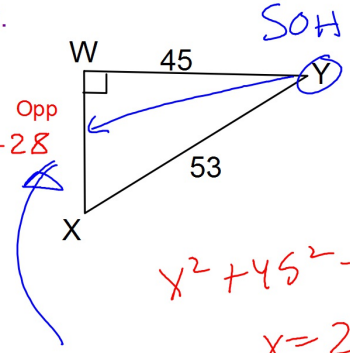
SOHCAHTOA

Sin F = $\frac{24}{25}$

Find each trig ratio as a fraction.

~~COS X =~~

SIN Y = $\frac{28}{53}$



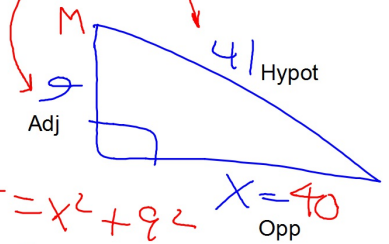
SOH

$x^2 + 45^2 = 53^2$

$x = 28$

Use Pythagorean Theorem to find the other leg.

If the Cos M = $\frac{9}{41}$ what would Sin M = ?



$41^2 = x^2 + 9^2$

$x = 40$

$\frac{40}{41}$

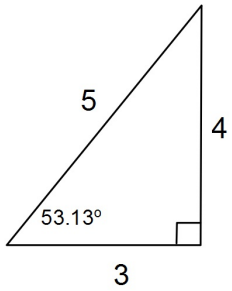
SOHCAHTOA

Up to this point you haven't really needed to use your calculator to Find Sin, Cos, and Tan except to find a missing side using the Pythagorean Theorem.

Why then are their buttons on the calculator for Sin, Cos, and Tan?

they are used when you know the measure of an angle.

Using a calculator to find Sin, Cos, and Tan.

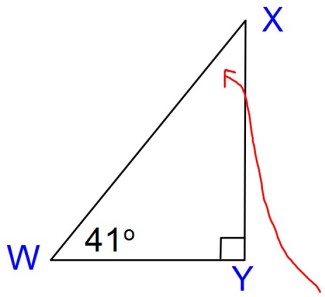


Use your calulator to find each to the nearest hundredth.

this should lead to the same result as writing the ratio of the sides.

1. Tan53.13° = 1.33 = $\frac{4}{3}$
2. Sin53.13° = .80 = $\frac{4}{5}$
3. Cos53.13° = .60 = $\frac{3}{5}$

Use your calulator to find each to the nearest hundredth.



1. CosW = Cos 41 = 0.75
2. TanW = Tan 41 = 0.87
3. SinX = Sin 49° = 0.75

180 - 90 - 41 = 49°

Solve each.

a) $\frac{0.73}{1} = \frac{42}{x}$

42 · 1 ÷ 0.73

X = 57.53

b) $\frac{0.38}{1} = \frac{x}{21}$

21 · 0.38 ÷ 1

X = 7.98