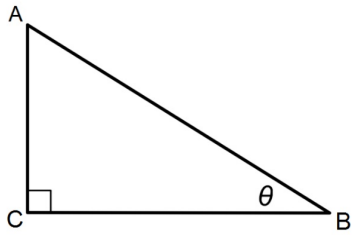
Right Triangle Trigonometry:

SOHCAHTOA

SOHCAHTOA



Sine of an angle

$\sin\theta = \frac{\text{Leg Opposite } \theta}{\text{Hypotenuse}}$

Cosine of an angle

$\cos\theta = \frac{\text{Leg Adjacent to } \theta}{\text{Hypotenuse}}$

Tangent of an angle

$\tan\theta = \frac{\text{Leg Opposite } \theta}{\text{Leg Adjacent to } \theta}$

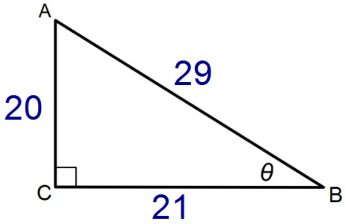
Write each trigonometric ratio as a fraction.

SOH CAH TOA

$\cos B = \frac{ADJ}{HYP} = \frac{21}{29}$

$\sin A = \frac{OPP}{HYP} = \frac{21}{29}$

$\tan A = \frac{OPP}{adj} = \frac{21}{20}$



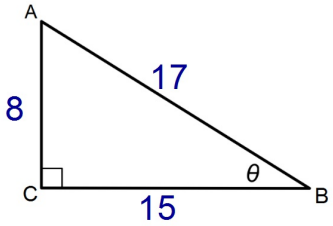
Write each trigonometric ratio as a fraction.

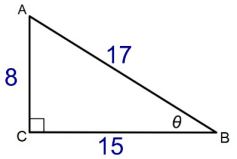
SOH CAH TOA

$\cos A = \frac{ADJ}{HYP} = \frac{8}{17}$

$\tan A = \frac{OPP}{adj} = \frac{15}{8}$

$\sin B = \frac{OPP}{HYP} = \frac{8}{17}$





In right triangle trigonometry why don't we find the Sin, Cos, or Tan of C?

There is no Opposite Leg and there are two Adjacent Legs.

In Right Triangle Trigonometry we can only find the Sin, Cos, and Tan of the acute angles of a right triangle.

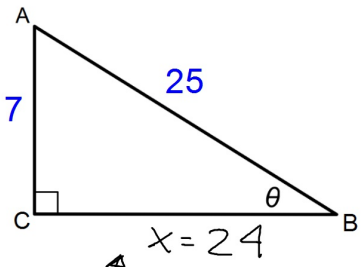
Write each trigonometric ratio as a fraction.

SOHCAHTOA

Tan B = $\frac{opp}{adj} = \frac{7}{24}$

Cos A = $\frac{adj}{hyp} = \frac{7}{25}$

Sin B = $\frac{opp}{hyp} = \frac{7}{25}$



Find this side using pythagorean theorem

$7^2 + x^2 = 25^2$

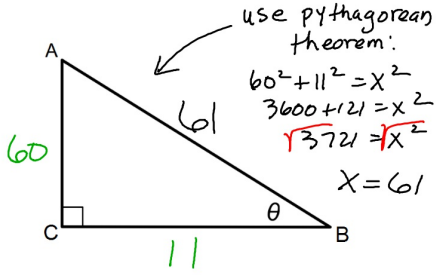
$49 + x^2 = 625$

$\sqrt{x^2} = \sqrt{576}$

$x = 24$

In triangle ABC, C is the right angle. SOHCAHTOA

Given TanA = $\frac{11}{60} = \frac{opp}{hyp}$



Find the following as ratios:

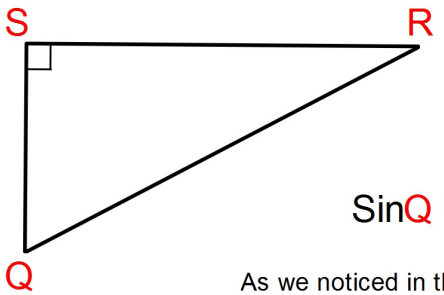
Cos A = $\frac{ADJ}{HYP} = \frac{60}{61}$

Sin A = $\frac{opp}{hyp} = \frac{11}{61}$

Tan B = $\frac{opp}{adj} = \frac{60}{11}$

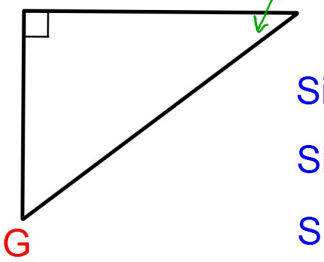
Cos B = $\frac{adj}{hyp} = \frac{11}{61}$

Sin B = $\frac{opp}{hyp} = \frac{60}{61}$



SinQ = Cos R

As we noticed in the previous problems when you switch from Sin to Cos and you switch angles you get the same answer.



Angle G and this angle are complementary

Sine G = Cos?

Sine G = Cos(90^o-G)

Sine G = Cos(complement to G)

Sin 38° = Cos 52° ← 90 − 38

Sin 92° = Cos −2° ← 90 − 92

Sin −87° = Cos 177° ← 90 − −87

Sin 162° = Cos −72° ← 90 − 162

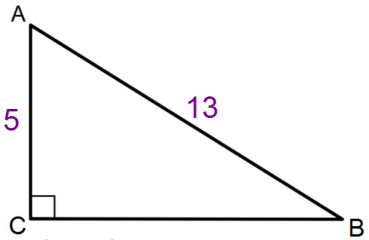
When we take the Sin, Cos, or Tan of an angle the result is a decimal amount equivalent to the ratio of two sides, i.e., SOHCAHTOA.

If we have the sides and need the measure of the angle we have to undo Sin, Cos, or Tan....called an inverse trigonometric function:

$\sin^{-1}$, $\cos^{-1}$, or $\tan^{-1}$
This is usually done by pressing the 2ND button first followed by the Sin, Cos, or Tan button. See an example on the next page.

Find the measure of angles A and B to the nearest hundredth of a degree.

SOHCAHTOA



Angle A: $\cos A = \frac{\text{Adj}}{\text{Hyp}}$ $\angle A = \cos^{-1}\left(\frac{\text{Adj}}{\text{Hyp}}\right) \Rightarrow \angle A = \cos^{-1}\left(\frac{5}{13}\right)$

$\angle A = 67.38°$

Angle B: one method: $\sin B = \frac{\text{OPP}}{\text{hyp}} \Rightarrow \sin B = \frac{5}{13}$

$\angle B = \sin^{-1}\left(\frac{5}{13}\right)$

$\angle B = 22.62°$

Second method

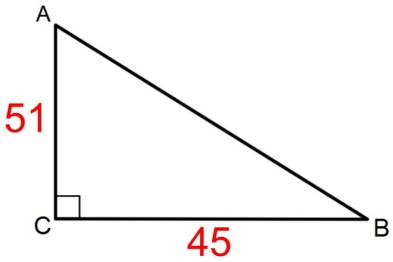
$\angle A$ & $\angle B$ are complementary

$\angle B = 90 - \angle A = 90 - 67.38$

$\angle B = 22.62°$

Find the measure of angles A and B to the nearest hundredth of a degree.

SOHCAHTOA



Angle A: $\tan A = \frac{45}{51}$ $\angle A = \tan^{-1}\left(\frac{45}{51}\right)$

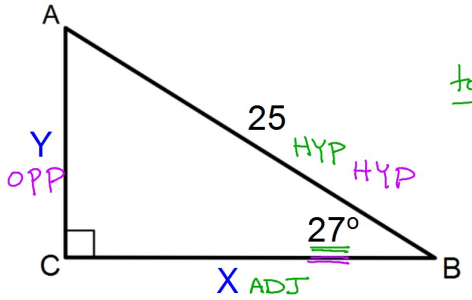
$\angle A = 41.42°$

Angle B: $\tan B = \frac{51}{45}$

$\angle B = \tan^{-1}\left(\frac{51}{45}\right) = 48.58°$

Find the values of x and y to the nearest hundredth.

SOHCAHTOA



to find x:

$\cos 27^\circ = \frac{X}{25}$

multiply both sides by 25

$X = 25 \cdot \cos 27^\circ$

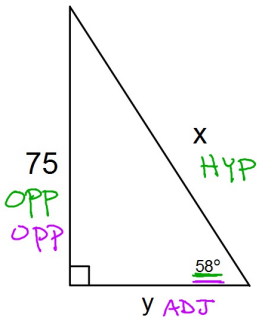
$X = 22.28$

to find y

$\sin 27^\circ = \frac{Y}{25}$ multiply both sides by 25

$Y = 25 \cdot \sin 27^\circ$ $y = 11.35$

Find the value of x and y to the nearest hundredth.



SOHCAHTOA

to find x

$\frac{\sin 58^\circ}{1} = \frac{75}{x}$

cross multiply to find x

$X = 88.44$

to find y

$\frac{\tan 58^\circ}{1} = \frac{75}{y}$

cross multiply to find y

$y = 46.87$