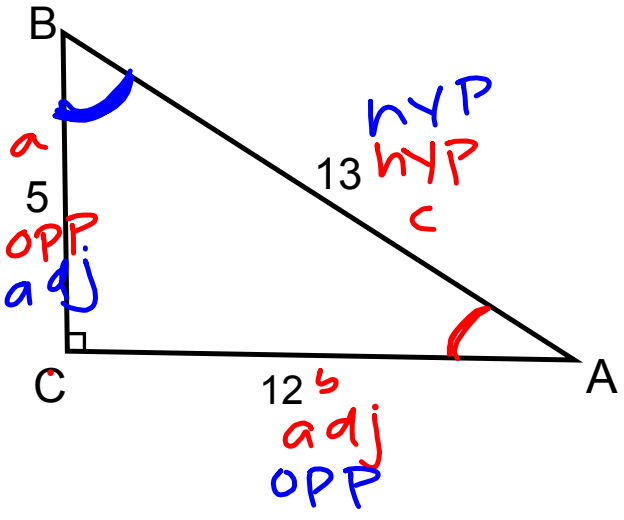
9-2 Trig Inverses and Reciprocals

- I can identify the reciprocal of a trig ratio ($\csc\theta, \sec\theta, \cot\theta$) } 9-1
- I can write all 6 trig ratios of a triangle
- I can use inverse trig functions to find measures of angles. ($\sin^{-1}, \cos^{-1}, \tan^{-1}$)
- I can solve a triangle

Fill in the trigonometric expression with the correct ratio from the figure.



$\sin A = \frac{5}{13}$ $\sin B = \frac{12}{13}$

$\cos A = \frac{12}{13}$ $\cos B = \frac{5}{13}$

$\tan A = \frac{5}{12}$ $\tan B = \frac{12}{5}$

S=O/H C=A/H T=O/A

Phyp

The cosecant, secant, and cotangent ratios can be expressed in terms of sine, cosine, and tan ratios.

$$\csc\theta = \frac{1}{\sin\theta},\ \sec\theta = \frac{1}{\cos\theta},\ \cot\theta = \frac{1}{\tan\theta}$$

Reciprocal = flip

When you know the trigonometric ratio of an angle you can find the measure of that angle by using the ***inverse relation***

If $\tan A = \frac{3}{4}$ then $m\angle A = \tan^{-1} \frac{3}{4}$

INVERSE = UNDO

* USED TO FIND ANGLES

~~$\tan^{-1} \tan A$~~ $\overset{\tan^{-1}}{=} \frac{3}{4}$

$A = 36.87^\circ$

Once you know the sine, cosine or the tangent of an acute angle, then you can use a calculator to find the measure of the angle.

For acute angle A:

If $\sin A = x$, then $\sin^{-1}(x) = m\measuredangle A$

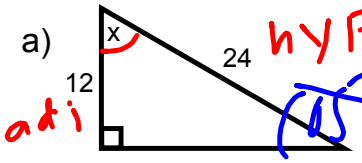
If $\cos A = x$, then $\cos^{-1}(x) = m\measuredangle A$

If $\tan A = x$, then $\tan^{-1}(x) = m\measuredangle A$

Inverse Trig

Find the measure of the indicated angle to the nearest **degree** (hint: calculator mode)

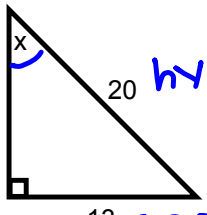
a)



adj hyp $\cos^{-1}$ $\cos X = \frac{12}{24}$ $X = 60^\circ$

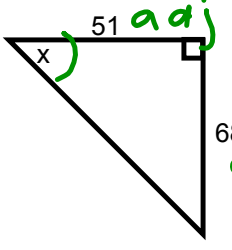
SOH CAH TOA

b)



hyp opp $\sin^{-1}$ $\sin X = \frac{13}{20}$ $X =$

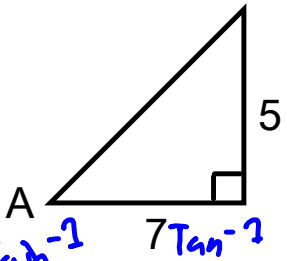
c)



adj opp $\tan^{-1}$ $\tan X = \frac{68}{51}$

$X = 53.13^\circ$

Find the m∠A by using inverse trigonometric functions.

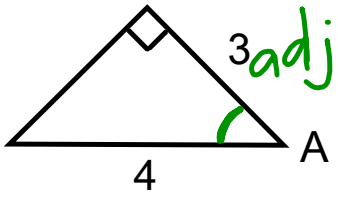


$\tan^{-1}$ $\tan^{-1}$

$\tan A = \frac{5}{7}$

$\tan^{-1}(5/7)$

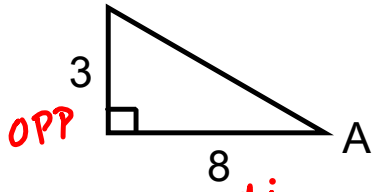
$A = 35.54$



hyp

~~$\cos^{-1}$~~ $\cos A = \frac{3}{5}$ $\cos^{-1}$

$\cos^{-1} A = 41.4°$



$\tan^{-1}$

$\tan^{-1}\tan A = \frac{3}{8}$

$A = 20.55°$

Solving a triangle involves finding the measures of all of the unknown sides and angles of the triangle.

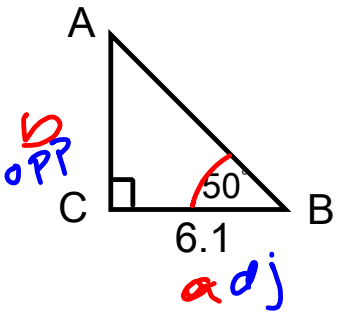
Helpful hints:

- The sum of the two acute angles is 90° all Δ's have 180°.
- If you know two sides of the right triangle, use the Pythagorean Theorem to find the third side. $a^2+b^2=c^2$
- Use trig ratios to find the length of sides and trig inverses to find the measure of angles

trig → sides

inverse → angles

Solve the right triangles.



$\angle A = 40^\circ$ $a = 6.1$

$\angle B = 50^\circ$ $b = 7.3$

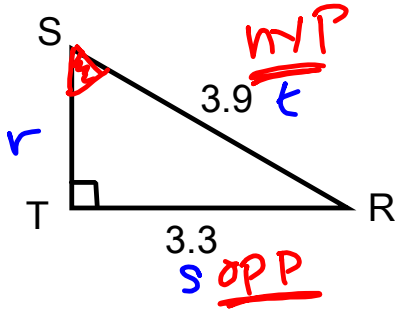
$\angle C = 90^\circ$ $c = 9.5$

$180 - 90 - 50 =$

$\tan 50 = \frac{b}{6.1}$ $\cdot 6.1$

$6.1 \cdot \tan 50 = b$

$6.1^2 + 7.3^2 = c^2$ $b = 7.3$



$S = 57.8^\circ$ $s = 3.3$

$T = 90^\circ$ $t = 3.9$

$r^2 + 3.3^2 = 3.9^2$

$-3.3^2 \quad -3.3^2$

$r^2 =$

$R = 32.2^\circ$ $r = 2.1$

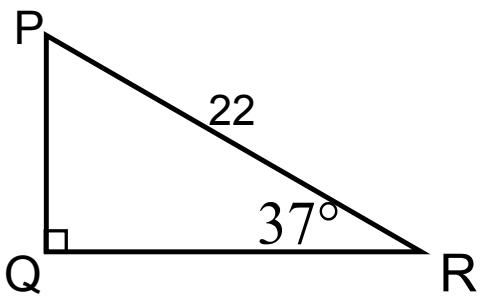
$\sin^{-1}$

$\sin S = \frac{3.3}{3.9}$

$r = 2.078$

$S = 57.8^\circ$

Solve the right triangle. Round decimals to the nearest tenth.

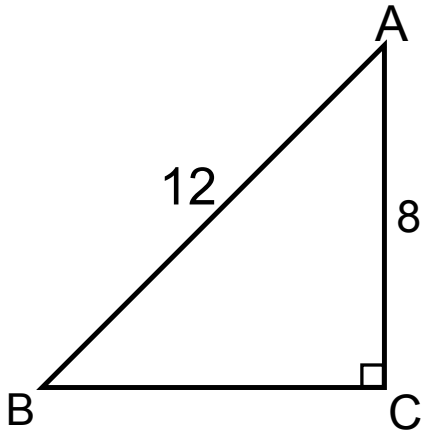


$\measuredangle P =$ $p =$

$\measuredangle Q =$ $q =$

$\measuredangle R =$ $r =$

Solve the right triangle. Round decimals to the nearest tenth.



$\measuredangle A =$ $a =$

$\measuredangle B =$ $b =$

$\measuredangle C =$ $c =$