11-1 Inverse Trigonometric Functions

Objectives:

I can use inverse trig functions to find ~~missing sides~~ and missing angles of right triangles.

✳ USE inverse to find angles
↓
UNDO

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.
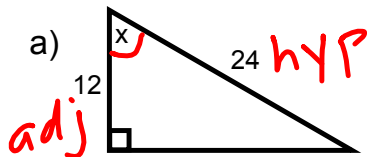
For acute angle A:

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

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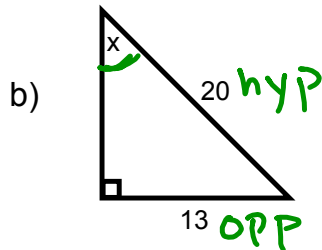
$\tan$ If $\tan A = x$, then $\tan^{-1}(x) = m\angle A$

Inverse Trig

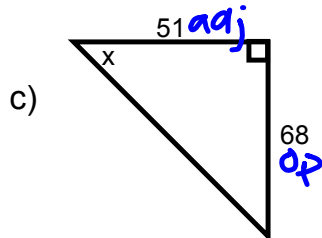Find the measure of the indicated angle to the nearest **degree** (hint: calculator mode)

a)

x
24 hyp
12
adj

$\cos^{-1}$

$\cos \cos X = \dfrac{12}{24}$ $X = 60°$

b)

x
20 hyp
13 opp

$\sin^{-1}$

$\sin^{-1} \sin X = \dfrac{13}{20}$

$X = 40.54°$

c)

51 adj
x
68 op

$\tan X = \dfrac{68}{51}$

$X = 53.13°$

Find the angles of the right triangle. Round to the nearest **degree.**

A

hyp
12

8 adj

B
C

$\angle A = 48.14°$

$\angle B = 41.86°$

$\angle C = 90°$
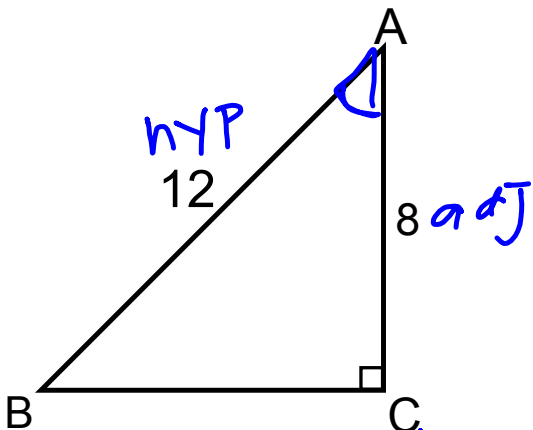
$\cos^{-1} \cos A = \dfrac{\cos^{-1} 8}{12}$

$A = 48.18°$

$180 - 90 - 48.14$

Find the angles of the right triangle. Round to the nearest **degree.**
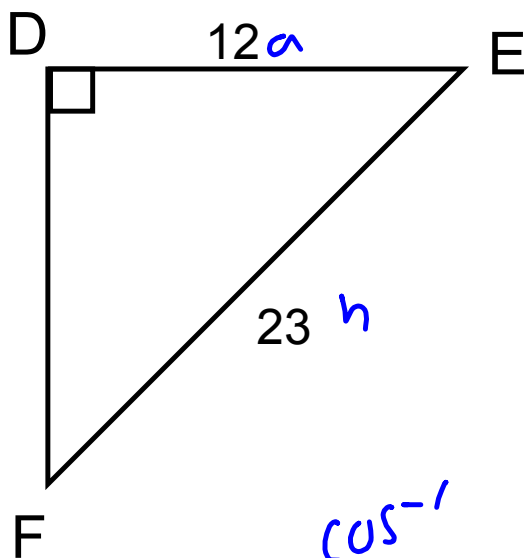
S

14

R

5

Q

$\angle Q = 70.35°$

$\angle R = 90°$

$\angle S = 19.65°$

tan⁻¹

$\tan Q = \dfrac{14}{5}$

tan⁻¹
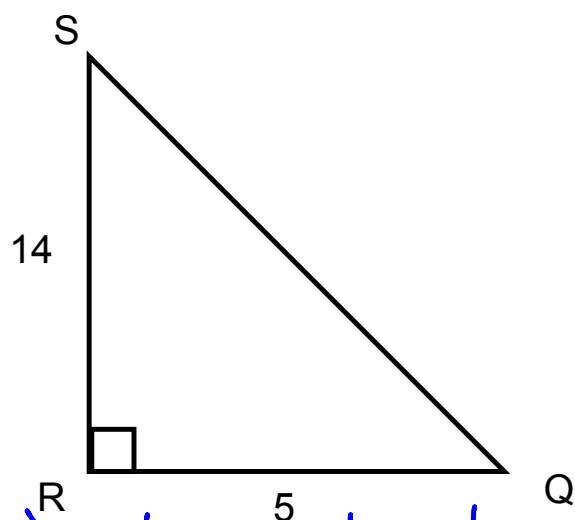
$Q =$

Find the angles of the right triangle. Round to the nearest **degree.**

D $\quad$ 12 a $\quad$ E

23 h

F

$\angle D = 90$

$\angle E = 58.55\,^{\circ}$

$\angle F = 31.45\,^{\circ}$

$\cos^{-1}\cos E = \dfrac{12}{23}$ $\quad$ $\cos^{-1}$

$E =$

A shelf extends perpendicularly 7 in. from a wall. You want to place a 9-in. brace under the shelf, as shown. To the nearest degree, what angle will the brace make with the wall? What angle will the brace make with the shelf?

Shelf

7 in.

C A

9 in.

Wall

B

Brace
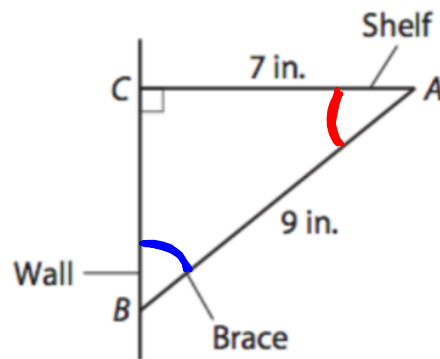
$\angle C = 90°$

$\angle B = 51.06°$

$\angle A = 38.94°$

Find the exact value. Find **_ALL_** possible solutions.

NON CALCULATOR - 2 step PLATE PROBS

Find angle where

$$\sin\left(\tan^{-1}\frac{\sqrt{3}}{3}\right) = \pm\frac{1}{2}$$

$$\overset{y}{\sin}\left(\frac{\pi}{6}\right) = \frac{1}{2}$$

$$\sin\left(\frac{2\pi}{6}\right) = -\frac{1}{2}$$

Find angle where y

$$\cos\left(\sin^{-1}\frac{\sqrt{3}}{2}\right) = \pm\frac{1}{2}$$

$$\cos\left(\frac{\pi}{3}\right) = \frac{1}{2} \quad \times$$

$$\cos\left(\frac{2\pi}{3}\right) = -\frac{1}{2} \quad \times$$

$$\sin^{-1}\left(\cos\frac{\pi}{3}\right) = \frac{5\pi}{6}, \frac{\pi}{6}$$

$$\cos^{-1}\left(\sin\frac{3\pi}{2}\right)$$

$$\sin^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{6}, \frac{5\pi}{6}$$

$$\cos^{-1}(-1) = \pi$$

Find ∠ where y

Find the exact value. Find **_ALL_** possible solutions.

$$\sin\left(\cos^{-1}\left(\frac{1}{2}\right)\right)$$

$$\tan\left(\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)\right)$$

$$\cos^{-1}\left(\sin\left(\frac{\pi}{6}\right)\right)$$

$$\sin^{-1}\left(\cos\left(\frac{\pi}{2}\right)\right)$$