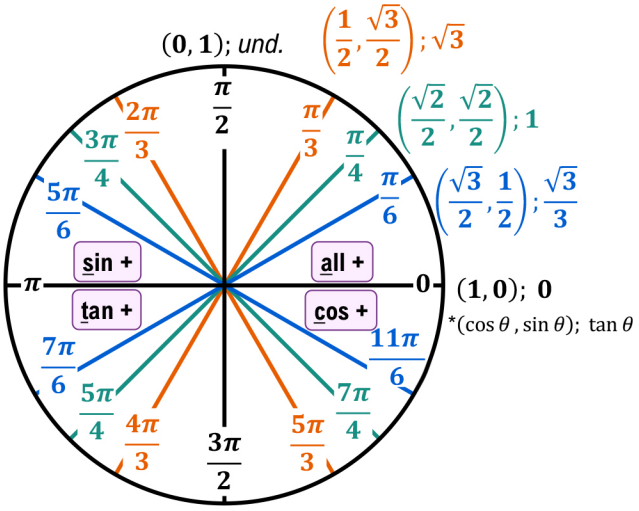
TOPIC: EVALUATE COMPOSITE TRIG FUNCTIONS

Evaluate Composite Functions - Values on Unit Circle

◆ To fully evaluate composite trig functions, evaluate function *inside* _____ *first*.

$$\sin\left(\underbrace{\cos^{-1}\frac{1}{2}}_{\cos\theta=\frac{1}{2}}\right)$$

$$\sin\left(\text{———}\right)$$



◆ When working with inverse trig functions, remember to *ALWAYS* use values in the correct interval.

EXAMPLE Evaluate the expression.

Recall **Inverse Trig Intervals**

Function	Interval
$\cos^{-1}$	$[-1,1]$ / $[0,\pi]$
$\sin^{-1}$	$[-1,1]$ / $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$
$\tan^{-1}$	$[-\infty,\infty]$ / $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$

(A) $\cos(\tan^{-1} 0)$

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

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Recall	Inverse Trig Intervals
Function	Interval
$\cos^{-1}$	$[-1,1]\ /\ [0,\pi]$
$\sin^{-1}$	$[-1,1]\ /\ \left[-\frac{\pi}{2},\frac{\pi}{2}\right]$
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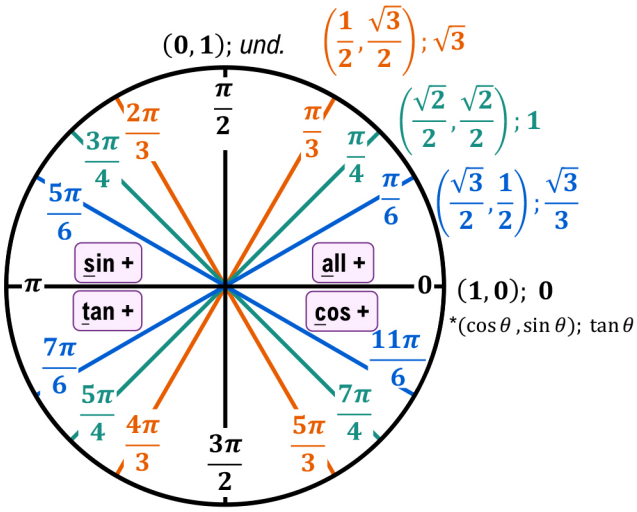

PRACTICE Evaluate the expression.

(A) $\cos(\sin^{-1} 1)$

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

EXAMPLE Evaluate the expression.

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

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Evaluate Composite Functions – Special Cases

◆ Though trig functions & their inverse undo each other, you CANNOT assume the argument is your final answer.

EXAMPLE Evaluate the expression.

(A)

$$\cos^{-1}\left(\cos\frac{11\pi}{6}\right)$$

(B)

$$\sin(\sin^{-1}(2))$$

Recall **Inverse Trig Intervals**

Function	Interval
$\cos^{-1}$	$[-1,1]$ / $[0,\pi]$
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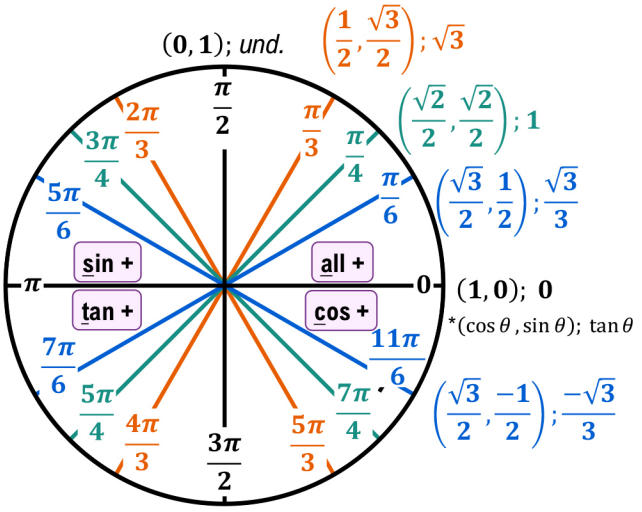


EXAMPLE Evaluate the expression.

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

PRACTICE Evaluate the expression.

(A)

$$\cos\left(\cos^{-1}\left(-\sqrt{3}\right)\right)$$

(B)

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

(C)

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

TOPIC: EVALUATE COMPOSITE TRIG FUNCTIONS

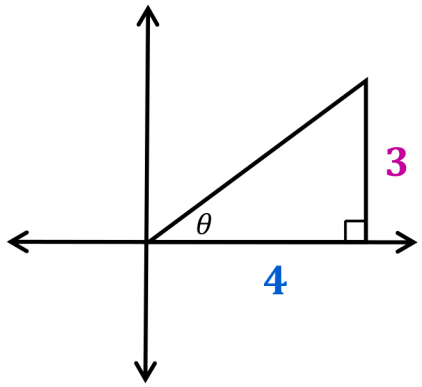
Evaluate Composite Functions – Values Not on Unit Circle

◆ To evaluate expressions for values *NOT* on the unit circle, use a right triangle.

$$\sin\left(\tan^{-1}\left(\frac{3}{4}\right)\right)$$

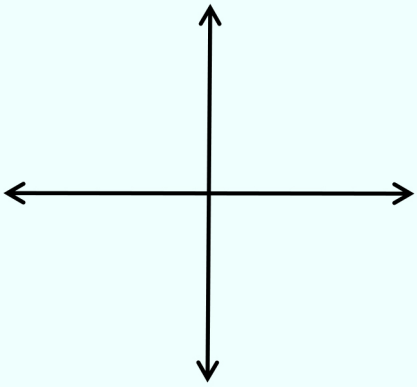
$\tan\theta = \frac{3}{4}$

$$\sin\left(\qquad\right) = \_\_\_\_\_$$



EXAMPLE Evaluate the expression:

$$\sin\left(\cos^{-1}\left(-\frac{5}{13}\right)\right)$$



HOW TO: Evaluate Composite Trig Functions *without* the Unit Circle

Inside Function

1) Use _____ to identify quadrant *(consider sign of argument)*

2) Draw ◿ & use _____ to label θ & 2 sides

3) Use Pythagorean Theorem to find 3rd side

4) Use ◿ to evaluate _____ function

Recall

$a^2 + b^2 = c^2$

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Recall **Inverse Trig Intervals**

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HOW TO: Evaluate Composite Trig Functions *without* the Unit Circle

Inside Function

1) Use interval to identify quadrant *(consider sign of argument)*

2) Draw ◿ & use argument to label θ & 2 sides

3) Use Pythagorean Theorem to find 3rd side

4) Use ◿ to evaluate outside function

Recall

$a^2 + b^2 = c^2$

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Recall Inverse Trig Intervals

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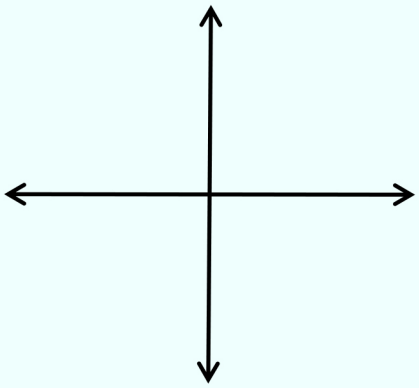
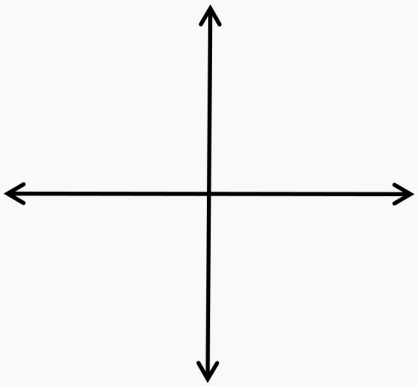
EXAMPLE Evaluate the expression.

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

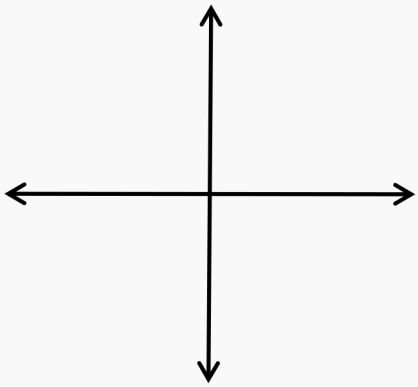


PRACTICE Evaluate the expression.

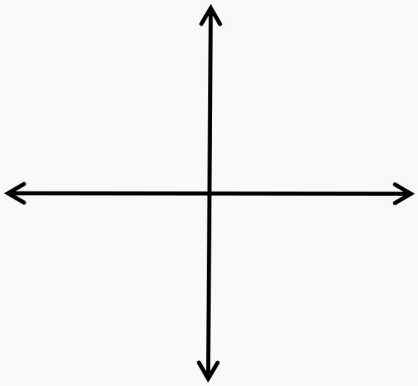
(A) $\tan\left(\cos^{-1}\frac{12}{13}\right)$



(B) $\sin\left(\tan^{-1}\frac{15}{8}\right)$



(C) $\cos\left(\sin^{-1}\left(-\frac{7}{25}\right)\right)$



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EXAMPLE Evaluate the expression.

$$\tan\left(\sin^{-1}\frac{x}{\sqrt{x^2+4}}\right)$$