TOPIC: INVERSE TRIG FUNCTIONS & BASIC TRIG EQUATIONS

Inverse Cosine

◆ Just like a square root *undoes* a square, the **inverse cosine** function (or arccos) *undoes* the cosine function.

Recall **Inverse Cosine**

$\cos\frac{\pi}{6}$

$\frac{\pi}{6}$ — *Operation* → $\frac{\sqrt{3}}{2}$

$\frac{\pi}{6}$ ← *Inverse* — $\frac{\sqrt{3}}{2}$

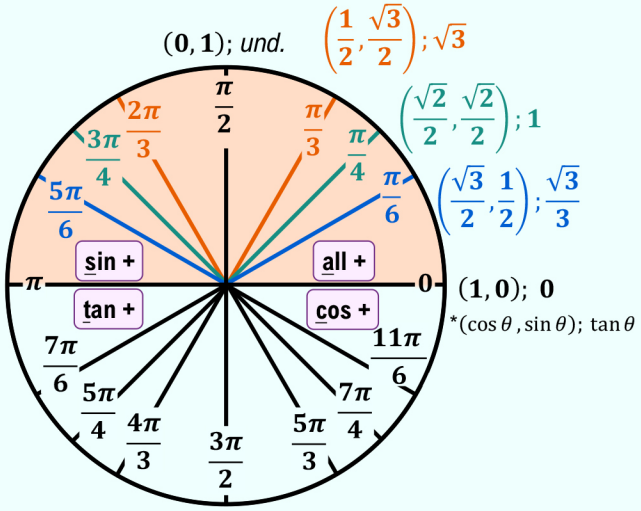
Angle ***Value***

$\cos^{-1}\frac{\sqrt{3}}{2}$

◆ To evaluate an $\cos^{-1}$ function, find the _____ with the corresponding value on the unit circle.

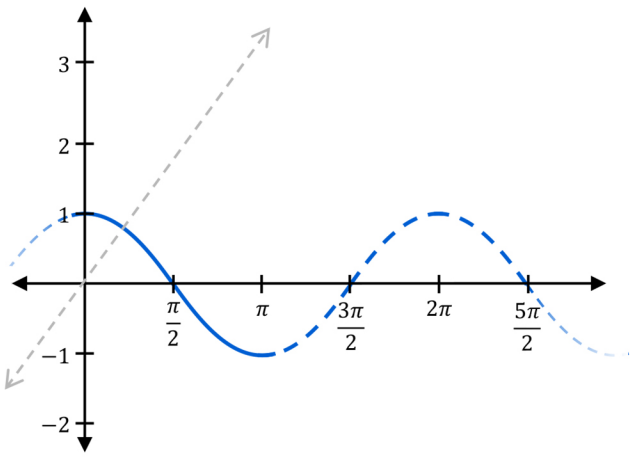
EXAMPLE Evaluate the expression.

$\cos^{-1}\frac{1}{2}$



◆ Since $\cos(x)$ is not _____, $\cos^{-1}(x)$ is only defined for *certain values* so that it passes the vertical line test.

- Recall: An *inverse* function is a reflection over the line _____.
- So, when taking $\cos^{-1}(x)$, only use angles in the interval [____ , ____].



New

Input: ____ $< x <$ ____

Output: ____ $< \theta <$ ____

(Inverse Cosine Interval)

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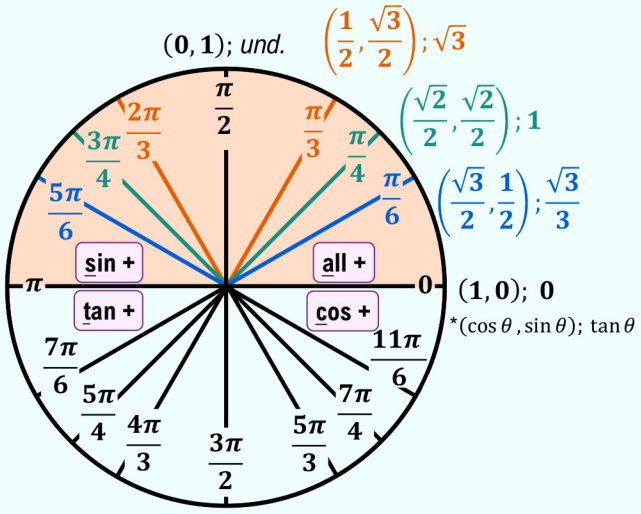
EXAMPLE Evaluate the expression.

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



PRACTICE Evaluate the expression.

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

(B) $\cos^{-1} 0$

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

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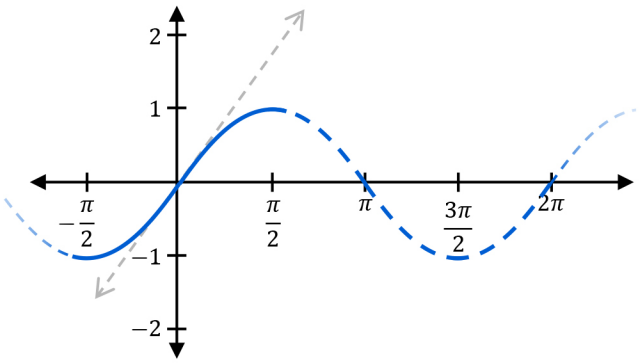
Inverse Sine

◆ Like inverse cosine, $\sin^{-1}(x)$ is only defined for *certain values* because the sine function is not one-to-one.



New

Input: ____ $< x <$ ____

Output: ____ $< \theta <$ ____

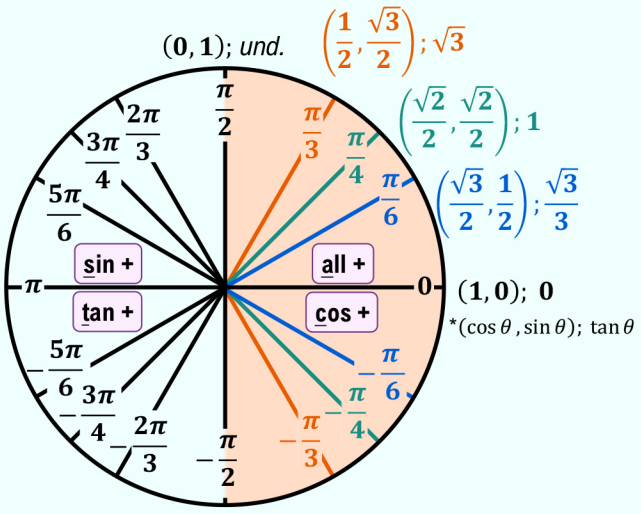
(Inverse Sine Interval)

◆ To evaluate an inverse sine function, find the ∠ with the corresponding value on the unit circle within the interval.

EXAMPLE Evaluate the expression.

(***A***) $\sin^{-1}\frac{1}{2}$

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



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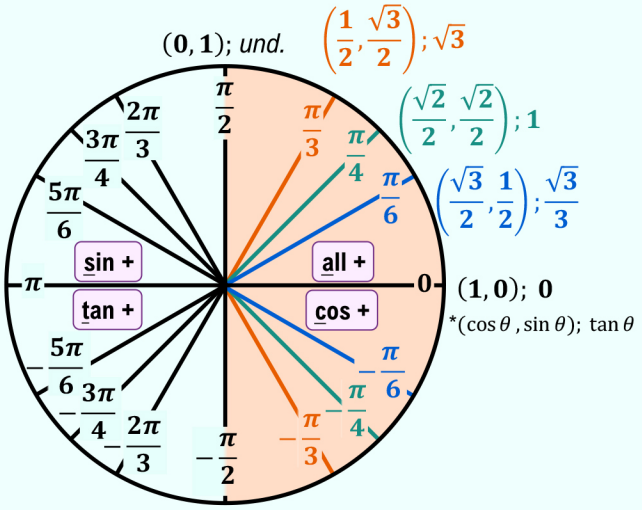
EXAMPLE Evaluate the expression.

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



PRACTICE Evaluate the expression.

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

(B) $\sin^{-1} \frac{\sqrt{3}}{2}$

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

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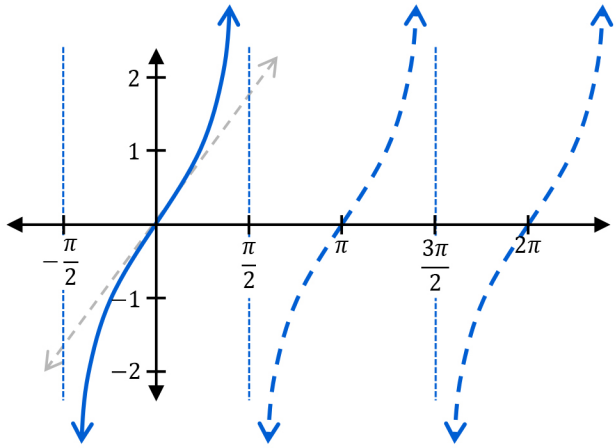
Inverse Tangent

◆ Like inverse sine & cosine, $\tan^{-1}(x)$ is only defined for *certain values* because the tangent fn is not one-to-one.



New

Input: ____ $< x <$ ____

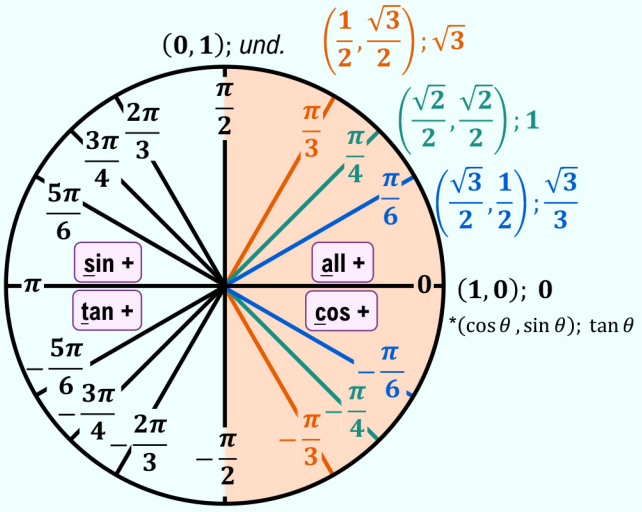
Output: ____ $< \theta <$ ____

(Inverse Tangent Interval)

EXAMPLE Evaluate the expression.

(***A***) $\tan^{-1}\sqrt{3}$

(***B***) $\tan^{-1}(-1)$



◆ To evaluate inverse trig functions using a calculator, press 2nd → SIN, COS or TAN. *(usually in RAD mode)*

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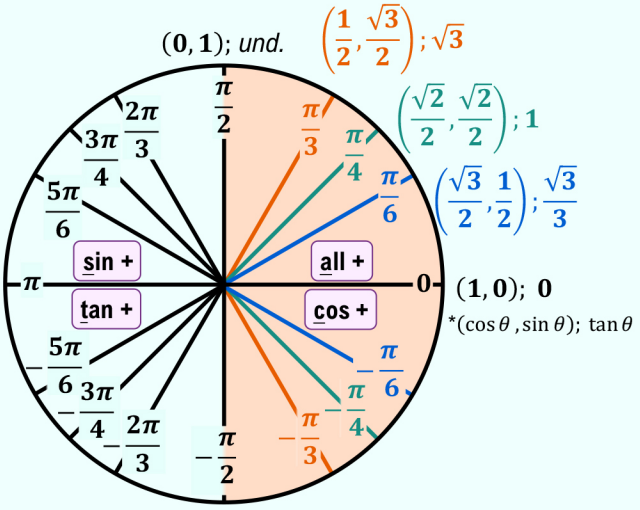
EXAMPLE Evaluate the expression.

$\tan^{-1}(-\sqrt{3})$



PRACTICE Evaluate the expression.

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

(B) $\tan^{-1} 1$

(C) $\tan^{-1}\left(-\frac{\sqrt{3}}{3}\right)$

PRACTICE Evaluate the expression using a calculator. Express your answer in radians, rounding to two decimal places.

(A) $\tan^{-1}(5)$

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

(C) $\cos^{-1}\left(\frac{1}{4}\right)$