Convert $245^\circ 10'$ to Decimal Degree Form $\rightarrow 245\frac{10}{60} \rightarrow \frac{10}{60} = \frac{x}{100} \rightarrow x = 16.66 \rightarrow 245.166^\circ$

1 min $= \frac{1}{60}$ of a degree

Convert -0.76° to Deg, Min, Sec. $\frac{76}{100} = \frac{x}{60} \rightarrow x = 45.6 \rightarrow \frac{6}{10} = \frac{x}{60} \rightarrow x = 36 \rightarrow -0^\circ 45' 36''$

Mixing Trig Functions

Make sure in RAD or DEG on calculator!!

$\sin\left(\cos^{-1}\frac{\sqrt{5}}{5}\right)$ ← cos must be between 0 and π, so this is Q1 since positive

$\sin = \frac{\text{opp}}{\text{hyp}} = \frac{2\sqrt{5}}{5}$

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

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

Even Function

$\sin^2\theta + \cos^2\theta = 1$

$1 + \tan^2\theta = \sec^2\theta$

$1 + \cot^2\theta = \csc^2\theta$

Reference Angles

$\frac{7\pi}{6} \rightarrow \frac{\pi}{6}$

$\frac{5\pi}{4} \rightarrow \frac{\pi}{4}$

$240^\circ \rightarrow 60^\circ$

$\theta = 665^\circ \rightarrow 55^\circ$

$665^\circ - 360^\circ = 305^\circ$

$360 - 305 = 55^\circ$

$\cos\frac{17\pi}{3}$ ← solve

$\frac{17\pi}{3} - 3\pi = \frac{11\pi}{3}$

$\frac{11\pi}{3} - 3\pi = \frac{5\pi}{3} \rightarrow \frac{1}{2} = \cos$

Q4 is positive

smaller than 3π okay to stop

Inverse Functions (Domain & Range switch)

$y^2 + x^2 = 1$ ← unit circle ($\sin y = x$, $\cos y = x$)

$1^\circ = \frac{\pi}{180}$ radians

$\sin^{-1}x$: D $[-1, 1]$ R: $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$, Q 1 or 4

$\cos^{-1}x$: D $[-1, 1]$ R: $[0, \pi]$, Q 1 or 2

$\tan^{-1}x$: D $(-\infty, \infty)$ R: $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, Q 1 or 4

$\sin^{-1}x(\sin x) = x$ (True or Cos can Then too)

For Final Cos

Domain → θ All Real #'s

Range → (x, y) $[-1, 1]$

$-1 \le \sin\theta \le 1$

$-1 \le \cos\theta \le 1$

$\theta = -\frac{11\pi}{3} + 3\pi = -\frac{5\pi}{3}$

$-\frac{5\pi}{3} + 3\pi = \frac{\pi}{3}$

Positive Reference Angles Always in Q1 & Positive

Arc Length

$\sin = \frac{y}{r}$

$\cos = \frac{x}{r}$

$\tan = \frac{y}{x}$

$\cos(x)$ - Even Function - Y-axis Symmetry $\cos(x) = \cos(-x)$

$\sin(x)$ - Odd Function - Origin Symmetry $\sin(-x) = -\sin(x)$

$\tan\theta = \cot(90 - \theta)$

Linear Speed: $\frac{s}{t}$, t = time

Angular Speed: $\frac{\theta}{t}$, t = time

Example with 5" Bicycle Wheel making 4 Revolutions/min

Find Angular Speed in Radians:

One Revolution = 2π → 4 Revolutions = 8π ← θ

$\omega = \frac{s}{r} \rightarrow 8\pi = \frac{s}{2.5} \rightarrow s = 20\pi \rightarrow 62.8$ ft/min

$\csc x = \frac{1}{\sin x}$ $\cos x = \frac{1}{\sec x}$

$\sec x = \frac{1}{\cos x}$ $\sin x = \frac{1}{\csc x}$

$\tan x = \frac{1}{\cot x}$ $\cot x = \frac{1}{\tan x}$

Arc length: $s = r\theta$ (s: Arc Length, r: Radius, θ: Angle Measure)

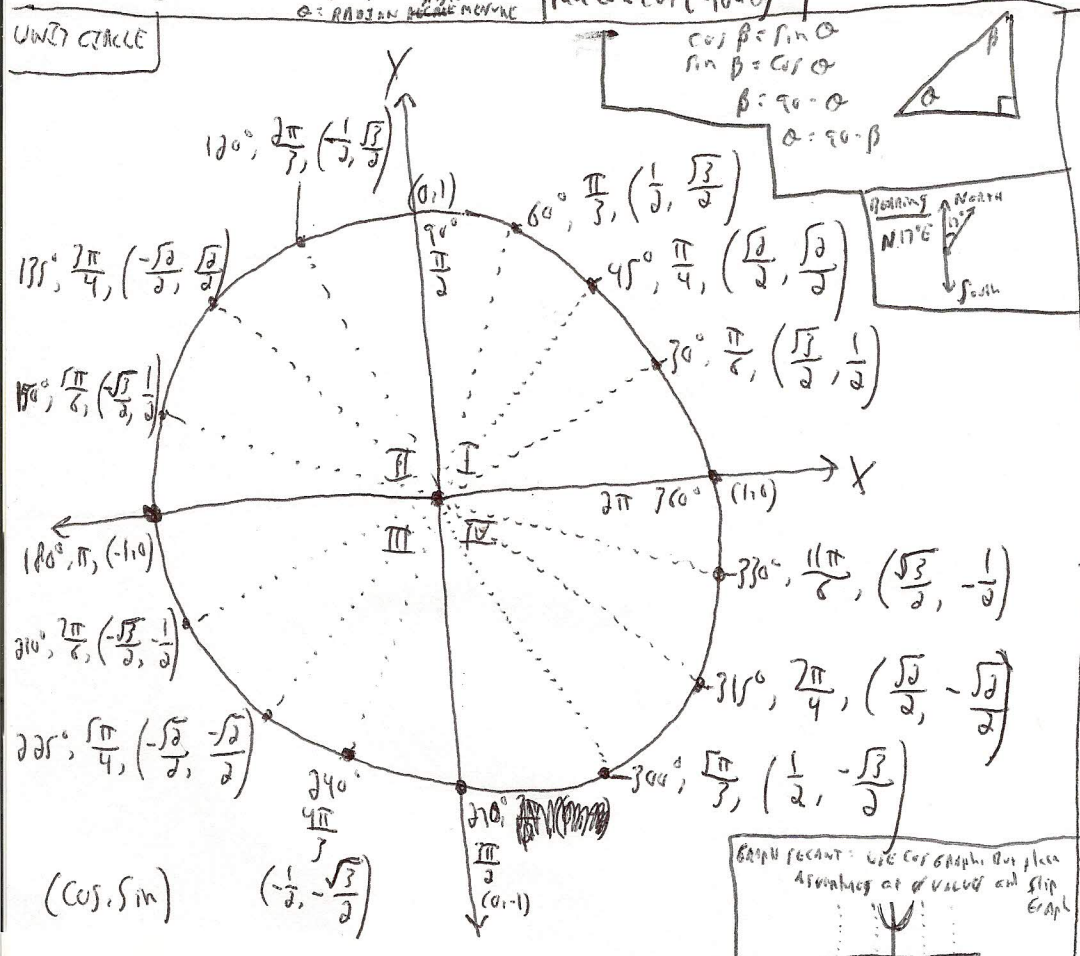
θ = Radian

240° and 480° (Above) are Co-Terminal Angles

-120° ← Negative Angle (Clockwise)

120° ← Positive Angle (Counter-Clockwise)

Unit Circle



All Angles Positive Above

Heading N 17° E

North

20°

South

Write $\sin(\cos^{-1}2x)$ as an Algebraic Expression

$2x = \frac{2x}{1}$

$1^2 - 2x^2 = 1 - 4x^2 = B^2$

$\sqrt{1-4x^2} = B$

$\sin = \frac{\text{opp}}{\text{hyp}} = \frac{\sqrt{1-4x^2}}{1} = \sqrt{1-4x^2}$

Graph Secant: Use Cos Graph, But Flip Asymptotes at x-values and Flip Graph

Sin & Cos have NO inverse on the Real Number Line

$y = k + a\sin(bx - c)$

Vertical Translation: $+$ = up, $-$ = down

Amplitude (Stretch Graph)

Can BE Sin or Cos

If $a < 0$, Graph Reflects over x-axis

Phase Shift: $\frac{c}{b}$

Period: $\frac{2\pi}{B}$

Amplitude $|A|$

$2 - 7\cos x$

$A = -7$

$|A| = 7$

(Phase Shift) Horizontal Translation

$-$ = Right

$+$ = Left

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