Inverse Trig Stuff To Memorize

Arcsine and Arccosine

x	$\sin^{-1}(x)$	$\cos^{-1}(x)$
-1		
$-\frac{\sqrt{3}}{2}$		
$-\frac{\sqrt{2}}{2}$		
$-\frac{1}{2}$		
0		
$\frac{1}{2}$		
$\frac{\sqrt{2}}{2}$		
$\frac{\sqrt{3}}{2}$		
1		

What to do!

1. Fill in all tables correctly.
2. Make note cards for all of these. This means that $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ goes on one side of the card and its simplified value goes on the other side.
3. Shuffle the cards and then flip through them as often as possible until all of these are second nature.

Function	**Domain**	**Range**
$y=\sin^{-1}(x)$		
$y=\cos^{-1}(x)$		
$y=\tan^{-1}(x)$		

Inverse Tangent

x	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$
$\tan^{-1}(x)$							

Function	Quadrants for *range*	Little Picture
$y=\sin^{-1}(x)$		
$y=\cos^{-1}(x)$		
$y=\tan^{-1}(x)$		

Take first quadrant and adjacent negative quadrant for each!

S	A
T	C

tangent follows sine

S. Turkington

Understanding how the inverse trig functions work is really important. Especially because your calculator will try to screw you up if you don't...remember when we were working with reference angles and had to use absolute values? Inverse functions were the cause of that. Here are some typical problems you'd have to deal with by hand.

Evaluate each of the following:

Evaluate	Quadrant	Reference Angle	Answer
$\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$			
$\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$			
$\tan^{-1}(-1)$			
$\cos^{-1}(0)$			
$\sin^{-1}(-1)$			

Evaluate each of the following by dealing with them a piece at a time.

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

S. Turkington

By far my favorite type of problems involving inverse trig functions are of the following sort. I can't explain why I like them so much, so don't bother asking.

Find an algebraic expression for each of the following.

$\tan\left(\sin^{-1}\left(\frac{x}{3}\right)\right)$
$\cos\left(\tan^{-1}\left(\frac{5}{x}\right)\right)$
$\sin\left(\cos^{-1}\left(\frac{3}{x+2}\right)\right)$

And, of course, we should do something ridiculous with this idea:

Evaluate $\sec\left(\tan^{-1}\left(\cos\left(\sin^{-1}\left(\frac{x}{2}\right)\right)\right)\right)$.

Name: _____ Date: _____

Period: _____ Trigonometry Inverse WS

1-5 Evaluate the expression without using a calculator, and write your answer in radians.

____ 1. $\tan^{-1}(1)$

____ 2. $\tan^{-1}(\sqrt{3})$

____ 3. $\arcsin\left(\frac{\sqrt{3}}{2}\right)$

____ 4. $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

____ 5. $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

6. Use a calculator to evaluate the expression to the nearest tenth of a degree.

$\cos^{-1}(0.8248)$ _____ °

7. Use a calculator to evaluate the expression to the nearest tenth of a degree.

$\cos^{-1}(-0.7190)$ _____ °

8. Use a calculator to evaluate the expression to the nearest tenth of a degree.

$\sin^{-1}(-0.2983)$ _____ °

9. Evaluate the expression without using a calculator, and write your answer in radians.

a. _____ $\tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$ b. _____ $\tan^{-1}(-1)$ c. _____ $\arcsin\left(-\frac{1}{2}\right)$

d. _____ $\cos^{-1}\left(\frac{1}{2}\right)$ e. _____ $\sin^{-1}\left(-\frac{1}{2}\right)$

10. Find the exact value of the expression.

a. $\sin\left(\arcsin\frac{4}{5}\right)$ _____ b. $\arccos\left(\cos\frac{3\pi}{4}\right)$ _____ c. $\arctan\left(\tan\frac{7\pi}{6}\right)$ _____

d. $\sin\left(\arcsin\frac{\sqrt{3}}{2}\right)$ _____ e. $\arccos\left(\cos-\frac{3\pi}{4}\right)$ _____ f. $\sec\left(\arcsin\left(-\frac{5}{13}\right)\right)$ _____

g. $\sin\left(\sin^{-1}\frac{1}{2}\right)$ _____ h. $\arccos\left(\cos\left(-\frac{\pi}{3}\right)\right)$ _____ i. $\arctan\left(\tan\left(-\frac{\pi}{6}\right)\right)$ _____