Review for Trig Exam #1

1. Convert from Radians/Degrees → Degrees/Radians

$\frac{\pi}{12}$ $\quad \frac{\pi}{12} \cdot \frac{180^\circ}{\pi} = 15^\circ$

225° $\quad 225^\circ \cdot \frac{\pi}{180^\circ} = \frac{5\pi}{4}$

2. Use Reference angles to find the exact values of the following trig functions.

1) $\sin 120^\circ$ 2) $\cos 240^\circ$ 3) $\tan 750^\circ$ 4) $\sec\left(-\frac{4\pi}{3}\right)$

$\oplus$ $\sin\theta_r$ $\quad \pm$ $\cos\theta_r$ $\quad \oplus$ $\tan\theta_r$ $\quad \pm$ $\sec\theta_r$

$+\sin 60^\circ = \frac{\sqrt{3}}{2}$ $\quad -\cos 60^\circ = -\frac{1}{2}$ $\quad +\tan 30^\circ = \frac{\sqrt{3}}{3}$ $\quad -\sec\frac{\pi}{3} = -2$

Steps to Solve

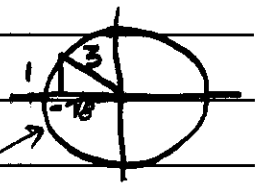
1. Find θ_r (always draw graph on loose paper)
2. Determine +/-
3. Compute the value

If $\csc\theta = 3$ & $\cos\theta < 0$

find 1) find the quadrant θ is in - QII

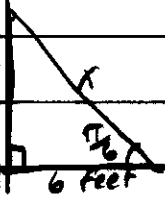
2) $\sin\theta =$ $\quad \csc\theta = 3 \Rightarrow \sin\theta = \frac{1}{3}$

3) $\cos\theta = -\frac{\sqrt{8}}{3} = -\frac{2\sqrt{2}}{3}$



$a^2 + b^2 = c^2 \quad a^2 + 1^2 = 3^2 \quad a^2 = 8 \quad a = \sqrt{8}$

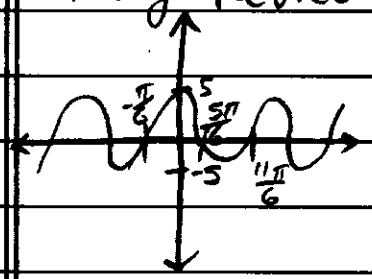
A ladder is placed against a wall, the foot of the ladder is 6 feet from the wall, with an angle of elevation $\pi/6$. Find the length of the ladder.



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

$x = \frac{6}{\cos\frac{\pi}{6}} = \frac{6}{\frac{\sqrt{3}}{2}} \cdot (6)\frac{2}{\sqrt{3}} = \frac{12}{\sqrt{3}} = \frac{12\sqrt{3}}{3} = 4\sqrt{3}$ feet

Trig Review



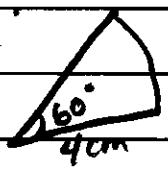
1. Amplitude = 5
2. Period = $\frac{12\pi}{6} = 2\pi$
3. Phase = $-\frac{c}{b} = \frac{\pi}{6}$
4. Correct equation $y = a\sin(bx+c)$

① $y = 5\cos(x+\frac{\pi}{6})$ ② $y = 5\sin(x+\frac{\pi}{6})$ ③ $y = 5\sin(x-\frac{\pi}{6})$ ④ $y = 5\cos(x-\frac{\pi}{6})$

Verify the identity

$(\tan\theta + \cot\theta)\tan\theta = \sec^2\theta$

$LS = \tan^2\theta + \cot\theta\tan\theta$	$(\tan\theta + \cot\theta)\tan\theta = \sec^2\theta$
$= \tan^2\theta + 1$	$(\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta})\frac{\sin\theta}{\cos\theta}$
$RS = \sec^2\theta$	$\frac{\sin^2\theta}{\cos^2\theta} + 1$
$LS = RS$ ✓	$\tan^2\theta + 1$



① Find the length of arc $s = r\cdot\theta$ (NEVER DEGREES, convert to radians)

$60^\circ \cdot \frac{\pi}{180^\circ} = \frac{\pi}{3}$ $s = r\cdot\theta$ $s = 4\cdot\frac{\pi}{3}$ $s = \frac{4\pi}{3}$

② Find the area $A = \frac{1}{2}r^2\theta$ $A = \frac{1}{2}(4)^2(\frac{\pi}{3}) = \frac{8\pi}{3}$

Verify the Identity

Compute $\tan(-\theta)\cdot\sin(-\theta) + \cos(-\theta) = \sec\theta$

$LS = (-\tan\theta)(-\sin\theta) + \cos\theta$

$= \tan\theta\sin\theta + \cos\theta$

$= \frac{\sin\theta}{\cos\theta}\cdot\sin\theta + \cos\theta$

$= \frac{\sin^2\theta}{\cos\theta} + \cos\theta$

$= \frac{\sin^2\theta}{\cos\theta} + \frac{\cos\theta}{1}\cdot\frac{\cos\theta}{\cos\theta}$

$= \frac{\sin^2\theta + \cos^2\theta}{\cos\theta}$

$= \frac{1}{\cos\theta}$

$= \sec\theta$

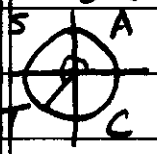
$RS = \sec\theta$

$LS = RS$ ✓

Trig Review

Find the exact value of the following using formulas for negatives

① $\cot\left(-\frac{7\pi}{6}\right)$



$-\left(\cot\frac{7\pi}{6}\right)$

$\ominus \cot\theta_r$

$-\cot\frac{\pi}{6}$

$-\sqrt{3}$

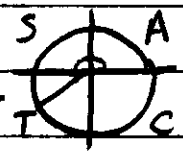
② $\sec\left(-\frac{4\pi}{3}\right)$

$\sec\frac{4\pi}{3}$

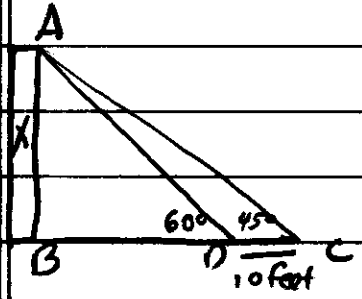
$+\ominus \sec\theta_r$

$-\sec\frac{\pi}{3}$

-2



A person looks at the top of a tower from where he stands the angle of elevation is 45°. He walks toward the tower 10 feet closer, the angle of elevation becomes 60°. How tall is the tower?



$\triangle ABC$

$\tan 45° = \frac{X}{BC}$

$1 = \frac{X}{BD+10}$

$\triangle ABD$

$\tan 60° = \frac{X}{BD}$

$\sqrt{3} = \frac{X}{BD}$

$BD = \frac{X}{\sqrt{3}}$

$1 = \frac{X}{BD+10}$

$1 = \frac{X}{\frac{X}{\sqrt{3}}+10}$

$X = \frac{X}{\sqrt{3}} + 10$

$X - \frac{X}{\sqrt{3}} = 10$

$X\left(1 - \frac{1}{\sqrt{3}}\right) = 10$

$X = \frac{10}{1 - 1/\sqrt{3}} = \frac{10}{\frac{\sqrt{3}-1}{\sqrt{3}}} = (10)\frac{\sqrt{3}}{\sqrt{3}-1}$

$X = 23.66$ feet