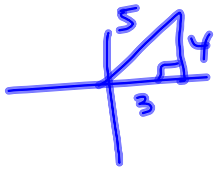
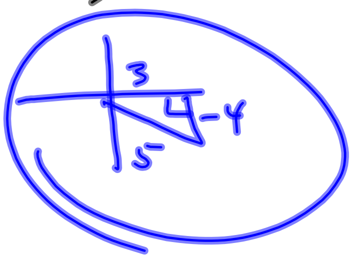
1st Review

Draw triangles for value of trig func.

$\cos x = \frac{3}{5}$





$\sin x = -\frac{4}{5}$

Find $\tan x = -\frac{4}{3}$

Basic Apps You know the ladder is 50′

Its base is 10′ from the house.

How far up is the top of the ladder?

What angle does the ladder make with the ground? ... the house?

Identity stuff: See Home & Quizzes.

Prove

$\cos x + \cos x \tan^2 x = \sec x$

$\cos x + \cos x \tan^2 x$

$= \cos x (1 + \tan^2 x)$

$= \cos x \sec^2 x$

$= \cancel{\cos x} \cdot \frac{1}{\cos^{\cancel{2}} x} = \frac{1}{\cos x} = \sec x$ ▨

$\cos x + \cos x \cdot \frac{\sin^2 x}{\cos^2 x}$

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

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

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

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

$= \sec x$ ▨

$\tan\left(\frac{u}{2}\right)$ $\sin\left(\frac{u}{2}\right)$

$\boxed{\tan \frac{u}{2}}$

$\frac{\tan u}{2}$

$\tan\left(\frac{u}{2}\right)$?

$\frac{1}{2}$-angle "trick"

$$\sin(15^\circ) = \pm\sqrt{\frac{1-\cos 30^\circ}{2}}$$

$+$ because $15^\circ \in QI$

$$\sin(195^\circ) = -\sqrt{\frac{1-\cos 390^\circ}{2}}$$

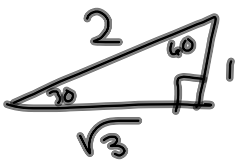
$195^\circ \in QIII$

Angle Sum: Find the Exact value

Do memorize Angle sum identities.

$$\sin(15^\circ) = \sin(45^\circ - 30^\circ)$$
$$= \sin(45^\circ + (-30^\circ))$$
$$= \sin 45^\circ \cos(-30^\circ) + \sin(-30^\circ)(\cos(45^\circ))$$
$$= \sin(45^\circ)\cos(30^\circ) - \sin(30^\circ)\cos(45^\circ)$$

30
45
60
90



$\sin(u+v) = \sin u \cos v + \sin v \cos u$

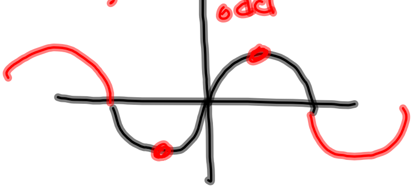
$\cos(u+v) = \cos u \cos v - \sin u \sin v$

$\sin(u-v) = \ldots$

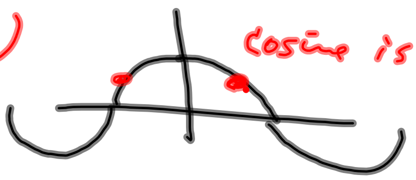
$\sin(-v) = -\sin v$

$\cos(-v) = \cos v$

sine is odd



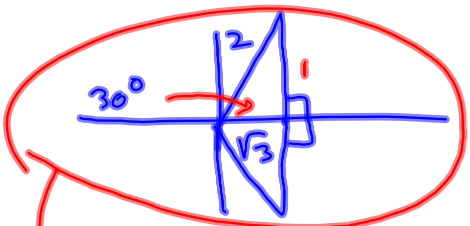
cosine is even

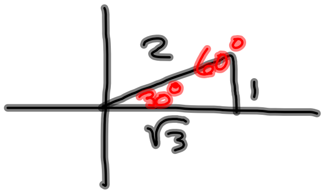


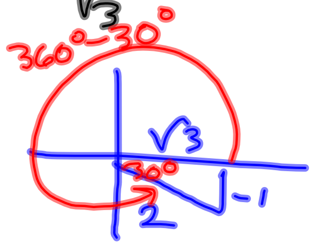
Trig eq'ns. Solve.

$\cos x = \frac{\sqrt{3}}{2}$

$\sec x = \frac{2}{\sqrt{3}}$







$x \in [0, 2\pi]$ is the restriction:

OK to draw this triangle, but once the $\sqrt{3}$ & 2 tell you what it SHOULD look like, you ought to re-draw it.

Messed ME up when I didn't.

$x = 30°, 330°$

$= \frac{\pi}{6}, \frac{11\pi}{6}$

$2\pi - \frac{\pi}{6} =$

No restriction:

$\frac{\pi}{6} + 2n\pi, \quad n \in \mathbb{Z}$

$\frac{11\pi}{6} + 2n\pi, \quad n \in \mathbb{Z}$

$30° + 360°n, \; n \in \mathbb{Z}$

$330° + 360°n, \; n \in \mathbb{Z}$

$4\sin^2\theta - 3 = 0$

$4u^2 - 3 = 0$

$a = 4, b = 0, c = -3$

$b^2 - 4ac = 0^2 - 4(4)(-3)$

$= 48$

$u = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$= \frac{\pm\sqrt{48}}{2(4)}$

$= \frac{\pm 4\sqrt{3}}{8} = \frac{\pm\sqrt{3}}{2}$

$4u^2 - 3 = 0$

$4u^2 = 3$

$u^2 = \frac{3}{4}$

$|u| = \sqrt{\frac{3}{4}}$

$u = \pm\frac{\sqrt{3}}{2}$

Square Root Property

$$\begin{array}{r|l} 2 & 48 \\ 2 & 24 \\ 2 & 12 \\ 2 & 6 \\ & 3 \end{array}$$

$\sqrt{48}$

$= \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3}$

$= 2 \cdot 2\sqrt{3}$

$= 4\sqrt{3}$

$4u^2 - 3 = 0$

$\boxed{(2u)^2 - \sqrt{3}^2} = 0$

$a^2 - b^2 = (a+b)(a-b)$

$(2u - \sqrt{3})(2u + \sqrt{3}) = 0$

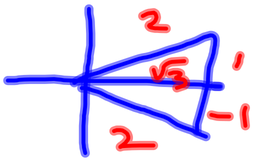
$2u - \sqrt{3} = 0$ OR $2u + \sqrt{3} = 0$

$\vdots$ $\vdots$

$u = \frac{\sqrt{3}}{2}$ $u = -\frac{\sqrt{3}}{2}$

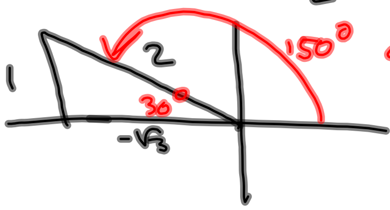
$u = \cos\theta = \pm \frac{\sqrt{3}}{2}$

$\cos\theta = \frac{\sqrt{3}}{2}$

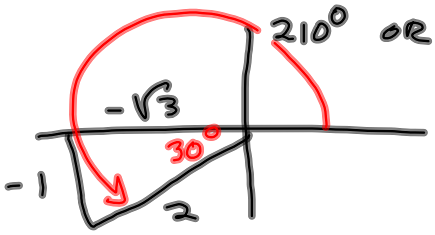


$\theta = \frac{\pi}{6}, \frac{11\pi}{6}$

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



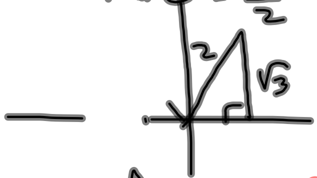
150° or $\frac{5\pi}{6}$



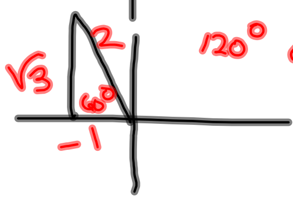
210° or $\frac{7\pi}{6}$

$\sin\theta = \pm \frac{\sqrt{3}}{2}$

$\sin\theta = \frac{\sqrt{3}}{2}$



60° or $\frac{\pi}{3}$



120° or $\frac{2\pi}{3}$

Build cosine from max, min, period & what t-value ~~the~~ gives the max.

Gunnison Temps.

High = 50
Low = 10

$\frac{HIGH - LOW}{2} = 20 = a$

$20 \cos x$

Period = 30 hrs.

High pt is @ x = 5 hrs.

$\frac{HIGH + LOW}{2} = \frac{60}{2} = 30$ $\quad 20 \cos x + 30$

$\frac{2\pi}{30} = \frac{\pi}{15}$ $\quad 20 \cos\left(\frac{\pi}{15}x\right) + 30$

High pt @ x=5

$$\boxed{20 \cos\left(\frac{\pi}{15}(x-5)\right) + 30}$$