

Bellwork: Login to schools.shmoop.com and go to ACT Prep Drills

Please ask me for a login paper if you were absent when we did shmoop in class!

Classroom Code: 1c41b

$$7) \quad \text{freq} = 30 = \frac{b}{2\pi} \cdot 2\pi$$

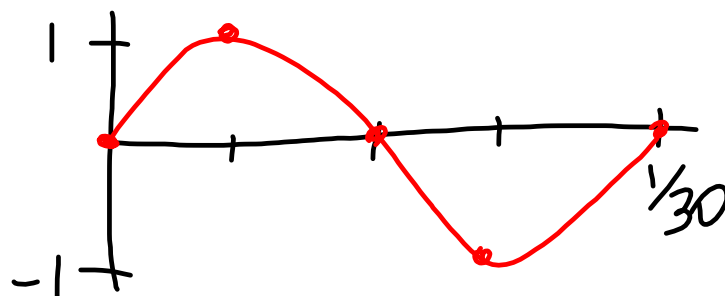
$$b = 60\pi$$

$$a = 1$$

$$k = 0$$

$$\sin(60\pi x)$$

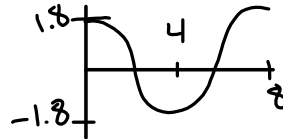
$$\text{per} = \frac{1}{30}$$



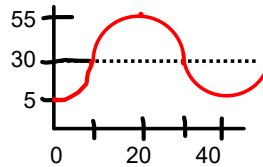
$$\frac{2\pi}{60\pi} = \frac{1}{30}$$

Homework 6.1 Solutions

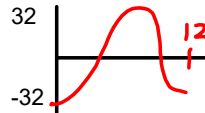
• 1. $h(x) = 1.8 \cos(\pi/4x)$



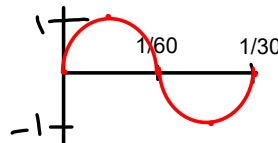
2. $h(x) = -25 \cos(\pi/20x) + 30$



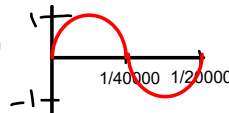
• 3. $h(x) = -32 \cos(\pi/6x)$



• 4. $f(x) = \sin(60\pi x)$



5. $f(x) = \sin(40000\pi x)$

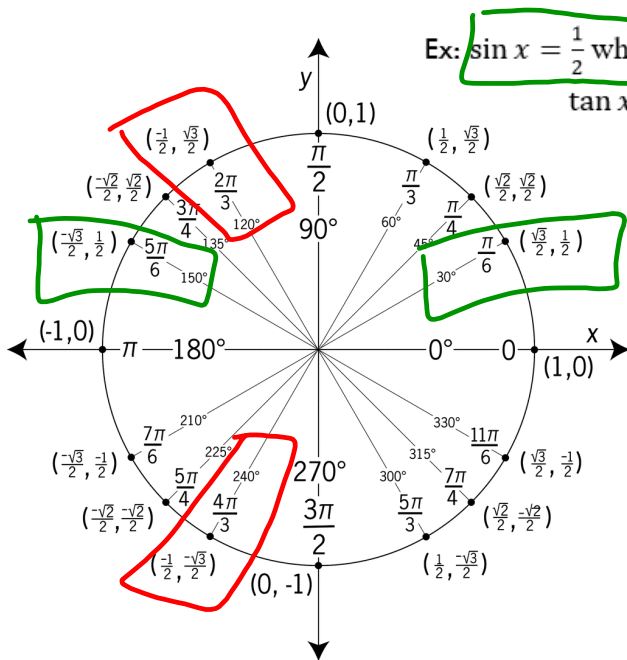


6. $t(x) = 12.5 \cos(\pi/6x) + 63.5$

Today's Objectives:

I can use inverse trig functions to solve problems

Sine and Cosine functions are periodic meaning that more than often there are more than one solution to a problem. We often limit results to $[0, 2\pi]$ or $[0, 360^\circ]$

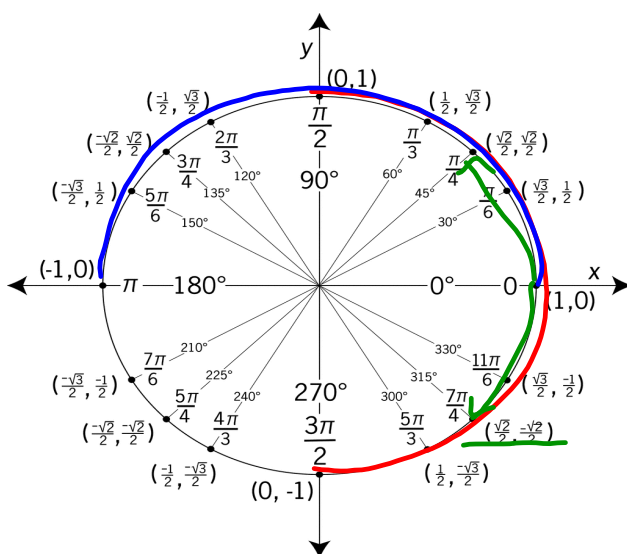


Ex: $\sin x = \frac{1}{2}$ when $x = \frac{\pi}{6}, \frac{5\pi}{6}$, $\cos x = -\frac{1}{2}$ when $x = \frac{2\pi}{3}, \frac{4\pi}{3}$, and $\tan x = -0.79$ when $x = 2.473, 5.6146$

$$\begin{aligned} \cos \theta &= x \\ \sin \theta &= y \\ \tan \theta &= y/x \end{aligned}$$

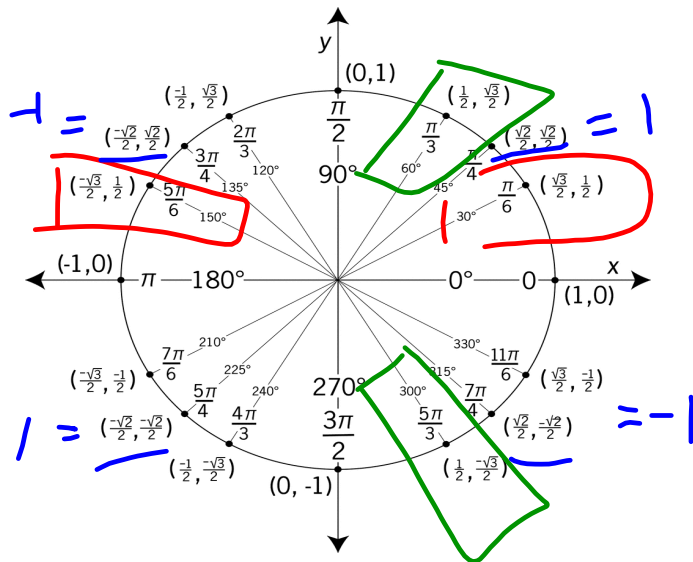
When using the $\sin^{-1} x$ and $\tan^{-1} x$ function, the calculator will give you the angle in the range $[-\pi, \pi]$ or $[-90^\circ, 90^\circ]$

When using the $\cos^{-1} x$ function, the calculator will give you the angle in the range $[0, \pi]$ or $[0, 90^\circ]$



$$\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right) = -\frac{\pi}{4}$$

- To find second answer for sine subtract first answer from 180° or π
 To find second answer for cosine subtract first answer from 360° or 2π .
 To find second answer for tangent add 180° or π to first answer.



~~cos~~ \cos^{-1}
 1. ~~cos~~ $x = 0.75$

$x = \cos^{-1}(0.75) = 0.7227 \text{ rad}$
 $2\pi - \text{ans} = 5.5604 \text{ rad}$

$$2. \underline{\sin} x = \frac{\sqrt{3}}{2}$$

$$\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = 1.04 \text{ rad}$$

$$\pi - 1.04 = 2.10 \text{ rad}$$

$$\frac{\pi}{3}, \frac{2\pi}{3}$$

$$3. \tan x = 5 \quad x = \tan^{-1}(5) = 1.37 \text{ rad}$$

$$\pi + \text{ans} = 4.51 \text{ rad}$$

$$4. \quad 2 \sin x - 1 = 0$$

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

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

$$x = \sin^{-1}\left(\frac{1}{2}\right) = \left[\frac{\pi}{6}, \frac{5\pi}{6} \right]$$

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

$$5. \quad \cos x = -\frac{3}{4}$$

$$\cos x = -\frac{3}{4}$$

$$x = \cos^{-1}\left(-\frac{3}{4}\right) = 2.42$$

$$2\pi - \text{ans} =$$

$$3.87 \text{ rad}$$

$$6. \tan x + 4 = 3$$

$$\quad \quad \quad -4 \quad -4$$

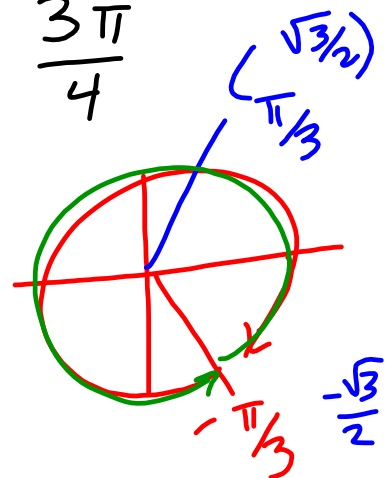
$$\tan x = -1 \quad x = \tan^{-1}(-1)$$

$$-0.785$$

$$2.356 \text{ 2nd}$$

$$2\pi + -0.785 = 5.49 \text{ 1st}$$

$$\frac{7\pi}{4}, \frac{3\pi}{4}$$



$$7. \sin x \cos x - 3 \cos x = 0$$

$$\cos x (\sin x - 3) = 0$$

$$\cos x = 0$$

$$\frac{3\pi}{2}, \frac{\pi}{2}$$

$$\sin x - 3 = 0$$

$$\quad \quad \quad +3 \quad +3$$

$$\sin x = 3$$

$$x = \sin^{-1}(3)$$

no soln

8. A heater turns on in a home when the outside temperature is below 45°F. During the middle of March in Salt Lake City, you can model the outside temperature in degrees Fahrenheit using the function $F(t) = 43 + 9.5 \cos\left(\frac{\pi}{12}t\right)$, where t is the number of hours past noon. During which hours is the heater heating the home?

$$45 = 43 + 9.5 \cos\left(\frac{\pi}{12}t\right)$$

$$-43 - 43 \quad 2 = 9.5 \cos\left(\frac{\pi}{12}t\right)$$

$$\cos^{-1} \quad \cos^{-1} \quad \cos^{-1}$$

$$0.210 = \cos\left(\frac{\pi}{12}t\right) \quad \frac{\pi}{12}t = \cos^{-1}(0.210)$$

$$2\pi - 1.359$$

$$\frac{\pi}{12}t = 1.359 \cdot \frac{12}{\pi} \quad \frac{12}{\pi} \frac{\pi}{12}t = 4.924 \cdot \frac{12}{\pi}$$

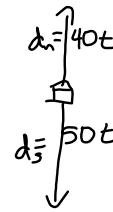
$$t = 5.19 \quad t = 18.81$$

5:11 pm turn on 6:48 am turn off

Mini Lesson 9: Rate, Distance, and Time problems

★ distance = rate * time or $d = rt$

Train A and B leave the station at the same time. Train A is going north and travelling at 40 mph, and train B is going south travelling at 50 mph. How long until the trains are 360 miles apart?



$$d_n + d_s = 360$$

$$40t + 50t = 360$$

$$90t = 360$$

$$\frac{90t}{90} = \frac{360}{90}$$

$$t = 4 \text{ hrs}$$

Two trains leave the station at the same time travelling south.

Train A is travelling 75 mph
Train B is travelling 50 mph. How far apart are they after 6 hrs?

How long have they been travelling when they are 500 miles apart?



$$D = 75t - 50t \quad D = 25t$$

$$a) 150 \text{ mi}$$

$$b) t = 20 \text{ hrs}$$

$$500 = 25t$$

$$\frac{500}{25} = \frac{25t}{25}$$

$$5) \quad -0.24 = \sin \theta$$
$$\theta = \sin^{-1}(-.24) = -.242 \quad \underline{1^{\text{st}}}$$

$$\pi - (-.242) = 3.384 \quad \underline{2^{\text{nd}}}$$
$$2\pi + -.242 = 6.041 \quad \underline{1^{\text{st}}}$$