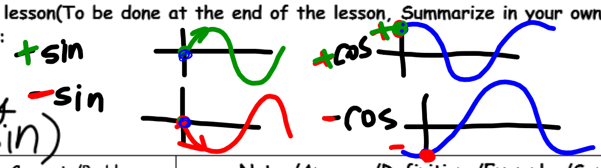
Notes!

Summary of lesson(To be done at the end of the lesson, Summarize in your own words what you learned):

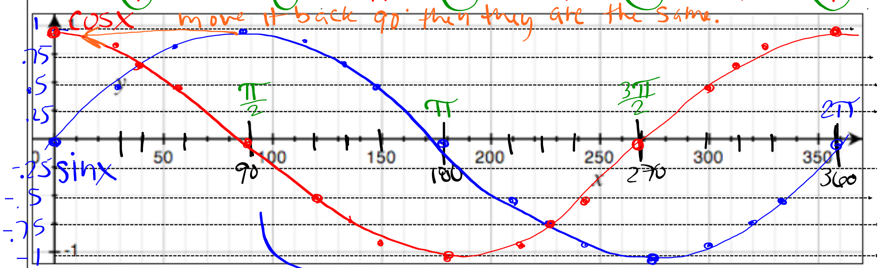


Key Words/Key Concepts/Problems	Notes/Answers/Definitions/Examples/Sentences

For each of the angles below, calculate the values of sin x and cos x (2 decimal places) on the chart and graph the points on the graph. use calc to fill in values (in degree)

sin(0) sin(30)

x	0°	30°	45°	60°	90°	120°	135°	150°	180°	210°	225°	240°	270°	300°	315°	330°	360°
$y = \sin x$	0	.5	.71	.87	1	.87	.71	.5	0	-.5	-.71	-.87	-1	-.87	-.71	-.5	0
$y = \cos x$	1	.87	.71	.5	0	-.5	-.71	-.87	-1	-.87	-.71	-.5	0	.5	.71	.87	1

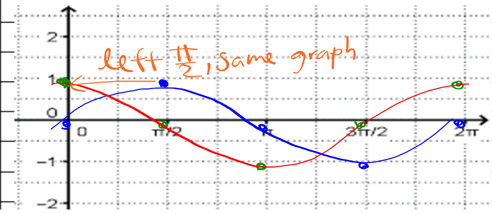


scale conversion

Most Trig graphs are in radians, convert to radians.

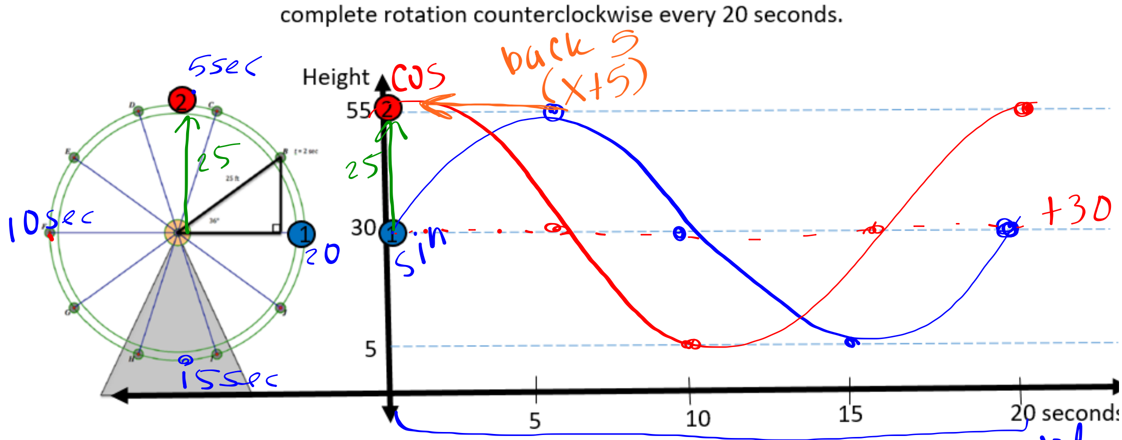
remember $(x-2)^2$ right 2

$\sin(x+\frac{\pi}{2}) = \cos x$ left $\frac{\pi}{2}$



6.7 Notes **Ferris Wheel Summary**

Ferris wheel facts: Radius of 25 feet, center is 30 feet above the ground, and the wheel makes one complete rotation counterclockwise every 20 seconds.



$$y = a\sin(b(x-c)) + d$$

(a)Amplitude: 25 Description: height from the center

Period: 20 sec Description: time for one rotation

(b)Frequency: $\frac{360}{20} = 18°$, $\frac{2\pi}{20}(\pi) = \frac{\pi}{10}$ Description: "Speed" rotations per second $\frac{2\pi}{\text{period}}$

(c)Horizontal shift: +5 Description: left/right phase shift

(d)Vertical shift: 30 Description: up/down = center height mid-line

Say Sinclair is in cart 1 and cosette is in cart 2. They call down to their friend, Carlos, to record a video of them on the ferris wheel. Find different equations to model the different ways this scenario could play out: He could start recording immediately(0), or he is 5, 15, or 20 seconds late fumbling for his camera.

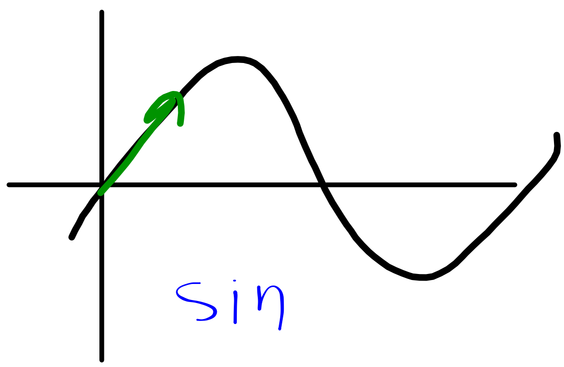
Write the equation at different starting positions: *(frequency in radian)*

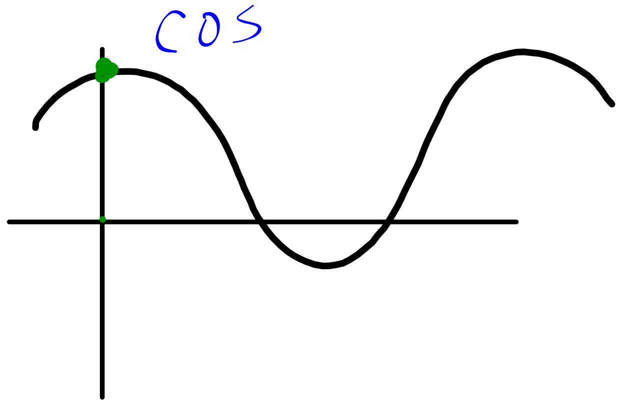
	Simplified	**Test**
Starting position 1, at 0 sec $y = \_\_\_\sin(\_\_(x + \_\_)) + \_\_$	$y = \_\_\_\_\_\_\_\_\_\_$	Expected height=___ Tested height: (0,___)
Starting position 2, at 0 sec $y = \_\_\_\cos(\_\_(x + \_\_)) + \_\_$	$y = \_\_\_\_\_\_\_\_\_\_$	Expected height=___ Tested height: (0,___)
Starting position 1, after 5 seconds $y = \_\_\_\sin(\_\_(x + \_\_)) + \_\_$	$y = \_\_\_\_\_\_\_\_\_\_$	Expected height=___ Tested height: (0 ___)
Starting position 1, after 20 seconds. $y = \_\_\_\sin(\_\_(x + \_\_)) + \_\_$	$y = \_\_\_\_\_\_\_\_\_\_$	Expected height= ___ Tested height: (0,___)
Starting position 2, after 15 seconds. $y = \_\_\_\sin(\_\_(x + \_\_)) + \_\_$	$y = \_\_\_\_\_\_\_\_\_\_$	Expected height=___ Tested height: (0 ,___)

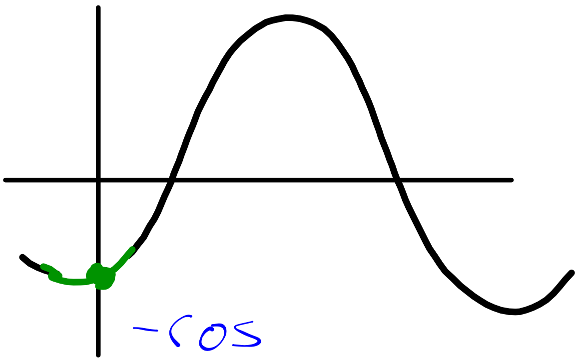
Show which ones are actually the same graph. **Draw** arrows connecting them.

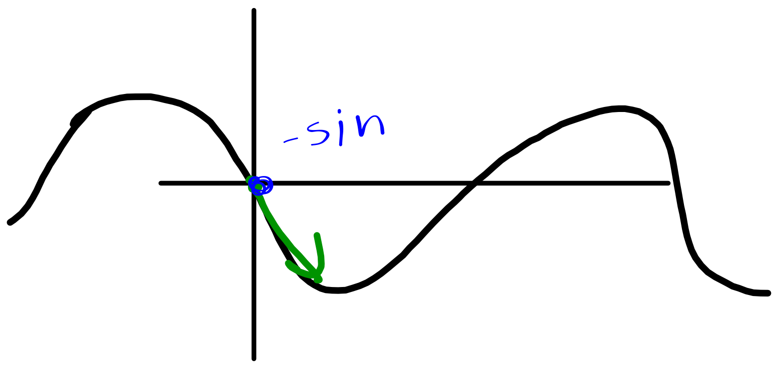
Describe how 2 equations can create the same graph:

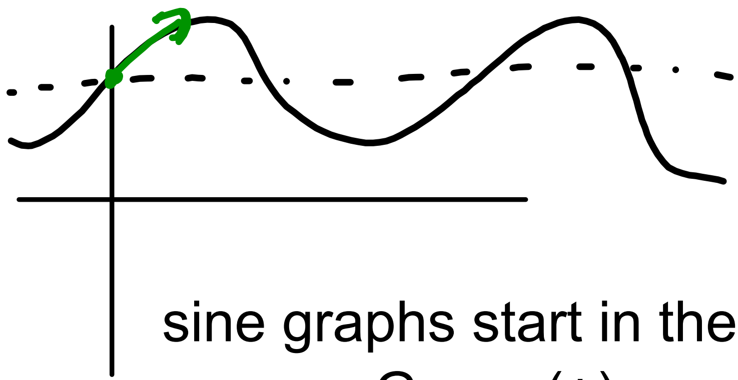
How are the radian values in the simplified equation related to the starting position?




cos


-cos

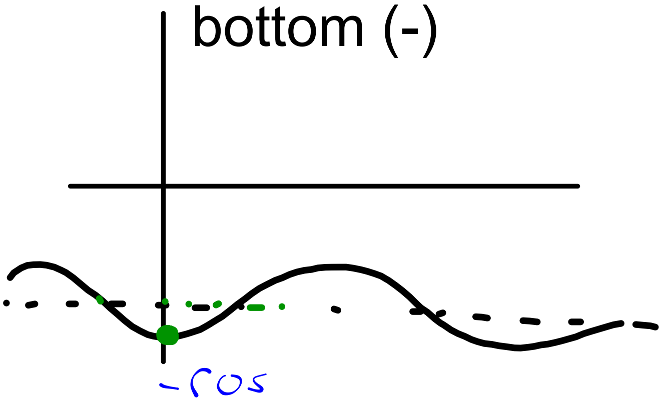




sine graphs start in the middle of a wave. Go up (+)

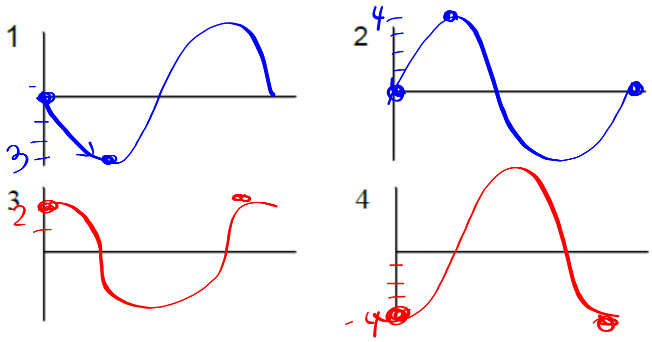
go down (-)

cos graphs start at the top(+) or bottom (-)



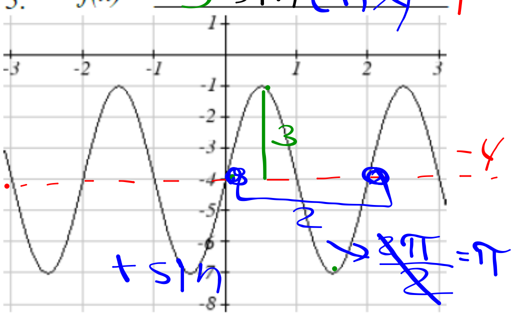
Review Trig Functions

1. Sketch a graph of $f(x) = -3\sin(x)$
2. Sketch a graph of $f(x) = 4\sin(x)$
3. Sketch a graph of $f(x) = 2\cos(x)$
4. Sketch a graph of $f(x) = -4\cos(x)$

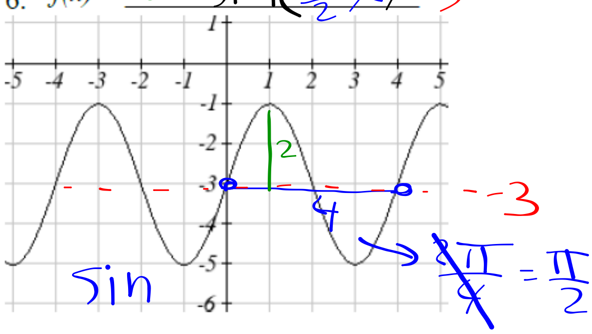


For the graphs below, determine the amplitude, midline, and period, then write an equation for the graph.

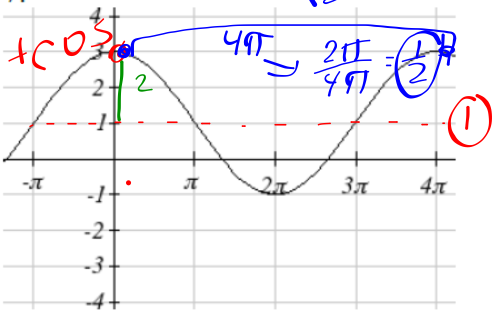
5. $f(x) = 3\sin(\pi x) - 4$



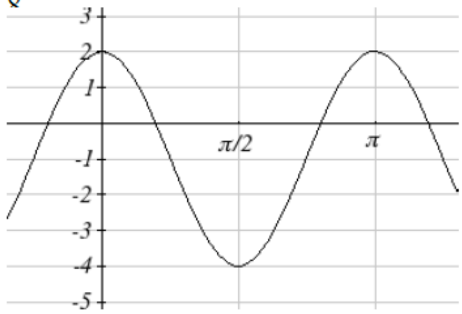
6. $f(x) = 2\sin\left(\frac{\pi}{2}x\right) - 3$



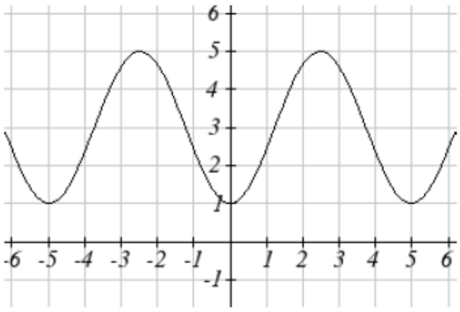
7. $f(x) = 2\cos(\frac{1}{2}x) + 1$



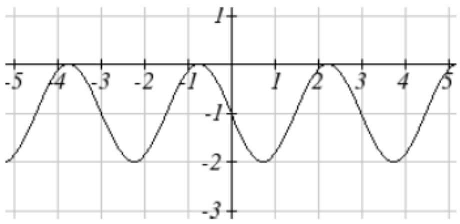
8. $f(x) =$ ____________



9. $f(x) =$ ____________



10. $f(x) =$ ____________



For each of the following equations, find the amplitude, period, horizontal shift, and midline.

11. $y = 3\sin(8(x+4)) + 5$ amp: 3, period = $\frac{\pi}{4}$, left 4, up 5

$p \cdot 8 = \frac{2\pi}{p} \cdot 8$ $p = \frac{2\pi}{8} = \frac{\pi}{4}$ test: $8 = \frac{2\pi}{\frac{\pi}{4}} = 8$ ✓

12. $y = 4\sin\left(\frac{\pi}{2}(x-3)\right) + 7$ amp: 4, period = 4, right 3, up 7

$\frac{2\pi}{P} \overset{?}{=} \frac{\pi}{2}$ solve: $\frac{2}{\pi} \cdot \frac{2\pi}{P} = \frac{\pi}{2} P$ $4 = P$

13. $y = 2\sin(3x - 21) + 4$ amp 2, period: $\frac{2\pi}{3}$, right 7, up 4

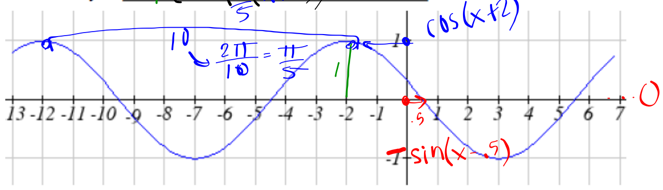
$p3 = \frac{2\pi}{p}$ $3(x-7)$ $p = \frac{2\pi}{3}$

14. $y = 5\sin(5x + 20) - 2$

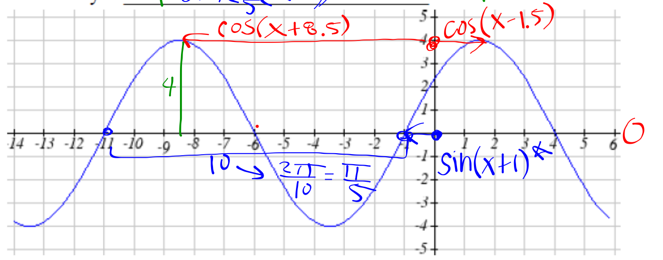
$5(x+4)$ $\frac{2\pi}{P} = 5$?, solve: $\frac{2\pi}{5P} = 5P$ $p = \frac{2\pi}{5}$

These functions have multiple solutions. You could shift it forward or back, even waayyy back or waaayy forward.
You choose which version to write, I typically write the easiest equation closest to the origin... you pick.

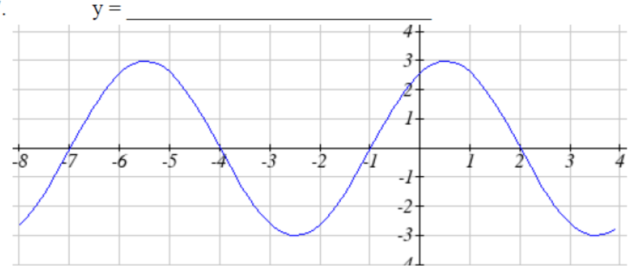
15. y = $1\cos\left(\frac{\pi}{5}(x+2)\right)+0$ or $-1\sin\frac{\pi}{5}(x-.5)+0$



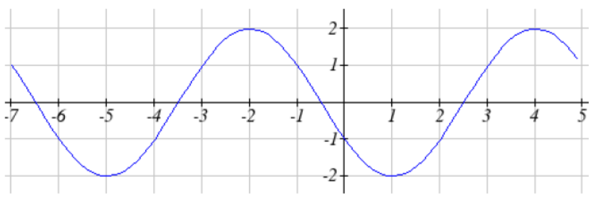
16. y = $4\sin\left(\frac{\pi}{5}(x+1)\right)+0$ or $4\cos\left(\frac{\pi}{5}(x-1.5)\right)$



17. y = ____________________

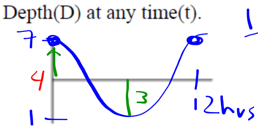


18. y = ____________________



19. The depth of water a beach changes every 12 hours because of the tides. This forms a periodic function. While on vacation with your family, you woke up early for a swim. The depth at 8 am (t=0) was 7 feet, which is the high point. Later you go back to the same spot at 2 pm, surprised to see the water level at only 1 foot deep. Write a sinusoidal function that models the Depth(D) at any time(t).

$D(t) = 3\cos\left(\frac{\pi}{6}x\right)+4$

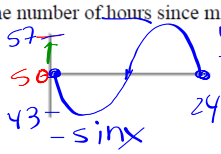


$\frac{1+7}{2}$ $\frac{8}{2}=4$

$\frac{2\pi}{12}=\frac{\pi}{6}$

20. Outside temperature over a day can be modeled as a sinusoidal function. Suppose you know the temperature is 50 degrees at midnight and the high and low temperature during the day are 57 and 43 degrees, respectively. Assuming t is the number of hours since midnight, find an equation for the temperature, D, in terms of t.

D(t) = $-7\sin\left(\frac{\pi}{12}x\right)+50$



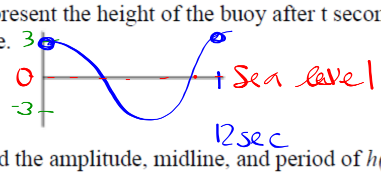
$\frac{43+57}{2}$ $\frac{100}{2}=50$

24hrs → $\frac{2\pi}{24}=\frac{\pi}{12}$

23. A Ferris wheel is 25 meters in diameter and boarded from a platform that is 1 meters above the ground. The six o'clock position on the Ferris wheel is level with the loading platform. The wheel completes 1 full revolution in 10 minutes. The function $h(\ )$ gives your height in meters above the ground t minutes after the wheel begins to turn.

a. Find the amplitude, midline, and period of $h(t)$
b. Find an equation for the height function $h(t)$
c. How high are you off the ground after 5 minutes?

24. A buoy is floating on the water bobbing up and down a total of 6 feet. From the top of the wave, 3 feet above sea level, the buoy completes a full cycle every 12 seconds. Write an equation to represent the height of the buoy after t seconds if at time t=0, the buoy is at the top of the wave.

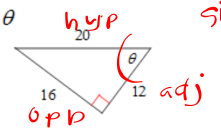


a. Find the amplitude, midline, and period of $h(t)$
b. Find an equation for the height function $h(t)$
c. Use your equation to estimate the height of the buoy after 27 seconds.

Term 3 Test Review

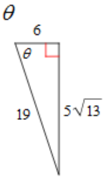
Find the value of the trig function indicated.

15) $\sin\theta$



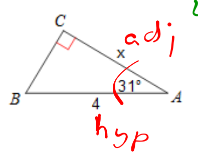
$\sin\theta = \frac{O}{H} = \frac{16}{20} = \frac{4}{5}$

16) $\cos\theta$



Find the measure of each side indicated. Round to the nearest tenth.

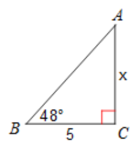
17)



$4(\cos 31) = \frac{x}{4}$

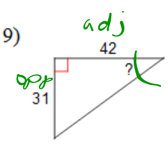
$3.4 = x$

18)



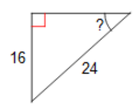
Find the measure of the indicated angle to the nearest degree. → Inverse

19)



$\tan^{-1}\left(\frac{31}{42}\right) = 36$

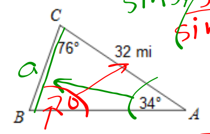
20)



Use LAW OF SINES to find the indicated side or angle. Round to the nearest tenth.

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \qquad \frac{\text{sides}}{\text{angles}}$$

21) Find BC

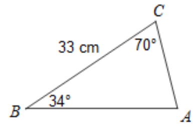


$$\cancel{\frac{\sin 34}{32}}\ \frac{32}{\sin 70} = \frac{a}{\cancel{\sin 34}}\ \sin 34$$

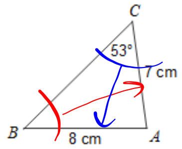
$$a = 19.0\text{ mi}$$

$180 - 34 - 76 = 70°$

22) Find AB



23) Find $m\angle B$ * inverse



$$\frac{\sin B}{7} = \left(\frac{\sin 53}{8}\right)7$$

$$\sin B = (.69)$$

$\sin^{-1}$

$$B = 44°$$

24) Find $m\angle B$