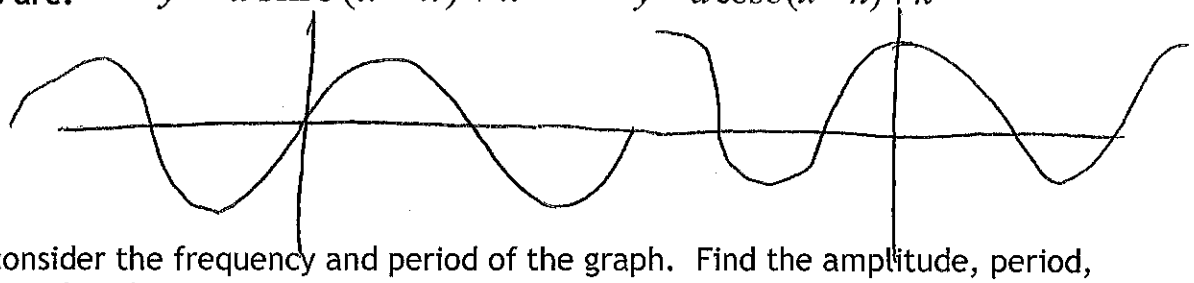
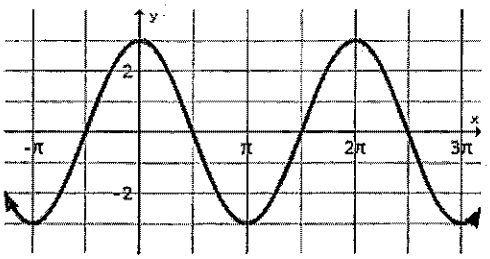
Algebra 3-4 Name: _____ Per: ____
Ch 8 Day 6 Transforming Trig Graphs - Frequency Date: _____

We have seen how changing the equation of the sine and cosine functions affects its graph using a, h and k. However, there is one more parameter for trig. functions, ***b (frequency)***.

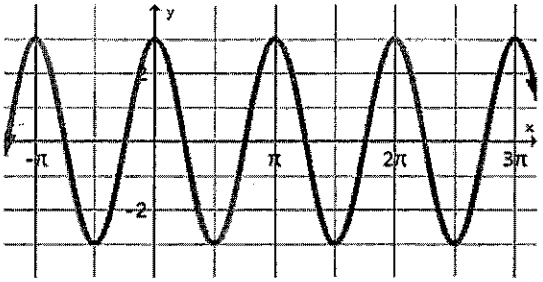
The general equations are: $y = a\sin b(x-h)+k$ $y = a\cos b(x-h)+k$



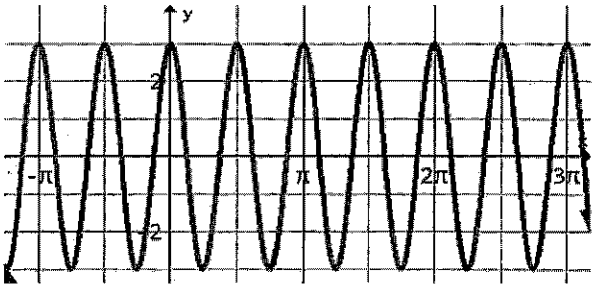
1) If $b \neq 1$, we must consider the frequency and period of the graph. Find the amplitude, period, and frequency of each graph. Then write its equation.



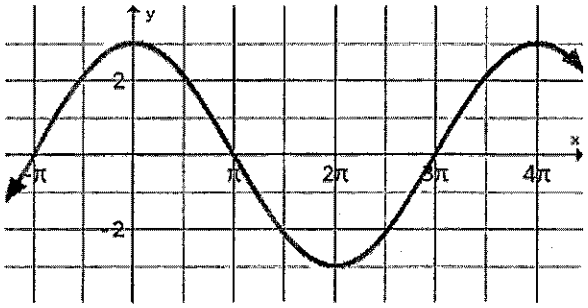
amplitude = 3
period = 2π
frequency = 1
The number of cycles it repeats every 2π.
y = 3cos(x)



amplitude = 3
period = π
frequency = 2
y = 3cos(2x)



amplitude = 3
period = π/2
frequency = 4
y = 3cos(4x)



amplitude = 3
period = 4π
frequency = 1/2
y = 3cos(½x)

2) Given each period, find the frequency. Then write the equation of a **sine** function.

a) period = π frequency = 2 equation: $y = \sin(2x)$

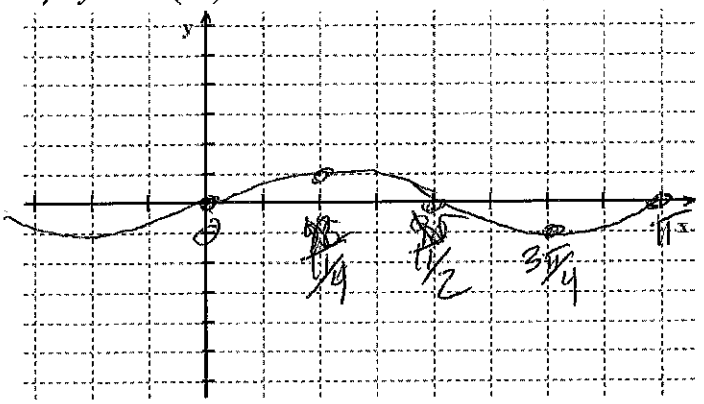
b) period = 4π frequency = $\frac{1}{2}$ equation: $y = \sin(\frac{1}{2}x)$

c) period = $\frac{\pi}{2}$ frequency = 4 equation: $y = \sin(4x)$

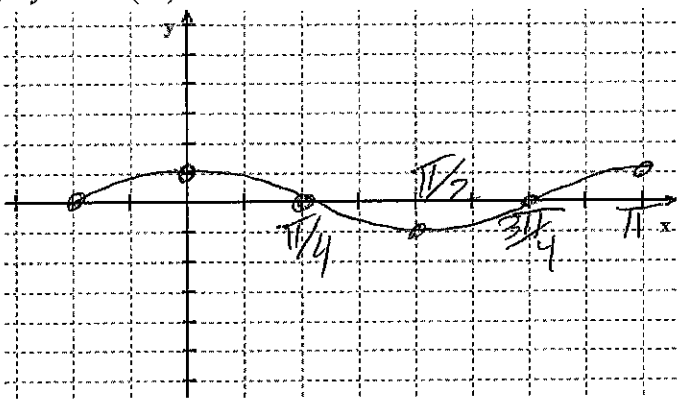
d) period = 16π frequency = $\frac{1}{8}$ equation: $y = \sin(\frac{1}{8}x)$

3) Graph each equation (label scale on axes).

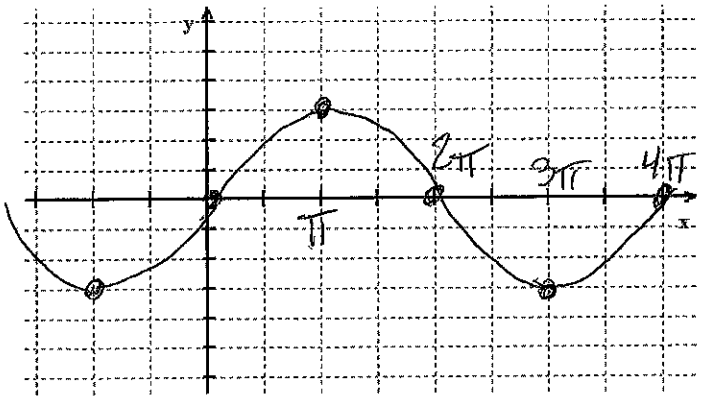
a) $y = \sin(2x)$



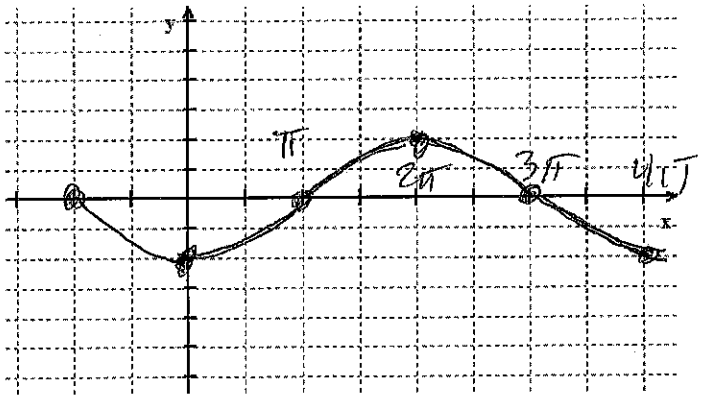
b) $y = \cos(2x)$



c) $y = 3\sin(\frac{1}{2}x)$



d) $y = -2\cos(\frac{1}{2}x)$

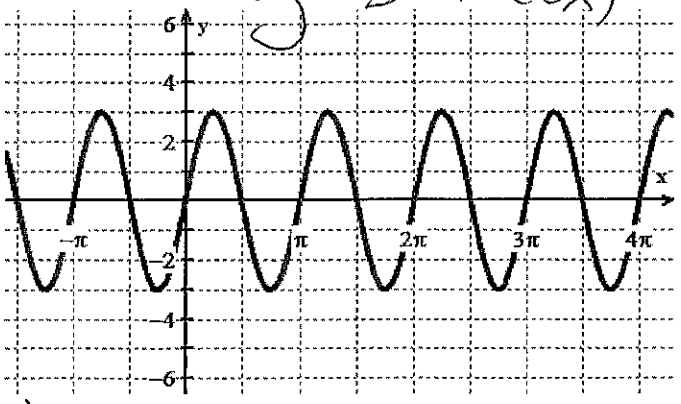


4) Write an equation for each of these graphs.

a)

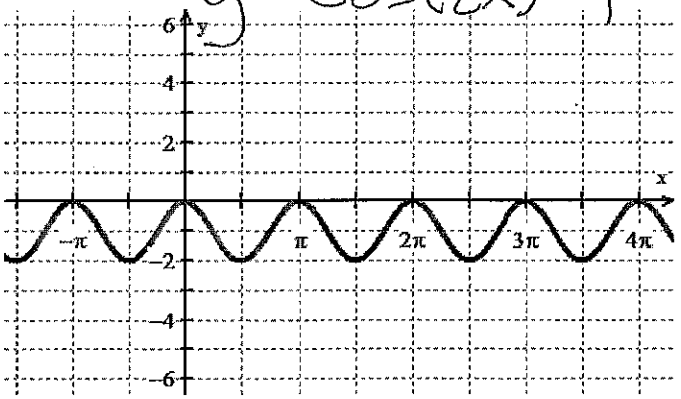
b)

$y = 3\sin(2x)$



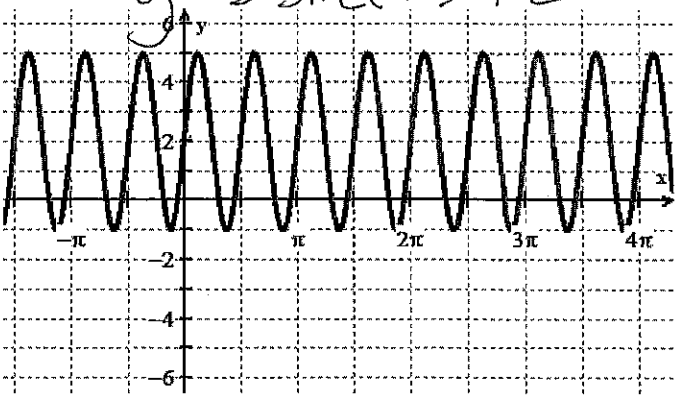
c)

$y = \cos(2x) - 1$

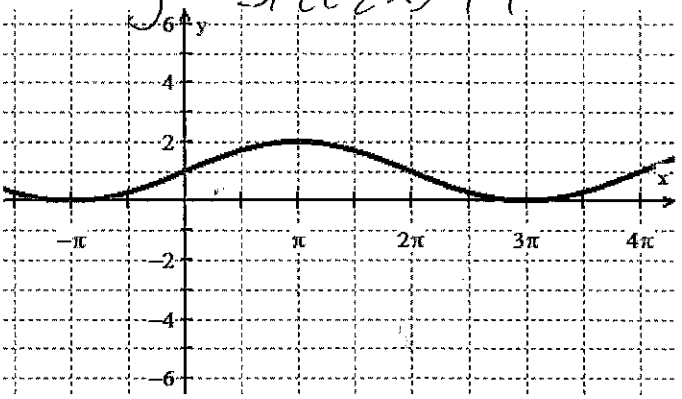


d)

$y = 3\sin(4x) + 2$

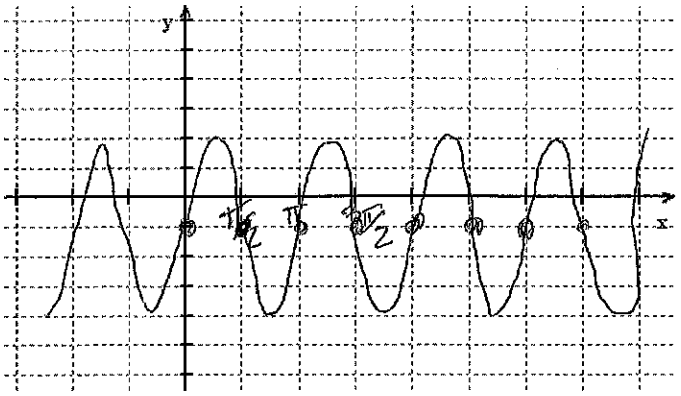


$y = \sin(\frac{1}{2}x) + 1$

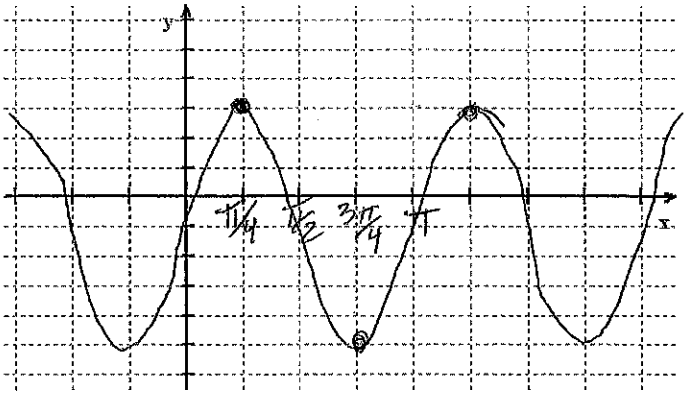


5) Graph each equation (label scale on axes).

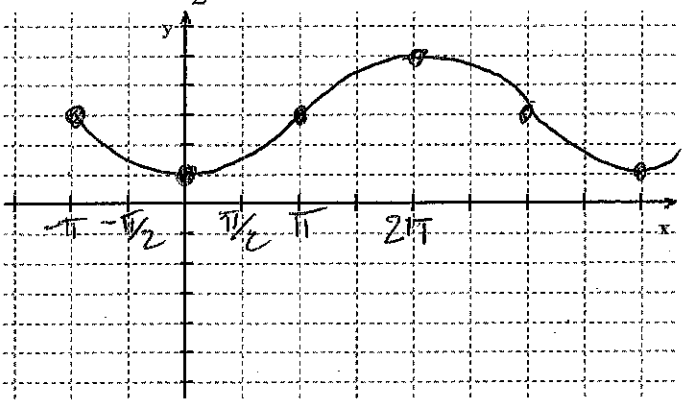
a) $y = 3\sin 2(x - \frac{\pi}{2}) - 1$



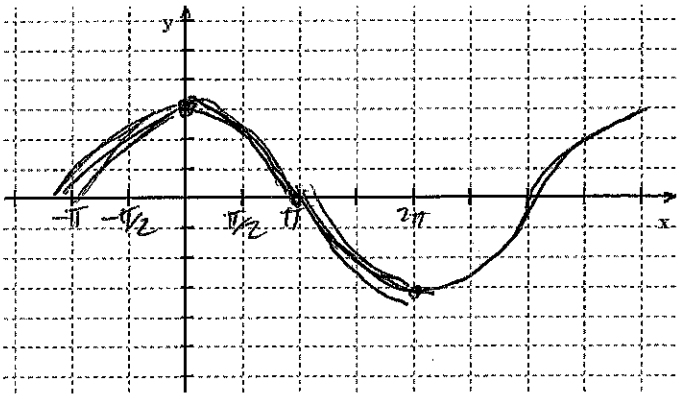
b) $y = 4\cos 2(x - \frac{\pi}{4}) - 1$



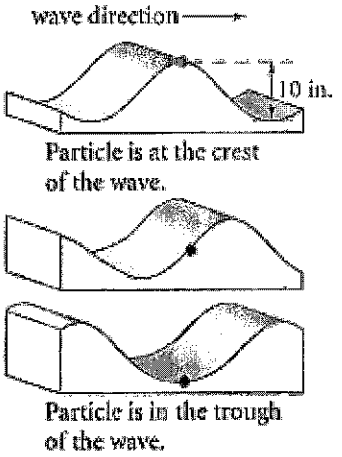
c) $y = -2\sin\frac{1}{2}(x+\pi)+3$

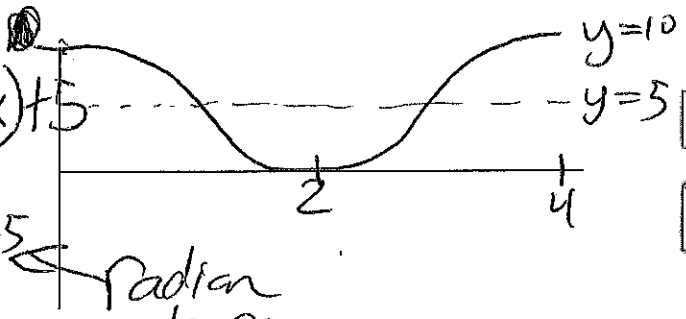


d) $y = -3\cos\frac{1}{2}(x+2\pi)$



6) The figures at right show the vertical motion of a water molecule as a waves moves by. Suppose 10 inch waves occur every 4 seconds. Write an equation that models the height of the water molecule as it moves from crest to crest.





$y = 5\cos\left(\frac{2\pi}{4}x\right)+5$

$5\cos\left(\frac{2\pi}{4}x\right)+5$ ← radian

OR

$5\cos(90x)+5$ ← degree

7) The table at the right shows the times for high tide and low tide. The markings on the side of a local pier showed a high tide of 7 feet and a low tide of 4 feet on the previous day.

Tide Table	
High tide	4:03 A.M.
Low tide	10:14 A.M.
High tide	4:25 P.M.
Low tide	10:36 P.M.

a) What is the average depth of water at the pier? $\frac{7+4}{2} = 5.5\text{ ft}$

b) What is the amplitude of the variation from the average depth? $7 - 5.5 = 1.5$

c) How long is one cycle of the tide? $12\text{hr } 22\text{min} = 742\text{min}$

d) Write a trig equation that models the depth of the water in relation to the time of day.

$y = 1.5\cos\left(\frac{2\pi}{742}x\right)+5.5$

e) Suppose your boat needs at least 5 feet of water to approach or leave the pier. Between what times can you come and go?

Use graph to solve.