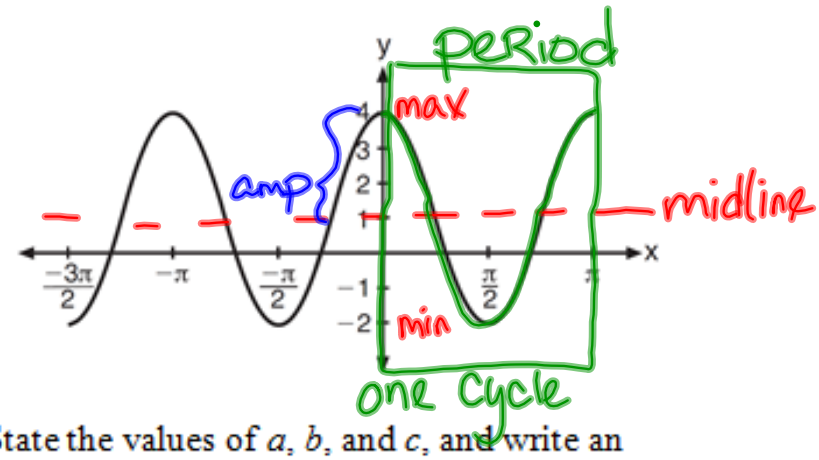
The periodic graph below can be represented by the trigonometric equation $y = a\cos bx + c$ where a, b, and c are real numbers.



State the values of a, b, and c, and write an equation for the graph.

midline = 1 (c)

amp = 3 (a)

period = π

$\frac{2\pi}{freq}$

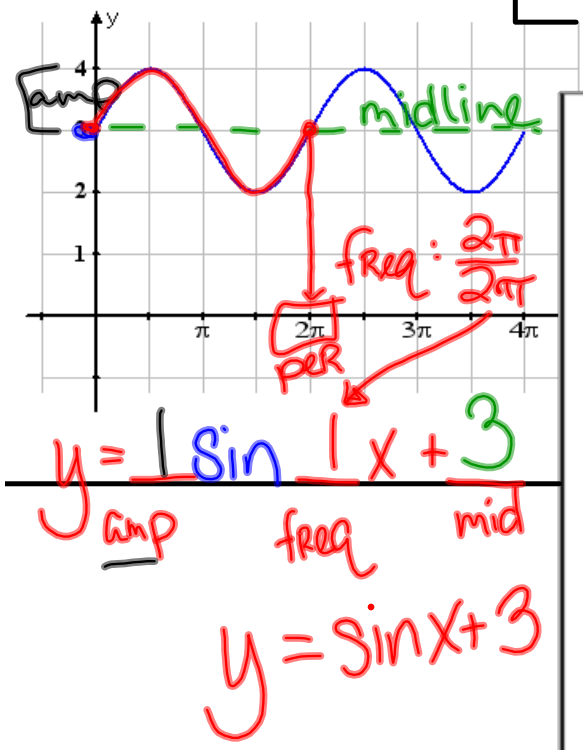
frequency = $\frac{2\pi}{\pi} = 2$ (b)

$\frac{2\pi}{per}$

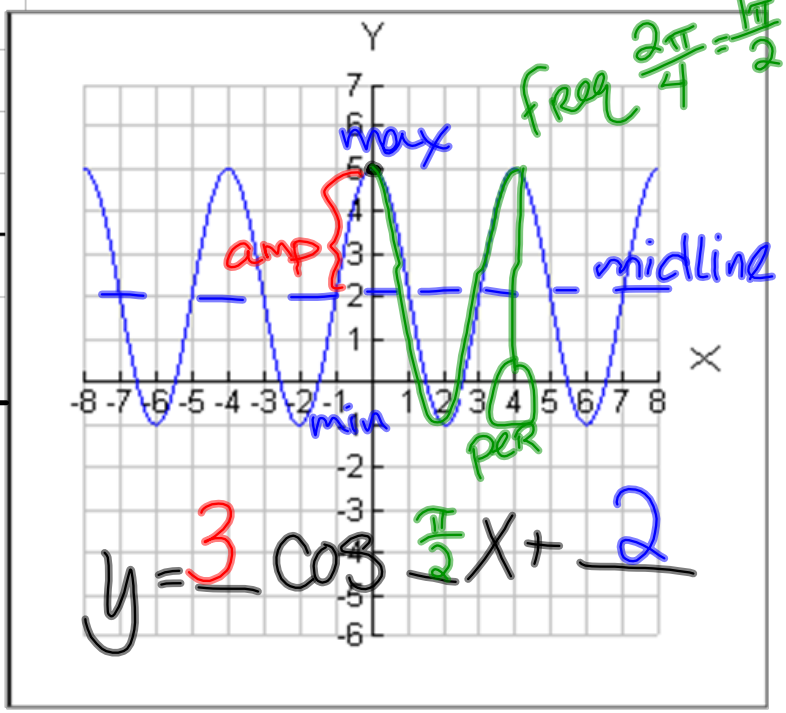
$y = 3\cos 2x + 1$

$y = A \begin{matrix}\sin \\ (\cos)\end{matrix} F(x - H) + V$

Write the equation of the graph shown below:



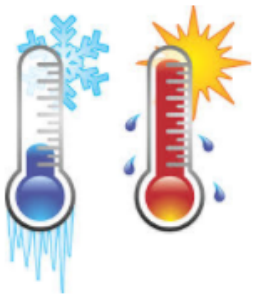
Write both a ~~sine and a~~ cosine equation for the following graph.



The Ferris wheel at the landmark Navy Pier in Chicago takes 7 minutes to make one full rotation. The height, H, in feet, above the ground of one of the six-person cars can be modeled by $H(t) = 70\sin\left(\frac{2\pi}{7}(t - 1.75)\right) + 80$, where t is time, in minutes. Using $H(t)$ for one full rotation, this car's minimum height, in feet, is

1) 150
2) 70
3) 10
4) 0

Based on climate data that have been collected in Bar Harbor, Maine, the average monthly temperature, in degrees F, can be modeled by the equation $B(x) = 23.914\sin(0.508x - 2.116) + 55.300$. The same governmental agency collected average monthly temperature data for Phoenix, Arizona, and found the temperatures could be modeled by the equation $P(x) = 20.238\sin(0.525x - 2.148) + 86.729$. Which statement can *not* be concluded based on the average monthly temperature models x months after starting data collection?



1) The average monthly temperature variation is more in Bar Harbor than in Phoenix.
2) The midline average monthly temperature for Bar Harbor is lower than the midline temperature for Phoenix.
3) The maximum average monthly temperature for Bar Harbor is 79° F, to the nearest degree.
4) The minimum average monthly temperature for Phoenix is 20° F, to the nearest degree.

Relative to the graph of $y = 3\sin x$, what is the shift of the graph of $y = 3\sin\left(x + \frac{\pi}{3}\right)$?

1) $\frac{\pi}{3}$ right
2) $\frac{\pi}{3}$ left
3) $\frac{\pi}{3}$ up
4) $\frac{\pi}{3}$ down

$y = A\sin F(x - H) + V$

left

negation

as is

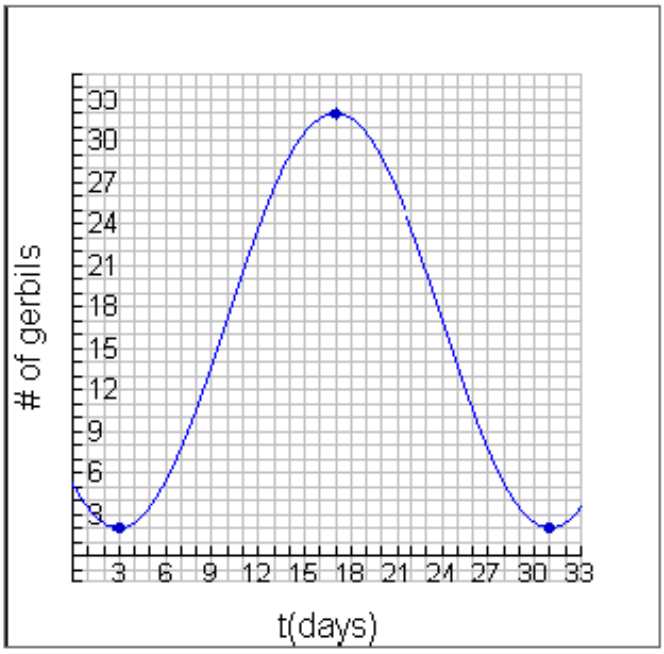
$y = \frac{1}{4p}(x-h)^2 + k$

Given the parent function $p(x) = \cos x$, which phrase best describes the transformation used to obtain the graph of $g(x) = \cos(x + a) - b$, if a and b are positive constants?

1) right a units, up b units
2) right a units, down b units
3) left a units, up b units
4) left a units, down b units

→ moves left (opposite)

3. A pet store clerk noticed that the population in the gerbil habitat varied sinusoidally with respect to time, in days. He carefully collected data and graphed his resulting equation. From the graph, determine the amplitude, period, horizontal shift and vertical shift. Write the equation of the graph.



Which statement is *incorrect* for the graph of the function $y = -3\cos\left[\frac{\pi}{3}(x-4)\right] + 7$?

amp = 3

1) The period is 6.
2) The amplitude is 3.
3) The range is [4,10].
4) The midline is $y = -4$.

$PER = \frac{2\pi}{FREQ} \rightarrow 2\pi \div \frac{\pi}{3}$

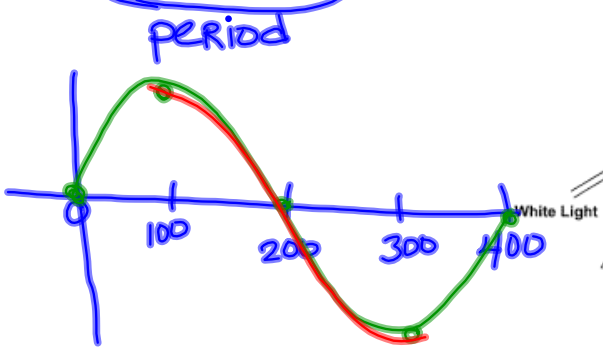
$2\pi \cdot \frac{3}{\pi} = 6$

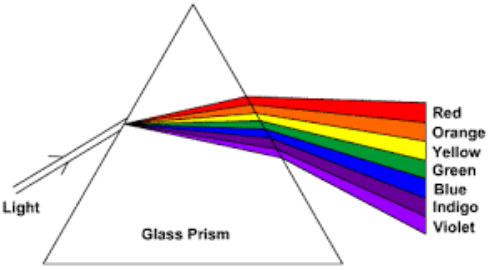
max: mid+amp = 10
min: mid-amp = 4
midline = 7

The volume of air in a person's lungs, as the person breathes in and out, can be modeled by a sine graph. A scientist is studying the differences in this volume for people at rest compared to people told to take a deep breath. When examining the graphs, should the scientist focus on the amplitude, period, or midline? Explain your choice.

A sine function increasing through the origin can be used to model light waves. Violet light has a wavelength of 400 nanometers. Over which interval is the height of the wave *decreasing*, only?

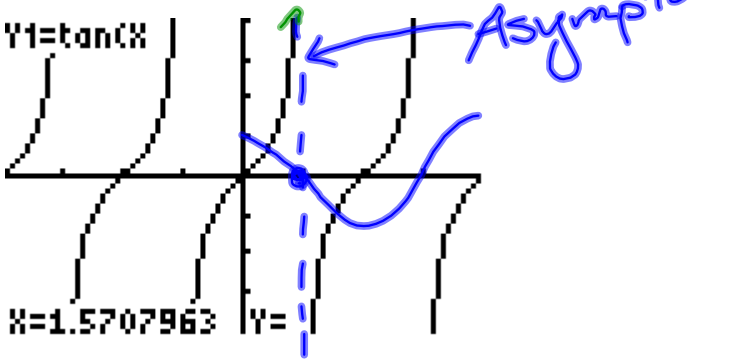
1) (0, 200)
2) (100, 300)
3) (200, 400)
4) (300, 400)





As x increases from 0 to $\frac{\pi}{2}$, the graph of the equation $y = 2\tan x$ will

1) increase from 0 to 2
2) decrease from 0 to −2
3) increase without limit
4) decrease without limit



Homework: worksheet