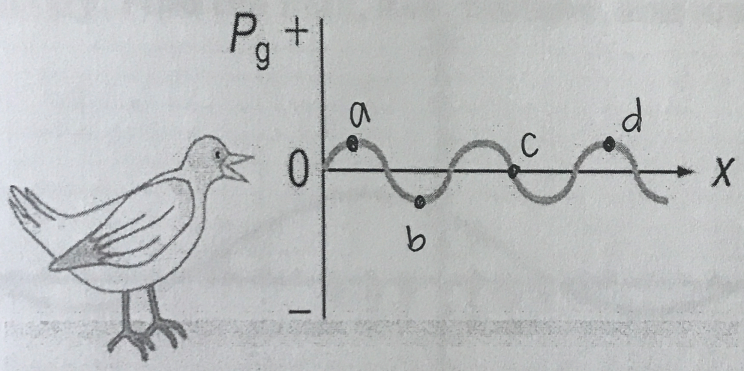
Wave Functions

Main points on our wave:

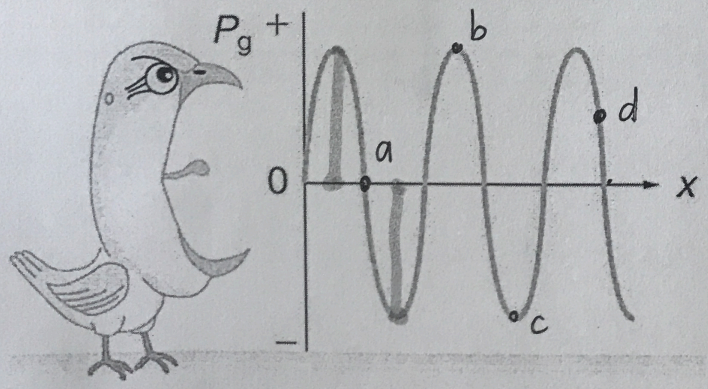
- **Maximum** - The highest *point* of the function.
- **Minimum** – The lowest *point* of the function.
- **Midline** – The horizontal axis that is used as the reference *line* about which the function oscillates (continually goes around). ✱ equation
- **Amplitude** – The *distance* from the midline to the maximum or minimum. ✱ Always positive

You try:

Label a, b, c, and d as the maximum, minimum



A – maximum
B – minimum
C – point on midline
D - maximum



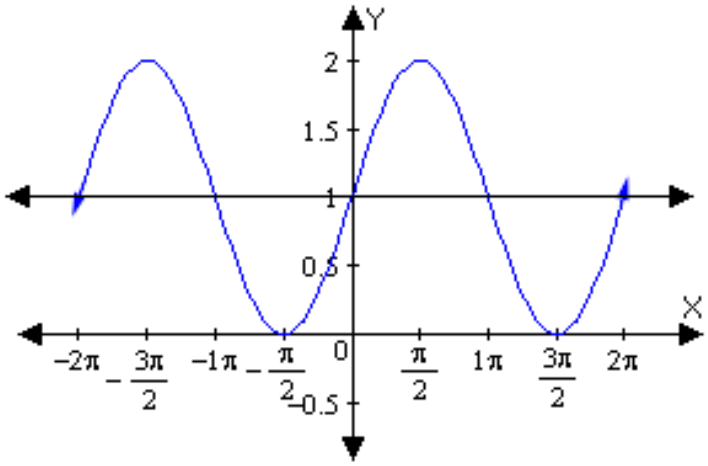
A – point on midline
B – maximum
C – minimum
D – None

- *Which figure has a larger amplitude? Why?*

The second one has the larger amplitude since the distance from the max to the midline is larger.

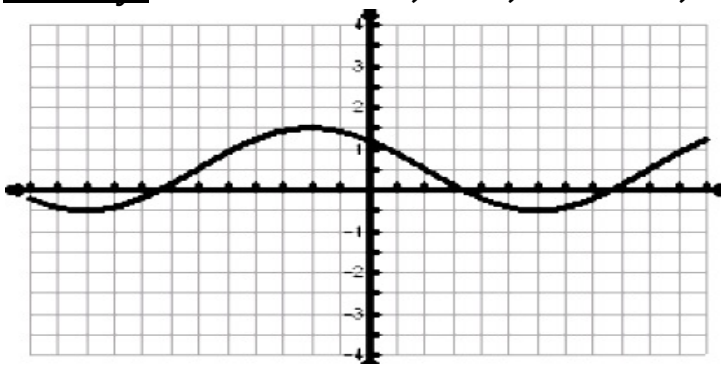
Also, the bird is yelling ☺

Example #1: **Find the max, min, midline, and amplitude.**



Max: 2
Min: 0
Midline: y = 1
A: 1

You try: **Find the max, min, midline, and amplitude.**



Max: 1.5
Min: -.5
Midline: y = .5
Amplitude: 1

The period of a wave function is the length of one cycle.
The frequency is the number of cycles in a given unit of time.

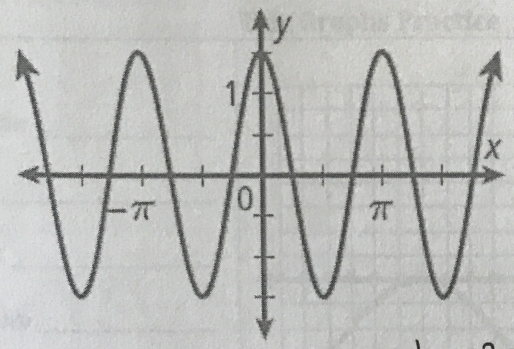
To relate period and frequency, we use "pb=2π"
"Peanut Butter Equals 2π"
** *b* is the commonly used letter for frequency.
** *p* is the commonly used letter for period.

To visually identify the period, there are 4 options:

1. Calculate the distance between two maxima
2. Calculate the distance between two minima
3. Calculate the distance between a max and a min and then double it
4. Calculate the distance between 3 midline values

Wave Functions are also referred to as "periodic" functions because the pattern repeats after a certain amount of time.

Example #2: **Find the period and frequency of the graph**



Period: π

Frequency: 2

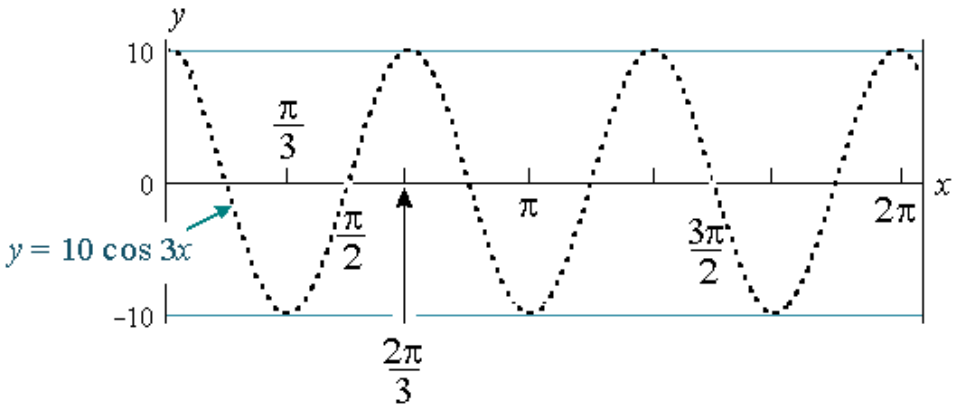
$pb = 2\pi$

$\pi b = 2\pi$

$b = 2$

Example #3:

Find the period, frequency, max, min, and amplitude.



Period: $\frac{2\pi}{3}$ (distance between two maxima)

Frequency: 3

Max: 10

Min: -10

Midline: y = 0

Amplitude: 10