## Section 13-1: Periodic Functions

What you should be able to do after this section:

- Tell if a function is periodic or not.
- Identify a cycle
- Find the following of periodic functions:
  - Period
  - Amplitude
  - Equation of the Midline(Axis)

Periodic function: A repeating pattern of y-values at regular intervals.

Cycle: One complete pattern.
The smallest portion of the function that could be translated left and right to create the entire function.

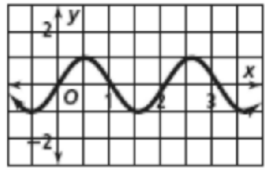
Period: The width of one cycle (x-values)

Amplitude:
The vertical distance from the midline to either the maximum or the minimum. y-values
OR
Half the total height of the periodic function

Midline (also called the Axis):
The horizontal line that passes through the middle of the graph.

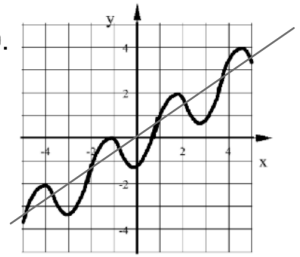
1. Is each of the below a periodic function? If no, explain why.

a.



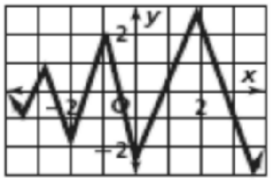
Yes, this is periodic because the same y-values repeat every four units

b.



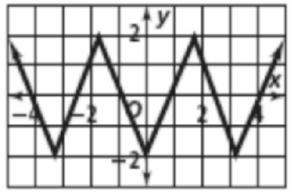
No, because the y-values don't repeat, they increase. And, the midline isn't horizontal.

c.



No, because the y-values don't repeat.

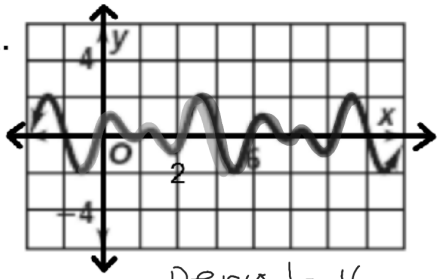
d.



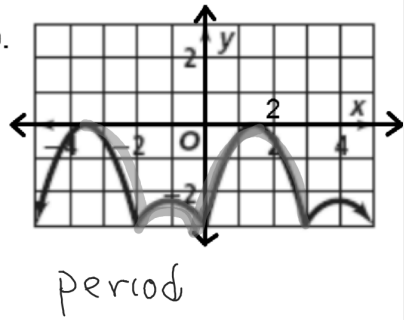
Yes, this is periodic because the same y-values repeat every three units

2. Highlight one cycle of each periodic function and find it's period.

a.

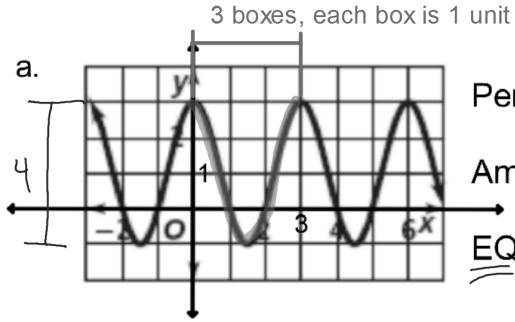



b.




3. Find the period, amplitude, and equation of the midline for each periodic function.

a.



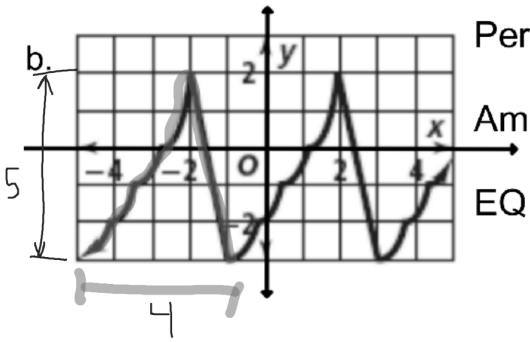

Period = 3

Amplitude = $\frac{4}{2} = 2$

EQ of Midline: $y = 1$

2 units down from the max or 2 units up from the min.

b.




Period = 4

Amplitude = $\frac{5}{2} = 2.5$

EQ of Midline: $y = -.5$

2.5 units down from the max or 2.5 units up from the min.

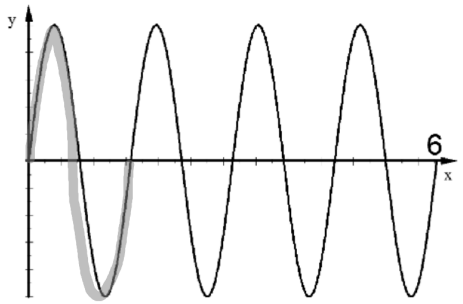
4 boxes, each box is 1 unit = 4

If you can't tell by looking at the graph, this is how you find the Midline and Amplitude mathematically.

Midline (Axis): $y = \frac{Max + Min}{2}$

Amplitude = $\frac{Max - Min}{2}$ = half the total height

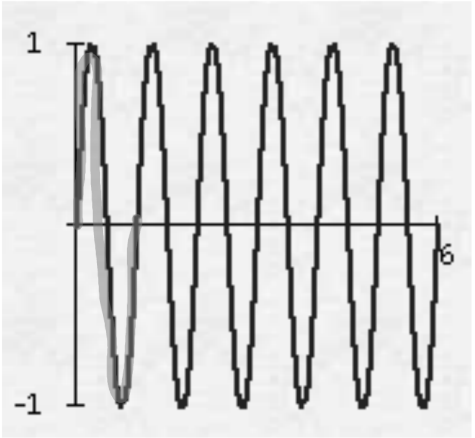
4. Find the period of this periodic function.




period = $\frac{6}{4}$

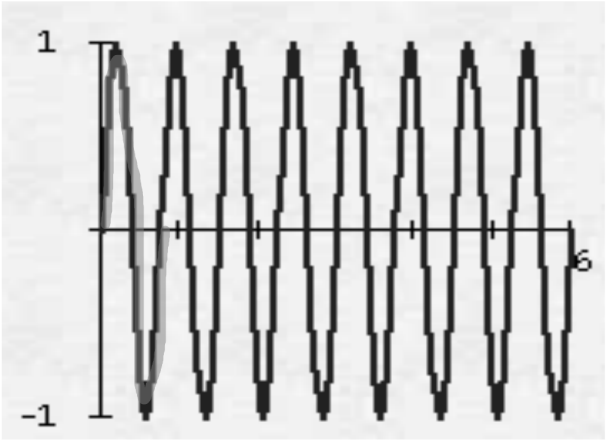
$= 1.5$

1. What is the period of this function?




Period = $\frac{6 \text{ units}}{6 \text{ cycle}} = 1$

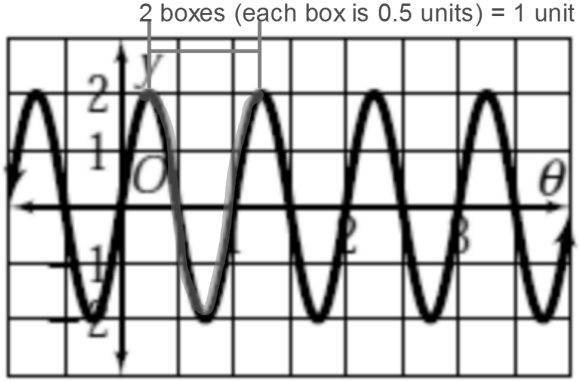
2. What is the period of this function?




Period = $\frac{6 \text{ units}}{8 \text{ cycles}}$

$= .75$

3. Find the Maximum, Minimum, amplitude, period, and equation of the midline.




Max = 2

Min = $-2$

Period = 1

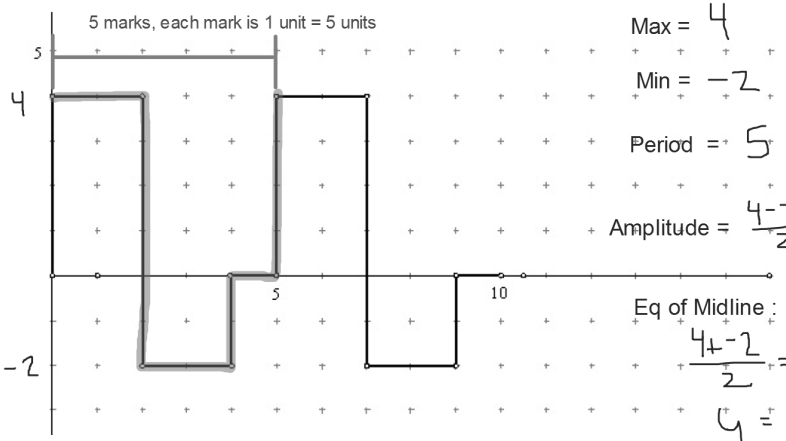
Amplitude = $\frac{2--2}{2} = \frac{4}{2} = 2$

Eq. of Midline:

$y = \frac{2+-2}{2}$

$y = 0$

4. Find the Maximum, Minimum, amplitude, period, and equation of the midline.




Max = 4

Min = $-2$

Period = 5

Amplitude = $\frac{4--2}{2} = \frac{6}{2} = 3$

Eq of Midline :

$\frac{4+-2}{2} = \frac{2}{2}$

$y = 1$

You can now finish Hwk # 28 Sec 13-1

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Problems 5-8, 11, 12, 20, 21, 23, 24

DON'T copy and sketch two more cycles