Section 13-1: Periodic Functions

What you should be able to do after this section:

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

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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)

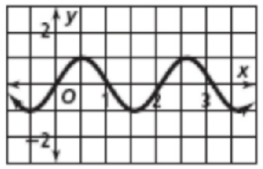
Amplitude:
The vertical distance from the midline to either the maximum or the minimum. y-values
OR
Half the total height of the periodic function

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

$y = \#$

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

a.



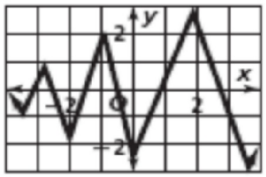
yes

b.

NO, because y-values are inc

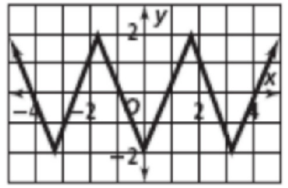
1. Is each of the below a periodic function? If no, explain why.

c.



No these isn't a repeating pattern of y-values.

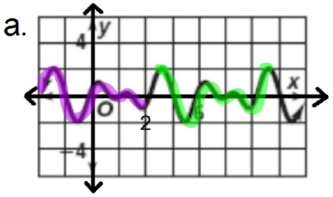
d.



Yes

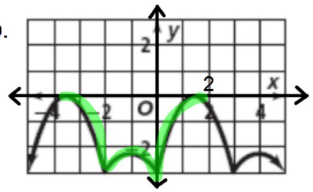
2. Highlight one cycle of each periodic function and find it's period.

a.



Period = 4

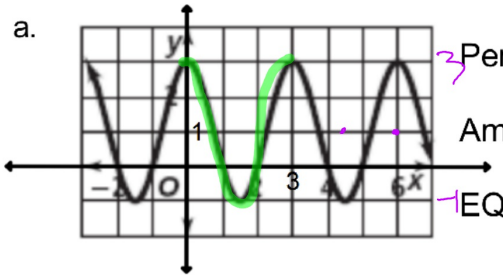
b.



Period = 5

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

a.

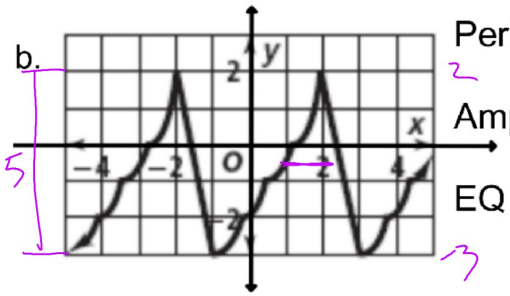


Period = 3

Amplitude = 2

EQ of Midline: y = 1

b.

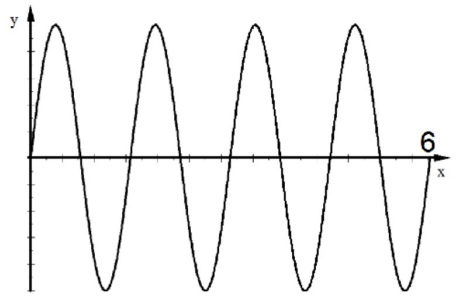


Period = 4

Amplitude = 2.5

EQ of Midline: $y = -.5$

4. Find the period of this periodic function.



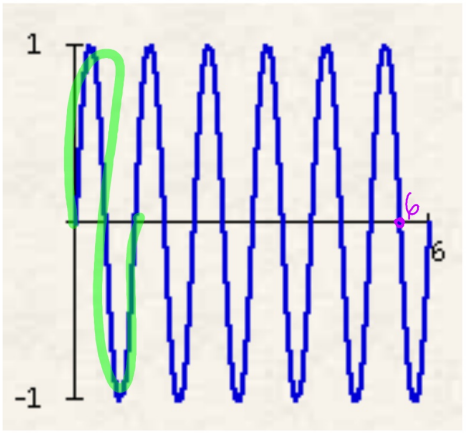
$\text{period} = \frac{6}{4} = 1.5$

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

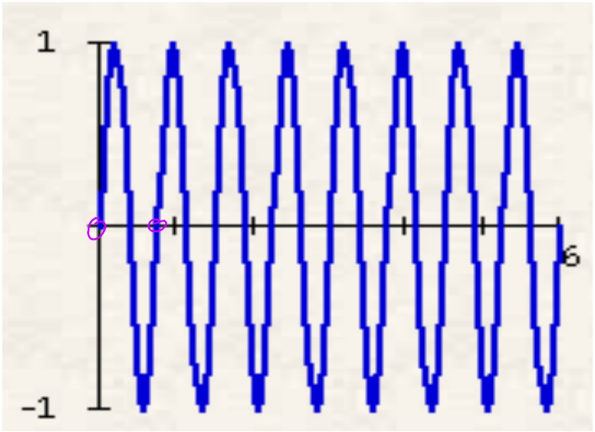
What is the period of this function?



Period =

$\frac{6}{6} = 1$

There are six cycles all within a total distance of 6 units.



Period = $\frac{6}{8} = \frac{3}{4}$

There are eight cycles all within a distance of 6 units.

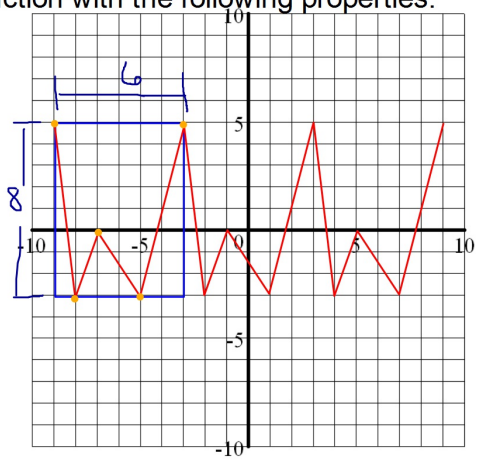
Draw a periodic function with the following properties:

Period = 6

each cycle must be 6 units wide.

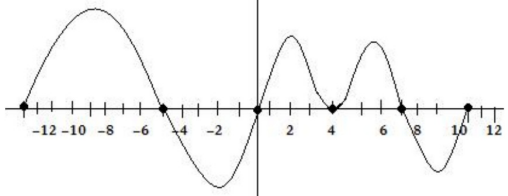
Amplitude = 4

Total height must be 8

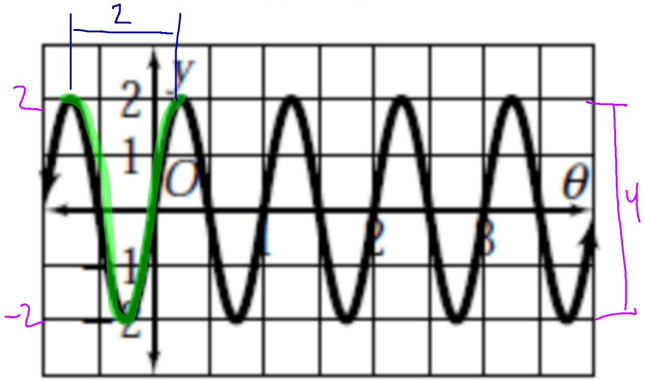


Is this a periodic function?

No, there isn't a repeating pattern of y-values



Find the amplitude, period, and equation of the midline.



Period = 2

Amplitude = 2

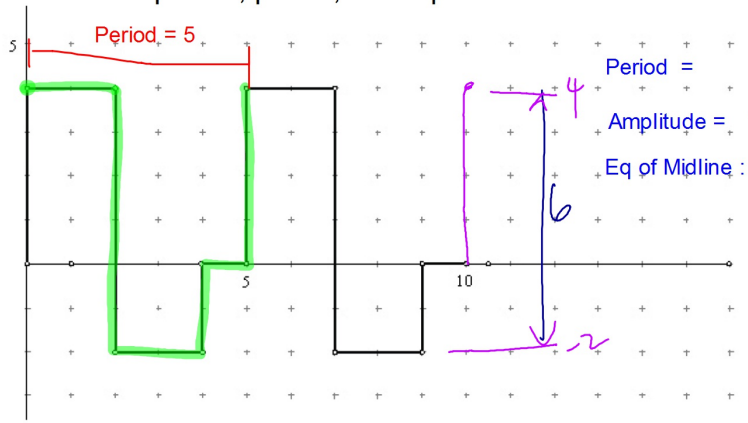
$\frac{2-(-2)}{2} = \frac{4}{2}$

Eq. of Midline:

$y = \frac{2+(-2)}{2} = \frac{0}{2}$

$y = 0$

Find the amplitude, period, and equation of the midline.



Period = 5

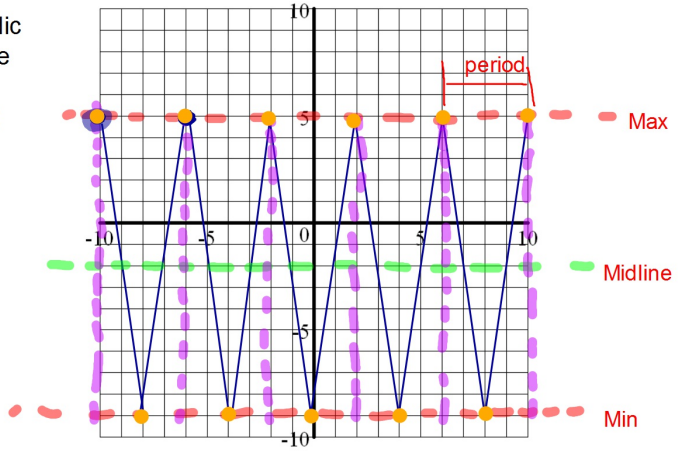
Amplitude = $\frac{6}{2} = 3$

Eq of Midline : $y = 1$

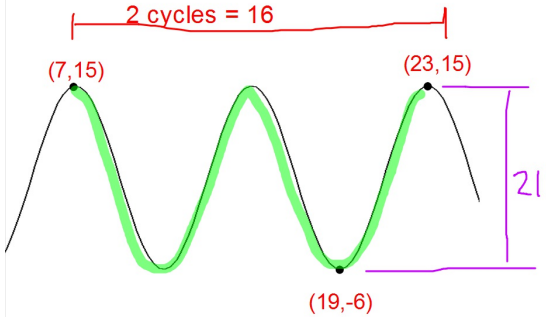
$\frac{4+-2}{2} = 1$

Sketch a periodic function with the following characteristics:

Period = 4
Amplitude = 7
Midline: y = -2



Find the amplitude, period, and equation of the midline.



Period = 16/2 = 8

Amplitude = 21/2 = 10.5

Eq of Midline :

$\frac{15+-6}{2} \Rightarrow y = 4.5$

Suppose f is a periodic function with a period of 10

This means every time I add or subtract 10 from the x-coordinate I should get the same y-coordinate

Given f(12)=23 and f(31) = 2

This is (12,23)

This is (31,2)

Find f(32) = 23

This is a point where x=32

Since x=32 is a multiple of 10 away from where x=12 they must have the same y-value.

Find f(21) = 2

This is a point where x=21

Since x=21 is a multiple of 10 away from where x=31 they must have the same y-value.

You can now finish Hwk #23 Sec 13-1

Pages 713-715

Problems 4-8, 11, 12, 20, 21, 32

Due tomorrow