Wednesday, April 15, 2020

Sec 7-5: Periodic Functions and their graphs

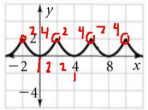
Periodic function: A function with a pattern of y-values that repeat at regular intervals.

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

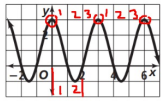
Period: The width of one cycle (x-values)

It's how often y-values repeat.

Examples of Periodic Functions

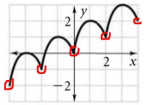


y-values repeat every 4 units

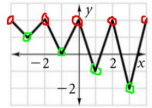


y-values repeat every 3 units

Not Periodic Functions

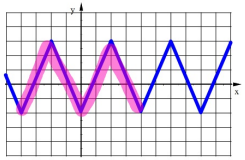


y-values are increasing not repeating.

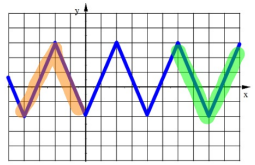


minimums are not the same y-values.

Find a Cycle of this periodic function.

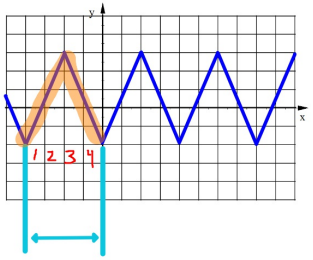


This is NOT a cycle of this graph because there is a smaller portion of the graph that could be repeated in order to create the whole graph.



This would be an example of a cycle of this graph. There are other cycles you could choose but they all would have the same width.

Find the Period of this Periodic Function.



Period = 4

Period = width of 1 cycle

Maximum of a Periodic Function:

The largest y-value or the highest point on the graph.

Minimum of a Periodic Function:

The smallest y-value or the lowest point on the graph.

Midline:

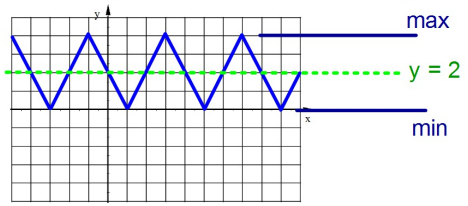
The horizontal line that passes through the middle of the graph.

or

The horizontal line halfway between the max and the min.

Always a y = equation

State the equation of the Midline of this periodic function.



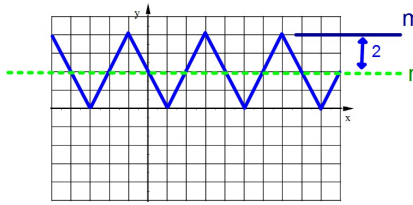
Amplitude:

The vertical distance from the midline to either the maximum or the minimum. (y-values)

OR

Half the total height of the periodic function

State the amplitude of this periodic function.



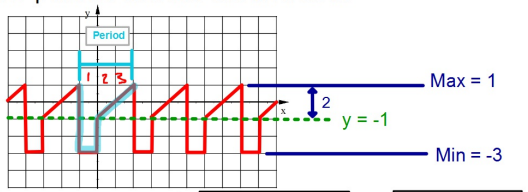
Amplitude = 2

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

Find the Period, Amplitude, and Equation of the Midline for the periodic function shown below.



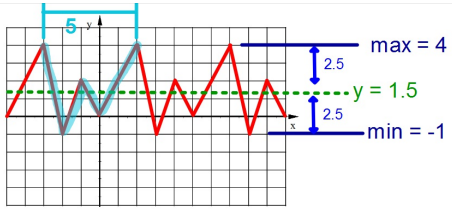
Eq of Midline: y= -1

$y = \frac{1 + -3}{2} = -1$

Amplitude = 2

Amp = $\frac{1 - (-3)}{2} = 2$

Period = 3



Amplitude = 2.5

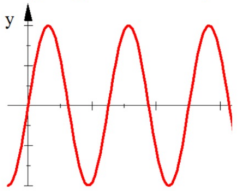
Amp= $\frac{4-(-1)}{2}$ =2.5

Eq of Midline: y= 1.5

y = $\frac{4+(-1)}{2}$ = 1.5

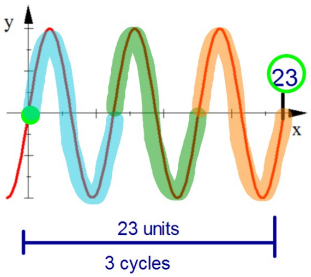
Period = 5

You will be working with lots of graphs that look like the one below so lets focus on those now. Finding the period is going to be a very important skill.



Find the period of each periodic function.

1.

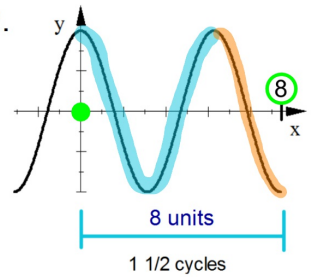


Period = width of one cycle

Period = $\frac{\text{Total width}}{\text{\# of cycles}}$

Period = $\frac{23}{3}$

2.



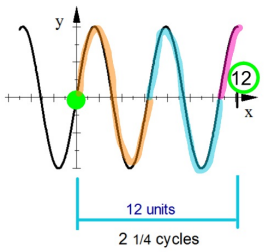
Period = $\frac{\text{Total width}}{\text{\# cycles}}$

$= \frac{8}{1\frac{1}{2}} = \frac{8}{\frac{3}{2}}$

$= 8 \cdot \frac{2}{3} = \frac{16}{3}$

Period = $\frac{16}{3}$

3.



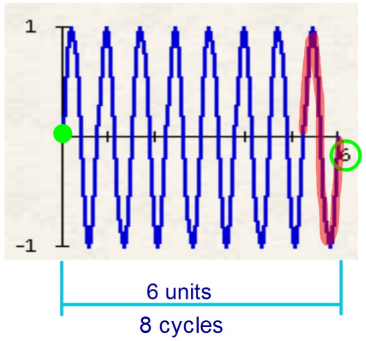
Period = $\frac{\text{total width}}{\text{\# cycles}}$

$= \frac{12}{2\frac{1}{4}} = \frac{12}{\frac{9}{4}} =$

$= 12 \cdot \frac{4}{9} = \frac{16}{3}$

Period = $\frac{16}{3}$

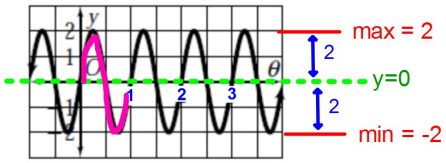
4.



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

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

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



Eq. of Midline: y=0

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

Amplitude = 2

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

Period = 1

1 unit containts 1 cycle

You can now do Practice #16 which is posted on my blog.