

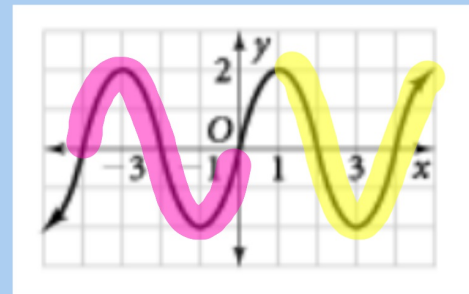
### 13.1 Exploring Periodic Data

**PERIODIC FUNCTION** – repeating a pattern of y-values (outputs) at regular intervals.

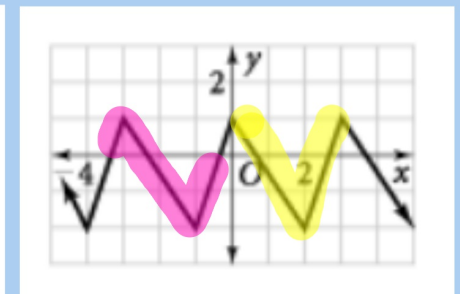
**CYCLE** – one complete pattern.

**PERIOD** – The horizontal length of one cycle.

For each function, identify one cycle in two different ways. Then determine the period of the function.



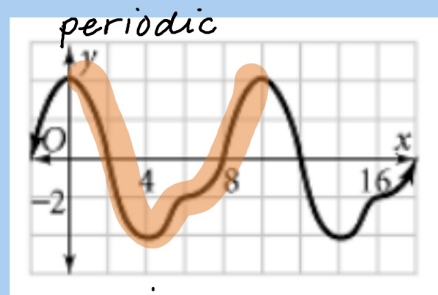
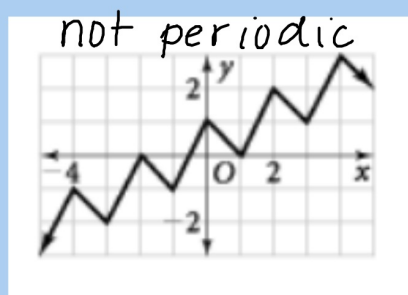
period : 4



period : 3

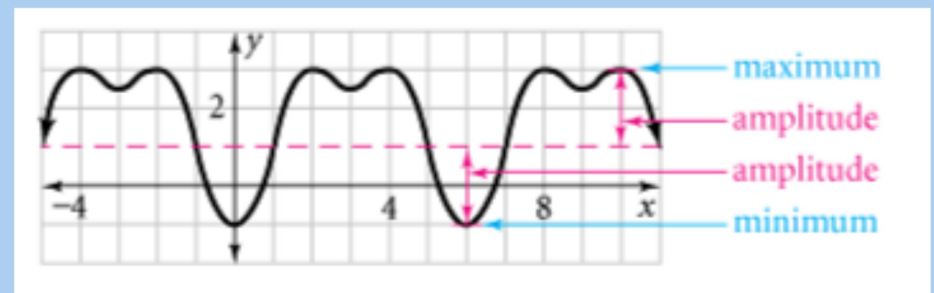
You can determine whether a function is a periodic by analyzing its graphs.

Determine whether each function *is* or *is not* periodic. If it is find the period and identify one cycle.



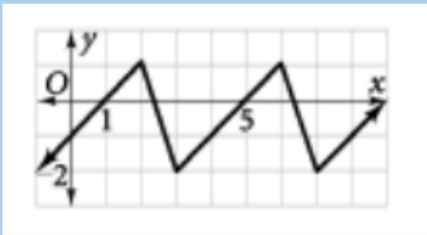
period : 10

The amplitude of a periodic function measures the amount of variation in the function values.



**AMPLITUDE OF PERIODIC FUNCTION** – Half the difference between the maximum and minimum values of the function.

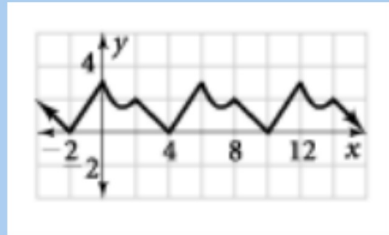
Find the amplitude of each function.



$$\frac{1}{2}(1 - (-2))$$

$$\frac{1}{2}(3)$$

$$\frac{3}{2} = 1.5$$



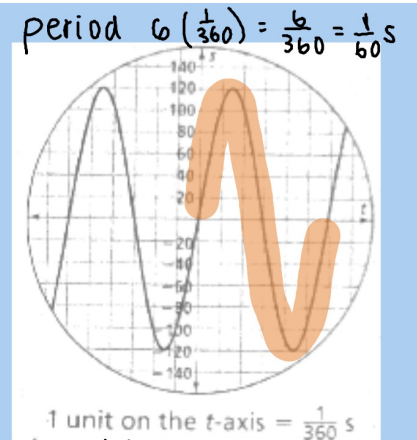
$$\frac{1}{2}(3 - 0)$$

$$\frac{1}{2}(3)$$

$$\frac{3}{2} = 1.5$$

You can model some data with periodic functions. The rotation of a Ferris Wheel, the beating of a heart, and the movement of sound waves are all examples of real-world events that generate periodic data.

The oscilloscope screen below shows the graph of the alternating current electricity  $s$ , in volts, supplied to homes in the United States. Find the period and amplitude.

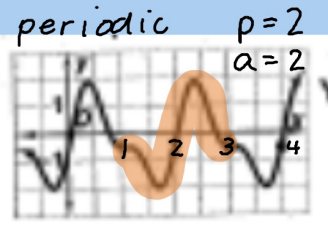
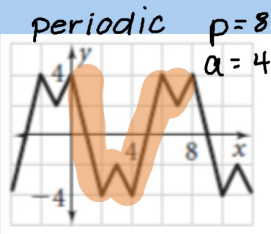
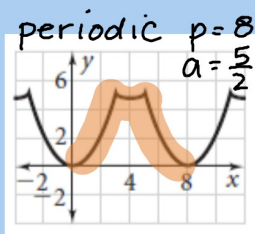


$$a = \frac{1}{2}(120 - (-120))$$

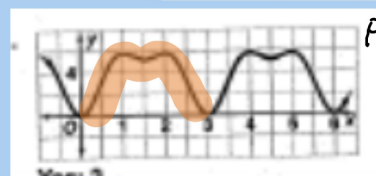
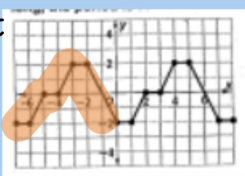
$$a = \frac{1}{2}(240)$$

$$a = 120$$

Determine whether each function *is* or *is not* periodic. If it is, identify one cycle and determine the period and amplitude.

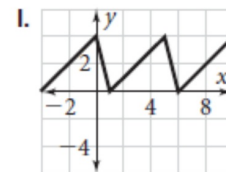


periodic  
 $p = 7$   
 $a = 2$

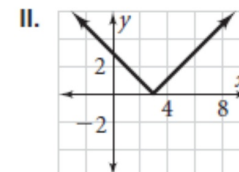


periodic  
 $p = 3$   
 $a = 3$

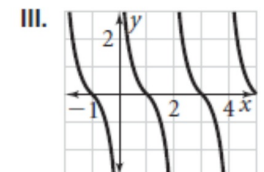
37. Which graph is NOT the graph of a periodic function?



A. I only



B. II only



C. III only

D. II and III

homework

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Ferris Wheel -- make accurate graph