

**(A) Lesson Objectives**

- Introduce periodic phenomenon through a variety of contextual explorations
- Introduce key terms related to periodic phenomenon → periodic, period, amplitude, axis of the curve (equilibrium axis)

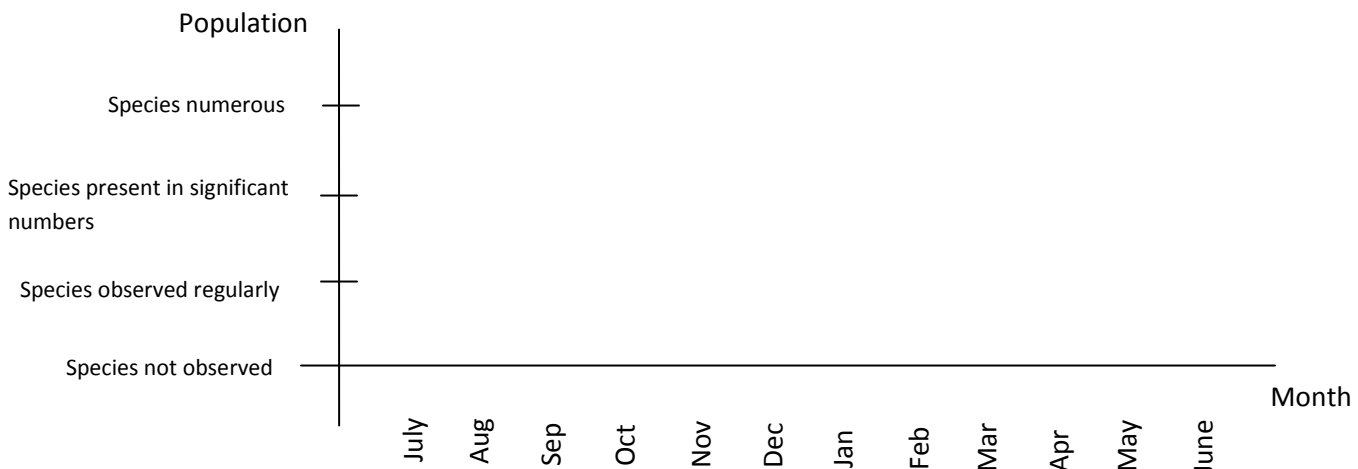
**(B) Video Notes – HW**

- Define the following terms:
  - Periodic →
  - Cycle →
  - Period →
  - Amplitude →
  - Axis of the curve/equilibrium axis →

**(C) Explorations – Birds in Bahrain**

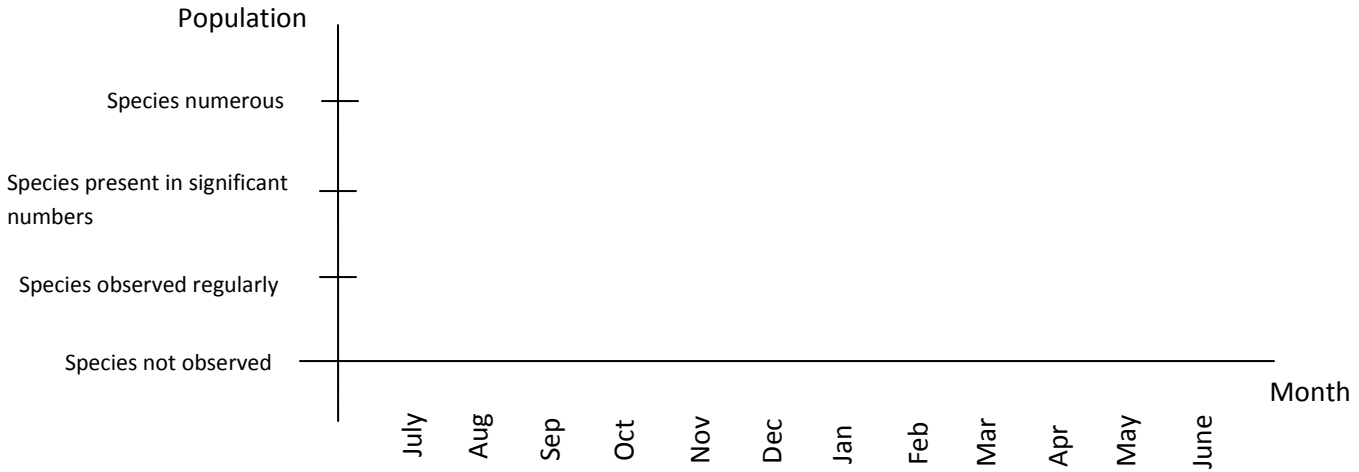
The country of Bahrain is a temporary home for many migrating bird species. In this activity, you will graph the observed population of certain species of birds in Bahrain over the course of one year.

- On your computer, go to <http://www.hawar-islands.com/tables.html>  
Look at the descriptors that will be used in the tables of bird population, and familiarize yourself with what the different colors mean. Note that no color means the bird has not been observed in that month.
- After familiarizing yourself with the meaning of the different colors, click on “To the Tables” and click on the second table – it should be the one with the “Teal” (#32).
- Graph the population of the Teal on the graph below, plotting points where you think they should go, **according to the descriptors of the bird population in that month**. Label your points (function) “Teal”.

Population of the Teal Species in Bahrain

4) Now find the table with the Bar-Tailed Godwit (#116), and graph its population on the graph below. USE A DIFFERENT COLOR. Label your points (function) “Bar-Tailed Godwit”.

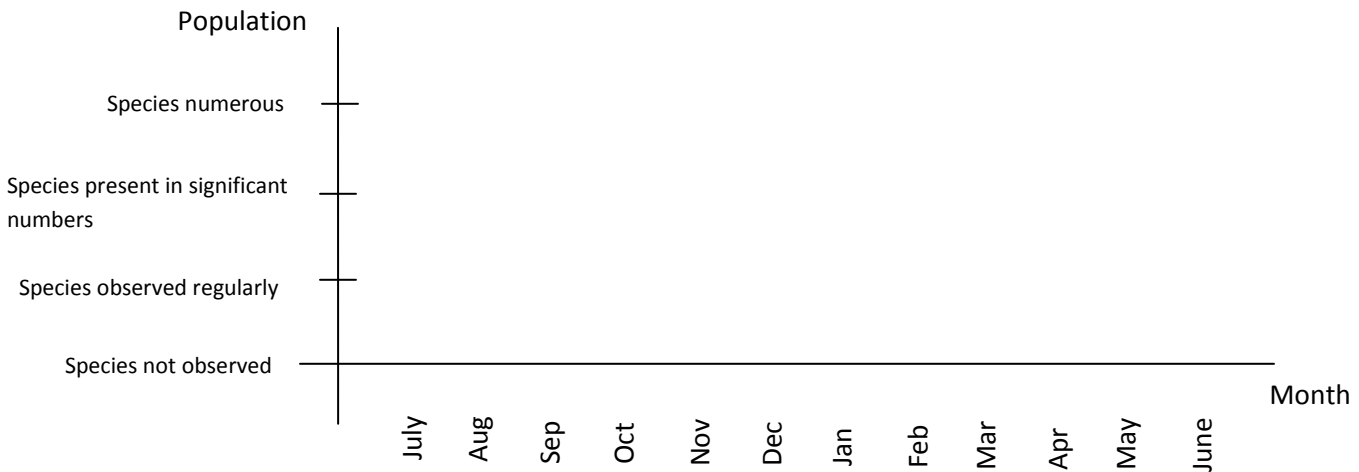
Population of Bar-Tailed Godwit Species in Bahrain



5) Explain the differences between these two graphs, in context of this scenario (i.e., what is the meaning of each graph?).

6) Choose another species to graph. Explain your choice of species. Explain on the how this species is different from or similar to the ones you already graphed.

Population of \_\_\_\_\_ Species in Bahrain

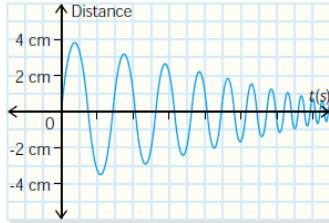


## (D) Further In Class Examples

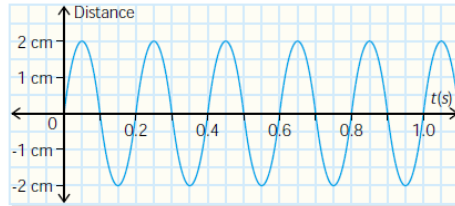
**Example 1**

Determine whether each graph is periodic or not.

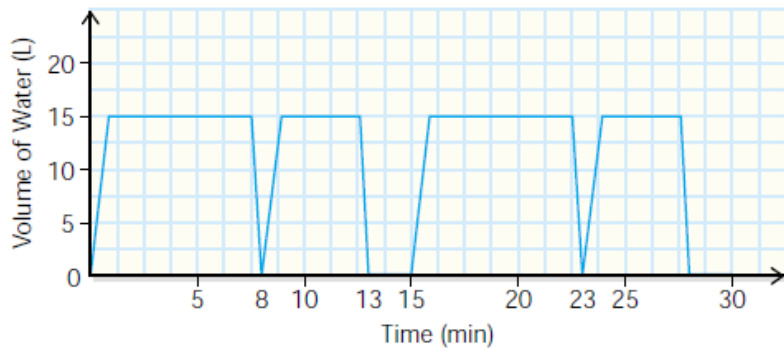
(a) tip of vibrating meter stick



(b) movement of a piston in a combustion engine

**Example 2**

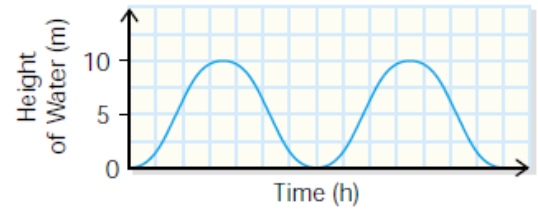
The automatic dishwasher in a school cafeteria runs constantly through lunch. The graph shows the amount of water used as a function of time.



- Explain why the operation of the dishwasher is an example of a periodic function.
- What is the length of the period? What does one complete cycle mean in the context of the question?
- Extend the graph for one more complete cycle.
- How much water is used if the dishwasher runs through eight complete cycles?

**Example 3**

The Bay of Fundy, which is between New Brunswick and Nova Scotia, has the highest tides in the world. There can be no water on the beach at low tide, while at high tide the water covers the beach.



- Why can you use periodic functions to model the tides?
- What is the change in depth of water from low tide to high tide?
- Determine the equation of the axis of the curve.
- What is the amplitude of the curve?

5. Sketch periodic graphs to satisfy the given properties.

Shape	Period	Amplitude	Equation of Axis	Number of Cycles
	4	6	$y = 2$	2
	3	4	$y = 1$	3
	$\frac{1}{2}$	5	$y = -3$	2

Go to the site <http://www.geogebra.org/student/m2702> and explain the role of the parameters A, B, C, D in the sinusoidal equation  $y = A \sin (B(x - C)) + D$