

L1 - Modeling Periodic Behaviour

MCR3U

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Section 1: Definitions

_____ : a function that has a pattern of y -values that repeats at regular intervals.

_____ : one complete repetition of a pattern.

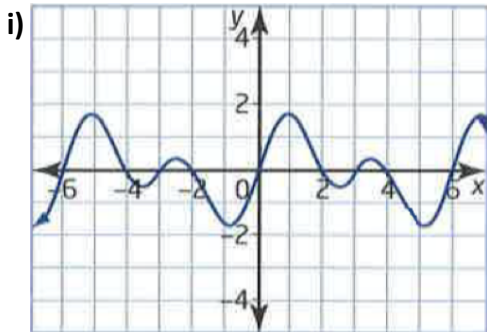
_____ : the horizontal length of one cycle on a graph.

_____ : half the distance between the maximum and minimum values of a periodic function.

Section 2: Recognizing Properties of Periodic Functions

*How to find the **PERIOD** of a function: choose a convenient x -coordinate to start at and then move to the right and estimate the x -coordinate of where the next cycle begins. Find the difference of these x -coordinates to calculate the period of the function.*

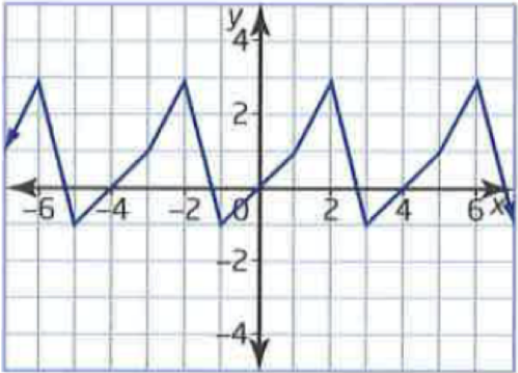
Example 1: Determine whether the functions are periodic or not. If it is, state the period of the function.



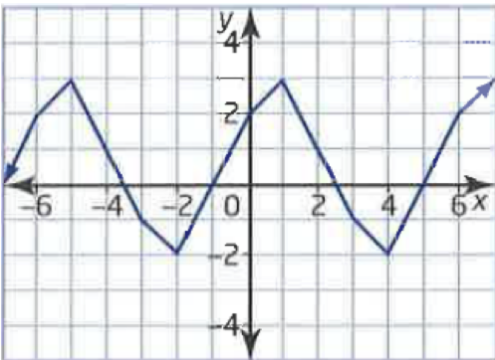
Example 2: Is the function periodic? If so, what is the amplitude?

How to find the AMPLITUDE of a function: the amplitude is half the difference between the max and min values. Use the formula:

$$\text{amplitude} = \frac{y_{\max} - y_{\min}}{2}$$

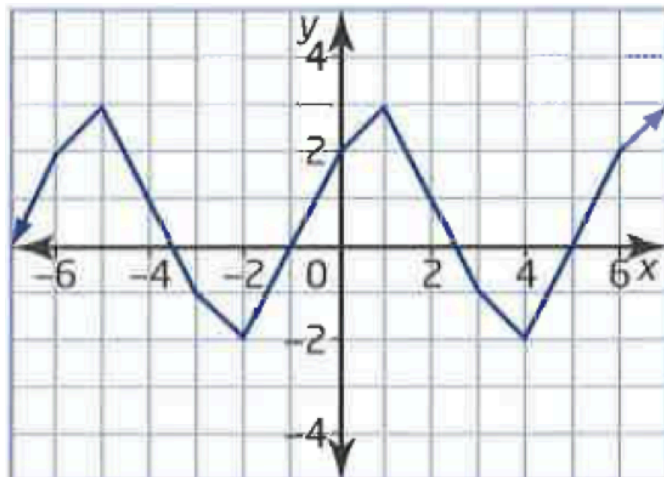


Example 3: In the following periodic function, determine the period and amplitude.



Section 3: Predicting Values of a Periodic Function

Example 4: For the following function...



a) determine $f(2)$ and $f(5)$

b) determine $f(8)$, $f(-10)$, and $f(14)$

Hint:

i) figure out the period of the function

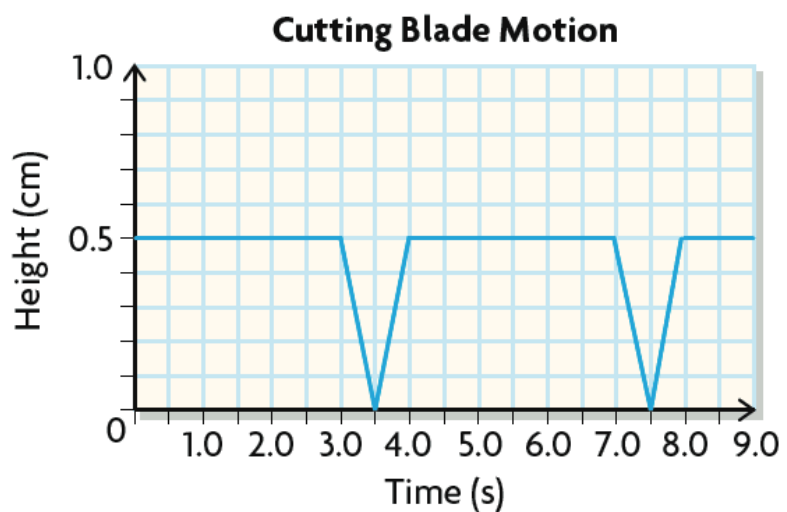
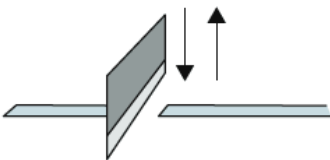
ii) add or subtract the period of the function until you get back to a value on the graph that you know.

c) determine 4 values of x so that $f(x) = 2$

Hint:

Keep adding/subtracting the period value to the x -value where $y = 2$.

Example 5: A cutting machine chops strips of plastic into their appropriate lengths. The following graph shows the motion of the cutting blade on the machine in terms of time.



a) State the max height of the blade, the minimum height, and the amplitude of the function.

b) What is the period of this function?

c) State the next two times that the blade will strike the cutting surface?