

Name: _____

Date: _____

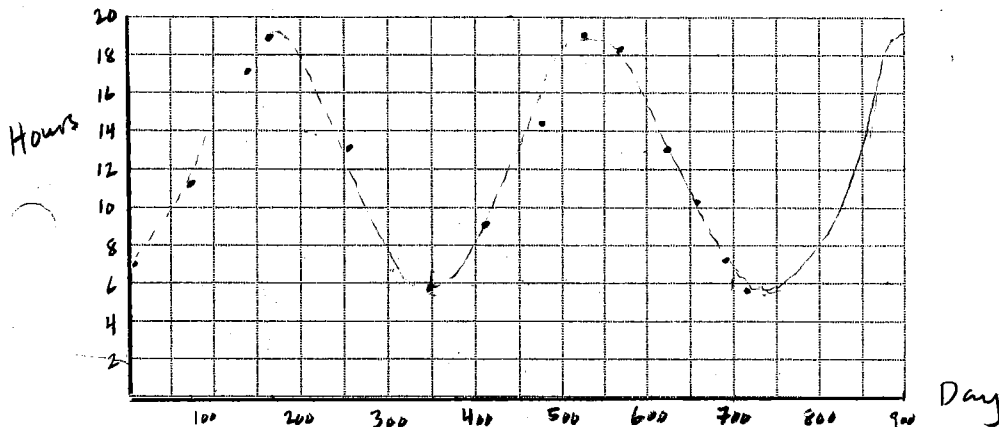
Periodic Functions and their Properties

11 Functions

Example: The number of hours of daylight at any particular location changes with the time of year. The table shows the average number of hours of daylight for approximately a two-year period at Hudson Bay, Nunavut. Note: Day 15 is January 15 of year 1. Day 74 is March 15 of year 1. Day 411 is February 15 of year 2.

Day	15	74	135	166	258	349	411	470	531	561	623	653	684	714
Hours of Daylight	6.7	11.7	17.2	18.8	12.9	5.9	9.2	14.6	18.8	18.1	12.9	10.2	7.5	5.9

a. Graph the data.



b. How many hours of daylight will there be on August 1 of year 3? (DAY 933 \Rightarrow 16-18 hrs.)

Periodic Function – A function that repeats itself in regular intervals or periods.

Period – The horizontal distance required for the graph of a periodic function to complete one full cycle.

Equation of the axis – The equation of the horizontal line half way between the minimum and the maximum.

Amplitude –

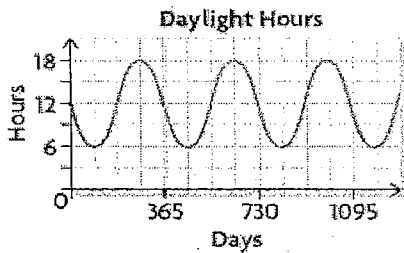
$$y = \frac{\text{max. value} + \text{min. value}}{2}$$

The vertical distance from the function's axis to the max. or min. value.

⊕ Amplitude is always POSITIVE! $\text{amplitude} = \frac{\text{max.} - \text{min.}}{2}$

Example: Determine whether the term periodic can be used to describe the graph for each situation. If so, state the period, equation of the axis, and amplitude.

- a) the average number of hours of daylight over a three-year period



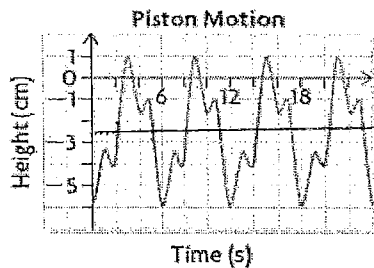
YES.

Period: 365 d.

Amp: 6

Eq'n of Axis: $h=12$

- b) the motion of a piston on an automated assembly line



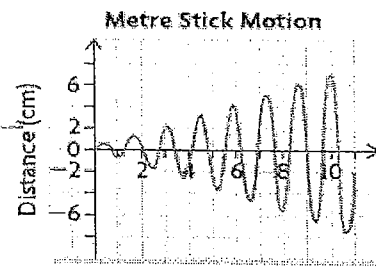
YES.

Period: 6 s

Amp: 3.5

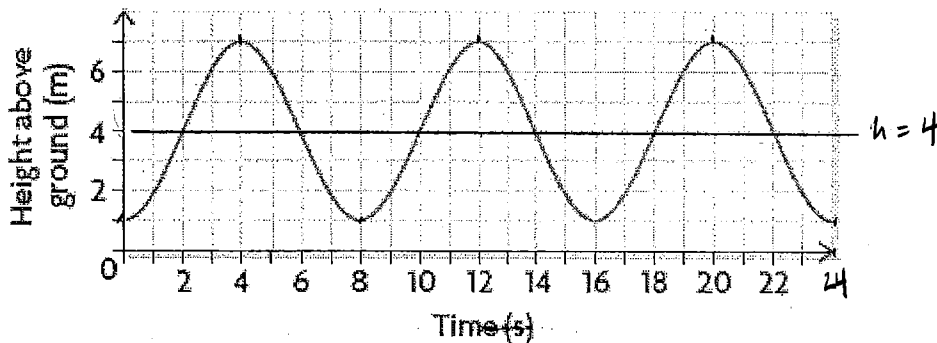
Eq'n of Axis: $h=-2.5$

- c) a student is moving a metre stick back and forth with progressively larger movements



No.

Example: While riding on a Ferris wheel, a person's height above the ground in terms of time can be represented by the graph shown.



- a. What is the period of this function, and what does it represent?

period = 8 sec. \Rightarrow Represents one full revolution of the wheel

- b. What is the equation of the axis? $h = 4$ m.

- c. What is the amplitude? amplitude = 3 m.

- d. What is the range of the function? $\{h \in \mathbb{R} \mid 1 \leq h \leq 7\}$

- e. After 24 s, when will a person be at the lowest height again? 32 seconds (ie. 8 seconds later)

- f. At what times is a person at the top of the wheel? 4, 12, 20 sec, etc.

- g. When will a person's height be 4 m between 24 s and 30 s?

26 sec and 30 sec.