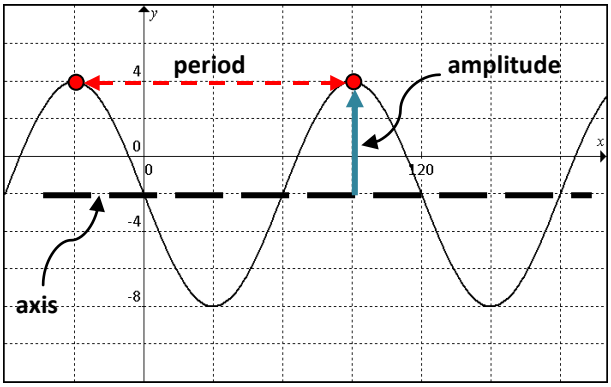
MCR 3U

PROPERTIES OF SINUSOIDAL FUNCTIONS

PART A:

Describe the following properties of each sinusoidal function:

- Range
- Amplitude
- Period
- Equation of Axis

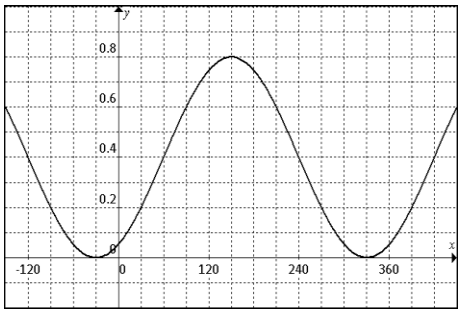


Range=[-8, 4]
Amplitude=6
Period=120
Axis: $y = -2$

EXERCISE:

For each graph, describe the above properties. Then evaluate the expressions that follow.

1.



Range=

Amplitude=

Period=

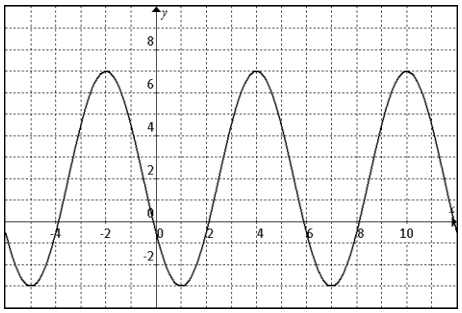
Axis:

A) $f(90)$ B) $f(240)$

C) $f(630)$ D) $f(-420)$

E) $f(x) = 0.2$ F) $f^{-1}(0.6)$

2.



Range=

Amplitude=

Period=

Axis:

A) $f(1)$ B) $f(-44)$

C) $f(15)$ D) $f(26)$

E) $f(x) = 7$ F) $f^{-1}(-0.5)$

PART B:

A passenger on a Ferris wheel measures her distance (in metres) above the ground every 3 s. Her data can be modelled by the equation $H(t) = 12\sin(10t)° + 16$. Determine the data she collected for the first 30 seconds of the ride. The ride lasts for 4 minutes.

t	h
0	
3	

Graph the data and determine:

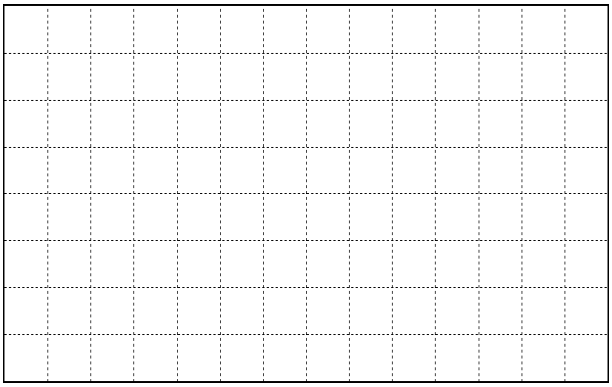
- Amplitude
- Period
- Equation of axis
- Range
- Evaluate ...

  $H(98 \text{ seconds})$

  $H(3.2 \text{ minutes})$

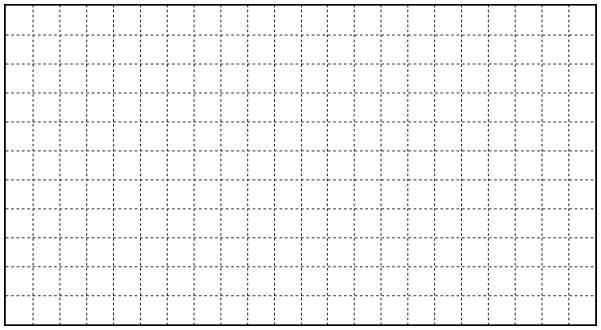
  $H(t) = 4.6\,m$

  $H(t) = 20.0\,m$

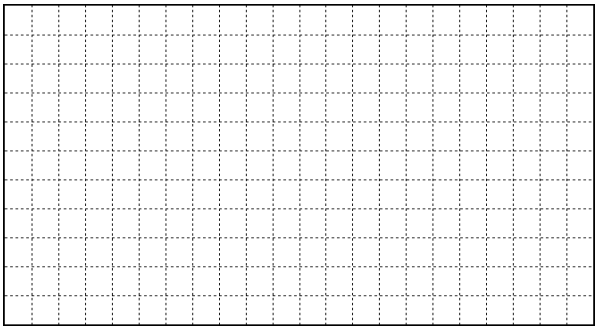


PART C: Graph 2 cycles of a sinusoidal function with the following parameters:

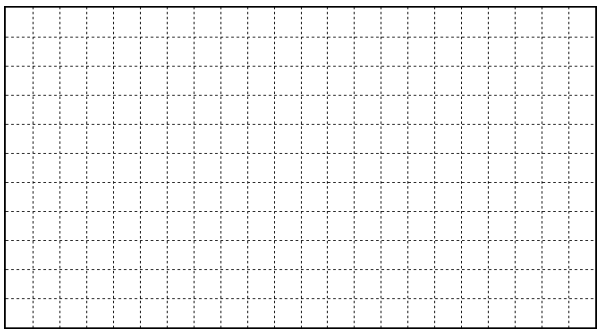
1. Amplitude = 4; Period=5; Axis: $y = 0$



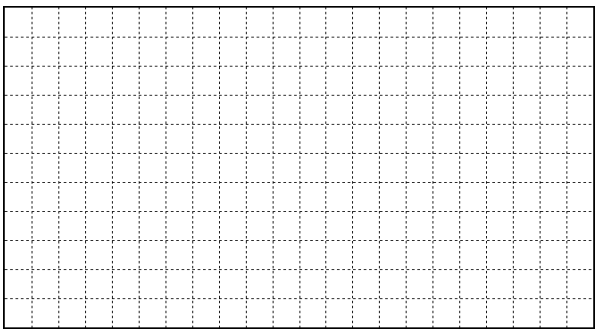
2. Amplitude = 30; Period=8; Axis: $y = 10$



3. Amplitude = 0.5; Period=1; Axis: $y = 3$



4. Period=400; Range=[-4, 10]

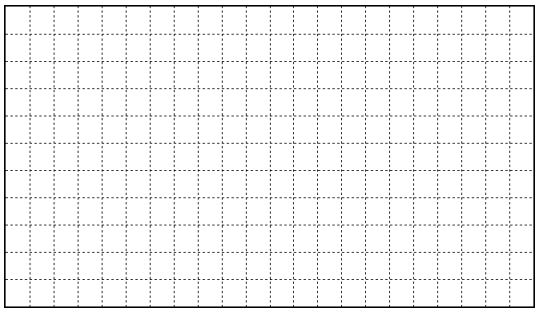


PART D:

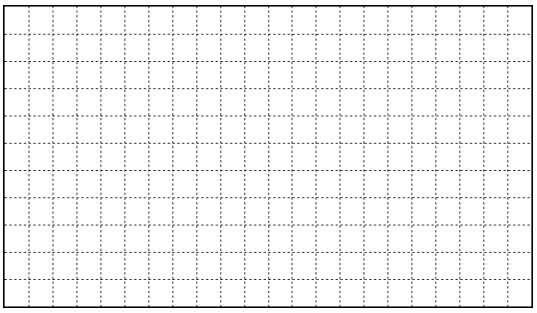
Sketch a graph of a sinusoidal function that models each situation.

Draw 1 cycle. State the period and amplitude.

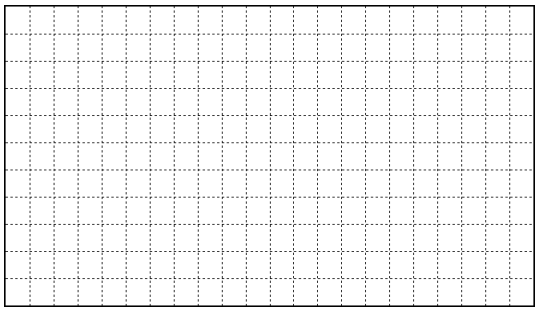
1. A Ferris wheel with a radius of 7 m, whose axle is 8 m above the ground, and that rotates once every 40 s.



2. A water wheel with a radius of 3 m whose centre is at water level, and that rotates once every 15 s.



3. A bicycle tire with a radius of 40 cm and that rotates once every 2 s.



4. Every year in TO, the average temperature reaches a low of -10° in Feb; 6 months later, a high of 30°.