

# Lesson 4: Discovering Parameters of Sine and Cosine

## Question #1

Reference Q.10829

Given the following function:  $2 \cos 2(\theta + 180^\circ) - 6$

- What is the phase shift?
- What is the period?
- What is the range?

## Question #2

Reference Q.10815

Given the following function:

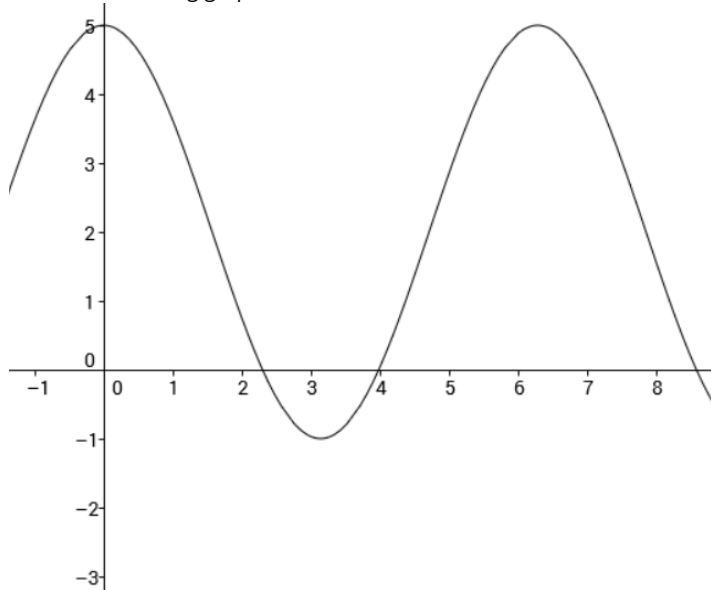
$$f(\theta) = \frac{1}{2} \sin \frac{1}{3}(\theta - 60^\circ) - 6$$

- What is the phase shift?
- What is the period?
- What is the range?

## Question #3

Reference Q.10816

Given the following graph?

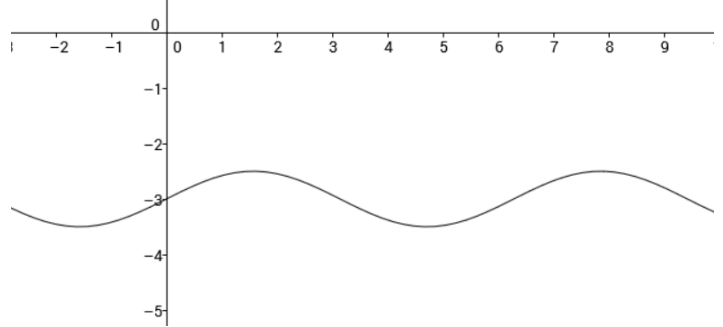


- What is the amplitude?
- What is the vertical displacement?

## Question #4

Reference Q.10817

Given the following graph:

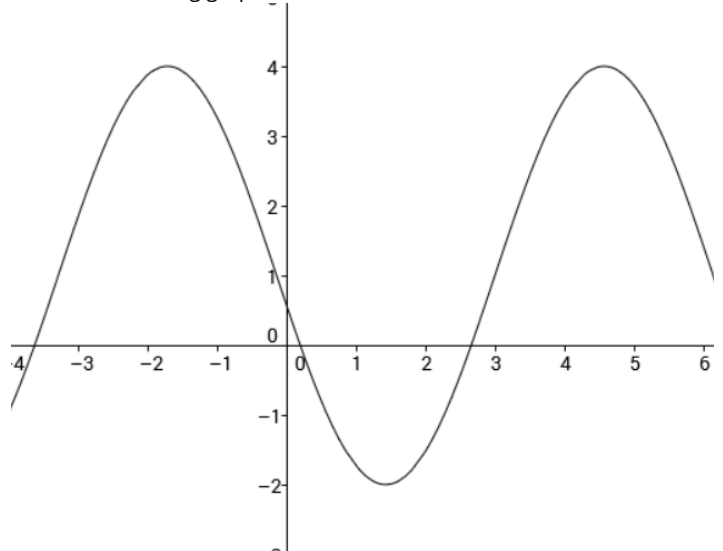


- What is the amplitude?
- What is the vertical displacement?

## Question #5

Reference Q.10818

Given the following graph:

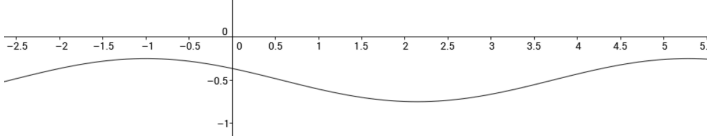


- What is the maximum value?
- What is the minimum value?
- What is the amplitude?

### Question #6

Reference Q.10819

What is the maximum value, minimum value and amplitude of the graph below?



- What is the maximum value?
- What is the minimum value?
- What is the amplitude?

### Question #7

Reference Q.10820

Given the function below, determine the following:

$$f(x) = \frac{1}{4} \sin \left[ \frac{1}{2}(x - 90^\circ) \right] - 2$$

- amplitude
- period
- phase shift
- vertical displacement
- mid-line

### Question #8

Reference Q.10821

Given the function below, determine the following:

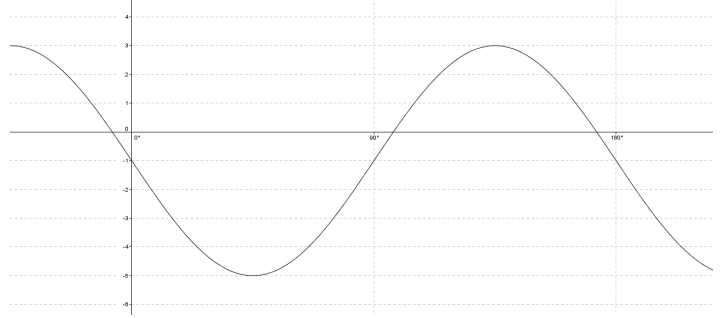
$$h(x) = 3 \cos[2(x + 45^\circ)] + 2$$

- amplitude
- period
- phase shift
- vertical displacement
- mid-line

### Question #9

Reference Q.10822

Determine the amplitude, period, phase shift, vertical displacement, and mid-line of the following sine function. Then write the equation of the function.

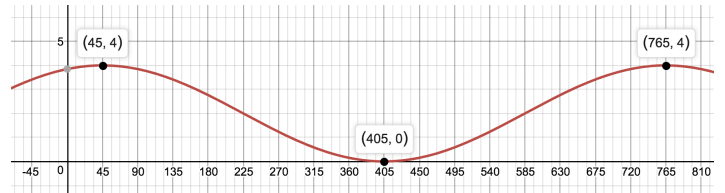


- amplitude
- period
- phase shift
- vertical displacement
- mid-line
- Now write the equation of the function.

### Question #10

Reference Q.10823

Determine the amplitude, period, phase shift, vertical displacement, and mid-line for the following cosine function. Then write the equation of the function.



- amplitude
- period
- phase shift
- vertical displacement
- mid-line
- Now write the equation for the function.

### Question #11

Reference Q.10824

Graph the following function for  $-360^\circ \leq x \leq 360^\circ$

$$f(x) = 2 \sin(x - 45^\circ) + 2$$

### Question #12

Reference Q.10825

Graph the following function for  $-360^\circ \leq x \leq 360^\circ$ ,

$$h(x) = 3 \cos(2x) - 1$$

### Question #13

Reference Q.10826

Graph the following function for  $-360^\circ \leq x \leq 360^\circ$ ,

$$f(x) = \frac{1}{3} \sin 4(x - 60^\circ) + 2$$

### Question #14

Reference Q.10827

Graph the following function for  $-360^\circ \leq x \leq 360^\circ$ ,

$$h(x) = 3 \cos \left[ \frac{1}{2}(x + 60^\circ) \right] - 3$$

### Question #15

Reference Q.10828

If the maximum of a sine graph is 45 and the minimum is 25:

- What is the amplitude?
- What is the mid-line?

### Question #16

Reference Q.10830

If the minimum of a cosine graph is -52 and the maximum is 14:

- What is the amplitude?
- What is the mid-line?

### Question #17

Reference Q.12426

- a. Complete the following table of values for domain  $0 \leq x \leq 2\pi$ . Give your answers to two decimal places where necessary.

$x$	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	$\pi$
$y = \cos x$							
$x$	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	$2\pi$	
$y = \cos x$							

- b. Plot the points. Do not join the points.
- c. Graph  $y = \cos x$  on your calculator using radian mode and the following window format.

$$x : [-2\pi, 3\pi, \frac{\pi}{6}]$$
$$y : [-1.2, 1.2, 0.2]$$

- d. On the grid, copy the graph from c) to complete the graph of  $y = \cos x, -2\pi \leq x \leq 3\pi$

### Question #18

Reference Q.12427

State the following for the function  $y = \cos x$ , where  $x$  is defined on the set of real numbers and is expressed in radians.

- Domain \_\_\_\_\_
- Range \_\_\_\_\_
- Amplitude \_\_\_\_\_
- Period \_\_\_\_\_
- $x$ -intercept(s) \_\_\_\_\_
- $y$ -intercept(s) \_\_\_\_\_

### Question #19

Reference Q.12428

A student was asked to reproduce one complete cycle of the graph of  $y = \cos x$  starting from zero degrees.

- Write down a graphing calculator window format the student could use.
- Sketch the graph of  $y = \cos x, 0^\circ \leq x \leq 360^\circ$ , showing the intercepts

### Question #20

Reference Q.12429

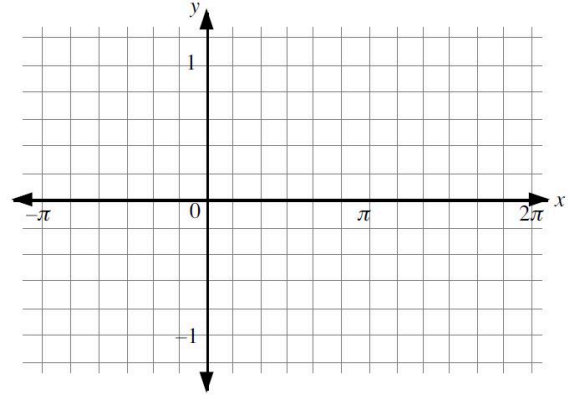
Complete the following:

- When  $\sin x$  has a maximum value, the value of  $\cos x$  is \_\_\_\_\_.
- When  $\sin x$  has a minimum value, the value of  $\cos x$  is \_\_\_\_\_.
- When  $\sin x$  has a value of 0, the value of  $\cos x$  is \_\_\_\_\_.

### Question #21

Reference Q.12430

- Using the same grid sketch the graph of  $y = \sin x$  and  $y = \cos x$  for domain  $-\pi \leq x \leq 2\pi$ .



- For what values of  $x$ , in the domain  $0 \leq x \leq 2\pi$ , do  $\sin x$  and  $\cos x$  have the same value?
- What is the minimum horizontal translation applied to the graph of  $y = \cos x$  which would result in the graph of  $y = \sin x$ ?
- If  $\sin x = \cos(x - c)$  for  $x \in \mathbf{R}$ , find the smallest positive value of  $c$ .
- If  $\cos x = \sin(x - k)$  for  $x \in \mathbf{R}$ , find a value for  $k$ .