

Student: _____	Instructor: Joe Betters	Assignment: 6.6 Classwork Day 2
Date: _____	Course: Pre-Calculus Pre AP (Master Course)	

1. Find the amplitude, period, and phase shift of the function. Graph the function. Be sure to label key points. Show at least two periods.

$$y = -6 \sin \left(4x + \frac{\pi}{2} \right)$$

What is the amplitude?

_____ (Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

What is the period?

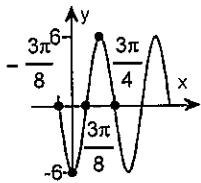
_____ (Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

What is the phase shift?

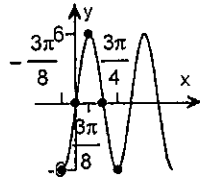
_____ (Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

Choose the correct graph below.

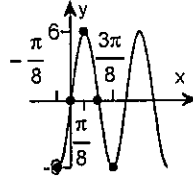
A.



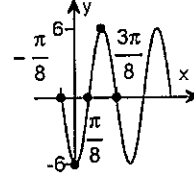
B.



C.



D.



2. The following data represent the average monthly temperatures (in °F) for a city in Alaska.

January, 1	24.6	April, 4	40.1	July, 7	57.0	October, 10	42.6
February, 2	29.4	May, 5	48.0	August, 8	56.0	November, 11	33.0
March, 3	33.7	June, 6	53.4	September, 9	49.8	December, 12	27.5

Answer the following questions.

(a) Use a graphing utility to draw a scatter diagram for the data of one period.

Which screen is correct? (All screens are [0,13] by [0,60].)

- A. B. C. D.



(b) By hand, find a sinusoidal function of the form $y = A \sin(\omega x - \phi) + B$ that fits the data.

A = _____

ω = _____

(Simplify your answer. Type an exact answer in terms of π . Use integers or fractions for any numbers in the expression.)

ϕ = _____

(Simplify your answer. Type an exact answer in terms of π . Use integers or fractions for any numbers in the expression.)

B = _____

(c) Draw the sinusoidal function found in part (b) on the scatter diagram.

Which screen is correct? (All screens are [0,13] by [0,60].)

- A. B. C. D.



(d) Use a graphing utility to find the sinusoidal function of best fit.

$$y = 15.70 \sin \left(\underline{\hspace{2cm}} x - \underline{\hspace{2cm}} \right) + 41.00$$

(Round to two decimal places as needed.)

(e) Draw the sinusoidal function of best fit on the scatter diagram.

Which screen is correct? (All screens are [0,13] by [0,60].)

- A. B. C. D.



3. In a certain city, the number of hours of sunlight on the summer solstice is 15.830 and the number of hours of sunlight on the winter solstice is 8.722.

Answer the following questions. Assume that summer solstice occurs on the 172nd day of the year, and that there are 365 days until the next summer solstice.

(a) Find a sinusoidal function of the form $y = A \sin(\omega x - \phi) + B$ that fits the data.

$A =$ _____

$\omega =$ _____

(Type an exact answer in terms of π . Use integers or fractions for any numbers in the expression. Simplify your answer.)

$\phi =$ _____

(Type an exact answer in terms of π . Use integers or fractions for any numbers in the expression. Simplify your answer.)

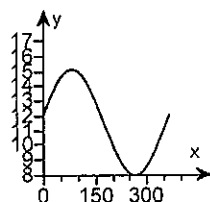
$B =$ _____

(b) Use the function found in part (a) to predict the number of hours of sunlight on April 1, the 91st day of the year.

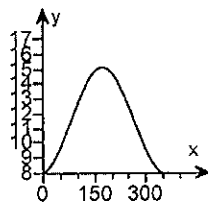
$y \approx$ _____ hours (Round to two decimal places as needed.)

(c) Draw a graph of the function found in part (a). Choose the correct graph of the function below.

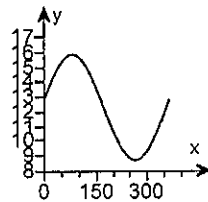
A.



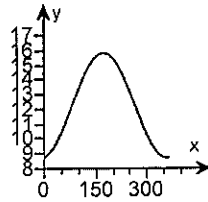
B.



C.



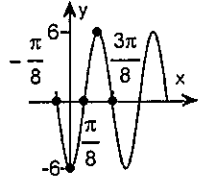
D.



1. 6

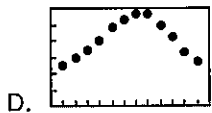
$$\frac{\pi}{2}$$

$$-\frac{\pi}{8}$$



D.

2.



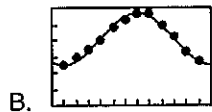
D.

16.2

$$\frac{\pi}{6}$$

$$\frac{2\pi}{3}$$

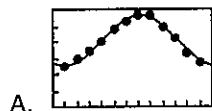
40.8



B.

0.51

2.07



A.

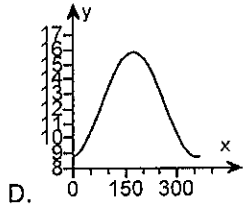
3. 3.554

$$\frac{2\pi}{365}$$

$$\frac{323\pi}{730}$$

12.276

12.90



6.6 classwork day 2

$$\textcircled{1} \quad y = -6 \sin(4x + \pi/2)$$

$$\text{Amplitude} = |-6| = \boxed{6}$$

$$\text{period} = \frac{2\pi}{\omega} = \frac{2\pi}{4} = \boxed{\pi/2}$$

$$\text{phase shift} = \frac{\phi}{\omega} = \frac{-\pi/2}{4} = \boxed{-\pi/8}$$

Graph D

6.6 classwork day 2 continued

② a) Graph **D** use calculator

b) $y = A \sin(\omega x - \phi) + B$

* Amplitude = $\frac{\text{High} - \text{Low}}{2} = \frac{57 - 24.6}{2} = \boxed{16.2}$

* Vertical Shift = $\frac{\text{High} + \text{Low}}{2} = \frac{57 + 24.6}{2} = \boxed{40.8}$

* $\omega = \frac{2\pi}{\text{period}} = \frac{2\pi}{12} = \boxed{\frac{\pi}{6}}$

* Phase Shift use $x=1, y=24.6$

$$24.6 = 16.2 \sin\left(\frac{\pi}{6}(1) - \phi\right) + 40.8$$

$$-1 = \sin\left(\frac{\pi}{6} - \phi\right)$$

* $\text{Arcsin}(-1)$ is $-\frac{\pi}{2}$

$$-\frac{\pi}{2} = \frac{\pi}{6} - \phi$$

$$\phi = \boxed{\frac{2\pi}{3}}$$

c) Graph **B** $y = 16.2 \sin\left(\frac{\pi}{6}x - \frac{2\pi}{3}\right) + 40.8$

d) use calculator sin reg

$$y = 19.70 \sin(0.51x - 2.07) + 41$$

e) Graph **A**

6.6 classwork day 2 continued

③ Sunlight summer solstice = 15.830
Sunlight winter solstice = 8.722

* Assume summer solstice occurs on 172 day of the year with 365 days until next solstice

a) $y = A \sin(\omega x - \phi) + B$

* Amplitude = $\frac{\text{High} - \text{Low}}{2} = \frac{15.830 - 8.722}{2} = \boxed{3.554}$

* Vertical Shift = $\frac{\text{High} + \text{Low}}{2} = \frac{15.830 + 8.722}{2} = \boxed{12.276}$

* $\omega = \frac{2\pi}{\text{period}} = \boxed{\frac{2\pi}{365}}$

* Phase shift use 15.830 as y and 172 as x

$$15.830 = 3.554 \sin\left(\frac{2\pi}{365}(172) - \phi\right) + 12.276$$

$$1 = \sin\left(\frac{2\pi}{365}(172) - \phi\right)$$

* $\text{Arcsin } 1 = \pi/2$

$$\frac{\pi}{2} = \frac{2\pi}{365}(172) - \phi$$

$$\phi = \boxed{\frac{323\pi}{730}}$$

$$y = 3.554 \sin\left(\frac{2\pi}{365}x - \frac{323\pi}{730}\right) + 12.276$$

b) 91st Day = $\boxed{12.9}$

c) $\boxed{\text{Graph D}}$