Student: _____ **Date:** _____	**Instructor:** Joe Betters **Course:** Pre-Calculus Pre AP (Master Course)	**Assignment:** 6.6 Classwork Day 1

1. Write the equation of a sine function that has the following characteristics.

Amplitude: 4 Period: 3π Phase shift: $\frac{1}{2}$

Type the appropriate values to complete the sine function.

y = _____ **sin** (_____ x − _____)

(Use integers or fractions for any numbers in the expression. Simplify your answers.)

2. The current I, in amperes, flowing through an ac (alternating current) circuit at time t, in seconds, is given below. What is the period? What is the amplitude? What is the phase shift? Graph this function over two periods.

$I(t) = 120 \sin\left(10\pi t - \frac{\pi}{3}\right), \quad t \geq 0$

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 amplitude?

_____

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

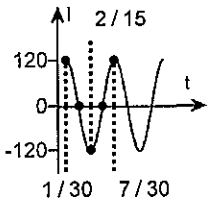
What is the phase shift?

_____

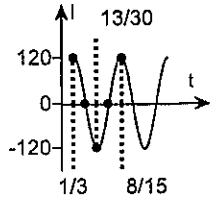
(Simplify your answer. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

Choose the correct graph below.

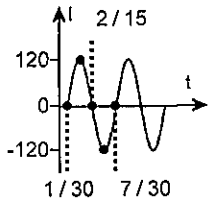
○ A.



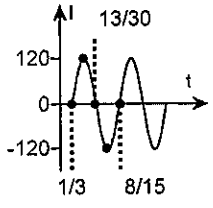
○ B.



○ C.



○ D.



3. Suppose that the length of time between consecutive high tides is approximately 12.5 hours. According to the National Oceanic and Atmospheric Administration, on a particular day in a city in Georgia, high tide occurred at 3:31 AM (3.5167 hours) and low tide occurred at 10:01 AM (10.0167 hours). Water heights are measured as the amounts above or below the mean lower low water. The height of the water at high tide was 8.2 feet and the height of the water at low tide was −0.2 foot. Answer parts **(a)** through **(c)** below.

(a) Use the given time between consecutive high tides to approximate when the next tide will occur.

_____:0_____ PM (Round to the nearest minute as needed.)

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

$A =$ _____
(Type an integer or a decimal.)

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

$\phi =$ _____ (Round to four decimal places as needed.)

$B =$ _____ (Type an integer or a decimal.)

(c) Use the function found in part (b) to predict the height of the water at the next high tide.

$y \approx$ _____ feet (Round to one decimal place as needed.)

1. 4

$\frac{2}{3}$

$\frac{1}{3}$

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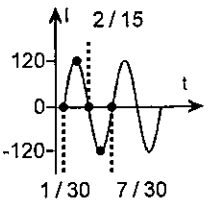
2. $\frac{1}{5}$

120

$\frac{1}{30}$

C.



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3. 4

1

4.2

$\frac{4\pi}{25}$

0.1969

4.0

8.2

6.6 classwork day 1

① Amplitude = 4
period = 3π
phase shift = $\frac{1}{2}$

$\text{phase shift} = \frac{\phi}{\omega}$

$\phi = \omega(\text{phase shift})$

$$\omega = \frac{2\pi}{\text{period}} = \frac{2\pi}{3\pi} = \frac{2}{3}$$

$$\phi = \omega(\text{phase shift}) = \frac{2}{3}\left(\frac{1}{2}\right) = \frac{1}{3}$$

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

$$\boxed{y = 4\sin\left(\frac{2}{3}x - \frac{1}{3}\right)}$$

6.6 classwork day 1 continued

② $I(t) = 120 \sin(10\pi t - \pi/3) \quad t \geq 0$

$$\text{period} = \frac{2\pi}{\omega} = \frac{2\pi}{10\pi} = \boxed{\frac{1}{5}}$$

$$\text{Amplitude} = |120| = \boxed{120}$$

$$\text{phase shift} = \frac{\phi}{\omega} = \frac{\pi/3}{10\pi} = \boxed{\frac{1}{30}}$$

Graph C

6.6 classwork day 1 continued

③ high tide 3:31 am (3.5167 hours)

12.5 hours between high tides

a) $3.5167 + 12.5 = 16.0167 \approx$ **4pm** rounded

4.01

b) high tide 8.2 ft

low tide −.2 ft

$\frac{\text{High-low}}{2}$ * Amplitude: $A = \frac{8.2-(-.2)}{2} =$ **4.2 ft** (A)

$\frac{\text{High+Low}}{2}$ * vertical shift: $B = \frac{8.2+(-.2)}{2} =$ **4 ft** (B)

* $\omega = \frac{2\pi}{\text{period}} = \frac{2\pi}{12.5} =$ **$\frac{4\pi}{25}\omega$**

* phase shift

(use 8.2 for y and 3.5167 for x)

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

$8.2 = 4.2\sin\left(\frac{4\pi}{25}(3.5167) - \phi\right) + 4$

$1 = \sin\left(\frac{4\pi}{25}(3.5167) - \phi\right)$

* Arcsin 1 is $\pi/2$

$\frac{\pi}{2} = \frac{4\pi}{25}(3.5167 - \phi)$

$\phi = .1969$

$$y = 4.2\sin\left(\frac{4\pi}{25}x - .1969\right) + 4$$