

GO COUGARS!

Homework Questions

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73. Respiratory Cycle For a person at rest, the velocity v (in liters per second) of air flow during a respiratory cycle (the time from the beginning of one breath to the beginning of the next) is given by $v = 0.85 \sin \frac{\pi}{3}t$, where t is the time (in seconds). (Inhalation occurs when $v > 0$, and exhalation occurs when $v < 0$.)

(a) Find the time for one full respiratory cycle.
 (b) Find the number of cycles per minute.
 (c) Sketch the graph of the velocity function.

79. Fuel Consumption The daily consumption C (in gallons) of diesel fuel on a farm is modeled by

$$C = 30.3 + 21.6 \sin\left(\frac{2\pi}{365}t + 10.9\right)$$

where t is the time (in days), with $t = 1$ corresponding to January 1.

(a) What is the period of the model? Is it what you expected? Explain.
 (b) What is the average daily fuel consumption? Which term of the model did you use? Explain.
 (c) Use a graphing utility to graph the model. Use the graph to approximate the time of the year when consumption exceeds 40 gallons per day.

80. Ferris Wheel A Ferris wheel is built such that the height h (in feet) above ground of a seat on the wheel at time t (in seconds) can be modeled by

$$h(t) = 53 + 50 \sin\left(\frac{\pi}{10}t - \frac{\pi}{2}\right)$$

(a) Find the period of the model. What does the period tell you about the ride?
 (b) Find the amplitude of the model. What does the amplitude tell you about the ride?
 (c) Use a graphing utility to graph one cycle of the model.

True or False? In Exercises 81–83, determine whether the statement is true or false. Justify your answer.

81. The graph of the function given by $f(x) = \sin(x + 2\pi)$ translates the graph of $f(x) = \sin x$ exactly one period to the right so that the two graphs look identical.
 82. The function given by $y = \frac{1}{2} \cos 2x$ has an amplitude that is twice that of the function given by $y = \cos x$.
 83. The graph of $y = -\cos x$ is a reflection of the graph of $y = \sin(x + \pi/2)$ in the x -axis.

Handwritten notes on page 330:

p 330

73) $y = 0.85 \sin \frac{\pi}{3}t$
 a) $\frac{2\pi}{\frac{\pi}{3}} = 6$ seconds
 b) 10 cycles per min
 c)

79) $C = 30.3 + 21.6 \sin\left(\frac{2\pi}{365}x + 10.9\right)$
 a) 365
 b) 30.3
 c)

80) $h(t) = 53 + 50 \sin\left(\frac{\pi}{10}t - \frac{\pi}{2}\right)$
 $= 50 \sin\left(\frac{\pi}{10}(t-5)\right) + 53$
 a) $\frac{2\pi}{\frac{\pi}{10}} = 20$ sec time to complete one round
 b) 50 ft ; radius of Ferris wheel is 50 ft
 c)

81) F minus left
 82) False 1/2
 83) True

Feb 2-9:51 PM

GO COUGARS!

WS #1 Homework Questions

WS #1

1) a)

b) $y = 2 \cos\left(\frac{\pi}{3}(x)\right)$
 c) $y = 2 \cos\left(\frac{\pi}{3}(2x)\right)$
 d) $2.5 = 2 \cos\left(\frac{\pi}{3}x\right)$
 $= 0.112 \text{ sec}$

2) a)

b) $y = -2.6 \cos\left(\frac{\pi}{4}x\right)$
 c) $y = -2.6 \cos\left(\frac{\pi}{4}(2x)\right)$
 $= 1.748$
 d) $2 = -2.6 \cos\left(\frac{\pi}{4}x\right)$
 $= 7.447$ (2nd time)

3) a)

b) $y = 7.5 \sin\left(\frac{\pi}{4}x\right)$
 c) $y = 7.5 \sin\left(\frac{\pi}{4}(2x)\right)$
 $= 7.5 \sin 2\pi$
 $= 0$
 d) $4 = 7.5 \sin\left(\frac{\pi}{4}x\right)$
 $x = 1.272 \text{ Sec}$

4) a)

b) $y = 155 \sin(120\pi x)$
 c) $y = 155 \sin(120\pi(\frac{1}{60}))$
 $= -134.234 \text{ V}$
 d) $100 = 155 \sin(120\pi x)$
 $= .002$

5) a) 45V
 b) $\text{freq} = .025$
 $\text{frequency} = \frac{1}{.025} = 40$
 $\frac{2\pi}{.025} = \frac{2\pi}{.025}$
 c) $y = 45 \cos(80\pi x)$

Feb 2-9:51 PM

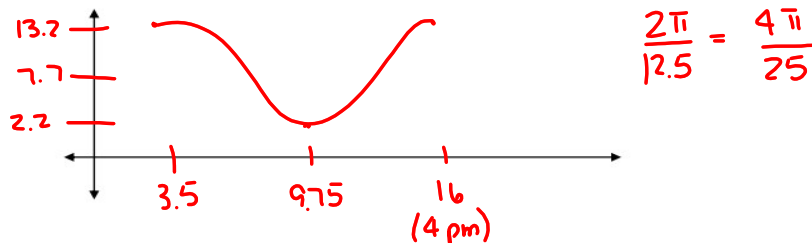
Harmonic Motion Part 2

Notes in Workbook p 59-61

Feb 7-2:03 PM

1. Suppose the length of time between consecutive high tides is approximately 12.5 hours. In Savannah, Georgia, high tide occurred at 3:30 AM on June 28, 1997 and low tide occurred at 9:45 AM. The height of the water at high tide was 13.2 ft and at low tide the height was 2.2 ft.

a) Make a sketch of the water level as a function of time.



b) Write an equation to model the water level.

$$y = 5.5 \cos\left(\frac{4\pi}{25}(x-3.5)\right) + 7.7$$

Enter the equation into a graphing calculator and answer the following questions:

c) When did the next high tide occur? 4 pm Jan 28

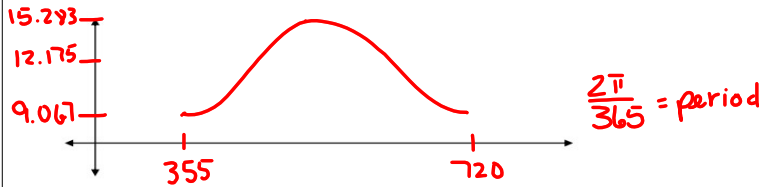
d) What was the water level at 11 PM on that day? 2.59 ft

$$y = 5.5 \cos\left(\frac{4\pi}{25}(23-3.5)\right) + 7.7$$

Feb 7-2:04 PM

2. Since the number of hours of sunlight in a day cycles annually, it can be modeled with a sinusoidal function. The longest day of the year occurs on the summer solstice, while the shortest day of the year occurs on the winter solstice. In Boston, the number of hours of sunlight on the summer solstice is 15.283 and on the winter solstice (day 355) there are 9.067 hours of sunlight.

a) Make a sketch of the hours of sunlight per day for Boston.



b) Write an equation to model the number of hours of sunlight per day.

$$y = -3.108 \cos\left(\frac{2\pi}{365}(x-355)\right) + 12.175$$

Enter the function into a graphing calculator and answer the following questions:

How many hours of sunlight were there on

c) September 20? (day 263) 12.215 hr

d) March 1? (day 60) 11.063 hr

e) When are there at least 12 hours of sunlight (to the nearest day)?

day 78 thru day 267

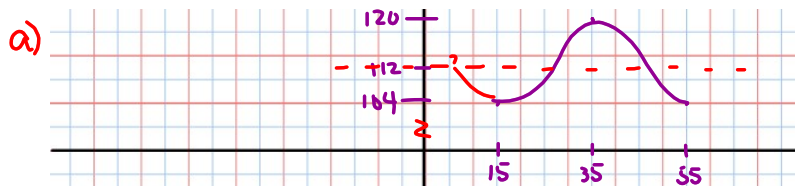
} plug day # in for x

Feb 7-2:05 PM

3. The Thing Problem

Researchers at the North Pole find a creature from an alien planet, and they name him the THING. Its body temperature seems to vary sinusoidally with time. Thirty-five minutes after the researchers start timing, its temperature reaches a high of 120°F. Twenty minutes later, it reaches a low temperature of 104°F.

- Sketch a graph of this sinusoid.
- Write an equation expressing the THING's temperature as a function of time in minutes after the researchers start timing.
- What was the THING's temperature when they started timing?
- What will be its temperature 1 1/2 hours after the researchers started timing?
- When the THING's temperature rises above 110°F, it becomes hostile and begins to eat sled dogs. Describe the first two intervals of time when the dogs should be hidden in a secure area.



b) $y = 8 \cos\left(\frac{\pi}{20}(x-35)\right) + 112$ OR $y = -8 \cos\left(\frac{\pi}{20}(x-15)\right) + 112$

c) ① temp 117.66

d) ② temp 106.34

e) above 110 (0, 6.61)(23.39, 46.61)

Apr 25-5:23 AM

HOMework



Workbook p 65-67

Aug 29-6:38 AM