Questions over homework 4.7?

Oct 11-10:36 AM

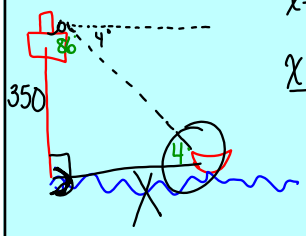
4.8 :: Applications and Models

- Angle of Elevation/Depression
- Bearings
- Simple Harmonic Motion

Oct 8-8:11 PM

Angle of Depression

An observer in a lighthouse 350 feet above sea level observes a ship directly offshore. The angle of depression to the ship is 4 degrees. How far away is the ship from the lighthouse?



$x \tan 4° = \frac{350}{x} \cdot x$

$\frac{x \tan 4°}{\tan 4°} = \frac{350}{\tan 4°}$

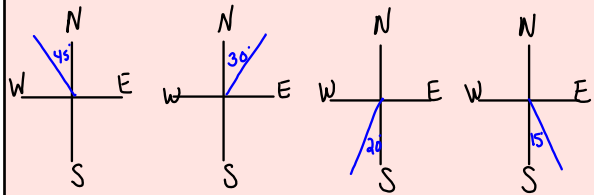
p. 339, #39 (HW)

$x = 5005.23 \text{ ft}$

Oct 8-8:15 PM

Bearings

In navigation, a bearing measures the acute angle a path makes with a **fixed north-south line**.



N45°W N30°E S20°W S15°E

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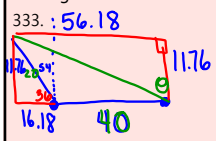
Bearings

A ship leaves port at noon and heads due west at 20 knots, or 20 nautical miles (nm) per hour. At 2 PM, the ship changes course to N 54° W. Find the ship's bearing and distance from the port of departure at 3 PM. Check out Fig. 3.48, p. 333.



$\sin 36° = \frac{x}{20}$

$20\sin 36° = x$

$11.76 = x$

$\cos 36° = \frac{y}{20}$

$20\cos 36° = y$

$16.18 = y$

p. 339, #33 (HW)

$(56.18)^2 + (11.76)^2 = c^2$

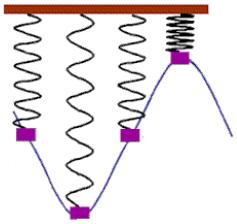
$57.39 \text{ nm} = c$

$\tan\theta = \frac{56.18}{11.76}$

$\theta = \tan^{-1}\left(\frac{56.18}{11.76}\right) = N78.15°W$

Oct 8-8:21 PM

Simple Harmonic Motion



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Simple Harmonic Motion

A point that moves on a coordinate line is said to be in **simple harmonic motion** if its distance d from the origin at time t is given by either of the following:

$$d = a\sin\omega t, d = a\cos\omega t$$

where a and ω are real numbers such that $\omega > 0$

amplitude: $|a|$

period: $\frac{2\pi}{\omega}$

frequency (number of cycles per second):

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

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Simple Harmonic Motion

Given the equation for simple harmonic motion

$$d = \cos\frac{3\pi}{4}t$$

Find (a) the maximum displacement, (b) the frequency, (c) the value of d when t= 4, and (d) the least positive value of t for which d=0.

amp.

a) $|1| = 1$

b) $\frac{3\pi}{4} \div 2\pi$

$\frac{3\pi}{4} \cdot \frac{1}{2\pi} = \frac{3}{8}$

c) $d = \cos\frac{3\pi}{4} \cdot 4$

$d = \cos 3\pi$

$d = \cos\pi$

$d = -1$

d) $0 = \cos\frac{3\pi}{4}t$

$\frac{\pi}{2}$

$\frac{3\pi}{2} = \frac{3\pi}{4}t$

$\frac{4}{3\pi}$

$\frac{2}{3} = t$

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Simple Harmonic Motion

Try #51, p. 341...

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HOMEWORK

...apply that trig!

4.8 (p. 337): 17, 21(a&c), 25, 29, 33, 37, 39, 51-55 (odd), 60

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