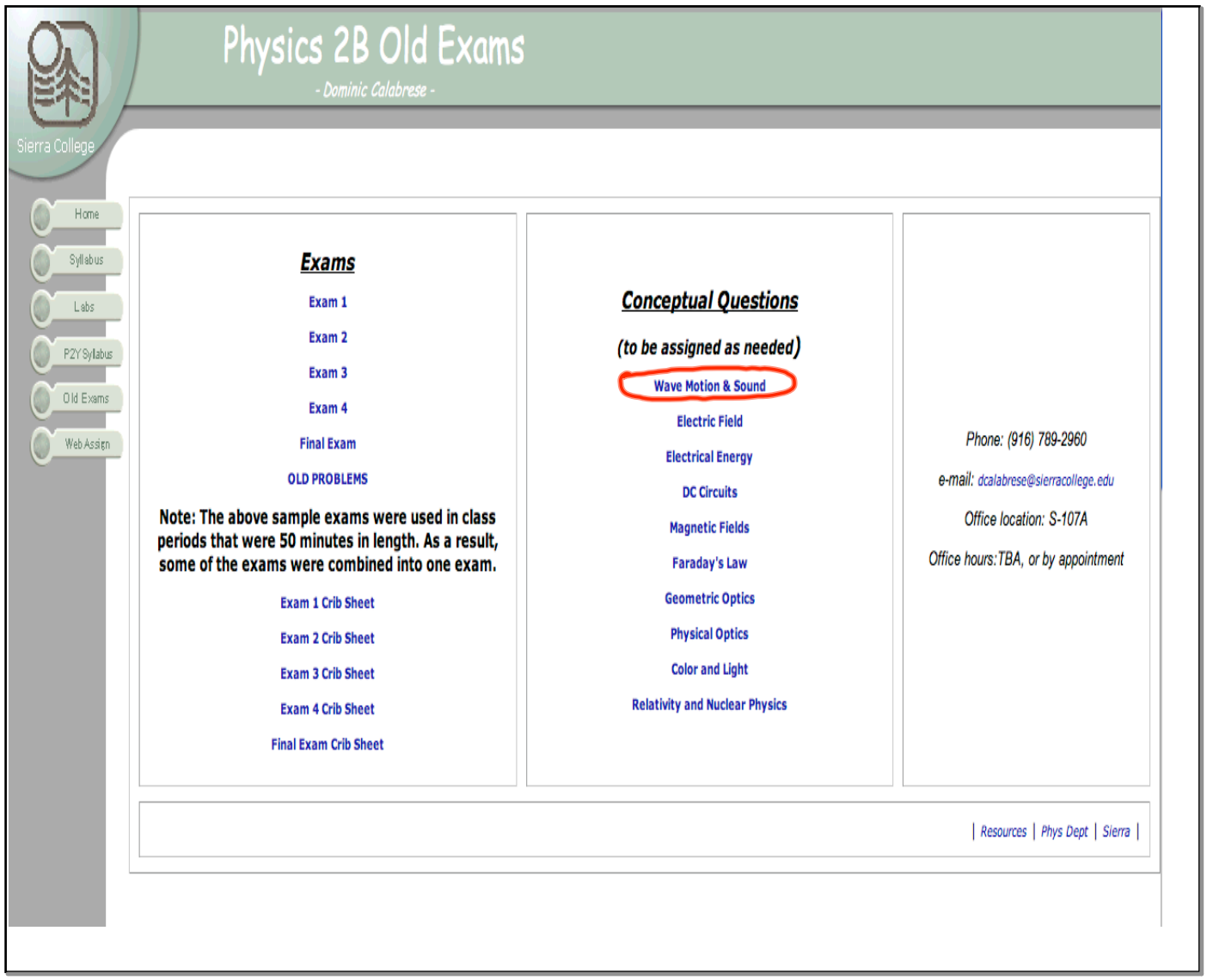
Reminders 1-24-08:
-Next Webassign Due February 3
-Wave Motion and Sound Conceptual Questions Due 1/31
-Read Chapter 14
-Sign up for Physics 2Y. Homework will be discussed in this class, not (generally) during lecture.

Objectives:
-Energy and Intensity of Sound Waves
-Properties of Waves
-Doppler Effect
-Interference and Standing Waves


Physics 2B Old Exams
- Dominic Calabrese -
Sierra College
Home
Syllabus
Labs
P2Y Syllabus
Old Exams
Web Assign
Exams
Exam 1
Exam 2
Exam 3
Exam 4
Final Exam
OLD PROBLEMS
Note: The above sample exams were used in class periods that were 50 minutes in length. As a result, some of the exams were combined into one exam.
Exam 1 Crib Sheet
Exam 2 Crib Sheet
Exam 3 Crib Sheet
Exam 4 Crib Sheet
Final Exam Crib Sheet
Conceptual Questions
(to be assigned as needed)
Wave Motion & Sound
Electric Field
Electrical Energy
DC Circuits
Magnetic Fields
Faraday's Law
Geometric Optics
Physical Optics
Color and Light
Relativity and Nuclear Physics
Phone: (916) 789-2960
e-mail: dcalabrese@sierracollege.edu
Office location: S-107A
Office hours:TBA, or by appointment
| Resources | Phys Dept | Sierra |

- A point source emits sound waves with an average power output of 80.0 W. If the sound intensity is measured to be 0.707 W/m^2 at a particular location, how far is this location from the source?

$$I = \frac{P}{A} = \frac{P}{4\pi r^2}$$

$$r^2 = \frac{P}{4\pi I} \Rightarrow r = \sqrt{\frac{P}{4\pi I}}$$

$$r = \sqrt{\frac{80\,W}{4\pi\ 0.707\,W/m^2}} = 3.00\,m$$

- 100dB corresponds to an intensity of…
- If the intensity of a siren changes from 0.90 W/m^2 to 0.055 W/m^2, what is the change in β?
- What is the change in β when the intensity of a sound doubles?

$$\beta = 10 \log \frac{I}{I_0} \qquad I_0 = 10^{-12} \frac{W}{m^2}$$

$$100 = 10 \log \frac{I}{I_0} \Rightarrow 10 = \log \frac{I}{10^{-12}}$$

$$10^{10} = \frac{I}{10^{-12}} \qquad I = 10^{-2} \frac{W}{m^2}$$

$$10^x = 10^6$$

$$\Delta\beta = 10\log\frac{I_f}{I_0} - 10\log\frac{I_i}{I_0}$$

$$= 10\left(\log\frac{I_f}{I_0} - \log\frac{I_i}{I_0}\right)$$

$$10\left(\log I_f - \log I_0 - \log I_i + \log I_0\right)$$

$$10\left(\log\frac{I_f}{I_i}\right) = 10\log\frac{.055}{0.9}$$

$$= -12\,dB$$

$$I_f = 2 I_i$$

$$\Delta B = 10 \log \frac{I_f}{I_0} - 10 \log \frac{I_i}{I_0}$$

$$= 10 \log \frac{I_f}{I_i}$$

$$= 10 \log 2 = 3 \text{ dB}$$

- Federal regulations have set β_{max} at 90 dB for the workplace (no ear protection). An office of 128 typewriters was found to have a maximum reading of 92 dB's by a federal inspector when all were in operation. How many typewriters must be removed to be in compliance ?

Want $\Delta B = -2$

$$\Delta B = 10 \log \frac{I_f}{I_i}$$

$$I_i = 128 I_t$$

$$I_f = n I_t$$

$$-2 = 10 \log \left(\frac{n I_t}{128 I_t} \right)$$

$$-2 = 10 \log \left(\frac{n}{128} \right)$$

$$-.2 = \log \frac{n}{128}$$

$$10^{(-.2)} = \frac{n}{128}$$

$$n = 128\, 10^{-(.2)}$$

$$n = 81$$

removed

$$128 - 81 = 47$$

$$\lambda' = \lambda - v_s T$$

$$v = f\lambda \qquad f = \frac{v}{\lambda'}$$

$$f' = \frac{v}{\lambda - v_s T} \qquad T = \frac{\lambda}{v}$$

$$f' = \frac{v}{\lambda - v_s\left(\frac{\lambda}{v}\right)} = \frac{v}{\lambda\left(1 - \frac{v_s}{v}\right)}$$

$\frac{v}{\lambda}$ = original frequency f

$$f' = f\left(\frac{1}{1 - \frac{v_s}{v}}\right) = f\left(\frac{v}{v - v_s}\right)$$

source away from observer

$$f' = f\left(\frac{v}{v + v_s}\right)$$