TechLab Springboard:
Sound Chaser

APPARATUS
__computer (iBook or equivalent)   __DataStudio with WavePort
__PC headset: earphones AND microphone (USB microphone on headset or equivalent)
__tuning fork set: two known, one unknown, and a mallet

SET UP
a. Start the computer (PhyzMac iBook). While it is starting up...

b. Connect the headset to the computer.

c. When the computer has completed its start-up cycle, make sure the External Mic is designated as the Input for the computer. Use the Sound Control Panel Tool on the control strip (the icon is a microphone in front of a CD). You shouldn't need to open the Sound Control Panel itself, but you may do so to make the input selection if you wish.

d. Start DataStudio; when asked what you would like to do, select "Open Activity."

e. Choose "Match Sounds" from the Phyz TechLabs > *Unitnumber* folder (X PhyzMac X / DataStudio / eLabs / Phyz TechLabs / *Unitnumber* / Match Sounds). Click "OK" to the warning that the file is locked and cannot be changed.

1. MATCH SOUNDS WITH SOUNDCREATOR
a. Notice this activity employs both SoundCreator and SoundAnalyzer. Activate the microphone in the SoundAnalyzer window. Notice there is a trace showing a 440 Hz waveform in the background of the SoundAnalyzer window.

b. Now activate the speaker in the SoundCreator window. The sound can be heard in the earphones of the headset.

c. Hold the headset microphone in your left hand. The microphone should be articulated about 45° from the earphones.

d. Carefully move the right earphone over to the microphone. The microphone is now listening to what the earphone is emitting. Do the **frequencies** match?
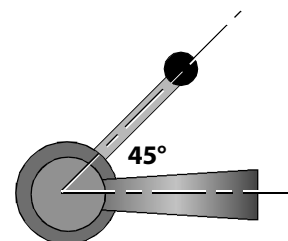
e. You can get the **amplitudes** to match if you adjust how close the microphone is to the earphone.

f. Change the frequency of the speaker sound (SoundCreator). See if you can match the waveform in SoundAnalyzer. This is tricky because the sound from SoundCreator stops whenever you manipulate the waveform in SoundAnalyzer. Use a "guess and check" technique.

7/18/06 db
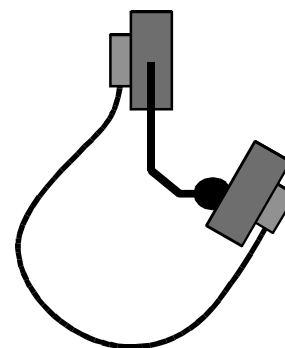
2. MATCH SOUNDS YOURSELF

a. Put the headset on. Adjust the frequency in SoundCreator to 350 Hz (this is very close to concert F).

b. Adjust the waveform in SoundAnalyzer to 350 Hz.

c. Listen to the tone in the headphones. Hum into the microphone to match the SoundCreator tone and the corresponding waveform in SoundAnalyzer.

d. You hear your own humming due to bone conduction in your head. You also hear the tone from the headphones. So you hear two tones at the same time. What is the physics term for what you hear when the two tones are just slightly off from each other?

3. FREQUENCY FINDER

a. Turn the speaker tone off. Obtain a tuning fork with a known frequency. Activate it by striking it with a soft object (use a rubber mallet or the heel of a shoe). Use SoundAnalyzer to verify the frequency stamped on the fork by the manufacturer.

b. Obtain a "Mystery Fork" from your instructor. Determine its frequency using SoundAnalyzer. Record your value, ask your instructor for the accepted value, and calculate a percent error.

i. Estimated frequency = _____

ii. Actual frequency = _____

iii. Percent error:

c. Wash the song flute (plastic recorder) given to your group. Map out the notes played by closing various finger holes. Keep the thumb hole closed. (See the reference table below.)
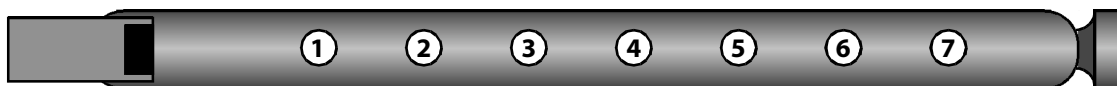
Thumbhole (closed) ____   +1____ +2____ +3____ +4____ +5____ +6____ +7___

d. Ask your instructor to "blow you a tone" on the organ pipe (or otherwise generate a tone having an unknown pitch). Report which note your instructor was playing.

Group Finding: Note = _____   Instructor Report: Note = _____

Concert Pitch:			
C = 261.6 Hz	D = 293.7 Hz	E = 329.6 Hz	F = 349.2 Hz
G = 392 Hz	A = 440 Hz	B = 493.9 Hz	C' = 532.2 Hz
D' = 587.4 Hz	E' = 659.2 Hz	F' = 698.4 Hz,	G' = 784 Hz
A' = 880 Hz.			