03:111 Name:_____
Basic Acoustics Section:_____
Due: Thursday, April 26, 2001

Chapter 8 (Sound Transmission contined) and Supplemental Reading 21 (Reverberation Time)

1. An incident wave of 10 μPa hits a wall with an absorption coefficient of 0.4. What is the amplitude of the reflected wave?

2. A room with a tile floor has a reverberation time of 60 ms. After adding padded seats, the reverberation time would increase, decrease, or stay the same?

3. An empty classroom has the following dimensions: 10 meters wide, 20 meters long, and 3 meters high. The floor is covered with heavy carpet and the walls and ceiling are constructed with plaster. For f = 500 Hz, α for the carpeting is 0.4 and α for the plaster is 0.1.

   a. Calculate the total absorption, **A'**, for the room. (Fill out the following table in addition to listing A').

	Surface Dimensions	Surface Area (S)	α	A
Side wall 1	_____	_____	_____	_____
Side wall 2	_____	_____	_____	_____
End wall 1	_____	_____	_____	_____
End wall 2	_____	_____	_____	_____
Floor	_____	_____	_____	_____
Ceiling	_____	_____	_____	_____

A' = _____

   b. Calculate $\mathbf{T_{60}}$ in ms (show your work):

c. Replace the plaster on the ceiling and one end wall with acoustical tile ($\alpha = 0.76$):

A' = _____ , and

$\mathbf{T_{60}}$ = _____ .

4. You are combining two sine waves of different frequencies. The first sine wave has a frequency of 515 Hz and the second sine wave has a frequency of 506 Hz, at what frequency will the combined frequencies beat? What pitch does this correspond to?

5. If you have a 500 Hz tone moving toward you at 90 meters/second, what is the altered frequency (what frequency do you hear)?

6. If the same 500 Hz tone is now moving away from you at 90 meters/second, what is the altered frequency (what frequency do you hear)?

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Supplemental Reading 21 (Auditorium Design)

1. Name **three** requirements of good acoustical environments.

2. What are the special requirements of auditoriums that will be used primarily for speech-related activities?

3. What are **three** acoustical defects that should be minimized in auditorium design? Of all possible acoustic defects, which is the most serious?

4. What are the perceptual attributes **and** the physical correlates of the two most important concert hall attributes?

5. What were **two** of the main complaints about the Philharmonic Hall at Lincoln Center, New York City, before it was reconstructed?