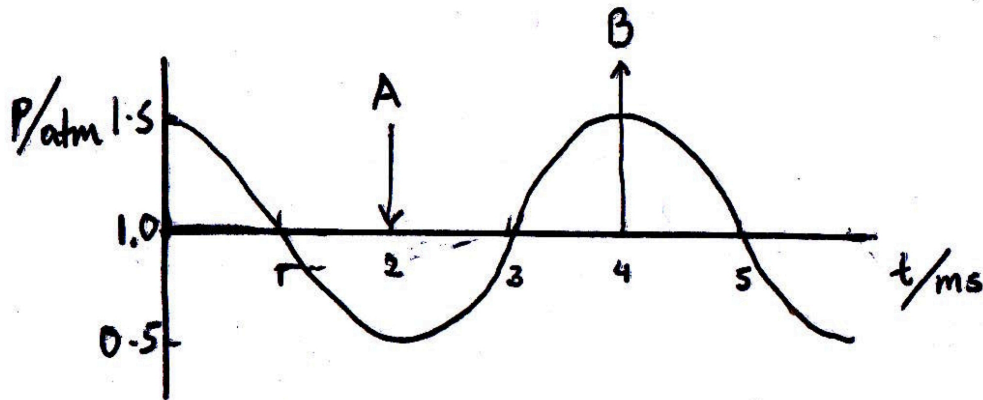
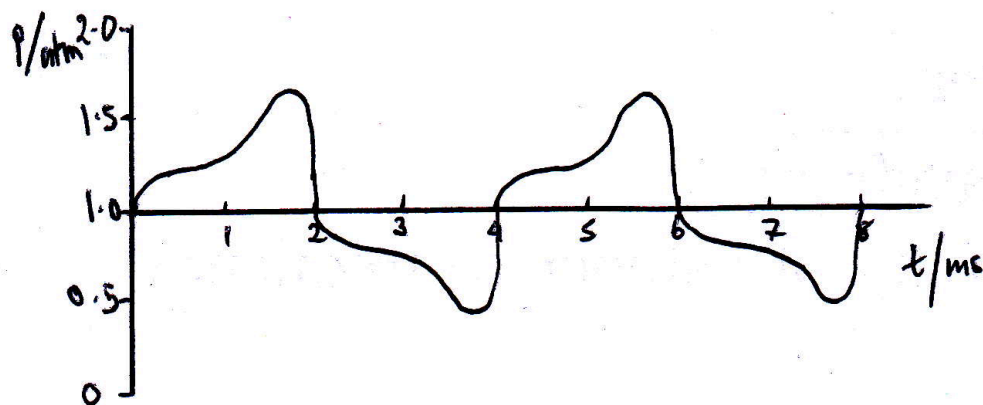


Exercises for Perception Lecture 7

1. The speed of sound in air is 330 m/s. What is the frequency of a simple tone with a wavelength of (a) 1m, (b) 2m, (c) 0.5m?
2. In granite, a sound of frequency 600Hz has a wavelength of 10m. What is the speed of sound in granite?
3. Sound travels faster in water than in air. In which medium does a 440Hz tone have the longer wavelength?
4. Study the following graph which represents a simple tone.



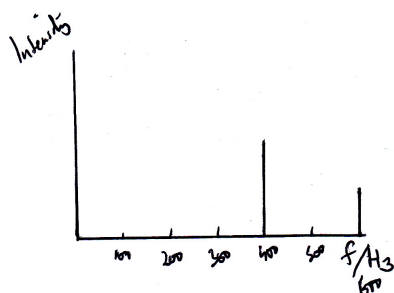
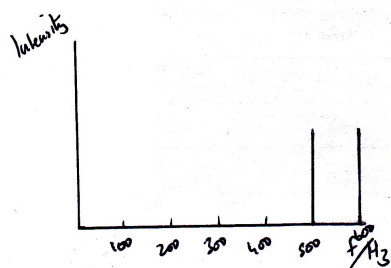
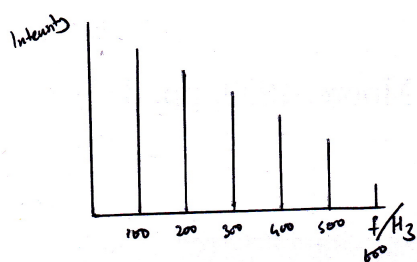
- a. What is the amplitude?
 - b. What is the period?
 - c. What is the frequency?
 - d. What is the phase difference between A and B?
5. Two sound sources, A and B, are both producing a simple tone at 600Hz. A has 4 times the intensity of B. How much greater is the amplitude of A than that of B?
 6. Study the following graph which represents a complex tone.



- What is the periodicity of this wave?
- What is the pitch of it?
- What is the period of the wave?

7. What range of frequencies are human ears most sensitive to?

8. Study the following graphs which show Fourier spectra for three different wave-forms.



- a. What is the fundamental frequency in each graph?
- b. What is the fourth harmonic in each graph?
- c. What is the third partial in each graph?
- d. What is the periodicity in each graph?
- e. What is the pitch in each graph?

9. If $I_1 = 10 \text{ W/m}^2$ and $I_2 = 20 \text{ W/m}^2$, what is the intensity in dB of I_2 relative to I_1 ?

10. S_1 and S_2 are two sounds with the same frequency. S_2 has twice the amplitude of S_1 . What is the intensity in dB of S_2 relative to S_1 ?

11. S_1 is a 600Hz simple tone and S_2 is a 200Hz simple tone. S_1 and S_2 have the same amplitude. What is the intensity of S_1 relative to that of S_2 in dB?

12. Suppose we have two sounds with the same frequency and amplitude. One wave travels in granite and the other travels in air. Which is more powerful and by how much? (Use the information given above about the speed of sound in granite.)