Today:	**17** Interference 1st 1/2	HW3 redo,	HW5
Wed:	**17** Interference 2nd 1/2	HW4 redo,	HW6
Lab:	**Lab2** Standing Waves and Resonance		
Fri:	**Review for Exam 1** (Ch 10, 16, 17)	HW5 redo,	HW7

Chapter 17

- **Introduction**

17.1 The Principle of Linear Superposition

- **Wave pulse: 'pull-up / pull-down' pairs**
- **Demo: two pulses on the long spring**
  - **Two up pulses interact**
  - **An up and a down pulse interact**
  - **the Principle of Linear Superposition**:
- **Definitions**
  - **Constructive interference:**
  - **Destructive interference:**

17.2 Constructive and Destructive Interference of Sound Waves

- **Full Waves 1-D propagation**
  - **Nodes**
  - **Anti-nodes**
- **Full Waves 2-D propagation**
  - To step this up from 1-D *toward* the case of sound waves, radiating in 3-D, we'll consider waves interacting in 2-D.
  - **Wave tank demo**

  Conditions of Constructive and Destructive interference

- **3-D Sound Waves**

  Demo: constructive & destructive sound waves.

Example1: I have two speakers, 1 and 2, and a microphone all arranged in a line, with the microphone between the speakers. The speakers are synchronously producing 900 Hz signals, and the speed of sound is 343 m/s. If the microphone is at a point of constructive interference,

- A) How far should I move speaker 1 to create another point of constructive interference?
- B) Alternatively, how far toward speaker 1 should I move the microphone to arrive at the next point of constructive interference?

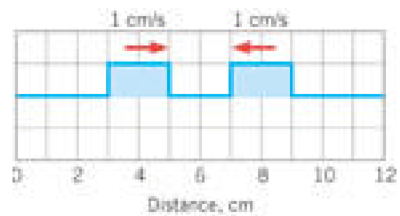
17.3 Diffraction

- **2-D**
  - **Demo & Observations**
  - **Application**
  - **Dependence on width and wavelength**
- **3-D**
  - **Dependence on width and wavelength**
    - **Demo**

- **Example2:** Say you have a speaker with a 6 inch (0.15 m) woofer and a 3 inch (0.075 m) tweeter. Given that the speed of sound is about 343 m/s, what would be the minimum frequency for each that doesn't "beam" at all?

HW6

3. The drawing graphs a string on which two rectangular pulses are traveling at a constant speed of 1 cm/s at time t = 0 s. Using the principle of linear superposition, draw the shape of the string's pulses at t = 1 s, 2 s, 3 s, and 4 s.



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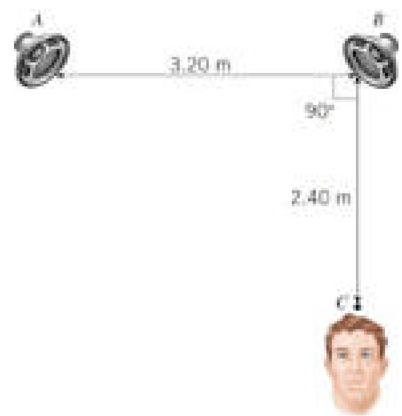
4. In the Figure, suppose that the separation between speakers A and B is 5.00 m and the speakers are vibrating in phase. They are playing identical 125-Hz tones, and the speed of sound is 343 m/s. What is the largest possible distance between speaker B and observer C, such that he observes destructive interference?



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10. The entrance to a large lecture room consists of two side-by-side doors, one hinged on the left and the other hinged on the right. Each door is 0.700 m wide. Sound of frequency 607 Hz is coming through the entrance from within the room. The speed of sound is 343 m/s. What is the diffraction angle θ of the sound after it passes through the doorway when (a) one door is open and (b) both doors are open?