UCONN Physics Practice Quiz — Name: _____
Waves, Sound — /55 — Date: _____ Period:_____

Problems: Show all of your work and label all of your units.

1. A sound is directed toward a vertical cliff 660 m from the source. A reflected pulse is detected 4.0 seconds after the pulse is produced. 2 pts each.

   a. What is the speed of sound in air? [330 m/s]

   b. The sound pulse has a frequency of 500 Hz. What is its wavelength? [0.66 m/wave]

   c. What is the period of the pulse? [2.0×10^{-3} sec/ wave]

2. A bat emits sound whose frequency is 91 kHz. The air temperature is 35 ^{0}C. Find the wavelength of the sound. 5 pts. [3.87×10^{-3} m/wave]

3. Use the Doppler equation for a moving source to calculate the observed frequency for a 250-Hz source of sound if it is moving with a speed of ____ . (Assume speed of sound in air is 340 m/s.) (2 pts each)

   a. 300. m/s towards the observer. (2125 Hz)

   b. 300. m/s away from the observer. (133 Hz)

   c. 100 m/s towards the observer when the observer is moving 50 m/s away from source. (302 Hz)

   d. 100 m/s away from the observer when the observer is moving 50 m/s away from source. (165 Hz)

4. The distance between a loudspeaker and the left ear of a listener is 2.7 m. 4 pts each.

   a. Calculate the time required for sound to travel this distance if the air temperature is 20 ^{0}C.
   [7.87 x 10^{-3} sec]

   b. Assuming the sound frequency is 523 Hz, how many wavelength of sound are contained in this distance? [4.11 waves]

5. What is the intensity of a sound whose intensity level is 60 dβ ? [1 x 10^{-6} W/m^2] 2 pts.

6. The "G" string on a violin has a fundamental frequency of 196 Hz, the length of the vibrating portion is 32 cm and has a mass of 0.50 grams. Under what tension the string must be placed? [24.6 N] 6 pts.

7. In the tubes below, DRAW the modes of vibration experience by both the open tubes and closed tubes. [own answer] 6 pts.

1st Harmonic

1st Harmonic

2nd Harmonic

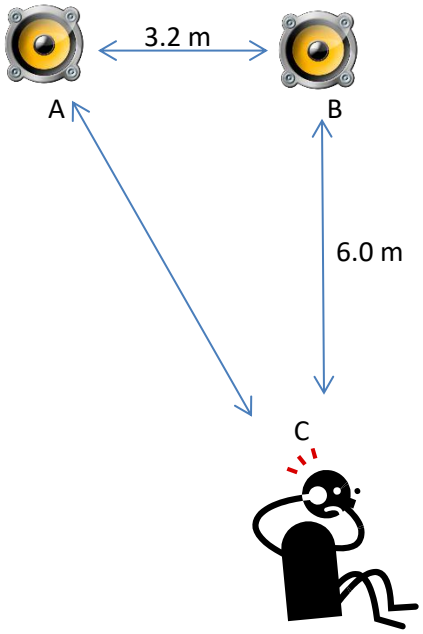
3rd Harmonic

3rd Harmonic

5th Harmonic

8. The speed of sound waves in air is found to be 340 m/s. Determine the fundamental frequency (1st harmonic) of an open-end air column that has a length of 67.5 cm. [252 Hz] (5 pts)

9. In the diagram below, the two speakers are separated by 3.2 m, and both are reproducing identical 214 Hz tones. The speed of sound is 343 m/s. Suppose point C is 6.0 m directly in front of speaker B. Does constructive or destructive interference occur at point C? 5 pts. [destructive - solve & explain]



10. A piano tuner uses tuning forks to determine if the piano is "in tune". She strikes the Middle C key on the piano and compares it to a 262 Hz tuning fork. She can tell the piano is not in tune because she hears a 2 Hz beat frequency. To determine the exact frequency she compares the piano's note she compares it to a 270 Hz tuning fork. This time she hears a 6 Hz beat frequency. What is the frequency of the piano's unturned Middle C note? 4 pts. [264 Hz]