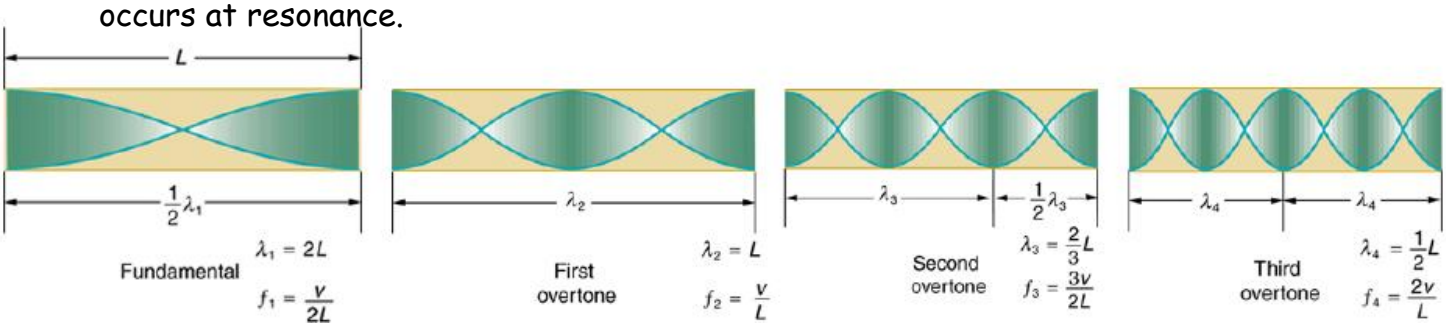
Physics 200 (Stapleton) Name: _____

Practice – 16.10 & 17.5 Superposition, Interference and Resonance

1. A "showy" custom-built car has two brass horns that are supposed to produce the same frequency but actually emit 263.8 and 264.5 Hz. What beat frequency is produced?

2. A piano tuner hears a beat every 2.00 s when listening to a 264.0-Hz tuning fork and a single piano string. What are the two possible frequencies of the string?

3. Another type of tube is one that is <u>open at both ends</u>. Examples are some organ pipes, flutes, and oboes. The resonances of tubes open at both ends can be analyzed in a very similar fashion to those for tubes closed at one end. The air columns in tubes open at both ends have maximum air displacements at both ends. A standing wave occurs at resonance.




   A. What is the fundamental frequency of a 0.672-m-long tube, open at both ends, on a day when the speed of sound is 344 m/s?
   B. What is the frequency of its second harmonic?

4. How long must an open-pipe (at both ends) instrument be in order to have a fundamental frequency of 262 Hz (this frequency corresponds to middle C on the evenly tempered chromatic scale) on a day when air temperature is 20.0°C?

5. A. Find the length of an organ pipe closed at one end that produces a fundamental frequency of 256 Hz when air temperature is 18.0°C.
~~B. What is its fundamental frequency at 25.0°C?~~ (I forgot to do this one in my video)

**<u>Solutions</u>**:

1. 0.7 Hz 2. 263.5 Hz, 264.5 Hz 3. A. 256 Hz B. 512 Hz 4. 0.655 m
5. A. 0.334 m B. 259 Hz