

Assignment 5
Physics of Music - 2016
Physics 341

1. Two loudspeakers are run so that the cones vibrate with the same velocity and the same frequency of 440. One of the cones is 5cm across, and the other is 10cm. How much difference in loudness (ie intensity of sound) is there between the two speakers? Express in both dB and relative intensities. (Remember both efficiency and size).

2. In order to make her tuning fork more audible, Alice glues a piece of paper to one of the tines of her tuning fork. Why would this help? Would it be better or worse for her to glue a piece of paper to both tines?

3. A vibrating string on its own makes very little sound. Why? What is the purpose of the body of a guitar?

4a) How much sharper or flatter (give a ratio) is a just major third (5/4) to two Pythagorean whole tones?

b) Three major thirds (four semitones) could be said to be an octave (twelve semitones). How mistuned would that octave be if each of those major thirds were just major thirds?

5) In just tuning, what is the size (ratio) of the "semitone" between a minor third and a major third? What is the size of the semitone between a major third and a perfect fourth? (This variable size of semitones was already recognized by the Pythagoreans, who wondered about it and argued for it)

6) Two notes, tuned an equal tempered perfect fifth apart are played together. How many beats per second would you get between the first three harmonics of the two notes that have the same frequency in Just tuning if the lower note was 220Hz?

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