Physics of Music Practice Questions

- 1. What is the sound intensity of a 45 dB tone?
- 2. Suppose a trumpet produces a SIL of 102 dB when 1 m from a listener. How loud (in dB) will the same trumpet be for a listener located 10 m away?
- 3. A set of instruments are all the same distance from a listener a base drum producing 103 dB, two violins each producing 96 dB and a tuba producing 105 dB. What is the combined sound intensity?
- 4. What is the wavelength of a 10 Hz wave passing through water if the speed of sound in water is 1500 m/s?
- 5. In doing a resonance experiment using a tube closed on one end and 0.06 m in diameter and 0.706 m long the fundamental was found to be 113 Hz. What is the wavelength of this sound?
- 6. From question 5, explain how you could use this information to determine the air temperature when this experiment was done. What was that temperature.
- 7. A string has a length of 122 cm and a mass of 1.3 g. What is the linear-mass density of this string in kg/m?
- 8. Suppose the string in question 7 was put under a tension of 125 N how fast would a transverse wave travel along this string?
- 9. If the string in question 8 was 0.65 m long what fundamental note would it produce?
- 10. What is the closest note to the note in question 9 (assume tempered scale, A=440 Hz)? How many cents sharp or flat is this note?
- 11. How would the note in question 9 change if you doubled the tension and halved the length of the string?
- 12. You are listening to two jazz bands on floats at a parade. One float is coming toward you at 5 m/s while the other is moving away from you at 2 m/s. If the clarinets in both bands play an A440 at the same time describe in detail the sound that you will hear? Assume the air temperature is 18C.

Answers:		7.	1.586 x 10 ⁻³ kg/m
1. 3.16 x 10 ⁻⁸ W	/m²	8.	342.5 m/s
2. 82 dB		9.	263.5 Hz
3. 107.7 dB		10.). C4, 12.5c sharp
4. 150 m/s		11.	L. 745.3 Hz
5. 2.904 m		12.	2. 440 Hz, beat 5.2 Hz
6. V = 328.2 m/s	s, T= -4.7 C		