Physics of Music – Activity #2

1. In a carefully controlled environment two pure tones are created. One tone is at 100 Hz, the other is at 1000 Hz and both have an intensity of 10^{-8} W/m^2 at the ear of a listener. Which tone is perceived as loudest and by approximately how many times (2x as loud, 3x etc…) (3 marks)

2. Complete the following table: (4 marks)

V = Wave Speed (m/s)	F = frequency (Hz)	L = wavelength (m)
100	40	
343	440	
	124	0.213
16		0.25

3. As an example of acoustic art we are proposing to the university administration the installation of an aeolian wind pavilion similar to the one shown on the right. Write a paragraph that explains to the administration how this will work! (3 marks)

4. The King's administration opts for a more modest installation – you are given a small budget for aluminum tubing 4 cm in diameter (and hearty best wishes!) and asked to construct a "pan-pipe" wind pavilion that could play an e2-minor pentatonic scale. The tubing costs $20/m. If you are careful – how much aluminum tubing will you need and how much will this cost? Decide if it will be open both ends or closed one end and explain your choice. Note that the installation is outdoors where the average air temperature is 0^o C. (5 marks)
5. A wire of density 2 x 10-4 kg/m and length 1.2 m is stretched with a tension of 100 N. Find the fundamental and first two overtones produced when this string is plucked. Sketch what the FFT would look like for this sound. (5 marks)