Standing Waves

	Closed/Fixed at Both Ends $L_n = \frac{n\lambda}{2}$
1st resonance (fundamental frequency)	○ ○
2nd resonance	○ ○
3rd resonance	○ ○
4th resonance	○ ○

Example: a guitar string is 50 cm long and is vibrating at the third harmonic with a frequency of 550 Hz. Calculate the speed of the wave in the string.

Standing Waves… continued

	Open at Both Ends $L_n = \frac{n\lambda}{2}$
1st resonance (fundamental frequency)	
2nd resonance	
3rd resonance	
4th resonance	

Example: an open air column is vibrating at the third resonance length. The column is 25cm long and the air temperature is 28°C. Calculate the frequency of the sound.

Standing Waves…continued

	Closed/Fixed at One End & Open at the Other $L_n = \frac{(2n-1)\lambda}{4}$
1st resonance (fundamental frequency)	
2nd resonance	
3rd resonance	
4th resonance	

Example: a metal rod, fixed at one end, is vibrating at the 2nd harmonic and has a measured wavelength of 20 cm. Calculate the length of the rod. If the rod is vibrating 40 times every 2 seconds calculate the speed of the wave.