

Ben Hammond |

Physics Period 3 |

Dr. Kasic |

250321

Speed of Sound Lab

Ben Hammond

Physics Period 3

Dr. Kasic

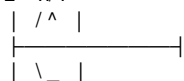
250321

Pre-Lab Questions

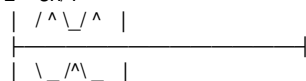
1. Harmonics practice questions.

a. The tube will resonate at $L = n\lambda/4$, when $n = 1, 3, 5, 7$, etc. Sketch wavelengths in the diagrams of the open ended tubes to show resonance at $L = \lambda/4$, $L = 3\lambda/4$, and $L = 5\lambda/4$. You may want to refer to your book.

$L = \lambda/4$



$L = 3\lambda/4$

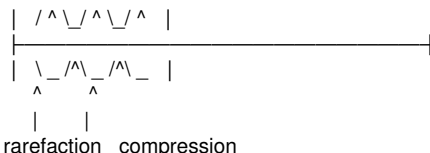


$L = 5\lambda/4$



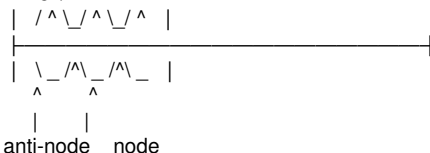
b. Look up the terms *rarefaction* and *compression* and label where these occur in the diagram represented by $L = 5\lambda/4$.

$L = 5\lambda/4$



c. Look up the terms *anti-node* and *node* and label where these occur in the same diagram.

$L = 5\lambda/4$



2. The velocity of sound in air in meters per second is modeled by the equation $v = 331 + 0.6T$ where "T" is in degrees Celsius.

a. Use the temperature probe to record the temperature near your apparatus. Record your finding.

21°C

b. Calculate the accepted velocity of sound at the current room temperature using the given equation. You will later compare your results to this value.

$$v = 331 + 0.6 * 21$$

$$v = 343.6 \text{ m/s}$$

Data

Hz	L (m)	L_eff (m)	V_s (m/s)
256	3.3E-01	3.4E-01	3.5E+02
288	2.8E-01	2.8E-01	3.2E+02
320	2.5E-01	2.5E-01	3.2E+02
341.3	2.3E-01	2.3E-01	3.1E+02
384	2.0E-01	2.0E-01	3.1E+02
426	1.8E-01	1.8E-01	3.1E+02
480	1.7E-01	1.7E-01	3.3E+02
512	1.6E-01	1.6E-01	3.3E+02
Average:		3.2E+02	

$\text{err} = | \text{accepted} - \text{calculated} | / \text{accepted} * 100$

$\text{err} = | 343.6 - 320 | / 343.6 * 100$

$\text{err} = 6.87\%$

Graph:

Post Lab Questions

1. What does the slope in the line in your graph represent?
2. Refer back to pre-lab question 1. When determining L, why would one not consider $n = 2, 4, 6$, etc?
3. The low E string on a guitar is 64.5cm long guitar and is tuned to play an "open" note at 82.41Hz.
 1. Find the wavelength of the fundamental vibration.
 2. What is the wavelength of the sound produced?
 3. Why is there a difference in your answers for part a and b?

*Last updated:
250321*