Physics
Sound Waves

This unit will allow each student to:

a. gain a better understanding of the behavior and characteristics of sound as a wave
b. continue making proper scientific measurements and calculations
c. define and properly use all vocabulary
d. properly apply all terms and concepts in describing/explaining real world examples
e. continue making and interpreting scientific graphs
f. teach someone else the concepts discussed
g. practice proper laboratory safety

This will be accomplished by each student that is able to:

1. recognize and relate SI and USCS units of period, frequency, wavelength, wave speed, and loudness
2. recognize period, frequency, wavelength, wave speed, and loudness by the units only
3. draw and label the parts of longitudinal waves
4. identify the wavelength, rest position, compression, rarefaction, and amplitude of a longitudinal wave
5. use the relationships of wave speed, frequency, wavelength, and period in calculations
6. describe the creation of sound waves
7. relate the speed of sound to medium properties and conditions
8. describe the intensity of a sound wave in terms of loudness and the units of decibels
9. compare the natural frequencies of various objects
10. describe forced vibrations as they relate to natural frequency and resonance
11. describe the interference of sound waves in terms of beats and beat frequency
12. illustrate and identify examples of the Doppler effect
13. describe the reflection and reverberation of sound waves
14. describe the diffraction of sound waves
15. explain the resonance of various objects due to forced vibrations

Textbook Reference – Physics (HMH)

Chapters/Sections **12**

Key Terms – *write the definitions of the boldface terms on your own paper, definitions are available at thetеterszone.net*

oscillation, vibration, period, frequency, natural frequency, medium, interference, rest position, wavelength, amplitude, decibel, longitudinal wave, compression, rarefaction, **sound, intensity/loudness/volume, pitch, resonance, forced vibration, diffraction, Doppler effect, beats, reflection, reverberation**

Sound Waves review sheet – **Answer on a separate sheet of paper**

A. What is the source of a sound wave?
B. What types of materials can transmit sound waves? Where does sound travel faster?
C. Why does sound travel faster in solids and liquids as compared to gases?
D. What happens to the speed of sound in air as the air temperature increases?
E. Explain why sound cannot travel through a vacuum.
F. A sound wave produced by a clock chime 515 m away is heard 1.5 s later.
    a. What is the speed of the sound wave?
    b. The sound wave has a frequency of 436 Hz. What is its period?
    c. What is its wavelength?
G. A hiker shouts toward a vertical cliff 685 m away. The echo is heard 4.0 s later.
    a. What is the speed of the sound wave?
    b. The wavelength of the sound is 0.75 m. What is its frequency?
    c. What is the period of the wave?
H. A sound wave with frequency of 262 Hz has a wavelength of 1.29 meters. What is the speed of the sound wave?
I. If the speed of sound were doubled, what would happen to the frequency of the sound wave? What would happen to the wavelength?
J. How many times louder is a 70 dB sound than a 40 dB sound?
K. When a wave source moves toward a receiver, does the receiver encounter an increase in wave frequency, wave speed, or both?
L. A car's horn is sounding as the car speeds by you. Describe how you hear the horn as the car approaches and then passes by.
M. Distinguish between *constructive* interference and *destructive* interference in sound waves.
N. How can you observe interference in sound waves?
O. What is the beat frequency of two tuning forks, one has a frequency of 440 Hz and the other a frequency of 443 Hz?
P. You got a really cheap seat at a popular concert. When you arrive at your seat you realize why...there is a support column between your seat and the stage. As a result you cannot see the show. Will you be able to hear the show? Explain.
Q. What is a forced vibration?
R. The handle of a tuning fork is held against a table top. Why does the sound produced become louder? How will this affect the amount of time the fork will vibrate?
S. Describe what happens when an object is forced to vibrate at its natural frequency?
T. Why do different objects make different sounds when dropped on the floor?
U. You have three tuning forks, 256 Hz, 440 Hz, and 512 Hz. Which is longer and why?
V. Why is it dangerous for people in the balcony of an auditorium to stamp their feet in a steady rhythm?