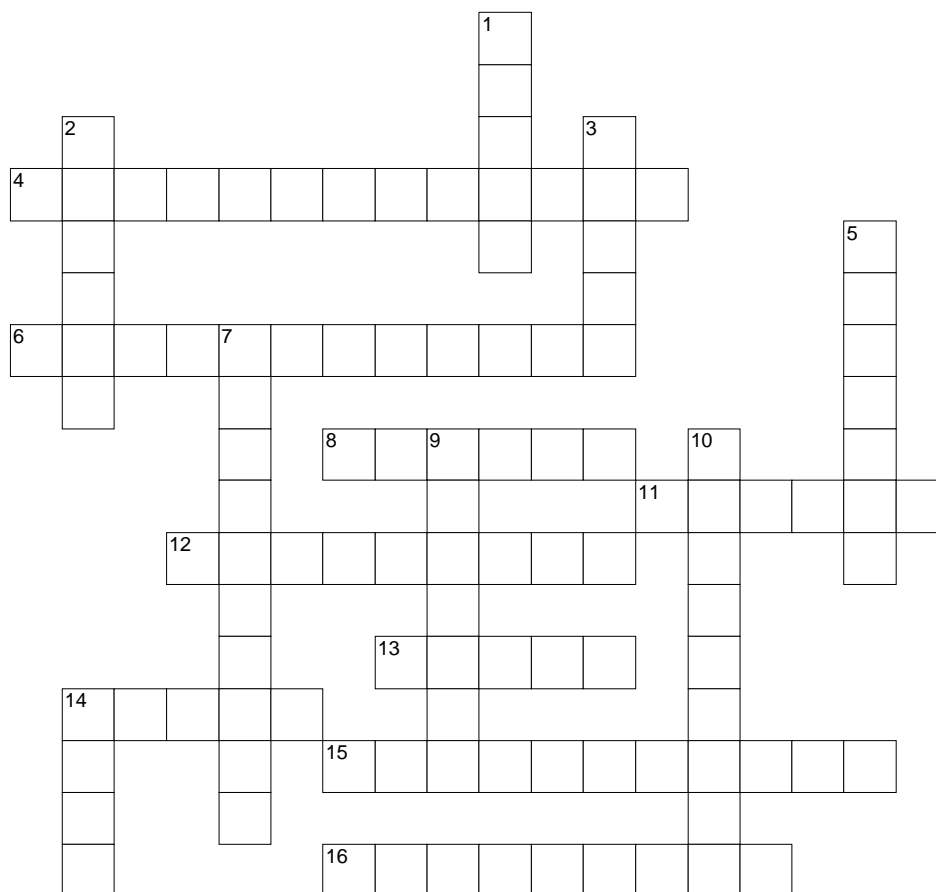


Review - Unit 12



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Across

- 4 multiple echoes
 6 "dead spots" in an auditorium are the results of destructive -
 8 twice the frequency of a musical note
 11 The pitch of a wind instrument depends on the ____ of the air column
 12 the fundamental mode plus overtones
 13 The frequency of the ____ overtone of a 100 Hz note is 600 Hz.
 14 mixture of sound frequencies with a pattern
 15 The ____ mode determines the pitch of a musical sound
 16 whole number multiples of the fundamental mode

Down

- 1 pulsing sound as the result of interference of sound waves of slightly different frequencies
 2 The first overtone of a note is the ____ harmonic
 3 random mixture of many sound frequencies
 5 Sound ____ depends on the number and relative intensity of harmonics
 7 the bending downward of sound waves as they move into a layer of cool air is an example of -
 9 Decreasing the ____ of a vibrating string lowers the pitch.
 10 When a tuning fork matches the frequency of piano string, ____ occurs.
 14 The pitch of a percussion instrument depends on -

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PROBLEMS: Give the formula used!

1. What is the speed of sound in air when the temperature is -32°C ?
2. How many seconds will it take a girl to hear her echo when she yells toward a mountain 220 m away ($T = 10.0^{\circ}\text{C}$)?
3. What is the wavelength of the sound of a wave produced in water by a 256 Hz tuning fork? The velocity of sound in water is 1497 m/s.
4. What is the intensity of a 450 w sound heard 26 m from the source?
5. Is an 80 dB sound twice as loud as a 40 dB sound? Explain.

FILL IN THE BLANKS:

1. Sound waves are _____, _____ waves, consisting of _____, and _____ rather than crests and troughs.
2. The frequency of a sound wave determines the _____ of the sound, and the amplitude determines the _____.
3. The velocity of sound waves depends on the _____.
4. _____ is characterized by a random mixture of frequencies with no readily identified pitch.
5. The upper limit of sound intensity is called the threshold of _____, and the lower limit is called the threshold of _____, which is 1.0×10^{-12} _____/_____ at 1000 Hz.

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6. Compared to the speed of light, sound is much _____, and compared to the energy of light, sound is much _____.
7. Sound waves cannot travel in a _____.
8. Of the 3 phases of matter, sound travels the fastest in _____ and slowest in _____. Sound travels _____ in hot air than in cold air.
9. The _____ range of frequencies for the average human is 20- _____ Hz. Sounds of higher frequencies are called _____ and of lower frequencies are _____.
10. The _____ is the "dimensionless" unit for β which is relative _____.
11. Sound intensity is _____ divided by _____. It is the best measure of _____ of sound which cannot be measured exactly because of differences among people's ears.
12. Sound intensity _____ as the distance from the source increases.
13. Two equations involving the speed of sound are: $v =$ _____ and $v =$ _____.
14. The change in pitch of a sound as the source and observer move towards or away from each other is the _____. Two practical applications are: _____ ; _____.
15. _____ occurs when an outside force matches the _____ frequency of an object. The result is a dramatic increase in the _____ of the waves.
16. _____ can be heard when two tuning forks of different frequencies are sounded together. This results from constructive and destructive _____ of the two sound waves produced.
17. Echoes are _____ sound waves, and _____ are multiple echoes.
18. _____ - One is the speed of sound. A _____ plane travels faster than sound. Trailing behind it is a _____ shaped region of compressed air producing a _____.