

**Physics: Sound**  
**Unit 11: Pre-Test**

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**Directions:** Use provided formula and conversion sheets provided. DO NOT write on this Pre-test if you wish to do your best on the actual test. I will not collect this pre-test, but writing on it will put you at a disadvantage for studying. Each question is worth 2 pts. You will have one class period to complete the actual test, therefore time yourself appropriately and don't spend too much time on any one question.

- 1) Which of the following is a false statement?
  - A) Sound waves are longitudinal pressure waves.
  - B) Sound can travel through a vacuum.
  - C) Light travels very much faster than sound.
  - D) The transverse waves on a vibrating string are different from sound waves.
  - E) "Pitch" (in music) and frequency have approximately the same meaning.
  
- 2) In general, sound is conducted fastest through
  - A) gases.
  - B) liquids.
  - C) solids.
  - D) a vacuum.
  
- 3) Sound vibrations with frequencies greater than 20,000 Hz are called
  - A) infrasonics.
  - B) ultrasonics.
  - C) supersonics.
  - D) none of the above
  
- 4) Suppose that a sound source is emitting waves uniformly in all directions. If you move to a point twice as far away from the source, the frequency of the sound will be
  - A) unchanged.
  - B) half as great.
  - C) one-fourth as great.
  - D) twice as great.
  
- 5) For spherically diverging waves, intensity is proportional to
  - A)  $R^2$ .
  - B)  $R$ .
  - C)  $1/R$ .
  - D)  $1/R^2$ .
  
- 6) You double your distance from a sound source that is radiating equally in all directions. What happens to the intensity of the sound? It reduces to
  - A) one-half its original value.
  - B) one-fourth its original value.
  - C) one-sixteenth its original value.
  - D) none of the above
  
- 7) You double your distance from a sound source that is radiating equally in all directions. What happens to the intensity level of the sound? It drops by
  - A) 2 dB.
  - B) 3 dB.
  - C) 6 dB.
  - D) 8 dB.

- 8) Which of the following increases as a sound becomes louder?
- A) frequency
  - B) wavelength
  - C) amplitude
  - D) period
  - E) velocity
- 9) When sound passes from air into water
- A) its wavelength does not change.
  - B) its frequency does not change.
  - C) its velocity does not change.
  - D) all of the above
- 10) Pressure and displacement waves are
- A) in phase.
  - B)  $45^\circ$  out of phase.
  - C)  $90^\circ$  out of phase.
  - D)  $180^\circ$  out of phase.
- 11) Consider the standing wave on a guitar string and the sound wave generated by the guitar as a result of this vibration. What do these two waves have in common?
- A) They have the same wavelength.
  - B) They have the same velocity.
  - C) They have the same frequency.
  - D) More than one of the above is true
  - E) None of the above is true.
- 12) In a resonating pipe which is open at both ends, there
- A) are displacement nodes at each end.
  - B) are displacement antinodes at each end.
  - C) is a displacement node at one end and a displacement antinode at the other end.
  - D) none of the above
- 13) The lowest tone to resonate in an open pipe of length  $L$  is 200 Hz. Which one of the following frequencies will not resonate in the same pipe?
- A) 400 Hz
  - B) 600 Hz
  - C) 800 Hz
  - D) 900 Hz
- 14) An open pipe of length  $L$  is resonating at its fundamental frequency. Which statement is correct?
- A) The wavelength is  $2L$  and there is a displacement node at the pipe's midpoint.
  - B) The wavelength is  $2L$  and there is a displacement antinode at the pipe's midpoint.
  - C) The wavelength is  $L$  and there is a displacement node at the pipe's midpoint.
  - D) The wavelength is  $L$  and there is a displacement antinode at the pipe's midpoint.
- 15) The third harmonic of a complex tone has a frequency of 1200 Hz. What is the frequency of the fourth harmonic?
- A) 400 Hz
  - B) 900 Hz
  - C) 1600 Hz
  - D) 4800 Hz
- 16) A pipe of length  $L$  closed at one end is resonating at its fundamental frequency. Which statement is correct?
- A) The wavelength is  $4L$  and there is a displacement node at the pipe's open end.
  - B) The wavelength is  $4L$  and there is a displacement antinode at the pipe's open end.
  - C) The wavelength is  $L$  and there is a displacement node at the pipe's open end.
  - D) The wavelength is  $L$  and there is a displacement antinode at the pipe's open end.

- 17) A person stands between two speakers driven by the same source. Each speaker produces a tone with a frequency of 200 Hz (in phase with each other) on a day when the speed of sound is 330 m/s. The person is 1.65 m from one speaker and 4.95 m from the other. What type of interference does the person sense?
- A) constructive
  - B) destructive
  - C) both constructive and destructive
  - D) neither constructive nor destructive
- 18) In order to produce beats, the two sound waves should have
- A) the same amplitude.
  - B) slightly different amplitudes.
  - C) the same frequency.
  - D) slightly different frequencies.
- 19) Two pure tones are sounded together and a particular beat frequency is heard. What happens to the beat frequency if the frequency of one of the tones is increased?
- A) It increases.
  - B) It decreases.
  - C) It does not change.
  - D) It could either increase or decrease.
- 20) Consider the airport ramp worker who is directing airplanes to their parking spot after landing. They wear ear protection but this only reduces the noise intensity by 40 decibels. If the average airplane jet engine makes 140 decibels of noise, how long could the worker remain in that specific environment before permanently damaging their hearing?
- A) 1 hour
  - B) 30 minutes
  - C) 15 minutes
  - D) 7.5 minutes
  - E) 3 minutes & 45 seconds
- 21) On a day when the speed of sound in air is 340 m/s, a bat emits a shriek whose echo reaches it 0.0250 s later. How far away was the object that reflected back the sound?
- A) 4.25 m
  - B) 8.50 m
  - C) 0.425 m
  - D) 0.850 m
- 22) You drop a stone into a deep well and hear the splash 2.5 s later. How deep is the well? (Ignore air resistance, and assume the velocity of sound is 340 m/s.)
- A) 25 m
  - B) 27 m
  - C) 29 m
  - D) 31 m
- 23) What is the intensity level of a sound with an intensity of  $1 \times 10^{-3} \text{ W/m}^2$ ?
- A) 30 dB
  - B) 60 dB
  - C) 90 dB
  - D) 96 dB
- 24) What is the intensity of a 70-dB sound?
- A)  $10^{-4} \text{ W/m}^2$
  - B)  $10^{-5} \text{ W/m}^2$
  - C)  $10^{-6} \text{ W/m}^2$
  - D)  $10^{-7} \text{ W/m}^2$
- 25) The intensity level by 15 engines in a garage is 100 dB. What is the intensity level generated by one engine?
- A) 67 dB
  - B) 13 dB
  - C) 44 dB
  - D) 88 dB
- 26) A sound has a frequency of 1000 Hz. If a listener moves with a speed of 30 m/s away from the stationary source, what is the frequency heard by the observer? (The sound speed is 340 m/s.)
- A) 912 Hz
  - B) 919 Hz
  - C) 1000 Hz
  - D) 1090 Hz

- 27) The intensity at a distance of 6.0 m from a source that is radiating equally in all directions is  $6.0 \times 10^{-10} \text{ W/m}^2$ . What is the power emitted by the source?  
 A)  $2.1 \times 10^{-8} \text{ W}$       B)  $2.7 \times 10^{-7} \text{ W}$       C)  $2.1 \times 10^{-6} \text{ W}$       D)  $2.7 \times 10^{-5} \text{ W}$
- 28) The intensity at a distance of 6.0 m from a source that is radiating equally in all directions is  $6.0 \times 10^{-10} \text{ W/m}^2$ . What is the intensity level in dB?  
 A) 18 dB  
 B) 23 dB  
 C) 28 dB  
 D) 32 dB
- 29) A barking dog delivers about 1 mW of power, which is assumed to be uniformly distributed in all directions. What is the intensity level at a distance 5.00 m from the dog?  
 A) 61 dB  
 B) 63 dB  
 C) 65 dB  
 D) 68 dB
- 30) The intensity level is 65 dB at a distance 5.00 m from a barking dog. What would be the intensity level if two identical dogs very close to each other are barking?  
 A) 65 dB  
 B) 68 dB  
 C) 130 dB  
 D) 136 dB
- 31) The frequency of the third harmonic of an open pipe is 900 Hz. What is the length of the pipe?  
 A) 0.189 m  
 B) 0.283 m  
 C) 0.567 m  
 D) 1.13 m
- 32) A closed organ pipe of length 0.75 m is played when the speed of sound in air is 340 m/s. What is the fundamental frequency?  
 A) 57 Hz      C) 170 Hz  
 B) 113 Hz      D) 227 Hz
- 33) A train is traveling away from you (standing still) at 120 km/h. It blows its whistle, and you hear a tone of 400 Hz. Take the speed of sound to be 340 m/s. What is the actual frequency of the whistle?  
 A) 361 Hz    B) 364 Hz    C) 439 Hz    D) 444 Hz
- 34) You are moving at 120 km/h toward a stationary train. The train blows its 400-Hz whistle. Take the speed of sound to be 340 m/s. What frequency do you hear?  
 A) 444 Hz  
 B) 439 Hz  
 C) 364 Hz  
 D) 361 Hz
- 35) The Concord airplane used to fly from the United States to Europe with a Mach number of 1.05 where the air temperature is  $5.0^\circ\text{C}$ . What was the speed of the plane?  
 A) 334 m/s  
 B) 337 m/s  
 C) 351 m/s  
 D) 359 m/s

CHAPTER / UNIT # 11

COPY # \_\_\_\_\_

FORM Pre-Test

/70

NAME: KEY

PERIOD: \_\_\_\_\_

DATE: \_\_\_\_\_

**DIRECTIONS:** Use the back side for any Bonus problems and be sure to identify the bonus area. The "Work Area" is to be used like scrap paper. If you need additional paper, raise your hand and I will provide you additional paper. Any extra scrap paper needs to be stapled to this answer sheet. GOOD LUCK!!

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|--------------|--------------|
| <u>B</u> 1.  | <u>A</u> 26. |
| <u>C</u> 2.  | <u>B</u> 27. |
| <u>B</u> 3.  | <u>C</u> 28. |
| <u>A</u> 4.  | <u>C</u> 29. |
| <u>D</u> 5.  | <u>B</u> 30. |
| <u>B</u> 6.  | <u>C</u> 31. |
| <u>C</u> 7.  | <u>B</u> 32. |
| <u>C</u> 8.  | <u>C</u> 33. |
| <u>B</u> 9.  | <u>B</u> 34. |
| <u>C</u> 10. | <u>C</u> 35. |
| <u>C</u> 11. | _____ 36.    |
| <u>B</u> 12. | _____ 37.    |
| <u>D</u> 13. | _____ 38.    |
| <u>A</u> 14. | _____ 39.    |
| <u>C</u> 15. | _____ 40.    |
| <u>B</u> 16. | _____ 41.    |
| <u>B</u> 17. | _____ 42.    |
| <u>D</u> 18. | _____ 43.    |
| <u>D</u> 19. | _____ 44.    |
| <u>C</u> 20. | _____ 45.    |
| <u>A</u> 21. | _____ 46.    |
| <u>C</u> 22. | _____ 47.    |
| <u>C</u> 23. | _____ 48.    |
| <u>B</u> 24. | _____ 49.    |
| <u>D</u> 25. | _____ 50.    |

**WORK AREA**