

## Chapter 12

Which of the following is most closely identified with the loudness of a musical note?

- A) Frequency
- B) Velocity
- C) Phase
- D) Amplitude

A guitar string is plucked and set into vibration. It disturbs the surrounding air, resulting in a sound wave. Which entry in the table below is correct?

	<u>in string</u>	<u>in air</u>
A) the wave is transverse	yes	yes
B) frequency changes if string is tightened	yes	no
C) wave is transmitted by particle vibrations	no	yes
D) wave speed increases if temperature rises	no	yes
E) wave transports energy	yes	no

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Consider the standing wave on a guitar string and the sound wave traveling through the air that is generated by the guitar string as a result of this vibration. What do the two waves have in common?

- A) They have the same wavelength
- B) They have the same velocity
- C) They have the same frequency
- D) None of the above is true.
- E) More than one of the above is true.

The lowest tone to resonate in an open pipe of length  $L$  is its fundamental frequency of 200 Hz. Which one of the following frequencies will not resonate in the same pipe?

- A) 400 Hz
- B) 500 Hz
- C) 600 Hz
- D) They will all resonate in the pipe.

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In a resonating pipe which is open at one end and closed at the other, there

- A) are displacement nodes at each end.
- B) are displacement antinodes at each end.
- C) is a displacement node at the open end and a displacement antinode at the closed end.
- D) is a displacement node at the closed end and a displacement antinode at the open end.

The lowest tone to resonate in an open pipe of length  $L$  is 400 Hz. What is the frequency of the lowest tone that will resonate in an open pipe of length  $2L$ ?

- A) 100 Hz
- B) 200 Hz
- C) 400 Hz
- D) 800 Hz
- E) 1600 Hz

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An open pipe of length  $L$  is resonating at its fundamental frequency. Which statement is true?

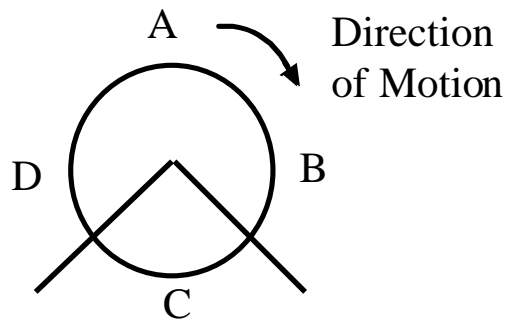
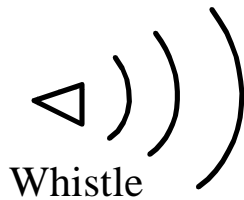
- A) The wavelength is  $2L$  and there is a displacement node at the pipe's midpoint.
- B) The wavelength is  $2L$  and there is a displacement antinode at the pipe's midpoint.
- C) The wavelength is  $L$  and there is a displacement node at the pipe's midpoint.
- D) The wavelength is  $L$  and there is a displacement antinode at the pipe's midpoint.
- E) The wavelength is  $4L$  and there is a displacement antinode at the pipe's midpoint.

It is a cool night and the speed of sound is  $340$  m/s. Two loud speakers that are being tested for a rock concert by playing a single frequency in each speaker. The frequency of the sound is  $170$  Hz. You are standing  $25$  meters from one speaker and  $31$  meters from the other. In order to decrease the volume, you ask the technician to change the test frequency to

- A)  $56$  Hz
- B)  $85$  Hz
- C)  $113$  Hz
- D)  $227$  Hz
- E)  $340$  Hz

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You are riding on a Ferris wheel and hear a loud whistle being blown from in front of you. On which point on the Ferris wheel will the pitch of the whistle sound lowest?



A) A

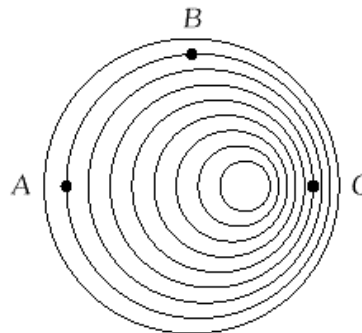
B) B

C) C

D) D

E) Both B and D

Three observers, A, B, and C are listening to a moving source of sound. The diagram shows the location of the wavecrests of the moving source with respect to the three observers. Which of the following is true?



A) The wavefronts move faster at A than at B and C.

B) The wavefronts move faster at C than at A and B.

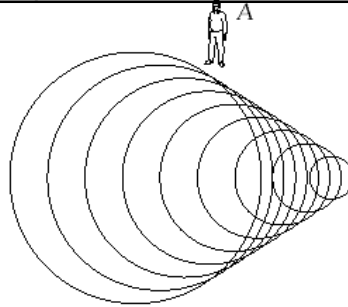
C) The frequency of the sound is highest at A.

D) The frequency of the sound is highest at B.

E) The frequency of the sound is highest at C.

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The figure shows the wavefronts generated by an airplane flying past an observer at a speed greater than that of sound. After the airplane has passed, the observer reports hearing



- A) a sonic boom only when the airplane breaks the sound barrier, then nothing.
- B) a succession of sonic booms.
- C) a sonic boom, then silence.
- D) first nothing, then a sonic boom, then the sound of engines.
- E) no sonic boom because the airplane flew faster than sound all along.