Sound Sublevel 1

(1) Sammy is talking to Sally. Position A is a position in front of Sammy's mouth. Position B is a position in front of Sally's ear. In order for Sally to hear Sammy's voice, air particles must ____.

a. move from A to B
b. move from A to B and then back to A
c. vibrate parallel to a line connecting A and B
d. vibrate perpendicular to a line connecting A and B
e. more than one of the above

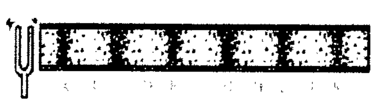
(2) A sound wave is often called a pressure wave because there are regions of high and low pressure established in the medium through which the sound wave travels. The regions of high pressure are known as ____ and the regions of low pressure are known as ____.

a. compressions, rarefactions
b. crests, troughs
c. antinodes, nodes
d. longitudes, transverses
e. none of these

(3) Suppose that you are watching a science fiction film involving two space ships in the deep void of outer space. In the film, an explosion occurs on space ship A. After seeing the fiery blast from a long distance away, the occupants of space ship B hear the loud boom of the blast. This is an example of _____.

a. sound behaving as a mechanical wave
b. sound behaving as an electromagnetic wave
c. sound behaving as a pressure wave
d. sound traveling slower than light
e. bad physics since sound could never traverse the empty space bewteen ship A and ship B

(4) The tines of a vibrating tuning fork create a sound which travels through a long tube. The diagram below portrays the presence of position of air molecules within the tube at an instant in time. Which of the lableled regions are compressions? List all that apply in alphabetical order with no commas or spaces between letters.



(5) In terms of the motion of the particles of the medium, a sound wave can be best described as a ____ wave.

a. longitudinal
b. transverse
c. circular
d. vibratory
e. None of these describe the motion of particles.

(6) Sound cannot travel through ____. List all that apply in alphabetical order with no commas or spaces between letters.

a. a solid substance
b. a liquid substance
c. a gaseous substance
d. a vacuum
e. ... nonsense! Sound can travel through all of these.

(7) TRUE or FALSE:

In order to hear a person talking, air particles (or some kind of particle) must move from the mouth of the talking person to the ear of the listening person.

a. True
b. False

(8) Waves are often categorized as being electromagnetic waves or mechanical waves. A sound wave is best categorized as a _____ wave.

a. electromagnetic
b. mechanical
c. usually mechanical, but at times electromagnetic
d. None of these categories describe a sound wave.

Sound: sublevel 2

1

M2 Characteristics of Sound Waves

Doubling the frequency of a sound wave within a uniform (unchanging) medium will _____. List all that apply in alphabetical order with no spaces or commas between letters.

a. double the speed of the wave
b. halve the speed of the wave
c. double the wavelength of the wave
d. halve the wavelength of the wave
e. double the amplitude of the wave
f. halve the amplitude of the wave
g. not alter any of these characteristics - speed, wavelength nor amplitude

2

M2 Characteristics of Sound Waves

Sound wave A and sound wave B are simultaneously traveling through the auditorium. Wave A has twice the frequency as wave B. Thus, the wavelength of wave A will be _____ the wavelength of wave B and the speed of wave A will be ____ the speed of wave B.

a. two times, two times
b. one-half, one-half
c. two times, one-half
d. one-half, two times
e. two times, the same as
f. one-half, the same as
g. the same as, two times
h. the same as, one-half
i. the same as, the same as
j. none of these

3

M2 Characteristics of Sound Waves

A sound wave is traveling through a medium. The diagram below depicts the presence and location of the particles at a given instant in time. Utilize the ruler to determine the best approximation of the wavelength of the wave. The wavelength is ____ units.

a. 0.6
b. 1.4
c. 1.7
d. 5.0
e. 6.0
f. 9.1
g. 10.0

4

M2 Characteristics of Sound Waves

Altering the _______ will be sure to result in an alteration of the speed of the sound wave. List all that apply in alphabetical order with no spaces or commas between letters.

a. the wavelength of the wave
b. the frequency of the wave
c. the amplitude of the wave
d. the intensity of the wave
e. the period of the wave
f. the properties of the medium

5

M2 Characteristics of Sound Waves

Several sounds waves travel through the same sample of air. A fast sound wave would be the wave that ____.

a. is longest
b. vibrates most frequently
c. has the greatest amplitude
d. has the shortest period
e. ...nonsense! None of these would effect the speed of a sound wave

6

M2 Characteristics of Sound Waves

TRUE or FALSE:

A loud sound has a greater speed than a soft sound. Yelling loud would make a sound wave travel measurably faster.

a. True
b. False

7

M2 Characteristics of Sound Waves

High-pitched sounds are characterized by sound waves which have a _____. List all that apply in alphabetical order with no commas or spaces between letters.

a. high frequency
b. low frequency
c. long wavelength
d. short wavelength
e. high amplitude
f. low amplitude
g. None of these are wave features unique to high-pitched sounds.

8

M2 Characteristics of Sound Waves

High intensity sounds are perceived as relatively loud sounds. The sound waves which are most intense and perceived as loud sounds are those which have a _____. Identify the one characteristic which is unique of such sound waves.

a. high speed
b. low speed
c. long wavelength
d. short wavelength
e. high amplitude
f. low amplitude
g. None of these are wave features unique to loud sounds.

9

M2 Characteristics of Sound Waves

Some sound waves have short wavelengths and others have long wavelengths. Suppose a comparison is made of two sound waves of varying wavelengths traveling through the same medium. The long wave can be certain to also have a relatively ____. List all that apply in alphabetical order with no commas or spaces between letters.

a. high speed
b. low speed
c. high frequency
d. low frequency
e. high amplitude
f. low amplitude
g. high period
h. low period
i. None of these characteristic are unique features of long waves.

Sound: sublevel 5

(1)

Resonance occurs when _____.

a. an object vibrates
b. an object vibrates at its natural frequency
c. two objects vibrate simulataneously
d. one vibrating object forces another object to vibrate at its natural frequency

(2)

A harmonic is ____.

a. one of the frequencies at which an instrument naturally vibrates at
b. a point on the standing wave pattern which is oscillating rapidly
c. the number of waves present in a standing wave pattern
d. the multiplier used to relate one natural frequency to another natural frequency
e. none of these

(3)

The fundamental frequency of a guitar string is _____.

a. the lowest possible frequency at which the guitar string would resonate
b. the multiplier used to relate one natural frequency to another natural frequency
c. the number of waves present in the standing wave pattern for a harmonic
d. the harmonic number for any given standing wave pattern
e. the highest audible frequency which a typical human could hear
f. none of these

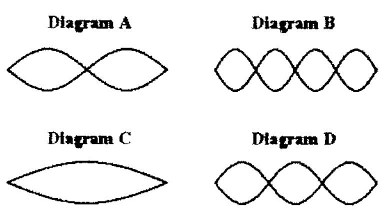
(4)

The result of resonance is ____.

a. a noisy or clangy sound
b. a broken instrument
c. an amplified vibration or loud sound
d. that bridges fall and dogs die

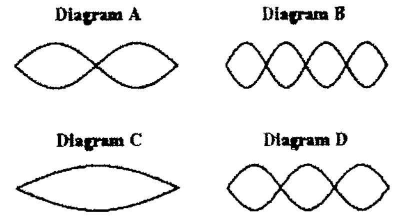
(5)

Various standing wave patterns for a resonating guitar string are shown below. Which one of the diagrams represents the standing wave pattern for the second harmonic? If none apply, then enter 'E' as the answer.



(6)

Various standing wave patterns for a resonating guitar string are shown below. Which one of the diagrams represents the standing wave pattern for the first harmonic? If none apply, then enter 'E' as the answer.



(7)

The first harmonic frequency of a musical instrument is 200 Hz. The second, third, and fourth harmonic frequencies are ____ Hz, ____ Hz, and ____ Hz respectively.

a. 50, 100, 150
b. 150, 100, 50
c. 202, 203, 204
d. 400, 800, 1200
e. 400, 600, 800
f. 400, 1200, 4800
g. none of these

(8)

A musical instrument produces a frequency of 600 Hz when it vibrates in the fifth harmonic. The fundamental frequency of this instrument is ____ Hz.

a. 100
b. 120
c. 200
d. 595
e. 605
g. 3000
h. More than one of the above could be correct.
g. Impossible to tell with so little information.

(9)

A guitar string has a set of natural frequencies at which they naturally resonate at. The following numbers represent sets of frequencies. Which would be a set of typical natural frequencies for a guitar string?

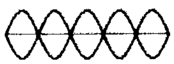
a. 1 Hz, 2 Hz, 3 Hz, 4 Hz
b. 1 Hz, 10 Hz, 100 Hz, 1000 Hz
c. 250 Hz, 267 Hz, 317 Hz, 323 Hz
d. 250 Hz, 257 Hz, 264 Hz, 271 Hz
e. 250 Hz, 500 Hz, 750 Hz, 1000 Hz
f. 250 Hz, 251 Hz, 252 Hz, 253 Hz
g. 251 Hz, 252 Hz, 253 Hz, 254 Hz

Sound: Sublevel 6

(1)

A standing wave pattern is established in a violin string as it vibrates with the pattern shown below. The violin string has a length of 80 cm. This pattern represents the ___ harmonic; its wavelength is ____ cm. Choose two letters in their respective order; enter them together without any commas or spaces between letters. Example: 'AM'

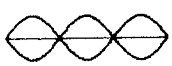
Harmonic #		**Wavelength(cm)**		
a. 1st	b. 2nd	m. 16	n. 32	o. 40
c. 3rd	d. 4th	p. 64	q. 96	r. 112
e. 5th	f. 6th	s. 128	t. 160	u. 200
g. 7th	h. 8th	v. None of these		



(2)

A standing wave pattern is established in a guitar string as it vibrates with the pattern shown below. The guitar string has a length of 120 cm. This pattern represents the ___ harmonic; its wavelength is ____ cm. Choose two letters in their respective order; enter them together without any commas or spaces between letters. Example: 'AM'

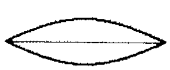
Harmonic #		**Wavelength(cm)**		
a. 1st	b. 2nd	m. 40	n. 60	o. 80
c. 3rd	d. 4th	p. 100	q. 120	r. 160
e. 5th	f. 6th	s. 200	t. 240	u. 360
g. 7th	h. 8th	v. None of these		



(3)

A standing wave pattern is established in a guitar string as it vibrates with the pattern shown below. The guitar string has a length of 80 cm. This pattern represents the ___ harmonic; its wavelength is ____ cm. Choose two letters in their respective order; enter them together without any commas or spaces between letters. Example: 'AM'

Harmonic #		**Wavelength(cm)**		
a. 1st	b. 2nd	m. 20	n. 40	o. 60
c. 3rd	d. 4th	p. 80	q. 100	r. 120
e. 5th	f. 6th	s. 160	t. 240	u. 320
g. 7th	h. 8th	v. None of these		



(4)

Diagram A shows the standing wave pattern created in a guitar string when it is vibrated at 480 Hz. Determine the vibrational frequency (in Hertz) which would be required of the same guitar string to produce the standing wave pattern shown in Diagram B. Enter a numerical answer.

Diagram A

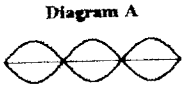
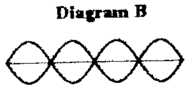


Diagram B



(5)

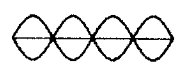
A standing wave pattern is established in a guitar string as it vibrates with the pattern shown below. The guitar string has a length of 80 cm. This pattern represents the ___ harmonic; its wavelength is ____ cm. Choose two letters in their respective order; enter them together without any commas or spaces between letters. Example: 'AM'

Harmonic #		**Wavelength(cm)**		
a. 1st	b. 2nd	m. 20	n. 40	o. 60
c. 3rd	d. 4th	p. 80	q. 100	r. 120
e. 5th	f. 6th	s. 160	t. 240	u. 320
g. 7th	h. 8th	v. None of these		

(6)

A standing wave pattern is established in a guitar string as it vibrates with the pattern shown below. The guitar string has a length of 80 cm. This pattern represents the ___ harmonic; its wavelength is ____ cm. Choose two letters in their respective order; enter them together without any commas or spaces between letters. Example: 'AM'

Harmonic #		**Wavelength(cm)**		
a. 1st	b. 2nd	m. 20	n. 40	o. 80
c. 3rd	d. 4th	p. 120	q. 160	r. 200
e. 5th	f. 6th	s. 240	t. 320	u. 400
g. 7th	h. 8th	v. None of these		



(7)

Diagram A shows the standing wave pattern created in a 95-cm long guitar string when it is vibrated at 210 Hz. Determine the vibrational frequency (in Hertz) which would be required of the same guitar string to produce the standing wave pattern shown in Diagram B. Enter a numerical answer.

Diagram A

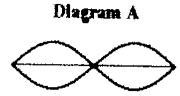
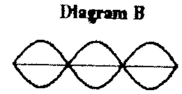


Diagram B

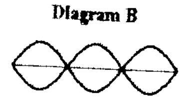


(8)

Diagram A shows the standing wave pattern created in a 95-cm long guitar string when it is vibrated at 240 Hz. Determine the vibrational frequency (in Hertz) which would be required of the same guitar string to produce the standing wave pattern shown in Diagram B. Enter a numerical answer.

Diagram A

Diagram B



(9)

The nodal positions on a standing wave pattern for a stringed instrument are ____.

a. always located one-half wavelength apart
b. always located a full wavelength apart
c. usually located one-half wavelength apart
d. usually (but not always) located a full wavelength apart
e. distanced varying number of wavelengths apart, depending upon the harmonic number
f. none of the above