

# Chapter 12 Waves and Sound

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## 12.1 Questions About Vibrations and Waves

- 1) A wiggle in time is a
- A) vibration.
  - B) wave.
  - C) both
  - D) neither

Answer: A

Diff: 1

Topic: *Vibrations and Waves*

- 2) A common source of wave motion is a
- A) wave pattern.
  - B) harmonic object.
  - C) vibrating object.
  - D) region of variable high and low pressure.
  - E) none of these

Answer: C

Diff: 1

Topic: *Vibrations and Waves*

- 3) Like a transverse wave, a longitudinal wave has
- A) amplitude, frequency, wavelength, and speed
  - B) amplitude, frequency, and wavelength.
  - C) amplitude, wavelength, and speed.
  - D) wavelength, speed, and frequency.
  - E) amplitude, frequency, and speed.

Answer: A

Diff: 1

Topic: *Vibrations and Waves*

- 4) In a longitudinal wave the compressions and rarefactions travel in
- A) the same direction.
  - B) opposite directions.
  - C) a vacuum.

Answer: A

Diff: 1

Topic: *Vibrations and Waves*

5) Which of the following is not a transverse wave?

- A) sound
- B) light
- C) radio
- D) all of these
- E) none of these

Answer: A

Diff: 1

Topic: Vibrations and Waves

6) The vibrations of a transverse wave move in a direction

- A) along the direction of wave travel.
- B) at right angles to the direction of wave travel.
- C) that changes with speed.

Answer: B

Diff: 1

Topic: Vibrations and Waves

7) The vibrations of a longitudinal wave move in a direction

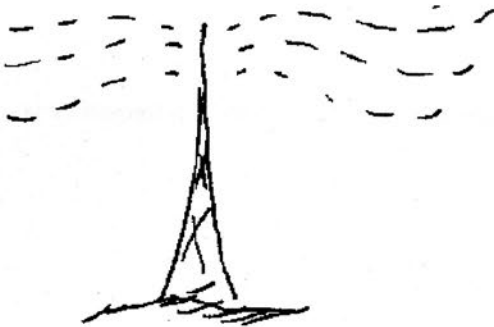
- A) along the direction of wave travel.
- B) at right angles to the direction of wave travel.
- C) that changes with speed.

Answer: A

Diff: 1

Topic: Vibrations and Waves

Figure 12-A



8) How many vibrations per second are associated with a 101-MHz radio wave?

- A) less than 101,000,000
- B) 101,000,000
- C) more than 101,000,000

Answer: B

Diff: 1

Topic: Vibrations and Waves

- 14) An object that completes 20 vibrations in 10 seconds has a frequency of
- A) 0.5 hertz.
  - B) 1 hertz.
  - C) 2 hertz.
  - D) 200 hertz.

Answer: C

Diff: 2

Topic: Vibrations and Waves

- 15) An object that completes 100 vibrations in 5 seconds has a period of
- A) 0.5 second.
  - B) 1 second.
  - C) 2 seconds.
  - D) None of the above choices are correct.

Answer: D

Diff: 2

Topic: Vibrations and Waves

- 16) To say that one wave is out of phase with another is to say that the waves are
- A) of different amplitudes.
  - B) of different frequencies.
  - C) of different wavelengths.
  - D) out of step.
  - E) all of these

Answer: D

Diff: 1

Topic: Vibrations and Waves

- 17) Wave interference occurs for
- A) sound waves.
  - B) light waves.
  - C) water waves.
  - D) All of the above choices are correct.
  - E) None of the above choices are correct.

Answer: D

Diff: 1

Topic: Vibrations and Waves

- 18) A standing wave occurs when
- A) two waves overlap.
  - B) a wave reflects upon itself.
  - C) the speed of the wave is zero or near zero.
  - D) the amplitude of a wave exceeds its wavelength.

Answer: B

Diff: 1

Topic: Vibrations and Waves

24) An aircraft that flies faster than the speed of sound is said to be

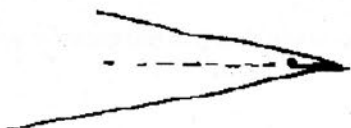
- A) subsonic.
- B) supersonic.
- C) impossible.

Answer: B

Diff: 1

Topic: Vibrations and Waves

Figure 12-B



25) As a supersonic craft increases in speed, the angle of its V-shaped shock wave becomes

- A) wider.
- B) narrower.
- C) neither

Answer: B

Diff: 1

Topic: Vibrations and Waves

26) The source of a sonic boom

- A) must itself be an emitter of sound.
- B) may or may not be an emitter of sound.
- C) is not itself an emitter of sound.

Answer: B

Diff: 1

Topic: Vibrations and Waves

27) A fishing-boat captain returns to port saying, "It's rough out there - the waves are 4 meters high." He probably means that the amplitude of the waves is

- A) 4 m.
- B) 3 m.
- C) 2 m.
- D) 1 m.

Answer: C

Diff: 2

Topic: Vibrations and Waves

28) The pendulum with the greatest frequency is the pendulum with the

- A) shortest period.
- B) shortest length.
- C) shortest period and the shortest length.
- D) shortest amplitude.
- E) greatest amplitude.

Answer: C

Diff: 2

Topic: Vibrations and Waves

Figure 12-C



- 42) You dip your finger repeatedly into water and make waves. If you dip your finger more frequently, the wavelength of the waves
- shortens.
  - lengthens.
  - stays the same.

Answer: A

Diff: 2

Topic: Vibrations and Waves

- 43) During a single period, the distance traveled by a wave is
- one-half wavelength.
  - one wavelength.
  - two wavelengths.

Answer: B

Diff: 2

Topic: Vibrations and Waves

- 44) A floating object oscillates up and down 2 complete cycles in 1 second as a water wave of wavelength 5 meters passes by. The speed of the wave is
- 2 m/s.
  - 5 m/s.
  - 10 m/s.
  - 15 m/s.
  - none of these

Answer: C

Diff: 2

Topic: Vibrations and Waves

- 45) A wave oscillates up and down two complete cycles each second. If the wave travels an average distance of 6 meters in one second, its wavelength is
- 0.5 m.
  - 1 m.
  - 2 m.
  - 3 m.
  - 6 m.

Answer: D

Diff: 2

Topic: Vibrations and Waves

4) Double the frequency of sound and you also double its

- A) wavelength.
- B) speed.
- C) amplitude.
- D) all of these
- E) none of these

Answer: E

Diff: 1

Topic: Sound

5) The approximate range of human hearing is

- A) 10 hertz to 10,000 hertz.
- B) 20 hertz to 20,000 hertz.
- C) 40 hertz to 40,000 hertz.
- D) Actually all of these—depends on the hearing ability of the person.

Answer: B

Diff: 1

Topic: Sound

6) We are best at hearing

- A) infrasonic sound.
- B) ultrasonic sound.
- C) both infrasonic and ultrasonic sounds.
- D) None of the above choices are true.

Answer: D

Diff: 1

Topic: Sound

7) A sound wave is a

- A) longitudinal wave.
- B) transverse wave.
- C) standing wave.
- D) shock wave.
- E) None of the above choices are correct.

Answer: A

Diff: 1

Topic: Sound

8) Compressions and rarefactions are characteristic of

- A) longitudinal waves.
- B) transverse waves.
- C) both longitudinal and transverse waves.
- D) Neither of the above choices are correct.

Answer: A

Diff: 1

Topic: Sound

24) Sound will be louder if a struck tuning fork is held

- A) in the air.
- B) with its base against a table top.
- C) with its prongs in shallow water.
- D) in your closed fist.

Answer: B

Diff: 1

Topic: Sound

25) A base fiddle is louder than a harp because of its

- A) thicker strings.
- B) sounding board.
- C) lower pitch.
- D) All of the above are true.
- E) None of the above are true.

Answer: B

Diff: 1

Topic: Sound

26) The natural frequency of an object depends on its

- A) size, shape and elasticity.
- B) size and shape.
- C) size and elasticity.
- D) shape and elasticity.

Answer: A

Diff: 1

Topic: Sound

27) The object with the highest natural frequency is a

- A) small bell.
- B) large bell.
- C) medium size bell.

Answer: A

Diff: 1

Topic: Sound

28) The least energy required to produce forced vibration in an object occurs

- A) below its natural frequency.
- B) at its natural frequency.
- C) above its natural frequency.

Answer: B

Diff: 1

Topic: Sound

- 34) When you tune a radio to a certain station, you match the frequency of the internal electrical circuit to the frequency of the wanted radio station. In so doing you are employing the principle of
- A) forced vibrations.
  - B) resonance.
  - C) beats.
  - D) reverberation.
  - E) wave interference.

Answer: B

Diff: 1

Topic: Sound

- 35) In the case of radio, which has the higher frequency?
- A) Carrier wave
  - B) Sound wave
  - C) Neither. Both may be of the same frequency.

Answer: A

Diff: 1

Topic: Sound

- 36) On some days, air nearest the ground is colder than air that is higher up. On one of these days, sound waves
- A) tend to be refracted upward.
  - B) tend to be refracted downward.
  - C) travel without refraction.

Answer: B

Diff: 2

Topic: Sound

- 37) Sound refraction depends on the fact that the speed of sound is
- A) constant.
  - B) variable.
  - C) proportional to frequency.
  - D) inversely proportional to wavelength.
  - E) None of the above choices are correct.

Answer: B

Diff: 2

Topic: Sound

- 38) A 340-hertz sound wave travels at 340 m/s in air with a wavelength of
- A) 1 m.
  - B) 10 m.
  - C) 100 m.
  - D) 1000 m.
  - E) None of the above choices are correct.

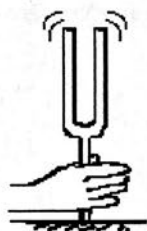
Answer: A

Diff: 2

Topic: Sound



Figure 12-D



39) When the handle of a tuning fork is held solidly against a table, the sound becomes louder and the time that the fork keeps vibrating

- A) becomes longer.
- B) becomes shorter.
- C) remains the same.

Answer: B

Diff: 2

Topic: Sound

40) Resonance can be looked at as forced vibration with the

- A) least amount of energy input.
- B) maximum amount of energy input.
- C) matching of wave amplitudes.
- D) matching of constructive and destructive interference.
- E) minimum beat frequency.

Answer: A

Diff: 2

Topic: Sound

41) In which one of these media does sound travel the fastest?

- A) water vapor
- B) water
- C) ice
- D) steam
- E) Sound travels the same speed in each of the above media.

Answer: C

Diff: 2

Topic: Sound

42) Inhaling helium increases the pitch of your voice. The reason for this is that sound travels

- A) slower in helium than in air.
- B) faster in helium than in air.
- C) the same speed in helium, but the wavelength is greater.

Answer: B

Diff: 2

Topic: Sound