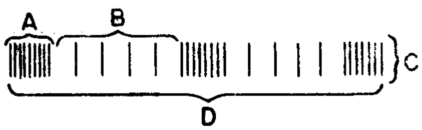
Practice - Sound Waves

Name: ______________________________ **Date:** ______________

1. A tuning fork that vibrates 256 times per second produces a wave that is 1.50 meters long. The speed of the wave is



A. 171 m/sec B. 256 m/sec
C. 258 m/sec D. 384 m/sec

2. An echo heard when a person shouts in a canyon is due to the sound waves being

A. mixed B. refracted
C. diffracted D. reflected

3. An echo is strong evidence that sound can be

A. amplified B. diffracted
C. dispersed D. reflected

4. If two identical sound waves arriving at the same point are in phase, the resulting wave will have

A. an increase in speed
B. an increase in frequency
C. a larger amplitude
D. a longer period

5. Two tuning forks are struck at the same time. Their sound is observed to become louder and softer at regular intervals. This is caused by wave

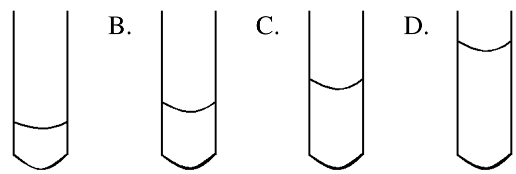
A. condensation B. refraction
C. interference D. amplification

6. Beats are produced by two sound waves having different

A. frequencies B. amplitudes
C. loudness D. energies

7. In the diagram, four test tubes contain varying amounts of water as shown. If all the air columns are made to vibrate by blowing air across their tops, which will have the highest frequency?

A. B. C. D.



8. A closed pipe 2 meters long will produce a sound wave having a wavelength of

A. 1 m B. 2 m C. 8 m D. 4 m

9. Sound may best be described as a form of

A. electrical energy B. chemical energy
C. nuclear energy D. mechanical energy

10. A tuning fork vibrates at a frequency of 512 hertz when struck with a rubber hammer. The sound produced by the tuning fork will travel through the air as a

A. longitudinal wave with air molecules vibrating parallel to the direction of travel
B. transverse wave with air molecules vibrating parallel to the direction of travel
C. longitudinal wave with air molecules vibrating perpendicular to the direction of travel
D. transverse wave with air molecules vibrating perpendicular to the direction of travel

11. A sound wave traveling eastward through air causes the air molecules to

A. vibrate east and west

B. vibrate north and south

C. move eastward, only

D. move northward, only

12. Sound travels as

A. an electromagnetic wave

B. a transverse wave

C. a longitudinal wave

D. a permanent wave

13. As the tension in a guitar string is increased, the wavelength of the sound produced will

A. decrease   B. increase

C. remain the same

14. A ringing electric bell is placed under a bell jar on a vacuum pump and the air is drawn from the space around the ringing bell. As the air is removed, the magnitude of the sound of the bell

A. decreases   B. increases

C. remains the same

15. A sound wave has a wavelength of 2 meters and a frequency of 100 cycles per second. The speed of the wave is

A. 0.02 m/sec   B. 50 m/sec

C. 100 m/sec   D. 200 m/sec

16. Compared to the speed of a sound wave in air, the speed of a radio wave in air is

A. less   B. greater   C. the same

17. As a sound wave passes from water, where the speed is 1.49×10^3 meters per second, into air, the wave's speed

A. decreases and its frequency remains the same

B. increases and its frequency remains the same

C. remains the same and its frequency decreases

D. remains the same and its frequency increases

18. A person observes a fireworks display from a safe distance of 0.750 kilometer. Assuming that sound travels at 340. meters per second in air, what is the time between the person seeing and hearing a fireworks explosion?

A. 0.453 s   B. 2.21 s

C. 410. s   D. 2.55×10^5 s

19. At an outdoor physics demonstration, a delay of 0.50 second was observed between the time sound waves left a loudspeaker and the time these sound waves reached a student through the air. If the air is at STP, how far was the student from the speaker?

A. 1.5×10^{-3} m   B. 1.7×10^2 m

C. 6.6×10^2 m   D. 1.5×10^8 m

20. Increasing the amplitude of a sound wave produces a sound with

A. lower speed   B. higher pitch

C. shorter wavelength   D. greater loudness

21. If the amplitude of a wave is increased, the frequency of the wave will

A. decrease   B. increase

C. remain the same

22. A student sees a train that is moving away from her and sounding its whistle at a constant frequency. Compared to the sound produced by the whistle, the sound observed by the student is

A. greater in amplitude
B. a transverse wave rather than a longitudinal wave
C. higher in pitch
D. lower in pitch

23. A car's horn is producing a sound wave having a constant frequency of 350 hertz. If the car moves toward a stationary observer at constant speed, the frequency of the car's horn detected by this observer may be

A. 320 Hz
B. 330 Hz
C. 350 Hz
D. 380 Hz

24. A car's horn produces a sound wave of constant frequency. As the car speeds up going away from a stationary spectator, the sound wave detected by the spectator

A. decreases in amplitude and decreases in frequency
B. decreases in amplitude and increases in frequency
C. increases in amplitude and decreases in frequency
D. increases in amplitude and increases in frequency

25. The driver of a car sounds the horn while traveling toward a stationary person. Compared to the sound of the horn heard by the driver, the sound heard by the stationary person has

A. lower pitch and shorter wavelength
B. lower pitch and longer wavelength
C. higher pitch and shorter wavelength
D. higher pitch and longer wavelength

26. An opera singer's voice is able to break a thin crystal glass if the singer's voice and the glass have the same natural

A. frequency
B. speed
C. amplitude
D. wavelength

27. When the vibration of one object causes a nearby object to vibrate, the phenomenon is called

A. reflection
B. refraction
C. resonance
D. diffraction

28. As the difference between the frequencies of two sound waves increases, the number of beats per second

A. decreases
B. increases
C. remains the same

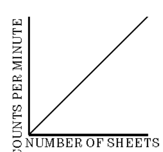
29. As the frequency of a sound wave decreases, its pitch

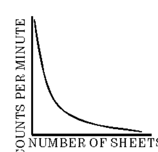
A. decreases
B. increases
C. remains the same

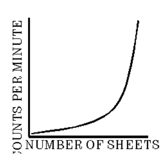
30. A term often used to describe the frequency of a sound is

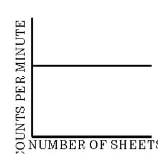
A. amplitude
B. volume
C. pitch
D. tone

31. Which graph best represents the relationship between wavelength and frequency for sound waves?

A.


B.


C.


D.


32. Base your answer(s) to the following question(s) on the information below.

A student plucks a guitar string and the vibrations produce a sound wave with a frequency of 650 hertz.

Calculate the wavelength of the sound wave in air at STP. [Show all work, including the equation and substitution with units.]

33. Base your answer(s) to the following question(s) on the passage below.

Shattering Glass

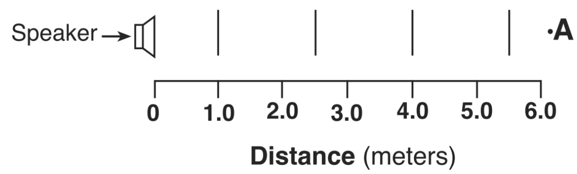
An old television commercial for audio recording tape showed a singer breaking a wine glass with her voice. The question was then asked if this was actually her voice or a recording. The inference is that the tape is of such high quality that the excellent reproduction of the sound is able to break glass.

This is a demonstration of resonance. It is certainly possibly to break a wine glass with an amplified singing voice. If the frequency of the voice is the same as the natural frequency of the glass, and the sound is loud enough, the glass can be set into a resonant vibration whose amplitude is large enough to surpass the elastic limit of the glass. But the inference that high-quality reproduction is necessary is not justified. All that is important is that the frequency is recorded and played back correctly. The waveform of the sound can be altered as long as the frequency remains the same. Suppose, for example, that the singer sings a perfect sine wave, but the tape records it as a square wave. If the tape player plays the sound back at the right speed, the glass will still receive energy at the resonance frequency and will be set into vibration leading to breakage, even though the tape reproduction was terrible. Thus, this phenomenon does not require high-quality reproduction and, thus, does not demonstrate the quality of the recording tape. What it does demonstrate is the quality of the tape player, in that it played back the tape at an accurate speed!

Explain why the glass would not break if the tape player did not play back at an accurate speed.

34. Base your answer(s) to the following question(s) on the information and diagram below.

The vertical lines in the diagram represent compressions in a sound wave of constant frequency propagating to the right from a speaker toward an observer at point *A*.



Determine the wavelength of this sound wave. [1]

35. The speaker is then moved at constant speed toward the observer at *A*. Compare the wavelength of the sound wave received by the observer while the speaker is moving to the wavelength observed when the speaker was at rest.

Practice - Sound Waves 10/13/2017

1.
Answer: D

2.
Answer: D

3.
Answer: D

4.
Answer: C

5.
Answer: C

6.
Answer: A

7.
Answer: D

8.
Answer: C

9.
Answer: D

10.
Answer: A

11.
Answer: A

12.
Answer: C

13.
Answer: A

14.
Answer: A

15.
Answer: D

16.
Answer: B

17.
Answer: A

18.
Answer: B

19.
Answer: B

20.
Answer: D

21.
Answer: C

22.
Answer: D

23.
Answer: D

24.
Answer: A

25.
Answer: C

26.
Answer: A

27.
Answer: C

28.
Answer: B

29.
Answer: A

30.
Answer: C

31.
Answer: C

32.
Answer: $v = f\lambda\lambda = \frac{v}{f}\lambda = \frac{331\,\text{m/s}}{650\,\text{Hz}}\lambda = 0.51\,\text{m}$ or $0.509\,\text{m}$

33.
Answer: the frequency of the sound is changed by variations in the speed of the tape.

34.
Answer: 1.5 m

35.
Answer: Indicating that the wavelength is shorter while the speaker is moving