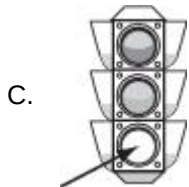
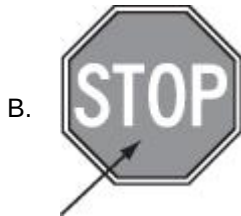


Section Name: Multiple Choice

Directions: Please choose the best answer choice for each of the following questions.

1. Don is studying the relationship between wavelength and the pitch of sound. Which of these choices BEST expresses the relationship between these two?
- A. The pitch of sound is constant as the wavelength of sound decreases.
 - B. The pitch of sound is constant as the wavelength of sound increases.
 - C. The pitch of sound decreases as the wavelength of sound decreases.
 - D. The pitch of sound decreases as the wavelength of sound increases.

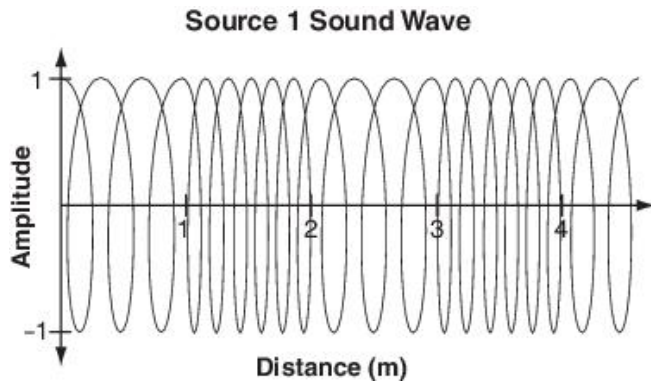
2. The frequencies of the visible light spectrum range from about 400 to about 790. Which arrow points to part of an object that represents a color frequency NEAREST to the low end of the visible spectrum?



3. Which color of light in a rainbow has a frequency CLOSEST to the frequency of blue?
- A. red
 - B. green
 - C. orange
 - D. yellow
4. A sound wave, P, and a light wave, Q, have frequencies p and q , respectively. If these frequencies are increased, which characteristic will show as a result?
- A. decreased energy of both waves
 - B. increased wavelength of both waves
 - C. increased pitch of the sound wave and changed perceived visible color
 - D. decreased pitch of the sound wave and changed amplitude of the light wave
5. James was standing around the corner of a building but he was able to hear someone talking around the front of the building even though he could not see that person. Why could he hear the person but he could not see them?
- A. Sound waves travel farther than light waves.
Light waves only travel in straight lines but sound waves will go in all directions and can change direction for no reason.
 - B. Because of the principle of diffraction, sound waves diffract around blunt (not sharp) corners more than light waves.
 - C. Sound waves have much more energy than light waves.
 - D.

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6. The graphs below show sound waves generated from two different sources over a fixed interval of time.



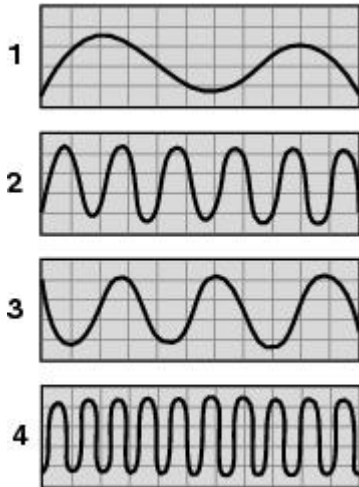
Which statement BEST compares the two graphs?

- A. The pitch of sound in graph 2 is the same as the pitch of sound in graph 1.
- B. The frequency of sound in graph 2 is less than the frequency of sound in graph 1.
- C. The amplitude of sound in graph 2 is less than the amplitude of sound in graph 1.
- D. The wavelength of sound in graph 2 is greater than the wavelength of sound in graph 1.
7. The sounds from two different sources, traveling at the same speed and through the same medium, have different pitches. Which property of sound could be used to determine this difference?
- A. amplitude
- B. loudness
- C. velocity
- D. wavelength

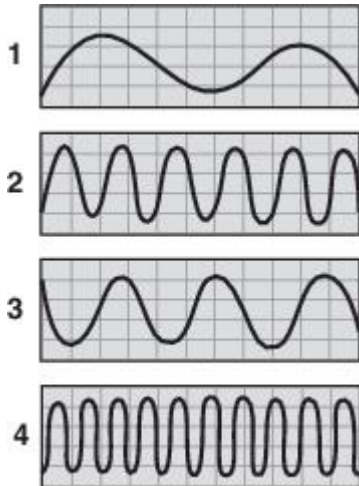
8. Which of the following best describes the motion of the particles of a transverse wave in relation to the motion of the wave?
- A. Circular
- B. Parallel
- C. Elliptical
- D. Perpendicular
9. Which best describes the motion of the particles in a longitudinal wave in relation to the motion of the wave?
- A. Circular
- B. Parallel
- C. Elliptical
- D. Perpendicular
10. A crowd of football fans is in a large stadium. A group of people at one end of the stadium begins to do "the wave" in cheering for their team. Groups of people stand up, raise their hands in the air as the "wave" reaches their part of the stadium, and then sit back down. Which type of wave is this?
- A. Longitudinal
- B. Transverse
- C. Surface
- D. Doppler
11. Which statement describes the waves that make light?
- A. Light waves are different lengths and travel through space at high speed.
- B. The different speeds of light waves traveling through space create colors.
- C. The different wave lengths of light reflect color and send it back into space.
- D. Light waves traveling through water will break and make things look distorted.

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12. Which sequence represents these wavelengths in order of longest to shortest?



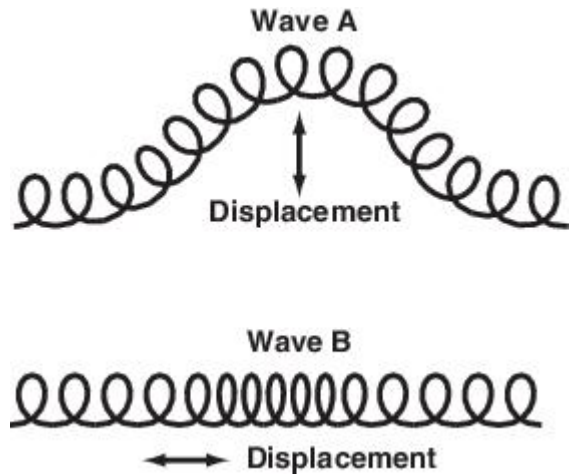
- A. 4, 3, 2, 1
 B. 1, 3, 2, 4
 C. 4, 2, 3, 1
 D. 2, 4, 1, 3
13. There are four waves on the screen of a wave testing instrument.



Which wave on the instrument screen has the highest frequency?

- A. wave 1
 B. wave 2
 C. wave 3
 D. wave 4

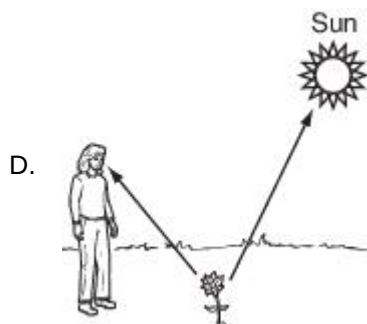
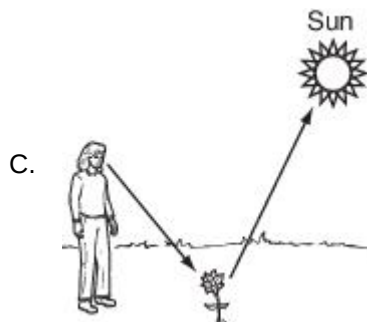
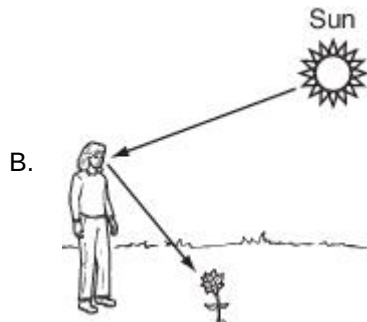
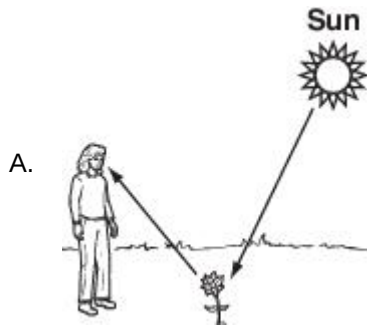
14. The diagram below shows two waves, A and B.



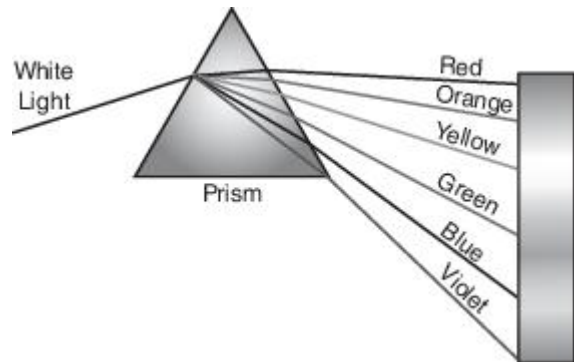
Which conclusion can be drawn about the two waves?

- A. Both waves are transverse waves.
 B. Both waves are longitudinal waves.
 C. Wave A is a longitudinal wave, and Wave B is a transverse wave.
 D. Wave A is a transverse wave, and Wave B is a longitudinal wave.

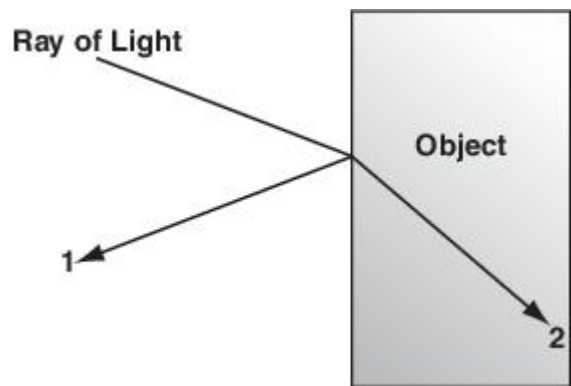
15. A girl sees a flower on a sunny day. Which of these pictures shows the path of the light that allows the girl to see the flower?



16. This diagram shows white light passing through a prism and being separated into a spectrum of visible colors. Which statement BEST explains how the prism changes white light into a spectrum of colors?



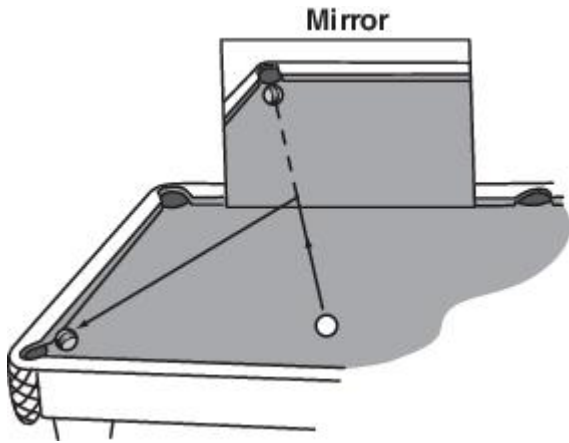
- A. The prism absorbs white light, making it possible to see the colored light.
 B. White light causes different molecules in the prism to radiate different colors.
 C. The prism changes the white light wavelength into a number of different wavelengths.
 D. The prism refracts each of the wavelengths that make up white light at a different angle.
17. A ray of light strikes an object at an angle, as shown below. Some of the light bounces off the object, while the rest of the light continues through the object, but at a different angle.



- Which processes are represented by arrows 1 and 2?
- A. Arrow 1 represents refraction and arrow 2 represents absorption.
 B. Arrow 1 represents reflection and arrow 2 represents refraction.
 C. Arrow 1 represents absorption and arrow 2 represents reflection.
 D. Arrow 1 represents refraction and arrow 2 represents reflection.

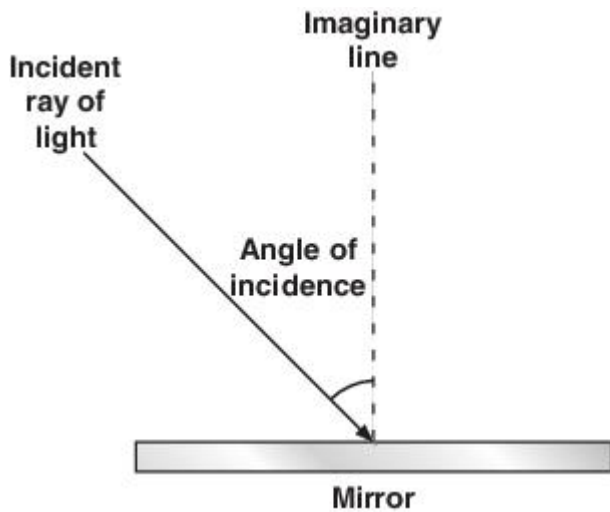
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18. A mirror has been placed at the edge of the pool table shown below so that a person can see where the ball will go when it bounces off the edge.



The person is assuming that bouncing balls and light follow the same principle of

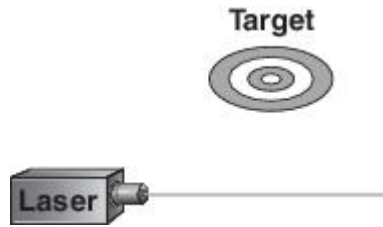
- A. reflection.
 - B. refraction.
 - C. absorption.
 - D. transmission.
19. The diagram below shows a ray of light striking a mirror. The angle of incidence of the light ray is 45° .



What will be the angle of reflection?

- A. 0°
- B. 45°
- C. 90°

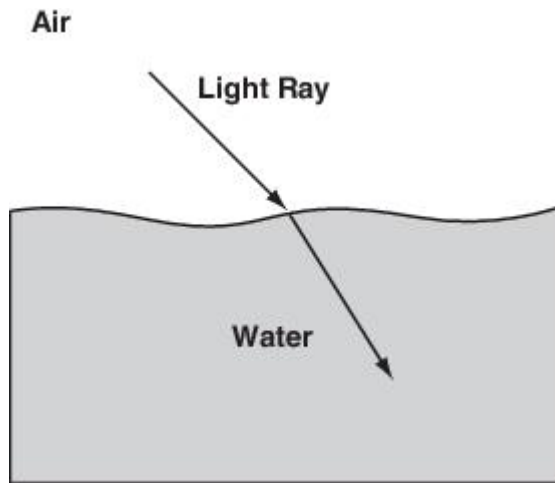
20. A scientist sets up a laser with a target above it. The line shows the direction of the laser beam.



Which diagram shows where to place a mirror so the laser beam can hit the target that is above it?

- A.
- B.
- C.
- D.

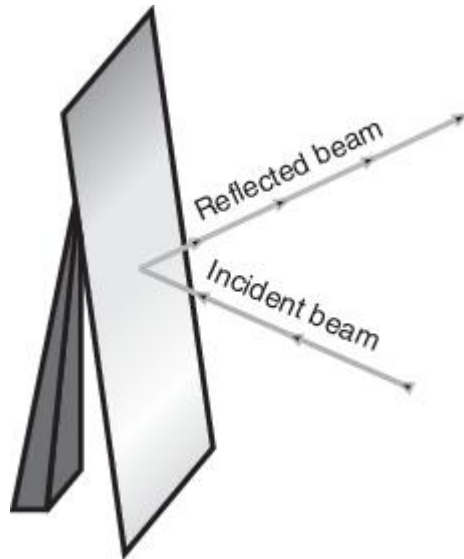
21. The diagram below shows the direction of a light ray as it passes through air and then through water.



What process causes the light in the diagram to change direction?

- A. absorption
- B. emission
- C. reflection
- D. refraction

22. The diagram below shows the incident beam of light meeting a mirror and the reflected beam traveling away from the mirror. A student shines a flashlight at a mirror at different angles and observes how the angle of reflection changes. Which of these is a fact that the student could discover?



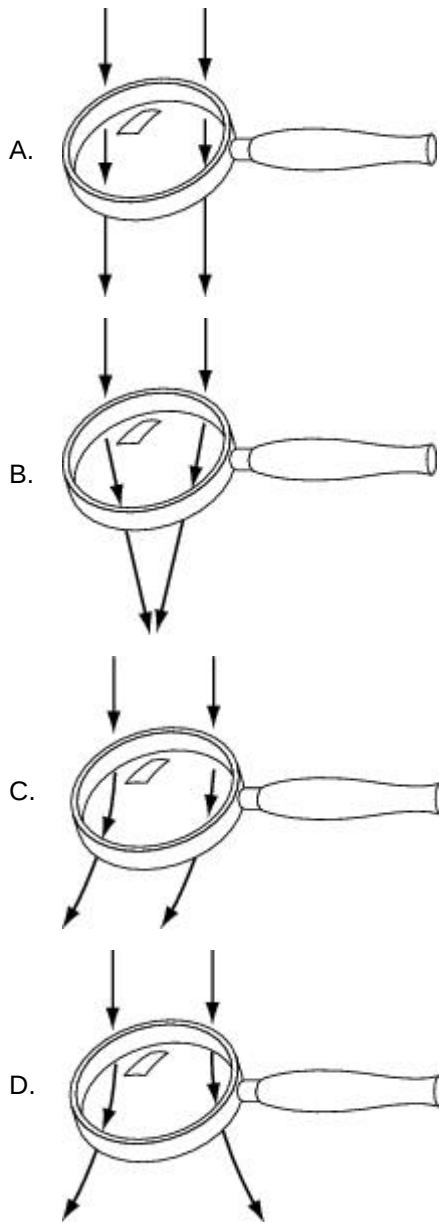
- A. The angle of incidence is always greater than the angle of reflection.
 - B. The angle of reflection is always greater than the angle of incidence.
 - C. The angle of incidence is always the same as the angle of reflection.
 - D. There is no relationship between the angle of reflection and the angle of incidence.
23. What role does the cornea play in the human eye?
- A. It reflects light to form an image on the retina.
 - B. It helps scatter light rays so they spread out and cover the back of the eye.
 - C. It acts as a screen at the back of the eye where the image is projected and captured.
 - D. It helps change the direction of light rays so they come together on the retina.
24. When a white light is passed through a prism, it scatters into seven different colors. Which characteristic determines the seven colors?
- A. speed
 - B. strength
 - C. amplitude
 - D. wavelength

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25. How does the eye process different colors?
- A. The iris filters each color of light separately.
 - B. The lens sorts different colors into different places.
 - C. Cells in the retina respond differently to different colors.
 - D. Cells in the vitreous humor process different colors for the optic nerve.
26. Some animals can see different types of light than humans can see. In which way do those types of light differ from light humans can see?
- A. They travel at different speeds.
 - B. Their intensity is much lower or higher.
 - C. Their wavelengths are shorter or longer.
 - D. They consist of different kinds of particles.
27. Jason is comparing the characteristics of sound waves and infrared waves. How are sound waves different from infrared waves?
- A. Sound waves are faster and can travel through a vacuum.
 - B. Sound waves are slower and can travel through a vacuum.
 - C. Sound waves are faster and are unable to travel through a vacuum.
 - D. Sound waves are slower and are unable to travel through a vacuum.
28. Which of these waves could transfer energy across a vacuum?
- A. radio waves
 - B. water waves
 - C. sound waves
 - D. seismic waves
29. A scientist conducted experiments to confirm facts about sound waves and light waves in a vacuum. What did the scientist MOST LIKELY observe?
- A. Both sound waves and light waves pass through the vacuum.
 - B. Both sound waves and light waves cannot travel through the vacuum.
 - C. The sound waves travel faster than the light waves through the vacuum.
 - D. The light waves travel through the vacuum, but the sound waves do not.
30. Enrique is exploring underwater sea life. He turned on his flashlight to look at an octopus. How will the light from his flashlight MOST LIKELY travel underwater?
- A. The light will travel through the water in a straight line.
 - B. The light beams will follow the wave pattern of the water.
 - C. The water will bend the light upward toward the surface.
 - D. The water will bend the light downward toward the seafloor.
31. What will happen to light as it travels from air into a lake?
- A. The light will change direction and the speed will change.
 - B. The light will change direction but the speed will remain the same.
 - C. The light will continue to travel in a straight line but the speed will change.
 - D. The light will continue to travel in a straight line and the speed will remain the same.

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32. Which of these diagrams shows the path of sunlight through a magnifying lens?



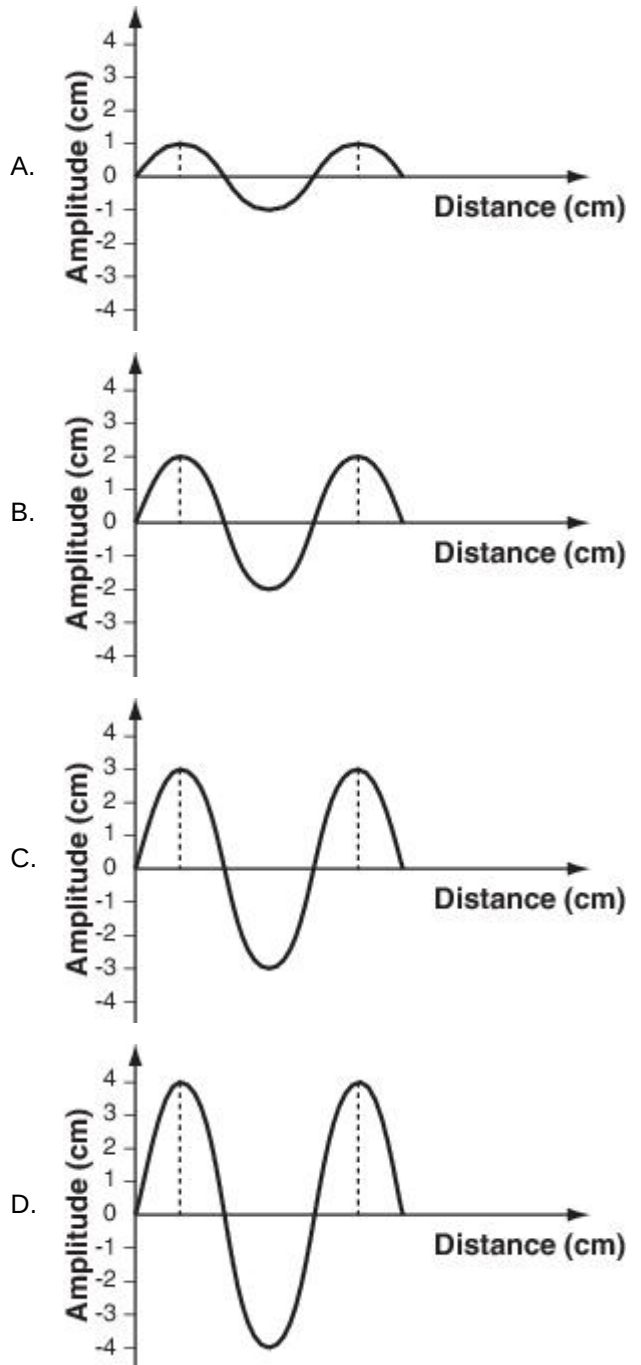
33. A scientist uses a device that transmits and receives sound waves to detect objects that are underwater. Which device performs this function?

- A. laser
- B. radar
- C. satellite
- D. sonar

34. Bats use sound waves to hunt in the dark. Which effect produced by the sound waves helps the bats to find their prey?

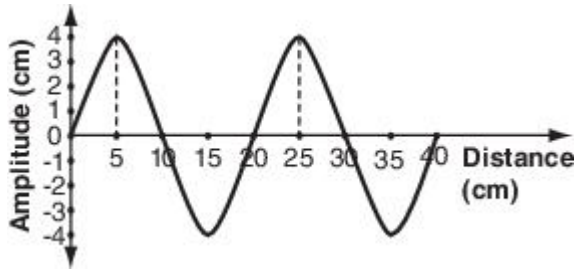
- A. echo
- B. pitch
- C. reflection
- D. scattering

35. Moya draws some graphs showing waves at varying amplitudes. Which graph shows waves at their highest amplitude?



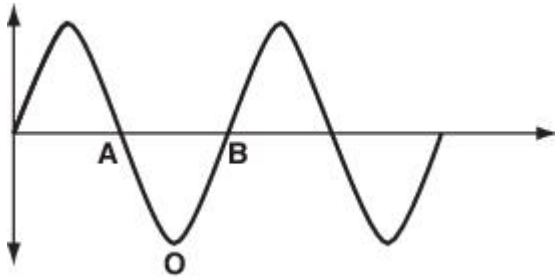
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36. The graph below shows a sound wave produced by a musical instrument.



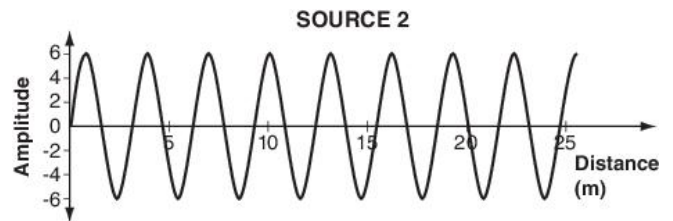
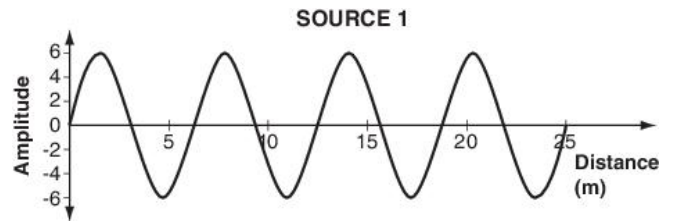
What is the wavelength of the wave?

- A. 20 cm
 - B. 25 cm
 - C. 30 cm
 - D. 40 cm
37. Ms. Morena draws a graph of a wave and labels a portion of the graph **AOB**.



What does **AOB** represent in the wave?

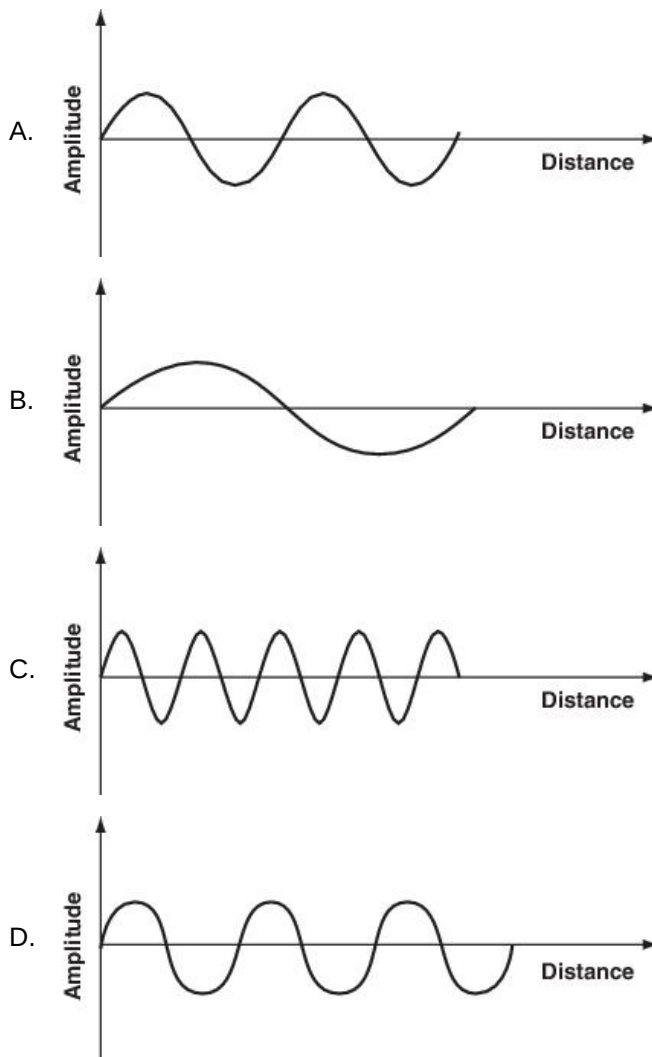
38. A scientist represents waves from two different sources in the graphs shown below.



Which characteristic do the two waves have in common?

- A. amplitude
 - B. frequency
 - C. period
 - D. wavelength
39. Sound waves are essentially a series of waves that travel through air. Which statement is the **LIKELY** cause of the production of sound waves?
- A. rapid movement of the air molecules
 - B. pressure difference in the air
 - C. excitement of electrons
 - D. vibration of an object
40. How is the sound wave created when we speak?
- A. by excitement of electrons
 - B. by pressure difference in air
 - C. by movement of air molecules
 - D. by the vibration of the vocal chord

41. Rosa conducts a lab experiment and records her observations from the experiment in four graphs shown below. Which graph shows the highest frequency?



42. When white light is passed through a narrow opening or slit, it can create a pattern of light and dark stripes on a wall behind the opening. This is caused by
- light being refracted as it goes through the opening.
 - some of the light being absorbed by the material around the opening and some of it going through the opening.
 - the light coming to the opening from different angles and some of the angles are blocked by the opening.
 - the light being diffracted as it passes through the opening; constructive and destructive interference of those diffracted waves causes the pattern.

43. Noise cancelling headphones use a property of sound waves in order to reduce and almost eliminate outside sound coming into the ear. How do they accomplish this? (*choose the answer that is most correct*).
- They are thick and well insulated and able to block out most of the sound.
 - They fit tightly around the ear and don't let outside sound into the ear.
 - They have a microphone that receives the outside sound, and creates an "opposite" sound in the headphone speakers that will destructively interfere with the outside sound.
 - They are made of a very hard material which will not transmit sound very well.

Stop! You have finished this exam.