

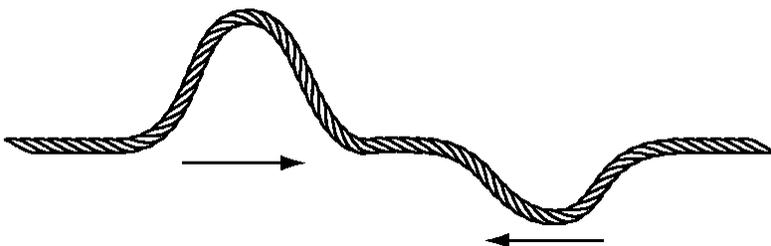
Phys.12-Q2W5-H.W.-Vibrations and waves

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ___ 1. A student sends a pulse traveling on a taut rope with one end attached to a post. What will the student observe?
- The pulse will not be inverted if the rope is fixed to the post.
 - The pulse will be reflected and inverted if the rope is free to slide up and down on the post.
 - The pulse will not be reflected if the rope is free to slide up and down on the post.
 - The pulse will be reflected and inverted if the rope is fixed to the post.
- ___ 2. A mass attached to a spring vibrates back and forth. At the equilibrium position, the
- acceleration reaches a maximum.
 - velocity reaches a maximum.
 - net force reaches a maximum.
 - velocity reaches zero.
- ___ 3. Each compression in the waveform of the longitudinal wave shown above corresponds to what feature of the transverse wave below it?
- amplitude
 - wavelength
 - troughs
 - crests
- ___ 4. Each stretched region in the waveform of the longitudinal wave shown above corresponds to what feature of the transverse wave below it?
- troughs
 - amplitude
 - crests
 - wavelength
- ___ 5. Which of the following most affects the wavelength of a mechanical wave moving through a medium? Assume that the frequency of the wave remains constant.
- the amplitude
 - the height of a crest
 - the nature of the medium
 - the energy carried by the wave
- ___ 6. Which of the following is a single nonperiodic disturbance?
- transverse wave
 - sine wave
 - periodic wave
 - pulse wave
- ___ 7. The superposition of mechanical waves can be observed in the movement of
- bumper cars.
 - violin bows in an orchestra.
 - water waves in a ripple tank.
 - electromagnetic radiation.
- ___ 8. Two mechanical waves that have positive displacements from the equilibrium position meet and coincide. What kind of interference occurs?
- constructive
 - destructive
 - complete destructive
 - none
- ___ 9. Waves arriving at a free boundary are
- inverted but not reflected.
 - reflected and inverted.
 - neither reflected nor inverted.
 - reflected but not inverted.
- ___ 10. A 2.0 m long stretched rope is fixed at both ends. Which wavelength would *not* produce standing waves on this rope?
- 3.0 m
 - 4.0 m
 - 6.0 m
 - 2.0 m
- ___ 11. Two mechanical waves can occupy the same space at the same time because waves
- do not cause interference patterns.
 - cannot pass through one another.
 - are displacements of matter.
 - are matter.

- ___ 12. Standing waves are produced by periodic waves of
- any amplitude and wavelength traveling in the same direction.
 - the same amplitude and wavelength traveling in the same direction.
 - any amplitude and wavelength traveling in opposite directions.
 - the same frequency, amplitude, and wavelength traveling in opposite directions.
- ___ 13. How many nodes and antinodes are shown in the standing wave above?
- four nodes and four antinodes
 - four nodes and three antinodes
 - five nodes and four antinodes
 - four nodes and five antinodes
- ___ 14. Which of the following features of a given pendulum changes when the pendulum is moved from Earth's surface to the moon?
- the equilibrium position
 - the restoring force
 - the length
 - the mass
- ___ 15. By what factor should the length of a simple pendulum be changed in order to triple the period of vibration?
- 6
 - 3
 - 9
 - 27
- ___ 16. How many nodes and antinodes are shown in the standing wave above?
- two nodes and three antinodes
 - one node and two antinodes
 - one-third node and one antinode
 - three nodes and two antinodes
- ___ 17. Which of the following wavelengths would produce standing waves on a string approximately 3.5 m long?
- 2.33 m
 - 3.75 m
 - 4.55 m
 - 2.85 m
- ___ 18. Consider two identical wave pulses on a rope having a fixed end. Suppose the first pulse reaches the end of the rope, is reflected back, and then meets the second pulse. When the two pulses overlap exactly, what will be the amplitude of the resultant pulse?
- same as the original pulses
 - half the amplitude of the original pulses
 - zero
 - double the amplitude of the original pulses
- ___ 19. Waves arriving at a fixed boundary are
- reflected and inverted.
 - reflected but not inverted.
 - neither reflected nor inverted.
 - inverted but not reflected.
- ___ 20. Which of the following types of interference will occur when the pulses in the figure above meet?
- complete constructive interference
 - complete destructive interference
 - partial interference
 - no interference
- ___ 21. A mass attached to a spring vibrates back and forth. At maximum displacement, the spring force and the
- acceleration reach zero.
 - acceleration reach a maximum.
 - velocity reach zero.
 - velocity reach a maximum.
- ___ 22. Which of the following wavelengths would *not* produce standing waves on a rope whose length is 1 m?
- 2 m
 - 1 m
 - $\frac{2}{3}$ m
 - $2\frac{1}{4}$ m



Problem

34. Radio waves from an FM station have a frequency of 95.9 MHz. If the waves travel with a speed of 3.00×10^8 m/s, what is the wavelength?
- A. 2.13 B. 3.13 C. 4.13 D. 5.13
35. A student wishes to construct a mass-spring system that will oscillate with the same frequency as a swinging pendulum with a period of 3.99 s. The student has a spring with a spring constant of 77.1 N/m. What mass should the student use to construct the mass-spring system?
- A. 31.1 kg B. 30.1 C. 29.1 D. 28.1
36. Waves propagate along a stretched string at a speed of 6.9 m/s. The end of the string vibrates up and down once every 3.6 s. What is the wavelength of the waves traveling along the string?
- A. 24 B. 25 C. 26 D. 27
37. A periodic wave has a wavelength of 0.58 m and a speed of 14 m/s. What is the wave frequency?
- A. 18 Hz B. 20 Hz C. 22 Hz D. 24 Hz
38. Imagine that you could transport a simple pendulum from Earth to another planet or moon, where the free-fall acceleration is one-fifth that on Earth. By what factor would the pendulum's frequency be changed? Express the answer with one significant figure.
- A. 0.1 B. 0.2 C. 0.3 D. 0.4
39. Vibration of a certain frequency produces a standing wave on a stretched string that is 1.6 m long. The standing wave has 7 nodes and 5 antinodes. What is the wavelength of the wave that produces this standing wave?
- A. 0.54 m B. 0.64 m C. 0.74 m D. 0.84 m
40. A mass on a spring vibrates in simple harmonic motion at an amplitude of 8.0 cm. If the mass of the object is 0.65 kg and the spring constant is 120 N/m, what is the frequency?
- A. 2.1 Hz B. 3.1 Hz C. 4.1 Hz D. 5.1 Hz

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