Name: _____ Unit VII
Mr. Willis Mechanical Waves & Sound
Conceptual Physics: _____ Need extra help?
Date: _____ Check out *http://www.bayhicoach.com*

Unit VII Study Guide

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

1. A mechanical wave moves through a medium, which can be
a. a liquid.
b. a solid.
c. a gas.
d. all of the above

2. A mechanical wave generally does NOT
a. move the medium from one place to another.
b. move through a medium.
c. move through solids.
d. disturb the medium.

3. Transverse and longitudinal waves both
a. have compressions and rarefactions.
b. transfer energy through a medium.
c. move at right angles to the vibration of the medium.
d. are capable of moving the medium a long distance.

4. Which type of mechanical wave needs a source of energy to produce it?
a. a transverse wave
b. a longitudinal wave
c. a surface wave
d. all of the above

5. Which wave causes the medium to vibrate only in a direction parallel to the wave's motion?
a. a transverse wave
b. a surface wave
c. a longitudinal wave
d. none of the above

6. A disturbance sends ripples across water in a tub. These ripples are an example of a
a. rarefaction.
b. longitudinal wave.
c. compression.
d. surface wave.

7. When a surfer rides an ocean wave on her surfboard, she is actually riding on
a. a crest that is toppling over.
b. a trough of the wave.
c. the rest position of the wave.
d. a region of rarefaction.

8. In an earthquake, a P wave is a longitudinal wave. It moves through soil and rock as a
a. wavy line.
b. series of faults.
c. series of compressions and rarefactions.
d. series of crests and troughs.

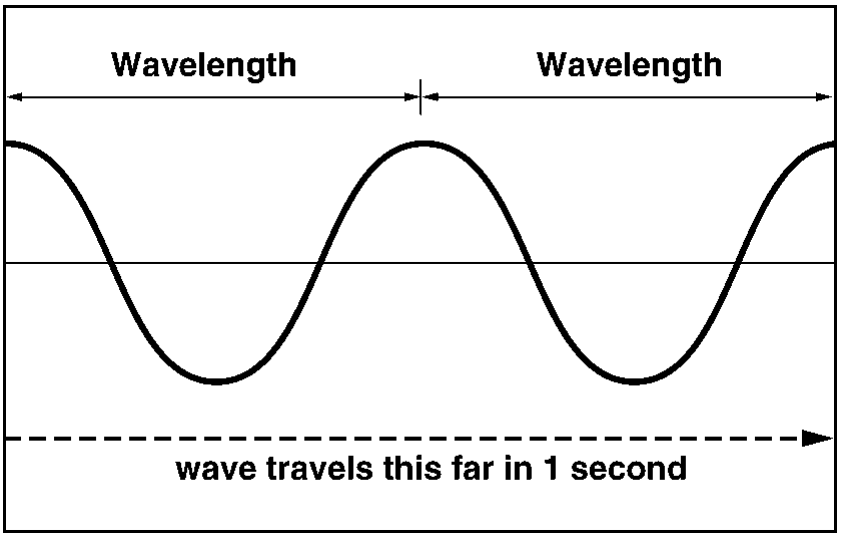

Figure 17-1

9. Figure 17-1 shows a wave movement during 1 second. What is the frequency of this wave?
a. 2 hertz
b. 2 meters/second
c. 0.5 second
d. 1 hertz

10. A period is the length of time it takes for
a. a disturbance to start a wave.
b. two complete wavelengths to pass a fixed point.
c. a wave to travel the length of a rope.
d. one complete wavelength to pass a fixed point.

11. To determine the speed of a wave, you would use which of the following formulas?
a. speed = frequency × amplitude
b. speed = wavelength × frequency
c. speed = wavelength × amplitude
d. speed = wavelength × period

12. A wave has a wavelength of 10 mm and a frequency of 5.0 hertz. What is its speed?
a. 50 mm/s
b. 50 hertz/s
c. 2.0 mm/s
d. 0.50 mm/s

13. To find amplitude, measure
a. from a trough to the rest position.
b. from a crest to the rest position.
c. neither A nor B
d. either A or B

14. To what is amplitude related?
a. the amount of energy carried by the wave
b. the maximum displacement from the rest position
c. neither A nor B
d. both A and B

15. When a wave strikes a solid barrier, it behaves like a basketball hitting a backboard. This wave behavior is called
a. constructive interference.
b. diffraction.
c. refraction.
d. reflection.

16. How does reflection differ from refraction and diffraction?
a. Reflection is the only process in which the wave does not continue moving forward.
b. Reflection is the only process that involves a change in the wave.
c. Reflection affects all types of mechanical waves, but refraction and diffraction do not.
d. Reflection is the only process that changes the direction of a wave.

17. For refraction to occur in a wave, the wave must
a. strike an obstacle larger than the wavelength.
b. change direction within a medium.
c. enter a new medium at an angle.
d. enter a new medium head-on.

18. In refraction, when a wave travels from one medium to another, it
a. changes speeds.
b. stays in step.
c. always moves in the same direction.
d. travels in the opposite direction.

19. What is one property of a wave that determines how much it will diffract when it encounters an obstacle?
a. speed
b. amplitude
c. polarization
d. wavelength

20. Which wave will probably be diffracted the most by an obstacle?
a. a longitudinal wave
b. the wave with the highest amplitude
c. the wave with the longest wavelength
d. the wave that strikes a solid barrier with the slowest speed

21. Suppose two waves collide and the temporary combined wave that results is smaller than the original waves. What term best describes this interaction?
a. diffraction
b. destructive interference
c. standing wave formation
d. constructive interference

22. The formation of a standing wave requires
a. the traveling of a wave for a long distance.
b. constructive interference between two waves of slightly different frequencies.
c. that refraction and diffraction occur at the same time in a wave.
d. interference between incoming and reflected waves.

23. A sound wave is an example of a
a. transverse wave.
b. longitudinal wave.
c. standing wave.
d. surface wave.

24. In which medium does sound travel the fastest?
a. salt water
b. fresh water
c. air
d. cast iron

25. Sonar equipment sends sound waves into deep water and measures
a. refraction of the transmitted wave.
b. only the direction of the reflected wave.
c. the time delay of the returning echoes.
d. interference of the transmitted and reflected waves.

26. A piano, violin, or guitar uses the resonance of a wooden soundboard to
a. amplify the sound.
b. dampen the sound.
c. raise the pitch.
d. limit standing waves.

27. An ambulance siren sounds different as it approaches you than when it moves away from you. What scientific term would you use to explain how this happens?
a. ultrasound
b. diffraction
c. rarefaction
d. the Doppler effect

28. When a sound source approaches you, the pitch you hear is
a. lower than when the source is stationary.
b. higher than when the source is stationary.
c. the same as when the source is stationary.
d. first higher and then lower than the pitch of the source when stationary.

29. Which part of the ear amplifies the vibrations from sound waves?
a. outer ear
b. inner ear
c. middle ear
d. both a and b

30. The part of the ear that sends coded nerve signals to the brain is
a. the outer ear.
b. the inner ear.
c. the middle ear.
d. the eardrum.

Completion
Complete each sentence or statement.

31. You can make a wave in a rope by adding _____ at one end of the rope.

32. Instead of crests and troughs, as in an ocean wave, a longitudinal wave has compressions and _____.

33. The trough of a transverse wave is most similar to a(an) _____ in a longitudinal wave.

34. A wave in a rope is a transverse wave, but a sound wave is a(an) _____ wave.

35. Waves in a rope are transverse waves because the medium's vibration is _____ to the direction in which the wave travels.

36. A pebble drops straight down into a tub of water, setting off _____ waves that travel at the boundary between the water and air.

37. In a transverse wave, _____ is measured from crest to crest or from trough to trough.

38. To determine the speed of a wave, you must know the wave's wavelength and _____.

39. If a wave has a wavelength of 4 m and a frequency of 3 hertz, its speed is _____.

40. To compare the energy of different waves, measure the _____ of the waves.

41. Amplitude measures the greatest displacement of a wave from the _____.

42. A wave entering a new medium at an angle will undergo _____ as one end of the wave changes speed.

43. Ocean waves will not bend if they approach the shore _____.

44. If two waves collide and form a temporary smaller wave, the interference is _____.

45. At the _____ of a standing wave, there is no displacement from the rest position.

46. The standard measure used to compare sound intensities is the _____.

47. When a person plucks a guitar string, the number of half wavelengths that fit into the length of the string determines the _____ of the sound produced.

48. On a piano, striking strings with the hammers sets up _____ between the strings and the soundboard.

49. When a train streaks by blowing its whistle, the changing pitch you hear is due to the _____.

50. The part of the ear that collects sound waves and focuses them inward is the _____ ear.

Short Answer

51. Why is a mechanical wave not always produced when a source vibrates?

52. What is a medium?

53. What type of mechanical wave is produced by pushing sharply on the end of a spring toy?

54. When you shake the end of a rope to make a wave, how can you increase the amplitude of the wave?

55. In what unit is wave frequency measured?

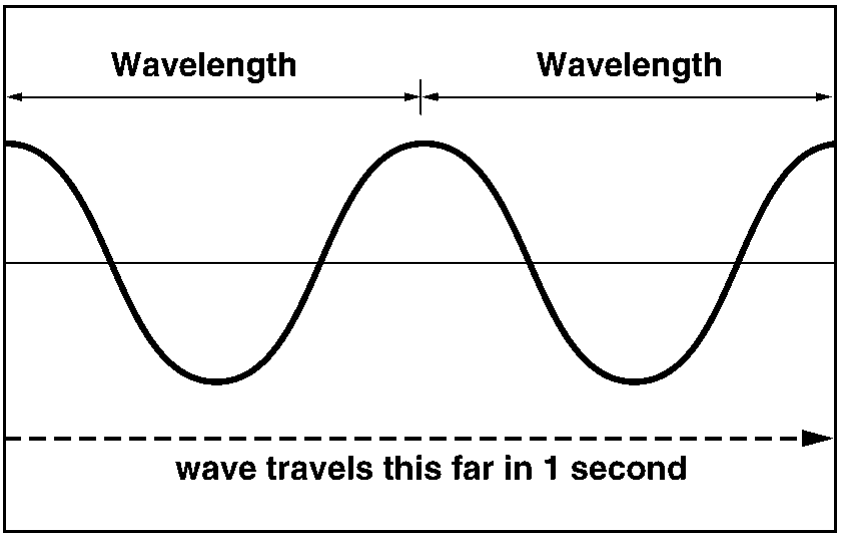

Figure 17-1

56. Consider the properties of a wave—wave speed, amplitude, wavelength, period, and frequency. Which two properties could you determine the numerical values of by using only the information given in Figure 17-1?

57. How can you change the wavelength of a wave in a rope without changing the amplitude?

58. How could you compare the energy carried in two different longitudinal waves?

59. Consider a wave approaching a barrier with a small hole. What change is the wave likely to undergo as it encounters the barrier?

60. Describe how a wave must enter a new medium in order for refraction to occur.

61. Waves X and Y are passing through a hole. Wave X has a relatively large wavelength compared to the hole. Wave Y has a relatively small wavelength. Which wave will diffract more as it passes through the hole?

62. Suppose two waves meet and temporarily cancel each other out. How would you describe the interference?

63. What sounds can damage hearing?

64. How do the frequencies of ultrasound compare to the frequencies that people normally hear?

65. What is the Doppler effect?

Essay

66. In a large cave, you can hear an echo a few seconds after you speak. Explain how this happens in terms of wave properties.

67. Explain the difference between reflection and refraction.

68. Sound waves have relatively long wavelengths. We can hear people around a corner before we can see them. Which wave behavior does this illustrate? Explain how wavelength relates to this behavior.

69. While practicing on the trumpet, you notice that every time you play a particular note, a window in the room rattles. How can you explain this rattling in terms of wave behaviors?

70. Compare the visible part of the ear to a satellite dish in terms of form and function.

Other

USING SCIENCE SKILLS

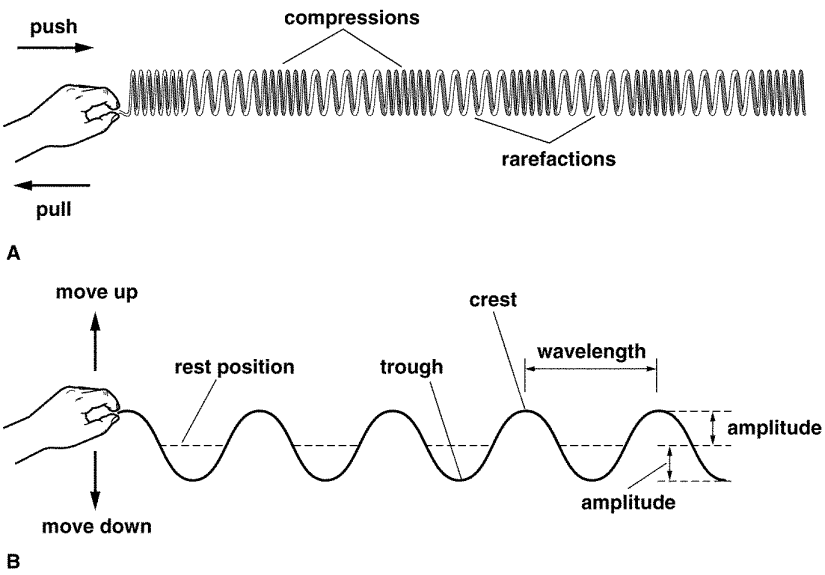

Figure 17-2

71. **Interpreting Illustrations** What kind of wave does A in Figure 17-2 represent? What kind of wave does B represent?

72. **Comparing and Contrasting** Figure 17-2 shows how someone starts the waves. How are these ways of starting waves alike? How are they different?

73. **Inferring** Compare the two waves in Figure 17-2. To what in wave B do the compressions of wave A correspond? To what in wave B do the rarefactions correspond?

74. **Inferring** What represents one wavelength in wave A of Figure 17-2? Define and describe the portion of the wave.

75. **Using Analogies** In Figure 17-2, wave A is produced by a spring toy, representing the concept of a sound wave in air. In sound, what is being squeezed together in the compressions, and what is being released in the rarefactions?

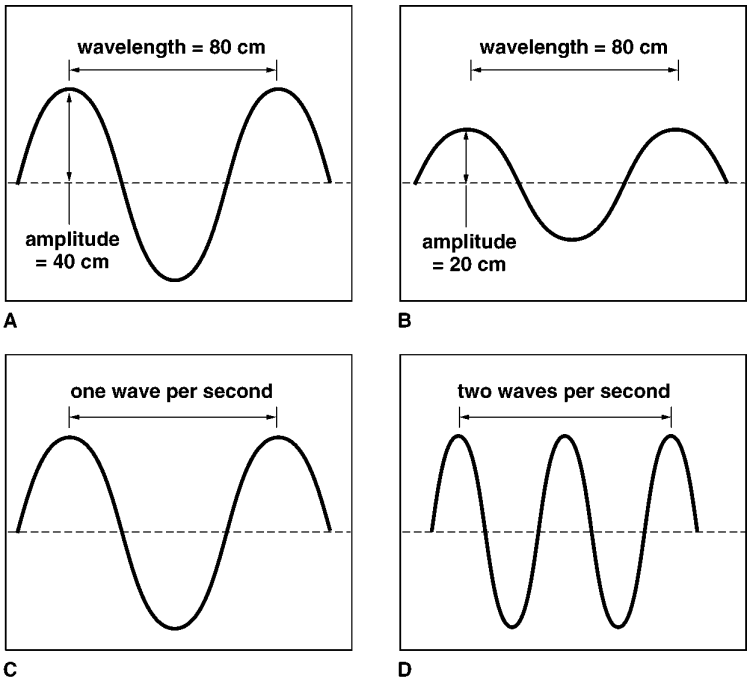

Figure 17-3

76. **Analyzing Data** What is the difference between wave A and wave B in Figure 17-3?

77. **Inferring** In Figure 17-3, both wave A and wave B were started by the same type of force—an up-and-down motion. What conclusion can you make about the energy of these two wave-starting forces?

78. **Predicting** Suppose you add the following panel E to the diagram: a wave pattern with a frequency of four waves per second. How will wavelength in this panel compare with the wavelength in panel D? How will it compare with the wavelength in panel C? Assume all the waves travel at the same speed.

79. **Analyzing Data** What is the difference between wave C and wave D in Figure 17-3?

80. **Drawing Conclusions** Consider both frequency and wavelength in Figure 17-3. How does each variable change between wave C and wave D? What is the relationship that explains the change? Assume the waves travel at the same speed.