Practice Questions for Conceptual Physics B ANSWERS WILL BE PLACED ON MOODLE

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. 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.

8. 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.

9. 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.

10. 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.

11. 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.

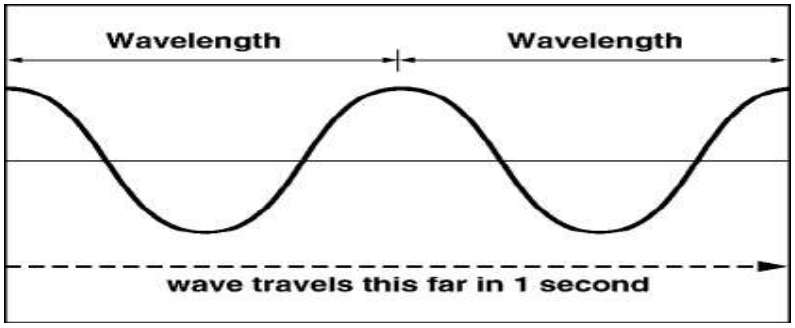


Figure 17-1

12. 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

13. 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

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. 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

16. 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

17. 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.

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

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

20. 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.

21. 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

22. 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.

23. Electromagnetic waves vary in
a. the speed they travel in a vacuum.
b. wavelength and frequency.
c. the way they reflect.
d. the orientation of their electric and magnetic fields.

24. To calculate the frequency of an electromagnetic wave, you need to know the speed of the wave and its
a. wavelength.
b. intensity.
c. refraction.
d. amplitude.

25. Light acts like
a. a wave.
b. a particle.
c. both a wave and a particle.
d. neither a wave nor a particle.

26. Because light travels in a straight line and casts a shadow, Isaac Newton hypothesized that light is
a. radiation.
b. a stream of particles.
c. a wave.
d. heat.

27. Photons travel outward from a light bulb in
a. a single straight line.
b. increasing intensity.
c. a small, dense area.
d. all directions.

28. Which of the following occurs as light travels farther from its source?
a. Far from the source, photons come together in a small area.
b. The intensity of light increases as photons move away from the source.
c. The source gives off less light as photons move away from it.
d. Far from the source, photons spread over a larger area.

29. Infrared rays have a shorter wavelength than
a. ultraviolet rays.
b. X-rays.
c. radar waves.
d. gamma rays.

30. The full range of frequencies of electromagnetic radiation is called
a. visible light.
b. radio waves.
c. the electromagnetic spectrum.
d. invisible radiation.

31. The waves with the longest wavelengths in the electromagnetic spectrum are
a. infrared rays.
b. radio waves.
c. gamma rays.
d. X-rays.

32. The visible light spectrum ranges between
a. radar waves and X-rays.
b. television waves and infrared rays.
c. infrared rays and ultraviolet rays.
d. ultraviolet rays and gamma rays.

33. Cellular telephones utilize
a. radar waves.
b. very high frequency waves.
c. very low frequency waves.
d. microwaves.

34. X-ray photographs show softer tissue
a. as invisible.
b. as dark, highly exposed areas.
c. the same as dense bones.
d. as bright white areas.

35. A translucent material
a. scatters some light.
b. transmits all light.
c. absorbs all light.
d. reflects all light.

36. In order of increasing light-transmitting capabilities of materials, which is the correct sequence?
a. transparent, opaque, translucent
b. opaque, transparent, translucent
c. opaque, translucent, transparent
d. translucent, transparent, opaque

37. Which of the following occurs as a light wave bends when it passes from one medium into another?
a. constructive interference
b. refraction
c. destructive interference
d. reflection

38. Polarized sunglasses work by
a. blocking light waves that vibrate in one plane.
b. gradually refracting light as it passes through the lenses.
c. bending light as it passes from air into the lenses.
d. reflecting most of the light that strikes the sunglasses.

39. Newton's prism experiments showed that white sunlight is made up of
a. the full electromagnetic spectrum.
b. only blue light.
c. all the colors of the visible spectrum.
d. only the longest wavelengths.

40. When droplets of water in the atmosphere act like prisms, the colors in sunlight undergo
a. interference.
b. absorption.
c. polarization.
d. dispersion.

41. What an object is made of and the color of light that strikes it determine the
a. apparent color of the object.
b. transparency of the object.
c. opacity of the object.
d. translucence of the object.

42. Blue light and yellow light combine to produce white light because
a. they absorb each other's wavelengths.
b. blue, yellow, and white are primary colors.
c. they are complementary colors of light.
d. they are both primary colors of light.

43. The primary colors of light are
a. green, blue, and black.
b. cyan, magenta, and yellow.
c. red, yellow, and blue.
d. blue, green, and red.

44. The primary colors of pigments
a. are cyan, yellow, and magenta.
b. are the same as the secondary colors of light.
c. combine in equal amounts to produce black.
d. all of the above

45. An incandescent light bulb produces light when electrons flow through the
a. air.
b. glass.
c. filament.
d. vacuum.

46. Which of the following is NOT true regarding neon lights?
a. Light is emitted as electrons move through a gas in a tube.
b. All neon lights are colored by the color of the tubing.
c. Neon lights may contain other gases, such as helium or krypton.
d. Each kind of gas produces its own distinctive color.

47. Light whose waves all have the same wavelength, direction, and coincidental peaks is called
a. coherent light.
b. incandescent light.
c. fluorescent light.
d. neon light.

48. Which kind of light is used to carry information through optical fibers?
a. incandescent
b. fluorescent
c. sodium-vapor light
d. laser

Matching
Use these terms to answer the next five questions.
a. less
b. translucent
c. infrared
d. transverse
e. black

49. Electromagnetic waves are _____ waves consisting of changing electric and magnetic fields.
50. Warm objects give off more _____ radiation than cool objects give off.
51. The farther away you are from a light source, the _____ intense it appears.
52. Objects that scatter some of the light that is transmitted through them are _____.
53. Combining equal amounts of the three primary pigments produces _____.

Use these terms to answer the next five questions.
a. electrons
b. transmits
c. gamma
d. vacuum
e. frequency

54. Electromagnetic waves can travel through a(an) _____.
55. Light is produced when _____ change energy levels in an atom.
56. Microwaves have a higher _____ than radio waves have.
57. A transparent object _____ almost all of the light that strikes it.
58. The electromagnetic waves with the shortest wavelengths are _____ rays.

Use these terms to answer the following five questions.
a. rarefactions
b. energy
c. perpendicular
d. surface
e. longitudinal

59. You can make a wave in a rope by adding _____ at one end of the rope.
60. Instead of crests and troughs, as in an ocean wave, a longitudinal wave has compressions and _____.
61. A wave in a rope is a transverse wave, but a sound wave is a(an) _____ wave.
62. Waves in a rope are transverse waves because the medium's vibration is _____ to the direction in which the wave travels.
63. A pebble drops straight down into a tub of water, setting off _____ waves that travel at the boundary between the water and air.

Use the following terms to answer the next five questions.

a. wavelength
b. frequency
c. amplitude
d. equilibrium
e. refraction

64. In a transverse wave, _____ is measured from crest to crest or from trough to trough.
65. A wave entering a new medium at an angle will undergo _____ as one end of the wave changes speed.
66. To determine the speed of a wave, you must know the wave's wavelength and _____.
67. Amplitude measures the greatest displacement of a wave from the _____.
68. To compare the energy of different waves, measure the _____ of the waves.

Use these terms to answer the following five questions.

a. destructive
b. node
c. decibel
d. Doppler effect
e. outer

69. At the _____ of a standing wave, there is no displacement from the rest position.
70. When a train streaks by blowing its whistle, the changing pitch you hear is due to _____.
71. The standard measure used to compare sound intensities is the _____.
72. If two waves collide and form a temporary smaller wave, the interference is _____.
73. The part of the ear that collects sound waves and focuses them inward is the _____ ear.

74. Like magnetic poles always
    a. repel each other.
    b. attract each other.
    c. cancel out each other's magnetic fields.
    d. point toward the north pole.
75. The magnetism of a piece of magnetized iron can be weakened by
    a. heating and hammering the iron.
    b. touching unmagnetized iron.
    c. bending the iron.
    d. None of the above
76. The magnetic field strength of a magnet
    a. decreases as distance from the magnet decreases.
    b. decreases as distance from the magnet increases.
    c. increases as distance from the magnet increases.
    d. remains the same at any distance from a magnet.
77. What material was used to make the first compass?
    a. lodestone
    b. limestone
    c. iron
    d. steel
78. What instrument is used to trace the direction of a magnetic field?
    a. lodestone
    b. limestone
    c. compass
    d. needle
79. Magnetic fields are produced by
    a. electric charges.
    b. electric currents.
    c. gravitational force.
    d. water currents.
80. A magnetic field around a current-carrying wire forms
    a. lines tangent to the wire.
    b. lines perpendicular to the wire.
    c. lines parallel to the wire.
    d. concentric circles around the wire.
81. The strength of a magnetic field created by current in a wire can be increased by
    a. using shorter wire.
    b. decreasing the current in the wire.
    c. using longer wire.
    d. wrapping the wire into a coil.

82. The strength of the magnetic field of a solenoid can be increased by
    a. decreasing the number of loops on the solenoid.
    b. decreasing the current in the solenoid.
    c. increasing the number of loops on the solenoid.
    d. increasing the resistance of the solenoid.

83. The strength of the magnetic field of a solenoid can be increased by
    a. decreasing its number of loops.
    b. decreasing its current.
    c. inserting an iron rod.
    d. inserting a rubber rod.

84. In a magnetized substance, the domains
    a. are randomly distributed.
    b. line up more uniformly in one direction.
    c. cancel each other.
    d. can never be reoriented.

85. Which orientation characterizes the magnetic domains in an unmagnetized piece of iron?
    a. parallel to the magnetic axis
    b. antiparallel to the magnetic axis
    c. random
    d. perpendicular to the magnetic axis

86. A device that converts electric energy into mechanical energy is a(n)
    a. generator.
    b. electric motor.
    c. commutator.
    d. transformer.

87. A potential difference causes
    a. electrons to move from the positive terminal to the negative terminal of a battery.
    b. electrons to move from the negative terminal to the positive terminal of a battery.
    c. protons to move from the positive terminal to the negative terminal of a battery.
    d. protons to move from the negative terminal to the positive terminal of a battery.

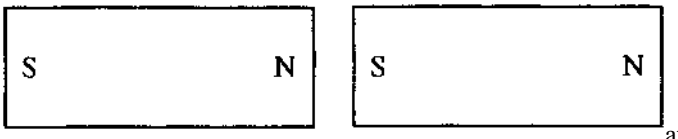
88. What is the current produced when 20 Volts is put across an 80 ohm resistor?
    a. 100A b. 1600 A c. 4 A d. 0.25 A

89. What is the power used by a motor which has a current of 60 A, coming from a 12V battery?
    a. 5 W b.48 W c. 72 W d. 720 W

90. Generators convert
    a. mechanical energy to electrical energy.
    b. electrical energy to mechanical energy.
    c. chemical energy to electrical energy.
    d. electrical energy to chemical energy.

91. A transformer changes
    a. both the amperage and the voltage of an electric current.
    b. the voltage of an electric current.
    c. the amperage of an electric current.
    d. the type of an electric current.

Short Answer



92. Will the magnets in the figure above attract or repel each other?

93. What do magnetic field lines that are close together indicate?

94. What is a solenoid, and what is its function?

95. What is a generator?

96. How are generators different from electric motors?

97. What are step-up and step-down transformers used for?

98. What is the difference between AC and DC? What voltage sources could you use to produce AC or DC?

99. Is a house wired in parallel or series? Does it use alternating or direct current?

100. A 30 Volt battery is wired to a 120-Ω resistor. Calculate the current and the power used, including correct units.