

FINAL EXAM PRACTICE TEST**Multiple Choice**

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

Unit 06 WAVES

- _____ 1. 1. When the absorption lines of a galaxy shift toward the red end of the spectrum, it means that the galaxy is
a. moving closer to Earth. c. moving away from Earth.
b. small and young. d. large and old.
- _____ 2. The big bang theory explains the
a. origin of the universe. c. Doppler effect.
b. life cycle of a star. d. arrangement of constellations.
- _____ 3. Which of the following provides support for the big bang theory?
a. red shift c. elliptical galaxies
b. cosmic microwave background radiation d. both a and b
- _____ 4. Dark matter can be detected by its
a. cosmic microwave background radiation. c. gravitational effects on visible matter.
b. red shift. d. velocity.
- _____ 5. In a diagram depicting the solar system as heliocentric, what is located at the center?
a. Earth c. the moon
b. the sun d. Mars
- _____ 6. Which of the following is the most likely reason that ancient observers believed that Earth was the center of the universe?
a. The Earth seemed to move on its axis.
b. Earth's motions are only recently known because of high-powered telescopes.
c. Objects in the sky appear to circle around Earth.
d. Ancient observers believed the universe was stationary.
- _____ 7. The orbit of a planet around the sun is a(an)
a. ellipse. c. circle.
b. straight line. d. parabola.
- _____ 8. Which of the following helps explain why the planets remain in motion around the sun?
a. density c. inertia
b. gravity d. both b and c
- _____ 9. Which of the following objects does NOT orbit directly around the sun?
a. planets c. moons
b. comets d. all of the above
- _____ 10. What led to the discovery of three more planets than those that the ancient observers knew about?
a. the invention of the telescope in 1600 c. space missions in the Apollo program
b. the Hubble telescope launched in 1990 d. observations by *Sputnik 1* in 1957
- _____ 11. Who was the first American in space?
a. Yuri Gagarin c. Chuck Yeager
b. Alan Shepard d. Neil Armstrong

- _____ 12. Why was Wegener's hypothesis of continental drift originally rejected by geologists?
- Wegener did not have any data to support his hypothesis.
 - The continents of South America and Africa do not fit well together.
 - Wegener could not explain how the continents could move through the ocean floor.
 - Wegener's data was incorrect.
- _____ 13. New ocean crust is formed along
- mid-ocean ridges.
 - subduction zones.
 - mountain belts.
 - trenches.
- _____ 14. A subducting oceanic plate
- is less dense than the plate it moves under.
 - is pushed up and over the continental crust.
 - sinks into the mantle, forming a trench.
 - moves horizontally in the opposite direction past the other plate.
- _____ 15. The heat that drives mantle convection comes from the cooling of Earth's interior and
- the sun.
 - the decay of radioactive isotopes.
 - sea-floor spreading.
 - trenches.
- _____ 16. Plates slide past each other, and crust is neither created nor destroyed at a
- convergent boundary.
 - divergent boundary.
 - mid-ocean ridge.
 - transform boundary.
- _____ 17. What is a break in a rock mass along which movement occurs?
- fold
 - earthquake
 - fault
 - epicenter
- _____ 18. Stress in Earth's crust is caused by
- folds.
 - plate movements.
 - earthquakes.
 - faults.
- _____ 19. What causes the magma inside a volcano to rise towards the surface?
- It is a thick liquid, denser than the surrounding rock.
 - It does not contain dissolved gases.
 - It is less dense than the surrounding rock.
 - It is cooler than the surrounding rock.
- _____ 20. Electromagnetic waves vary in
- the speed they travel in a vacuum.
 - wavelength and frequency.
 - the way they reflect.
 - their direction.
- _____ 21. To calculate the frequency of an electromagnetic wave, you need to know the speed of the wave and its
- wavelength.
 - intensity.
 - refraction.
 - amplitude.
- _____ 22. Infrared rays have a shorter wavelength than
- ultraviolet rays.
 - X-rays.
 - radar waves.
 - gamma rays.
- _____ 23. The full range of frequencies of electromagnetic radiation is called
- visible light.
 - radio waves.
 - the electromagnetic spectrum.
 - invisible radiation.
- _____ 24. The waves with the longest wavelengths in the electromagnetic spectrum are
- infrared rays.
 - radio waves.
 - gamma rays.
 - X-rays.

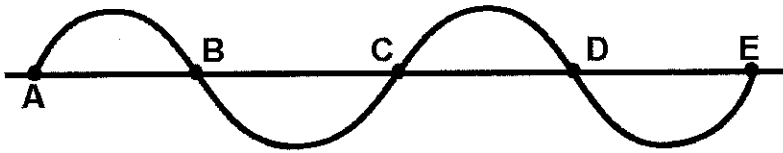
Name: _____

ID: A

- _____ 25. The visible light spectrum ranges between
a. radar waves and X-rays. c. infrared rays and ultraviolet rays.
b. television waves and infrared rays. d. ultraviolet rays and gamma rays.
- _____ 26. Cellular telephones utilize
a. radar waves. c. very low frequency waves.
b. very high frequency waves. d. microwaves.
- _____ 27. Which of the following occurs as a light wave bends when it passes from one medium into another?
a. constructive interference c. destructive interference
b. refraction d. reflection
- _____ 28. Newton's prism experiments showed that white sunlight is made up of
a. the full electromagnetic spectrum. c. all the colors of the visible spectrum.
b. only blue light when separated by a prism. d. only the longest wavelengths.
- _____ 29. The energy of motion is called
a. kinetic energy. c. thermal energy.
b. potential energy. d. work.
- _____ 30. A small 30-kilogram canoe is floating downriver at a speed of 2 m/s. What is the canoe's kinetic energy?
a. 32 J c. 120 J
b. 60 J d. 900 J
- _____ 31. A 12-kg sled is moving at a speed of 3.0 m/s. At which of the following speeds will the sled have twice as much kinetic energy?
a. 1.5 m/s c. 6.0 m/s
b. 4.2 m/s d. 9.0 m/s
- _____ 32. An object's gravitational potential energy is directly related to all of the following EXCEPT
a. its height relative to a reference level. c. its speed.
b. its mass. d. the acceleration due to gravity.
- _____ 33. Why is the gravitational potential energy of an object 1 meter above the moon's surface less than its potential energy 1 meter above Earth's surface?
a. The object's mass is less on the moon.
b. The object's weight is more on the moon.
c. The moon's acceleration due to gravity is less.
d. both a and c
- _____ 34. A 4-kilogram cat is resting on top of a bookshelf that is 2 meters high. What is the cat's gravitational potential energy relative to the floor if the acceleration due to gravity is 9.8 m/s^2 ?
a. 6 J c. 20 J
b. 8 J d. 78 J
- _____ 35. The mechanical energy of an object equals its
a. chemical energy plus its nuclear energy. c. nuclear energy.
b. kinetic energy plus its potential energy. d. thermal energy.
- _____ 36. The equation $E = mc^2$ relates energy and
a. force. c. mass.
b. gravity. d. work.

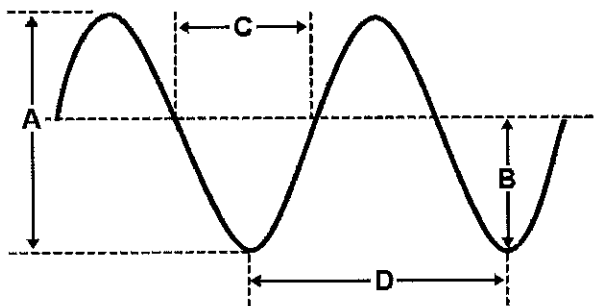
- _____ 37. Motion that occurs in repeated cycles includes all of the following EXCEPT _____ motion.
- pendulum
 - harmonic
 - linear
 - circular
- _____ 38. A unit of motion repeated over and over again is called the:
- amplitude.
 - cycle.
 - velocity.
 - period.
- _____ 39. Oscillating systems include all of the following EXCEPT:
- the moving pedals on a bicycle.
 - a radio signal from FM station 106.3.
 - Earth turning on its axis.
 - a block sliding down a ramp.
- _____ 40. The measure of the number of cycles per second is called:
- frequency.
 - period.
 - amplitude.
 - vibration.
- _____ 41. The unit for measuring the frequency of an oscillating system is the:
- meter.
 - meter/second.
 - hertz.
 - hertz/second.
- _____ 42. The amount of time required for one cycle to occur is called the:
- amplitude.
 - frequency.
 - harmonic.
 - period.
- _____ 43. A pendulum makes one complete swing over and back in 2.2 seconds. Its frequency is:
- 0.45 hertz.
 - 0.45 seconds.
 - 2.2 hertz.
 - 2.2 second.
- _____ 44. An insect moves its wings up and down 144 times in three seconds. The period of this movement is:
- 0.0208 seconds.
 - 48 hertz.
 - 48 seconds.
 - 144 hertz.
- _____ 45. When damping occurs in a moving pendulum system, it may cause the:
- mass of the pendulum to decrease.
 - amplitude of the pendulum to decrease.
 - length of the pendulum to increase.
 - period of the pendulum to decrease.

46. The diagram below represents a graph of harmonic motion:



One cycle of the motion is represented by the distance from:

- A to B.
 - B to D.
 - B to E.
 - A to E.
47. Assuming that it takes exactly 24 hours for Earth to rotate on its axis, the frequency of rotation of Earth measured in hertz is:
- 0.125 seconds
 - 0.042 hertz.
 - 1400 hertz.
 - 86000 hertz.
48. One full cycle of harmonic motion is represented by _____ degrees.
- 45
 - 90
 - 180
 - 360
49. The graph below represents position versus time for the amplitude of a pendulum that was allowed to swing for four seconds:



Which letter correctly identifies the amplitude of the pendulum?

- A
- B
- C
- D

Completion

Complete each sentence or statement.

50. By using a spectrograph, a star's absorption lines can identify the different _____ that a star is composed of.
51. The apparent change in frequency and wavelength of a sound or light source as it moves toward or away from an observer is called the _____.

52. The theory that the universe came into being in a single moment with an enormous explosion is the _____ theory.
53. The observation that cosmic microwave background radiation is detected in all directions in the universe supports the hypothesis that the universe is _____.
54. The model of the universe in which Earth is stationary is the _____ model.
55. The process by which oceanic plates sink into the mantle through a trench is called _____.
56. Alfred Wegener proposed that a continent was formed by continental drift. This supercontinent was called _____.
57. Due to sea-floor spreading, the youngest rocks in the ocean floor are found near a(an) _____.
58. Subduction occurs at _____ plate boundaries.
59. Electromagnetic waves are _____ waves consisting of changing electric and magnetic fields.
60. Warm objects give off more _____ radiation than cool objects give off.
61. The speed of light in a vacuum is _____ m/s.
62. Electromagnetic waves can travel through a(an) _____.
63. Light is produced when _____ change energy levels in an atom.
64. Visible light waves have a shorter _____ than infrared waves have.
65. The electromagnetic waves with the shortest wavelengths are _____ rays.
66. A mirage, or distorted image, can be caused by the _____ of light as it moves into layers of hotter and hotter air.
67. The following electromagnetic waves are arranged in order of increasing frequency: infrared, _____, ultraviolet.
68. Energy and work are measured in the SI unit called the _____.
69. If the _____ of an object doubles, its kinetic energy doubles.
70. The kinetic energy of an object is proportional to the square of its _____.
71. Energy that is stored due to position or shape is called _____ energy.
72. You can calculate an object's gravitational potential energy by using the equation _____.
73. The sum of the kinetic energy and potential energy of an object is called its _____ energy.
74. All energy can be considered as kinetic energy, _____ energy, or the energy in fields.
75. "Energy cannot be created or destroyed" is a statement of the law of _____.

Name: _____

ID: A

Short Answer

76. Who was the first human to step onto the moon?
77. What theory explains how Earth's plates form and move?
78. In what two types of locations do most volcanoes occur?
79. Why did most geologists initially reject Alfred Wegener's hypothesis of continental drift?
80. What is a basic difference between electromagnetic waves and sound waves?
81. Which type of electromagnetic wave has the longest wavelength and lowest frequency?
82. Both gamma rays and X-rays are used to see inside the body. Which one is used to make images of bones? How are the other rays used?
83. Which waves have wavelengths longer than those of visible light? Give an example of how each kind of wave is used.

Problem

84. A communications satellite transmits a radio wave at a frequency of 9.4×10^9 Hz. What is the signal's wavelength? Assume the wave travels in a vacuum. Show your work.
85. What is the kinetic energy of a 74.0-kg sky diver falling at a terminal velocity of 52.0 m/s? Show your work.
86. A 0.49-kg squirrel jumps from a tree branch that is 3.6 m high to the top of a bird feeder that is 1.5 m high. What is the change in gravitational potential energy of the squirrel? (The acceleration due to gravity is 9.8 m/s^2 .) Show your work.

Essay

87. What is the electromagnetic spectrum? Give examples of each kind of wave and relate each example to its relative position in the spectrum.

Other

USING SCIENCE SKILLS

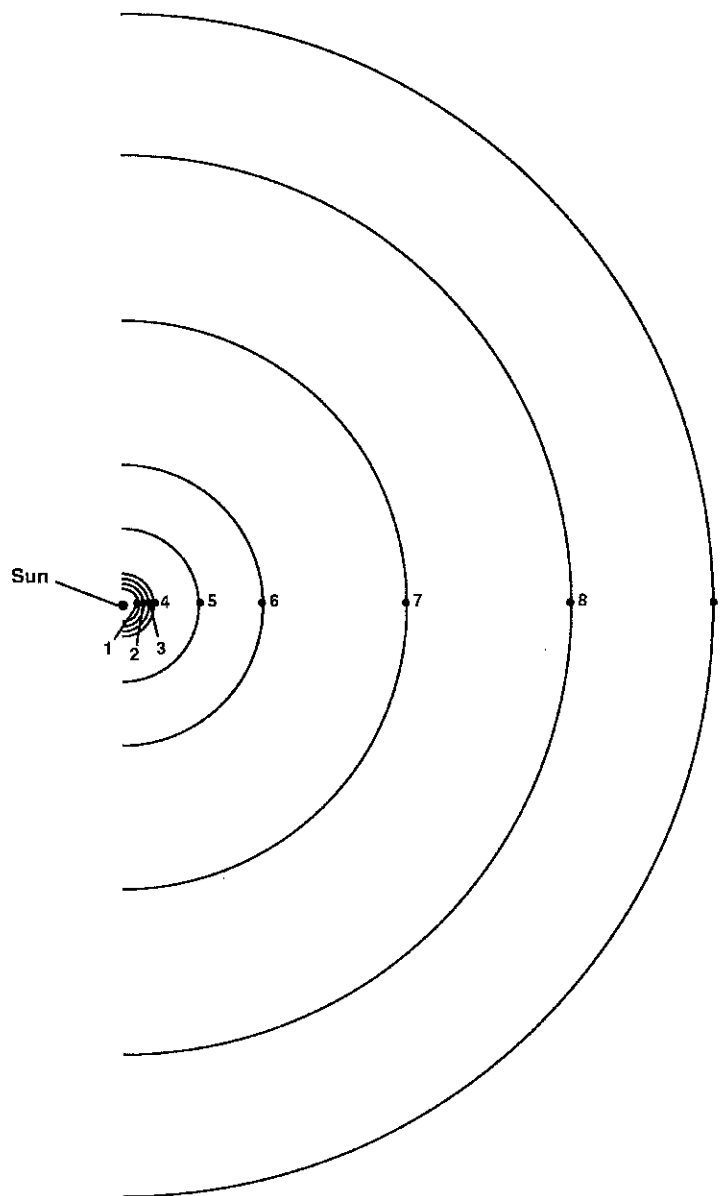


Figure 25-2

88. **Interpreting Graphics** Is the model in Figure 25-2 geocentric or heliocentric? Explain how you know.

USING SCIENCE SKILLS

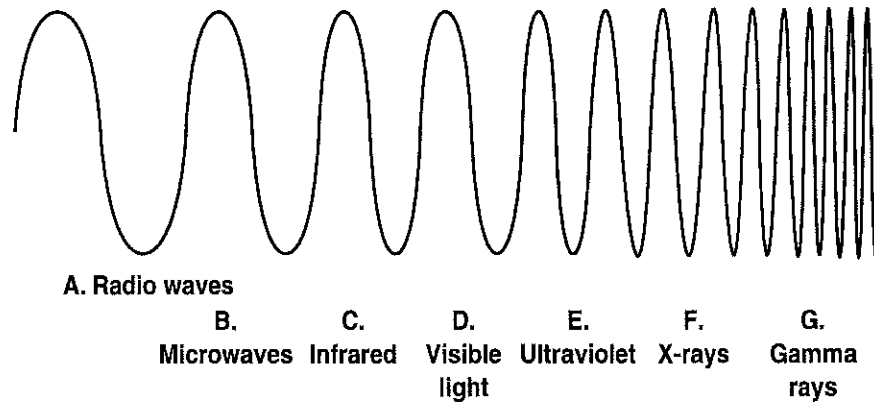


Figure 18-2

89. .
90. **Classifying** In Figure 18-2, which waves can be separated into different wavelengths of colored light?
91. **Inferring** Look at Figure 18-2. Without knowing the specific frequencies and wavelengths of the colors of the visible spectrum, at which end of the visible spectrum would you place red? At which end would you place violet? *Hint:* Use the names of the waves outside the visible spectrum to help you.

FINAL EXAM PRACTICE TEST

Answer Section

MULTIPLE CHOICE

1.	ANS: C	DIF: L1	OBJ: 26.5.1
2.	ANS: A	DIF: L1	OBJ: 26.5.2
3.	ANS: D	DIF: L2	OBJ: 26.5.2
4.	ANS: C	DIF: L1	OBJ: 26.5.3
5.	ANS: B	DIF: L1	OBJ: 25.1.1
6.	ANS: C	DIF: L2	OBJ: 25.1.1
7.	ANS: A	DIF: L1	OBJ: 25.1.2
8.	ANS: D	DIF: L2	OBJ: 25.1.2
9.	ANS: C	DIF: L1	OBJ: 25.1.3
10.	ANS: A	DIF: L2	OBJ: 25.1.3
11.	ANS: B	DIF: L1	OBJ: 25.1.4
12.	ANS: C	DIF: L2	OBJ: 22.4.1
13.	ANS: A	DIF: L1	OBJ: 22.4.2
14.	ANS: C	DIF: L2	OBJ: 22.4.2
15.	ANS: B	DIF: L2	OBJ: 22.4.3
16.	ANS: D	DIF: L1	OBJ: 22.4.3
17.	ANS: C	DIF: L1	OBJ: 22.5.1
18.	ANS: B	DIF: L2	OBJ: 22.5.1
19.	ANS: C	DIF: L2	OBJ: 22.6.1
20.	ANS: B	DIF: L2	OBJ: 18.1.1
21.	ANS: A	DIF: L1	OBJ: 18.1.2
22.	ANS: C	DIF: L1	OBJ: 18.2.1
23.	ANS: C	DIF: L2	OBJ: 18.2.1
24.	ANS: B	DIF: L1	OBJ: 18.2.1
25.	ANS: C	DIF: L2	OBJ: 18.2.1
26.	ANS: D	DIF: L1	OBJ: 18.2.2
27.	ANS: B	DIF: L1	OBJ: 18.3.2
28.	ANS: C	DIF: L1	OBJ: 18.4.1
29.	ANS: A	DIF: L1	OBJ: 15.1.2
30.	ANS: B	DIF: L2	OBJ: 15.1.2
31.	ANS: B	DIF: L2	OBJ: 15.1.2
32.	ANS: C	DIF: L1	OBJ: 15.1.3
33.	ANS: C	DIF: L2	OBJ: 15.1.3
34.	ANS: D	DIF: L1	OBJ: 15.1.4
35.	ANS: B	DIF: L1	OBJ: 15.2.3
36.	ANS: C	DIF: L1	OBJ: 15.2.4
37.	ANS: C	DIF: basic	REF: section 19.1
38.	ANS: B	DIF: basic	REF: section 19.1
39.	ANS: D	DIF: basic	REF: section 19.1

40.	ANS: A	DIF: basic	REF: section 19.1
41.	ANS: C	DIF: basic	REF: section 19.1
42.	ANS: D	DIF: basic	REF: section 19.1
43.	ANS: A	DIF: intermediate	REF: section 19.1
44.	ANS: A	DIF: intermediate	REF: section 19.1
45.	ANS: B	DIF: intermediate	REF: section 19.1
46.	ANS: B	DIF: intermediate	REF: section 19.1
47.	ANS: A	DIF: advanced	REF: section 19.1
48.	ANS: D	DIF: basic	REF: section 19.2
49.	ANS: B	DIF: intermediate	REF: section 19.2

COMPLETION

50.	ANS: elements		
	DIF: L1	OBJ: 26.2.2	
51.	ANS: Doppler effect		
	DIF: L2	OBJ: 26.5.1	
52.	ANS: big bang		
	DIF: L1	OBJ: 26.5.2	
53.	ANS: expanding		
	DIF: L2	OBJ: 26.5.2	
54.	ANS: geocentric		
	DIF: L1	OBJ: 25.2.2	
55.	ANS: subduction		
	DIF: L1	OBJ: 22.4.2	
56.	ANS: Pangaea		
	DIF: L2	OBJ: 22.4.1	
57.	ANS: mid-ocean ridge		
	DIF: L2	OBJ: 22.4.2	
58.	ANS: convergent		
	DIF: L2	OBJ: 22.4.3	
59.	ANS: transverse		
	DIF: L1	OBJ: 18.1.1	
60.	ANS: infrared		
	DIF: L1	OBJ: 18.2.1	

61. ANS:
 3.00×10^8
300,000,000
DIF: L1 OBJ: 18.1.3
62. ANS: vacuum
DIF: L1 OBJ: 18.1.1
63. ANS: electrons
DIF: L1 OBJ: 18.5.1
64. ANS: wavelength
DIF: L1 OBJ: 18.2.1
65. ANS: gamma
DIF: L1 OBJ: 18.2.2
66. ANS: refraction
DIF: L2 OBJ: 18.3.2
67. ANS: visible light
DIF: L2 OBJ: 18.2.1
68. ANS: joule
DIF: L2 OBJ: 15.1.1
69. ANS: mass
DIF: L1 OBJ: 15.1.2
70. ANS: speed
DIF: L2 OBJ: 15.1.2
71. ANS: potential
DIF: L1 OBJ: 15.1.3
72. ANS: $PE = mgh$
DIF: L2 OBJ: 15.1.4
73. ANS: mechanical
DIF: L1 OBJ: 15.1.5
74. ANS: potential
DIF: L2 OBJ: 15.1.5
75. ANS: conservation of energy
DIF: L1 OBJ: 15.2.2

SHORT ANSWER

76. ANS:
Neil Armstrong
- DIF: L1 OBJ: 25.1.4
77. ANS:
the theory of plate tectonics
- DIF: L1 OBJ: 22.4.2
78. ANS:
at plate boundaries and at hot spots
- DIF: L1 OBJ: 22.6.3
79. ANS:
Wegener could not explain how the continents could move through the solid rock of the ocean floor or what force could move entire continents.
- DIF: L2 OBJ: 22.4.1
80. ANS:
Electromagnetic waves can travel through a vacuum; sound waves cannot. Also, electromagnetic waves are transverse waves, whereas sound waves are longitudinal waves.
- DIF: L2 OBJ: 18.1.1
81. ANS:
radio waves
- DIF: L1 OBJ: 18.2.1
82. ANS:
X-rays are used to make images of bones. Gamma rays are used to make images of the brain and to kill cancer cells.
- DIF: L2 OBJ: 18.2.2
83. ANS:
radio waves (radio and television signals); microwaves and radar waves (microwave ovens); infrared rays (heat lamps)
- DIF: L1 OBJ: 18.2.1

PROBLEM

84. ANS:

$$\text{wavelength} = \frac{\text{speed}}{\text{frequency}} = \frac{3.00 \times 10^8 \text{ m/s}}{9.4 \times 10^9 \text{ Hz}} = 0.032 \text{ m}$$

DIF: L2 OBJ: 18.1.2

85. ANS:

$$\text{KE} = \frac{1}{2} mv^2 = \frac{1}{2} (74.0 \text{ kg})(52.0 \text{ m/s})^2 = \frac{1}{2} (74 \text{ kg})(2704 \text{ m}^2/\text{s}^2) = 100,000 \text{ J}$$

DIF: L2 OBJ: 15.1.2

86. ANS:

$$\text{PE} = mgh = (0.49 \text{ kg})(9.8 \text{ m/s}^2)(3.6 \text{ m} - 1.5 \text{ m}) = 10 \text{ J}$$

decreased by 10 J

DIF: L2 OBJ: 15.1.4

ESSAY

87. ANS:

The full range of wave frequencies of electromagnetic radiation is called the electromagnetic spectrum. In order of increasing frequency, the electromagnetic spectrum includes radio waves (radio, television, microwave ovens, radar), infrared rays (heat lamps), visible light (communication), ultraviolet rays (kill microorganisms), X-rays (medical imaging), and gamma rays (kill cancer cells). Visible light is the only part of the spectrum that we can see, and it is a very small part.

DIF: L2 OBJ: 18.2.1

OTHER

88. ANS:

Heliocentric; the sun is shown at the center, and other bodies are indicated in orbit around the sun.

DIF: L1 OBJ: 25.1.1

89. ANS:

DIF: L1 OBJ: 18.2.2

90. ANS:

visible light

DIF: L1 OBJ: 18.4.1

91. ANS:

Red would be at the end of the visible spectrum with the lowest frequency and longest wavelength of all the colors, just above the infrared range. *Infra* means “under,” so *infrared* means “under red.” In the same way, *ultra* means “beyond,” so *ultraviolet* means “beyond violet.” Violet would be at the end of the visible spectrum with the shortest wavelength and the highest frequency.

DIF: L1

OBJ: 18.2.1

