Name: _____ Class: _____ Date: _____ ID: A

Review of Chapter 25

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

____ 1. The source of all wave motion is a
a. region of variable high and low pressure.
b. vibration.
c. movement of matter.
d. harmonic object.

____ 2. The time needed for a wave to make one complete cycle is its
a. frequency.
b. velocity.
c. amplitude.
d. period.
e. wavelength.

____ 3. The distance between successive identical parts of a wave is called its
a. frequency.
b. period.
c. velocity.
d. amplitude.
e. wavelength.

____ 4. The Hertz is a
a. special radio wave.
b. type of car.
c. unit of period.
d. unit of wavelength.
e. unit of frequency.

____ 5. A wave created by shaking a rope up and down is called a
a. Doppler wave.
b. standing wave.
c. longitudinal wave.
d. constructive wave.
e. transverse wave.

____ 6. Which of the following is NOT a transverse wave?
a. light.
b. radio wave.
c. sound.
d. all of the above.
e. none of the above

____ 7. Sound is an example of a
a. longitudinal wave.
b. constructive wave.
c. Doppler wave.
d. transverse wave.
e. standing wave.

____ 8. A longitudinal wave lacks which of the following properties?
a. speed.
b. frequency.
c. wavelength.
d. amplitude.
e. A longitudinal wave has all of the above.

____ 9. When two or more waves are at the same place at the same time, the resulting effect is called
a. a standing wave.
b. a Doppler wave.
c. a shock wave.
d. interference.
e. a period.

____ 10. Where can you touch a standing wave on a rope without disturbing the wave?
a. At a node
b. At any place along the wave
c. At an antinode

____ 11. Standing waves can be set up
a. in organ pipes.
b. by blowing across the top of a soda bottle.
c. on strings of musical instruments.
d. all of the above
e. none of the above

____ 12. Suppose a bug is jiggling up and down and swimming towards you at the same time. Compared to the frequency at which the bug is emitting waves, the frequency of the waves reaching you is
a. lower.
b. higher.
c. just the same.

____ 13. As the sound of a car's horn passes and recedes from you, the pitch of the horn seems to
a. increase.
b. stay the same.
c. decrease.

____ 14. When a sound source moves towards you, what happens to the wave speed?
a. It decreases.
b. It increases.
c. It stays the same.

____ 15. Some of a wave's energy is always being dissipated as heat. In time, this will reduce the wave's
a. frequency.
b. wavelength.
c. speed.
d. period.
e. amplitude.

____ 16. The amplitude of a particular wave is 4.0 m. The top-to-bottom distance of the disturbance is
a. 2.0 m.
b. 4.0 m.
c. 8.0 m.
d. none of the above

____ 17. When a pendulum clock is taken from sea level to the top of a high mountain, it will
a. neither lose nor gain time.
b. gain time.
c. lose time.

____ 18. If you double the frequency of a vibrating object, its period
a. halves.
b. is quartered.
c. doubles.

____ 19. You dip your finger repeatedly into water and make waves. If you dip your finger more frequently, the wavelength of the waves
a. lengthens.
b. stays the same.
c. shortens.

____ 20. During a single period, the distance traveled by a wave is
a. two wavelengths.
b. one wavelength.
c. one half wavelength.

____ 21. A child swings back and forth on a playground swing. If the child stands rather than sits, the time for a to-and-fro swing is
a. unchanged.
b. lengthened.
c. shortened.

____ 22. Suppose a simple pendulum is suspended in an elevator. When the elevator is accelerating upward, the period of the pendulum
a. doesn't change.
b. increases.
c. decreases.

____ 23. A horse would be able to run faster if most of the mass in its legs were concentrated
a. in the upper part, nearer the horse's body.
b. halfway up its legs.
c. toward its feet.
d. uniformly all along its legs.
e. none of the above

____ 24. What happens when an airplane is flying faster than the speed of sound?
a. There is no sonic boom.
b. It becomes very quiet inside the plane.
c. Nobody can hear the plane fly overhead.
d. A shock wave is produced.
e. none of the above

____ 25. An observer on the ground hears a sonic boom that is created by an airplane flying at a speed
a. equal to the speed of sound.
b. greater than the speed of sound.
c. just below the speed of sound.
d. none of the above

____ 26. An aircraft that flies faster than the speed of sound is said to be
   a. subsonic.
   b. supersonic.
   c. neither of the above

____ 27. The Doppler effect occurs when a source of sound moves
   a. away from you.
   b. toward you.
   c. both A and B
   d. none of the above

____ 28. A sound wave that has a higher frequency has a wavelength that is
   a. shorter.
   b. longer.

____ 29. The frequency of the second hand on a clock is
   a. $\frac{1}{60}$hertz.
   b. 1 hertz.
   c. 60 hertz.

____ 30. Two waves arrive at the same place at the same time exactly in step with each other. Each wave has an amplitude of 2.5 m. The resulting wave has an amplitude of
   a. 0.6 m.
   b. 1.3 m.
   c. 2.5 m.
   d. 5.0 m.
   e. 10.0 m.

____ 31. The period of an ocean wave is 10 seconds. What is the wave's frequency?
   a. 0.10 Hz
   b. 5.0 Hz
   c. 10.0 Hz
   d. 20.0 Hz
   e. 30.0 Hz

____ 32. A certain ocean wave has a frequency of 0.07 hertz and a wavelength of 10 meters. What is the wave's speed?
   a. 0.07 m/s
   b. 0.70 m/s
   c. 1.0 m/s
   d. 10 m/s
   e. 143 m/s

____ 33. A weight on the end of a spring bobs up and down one complete cycle every 4.0 seconds. Its frequency is
   a. 0.25 hertz.
   b. 4.0 hertz.
   c. none of the above.

____ 34. A weight on the end of a spring bobs up and down one complete cycle every 5.00 seconds. Its period is
   a. 0.20 sec.
   b. 5.00 sec.
   c. none of the above

____ 35. A weight suspended from a spring bobs up and back down again over a distance of 3.00 meters in 10.00 seconds. Its frequency is
   a. 0.10 hertz.
   b. 3.0 hertz.
   c. 10.0 hertz.
   d. none of the above

____ 36. A leaf on a pond oscillates up and down two complete cycles each second as a water wave passes. What is the wave's frequency?
   a. 0.5 hertz
   b. 1 hertz
   c. 2 hertz
   d. 3 hertz
   e. 6 hertz

____ 37. A cork floating in a pool oscillates up and down three complete cycles in 1 second as a wave passes by. The wave's wavelength is 2 meters. What is the wave's speed?
   a. 1 m/s
   b. 2 m/s
   c. 6 m/s
   d. 12 m/s
   e. More than 12 m/s

____ 38. A wave has two crests and two troughs each second. If the wave travels an average distance of 8 meters in 4 seconds, its wavelength is
   a. 20 m.
   b. 15 m.
   c. 10 m.
   d. 1 m.
   e. 0 m.

____ 39. Radio waves travel at the speed of light, 300,000 km/s. The wavelength of a radio wave received at 200 megahertz is
   a. 0.7 m.
   b. 1.5 m.
   c. 6.7 m.
   d. 15 m.

____ 40. A skipper on a boat notices wave crests passing the anchor chain every 6.0 seconds. The skipper estimates the distance between crests at 30.0 m. What is the speed of the water waves?
   a. 5.0 m/s
   b. 6.0 m/s
   c. 30.0 m/s
   d. not enough information given

Problem

41. Waves in a lake are 1.5 m in length and pass an anchored boat 0.5 s apart. What is the speed of the waves?

42. A boat at anchor is rocked by waves whose crests are 28 m apart and whose speed is 7 m/s. How often do these waves reach the boat?

43. Radio amateurs are permitted to communicate on the "10-meter band". What frequency of radio waves corresponds to a wavelength of 10 m? (The speed of radio waves is 3.0×10^8 m/s.)

44. A radio station broadcasts at a frequency of 600 kHz. Knowing that radio waves have a speed of 3.00×10^8 m/s, what is the wavelength of these waves?

45. A supersonic aircraft produces a shock wave that describes a 30° cone. What happens to the angle of the cone as the aircraft travels faster?

Ch26Review

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

____ 1. Compared to the speed of light, sound travels
a. faster.
b. at about the same speed.
c. slower.

____ 2. Sound waves are produced by
a. radio stations.
b. vibrating objects.
c. soft objects.
d. objects under pressure.
e. none of the above

____ 3. Sound waves in air are a series of
a. periodic disturbances.
b. periodic condensations and rarefactions.
c. high- and low-pressure regions.
d. all of the above
e. none of the above

____ 4. A sound wave is a
a. standing wave.
b. longitudinal wave.
c. transverse wave.
d. shock wave.
e. none of the above

____ 5. Sound waves cannot travel in
a. steel.
b. air.
c. a vacuum.
d. water.
e. Sound can travel in all of the above.

____ 6. Sound travels faster in air if the air is
a. neither warm nor cold.
b. cold.
c. warm.

____ 7. Resonance occurs when
a. sound changes speed in going from one medium to another.
b. sound makes multiple reflections.
c. the amplitude of a wave is amplified.
d. an object is forced to vibrate at its natural frequency.
e. all of the above

____ 8. A singer shattering crystal glass with her voice is a demonstration of
   a. beats.
   b. sound refraction.
   c. an echo.
   d. interference.
   e. resonance.

____ 9. Noise-canceling earphones are an example of
   a. constructive interference.
   b. destructive interference.
   c. beats.
   d. resonance.

____ 10. The phenomenon of beats results from sound
   a. interference.
   b. reflection.
   c. refraction.
   d. all of the above
   e. none of the above

____ 11. Beats can be heard when two tuning forks
   a. are sounded together.
   b. have almost the same frequency and are sounded together.
   c. have the same frequency and are sounded together.
   d. all of the above
   e. none of the above

____ 12. A 1134-Hz tuning fork is sounded at the same time a piano note is struck. You hear three beats per second. What is the frequency of the piano string?
   a. 1131 Hz
   b. 1134 Hz
   c. 1137 Hz
   d. 2268 Hz
   e. Not enough information given to determine

____ 13. An explosion occurs 340 km away. Given that sound travels at 340 m/s, the time the sound takes to reach you is
   a. 1 s.
   b. 10 s.
   c. 100 s.
   d. 200 s.
   e. more than 200 s.

____ 14. A 680-Hz sound wave travels at 340 m/s in air, with a wavelength of
   a. 0.5 m.
   b. 5 m.
   c. 50 m.
   d. 500 m.
   e. none of the above

____ 15. A sound wave that has a wavelength of 2 m in room-temperature air has a frequency of about
   a. 170 Hz.
   b. 1360 Hz.
   c. 2040 Hz.
   d. none of the above

____ 16. An oceanic depth-sounding vessel surveys the ocean bottom with ultrasonic sound that travels 1530 m/s in seawater, and finds a 10-second time delay of the echo to the ocean floor and back. The ocean depth there is
   a. 1700 m.
   b. 3400 m.
   c. 7650 m.
   d. 15,300 m.
   e. none of the above

Problem

17. If you wished to produce a sound with a wavelength in air equal to the length of a 5-m room, what would its frequency be?

18. You note a 2.0-second delay for an echo in a canyon. What is the distance to the wall of the canyon?

19. What beat frequency is produced by two tuning forks that vibrate simultaneously with frequencies 300 Hz and 311 Hz?

20. Two notes are sounding, one of which is 369 Hz. If a beat frequency of 4 Hz is heard, what is the other note's frequency?

Name: _____ Class: _____ Date: _____ ID: A

Ch 27 review

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

____ 1. Electromagnetic waves are
a. transverse waves.
b. longitudinal waves.

____ 2. Electromagnetic waves
a. need a medium to travel through.
b. can travel through a vacuum.

____ 3. Which of these electromagnetic waves has the shortest wavelength?
a. Infrared waves
b. Light waves
c. Radio waves
d. X-rays
e. Ultraviolet waves

____ 4. Compared to the wavelength of ultraviolet waves, the wavelength of infrared waves is
a. the same.
b. shorter.
c. longer.

____ 5. Compared to the velocity of radio waves, the velocity of visible light waves is
a. slower.
b. faster.
c. the same.

____ 6. The source of all electromagnetic waves is
a. magnetic fields.
b. heat.
c. electric fields.
d. vibrating charges.
e. none of the above

____ 7. Which of the following are fundamentally different from the others?
a. Gamma rays
b. Radio waves
c. Sound waves
d. Light waves
e. X-rays

____ 8. The main difference between a radio wave and a light wave is its
a. speed.
b. wavelength.
c. both A and B
d. none of the above.

10

____ 9. The main difference between a radio wave and a sound wave is its
a. basic nature.
b. amplitude.
c. energy.
d. frequency.
e. wavelength.

____ 10. If the sun were to disappear right now, we wouldn't know about it for 8 minutes because it takes 8 minutes
a. to operate receiving equipment in the dark.
b. for light to travel from the sun to Earth.
c. for the sun to disappear.
d. all of the above
e. none of the above

____ 11. When Roemer took measurements of one of Jupiter's moons (Io) moving behind Jupiter, he found his predicted time was off. Compared to when Earth was closest to Io, the predicted times when Earth was farthest from Io were
a. late.
b. early.

____ 12. Which of the following is NOT an electromagnetic wave?
a. Sound
b. Radio
c. Light
d. Infrared
e. X-ray

____ 13. Heat lamps give off mostly
a. X-rays.
b. infrared waves.
c. ultraviolet waves.
d. microwaves.
e. radio waves.

____ 14. Glass is transparent to visible light, but not to
a. ultraviolet.
b. infrared.
c. both a and b.
d. none of the above

____ 15. The shiny surfaces of metals have most to do with
a. metals' relatively high density.
b. a resonant frequency of electrons in the metal.
c. the fact that light reflects from metals.
d. the free electrons in metal atoms.

____ 16. Clouds
a. neither block nor transmit UV light.
b. block UV light.
c. transmit UV light.

____ 17. Electromagnetic waves with higher frequencies have wavelengths that are
a. shorter.
b. longer.

11

____ 18. The shadow produced by an object held close to a piece of paper in sunlight will be
a. sharp.
b. fuzzy.

____ 19. Light waves are
a. longitudinal waves.
b. transverse waves.

____ 20. What is the ultimate source of electromagnetic waves?
a. Vibrating atoms
b. Vibrating molecules
c. Radio sets
d. Vibrating charged particles
e. TV antennas

____ 21. Light does not pass through what kind of materials?
a. transparent
b. opaque
c. neither a nor b

____ 22. How far is a light-second?
a. 5000 km
b. 300,000 km
c. 9,000,000 km
d. 18,000,000 km
e. 95,000,000,000 km

____ 23. Light that reflects at glancing angles from nonmetallic surfaces, such as glass, water, or roads is
a. polarized perpendicular to the surface.
b. polarized parallel to the surface.
c. randomly polarized.

____ 24. Light reflected from a lake surface is polarized
a. randomly.
b. horizontally.
c. vertically.

____ 25. If an electron vibrates up and down 1000 times each second, it generates an electromagnetic wave having a
a. frequency of 1000 Hz.
b. speed of 1000 m/s.
c. period of 1000 s.
d. wavelength of 1000 m.

____ 26. What is the wavelength of an electromagnetic wave that has a frequency of 1 Hz?
a. More than 1 m
b. Less than 1 m
c. 1 m

____ 27. What is the frequency of an electromagnetic wave having a wavelength of 300,000 km?
a. More than 1 Hz
b. Less than 1 Hz
c. 1 Hz

____ 28. After randomly polarized light passes through a polarizer, it is
   a. totally blocked.
   b. totally polarized.
   c. randomly polarized.
   d. partially polarized.

____ 29. If two polarizing filters are held with their polarization axes at right angles to each other, the amount of light transmitted compared to when their axes are parallel is
   a. zero.
   b. half as much.
   c. the same.
   d. twice as much.

____ 30. An ideal polarizing filter will transmit 50% of nonpolarized light incident on it. How much light is transmitted by two ideal polarizing filters that are oriented with their axes parallel to each other?
   a. 0%
   b. Between 0% and 50%
   c. 50%
   d. Between 50% and 100%
   e. 100%

Name: _____ Class: _____ Date: _____ ID: A

Chapter 29 review

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

____ 1. The law of reflection says that
a. the angle of reflection from a mirror equals the angle of incidence.
b. waves incident on a mirror are partially reflected.
c. all waves incident on a mirror are reflected.
d. the angle a ray is reflected from a mirror is random.

____ 2. When a virtual image is created in a plane mirror
a. the image is upright.
b. the image is located behind the mirror.
c. reflected rays diverge.
d. all of the above
e. none of the above

____ 3. The reason we can read print from any direction is that
a. the white part of a page reflects light in all directions.
b. letters emit black light in all directions.
c. letters absorb black light from all directions.
d. all of the above
e. none of the above

____ 4. An echo occurs when sound
a. is transmitted through a surface.
b. is reflected from a distant surface.
c. changes speed when it strikes a distant surface.
d. all of the above
e. none of the above

____ 5. Refraction is caused by
a. different wave speeds.
b. more than one reflection.
c. displaced images.
d. bending.

____ 6. Refraction occurs
a. when a wave changes speed.
b. only at a wave front.
c. at any unpredictable time.
d. only with light waves.
e. all of the above

____ 7. A penny lies in the bottom of a tea cup filled with water. As you look down on the penny, compared to its actual depth, it looks
a. closer.
b. farther away.
c. at the same depth.

14

____ 8. When you see a "wet spot" mirage on the road in front of you, you are most likely seeing
a. water.
b. hot air.
c. a figment of your imagination.
d. sky.
e. none of the above

____ 9. A beam of light emerges from water into air at an angle. The beam is bent
a. away from the normal.
b. not at all.
c. 48 degrees upward.
d. 96 degrees upward.
e. towards the normal.

____ 10. When a light beam emerges from water into air, the average light speed
a. remains the same.
b. decreases.
c. increases.

____ 11. A person standing waist-deep in a swimming pool appears to have short legs because of light
a. refraction.
b. interference.
c. diffraction.
d. reflection.
e. absorption.

____ 12. Different colors of light travel at different speeds in a transparent medium. In a vacuum, different colors of light travel at
a. the same speed.
b. different speeds.

____ 13. If you walk towards a mirror at a certain speed, your relative speed with respect to your image is
a. the same as your actual speed.
b. half your actual speed.
c. twice your actual speed.
d. none of the above

____ 14. A beam of light travels fastest in
a. air.
b. water.
c. plastic.
d. glass.
e. Its average speed is the same in each of the above.

____ 15. In a curved optical fiber, light
a. gains energy in each internal reflection.
b. internally reflects in a succession of straight-line paths.
c. bends and follows the curve of the fiber.
d. scatters in random directions from the fiber's inner surface.

True/False
Indicate whether the sentence or statement is true or false.

____ 16. When you look at the image of a candle in a plane mirror, you see a real image.

15

____ 17. Diffuse reflection occurs when light is reflected in many directions from a rough surface.

____ 18. When a wave reaches a boundary between two media, in most cases some of the wave is reflected and some is refracted.

____ 19. A line perpendicular to a surface is called a normal line.

____ 20. When you shine a waterproof light from underwater toward the surface of the water, there is a certain angle at which no light is refracted above the water and all the light is reflected back.

16

Name: _____ Class: _____ Date: _____ ID: A

Chapter 30 review

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

____ 1. A converging lens
a. converges parallel rays of light.
b. refracts parallel rays of light.
c. is thicker in the center than at the edges.
d. bends parallel rays of light so they cross at a single point.
e. all of the above

____ 2. An image of a distant object formed by a single converging lens
a. is upside down.
b. can be focused on a screen.
c. is real.
d. can be projected on a wall.
e. all of the above

____ 3. A magnifying glass is a
a. diverging lens.
b. combination of diverging and converging lenses.
c. converging lens.

____ 4. Ray diagrams are used to
a. figure out where an image will be located.
b. find the focal point of a lens.
c. draw pretty pictures.
d. figure out what kind of lens is being used.
e. all of the above

____ 5. In drawing a ray diagram, rays can be drawn
a. from the tip of the object arrow.
b. through the focal point in front of the lens.
c. parallel to the principal axis of the lens.
d. through the center of the lens.
e. all of the above

____ 6. Suppose you hold a converging lens in front of a window. An image of some distant hills can be focused on your hand, behind the lens. The focal point of this lens is located
a. approximately at your hand.
b. behind your hand.
c. in front of your hand.

____ 7. All lenses rely on light having a
a. slower speed in the lens.
b. consistent speed everywhere.
c. wavelength and frequency, the product of which equals *c*.
d. none of the above

17

____ 8. Which instrument is a human eye most similar to?
   a. telescope
   b. microscope
   c. slide projector
   d. camera

____ 9. The image your eye receives is
   a. upside down.
   b. right-side up.

____ 10. On a bright day, the iris of the eye changes so the pupil
   a. stays the same as always.
   b. becomes larger.
   c. becomes smaller.

____ 11. A magnifying glass under water will magnify
   a. less.
   b. the same.
   c. more.

____ 12. If a fish out of water wished to clearly view its surroundings, it should wear goggles filled with
   a. air.
   b. water.
   c. none of the above.

____ 13. Suppose you stand 2 m in front of a plane mirror. How far away from you is your image?
   a. $\frac{1}{4}$ m.
   b. $\frac{1}{2}$ m.
   c. 1 m.
   d. 2 m.
   e. 4 m.

True/False
Indicate whether the sentence or statement is true or false.

____ 14. A lens that makes parallel rays of light meet after passing through it is called a converging lens.

____ 15. A real image can be projected onto a screen.

____ 16. A telescope is a collection of lenses that allows us to look at very distant objects.

____ 17. The eye contains a converging lens that focuses light.

____ 18. Nearsighted people can clearly see objects that are close to them.

____ 19. The point on the principal axis at which parallel rays of light cross after passing through a converging lens is the focal point.

____ 20. A real image formed by a single converging lens is always upside down.

18

Name: _____ Class: _____ Date: _____ ID: A

Chapter 32 review

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

____ 1. The charge of an electron is
a. positive.
b. negative.
c. Electrons have no charge.

____ 2. Atomic nuclei of almost all elements consist of
a. only neutrons.
b. protons and electrons.
c. neutrons and electrons.
d. only protons.
e. protons and neutrons.

____ 3. Protons and electrons
a. attract each other.
b. repel each other.
c. do not interact.

____ 4. The fundamental force underlying all chemical reactions is
a. electrical.
b. gravitational.
c. centripetal.
d. nuclear.
e. none of the above

____ 5. Electrical forces between charges are strongest when the charges are
a. far apart.
b. close together.
c. The electrical force is constant everywhere.

____ 6. Coulomb's law says that the force between any two charges depends
a. directly on the size of the charges.
b. inversely on the square of the distance between the charges.
c. both A and B
d. none of the above

____ 7. When the distance between two charges is halved, the electrical force between the charges
a. doubles.
b. reduces to one fourth.
c. halves.
d. quadruples.
e. none of the above

____ 8. The net charge of a nonionized atom
a. depends only on the number of electrons it has.
b. is zero.
c. usually cannot be determined.
d. depends only on the number of protons it has.

19

____ 9. A positive ion has
   a. more electrons than protons.
   b. more protons than electrons.
   c. a +1 charge always.
   d. one proton.

____ 10. Conservation of charge means that
   a. the total amount of charge in the universe is constant.
   b. no experimenter has ever seen a single charge destroyed by itself.
   c. electrons by themselves can be neither created nor destroyed.
   d. charge can be neither created nor destroyed.
   e. all of the above

____ 11. If you comb your hair and the comb becomes positively charged, your hair becomes
   a. uncharged.
   b. positively charged.
   c. negatively charged.

____ 12. A difference between electrical forces and gravitational forces is that electrical forces include
   a. infinite range.
   b. repulsive interactions.
   c. the inverse square law.
   d. separation distance.
   e. none of the above

____ 13. In a good insulator, electrons are usually
   a. not moving at all.
   b. free to move around after an impurity has been added.
   c. free to move around.
   d. tightly bound in place.
   e. semi-free to move around.

____ 14. Objects can be charged by
   a. induction.
   b. friction.
   c. touching.
   d. all of the above
   e. none of the above

____ 15. Charge carriers in a metal are electrons rather than protons, because electrons are
   a. relatively far from a nucleus.
   b. loosely bound.
   c. lighter.
   d. all of the above
   e. none of the above

____ 16. Much electronic equipment contains transistors and diodes that are made from semiconductors. Semiconductors
   a. can be very good insulators.
   b. can conduct electricity.
   c. contain helpful impurities.
   d. all of the above
   e. none of the above

20

____ 17. An electroscope is charged positively, as shown by foil leaves that stand apart. As a negatively charged rod is brought close to the electroscope, the leaves
   a. spread farther apart.
   b. do not move.
   c. move closer together.

____ 18. Two charged particles held close to each other are released. As they move, the force on each particle increases. Therefore, the particles have
   a. opposite signs.
   b. the same sign.
   c. charges that cannot be determined

____ 19. How many different kinds of force would act on a proton placed in both an electric field and a gravitational field?
   a. one.
   b. none.
   c. two.

____ 20. The SI unit of charge is the
   a. ohm.
   b. joule.
   c. coulomb.
   d. ampere.
   e. newton.

Name: _____ Class: _____ Date: _____ ID: A

Chapter 34Review

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

____ 1. In order for there to be a flow of charge from one place to another, there must be a
a. conductor, such as a wire, connecting the two places.
b. potential difference between the two places.
c. Both A and B above

____ 2. In solid conductors, electric current is the flow of
a. positive and negative charges.
b. electrons.
c. negative ions.
d. protons.
e. none of the above

____ 3. An ampere is a
a. unit of resistance.
b. unit of current.
c. type of charge.
d. voltage.
e. current.

____ 4. An example of a voltage source is
a. a dry cell.
b. a generator.
c. a car battery.
d. rubbing a rubber rod with fur.
e. all of the above

____ 5. Electrical resistance in a wire depends on the wire's
a. thickness.
b. conductivity.
c. length.
d. all of the above
e. none of the above

____ 6. Compared to thin wires, electrical resistance in thick wires is
a. less.
b. the same.
c. greater.

____ 7. Electrical resistance is measured in
a. volts.
b. joules.
c. watts.
d. amperes.
e. none of the above

22

____ 8. A woman experiences an electric shock. The electrons making the shock come from
a. the ground.
b. the electric field in the air.
c. a nearby power supply.
d. the woman's body.
e. the object causing the shock.

____ 9. A wire carrying a current is normally charged
a. not at all.
b. positively.
c. negatively.

____ 10. The primary reason a bird can perch harmlessly on bare high voltage wires is that
a. a bird's feet are close together.
b. a bird has a very large electrical resistance.
c. there is no potential difference across the bird's feet.
d. all of the above

____ 11. The frequency of AC current in North America is
a. 120 V.
b. 50 hertz.
c. 30 V.
d. 60 hertz.

____ 12. Current from a battery is always
a. DC.
b. AC.

____ 13. Where do the electrons come from that produce heat and light in a light bulb?
a. the power company
b. the air
c. the wall plug
d. the bulb's wire filament
e. none of the above

____ 14. In 2004, the number of electrons delivered to an average American home by an average power utility was
a. zero.
b. 110.
c. 220.
d. billions of billions.
e. none of the above

____ 15. If you plug an electric toaster rated at 110 V into a 220-V outlet, current in the toaster will be
a. twice what it should be.
b. the same as if it were plugged into 110 V.
c. half what it should be.
d. more than twice what it should be.
e. none of the above

____ 16. Electric power is defined as
a. current times voltage.
b. current divided by voltage.
c. current times resistance.
d. resistance times voltage.
e. voltage divided by current.

23

____ 17. Power outlets in our homes typically have a potential difference of
   a. 30 V.
   b. 120 A.
   c. 60 A.
   d. 240 V.
   e. 120 V.

____ 18. When an 8-V battery is connected to a resistor, 2 A of current flows in the resistor. What is the resistor's value?
   a. 2 ohms
   b. 4 ohms
   c. 8 ohms
   d. 16 ohms
   e. more than 16 ohms

____ 19. What is the resistance of a toaster that uses 5 A of current when connected to a 120-volt power source?
   a. 5 ohms
   b. 24 ohms
   c. 120 ohms
   d. 600 ohms
   e. none of the above

____ 20. How much power is used by a 12.0-V car battery that draws 0.5 A of current?
   a. 0.5 W
   b. 6 W
   c. 12 W
   d. 24 W
   e. 30 W

____ 21. A heater uses 21 A when connected to a 110-V line. If electric power costs 10 cents per kilowatt-hour in this location, the cost of running the heater for 13 hours is _____.
   a. $0.30
   b. $0.75
   c. $3.00
   d. $7.51
   e. none of the above

24

Name: _____ Class: _____ Date: _____ ID: A

Chapter 35

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

____ 1. In order to form an electric circuit, you need to have
a. wires or conductors to connect everything.
b. a power source.
c. a light bulb or some resistance.
d. a complete path for the current.
e. all of the above

____ 2. Electrical resistance is measured in
a. volts.
b. amperes.
c. joules.
d. watts.
e. none of the above.

____ 3. A closed circuit is a circuit in which charge
a. can flow.
b. is prevented from flowing.

____ 4. When resistors are put in series next to each other, their overall resistance is
a. the same as the resistance of one of the resistors.
b. larger than the resistance of any individual resistor.
c. smaller than the resistance of any of the resistors.

____ 5. When resistors are put in parallel with each other their overall resistance is
a. smaller than the resistance of any of the resistors.
b. larger than the resistance of any other resistor.
c. the same as the resistance of one of the resistors.

____ 6. As more lamps are put into a parallel circuit, the overall current in the circuit
a. increases.
b. stays the same.
c. decreases.

____ 7. Compared to the resistance of two resistors connected in series, the same two resistors connected in parallel have
a. less resistance.
b. more resistance.
c. the same resistance.

____ 8. When one light bulb in a series circuit containing several light bulbs burns out
a. none of the other bulbs will light up.
b. nothing changes in the rest of the circuit.
c. the other light bulbs burn brighter.

____ 9. When one light bulb in a parallel circuit containing several light bulbs burns out, the other light bulbs
a. do not burn at all.
b. burn brighter.
c. burn the same as before.

25

____ 10. Electrical devices in our homes are connected in
   a. parallel.
   b. series.

____ 11. Fuses and circuit breakers are used to
   a. protect us.
   b. prevent overloading.
   c. keep wires from getting overheated.
   d. break the circuit when too much current is being used.
   e. all of the above

____ 12. A 60-W light bulb is connected to a 12-V car battery. When another 60-W bulb is connected in parallel with the first bulb, the battery's output energy
   a. doubles.
   b. halves.
   c. remains the same.

____ 13. The total resistance of a 10-ohm resistor and a 7-ohm resistor in series is
   a. 2 ohms.
   b. 3 ohms.
   c. 7 ohms.
   d. 17 ohms.
   e. 70 ohms.

____ 14. The total resistance of a 6-ohm resistor and a 12-ohm resistor in parallel is
   a. 4 ohms.
   b. 6 ohms.
   c. 18 ohms.
   d. 20 ohms.
   e. 73 ohms.

____ 15. A 60-W light bulb and a 100-W light bulb are both connected in parallel to a 120-V outlet. Which light bulb has more current in it?
   a. the 100-W bulb
   b. the 60-W bulb
   c. Both have the same current.

True/False
Indicate whether the sentence or statement is true or false.

____ 16. When light bulbs are connected in series, all carry the same current regardless of their resistances.

____ 17. In a series circuit, the total voltage drop across a series of resistors is the sum of voltage drops across each individual resistor.

____ 18. When resistors are arranged in parallel, their overall resistance is less than that of the smallest resistor.

____ 19. In order to prevent overloading in a circuit, fuses are inserted in the circuit.

____ 20. A fuse or circuit breaker used in a circuit is usually inserted in parallel.