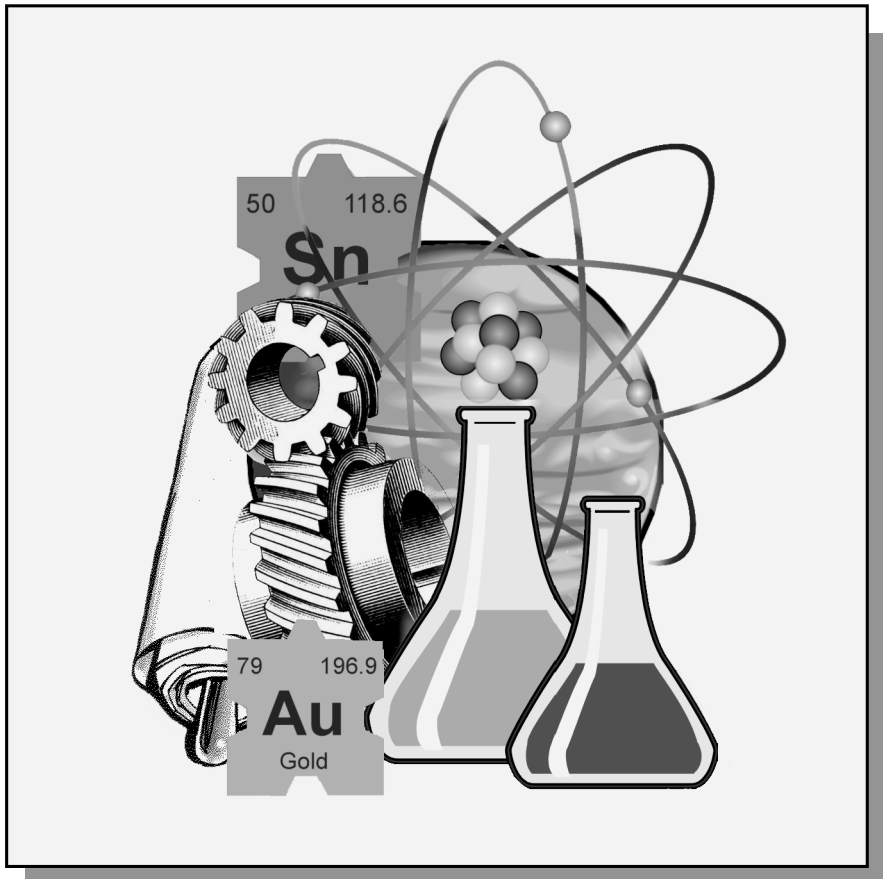
Integrated Physics & Chemistry

ACTIVITIES



Chapter 12

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Integrated Physics & Chemistry

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ACTIVITIES
Lesson 1:
Motion

Distance, Speed and Time

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. Average ***speed*** is calculated by dividing the total _____ by the total time.

*2. The standard unit of measure in the metric system is: _____.
(a) foot (b) minute (c) centimeter (d) meter

3. Feet, miles and kilometers are all measures of: _____.
(a) distance (b) mass (c) speed (d) time

4. The meter as a measurement was define by two marks on a special _____ _____ bar kept in a vault in Paris.

*5. Which of these is longer?_____
(a) meter (b) yard (c) millimeter (d) inch

6. A meter is _____ millimeters

7. The standard unit of time is the: _____.
(a) day (b) hour (c) second (d) year

*8. The units m/sec, ft/sec and mi/hr are all units to measure: _____.
(a) distance (b) speed (c) time (d) volume

*9. The formula for calculating speed is: _____.
(a) πr^2 (c) change in distance/change in time
(b) mass/area (d) change in velocity/change in time

10. If the distance is 256-miles and the time is 4 hours, the average speed is _____.

11. Which of these measures the speed over an entire route? _____ speed
(a) average (b) instantaneous (c) velocity (d) slow

12. The average speed of a runner is the same as his speed as he leaves the starting block.
(a) True or (b) False

13. _____ speed is the speed at any one particular instant in time.

*14. A kilometer is _____ meters.

15. Speed limit signs on the highway are concerned with: _____.
(a) velocity (b) *instantaneous speed* (c) *average speed* (d) distance

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*16. ***Velocity*** measures the speed of an object as well as its: _____.
(a) density (b) direction (c) gravitational attraction (d) mass

17. A flag flying on a ferry that is sailing at right angles to the wind can only respond to one velocity at a time.
(a) True or (b) False

18. A ship with a flag traveling due west encounters a wind blowing due south. The effect on the flag is: _____
_____
_____.

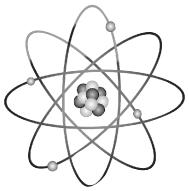
19. The _____ is a single velocity that replaces two or more velocities.

20. Write the **Life Principle:** *"*_____
_____.*"*

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ACTIVITIES
Lesson 2:
Energy

Energy

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. The human body converts carbohydrates into _____.

2. The type of ***energy*** produced from food is _____ energy.

3. _____ energy is the energy transmitted by a machine and includes the _____ plus the _____ energy of a body.

*4. ***Kinetic energy*** is the energy of _____.

5. Usually, when energy changes from one form to another, _____ energy is produced.
(a) chemical (b) heat (c) kinetic (d) potential

6. Gasoline is a mixture of: _____.
(a) coal slurry (b) liquid hydrocarbons (c) nuclear wastes (d) silicon gels

*7. Most energy changes produce _____.

8. Nuclear power plants do not release heat into the environment.
(a) True or (b) False

*9. Burning a fuel is a _____ reaction.

10. The water behind a dam has gravitational _____ energy.

*11. Heat is the random motion of: _____.
(a) atoms and molecules (c) electrons
(b) electromagnetic waves (d) photons

12. Once energy becomes _____, some of it is forever lost for useful purposes.

13. The form of energy most difficult to recover is: _____.
(a) mechanical (b) potential (c) heat (d) kinetic

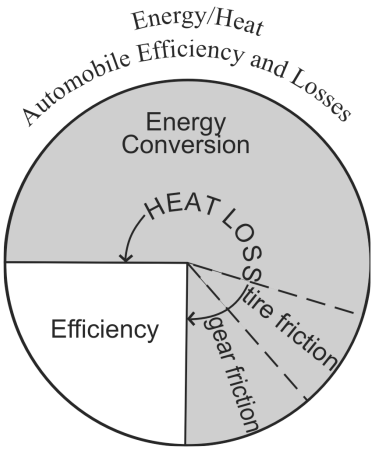
14. **(Review Question)** The five forms of energy discussed in this lesson fit an acrostic of the abbreviation for "chemistry" (chem.) plus the letters "K" and "P":
C _____
H _____
E _____
M _____
K _____
P _____

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*15. The formula for efficiency is: _____.
(a) distance/time (c) mechanical advantage
(b) load/effort (d) energy output/energy input

16. The efficiency of a car is about _____ percent efficiency.
(a) 2 (b) 25 (c) 90 (d) 98

17. According to the pie chart, the largest percent of the energy in the fuel of an automobile is consumed in _____.



18. The efficiency of modern electrical generating plants is about: _____.
(a) 20 percent (b) 30 percent (c) 40 percent (d) 50 percent

19. Scientists believe that only about _____ percent of the original energy of the fuel burned at a power plant makes its way to the intended use.

20. A fuel cell generates electricity directly from hydrocarbon fuels.
(a) True or (b) False

21. Fuel cells have about _____ percent efficiency.

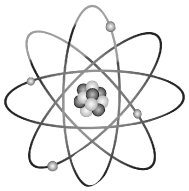
22. Write the **Life Principle:** *"*_____
_____*."*

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Chapter 12, Section 1

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ACTIVITIES
Lesson 3:
Energy

Force and Simple Machines

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. An ***inclined plane*** is an example of a simple _____.

*2. A ***simple machine*** may change the direction that a force is applied without changing the amount of force that is required.
(a) True or (b) False

*3. A ***lever*** is an example of a _____ _____.

*4. The ***pulley*** is an example of a: _____.
(a) simple machine (c) power machine
(b) complex machine (d) wheel and axle

5. The mechanical advantage compares the _____ required to do a task with the _____ to do the same task without a simple machine.

*6. The formula for mechanical advantage is _____.

7. A loading ramp has a mechanical advantage of: _____.
(a) less than one (b) one (c) more than one (d) cannot determine

8. If a force is applied over 18 feet to raise a load three feet, the mechanical advantage is _____.

9. What is the purpose for having a wheelchair ramp? _____
_____
_____

10. A loading ramp, wheelchair ramp and a highway that has its grades reduced are examples of:_____.
(a) inclined planes (b) levers (c) pulleys (d) wheels and axles

11. For a lever, the mechanical advantage is M.A. = _____.

12. A pop-top can, pry bar, wire pliers and nutcracker are examples of:_____.
(a) inclined planes (b) levers (c) pulleys (d) wheels and axles

13. Casting of a rod when fishing is an example of a lever with a mechanical advantage of: _____.
(a) zero (b) one (c) greater than one (d) less than one

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14. A ***wheel and axle*** is an example of a simple machine.
(a) True or (b) False

15. A steering wheel on a car is an example of a _____.

16. A screwdriver is an example of a(n): _____.
(a) inclined plane (b) lever (c) pulley (d) wheel and axle

*17. If the wheel is larger than the axle, the mechanical advantage is: _____.
(a) greater than one (b) less than one (c) one (d) zero

18. The four types of simple machines are wheel and axle, pulley, inclined plane and _____.

*19. A vise, scissors, and bicycle are examples of _____ machines.
(a) simple (b) complex (c) mechanical (d) inefficient

20. Write the **Life Principle:** *"*_____
_____*."*

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Chapter 12, Section 1

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ACTIVITIES
Lesson 4:
Motion

Laws of Motion

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. ***Friction*** is a force that tends to cause things moving to _____.

*2. Write the *First Law of Motion*. "_____ _____."

3. If all forces acting on an object are equal, it has zero _____ acting on it.

4. Acceleration is the rate at which _____ changes.

5. A race car with zero acceleration: _____.
   (a) has a rapidly changing velocity (c) is slowing down
   (b) is traveling at a constant speed (d) is gaining speed

6. Speed that changes from 0 miles per hour to 25 miles per hour in five seconds is an example of: _____.
   (a) a body with a net force of zero (c) constant speed
   (b) an acceleration of 5 mi/hr per sec (d) zero acceleration

*7. Change in velocity divided by change in time calculates: _____.
   (a) acceleration (b) force (c) friction (d) speed

*8. The *Second Law of Motion* shows how force, mass and _____ are related.

*9. Write the Second Law of Motion. "_____ _____."

*10. The formula that summarizes the Second Law of Motion is: _____.
   (a) $a = F/m$ (b) $a = v/t$ (c) $F_1 = F_2$ (d) *if* $F = 0$ *then* $a = 0$

11. Increasing the _____ reduces the acceleration.
   (a) mass of a body (c) percentage of velocity
   (b) force acting on a body (d) speed of a body

12. Extra mass in a vehicle causes the vehicle to have _____ acceleration than when it is empty.
   (a) better (b) more (c) poorer (d) some

*13. Write the *Third Law of Motion*. "_____ _____."

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14. Cars that are difficult to get moving, difficult to steer and difficult to stop on an icy pavement are following the: _____.
(a) First Law of Motion (c) Second Law of Motion
(b) Law of Gravity (d) Third Law of Motion

*15. According to the Third Law of Motion, two objects that interact with one another give each other the same acceleration.
(a) True or (b) False

16. When two skaters push away from each other, the one who receives the greater acceleration and higher final speed is the _____ skater.
(a) heavier (b) better (c) lighter (d) worse

17. According to the ***Law of Gravity***, which items would have the greatest attraction to each other? _____
(a) two apples (c) the Sun and comets with ***elongated*** orbits
(b) the Sun and the Earth (d) two large mountains in Colorado

18. According to the Law of Universal Gravitation, the force of attraction between two bodies is directly proportional to the product of their _____.

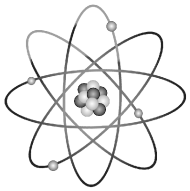
19. The force of attraction between two bodies is inversely proportional to the square of the _____ separating them.

20. Write the **Life Principle:** *"*_____
_____*."*

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Date: _____ Grade: _____



ACTIVITIES
Lesson 5:
Energy

Heat

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. The cat sitting in sunlight in the window was being warmed by: _____.
   (a) chemical energy (c) convection of heat
   (b) conduction of heat (d) radiant energy

*2. A ***cold-blooded*** animal keeps its body at a constant temperature.
   (a) True or (b) False

3. An anhinga is a type of ***warm-blooded***: _____.
   (a) amphibian (b) bird (c) reptile (d) South American pig

4. Most water birds have air sacs to help them _____ and oil glands to make their _____ waterproof.

5. An anhinga dries its wings by: _____.
   (a) flying in a cool convection current (c) radiant energy of sunlight
   (b) holding them open by a hot fire (d) constantly flapping them

6. The Incan civilization was located in the Andes Mountains of: _____.
   (a) Brazil (b) Colorado (c) Panama (d) Peru

7. Machu Picchu is a(n): _____.
   (a) South American pig (c) Peruvian bird
   (b) ancient Inca city (d) large city in China

8. _____ are scientists who study the remains of ancient civilizations.

9. Incan buildings were heated in the mornings by: _____.
   (a) burning moss (b) fuel from potatoes (c) hot springs (d) radiant sunlight

10. The Incas used freeze-dried potatoes to make potato _____.

*11. Radiant energy is a form of _____ waves.

*12. Radiant energy can travel through the _____ of space.

13. Heat energy is the kinetic energy from the motion of atoms and molecules.
   (a) True or (b) False

*14. Convection is the transfer of heat energy: _____.
   (a) by contact of one body to another (c) by currents in fluids such as water or air
   (b) by flames (d) through the vacuum of space

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15. The Incan homes were heated at night by the _____ of heat from the arm rock layers on the outside of the house into the inner _____ of the building.

*16. The circulation of air around a room is an example of heat transfer by: _____.
(a) ***conduction*** (b) *convection* (c) kinetic energy (d) radiation

17. Heat pumps work best in extremely cold climates.
(a) True or (b) False

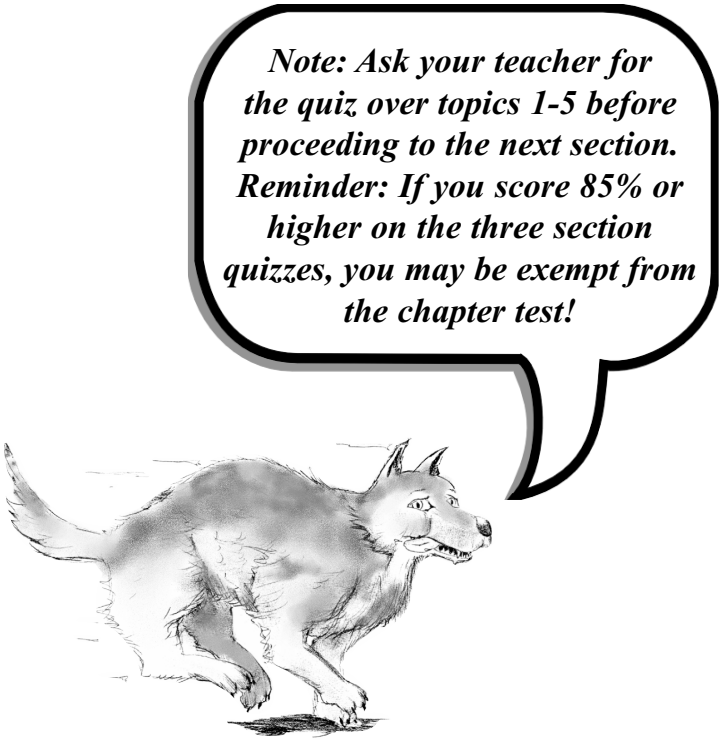
18. A forced air furnace is an example of heating a home by: _____.
(a) conduction (b) convection (c) confusion (d) radiation

19. A home that heats water by running it through a solar heater on the roof is heating the water by: _____.
(a) extrapolation (b) conduction (c) convection (d) radiation

20. The center of a cake is cooked by: _____.
(a) conduction (b) deflection (c) convection (d) radiation

21. Infrared rays are an example of _____ energy.

22. Write the **Life Principle:** *"*_____
_____*."*



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ACTIVITIES
Lesson 6:
Geology

Pressure and Density

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. William Henry Jackson was a: _____.
   (a) expedition leader (b) fur trader (c) photographer (d) U.S. Senator

2. Yellowstone was the first National Park in the United States.
   (a) True or (b) False

3. Old Faithful ***Geyse***r erupts about once every _____.

*4. Earthquakes and volcanoes can change the times of a geyser's _____.

*5. At a higher elevation, water boils at a _____ temperature.
   (a) hotter (b) cooler (c) constant (d) elevated

6. Air ***pressure*** is greater: _____.
   (a) in a tall tree
   (b) above sea level such as on a high on a mountain
   (c) below sea level such as in Death Valley
   (d) at sea level on a beach

7. The eruption of a geyser takes places because: _____.
   (a) a nuclear reaction takes place in the deep magma
   (b) a decrease in pressure changes hot water to steam
   (c) an earthquake produces shock waves that drives out the water
   (d) trapped air expands

8. The three states of matter are solids, liquids and _____.

*9. Water has a density of _____ g/cm^3.

10. The human body has a density very nearly _____g/cm^3.

*11. The upward force of a fluid acting on an immersed body is known as: _____.
   (a) buoyancy (b) compensation (c) density (d) pressure

12. Gases have a density: _____.
   (a) greater than the density of a solid (c) of about 1.00 g/cm^3
   (b) less than the density of a solid (d) that cannot be measured

*13. Pressure is the _____ per unit area.

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14. A woman in high heels can exert more pressure on the floor than an elephant because: _____.

*15. State Boyle's Law relating volume and pressure of a gas. "_____ _____."

16. Air _____ when it is heated.
(a) expands (b) explodes (c) contracts (d) dissipates

17. Air _____ when it is cooled.

18. ***Isotherms*** and ***isobars*** are: _____.
(a) terms used in geological reports (c) street locations with the same name
(b) numbers in mathematical tables (d) lines on weather maps

19. During high pressure the skies are usually: _____.
(a) clear (b) cloudy (c) higher (d) translucent

20. Write the **Life Principle:** *"*_____ _____*."*

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Name: _____

Date: _____ Grade: _____



Wave Motion

ACTIVITIES
Lesson 7:
Light & Sound

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. In deciding whether the runner on first base was safe or out, the umpire used his sense of: _____.
   (a) sight (b) sound (c) smell (d) touch

*2. Sound and light are both types of _____ motions.

3. Sound waves are: _____.
   (a) critical (b) longitudinal (c) transverse (d) vertical

4. Light waves are:_____.
   (a) longitudinal (b) critical (c) transverse (d) vertical

5. The one with the greatest speed is _____ waves.
   (a) sound (b) light (c) air (d) water

6. Television signals are a type of _____ waves like light.

7. Television signals travel at the same speed as: _____.
   (a) sound (b) light (c) water (d) air

*8. Sound travels faster in: _____.
   (a) a vacuum (b) air (c) steel (d) wood

9. Unlike sound, light can travel in: _____.
   (a) a vacuum (b) air (c) a diamond (d) water

10. Satellites in a ***geosynchronous orbit*** travel around the earth once every: _____.
    (a) hour (b) 24 hours (c) 3 months (d) year

*11. Light waves travel well in the _____ of space.

12. The one that transmits a greater distance through water is: _____.
    (a) sound (b) light (c) mineral (d) color

*13. The pitch of a sound wave is its: _____.
    (a) frequency (b) loudness (c) speed (d) wavelength

14. Sound waves of low frequency have _____ wavelengths.
    (a) short (b) long (c) vertical (d) horizontal

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15. The sound waves that reflect better are those with _____ wavelengths.
(a) horizontal (b) long (c) short (d) vertical

16. The word ***sonar*** is made from the words: _____.
(a) **S**ubmarines **o**n **Na**val **R**econnaissance (c) **So**und **Na**vigation and **R**anging
(b) **Sou**n**d** **A**ve **R**aging (d) **So**und **N**ear **A**irpo**r**ts

17. ***Echolocation*** methods such as sonar use _____ waves.
(a) long (b) short (c) horizontal (d) vertical

18. A change in density causes sound waves to _____.

*19. A sonogram is an image produced by: _____.
(a) lithographs (b) radargrams (c) sound waves (d) sonar

20. Both X–rays and ultrasound give a view of the body that is essentially the same.
(a) True or (b) False

21. Ultrasound can damage DNA.
(a) True or (b) False

*22. The one that is least dangerous to the growth and development of an unborn baby is : _____.
(a) ultrasound (b) X–rays (c) sonar (d) radar

23. Write the **Life Principle:** *"*_____
_____*."*

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Date: _____ Grade: _____



ACTIVITIES
Lesson 8:
Light & Sound

Light

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. Microwave ovens heat by: _____.
(a) conduction (b) convection (c) radiation (d) flames

2. Microwave radiation affects all materials the same way.
(a) True or (b) False

3. Microwaves are part of the electromagnetic _____.

4. The ***bar code*** (Uniform Product Code) contains a product's: _____.
(a) price (c) ingredients
(b) manufacturer and type of product (d) availability

*5. The expression waves per second is a measure of: _____.
(a) amplitude (b) brightness (c) frequency (d) wavelength

6. The higher the frequency the _____ the wavelength.
(a) faster (b) longer (c) shorter (d) louder

Write the numbers 1 through 7 to put in order the following list from 1 (longest wavelength, lowest frequency) to 7 (shortest wavelength, highest frequency):



7. _____ FM radio and television

8. _____ gamma rays

9. _____ infrared

10. _____ microwaves

11. _____ radio band

12. _____ visible light

13. _____ X–rays

14. Devices such as cellular telephones and satellite receivers use some part of the _____ spectrum.

15. Which of these would NOT cause disruption of radio wave frequencies? _____
(a) rain (b) lightening (c) clouds (d) sunlight

*16. The Doppler effect is that wave motion appears to change in _____ if the source or observer is moving.

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17. The Sun rotates on its axis. (a) True or (b) False

18. Detecting the rotation rate of stars is possible by using the _____ effect.

*19. State Hubble's Law: "_____
_____."

*20. The Hubble Space Telescope is named in honor of _____.

21. When light becomes polarized, ***waves***: _____.
(a) cannot be seen by human eyes (c) travel faster
(b) cause excessive glare (d) vibrate in only one plane

22. Isomers have the same elements in the same _____.

23. Isomers have the same chemical and physical properties.
(a) True or (b) False

24. *Optical isomers* were first detected because solutions of them _____ light.

25. Glucose and galactose are examples of _____.

*26. The body can digest all isomers equally well. (a) True or (b) False

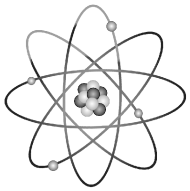
27. Write the **Life Principle:** *"*_____
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Name: _____ *Integrated Physics & Chemistry*

Chapter 12, Section 2

Date: _____ Grade: _____



ACTIVITIES
Lesson 9:
Energy

Electricity

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. The United States President who experimented with making copies of his letters was: _____.
   (a) Benjamin Franklin (c) Thomas Edison
   (b) George Washington (d) Thomas Jefferson

2. ***Xerography*** makes use of _____ electricity.

*3. An object with too many electrons has a _____ static charge.
   (a) negative (b) positive (c) neutral (d) warm

4. Two bodies with like static charges will _____ one another.

5. If two objects have unlike charges or if one is charged and the other is uncharged, they will _____ one another.
   (a) accept (b) attract (c) repel (d) cancel

6. The Three Laws of Static Electricity were developed by: _____.
   (a) Benjamin Franklin (c) Thomas Edison
   (b) Dr. Benjamin Spock (d) Thomas Jefferson

*7. Most nonmetals are electrical: _____.
   (a) insulators (b) neoconductors (b) conductors (d) semiconductors

8. Gold, silver, copper and aluminum are electrical: _____.
   (a) insulators (b) conductors (c) transmitters (d) transformers

*9. Electrostatic copying such as Xerography makes use of semiconductors that conduct electricity when: _____.
   (a) coated with ink (c) light falls on them
   (b) heated red hot (d) shaken violently

10. In Carlson's electrostatic copying process, where light struck the selenium sheet it _____ its electrical charge.
   (a) gained (b) lost (d) retained (d) regained

11. The ink particles in an electrostatic copy are made to permanently adhere to the paper by: _____.
   (a) glue (b) chemical action (c) electrical change (d) melting them

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12. Laser printers are a type of _____ copiers.

13. Electrostatic copiers and laser printers make use of the fact that _____ gives electrons on the surface of certain materials enough velocity to travel elsewhere.
(a) electrical action (b) heat (c) light (d) mechanical action

*14. Sunlight striking the surface of solar cells puts electrons in motion and _____ electricity.

*15. ***Solar cells*** are also known as: _____.
(a) electrostatic displays (c) liquid crystal devices
(b) light emitting diodes (d) photocells

*16. Solar cells are: _____.
(a) being used less and less (c) coming into greater use
(b) useless (d) are common in printing offices

17. Solar cells produce electricity more _____ than electric power stations.

18. The Hubble Space Telescope has 3,120 square feet of solar cells that generate _____ watts of electric power.
(a) 7 (b) 1,200 (c) 5,500 (d) 100,000

19. Ash, dust and smoke particles can be removed from a smokestack by static _____.

*20. The unit for measuring electric charge is: _____.
(a) ampere (b) coulomb (c) volt (d) watt

Match the seven base metric units with the quantities they measure. (21-27)

*21. _____ *meter* (a) brightness of light

*22. _____ *second* (b) distance

*23. _____ *kilogram* (c) electric current

*24. _____ *Kelvin degree* (d) mass

*25. _____ *mole* (e) number of particles

*26. _____ *candela* (f) temperature

*27. _____ *ampere* (g) time

28. A _____ unit can be stated in terms of ***base units***.

29. The *watt* is a _____ unit.
(a) base (b) derived (c) composite (d) generated

30. Write the **Life Principle:** *"*_____
_____*."*

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 10:
Inventions & Discoveries

Series and Parallel Circuits

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

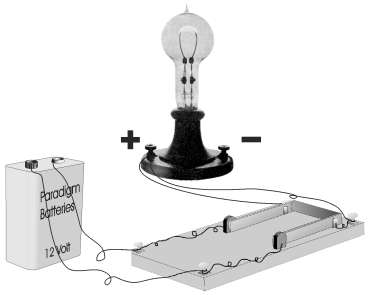
1. The negative terminal of an AA ***battery*** is the _____ part of the battery.
   (a) flat (b) raised (c) middle (d) round

2. Devices are connected in a single path in a(n) _____ circuit.
   (a) protracted (b) series (c) parallel (d) opposite

3. ***Cells*** marked AAA, AA, C and D (are) all: _____.
   (a) the same size
   (b) the same length
   (c) have the same voltage
   (d) identical in wattage

4. Cells are in series if the negative pole of one connects to the _____ pole of the other.

5. The series circuit in the diagram below is unable to produce light because: _____.
   (a) a higher voltage battery is required
   (b) a higher watt bulb is needed
   (c) the switch is closed
   (d) the wires are attached to the same pole



6. Replacing one battery with two batteries in series _____ the voltage.
   (a) increases (b) decreases (c) reinforces (d) neutralizes

7. Voltage is sometimes called voltage _____.

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*8. The total voltage put into a circuit by batteries connected in series is given by the formula: _____.
(a) $V_T = V_1 + V_2 + V_3 + V_4$ (c) $V_T = V_1 * V_2 * V_3 * V_4$
(b) $V_T = V_1 = V_2 = V_3 = V_4$ (d) $V_T = I^2R$

9. Four cells of 1.5 volts each connected in series will give _____ volts.

10. A 9-volt battery is made of 6 individual 1.5 volt cells _____ in series.

11. The three quantities of an electric circuit are current, voltage and _____.

12. The ***resistance*** of a circuit is sometimes called the _____.

*13. Write Ohm's Law: "_____
_____."

14. The formula for Ohm's Law can be written as: _____.
(a) $R_T = R_1 + R_2 + R3 + R_4$ (b) $Heat = I^2R$ (c) $a = F/m$ (d) $I = V/R$

15. Doubling the voltage will _____ a flashlight bulb.
(a) send twice as much current through (c) blow out
(b) double the resistance of (d) ignite

16. In a series circuit, doubling the resistance: _____.
(a) allows the resistors to grow (c) cuts the current flow in half
(b) doubles the current flow (d) does not change the current flow

17. The two ways of controlling the current in a circuit is by changing the _____ or changing the resistance.

18. In a _____ _____ all the electrons travel the entire path of the circuit.

*19. Total resistance in a *series circuit* is equal to the _____ of the individual resistances.
(a) difference (b) proportion (c) product (d) sum

20. In a series circuit, the total current is the same at any point along the entire path of the circuit.
(a) True or (b) False

21. Write the **Life Principle:** *"*_____
_____*."*

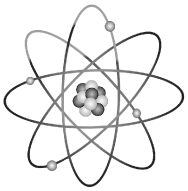
Note: Ask your teacher for the quiz over topics 6-10 before proceeding to the next section. Reminder: If you score 85% or higher on the three section quizzes, you may be exempt from the chapter test!



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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 11:
Energy

Parallel Circuits

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. A break in a series circuit stops the electric _____.

2. A _____ circuit has two or more paths that electric current can follow.

3. Should one bulb in a string of Christmas lights burn out, _____ would go out provided the circuit is a parallel one.
   (a) all the other bulbs (c) some of the other bulbs
   (b) none of the other bulbs (d) 11 other bulbs

4. A power strip for plugging in several electrical appliances at once is a _____ circuit.
   (a) dangerous (b) parallel (c) series (d) open

*5. Ohm's Law states that current is directly proportional to voltage but inversely proportional to _____.

6. The formulas for calculating current, voltage and resistance are the same in parallel and series circuits.
   (a) True or (b) False

7. Batteries are in parallel by connecting the positive terminal of one with the _____ terminal of the other.

8. The heating element of a toaster is an example of _____ in an electric circuit.

*9. Another name for resistance is: _____.
   (a) current (b) electromotive force (c) load (d) voltage

*10. The formula for voltage that applies to the paths of a parallel circuit is: _____.
   (a) $V_T = V_1 = V_2 = V_3$ (c) $V_T = V_1 + V_2 + V_3$
   (b) $V_T = (V_1 + V_2)/V_1V_2$ (d) $V_T = V_1 + V_3$

11. In a *parallel circuit*, the path with the least resistance carries the most _____.

12. In a parallel circuit, the total current is the _____ of the currents in each individual path.

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13. The total resistance of three paths in a parallel circuit is given by the equation: _____.
(a) $1/R_T = 1/R_1 + 1/R_2 + 1/R_3$ (c) $R_T = R_1/(R_2 + R_3)$
(b) $R_T = R_1 + R_2 + R_3$ (d) $R_T = R_1 - R_2 + R_3$

*14. A circuit in which electricity will NOT flow is described as: _____.
(a) *open* (b) *closed* (c) neutral (d) idle

15. Students at MIT developed some of the principles of how a computer works by switching model trains along a model railroad track arranged in _____ and series.

16. If the current at any point of a circuit is equal to the current at any other point in the circuit, then the arrangement is a _____ circuit.
(a) elongated (b) series (c) parallel (d) computer

17. Write the formula for showing the current in a series circuit. _____

18. In a series circuit, the total voltage drop across the entire circuit is equal to the _____ of the individual voltage drops across each resistance in the series circuit.
(a) difference (b) product (c) reciprocal (d) sum

19. Write the formula for showing the total voltage drop in a series circuit. _____

20. In a series circuit, the total resistance is the _____ of all the resistances in the series circuit.

21. Write the formula for calculating the total resistance in a series circuit. _____

22. Write the formula for calculating the total current that flows along all of the paths of a parallel circuit. _____

23. The total voltage drop is equal to the voltage drop across any one of the paths of _____ in a parallel circuit.

24. The ***reciprocal*** of the total resistance is equal to the sum of the reciprocals of the resistances through each resistor in a(n) _____ circuit.
(a) series (b) obtuse (c) parallel (d) resistance

25. Write the **Life Principle:** *"*_____
_____*."*

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ACTIVITIES
Lesson 12:
Energy

Current and Power

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. As batteries become exhausted, they produce _____ voltage.
   (a) less (b) the same (c) more (d) excessive

2. One way to check the freshness of batteries is to measure their _____.

3. Liquid crystals have properties of both solids and _____.

4. The direction a liquid crystal faces can be changed by: _____.
   (a) electricity (b) heat (c) pressure (d) all of these

5. Speaker and tape motor of a cassette player have _____ ***power*** requirements.
   (a) similar (b) different (c) the same (d) composite

*6. Work is defined as: _____.
   (a) change in speed divided by change in time
   (b) force times distance
   (c) how quickly energy is lost
   (d) mass divided by acceleration

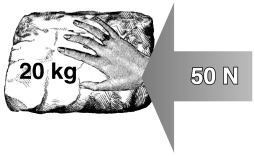
7. Applying 200 ***pounds*** of force over a distance of 3 feet requires work of _____ foot-pounds.
   (a) 3 (b) 200 (c) 500 (d) 600

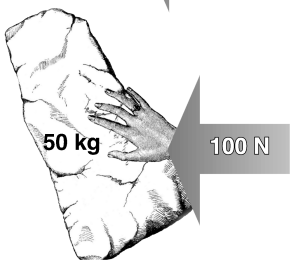
8. The term, ***foot-pound***, is the English unit of _____.

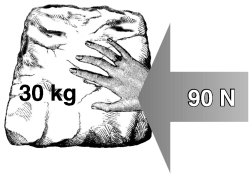
9. A _____ is the metric unit of force.

10. In the following diagrams, which force (newtons) will move the rock weight (kilograms) the greatest distance in the same amount of time? _____.

(a) 

(c) 

(b) 

(d) 

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11. The joule, calorie and foot-pound are all measures of _____ or energy.
(a) force (b) power (c) temperature (d) work

12. How quickly work is done is: _____.
(a) acceleration (b) energy (c) force (d) power

*13. In the metric system, the unit of work is the _____.

*14. In the metric system the unit of power is the _____.

15. Residential electric customers purchase electric energy by the: _____.
(a) coulomb (b) gallon (c) *kilowatt-hour* (d) *watt*

*16. A kilowatt-hour is a measure of: _____.
(a) work (b) force (b) power (c) watts

17. A kilowatt-hour is equal to _____ watts of electrical power flowing for one hour.
(a) 1 (b) 10 (c) 1,000 (d) 1,000,000

18. Based on 12 cents per kwh, a seven-watt night-light costs about _____ to operate 10 hours a day for a month.
(a) 2 cents (b) 25 cents (c) $1.40 (d) 25 dollars

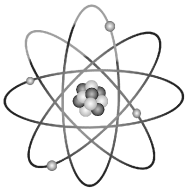
19. The Mars Climate Orbiter burned up in the Martian atmosphere because the ground control navigation team confused Mars with Jupiter.
(a) True or (b) False

20. Write the **Life Principle:** *"*_____
_____*."*

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 13:
Energy

Keeping Electricity Safe

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. The shock from a 120-volt line is harmless to humans. (a) True or (b) False

*2. Bare wires cause _____.

3. A *ground* can accept or give up _____ without becoming charged itself.

4. Electrical wires are enclosed in metal _____ because electricians assume insulation will eventually fail.

*5. The purpose of metal ***conduit*** for wires, metal ***junction boxes*** and metal boxes around wall outlets is to: _____.
(a) keep electricity within the house (c) prevent fires
(b) keep wires from flexing (d) provide a conduit to the ground

6. An appliance such as a washer with a three prong plug has a wire that connects through the outlet cord to the _____.

7. The heating effect of a current flowing through a resistance is desired in a: _____.
(a) toaster (b) short circuit (c) ground (d) radio

*8. A *short circuit* is a: _____.
(a) high resistance path (c) long way to the ground
(b) low resistance short cut (d) the key principle in the operation of a toaster

9. When too much electricity flows, a circuit breaker: _____.
(a) provides a low resistant path to the ground
(b) sounds a smoke alarm
(c) uses an electromagnet to open the circuit and stop the flow of electricity
(d) melts a strip of metal to stop the flow of electricity

10. A 100-watt bulb on a 120-volt circuit carries: _____.
(a) 200 amps (b) less than 1.0 amp (c) almost 15 amps (d) 100 amps

11. Hair dryers and other heat–producing appliances would be described as _____ amperage devices.

12. If two devices require a total current of 16.25 amperes and are on a 15-ampere circuit, then both cannot operate at the same time because a circuit breaker or fuse will stop the flow of current. (a) True or (b) False

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*13. A fuse always acts quickly enough to keep a person from being ***electrocuted***.
(a) True or (b) False

*14. Electrical appliances fall into four broad categories: light, heat, _____ _____ and electronic devices.

15. Light can be generated by: _____.
(a) fluorescent lights (c) light emitting diodes
(b) incandescent bulbs (d) all of these

16. A fluorescent tube is filled with argon and mercury vapor at _____ pressure.
(a) low (b) minus (c) high (d) static

17. The electrons of the mercury atom release their energy as: _____.
(a) infrared rays (b) ultraviolet light (c) visible light (d) X–rays

18. The key component of a doorbell is a(n) _____.
(a) ballast (b) hot filament (c) starter (d) electromagnet

*19. Electric motors change electric current into: _____.
(a) heat energy (c) mechanical motion
(b) high frequency electromagnetic waves (d) sonograms

20. Philo T. Farnsworth invented the basics of the _____ while he was still a teenager.
(a) fluorescent light (b) microwave oven (c) telescope (d) television

21. Write the **Life Principle:** *"*_____ _____*."*

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ACTIVITIES
Lesson 14:
Inventions & Discoveries

Discovery by Design

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. The boys' initial tests _____ (of) their mystery item.
   (a) could not identify anything about
   (b) identified exactly the size, shape, and weight
   (c) revealed that limburger cheese was
   (d) told them something about the size, shape and weight

2. After seeing the six possible items, Adam believed his flat, circular object was a: _____.
   (a) glass fuse or ring from a pop-top can
   (b) marble or chalk
   (c) penny or iron washer
   (d) steel tack or plastic paperclip

3. After seeing the six possible items, Samuel believed his object that did not roll was a: _____.
   (a) glass fuse or ring from a pop-top can
   (b) marble or chalk
   (c) penny or iron washer
   (d) steel tack or plastic paperclip

4. The breakthrough came when Adam thought to: _____.
   (a) place the containers in a microwave
   (b) use a magnet
   (c) use X–rays
   (d) weight each object

5. Adam decided his object was a penny because it _____ (was/was not) attracted to a magnet.

6. Because his object responded to a magnet, Samuel decided it was a: _____.
   (a) glass marble
   (b) piece of chalk
   (c) plastic paperclip
   (d) steel thumbtack

*7. Geiger counters click several times every minute even when no _____ material is present.

8. During the first ten years after the discovery, scientists believed the ***background radiation*** came from: _____.
   (a) above ground nuclear tests
   (b) charged particles coming from the Sun
   (c) naturally radioactive substances in Earth's crust
   (d) electromagnetic waves

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9. Franz Hess showed that some of the background radiation came from: _____.
   (a) deep ocean lakes (b) outer space (c) the Sun (d) people

10. When the air around an electroscope becomes ionized, the leaves of the electroscope: _____.
   (a) fall off (c) stay apart forever
   (b) come together faster (d) modulate in a circular motion

11. Balloon flights at night proved that cosmic rays came from the Sun.
   (a) True or (b) False

12. None of the background radiation came from naturally radioactive elements in the Earth's crust.
   (a) True or (b) False

13. The one who named ***cosmic rays*** was: _____.
   (a) Arthur Holly Compton (c) Marie Curie
   (b) Franz Hess (d) Robert Millikan

14. If cosmic rays were electromagnetic waves they would have more energy than: _____.
   (a) radio waves (b) gamma waves (c) ocean waves (d) hand waves

15. If cosmic rays were particles with a charge then they would be guided toward: _____.
   (a) glaciers (c) the North or South Poles
   (b) the equator (d) the Pacific Ocean

16. Cosmic rays are particles that carry an electric _____.

17. Most cosmic rays are high speed: _____.
   (a) electrons (b) iron atoms (c) neutrons (d) protons

18. Scientists have learned that the source of cosmic rays are magnetic fields in space.
   (a) True or (b) False

19. Cosmic rays have enough energy to smash atoms.
   (a) True or (b) False

20. A *positron* has a _____ charge.

21. Write the **Life Principle:** *"*_____ _____*."*

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ACTIVITIES
Lesson 15:
Motion

A Career in Physics May be for You

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Physics along with chemistry, geology and astronomy are examples of _____ sciences.

*2. Physicists study the interaction of _____ and _____.

*3. *Theoretical research* is also known as _____ research.
(a) applied (b) pure (c) practical (d) explained

4. Applied research has more _____application.
(a) potential (b) immediate (c) pure (d) theoretical

*5. _____ is the study of sound.

*6. Rather than testing nuclear weapons underground, they are tested: _____.
(a) by computer simulation (c) on the Moon
(b) in the atmosphere (d) under the ocean

*7. *Cold fusion* is a process that: _____.
(a) is the same as fission (c) works very well and is efficient
(b) is the same as hot fusion (d) a theory which is being researched

8. Fusion of hydrogen atoms at normal temperatures is called _____.

*9. *Cryogenics* deals with: _____.
(a) mechanical intelligence (c) cosmic energy
(b) very cold temperatures (d) life on other planets

10. Lowering the temperature to near absolute zero _____ current flow by changing the resistance.
(a) improves (b) hinders (c) obliterates (d) reverses

11. Cryogenics has proven useful in may areas including _____, _____ and _____.

*12. *Optics* is the study of: _____.
(a) use of light in electronics (c) options and how to make decisions
(b) hearing aids (d) operational osmosis

13. The central processing unit of a computer generates _____.

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*14. Cutting down a tree to learn its age is known as _____ testing.

15. ***Magnetic Resonance Imaging*** is an example of _____ testing.

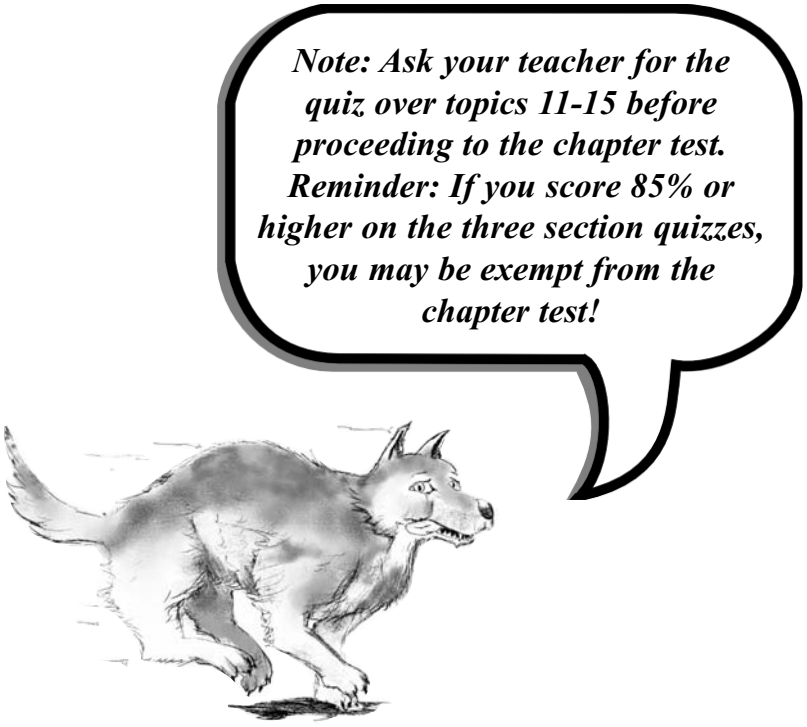
16. The job outlook for high school teachers of physics appears to be: _____.
(a) low—physics teachers are not in demand
(b) shortsighted—schools do not see a need for more physics teachers
(c) high—physics teachers are in high demand
(d) dismal—satellites have replaced most classroom physics teachers

17. Michael Faraday had exceptional mathematical ability.
(a) True or (b) False

18. Knowledge of physics can make a person a better _____.

19. The more important qualities of a good physicist are: _____.
(a) exceptional math skills
(b) good computer programming skills
(c) never ending curiosity and desire to discover secrets of life
(d) unlimited time and money

20. Write the **Life Principle:** *"*_____
_____*."*



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