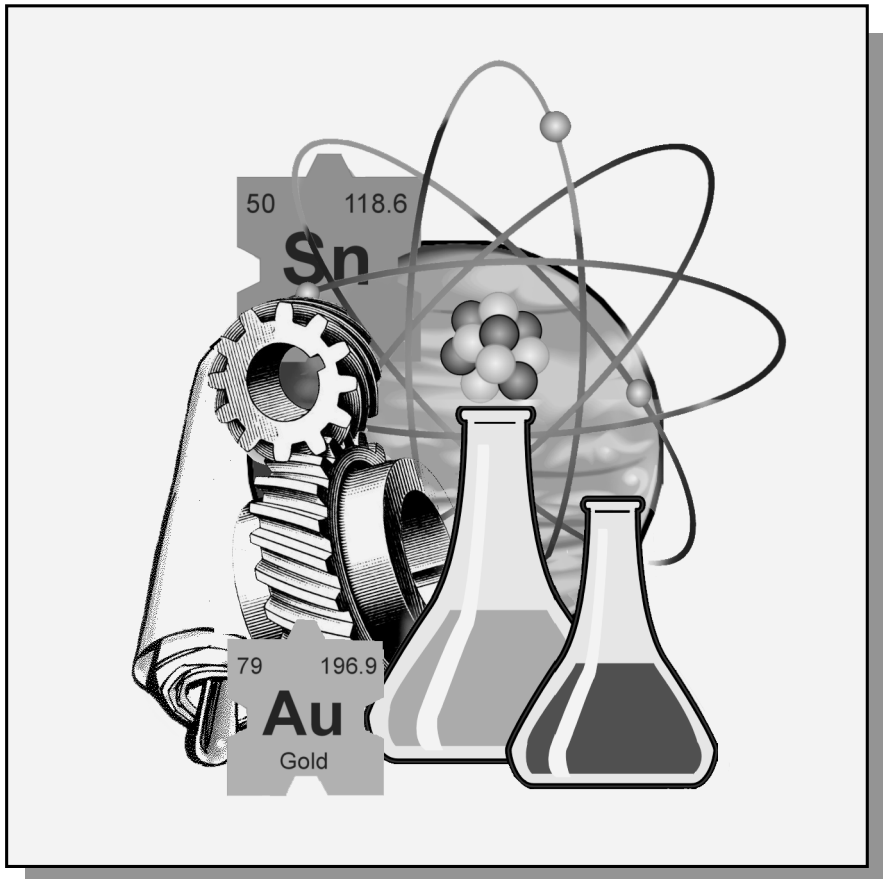
Integrated Physics & Chemistry

ACTIVITIES



Chapter 5

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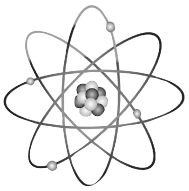
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ACTIVITIES
Lesson 1:
Energy

Static 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 Greek scientist who noticed that amber could be given a static charge was _____.
2. The word for *electricity* comes from the Greek word for _____.
3. The English physician who showed that many substances could be given a static charge by rubbing was _____.
4. Gemstones will take a static charge when they are: _____.
   (a) immersed in oil (c) rubbed with wool
   (b) placed in moonlight (d) sprayed with water
5. An object with a static charge has no effect on a stream of water.
   (a) True or (b) False

*6. The ***north pole*** of a magnet will attract a _____.

7. The French physicist who believed static electricity existed in two forms was _____.

*8. A charged body will _____ an uncharged cork ball.
   (a) attract (c) have no affect on
   (b) repel (d) run over

*9. An uncharged cork ball will take on the _____ charge as the charged body it touches.

*10. _____ carry negative charges.
   (a) Electrolytes (b) Neutrons (c) ***Electrons*** (d) ***Protons***

*11. _____ are free to move around.
   (a) Electrolytes (b) Protons (c) Electrons (d) Neutrons

12. An object that has more protons than electrons has a _____ charge.

*13. State the ***Law of Conservation of Electric Charge***: "_____.
_____
_____"

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14. The American scientist who stated the ***Three Laws of Static Electricity*** was _____.

15. Only an object with a negative charge can attract a piece of paper that has no charge.
(a) True or (b) False

*16. Two objects that have the same static charge will: _____.
(a) attract one another (c) have no effect on one another
(b) repel one another (d) dissolve

*17. One object has a positive charge and the other object has a negative charge. They will: _____.
(a) cancel each other out (c) have no effect on each other
(b) repel one another (d) attract one another

18. The German inventor of the first electrostatic generator was _____.

*19. Electrostatic generators make ***static electricity*** by: _____.
(a) capturing lightning (c) extraction from crystals
(b) chemical reactions (d) rubbing together two dissimilar substances

20. The device that stored static electricity was the _____.

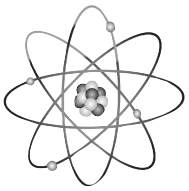
21. The modern device that is similar to a Leyden jar is a _____.

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

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 2:
Energy

Electric Charge

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 object with the same number of electrons as protons: _____.
(a) is electrically ***neutral*** (c) carries only neutrons
(b) has a negative charge (d) has a positive charge

*2. A ***ground*** will freely accept or donate _____.

3. The chassis of a car acts as the ground to prevent an electrical shock.
(a) True or (b) False

*4. When friction causes fur to give a negative charge to amber, the charge the fur gains is: _____.
(a) negative (b) neutral (c) positive (d) indirectly not affected

5. When an uncharged cork is touched by amber that has a negative charge, the cork receives: _____.
(a) a positive charge (c) nothing
(b) no charge (d) a negative charge

*6. An object charged by contact has the _____ charge as the object that touched it.

7. During the process of charging by ***induction***, a body must be _____.

*8. When a body is charged by induction by having a negative charge brought near, the body will have a _____ charge.
(a) negative (b) neutral (c) positive (d) neutron

9. A piece of paper without a charge can be attracted to a comb that has a charge.
(a) True or (b) False

*10. Three ways a body can become charged is friction, direct contact and _____.

*11. Static charge is evenly distributed over the surface of a _____ object.

12. The one who investigated the distribution of charge on the surface of an object was _____.

*13. A negative charge is repelled by a _____ charge.

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14. When a person with a negative charge extends his or her hand toward a metal doorknob, the electrons in the doorknob _____ away from the hand.

*15. An object that loses electrons will have a _____ charge.

16. The metal plates of a charged ***capacitor*** have: _____.
(a) like charges (c) unlike charges
(b) no charge (d) metallic charges

*17. The electronic device that temporarily stores a charge for a camera flash is a: _____.
(a) battery (b) vacuum tube (c) resistor (d) capacitor

18. Like the capacitor in the flash camera, a *Leyden jar* accepts and accumulates an _____.

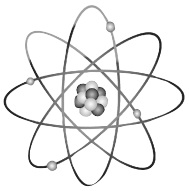
19. The person who killed a turkey with the static charge from a Leyden jar was _____.

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

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 3:
Energy

Lightning—A Key Experiment

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. Benjamin Franklin was born in 1706 _____ the Colonies declared their independence.

2. Benjamin Franklin's experiment to capture lightning was extremely _____.

3. Benjamin Franklin captured lightning because he wanted to: _____.
   (a) compare it to static electricity (c) invent the light bulb
   (b) cook a turkey (d) set fire to a barn

*4. Benjamin Franklin proved that lightning and static electricity have nothing in common.
   (a) True or (b) False

5. Benjamin Franklin was the youngest son of _____ children.
   (a) 4 (b) 9 (c) 13 (d) 20

6. Benjamin Franklin met personally with Isaac Newton.
   (a) True or (b) False

7. The person who wrote in *Poor Richard's Almanac* that "Early to bed, early to rise, makes a man healthy, wealthy and wise" was _____.

8. Which of the following is more efficient at heating a room? _____
   (a) fireplace (b) Franklin stove (c) oven (d) heating pad

9. By the age of 44, Benjamin Franklin had become well-known as a civic leader, writer and _____.

*10. Benjamin Franklin knew that a _____ would carry away static electricity.

*11. The primary purpose of lightning rods was to: _____.
   (a) gather electricity for cooking
   (b) protect homes from British fire rockets
   (c) prove lightning and static electricity have the same properties
   (d) drain away static electricity before lightning formed

*12. A tall building under a cloud becomes charged with electricity by: _____.
   (a) direct contact (b) friction (c) induction (d) reduction

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*13. Lightning rods _____ the charge between ground and clouds.

14. Benjamin Franklin was quick to take all of the credit for the invention of lightning rods.
(a) True or (b) False

15. Benjamin Franklin helped draft the: _____.
(a) Gettysburg Address (c) Magna Carta
(b) Hammurabi Code (d) Declaration of Independence

16. The person who invented bifocal reading glasses was _____.

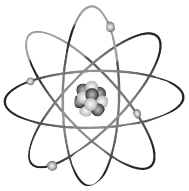
17. The year the American Colonies declared their independence was _____.

*18. The person who showed that the force for electrostatic charge followed the Inverse Square Law was _____.

*19. ***Coulomb's Law of Electrostatic Force*** states, "_____
_____
_____
_____."

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

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ACTIVITIES
Lesson 4:
Energy

Electric Potential

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 *coulomb* of charge placed one meter from a like charge will produce a force of one _____.

*2. State *Coulomb's Law of Electrostatic Force* in symbols and identify the meaning of each symbol. "_____
_____
_____."

*3. The force between two charged bodies is _____ proportional to the product of their charge.

*4. The force between two charged bodies is inversely proportional to the _____ of the distance between them.

5. The weakest force in nature is: _____.
(a) electric (b) gravity (c) magnetic (d) nuclear

6. _____ built *high-**voltage** electrostatic generators* in the 1930s.

7. Conductors designed to accept and give up electrons should have _____ ends.

*8. The charge on a hollow metal sphere is greatest: _____.
(a) on its outer surface (c) on its upper crust
(b) at its center (d) on its inner layer

*9. ***Electric potential*** is a difference in _____
_____ between two points around a charged body.

10. When no sparks are between two objects, the electric potential is _____.

*11. In the equation V = E/Q, the letter V stands for: _____.
(a) charge (b) electric potential (c) force (d) work

*12. Electric potential is measured with: _____.
(a) coulombs (b) newtons (c) ohms (d) ***volts***

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13. One way to think of voltage is as the electric force that puts a(n) _____ in motion.
    (a) neutron (b) proton (c) electron (d) atom

14. An electron that experiences a high voltage also experiences a _____ _____ to cause it to move.

15. Electricity will not spark across a gap of dry air.
    (a) True or (b) False

16. The Van de Graaff electrostatic generator produces voltages so great it can tear apart an atom.
    (a) True or (b) False

17. The Van de Graaff generator produces _____ electricity.

18. The scientist who noticed that lightning caused frog legs to twitch was: _____.
    (a) Charles Coulomb (c) Luigi Galvani
    (b) Benjamin Franklin (d) Alessandro Volta

19. An *electrophorus* was invented by _____.

20. The scientist who showed a chemical reaction would cause electricity to flow was: _____.
    (a) Charles Coulomb (c) Luigi Galvani
    (b) Benjamin Franklin (d) Alessandro Volta

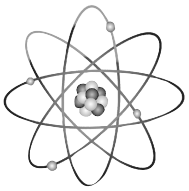
21. A chemical _____ can produce an *electric current*.

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

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 5:
Energy

Electric Current

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 person who showed that two different metals separated by salt water produced electricity was _____.

2. Voltage can be increased by placing voltaic cells in: _____.
   (a) cold water (b) parallel (c) series (d) hot water

*3. A ***series*** circuit connects the _____ ***electrode*** of one cell to the negative electrode of the next circuit.

4. The unit of electric potential is named after: _____.
   (a) Ampere (b) Coulomb (c) Ohm (d) Volta

*5. The three main parts of a *battery* are the _____, the _____ and the _____.

*6. The positive electrode is the _____.

*7. ***Ions*** are groups of atoms that have lost or gained electrons.
   (a) True or (b) False

8. An atom that gains an electron becomes an ion with a _____ charge.

9. A copper wire can carry both positive and negative charges.
   (a) True or (b) False

10. The charged bodies that travel around the external copper wire are: _____.
    (a) electrons (b) hydrogen ions (c) sulfate ions (d) zinc ions

*11. Electricity is turned off when a circuit is: _____.
    (a) closed (b) opened (c) shorted (d) elongated

*12. Voltage puts electrons in _____.

13. A greater potential difference between two electrodes causes a decrease in the measure of voltage.
    (a) True or (b) False

14. ***Current*** is the flow of _____.

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*15. Current measures the rate that electrons pass through a point with respect to: _____.
(a) voltage (b) electronic resonance (c) time (d) distance

*16. I = Q/t is the equation for: _____.
(a) charge (b) current (c) electric potential (d) resistance

*17. In the metric system, current is measured in: _____.
(a) amps (b) coulombs (c) ohms (d) volts

*18. Define an ***ampere***: _____.

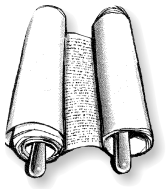
*19. A coulomb of charge is about _____ electrons.
(a) 299,000,000 (b) 3.14 (c) 6.023×10^{23} (d) 6.25×10^{18}

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

Note: Ask your teacher for the quiz over topics 1-5 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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ACTIVITIES
Lesson 6:
Scientific Laws

Ohm's Law

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 equation I = Q/t is definition for: _____.
(a) ***charge*** (b) *current* (c) ***resistance*** (d) *voltage*

Match the units with what they measure:

*2. ___ ampere (a) electromotive force

*3. ___ coulomb (b) charge

*4. ___ volt (c) current

*5. ___ ***ohm*** (d) resistance

6. More current will flow through a circuit if the voltage is: _____.
(a) 1.5 volts (b) 4.5 volts (c) 3.0 volts (d) 9 volts

*7. A long wire offers _____ resistance than a wire that is shorter.

*8. A large ***diameter*** wire offers _____ resistance than a wire that is smaller in diameter.

9. The first person to answer the question "How are current, voltage and resistance related?" was _____.

10. Almost every research paper Ohm wrote was of great significance.
(a) True or (b) False

*11. Resistance is directly proportional to the _____ of a wire.

*12. Resistance is inversely proportional to the square of the _____ of a wire.

*13. Ohm's Law states, "_____
_____
_____."

14. The unit of resistance is the: _____.
(a) ampere (b) coulomb (c) ohm (d) volt

*15. State Ohm's Law in symbols and identify each letter: _____
_____

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*16. Calculate the current that flows in a 6.0 volt circuit with a resistance of 16 ohms
_____

*17. Ohm's Law is the Fundamental Law of Electric Circuits.
(a) True or (b) False

*18. State in symbols how Ohm's Law would be written to find resistance given voltage and current _____

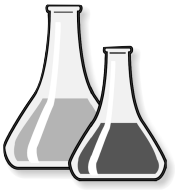
*19. Calculate resistance given that a 1.5 volt circuit carries 0.5 amps. _____
_____

*20. State in symbols how Ohm's Law would be written to find voltage given resistance and current _____

21. Calculate the voltage of a circuit that has a resistance of 12 ohms and carries 10 amps of current _____

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

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ACTIVITIES
Lesson 7:
Compounds

Humphry Davy: Chemical Detective

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. Humphry Davy, an English chemist, discovered new metals, miner's lamps and _____.
2. Davy's habit of tasting and sniffing chemicals had little effect on his health.
   (a) True or (b) False
3. The person who discovered nitrous oxide was _____.

*4. The formula for nitrous oxide is _____.

*5. Nitrous oxide is still used as a _____.

6. William Nickolson and Anthony Carlisle separated water into hydrogen and oxygen by _____.
7. When Davy sent electricity through water and potash, which of the following disassociated? _____
   (a) nitrogen (b) potash (c) potassium (d) water

*8. The metal that Davy freed from ***potash*** was _____.

*9. The word ending *-ium* is used to show that an element: _____.
   (a) is an alkali (c) is a metal
   (b) is a base (d) was unknown in ancient times

*10. The chemical formula for ***potassium carbonate*** is _____.

11. Humphry Davy became a knight in 1812.
   (a) True or (b) False
12. _____ proved to be a perfect assistant for Humphry Davy.
13. After Davy returned to England, he invented a safe miner's _____.
14. Humphry Davy never solved the problem of explosive gases used by the miners.
   (a) True or (b) False
15. The inventor of the ***arc lamp*** was _____.

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16. According to Davy himself, his greatest discovery was _____.

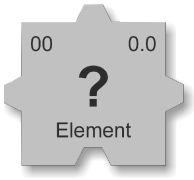
17. Sir Humphry Davy died in 1829 at the age of _____.

18. Davy's life was cut short because of: _____.
    (a) his lack of caution around chemicals (c) a Naval battle
    (b) a mining accident (d) a railroad accident

19. Humphry Davy was the first chemist to use ***electrolysis*** as a tool to ***smelt*** metal ore.
    (a) True or (b) False

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

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The Sodium Metals: Lithium



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. ***Lithium*** chloride is a type of ***salt***.
   (a) True or (b) False

*2. A _____ _____ identifies the presence of an element by the color of the ash that is left behind after the element is burned.

State the chemical symbol for:

*3. lithium _____

*4. sodium _____

*5. potassium _____

*6. rubidium _____

*7. cesium _____

*8. francium _____

*9. Members of the sodium family are: _____.
   (a) active gases (b) inert gases (c) active metals (d) nonmetals

10. The density of lithium, sodium and potassium is _____ than the density of water.

*11. _____ is the process of removing oxygen from a compound.

*12. A chemical that causes foods such as grapefruit or lemon to have a sour taste is: _____.
   (a) an ***acid*** (b) a ***base*** (c) sweet tarts (d) medicine

*13. A chemical that is caustic and feels slippery to the touch is most likely a(n) _____.

14. Food is digested in the stomach by very dilute hydrochloric acid, and carried throughout the body by blood which is a weak base.
   (a) True or (b) False

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*15. Complete this equation: base + acid → _____ + water.

16. Lithium is the lightest of all _____.

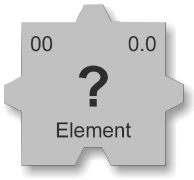
17. The one who is credited with the discovery of lithium is _____.

18. Lithium was named from: _____.
(a) a word meaning floor covering
(b) the name of Arfvedson's wife
(c) a Greek word meaning stone
(d) the name of a Swedish plant

19. _____ batteries are compact, lightweight, used in cameras, and were used to power the lunar rover.

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

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Sodium



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. Salt at one time was used as part of a soldier's _____.

2. ***Brine*** is a type of fish that have high concentrations of salt in their blood.
   (a) True or (b) False

3. Salt is common in the sea but is never found on land.
   (a) True or (b) False

*4. Salt is _____ to the diet of both humans and animals.

*5. The chemical symbol for ***sodium*** is _____.

6. Humphry Davy prepared pure sodium by: _____.
   (a) chemical analysis (c) measuring its radioactivity
   (b) electrolysis (d) using the spectroscope

7. Today, the metal sodium is freed from salt by: _____.
   (a) crushing (b) dissolving in water (c) electrolysis (d) oxidation

*8. Sodium metal must be kept in _____.

*9. Sodium _____ by itself has few uses.

State the chemical formula:

*10. ***sodium chloride*** _____

*11. ***sodium carbonate*** _____

*12. ***sodium bicarbonate*** _____

*13. ***sodium hydroxide*** _____

*14. The stronger base is sodium _____.

*15. Sodium hydroxide is a(n): _____.
   (a) acid (b) base (c) hydrocarbon (d) salt

*16. Certain types of fire extinguishers use sodium _____ to fight fires.
   (a) trioxide (b) bicarbonate (c) oxide (d) dioxide

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17. Sodium bicarbonate is also known as: _____.
(a) baking soda (b) caustic soda (c) lye (d) oxide of sodium

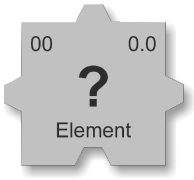
18. Self-rising flour uses _____ to generate carbon dioxide.

*19. Given that the atomic weight of sodium is 23.0, hydrogen is 1.00 and oxygen is 16.0, calculate the molecular weight of sodium hydroxide (NaOH).

_____

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

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The Sodium Family of Metals

ACTIVITIES
Lesson 10:
Elements

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. Potassium sets water on fire.
(a) True or (b) False

*2. All of the following would be used to put out a potassium fire except: _____.
(a) dry sand (b) salt (c) soda ash (d) water

*3. The chemical symbol for potassium is _____.

*4. Compounds in the earth's crust that contain potassium are _____.

5. One mineral that contains potassium is _____.

*6. The formula for potassium hydroxide is _____.

*7. The formula for potassium carbonate is _____.

*8. The formula for potassium nitrate is _____.

Write the chemical symbol for the following metals:

*9. lithium _____

*10. sodium _____

*11. potassium _____

*12. rubidium _____

*13. cesium _____

14. *Rubidium* and *cesium* were discovered by: _____.
(a) chemical analysis (c) ***radioactive*** decay
(b) electrolysis (d) the ***spectroscope***

15. A _____ identifies the elements by the number and position of the bright lines from the light emitted by a glowing compound.

*16. When light gives electrons enough energy to escape from an atom, the process is called the _____ effect.

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17. Francium (Fr) was discovered by: _____.
    (a) chemical analysis (c) radioactive emissions
    (b) electrolysis (d) the spectroscope

*18. All of the metals of the ***sodium family*** form ions with a single _____ charge.

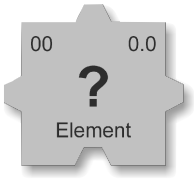
*19. All of the metals of the sodium family form oxides by combining with two oxygen atoms.
    (a) True or (b) False

20. 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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Beryllium and Magnesium

ACTIVITIES
Lesson 11:
Elements

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. ***Beryl*** can be found as _____.
2. Emerald contains _____ and aluminum in combination with silicon oxide.

*3. The chemical symbol for ***beryllium*** is _____.

4. Chemical analysis is _____ and _____.
5. Beryllium was discovered by one of Louis Vauquelin's students.
   (a) True or (b) False
6. Dmitri Mendeleev believed beryllium to be a member of the _____ family.

*7. Compared to the other members of the calcium family, beryllium is _____ metallic.

*8. When _____ encounter beryllium, they pass on through it.

*9. The chemical symbol *Mg* stands for the element _____.

10. One way to put out burning ***magnesium*** is to surround it with nitrogen.
    (a) True or (b) False
11. *Epsom salt* was first discovered outside the village of Epsom in southeast England.
    (a) True or (b) False

*12. The metal in Epsom salt is _____.

*13. A ***hydrate*** contains: _____.
    (a) chlorine (b) nitrate (c) sulfur (d) water

*14. The name for *MgO* is _____.

*15. The formula for magnesium hydroxide is _____.

*16. Milk of ***Magnesia*** is a(n): _____.
    (a) acid (b) base (c) oxide (d) salt

*17. The metal in ***chlorophyll*** is _____.

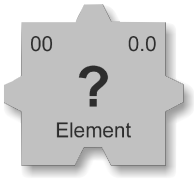
*18. Most magnesium is extracted from: _____.
    (a) chlorophyll (b) dolomite (c) milk of magnesia (d) seawater

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*19. The formula for magnesium chloride is _____.

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

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Magnesium and Calcium

ACTIVITIES
Lesson 12:
Elements

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. _____ has proven to be a health risk and is no longer used in public structures.

*2. ***Talc*** is: _____.
(a) hard and rough (c) hard and slick
(b) soft and feels slick (d) soft and rough

*3. Both *asbestos* and talc contain: _____.
(a) aluminum (b) chlorine (c) magnesium (d) sodium

4. The reason gold was discovered before ***calcium*** is: _____.
(a) calcium is far less abundant than gold
(b) calcium is found only in the upper atmosphere
(c) calcium is transparent and its weight is too slight to be noticed
(d) gold is found in the native or free state while calcium is combined with other elements

*5. A calcium ion would be written as: _____.
(a) Ca^{-} (b) Ca^{--} (c) Ca^{+} (d) Ca^{++}

*6. Limestone is: _____.
(a) a type of salt (c) calcium carbonate
(b) asbestos (d) talc

*7. The walls, ceiling, floor and formations in caves such as Mammoth Cave are of: _____.
(a) calcium hydroxide (c) calcium sulfate
(b) calcium nitrate (d) limestone

*8. The formula for calcium carbonate is _____.

9. Marble is a harder stone than rock, limestone and concrete.
(a) True or (b) False

10. *Marble* is a favorite building material because it can _____ _____.

11. _____ is a mixture of clay and dry limestone.

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12. ***Cement*** will harden under water.
(a) True or (b) False

13. Concrete is a mixture of sand, crushed stone and: _____.
(a) asphalt (b) cement (c) marble (d) talcum powder

14. Reinforced concrete is made of steel reinforcing rods with _____ poured around them.

*15. The common name for calcium oxide is _____.

*16. Each member of the calcium family of metals has a valence of: _____.
(a) +1 (b) +2 (c) –1 (d) –2

State the valence of:

*17. sodium _____

*18. calcium _____

*19. chlorine _____

*20. oxygen _____

*21. hydroxyl group _____

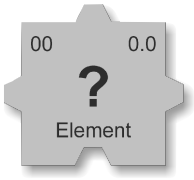
*22. nitrate group _____

*23. carbonate group _____

*24. sulfate group _____

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

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Calcium, Hard Water and Strontium

ACTIVITIES
Lesson 13:
Elements

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. Calcium is not found in the human body.
(a) True or (b) False

2. One use of _____ is as a cast to hold broken bones in place.

3. Pearls are not ***minerals*** because: _____.
(a) pearls are made by living organisms
(b) pearls are not gems
(c) the composition of pearls can change
(d) pearls have no crystalline structure

*4. An eggshell, a pearl, a coral and mother of pearl button are all made of _____.

5. Both soap and detergents cause scum in ***hard water***.
(a) True or (b) False

*6. Rainwater has _____ dissolved in it before it hits the ground.

*7. _____ that percolates through the soil can pick up calcium and magnesium carbonates.

*8. Vinegar is a mild _____.

*9. When *temporary hard water* is boiled, the calcium carbonate: _____.
(a) changes into sodium carbonate
(b) floats to the top of the water as a scum
(c) goes into solution as ions
(d) settles out as a solid

10. _____ hard water cannot be made soft by boiling.

11. *Ion exchange* was once thought to be a useful idea but is today discredited.
(a) True or (b) False

*12. The symbol for ***strontium*** is _____.

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13. Strontium is named for a mineral from a town in: _____.
(a) Greece (b) Rome (c) Scotland (d) Spain

*14. The formula for strontium carbonate is _____.

*15. The formula for strontium sulfate is _____.

*16. *Radioactive strontium* can substitute in bones for: _____.
(a) calcium (b) lithium (c) magnesium (d) neon

*17. Countries with nuclear weapons agreed to test weapons _____ to prevent strontium from escaping.

*18. Both _____ and _____ are more common and less expensive than strontium.

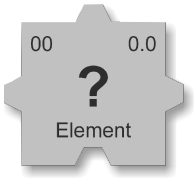
19. Strontium is used in flares and fireworks because: _____.
(a) it falls to earth as a healthy substitute for calcium
(b) it is found free in nature
(c) it is radioactive
(d) of its distinctive scarlet color

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

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 14:
Elements

Barium and Radium

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. Barium sulfate is used to make stomach and intestines visible because barium is ***transparent*** to ***X-rays***.
   (a) True or (b) False

*2. The symbol for ***barium*** is _____.

3. Barium received its name from a Greek word meaning: _____.
   (a) hard (b) heavy (c) low in density (d) soft

*4. Barite mud is used for well drilling because the mud is especially _____.

*5. The formula for barium oxide is _____.

*6. The formula for barium carbonate is _____.

*7. The formula for barium sulfate is _____.

*8. The symbol for ***radium*** is _____.

*9. Radium is a naturally occurring _____ element.

*10. Radium is one of the few radioactive elements that is safe to handle.
   (a) True or (b) False

11. The primary use of radium today is to make clock and watch dials glow in the dark.
   (a) True or (b) False

12. Radiation treatment for cancer destroys much _____.

Use the following calcium family of metals to match items 13-17.

*13. _____ most of its uses are because it is heavy — (a) beryllium

*14. _____ has the lowest atomic weight — (b) magnesium

*15. _____ found in bones and teeth — (c) strontium

*16. _____ symbol is *Mg* — (d) barium

*17. _____ naturally radioactive — (e) calcium

*18. _____ symbol is *Sr* — (f) radium

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*19. The *atomic number* equals the number of _____ in the nucleus of an atom of an element.

*20. Atoms of the same element always have the same _____.

*21. The atomic number of hydrogen is _____.

*22. The atomic number of uranium is _____.

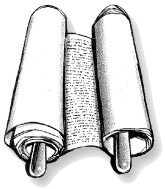
*23. Should uranium lose four protons it would be _____.

*24. An atomic number is always a _____.

*25. Atomic number is the number of electrons in a charged ion.
(a) True or (b) False

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

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ACTIVITIES
Lesson 15:
Scientific Laws

Periodic Laws

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. Mendeleev's students became discouraged because he was such a poor teacher.
   (a) True or (b) False
2. Mendeleev believed laws of nature could be _____ easily.
3. At the technical school, Mendeleev: _____.
   (a) finished at the top of his class
   (b) dropped out because he became homesick
   (c) graduated and returned to the glass factory his mother managed
   (d) injured his eyes from chemical experiments
4. Mendeleev began his project to organize the elements in the late _____.
5. The number of elements known as Mendeleev began his project was about _____.

*6. The lightest element is _____.

*7. Comparing *HCl* with H_2O, shows the one with the greater valence is _____.

From the second row of Mendeleev's table, write the names for each element.

*8. *Li* _____

*9. *Be* _____

*10. *B* _____

*11. *C* _____

*12. *N* _____

*13. *O* _____

*14. *F* _____

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From the third row of Mendeleev's table, write the name for each element below.

*15. *Na* _____

*16. *Mg* _____

*17. *Al* _____

*18. *Si* _____

*19. *P* _____

*20. *S* _____

*21. *Cl* _____

*22. The fact that chemical properties of the elements repeat on a regular basis is: _____.

(a) Davy's Principle
(b) the ***family*** of elements
(c) the ***Periodic Law***
(d) principle of the metals

*23. A horizontal row of elements in the ***periodic table*** is called a _____.

*24. A vertical column of elements in the periodic table is called a _____.

*25. Elements in the same family share similar properties.
(a) True or (b) False

*26. The ***inert gases*** have a valence of _____.

27. Some chemists modified Mendeleev's table because: _____.
(a) they added newly discovered elements
(b) they added the family of inert gases
(c) to make it better fit on a sheet of paper
(d) all of the above

28. The only proper way to show the Periodic Law is with a periodic table.
(a) True or (b) False

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

Note: Ask your teacher for the quiz over topics 11-15 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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