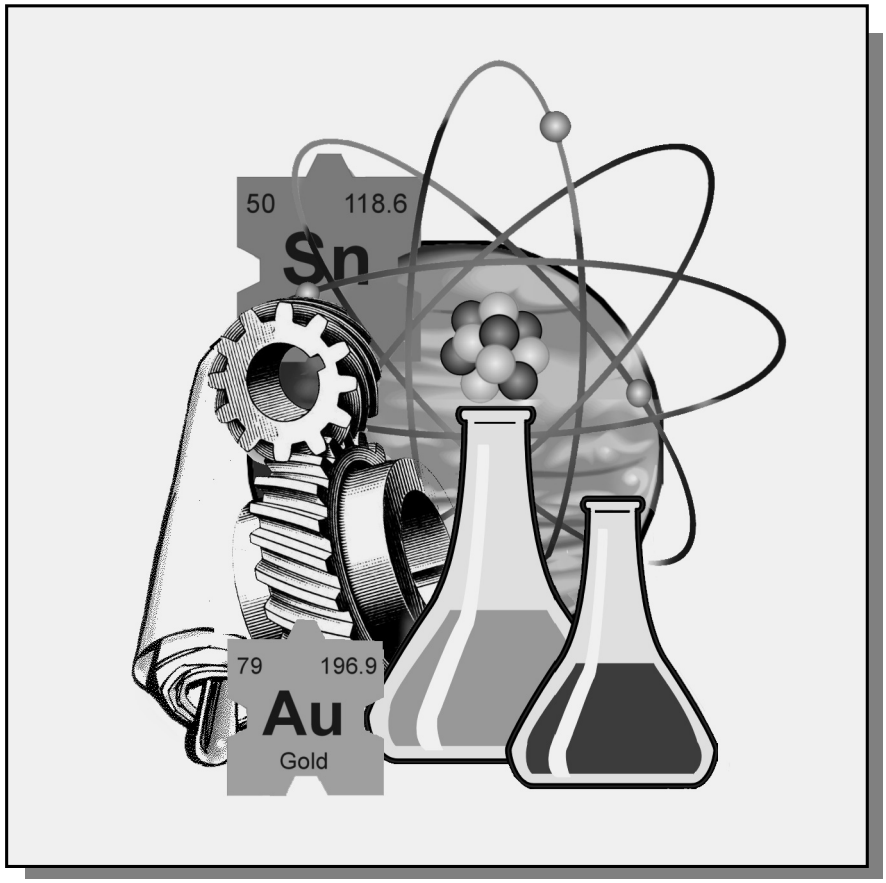
Integrated Physics & Chemistry

ACTIVITIES



Chapter 1

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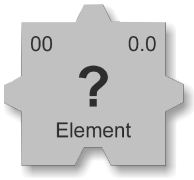
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ACTIVITIES
Lesson 1:
Elements

Putting Together the Pieces

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 this course, we will only be talking about modern scientists.
   (a) True or (b) False

2. This course will teach you how to build puzzles more quickly.
   (a) True or (b) False

3. What will this course explain? (Answer in a complete sentence.)
   _____
   _____

*4. The *scientific method* is a problem solving process used by scientists.
   (a) True or (b) False

*5. A *hypothesis* is: _____.
   (a) another word for the scientific method
   (b) an airplane or toy car model
   (c) a prediction of the answer to a scientific question
   (d) a concept of invention

*6. Scientists test their hypotheses by: _____.
   (a) experience (c) expertise
   (b) experiments (d) opinions of others

7. List the six steps of the scientific method.
   (1) _____
   (2) _____
   (3) _____
   (4) _____
   (5) _____
   (6) _____

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Grammar	Literature	Writing
Chemistry	Physics	Geology
Sculpture	Paint	Sketch
Algebra	Geometry	Calculus

8. From the chart above name three kinds of sciences.

_____
_____
_____

*9. An example of *matter* would be a(n):_____.
(a) ball (b) thought (c) song (d) exercise

*10. An example of *energy* would be: _____.
(a) your hand
(b) the force used to throw a ball
(c) a flashlight
(d) having the strength to run a marathon

11. ***Chemistry*** and ***physics*** are different words with the same meaning.
(a) True or (b) False

12. Matter is built of combinations of the _____ in the periodic table.

13. List five things we have because of science.

_____
_____
_____
_____
_____

14. How can you be more like a scientist? (Answer in a complete sentence.)

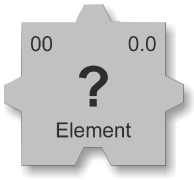
_____
_____

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

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Name: _____

Date: _____ Grade: _____



Chemists Who Wanted to Make Gold

ACTIVITIES
Lesson 2:
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. The science that deals with the composition, properties and changes of matter is: _____.
   (a) biology (b) chemistry (c) physics (d) calculus

2. The label on a box of raisin bran cereal reads, "contents may separate during transport." The contents of the box are most likely a(n): _____.
   (a) *compound* (b) *mixture* (c) ***element*** (d) solid

*3. The combination of water, sand, gravel and gold is a: _____.
   (a) medley (b) compound (c) mixture (d) solid

4. The atmosphere is an example of a(n): _____.
   (a) element (b) compound (c) mixture (d) solid

5. Pure water is an example of a(n): _____.
   (a) element (b) compound (c) mixture (d) solid

6. Salt is an example of a(n): _____.
   (a) element (b) compound (c) mixture (d) solid

7. Gold was known in ancient times.
   (a) True or (b) False

8. ***Inert*** means that a substance will combine with others easily.
   (a) True or (b) False

9. Gold is not very malleable.
   (a) True or (b) False

*10. A substance whose shape can be changed by beating on it is: _____.
   (a) brittle (b) *malleable* (c) abused (d) solvent

11. If gold is used for jewelry and coins, the effect is that it: _____.
   (a) is too soft and will wear away (c) will turn green if worn too long
   (b) will tarnish (d) is too hard

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*12. If copper is mixed with gold, the gold will be harder.
(a) True or (b) False

*13. Two rings are the same size, but one is 8 carat gold; the other is 14 carat gold. Which of the two rings has more gold? _____.
(a) 8 carat (c) They will have the same amount
(b) 14 carat (d) Cannot tell

14. The person more likely to announce a new discovery is a(n): _____.
(a) gold prospector (b) alchemist (c) chemist (d) student

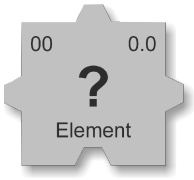
15. Chemistry is a science based on truth and alchemy is a false science.
(a) True or (b) False

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

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Name: _____

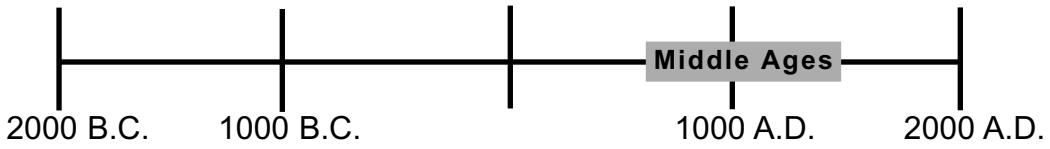
Date: _____ Grade: _____



The Man Who Defined an Element

ACTIVITIES
Lesson 3:
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. According to the time line above, the Middle Ages were approximately between: _____.
   (a) 2000 B.C. and 1000 B.C. (c) 600 A.D. and 1400 A.D.
   (b) 1400 B.C. and 600 B.C. (d) 1900 A.D. and 2000 A.D.

2. Robert Boyle lived: _____.
   (a) in ancient Greek times (c) during the Great Depression
   (b) after the Middle Ages (d) during the Primitive Ages

3. The Greeks were noted for their skill at experimentation.
   (a) True or (b) False

4. Aristotle was a(n): _____.
   (a) Egyptian alchemist (c) physician
   (b) Greek natural philosopher (d) chemist

5. A chemical _____ is a pure substance, which cannot be broken down into any simpler substance by chemical means.

6. An element has atoms of only one type.
   (a) True or (b) False

*7. A _____ contains atoms of two or more different elements in a chemical union.

*8. Galena can be broken down into lead and sulfur, which shows that it is a(n): _____.
   (a) compound (b) element (c) atom (d) neutron

9. Gold is an element.
   (a) True or (b) False

10. The *Royal Society* was a secret organization dedicated to making gold.
   (a) True or (b) False

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*11. The ones most likely to do experiments were: _____.
(a) ancient Greek *philosophers* (c) clowns
(b) members of the Royal Society (d) animal trainers

12. *Phosphorus* is an element.
(a) True or (b) False

*13. The chemical symbol for phosphorus is _____.

14. Robert Boyle used phosphorus and sulfur to make: _____.
(a) gold (b) gunpowder (c) the first match (d) the first boiler

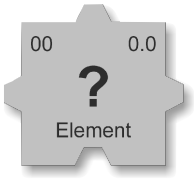
*15. Phosphorus is more likely to be used to: _____.
(a) be beaten into sheets to cover an important book
(b) be drawn into long thin wire
(c) make fireworks
(d) cover gold

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

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 4:
Elements

The Money Metals

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 chemical symbol of gold is _____.

2. An unknown substance conducts electricity, has a shiny surface, and can be formed into different shapes by hammering it. The substance is most likely a: _____.
(a) *metal* (b) *nonmetal* (c) steel bar (d) metallic

3. A metal that can be beaten into thin sheets is considered to be _____.

4. A metal that can be drawn into thin wires is considered to be _____.

*5. Gold is the most *malleable* of metals.
(a) True or (b) False

*6. *Ag* is the chemical symbol for _____.

*7. *Copper* is mixed with *silver* to make an alloy. The alloy will be: _____.
(a) brighter (b) greener (c) more wear resistant (d) darker

8. The formula Ag_2S shows that silver sulfide has how many silver atoms? _____

9. Silver mirrors were sealed to protect them from tarnish caused by: _____.
(a) oxygen (c) oils in the skin
(b) sulfur (d) bright spots

*10. Of gold, silver and copper, the one used in photographic film is _____.

*11. The chemical symbol of copper is _____.

12. Of gold, silver and copper, the metal with the highest *specific gravity* is _____.

*13. The main use of copper today is found in: _____.
(a) tooth fillings (c) coins
(b) electrical applications (d) automobiles

14. Of gold, silver and copper, the metal that is the most efficient conductor of heat and electricity is _____.

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15. Copper is used in electrical wires rather than silver. We can conclude that copper is: _____.
    (a) less ***ductile*** than silver (c) cheaper than silver
    (b) more ***ductile*** than silver (d) more expensive than silver

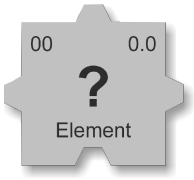
16. When copper tarnishes it turns: _____.
    (a) bright red (b) black (c) green (d) bright yellow

17. Pure copper is too hard to make good knife blades.
    (a) True or (b) False

*18. *Bronze* and *brass* are both alloys containing: _____.
    (a) copper (b) zinc (c) silver (d) gold

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

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The Working Metals

ACTIVITIES
Lesson 5:
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. *Iron*, lead, tin and mercury are all metals.
   (a) True or (b) False

2. The iron we see in daily life is: _____.
   (a) pure iron (c) tarnished
   (b) iron in combination with other elements (d) stronger than ordinary iron

* 3. The symbol for iron is _____.

4. Iron has magnetic properties.
   (a) True or (b) False

5. Iron is common because it is found in the native state, uncombined with other elements.
   (a) True or (b) False

*6. A compound is considered an ***ore*** until the metal can be removed.
   (a) True or (b) False

*7. Most ores contain either sulfur or _____.

8. An element combined with sulfur is a(n): _____.
   (a) ***sulfide*** (b) ***oxide*** (c) suffusion (d) confused mass

9. *Pyrite* is also known as: _____.
   (a) baking grease (c) 24 carat gold
   (b) fool's gold (d) 14 carat gold

10. The ancient Egyptians built blast furnaces to smelt iron from its ore.
    (a) True or (b) False

*11. Removing oxygen from a compound is known as: _____.
   (a) oxidation (b) eradication (c) ***reduction*** (d) subtraction

12. *Cast iron* and steel contain iron with: _____.
   (a) zinc (b) carbon (c) tin (d) gold

13. Iron in a form that is especially hard is: _____.
   (a) wrought iron (b) pig iron (c) tempered steel (d) aluminum

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14. Used as building material, steel becomes more useful when teamed with: _____.
(a) pig iron (b) concrete (c) tin (d) aluminum

15. Iron does not combine readily with oxygen from the air.
(a) True or (b) False

16. *Burning* and *rusting* are both examples of: _____.
(a) *oxidation* (b) corrosion (c) tarnishing (d) refurbishing

17. Iron is a poison to humans and is not found in the human body.
(a) True or (b) False

*18. The chemical symbol for *tin* is _____.

19. Bronze, pewter and solder are all alloys of: _____.
(a) iron (b) tin (c) carbon (d) steel

* 20. A tin can is made of pure tin.
(a) True or (b) False

21. The chief source of tin is: _____.
(a) its ore (c) recovery from scrap
(b) from the compound SnO_2 (d) aluminum

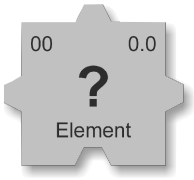
22. Tin turns brittle at cold temperatures.
(a) True or (b) False

23. 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:
Elements

Metals and Nonmetals

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. Which of the following metal is the least conductor of electricity? _____
   (a) copper (b) lead (c) silver (d) gold

*2. The chemical symbol for *lead* is _____.

3. The Romans used lead pipes in their plumbing.
   (a) True or (b) False

*4. Lead is: _____.
   (a) toxic (c) non-toxic
   (b) nourishing for small children (d) very tasty

5. Lead flushes from the human body: _____.
   (a) slowly (b) quickly (c) never (d) in a steady, comfortable flow

6. The main ore of lead is galena, a compound of lead and: _____.
   (a) oxygen (b) sulfur (c) carbon (d) mercury

7. In the smelting of ores, charcoal and limestone are both sources of: _____.
   (a) oxygen (b) sulfur (c) carbon (d) nitrogen

*8. The largest use of lead is in: _____.
   (a) electrical storage batteries (c) X-ray shielding
   (b) paint thinners (d) making pencils

9. The only ancient metal to be a liquid at room temperatures is _____.

*10. The symbol *Hg* is the chemical symbol for _____.

11. *Mercury* is more dense than lead.
   (a) True or (b) False

*12. Mercury, like lead, is toxic.
   (a) True or (b) False

*13. Mercury is sometimes used with gold or silver in making: _____.
   (a) dental fillings (b) water pipes (c) thermometers (d) teapots

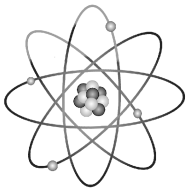
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14. A ***barometer*** measures: _____.
    (a) humidity (c) air pressure
    (b) temperature (d) economic conditions

15. Mercury has no ores.
    (a) True or (b) False

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

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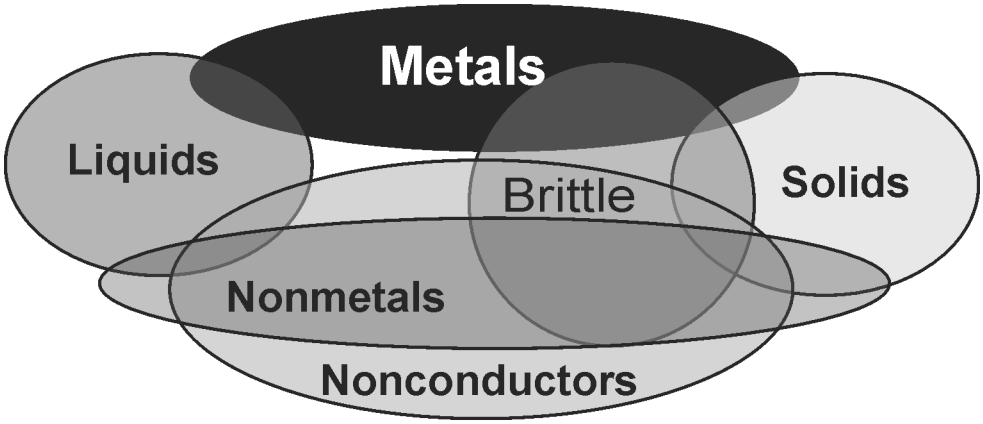
ACTIVITIES
Lesson 7:
Energy

Making Chemistry Easier

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. Chemistry is a science.
   (a) True or (b) False

2. Grouping similar objects together is called _____.



3. Using the diagram above, a substance that is brittle and does not conduct electricity well is most likely a: _____.
   (a) metal (b) nonmetal (c) liquid (d) solid

*4. Mercury is a(n): _____.
   (a) metal (b) nonmetal (c) solid (d) explosive

5. The iron ore, magnetite, is an example of a(n): _____.
   (a) chemical substance (c) *element*
   (b) *mixture* (d) *classification*

*6. All compounds have properties exactly like the elements that make them.
   (a) True or (b) False

7. The term ***atom*** is from a Greek word meaning: _____.
   (a) indestructible (c) indivisible
   (b) continuous (d) divisible by two

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8. The one who said, "The only existing things are the atoms and empty space" was: _____.
   (a) Lucretius (b) Isaac Newton (c) Democritus (d) Socrates

9. Most Greek philosophers immediately accepted Democritus' Atomic Theory.
   (a) True or (b) False

10. *On the Nature of Things* is a(n): _____.
    (a) encyclopedia (b) long poem (c) almanac (d) short story

11. The Middle Ages are noted for the: _____.
    (a) decline in learning (c) rapid technological advancement
    (b) great scientific achievement (d) wars

12. Scholars and chemists of the 1600s did not accept the ***Atomic Theory*** because: _____.
    (a) it was against common sense
    (b) no experiments or observations supported it
    (c) they had proven the subatomic theory
    (d) they just did not want to

*13. The three forms of matter are s*olids, liquids* and _____, therefore all matter is either solid, liquid or _____ or some combination of these three.

14. Ice is an example of a: _____.
    (a) liquid (b) solid (c) gas (d) drink

*15. Which state of matter is most easily compressed? _____

*16. Robert Boyle showed that as the pressure on a ***gas*** becomes greater, the volume of the gas becomes: _____.
    (a) larger (b) smaller (c) unchanged (d) heavier

17. Robert Boyle believed his experiments confirmed the atomic theory.
    (a) True or (b) False

18. Daniel Bernoulli was a: _____.
    (a) hot air balloonist (c) mathematician
    (b) physicist (d) college professor

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

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ACTIVITIES
Lesson 8:
Inventions & Discoveries

Chemistry Matters

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. Chemistry is a: _____.
   (a) biological science (c) false science
   (b) physical science (d) social science

*2. *Matter* occupies space and has: _____.
   (a) energy (b) weight (c) definite shape (d) definite size

*3. ***Energy*** is the ability to do work.
   (a) True or (b) False

4. Compared to other physical sciences of the 1600s, chemistry advanced more: _____.
   (a) slowly (b) not at all (c) quickly (d) suddenly

5. To the scientists of the 1600s, progress in chemistry was easy.
   (a) True or (b) False

6. An experiment is a: _____.
   (a) process found only within chemistry (c) controlled observation
   (b) secret activity (d) "hope it works" theory

7. ***Conditions*** of an experiment include directions on how to carry out the experiment, the equipment used and a list of the _____ used.

*8. The ingredients at the start of a chemical reaction are: _____.
   (a) ***products*** (c) essential basics
   (b) ***reactants*** (d) inactive ingredients

9. Weight and volume could be measured accurately by chemists of the early 1600s.
   (a) True or (b) False

10. Time and temperature could be measured accurately by chemists of the early 1600s.
   (a) True or (b) False

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11. One of the first to see the importance of measurement was: _____.
    (a) Antoine Laurent Lavoisier (c) Robert Boyle
    (b) Jan Baptista van Helmont (d) Thomas Jefferson

12. Van Helmont overlooked that the willow tree received nourishment from the air.
    (a) True or (b) False

13. Robert Boyle agreed with Jan van Helmont that measurement is important in chemistry.
    (a) True or (b) False

14. Antoine Laurent Lavoisier believed some chemists were trying to be too precise in their measurements.
    (a) True or (b) False

15. Lavoisier could measure the weight of a person's breath.
    (a) True or (b) False

16. When pure, distilled water was boiled in a glass container, the scaly material that formed came from the: _____.
    (a) water (b) air (c) glass container (d) atmosphere

*17. Matter follows the Law of Conservation of Matter, therefore matter can neither be _____ nor destroyed during a chemical reaction.

*18. The weight of the products that results from a chemical reaction can weigh less than the ingredients that go into the reaction.
    (a) True or (b) False

*19. After an object burns, the weight of the ash is always less than the object before it burns.
    (a) True or (b) False

20. Diamond is made of carbon.
    (a) True or (b) False

21. Diamond and coal are alike in that both will: _____.
    (a) float on water (b) burn (c) easily bend (d) disappear

22. Lavoisier's experiments agreed with the Atomic Theory of Matter.
    (a) True or (b) False

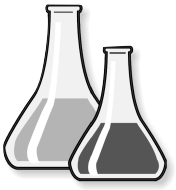
23. Lavoisier's experiments agreed with the concept that matter is made of atoms.
    (a) True or (b) False

24. Lavoisier was safe from the Reign of Terror because he was a government official.
    (a) True or (b) False

25. Antoine Lavoisier's contributions to chemistry are nearly forgotten today.
    (a) True or (b) False

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

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ACTIVITIES
Lesson 9:
Compounds

Continuous and Discrete

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. Rope is an example of a product that is: _____.
   (a) ***continuous*** (c) always changing
   (b) ***discrete*** (d) easily melted

2. Doughnuts are an example of a product that is continuous.
   (a) True or (b) False

3. Cloth is an example of a product that is continuous.
   (a) True or (b) False

*4. The formula for copper carbonate is $CuC0_3$. It contains copper, carbon and _____.

5. A ***proportion*** compares a part against the _____.

6. Proportions can be formed using numbers of elements, their volumes or their _____.

7. Joseph Louis Proust lived around the same time as Antoine Laurent Lavoisier.
   (a) True or (b) False

8. Copper carbonate is not found in nature.
   (a) True or (b) False

*9. Copper carbonate is made with more copper than its proportion. The amount left over will: _____.
   (a) be left uncombined (c) only be used up sometimes
   (b) react anyway (d) be sold at the next auction

*10. The Law of *Definite* Proportions states that all compounds contain _____ in definite proportion by weight regardless of how they were produced.

11. Joseph Louis Proust discovered the: _____.
   (a) Law of Descending Primes (c) Law of Definite Proportions
   (b) Law of Conservation of Matter (d) Law of Ascending Latters

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12. The Law of Definite Proportions is best explained by thinking of matter as: _____.
(a) continuous (c) always changing
(b) discrete (d) never changing

13. In making lead sulfide, if more lead is used than its proportion, the excess lead is left over and does not react.
(a) True or (b) False

14. Jons Jakob Berzelius confirmed that the Law of Definite Proportions was true by doing about: _____.
(a) 100 analyses (c) 2,000 analyses
(b) 200 analyses (d) 10,000 analyses

*15. Separating a compound into its elements and measuring the amount of each one is chemical: _____.
(a) reduction (b) conservation (c) analysis (d) economics

16. Jons Jakob Berzelius violently opposed Proust's Law of Definite Proportions.
(a) True or (b) False

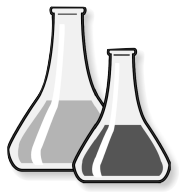
17. Joseph Proust was never able to return to France.
(a) True or (b) False

18. Proust's Law of Definite Proportions supported the idea of atoms.
(a) True or (b) False

19. The Law of Definite Proportions has no use in business and industry.
(a) True or (b) False

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

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ACTIVITIES
Lesson 10:
Compounds

Chemical Formulas of Compounds

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. John Dalton earned his living as a weatherman.
   (a) True or (b) False

2. *Meteorology* is the study of: _____.
   (a) chemistry (b) weather (c) meteors (d) cartoons

*3. The *atmosphere* is a: _____.
   (a) mixture of gases (c) mixture of liquids
   (b) vacuum (d) mixture of solids

*4. The chemical formula for carbon dioxide is: _____.
   (a) CO_2 (b) H_2O_2 (c) *CO* (d) *CaDo*

*5. The gas that comes from the bottom of a marshy pond is: _____.
   (a) hydrogen peroxide (c) methane
   (b) carbon dioxide (d) carbon monoxide

*6. *Methane* is a(n): _____.
   (a) sulfide (b) ***hydrocarbon*** (c) oxide (d) hydrofluid

*7. In methane (CH_4) the ratio of carbon to hydrogen by number is _____.

8. For the same compound, the ratio of atoms based on their numbers equals the ratio of atoms based on their weights. (a) True or (b) False

9. A ***relative weight*** compares the weight of one atom with the weight of another atom.
   (a) True or (b) False

10. John Dalton showed that the Law of Definite Proportions does not apply to gases.
    (a) True or (b) False

11. The same elements can combine in different proportions to give different compounds.
    (a) True or (b) False

*12. The fact that the proportion of carbon and oxygen is different in carbon dioxide and hydrogen peroxide violates the Law of Definite Proportions.
    (a) True or (b) False

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Water		
Hydrogen	Hydrogen	Oxygen

Hydrogen Peroxide			
Hydrogen	Hydrogen	Oxygen	Oxygen

*13. Using the chart above, water and hydrogen peroxide both contain hydrogen and: _____.

(a) carbon (c) carbon dioxide
(b) oxygen (d) carbon monoxide

14. Chemists were very slow to accept John Dalton's theory that matter is made of atoms.
(a) True or (b) False

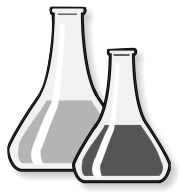
15. John Dalton died in poverty and was forgotten.
(a) True or (b) False

16. 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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ACTIVITIES
Lesson 11:
Compounds

Learning Chemical Formulas

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. John Dalton is given the credit for articulating the Atomic Theory of Matter.
(a) True or (b) False

*2. According to John Dalton, atoms are the smallest particles that make up matter.
(a) True or (b) False

3. According to John Dalton, atoms can neither be created nor _____.

*4. According to John Dalton, atoms of the same element have: _____.
(a) same weight (c) greater weights
(b) different weights (d) heavy weights

*5. According to John Dalton, molecules of the same compound: _____.
(a) are identical in all aspects (c) greater in all aspects
(b) differ from one another (d) argue in all aspects

*6. A(n) _____ is the smallest particle that contains the chemical properties of a particular element.

*7. A(n) _____ is the smallest particle that contains the chemical properties of a particular compound.

8. An element cannot be made of molecules.
(a) True or (b) False

*9. Hydrogen gas is made of molecules with two atoms of hydrogen each. Therefore, hydrogen gas is ***binary***. (a) True or (b) False

*10. Elements are usually made of _____ that are all the same.

*11. Compounds are made of _____ that are all the same.

12. The number of atoms in a line one centimeter long is about: _____.
(a) 2,000 (b) 100,000,000 (c) 200,000,000 (d) 3,500

13. The formula for methane is CH_4. Because ethylene has twice as much carbon, its formula is: _____.
(a) CH_8 (b) C_2H_4 (c) $2(CH_4)$ (d) CH

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14. John Dalton was the first to weigh a single atom.
(a) True or (b) False

15. When water is broken into hydrogen gas and oxygen gas: _____
_____.
(a) the amount of hydrogen gas is equal to the amount of oxygen gas
(b) twice as much oxygen gas as hydrogen gas is produced
(c) twice as much hydrogen gas as oxygen gas is produced
(d) one-half as much hydrogen as oxygen

16. Joseph Louis Gay-Lussac stated that when gaseous elements combine, they do so by small whole number amounts by volume.
(a) True or (b) False

17. The fact that ammonia is made from three volumes of hydrogen combined with one volume of nitrogen gas is an example of the: _____.
(a) Atomic Theory of Matter
(b) Conservation of Matter
(c) Law of Combining Volumes
(d) Law of Disappearing Volumes

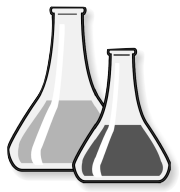
18. Avogadro's *hypothesis* states that the same volume of gas always contains the same:
_____.
(a) number of particles regardless of the gas
(b) weight of gas regardless of the gas
(c) volume of a different gas
(d) size of particles

19. A gas: _____.
(a) is mostly empty space
(b) has atoms in contact with one another
(c) is usually quite dense
(d) disappears readily

20. Atoms have been photographed.
(a) True or (b) False

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

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ACTIVITIES
Lesson 12:
Compounds

Chemical Shorthand

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. Scientists before the time of Christ had not found any elements.
   (a) True or (b) False

2. The total number of naturally occurring elements is: _____.
   (a) 30 (b) 92 (c) 108 (d) 218

3. John Dalton's symbols for elements were: _____.
   (a) figures enclosed in circles (c) letters
   (b) numbers (d) all of the alphabet

4. The lack of a consistent way to represent elements resulted in better communication among chemists.
   (a) True or (b) False

5. Jons Jakob Berzelius' symbols for elements were: _____.
   (a) figures enclosed in circles (c) letters
   (b) numbered circles (d) all of the alphabet

6. Sometimes a second letter is used in the symbol for an element.
   (a) True or (b) False

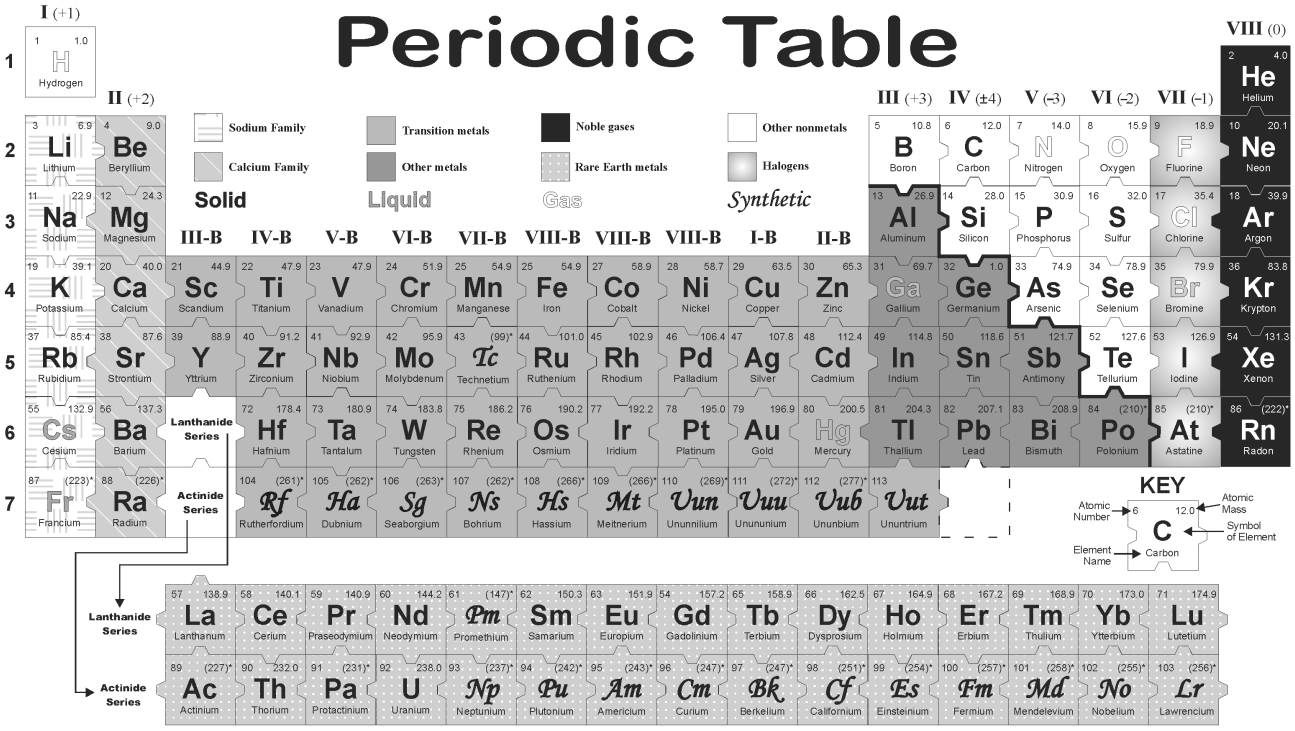
*7. The first letter of the symbol for an element is: _____.
   (a) always capitalized (c) sometimes capitalized and sometimes lowercase
   (b) always lowercase (d) never written the same

8. All symbols for elements begin with the first letter of their name.
   (a) True or (b) False

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For each element, supply the missing symbol or element names using the Periodic Table of the Elements.

Name	Symbol	Name	Symbol
*9. _____	C	*21. argon	_____
*10. _____	Cl	*22. berylium	_____
*11. _____	Fe	*23. boron	_____
*12. _____	H	*24. copper	_____
*13. _____	Hg	*25. fluorine	_____
*14. _____	N	*26. gold	_____
*15. _____	O	*27. helium	_____
*16 _____	P	*28. lithium	_____
*17. _____	Pb	*29. magnesium	_____
*18. _____	S	*30. silicon	_____
*19. _____	Sn	*31. silver	_____
*20. aluminum _____		*32. sodium	_____



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33. Nothing of importance came out of the First International Chemical Congress held in 1860.
(a) True or (b) False

*34. The ***chemical formula*** for a compound shows the type and number of _____ in the compound.

35. The formula for carbon dioxide is _____.

*36. A chemical _____ is a shorthand way of showing a ***chemical reaction***.

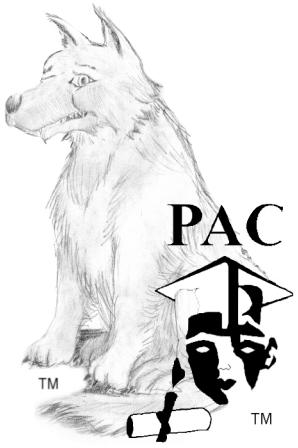
*37. A ***chemical equation*** must balance because of the Law of: _____.
(a) Definite Proportions
(b) Equal Weights for Equal Numbers
(c) Conservation of Matter
(d) Equal Productions

38. The equation $H_2 + O_2 = 2H_2O$ is balanced.
(a) True or (b) False

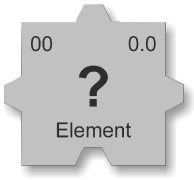
39. For a chemical equation to be *balanced*, the number of atoms of each reactant must agree in the _____.

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

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ACTIVITIES
Lesson 13:
Elements

Atomic Weights

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. Atoms of the same element always have exactly the same *atomic weight*.
   (a) True or (b) False

2. The name given to atoms of the same element but with different numbers of ***neutrons*** is: _____.
   (a) daltons (b) isotopes (c) molecule (d) protons

*3. Protons have a positive electrical change.
   (a) True or (b) False

4. Protons are found in the ***nucleus*** of an atom, as are: _____.
   (a) electrons (b) neutrons (c) molecules (d) isotopes

5. Of protons, neutrons and ***electrons***, the one that weighs the least is _____.

6. The ***atomic number*** is based on the number of _____ in the nucleus of an atom.

*7. Cause: An atom gains a proton. Effect: The atom becomes a different: _____.
   (a) element (c) isotope of the same element
   (b) compound (d) nuclei

8. If an atom gains a neutron, the atom becomes a different: _____.
   (a) compound (c) element
   (b) isotope of the same element (d) nuclei

9. Almost all of the elements have ***isotopes***.
   (a) True or (b) False

10. If all hydrogen atoms had but one proton and no neutrons, the atomic weight for hydrogen would be _____.

11. A few hydrogen atoms have neutrons, which causes the atomic weight to be a little higher (1.0080).
   (a) True or (b) False

12. All isotopes are equally abundant.
   (a) True or (b) False

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13. Chlorine has an atomic weight of 35.45 because its atoms have different numbers of: _____.
(a) protons (b) neutrons (c) electrons (d) nuclei

14. A chemist may use the term atomic weight when referring to the: _____.
(a) atomic mass (c) atomic number
(b) formula weight (d) atomic bomb

15. In 1960, chemists agreed to measure atomic mass based on 1/12th of the mass of: _____ _____.
(a) hydrogen (b) *carbon 12* (c) magnesium (d) potassium

*16. *Molecular weight* is based on the total weight of the atoms that compose a molecule of the substance.
(a) True or (b) False

17. The atomic number of boron is _____. (Refer to the Periodic Table of the Elements.)

18. The atomic weight of nitrogen is _____. (Refer to the Periodic Table of the Elements.)

Complete this calculation for the molecular weight of magnesium chloride ($MgCl_2$). (Refer to the Periodic Table of the Elements.)

19. The atomic weight of one magnesium atom is _____.

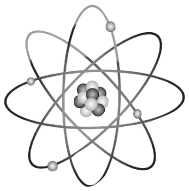
20. The atomic weight of one chlorine atom is _____.

21. The atomic weight of two chlorine atoms is _____.

22. The molecular weight of magnesium chloride ($MgCl_2$) is _____.

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

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ACTIVITIES
Lesson 14:
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. Lavoisier believed ***heat*** to be a substance.
   (a) True or (b) False

2. As most substances are heated, they: _____.
   (a) contract (c) expand
   (b) show no change (d) decrease in size

3. Count Rumford was born in: _____.
   (a) Bavaria (b) England (c) the United States (d) France

4. The friction of the boring of a cannon barrel from blocks of brass caused the metal to become intensely hot. (a) True or (b) False

*5. Count Rumford concluded that heat is a: _____.
   (a) form of energy (c) kind of element
   (b) kind of matter (d) kind of surprise

6. When water is heated, it gains weight.
   (a) True or (b) False

*7. As a substance grows hotter, its atoms and molecules move: _____.
   (a) more slowly (c) the same
   (b) more rapidly (d) in a different direction

8. ***Kinetic energy*** is the energy of: _____.
   (a) motion (b) position (c) time (d) direction

9. Heat is the _____ kinetic energy of all the atoms or molecules of a substance.

10. ***Temperature*** is the _____ kinetic energy of the molecules of a substance.

11. Heat and temperature are the same. (a) True or (b) False

12. Two samples of the same compound, at the same temperature, can differ in the amount of heat energy they have if they differ in: _____.
   (a) color (b) size (c) texture (d) production

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13. As the temperature increases, solids: _____.
(a) expand (b) grow heavier (c) contract (d) remain the same

14. As the temperature increases, liquids: _____.
(a) expand (b) grow heavier (c) contract (d) remain the same

*15. As temperature increases, gases: _____.
(a) expand (c) grow heavier
(b) take up the same volume (d) remain the same

16. Galileo's *thermometer* measured temperature by the expansion of: _____.
(a) air (b) mercury (c) alcohol (d) air pressure

17. Once an accurate thermometer became available, chemists could then define heat.
(a) True or (b) False

*18. The quantity of heat required to raise the temperature of 1 ***gram*** of water by 1°C is called a _____.

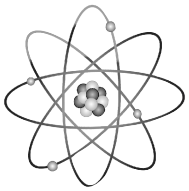
19. The prefix *kilo-* means _____.

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

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 15:
Energy

Measuring Temperature

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. Daniel Fahrenheit discovered that each liquid has a set boiling temperature.
(a) True or (b) False

2. A liquid has a set temperature at which it freezes.
(a) True or (b) False

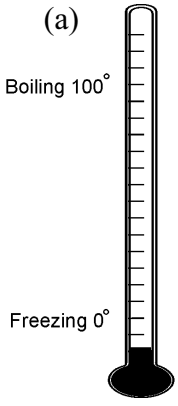
3. The boiling point of a substance can change due to changes in the: _____ _____.
(a) air pressure
(b) humidity
(c) amount of the substance
(d) weight of the substance

4. Compared to sea level, water in Denver, Colorado, will boil at: _____.
(a) a higher temperature
(b) the same temperature
(c) a lower temperature
(d) dissipating temperature

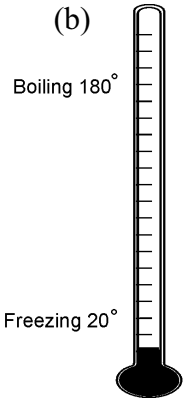
5. *Standard air pressure* is the average pressure at the top of Mount Everest.
(a) True or (b) False

*6. Which thermometer describes the temperature scale Anders Celsius invented?

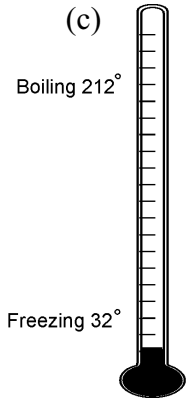
(a)



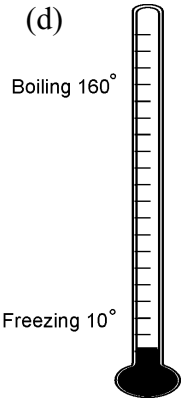
(b)



(c)



(d)



7. The word ***centigrade*** means: _____.
(a) "many feet"
(b) "high achievement"
(c) "100 steps"
(d) "mini-grades"

8. When quantities have an *inverse relationship*, as one increases the other: _____ _____.
(a) decreases
(b) stays the same
(c) increases
(d) is not affected at all

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9. Boyle's Law applied only to the gases of the atmosphere.
   (a) True or (b) False

10. When quantities have a *direct relationship*, as one increases the other: _____.
   (a) decreases (c) increases
   (b) stays the same (d) is not affected at all

*11. According to Charles' Law, an increase in temperature of 1°C caused the volume of a gas to increase by _____ of its volume at 0°C. (Answer is a fraction.)

12. Charles' Law applied only to gases of the atmosphere.
   (a) True or (b) False

13. Both Boyle's Law and Charles' Law apply to liquids and gases.
   (a) True or (b) False

14. Of all the gases, the one that remains a gas at the coldest temperature is: _____.
   (a) helium (b) oxygen (c) hydrogen (d) nitrogen

15. As a gas cools, its molecules: _____.
   (a) move more slowly (c) become smaller
   (b) become larger (d) have no changes at all

16. The temperature at which all the atoms and molecules of a substance cease their motion is know as _____ zero.

*17. The absolute temperature scale is known today as the _____ temperature scale.
   (a) Boyle (b) Fahrenheit (c) Kelvin (d) thermometer

18. The Celsius degree and the Kelvin degree are the same size.
   (a) True or (b) False

*19. To convert from Celsius to Kelvin, the number added to the Celsius temperature is _____.

20. 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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