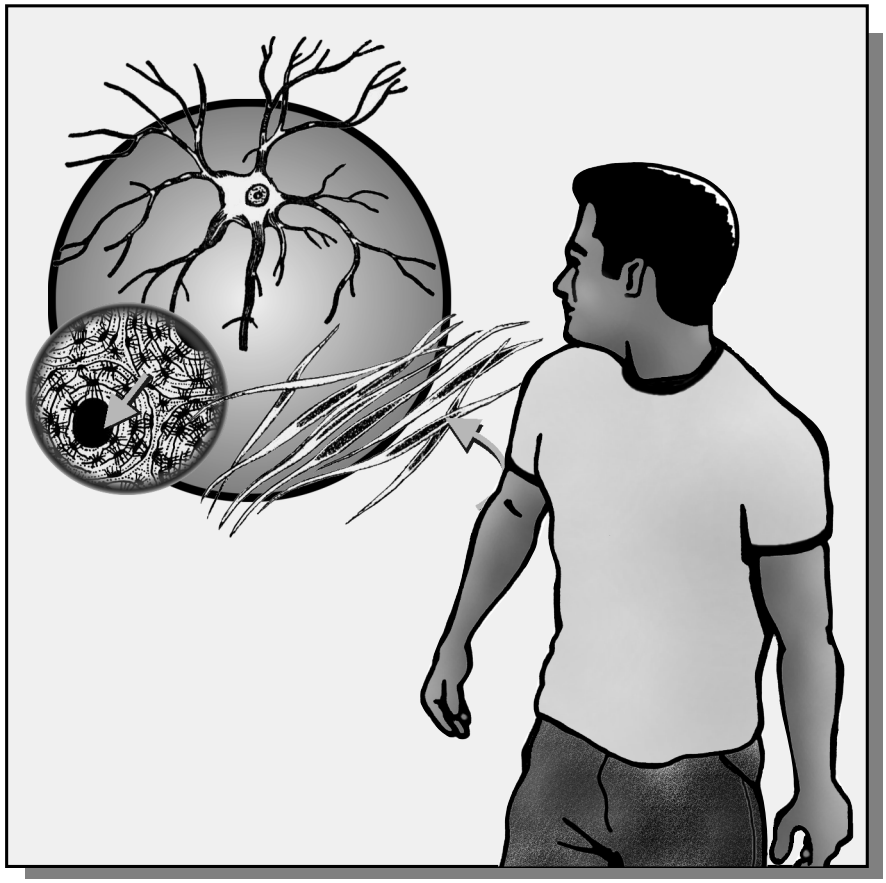
Natural Science Mysteries

Activities



Chapter 1

NSM 62942 Revision: 031609

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Natural Science
Mysteries
Chapter 1

Publisher and Managing Editor
Ronald E. Johnson, Ph.D.

Writers
Dennie Lindsey
John Hudson Tiner

Editors
David Browder
Nancy Johnson
Sarah Johnson

Production Manager
H. Michael Young

Page Composition
Randy Burch
Kathy L. Dial
Pamela K. Hurst
Amy Luna
Holly Creacy Williams
H. Michael Young

Graphic Artists
Randy Burch
Pamela K. Hurst
Lydia Johnson
Amy Luna
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Nancy Johnson
Sarah Johnson
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Holly Creacy Williams

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ACTIVITIES
Lesson 1:
Biology

Describing Matter

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. _____ is anything that takes up space and has ***mass***.
2. Air takes up space. (a) True or (b) False
3. _____ is the amount of ***matter*** in an object or a material.
4. Scientists have grouped all living things into five _____ according to the types of _____ in those living things.
5. The two categories with which you are probably most familiar are the _____ and the _____.
6. People are part of the animal grouping because they are animals.
   (a) True or (b) False
7. The animal category is further divided into _____ or animals with backbones, and _____ or animals without backbones.
8. Amphibians, reptiles and mammals are classified as vertebrates.
   (a) True or (b) False
9. Scientists have divided matter into three groups, which together are called the _____.
10. All matter is made up of tiny particles called _____ and _____.

Match the states of matter:

11. _____ ***Solid***	(a) definite ***volume*** but no definite shape
12. _____ ***Liquid***	(b) no definite volume and no definite shape
13. _____ ***Gas***	(c) definite volume and definite shape

14. Which has molecules that are described as being tightly packed together? _____
    (a) solid (b) liquid (c) gas
15. All solids are as hard as a rock. (a) True or (b) False

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16. If you pour orange juice from a pitcher into a glass, what are you demonstrating?

_____

(a) that liquids have definite shape
(b) that gases do not have definite shape
(c) that a liquid takes on the shape of its container

17. How could you demonstrate that gas takes up space?

_____

(a) Release oxygen from a tank into the air.
(b) Blow into a balloon.
(c) Observe an "empty" container.
(d) none of these

18. The three states of matter help in identifying the way substances behave and react.
(a) True or (b) False

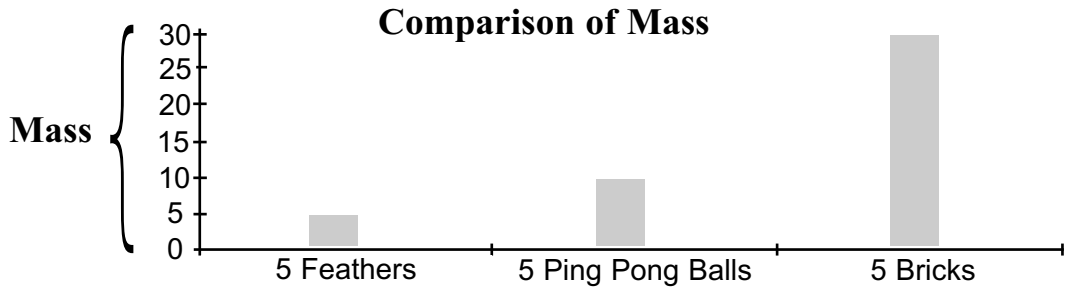
19. **Review.** Classify milk, feather, steam, syrup, ice and air on the chart below:

Solid	Liquid	Gas

20. At the end of the opening story episode of this lesson, you arrived at a **conclusion** about all the things in your environment: everything was composed of _____.

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

Use the following graph to answer questions #22-23.



22. Which contains the most mass? _____
(a) feathers (b) ping pong balls (c) bricks

23. Which contains the least mass? _____
(a) feathers (b) ping pong balls (c) bricks

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 2:
Physics

Physical Properties of Matter

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. Any characteristic of a material that can be _____ or _____ is a ***physical property***.
2. State of matter is not a physical property. (a) True or (b) False
3. You can determine many physical properties with your senses of _____, _____, _____ and _____.
4. ***Length*** is a physical property. (a) True or (b) False
5. Which is **NOT** a unit of measurement for determining length? _____
   (a) meters (b) centimeters (c) liters (d) kilometers

Use the table below to answer questions #6-8.

LENGTH EQUIVALENT	
10 millimeters (mm)	1 centimeter (cm)
100 centimeters (cm)	1 meter (m)
1,000 meters (m)	1 kilometer (km)

6. What is the equivalent of 1 kilometer? _____
   (a) 1 centimeter (c) 100 centimeters
   (b) 10 millimeters (d) 1,000 meters
7. What is the equivalent of l meter? _____
   (a) 1 centimeter (c) 100 centimeters
   (b) 10 millimeters (d) 1,000 meters
8. What is the equivalent of 10 millimeters? _____
   (a) 1 centimeter (c) 1 kilometer
   (b) 1 meter (d) 2 liters
9. _____ is the amount of space an object or a material occupies.
10. What are the most common ***SI*** units used to express the *volume* of liquids?
    _____
    (a) centimeters and kilometers (c) liters and milliliters
    (b) grams and kilograms (d) liters and grams

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11. What are the most common *SI* units used to express *mass*? _____
(a) centimeters and kilometers (c) liters and milliliters
(b) grams and kilograms (d) liters and grams

12. Temperature is a physical property. (a) True or (b) False

13. What is the SI unit of measurement for *temperature*? _____
(a) Fahrenheit (b) Celsius (c) liters (d) grams

14. Upon what does the state of a substance depend? _____
(a) its color (c) its temperature
(b) its size (d) its shape

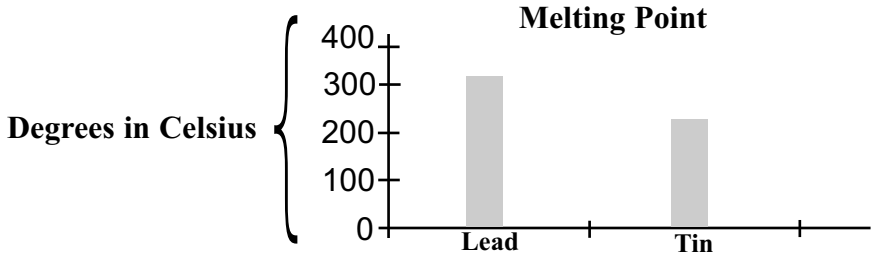
15. What is water in the solid state called? _____
(a) water vapor (c) condensation
(b) ice (d) a liquid

16. A substance is the same substance after a physical change.
(a) True or (b) False

17. In the beginning story episode of this lesson, you **classified** jewelry by its: _____.
(a) size (b) shape (c) color (d) function

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

Use the following graph below to answer questions #19-21.



19. At what temperature does lead melt? _____
(a) about 125ºC (c) about 325ºC
(b) about 225ºC (d) about 425ºC

20. At what temperature does tin melt? _____
(a) about 130ºC (c) about 330ºC
(b) about 230ºC (d) about 430ºC

21. Which has a lower melting point? _____
(a) lead (b) tin

Congratulations! You have finished Lesson 2 Activities. Score your work.

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Chemical Properties of Matter

ACTIVITIES
Lesson 3:
Chemistry

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. One way you can tell the difference between different kinds of matter is by examining their _____.

2. What is ***pyrite***? _____
   (a) real gold (c) a type of aluminum
   (b) an iron compound (d) sodium

3. What can you do to identify the ***chemical properties*** of a substance? _____
   _____
   (a) hammer it (c) observe how it reacts with other substances
   (b) measure it (d) touch it

4. Identifying how a substance reacts to light, air, water, or with other chemicals is:
   _____.
   (a) to observe its physical properties
   (b) to observe its chemical properties
   (c) to observe both chemical and physical properties together

5. _____ is the ability of a substance to burn.

6. What happens when sodium reacts with water? _____
   (a) it bubbles (c) it dissolves
   (b) it explodes (d) it becomes a solid

7. If the chemical properties of a substance are such that it reacts to light, what kind of container should be used to store it? _____
   (a) opaque (b) transparent (c) corrosive (d) lightweight

8. ***Hydrogen peroxide*** is sold in a dark, ***opaque*** containers because: _____
   (a) it reacts to air (c) it burns easily
   (b) it reacts to light (d) it is cheaper that way

9. What happens when baking soda is added to vinegar? _____
   (a) it burns (c) it turns a dark color
   (b) a gas is released (d) it curdles

10. Water and vinegar have nearly the same chemical properties.
    (a) True or (b) False

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Match the terms:

11. _____ opaque (a) see through
12. _____ ***transparent*** (b) eats away a substance
13. _____ ***corrosive action*** (c) light cannot pass through

14. Aluminum is a _____ metal.
(a) heavyweight (b) lightweight (c) corrosive (d) transparent

15. Aluminum weighs a third more than steel. (a) True or (b) False

16. Although the physical properties of _____ fit it for many useful products, the chemical properties can be hazardous to one's _____ when absorbed by the body.

Review: Use the following table to answer questions #17-20.

PROPERTY	PHYSICAL	CHEMICAL
color	x	
smell	x	
taste	x	
hardness	x	
temperature at which boils, melts, or freezes	x	
flammability		x
how a substance reacts with air		x
how a substance reacts with light		x
how a substance reacts with water		x
how a substance reacts with other substances		x

17. When you describe how sodium reacts with water, which property are you identifying?
_____ (a) physical (b) chemical

18. When you describe gold as being scratched with a knife, what property are you identifying?
_____ (a) physical (b) chemical

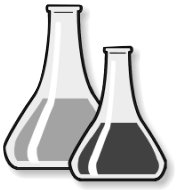
19. When you describe the flammability of wood, what property are you identifying?
_____ (a) physical (b) chemical

20. When you describe water as freezing at 0ºC, what property are you identifying?
_____ (a) physical (b) chemical

21. In this beginning story episode, you learned that (**effect:**) older baseball cards were harder to find be**cause** they were _____ and _____.

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

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ACTIVITIES
Lesson 4:
Chemistry

Physical and Chemical Changes

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 _____ change alters the appearance of a substance, but does not affect its chemical properties.

2. When you break a piece of chalk into smaller pieces, a _____ change takes place. (a) physical (b) chemical

3. A piece of paper folded into the shape of an airplane represents a _____ change. (a) physical (b) chemical

4. Identify the type of change present when water freezes into ice. _____
   (a) physical (b) chemical

5. Physical changes alter only the _____, _____ or _____ of a substance.

6. Which type of change produces new substances with new properties? _____
   (a) physical (b) chemical

7. Identify the type of change that takes place when wood burns. _____
   (a) physical (b) chemical

8. When an apple you are eating turns brown, a _____ change has occurred. (a) physical (b) chemical

9. Identify the type of change taking place when a bike rusts. _____
   (a) physical (b) chemical

10. When a penny ***tarnishes***, the change is: _____.
    (a) physical (b) chemical

11. Chemical changes such as _____ are taking place inside your body.

12. Which is an example of a chemical change? _____
    (a) cutting your hair (c) beating an egg
    (b) digesting your food (d) melting butter

13. In the story, Mr. Turner was wise to value and want to project his _____.

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14. Which would a person of ***integrity*** **NOT** do? _____
    (a) practice honesty (c) take advantage of people
    (b) work hard (d) follow the Golden Rule

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

Use the following table to answer questions #16-20.

Clues that Show a Chemical Change has Occured
Color changes.
A gas is given off.
A solid is formed.
Heat and/or light are given off.
A new substance with new identifying properties is formed.

16. A gas is given off during a ***physical change***. (a) True or (b) False

17. If there is a color change, then that's a clue a ***chemical change*** has occurred.
    (a) True or (b) False

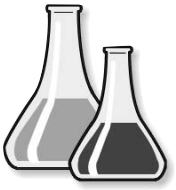
18. Heat and/or light are given off during a physical change.
    (a) True or (b) False

19. You mix two chemicals during an experiment. A solid is formed. What has occurred?
    _____
    (a) a chemical change (b) a physical change

20. You mix two chemicals during an experiment. You notice a color change. What has occurred? _____
    (a) a chemical change (b) a physical change

You are becoming a scholar!
Continue on to the next lesson.

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ACTIVITIES
Lesson 5:
Chemistry

Important Discoveries

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. Discoveries are usually planned activities conducted by scientists in a laboratory.
   (a) True or (b) False

2. What was Bette Nesmith's occupation? _____
   (a) scientist (b) teacher (c) secretary (d) painter

3. Bette wanted to solve the problem of: _____
   _____.
   (a) how to paint holiday scenes on windows
   (b) how to correct mistakes when using a typewriter carbon film ribbon
   (c) how to correct mistakes when using a computer
   (d) how to correct the tellers at the bank when they gave the incorrect change

4. _____ gave Bette the idea of how to correct her mistakes.
   (a) Watching painters
   (b) Watching bank tellers
   (c) Watching her son play basketball
   (d) Watching her son's science teacher give a lesson

5. What type of paint did Bette first use in her experiment? _____
   (a) oil base ***tempera paint*** (b) ***water-base*** tempera paint

6. Bette's first experiment with painting over her mistakes was successful.
   (a) True or (b) False

7. Why did Bette go to the Dallas Public Library? _____
   _____
   (a) To read a novel.
   (b) To read about ways to type faster.
   (c) To read about ways to find a new job.
   (d) To read about paint formulas.

8. From reading a library book, Bette discovered a paint formula that she could use.
   (a) True or (b) False

9. When Bette described the characteristics of the paint, she was really describing both its physical and chemical properties. (a) True or (b) False

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Use the following table to answer questions #10-12.

Bette's Description	Physical Property	Chemical Property
white paint	x (color)	
spread very smoothly	x (texture)	
dries exceptionally fast		x (The paint reacts with the oxygen in the air as it dries.)
does not turn brittle or grainy	x (texture)	
will dry white like paper	x (color)	
cover a mistake	x (density)	
not crack when folded	x (texture)	
stay liquid in the bottle	x (state of matter)	

10. Bette's description of a paint that will not turn ***brittle*** or ***grainy*** is an example of:
_____.
(a) a chemical property (b) a physical property (c) both a and b

11. Bette's description of a paint that will dry exceptionally fast is an example of:
_____.
(a) a chemical property (b) a physical property (c) both a and b

12. Bette's description of a paint that will stay liquid in the bottle is an example of:
_____.
(a) a chemical property (b) a physical property (c) both a and b

13. How many combinations of chemicals and paints did Bette use before she succeeded?
_____ (a) 10 (b) 100 (c) 500 (d) 1,000

14. What was the first name for Bette's invention? _____

15. **Review question**. In order of their occurrence, number Bette's steps to the discovery of a workable "White Out" formula.

_____ contacted several paint manufacturers
_____ got slow-drying, grainy, brittle results
_____ conducted over 100 experiments before succeeding
_____ sought paint formula information at city library
_____ experienced frustration with carbon typewriter ribbon
_____ consulted a science teacher
_____ got an idea from watching window painters

16. Which characteristics would **NOT** describe Bette? _____
(a) careful, hardworking (c) lazy, bored, selfish
(b) inquisitive, creative (d) patient, persistent

17. In this story episode you had discovered a rare, valuable 1956 New York Yankees _____ baseball card!

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

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Use the following table to answer questions #19-20.

Data	Tempera Painting
History	one of the oldest methods of painting known
Location	ancient Egypt, Babylonia, Greece
Solution	egg or glycerin solution in water

19. Where have discoveries been made of ancient tempera painting? _____
    (a) ancient Rome, England, Greece
    (b) ancient Egypt, Babylonia, Greece
    (c) ancient Egypt, Rome, England
    (d) ancient Babylonia, Greece, Rome

20. What type of solution was used with ancient tempera painting? _____
    _____

Use the following table to answer questions #21-23.

Composition of Paint		
Vehicle	**Pigment**	**Solvent**
forms the coating	adds the color	evaporates
polymer (a long chain of carbon atoms)	inorganic oxides	usually turpentine

21. What adds the color? _____
    (a) vehicle (b) pigment (c) solvent

22. What forms the coating? _____
    (a) vehicle (b) pigment (c) solvent

23. What is turpentine? _____
    (a) a vehicle (b) a pigment (c) a solvent

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:
Chemistry

Atoms—Early Discoveries

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 philosopher, Democritus, based his idea of atoms on the concept that: _____.
   (a) you have to see something for it to exist
   (b) small objects can grow larger
   (c) large objects can shrink in size
   (d) matter is made up of small particles with common properties

2. The Greek word for ***atom*** means "indivisible." This implies that: _____ _____.
   (a) atoms are large particles that are easily divided
   (b) regardless of how small an object is cut, it retains the same properties
   (c) regardless of how small an object is, it will remain the same mass
   (d) regardless of how small an object is, it will form a pattern

3. John Dalton's ***Atomic Theory*** opposed the idea that all matter is composed of atoms.
   (a) True or (b) False

4. Experiments with _____ gave evidence of charged particles in the air.

Match the terms:

5. _____ Negative charge — (b) proton, discovered by Ernest Rutherford in 1919
6. _____ Positive charge — (c) neutron, discovered by James Chadwick in 1932
7. _____ Neutral charge — (a) electron, discovered by J. J. Thomson in 1897

Use the following table to answer questions #8-11.

The Atom	Charge	Position
Proton	Positive	nucleus
Neutron	Neutral (no charge)	nucleus
Electron	Negative	orbit
Nucleus	Positive	center

8. The center of the atom is called the _____.

9. The ***nucleus*** of an atom is composed of _____ and _____.

10. The nucleus of an atom is _____ charged.
    (a) positively (b) negatively (c) not

11. _____ are found orbiting an atom's nucleus.

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12. Be**cause** an atom has an equal number of ***electrons*** and ***protons***, (**effect:**) the atom is considered to be _____ in charge.

13. Scientists have recently discovered _____ known as ***quarks***.

14. New scientific discoveries allow us to see the atom with a scanning tunneling microscope. (a) True or (b) False

15. All matter—everything in existence—is made up of different arrangements of atoms. (a) True or (b) False

16. **Effect:** We know unseen forces such as wind or electricity are at work in our lives, be**cause** we see the _____ of their presence.

17. In the beginning story episode of this lesson, what was the "unbelievable news?"

_____

(a) Mrs. Franklin sold the baseball card.
(b) Mrs. Franklin included you in a meeting.
(c) Mrs. Franklin wanted to provide a baseball park.
(d) Mrs Franklin wanted to give away money.

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

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Name: _____

Date: _____ Grade: _____



Structure and Function of the Atom

ACTIVITIES
Lesson 7:
Chemistry

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. _____ help us understand and _____ things that are either too large, too small, too distant or otherwise unavailable to see.
2. The globe is a _____ of the world in which we live.
3. _____ was the Danish scientist who developed a circular orbit model of the _____ in 1913.
4. British scientist Ernest Rutherford proposed the _____ of the atom in 1911.
5. Either model of the atom resembles our _____.
6. From what you already know or can **predict**, which of the following cultural scenes would **NOT** fit the planetary pattern of electrons orbiting a nucleus?

   _____

   (a) a family: parent and children
   (b) a church: minister and congregation
   (c) a business: boss and employees
   (d) a classroom: teachers and students
   (e) a barnyard: dog and chickens
   (f) a government: president and people
   (g) a beehive: queen and workers

Use the following table to answer questions #7-10 regarding the Orbital Model of the atom.

Energy Level	MaximumNumber of Electrons Held
Level One	2
Level Two	8
Level Three	18
Level Four	32

7. The first energy level, closest to the nucleus, can hold a ***maximum*** of _____ electrons.
8. Which energy level can hold a maximum of 18 electrons? _____
9. How many electrons can be held on level four? _____
10. Which energy level can hold a maximum of eight electrons? _____
11. The number of protons in the nucleus is the _____ of the element.
12. An atom always has the same number of: _____.
    (a) electrons as neutrons (b) neutrons as protons (c) electrons as protons

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13. An element's **A**tomic number is the same as the number of either **P**rotons or **E**lectrons. The capital letters form the acronym _____ which can help you remember how to calculate an atom's atomic number if you know either the number of _____ or _____.

Use the following table and information from question #13 to answer questions #14-18.

First Ten Elements	
Name of Element	**Atomic Number**
Hydrogen	1
Helium	2
Lithium	3
Beryllium	4
Boron	5
Carbon	6
Nitrogen	7
Oxygen	8
Flourine	9
Neon	10

14. The atomic number of hydrogen is _____.

15. The atomic number of _____ is two.

16. The atomic number of fluorine is _____.

17. Which element has eight electrons? _____

18. Which element has five protons? _____

Use the following table to answer questions #19-24.

Particle	Relative Mass	Charge	Placement
Proton	1	positive	nucleus
Neutron	1	neutral	nucleus
Electron	0.0005	negative	energy level around the nucleus

19. The proton and the _____ have about the same mass.

20. The electron is _____ in comparison to the proton and the neutron.
(a) much larger (b) much smaller (c) about the same

21. What is the placement of the neutron? _____

22. Which have the same placement? _____
(a) proton and electron (b) proton and neutron (c) electron and neutron

23. What is the relative mass of a proton? _____

24. What is the relative mass of an electron? _____

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25. In the story, which was **NOT** one of the valuable, rare items belonging to Mrs. Franklin?
    (a) a Mickey Mantle baseball card
    (b) a Babe Ruth baseball bat
    (c) a signed Chicago Cubs baseball
    (d) a World Series Chicago Cubs uniform

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

Keep working enthusiastically! Continue to Lesson 8 to increase your knowledge.

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 8:
Chemistry

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. Matter made up of just one kind of _____ is called an ***element***.

2. An element is a substance which _____ be broken down into anything simpler by ordinary physical or chemical means.

3. For best results, elements should not be combined. (a) True or (b) False

4. Scientists have discovered _____ naturally occurring elements.

5. Elements only occur naturally and never can be made by artificial means.
   (a) True or (b) False

6. Everything in the universe is composed of elements or a combination of elements.
   (a) True or (b) False

7. _____ was a Greek ***philosopher*** who thought only four basic elements of _____, _____, _____, _____ existed.

8. British scientist Henry Cavendish's experiment with water about 1780 was important because: _____.
   (a) it proved that water was composed of two elements
   (b) it proved that water was not safe to drink
   (c) it proved that hydrogen and oxygen were safe
   (d) it proved that hydrogen and oxygen were poisonous

9. **Effect:** Swedish chemist Jons Jakob Berzelius thought of using symbols to represent the elements, be**cause:** _____.
   (a) the Post Office uses abbreviations for the names of the states
   (b) no person can remember over 100 names of elements
   (c) symbols were being used at that time for algebra and physics
   (d) symbols were being used at that time for gases

10. Symbols that seem unrelated to names were based on their _____ names.

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Use the Elements Table found in this lesson of your text to answer questions #11-15.

11. Which element has an atomic number of six? _____

12. What is the symbol for helium? _____ What is its atomic number? _____

13. *N* is the _____ for nitrogen.

14. *Be* is the symbol for which element? _____

15. B is the symbol for _____.

16. The human body is only composed of naturally occurring elements. (a) True or (b) False

Use the Most Common Elements Found in the Human Body Table in this lesson of your text to answer questions #17-19.

17. What is the symbol for chlorine? _____

18. K is the symbol for _____.

19. What is the atomic number for iron? _____

20. In the story, which valuable item had Mrs. Franklin misplaced? _____
_____

(a) the Mickey Mantle baseball card
(b) the Babe Ruth baseball bat
(c) the signed Chicago Cubs baseball
(d) the Chicago Cubs World Series baseball uniform

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

The correct way to write the symbol of an element is to capitalize the first letter. The letters following the first letter are not to be capitalized. Using that information, select the correct symbols for these elements in questions #22-24.

22. Which is the correct symbol for oxygen? _____ (a) *O* (b) *OX*

23. Which is the correct symbol for neon? _____ (a) *NE* (b) *Ne*

24. Which is the correct symbol for lithium? _____ (a) *LI* (b) *Li*

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ACTIVITIES
Lesson 9:
Chemistry

Organizing the Periodic Table

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. Breaking down a product and identifying the parts is similar to _____ elements.

2. All known matter in the universe is made up of _____, either alone or in different combinations.

3. During the nineteenth century, chemists began to list elements by atomic _____.

4. The weight of protons and _____ in the nucleus makes up the ***atomic mass*** of the atom.

5. _____ have little mass in comparison to the proton and neutron.

6. The chart to identify elements and their properties, developed by Mendeleev in 1869, has been slightly modified and is still in use today. Why is it called the ***Periodic Table***?

   _____

   (a) It has gaps in it.
   (b) It has columns and rows.
   (c) Properties of groups of elements repeat in a pattern.
   (d) Symbols of elements are in a pattern.

7. Elements in the Periodic Table are arranged according to _____, and from _____ to _____.

Match #8-13:

8. _____ ***families***	(a) usually good conductors
9. _____ ***periods***	(b) elements in a vertical column
10. _____ metals	(c) insulators
11. _____ ***malleable***	(d) elements in a horizontal row
12. _____ ***ductile***	(e) pulled into a wire without breaking
13. _____ nonmetals	(f) hammered into shape without breaking

14. Chemical properties and chemical behaviors of elements not yet discovered could be predicted by using Mendeleev's chart. (a) True or (b) False

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15. The Periodic Table of the Elements helps us to see _____ and _____ of the elements.

16. The **main idea** from the opening story episode of this lesson is that a system of organization is necessary to prevent misplacing things of value. (a) True or (b) False

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

Refer to the Periodic Table located on the inside back cover of this book to answer questions #18-22.

18. What is the best way to describe atomic mass and atomic numbers on this chart?

_____

(a) The numbers become smaller going from the top to bottom and left to right on the chart.
(b) The numbers become larger going from the top to bottom and left to right on the chart.
(c) The numbers become larger going from the bottom to top and right to left on the chart.
(d) The numbers become smaller going from the top to bottom and right to left on the chart.

19. What is the atomic mass of hydrogen? _____

20. What is the atomic mass of oxygen? _____

21. Which element has an atomic mass of 9.0? _____

22. Which element has an atomic mass of 20.1? _____

Congratulations! You have completed another lesson. Continue working diligently.

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ACTIVITIES
Lesson 10:
Chemistry

Interpreting the Periodic Table

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 Periodic Table of the Elements is like a(n) _____ of the elements.
   (a) dictionary (b) encyclopedia (c) map (d) atlas

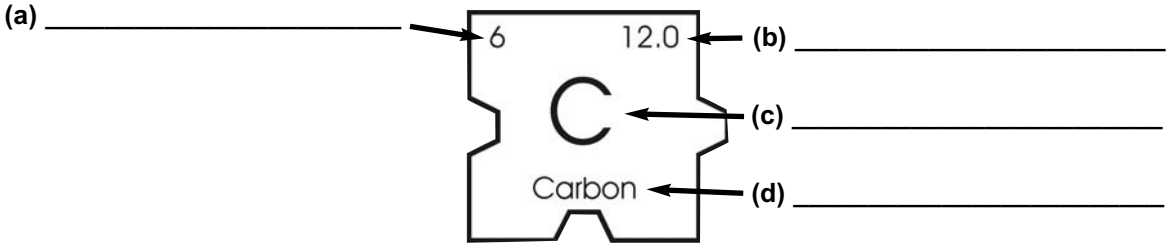
2. In the Periodic Table of the Elements boxes (or puzzle pieces), the _____ is always a whole number printed at the top and equals the number of protons in the atom of each element.
   (a) symbol (b) atomic mass (c) atomic number (d) name

3. An element's _____ is always 1-3 letters in the center of the box.
   (a) name (b) atomic number (c) atomic mass (d) symbol

4. An element's name is printed below its _____.
   (a) symbol (b) atomic mass (c) atomic number (d) center

5. An element's _____ number is always expressed as a decimal and represents the mass of both _____ and _____.

6. **Label the following diagram:**



7. _____ (up and down) columns are called families.
   (a) Horizontal (b) Vertical (c) Vertigo (d) Nuclear

8. Family columns are designated or numbered by _____ with _____ families in all.

9. Elements in the same family _____ each other and _____ in much the same ways.

10. More stable, means less reactive. (a) True or (b) False

11. The number of electrons in an atom's outer orbit determines the atom's stability.
    (a) True or (b) False

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12. Family I is known as _____ and is the least stable, most reactive of the metals.

13. Family II is called _____ and is less reactive than family I.

14. List the family numbers in order with their standard number equivalents in parentheses along side: _____, _____, _____, _____, _____, _____, _____, _____.

15. Family VIII, known as the _____, is the most stable of all element families.

16. From the opening story episode of this lesson, you and Jason can **conclude** that by being disorganized, much time is wasted in looking for things that are out of place.
(a) True or (b) False

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

Use the Periodic Table of the Elements (inside back cover) to answer questions #18-32.

18. Locate carbon in family IV. What does the number 6 represent? _____
(a) the atomic number (b) the atomic mass (c) the element's symbol

19. Locate oxygen in family VI. What is its symbol? _____
(a) *Ox* (b) 8 (c) *O* (d) 15.9

20. What is the name of the element in family I-B that has *Cu* as its symbol? _____
(a) calcium (b) copper (c) carbon (d) cobalt

21. What is the symbol and atomic mass of magnesium in family II? _____, _____

22. What is the symbol and atomic mass of potassium? _____, _____

23. What is the symbol and atomic mass of sulfur in family VI? _____, _____

24. What is the symbol and atomic mass of neon in family VIII? _____, _____

25. What is the symbol and atomic number of helium in family VIII? _____, _____

26. What is the symbol and atomic number of sodium? _____, _____

27. What is the symbol and atomic number of silver in family I-B? _____, _____

28. What is the symbol and atomic number of gold in family I-B? _____, _____

29. What is the symbol and atomic number of lead in family IV? _____, _____

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30. The letter "B" after certain Roman numerals represents extensions of those families.
    (a) True or (b) False

31. Look at family VII. The first two elements in this family are fluorine and chlorine. Name the others. _____
    (a) beryllium, magnesium, calcium
    (b) lithium, sodium, potassium
    (c) bromine, iodine, astatine
    (d) nitrogen, oxygen, neon

32. Identify the family number of elements with these symbols: *He*, *Ne*, *Ar*, *Kr*, *Xe*, *Rn*.
    _____
    (a) family I (b) family II (c) family VI (d) family VIII

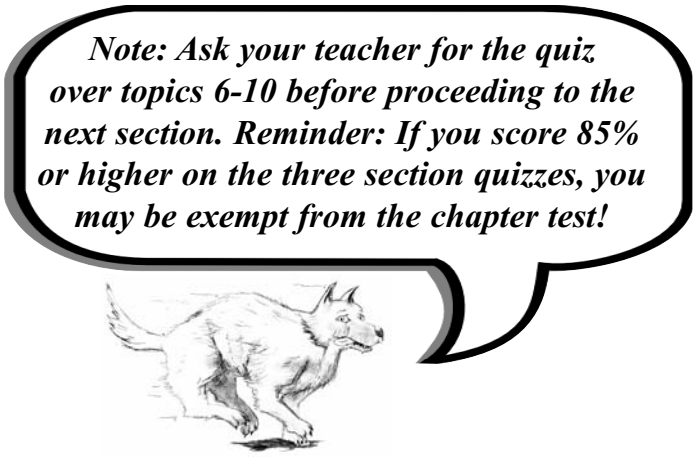
Use the information in the following table to answer questions #33-35.

Family Number	Number of Electrons in Outer Energy Level
I	1
II	2
III	3
IV	4
V	5
VI	6
VII	7
VIII	8

33. How many electrons are in the outer energy level of family number V? _____

34. There are eight electrons in the outer energy level of elements in family number VI.
    (a) True or (b) False

35. Do the Family Number values **compare** or **contrast** with/to the electron numbers? _____



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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 11:
Chemistry

Kinds of Chemical Bonds

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. When atoms combine with other atoms, _____ are formed.
2. ***Chemical bonds*** are forces that hold together the _____ in a ***compound***.
3. A _____ is a substance formed when two or more elements combine chemically to form ***molecules***.
4. When atoms share electrons, the chemical bond that forms is called a _____ _____.
5. By sharing, gaining or losing electrons atoms are trying to become _____.
6. _____ bonding is proof that "opposites attract."

Use the following table below to answer questions #7-11.

Type of Bond	How Formed	Example
Covalent	shared electrons	water and carbon dioxide
Ionic	gaining or losing electrons	sodium chloride

7. What type of bond is formed by gaining or losing electrons? _____
   (a) covalent (b) ionic (c) physical
8. What type of bond is formed by shared electrons? _____
9. What is an example of an ionic bond? _____
10. Water and ***carbon dioxide*** are examples of ionic bonding. (a) True or (b) False
11. Sodium chloride is formed by shared electrons. (a) True or (b) False

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Use the following table below to answer questions #12-16.

IONIC BONDING		
How Formed	**How Charge is Determined**	**Example**
When atoms lose or gain electrons	***When an atom loses an electron, the result is a positive charge** ***When an atom gains an electron, the result is a negative charge**	**Sodium loses an electron and chlorine gains an electron. The resulting ionic bond forms sodium chloride, which is common table salt.**

12. A positive charge results when: _____
_____.
(a) an atom loses an electron (c) an atom loses a neutron
(b) an atom gains an electron (d) an atom gains a proton

13. When the atom gains an electron, what type of charge results? _____

14. Ionic bonding is formed when atoms lose or gain protons.
(a) True or (b) False

15. To become stable, what do sodium and chlorine atoms do? _____
_____
(a) Sodium loses a proton and chlorine gains a proton.
(b) Sodium loses an electron and chlorine gains an electron.
(c) Sodium gains an electron and chlorine loses an electron.

16. The common name for sodium chloride is _____.

17. Most ionic compounds will conduct electricity if they are _____ or _____.

18. An atom's electrons determine the type of bonding that occurs. (a) True or (b) False

19. The **main idea** of this lesson on chemical bonds is: _____
_____
(a) Ionic bonding takes place because opposites attract.
(b) Covalent bonding requires electrons to be shared.
(c) Chemical bonds are formed to stabilize the atoms involved.
(d) Ionic bonding is stronger than covalent bonding.

20. In the closing episode of the story, Jason discovered that he could have avoided risking his reputation and causing friends and family undue concern if he had _____ with his mother about the missing money.

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

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Use the following table below to answer questions #22-25.

MOLECULE	HOW FORMED
water	2 atoms of hydrogen and 1 atom of oxygen
carbon dioxide	2 atoms of oxygen and 1 atom of carbon

22. How are water and carbon dioxide alike? _____
    (a) They both are ions and they both contain hydrogen.
    (b) They both are ions and they both contain oxygen.
    (c) They both are molecules and they both contain carbon.
    (d) They both are molecules and they both contain oxygen.

23. How many atoms of carbon does carbon dioxide contain? _____

24. How many atoms of hydrogen does water contain? _____

25. How many atoms of oxygen does carbon dioxide contain? _____

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ACTIVITIES
Lesson 12:
Chemistry

Adhesives

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 who study matter and the changes that happen to it are called: _____.

2. A material that can hold substances together is called a(n): _____.
   (a) proton (b) element (c) chemical (d) adhesive

3. Glues and tapes are non-***adhesives***. (a) True or (b) False

4. What is the attraction force between atoms or molecules of different types? _____
   (a) cohesion (b) adhesion (c) friction (d) constriction

5. The attraction force between molecules of the same type is called: _____
   (a) cohesion (b) adhesion (c) friction (d) constriction

6. Name 3 adhesives from natural origins and name the origins: _____ (from _____), _____ (from _____), _____ (from _____).

7. Spencer Silver was trying to develop a _____ when he developed a weak glue that was considered a failure.
   (a) Milk Glue (c) Super Glue
   (b) Tooth Glue (d) Casein Glue

8. What problem was Arthur Fry trying to solve when he used Spencer Silver's weak glue? _____
   (a) How to keep presents securely wrapped.
   (b) How to keep bookmarks from falling out of his hymnal.
   (c) How to keep packages together when being mailed.
   (d) How to repair torn pages in his church hymnal.

9. Spencer Silver and Arthur Fry found success accidentally by inventing: _____ _____.
   (a) Super Glue (c) Post-It Notes
   (b) glue sticks (d) double adhesive Scotch Tape

10. In the opening story episode of this lesson, how would you **categorize** your project for Mrs. Franklin? _____
    (a) occupational (b) vocational (c) recreational (d) organizational

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

Use the following table to answer questions #12-15.

Glue Type	Made From	Works Best On
Super Glue	Plastic	Glass or Ceramics
White Glue	Water	Natural Fibers
Rubber Cement	Rubber	Most Materials

12. Which glue is made from plastic? _____
13. Which glue works best on natural fibers? _____
14. Which glue is made from rubber? _____
15. Which glue works best on glass or ceramics? _____

Use the following table to answer questions #16-21.

Time	Location	Type of Glue	Data
3000 B.C.	Ancient Egypt	Animal Glue	Glued layers of wood together to make tables
800 A.D.	Greece	Milk Glue	Casein glue made from milk
1500s	Mexico & Central America	Wild Flower Glue	Made from wild flowers such as orchids
1690	Holland	Natural Glues	First glue manufacturing plant. Made glues from hides, bones, milk, fish, blood, and natural gums.
1869	United States	Synthetic Glues	First glue produced which was not made from things found naturally in the world.
1995	United States	Bone Glue	First used on billiard balls and shatter proof glass.

16. What type of glue did ancient Egyptians use? _____
17. Name the location where milk glue was first used. _____
18. What type of glue did people in Mexico and Central America use in the 1500s?
_____
19. Where was the location of the first glue manufacturing plant? _____
20. What is the type of glue that is not made from things found naturally in the world?
_____
21. The United States began testing glue that would hold broken bones in place in the year
_____.

Keep working enthusiastically! Continue to Lesson 13 to increase your knowledge.

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ACTIVITIES
Lesson 13:
Chemistry

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. Many recipes are based on an understanding of chemical reactions.
   (a) True or (b) False

2. ***Chemical formulas*** are combinations of _____ and _____ to identify what amounts of elements are involved.

3. What is the chemical name and formula for ***baking soda***? _____
   _____

4. Baking soda and ***baking powder*** are used for: _____.
   (a) adding flavor (c) leavening agents
   (b) adding chocolate (d) adding color

5. A ***leavening agent*** is an ingredient in certain baking products that makes them _____.

6. Be**cause** they speak different languages, (**effect:**) scientists around the world have difficulty communicating with one another when using chemical formulas.
   (a) True or (b) False

7. H_20 is the chemical formula for _____.

8. Water contains two atoms of _____ and one atom of _____.

9. The formula for carbon dioxide is _____, which means it has one atom of _____ and two atoms of _____.

10. The formula for hydrogen peroxide is _____, meaning it has two atoms of _____ and two atoms of _____.

11. In the opening story episode of this lesson, in what unlikely spot did you find Babe Ruth's baseball bat? _____

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

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Use the following table below to answer questions #13-25.

Formula	Name	Subscript Explanation
$NaHCO_3$	sodium bicarbonate	3 atoms of oxygen
H_2O	water	2 atoms of hydrogen
CO_2	carbon dioxide	2 atoms of oxygen
H_2O_2	hydrogen peroxide	2 atoms of hydrogen and 2 atoms of oxygen
SO_2	sulfur dioxide	2 atoms of oxygen
NH_3	ammonia	3 atoms of hydrogen

13. What is the formula for sodium bicarbonate? _____
14. How many atoms of oxygen are in sodium bicarbonate? _____
15. How many atoms of oxygen does sulfur dioxide have? _____
16. What is the formula for sulfur dioxide? _____
17. What is the common name of H_2O? _____
18. How many atoms of hydrogen does H_2O have? _____
19. What is the formula for hydrogen peroxide? _____
20. How many atoms of oxygen does hydrogen peroxide have? _____
21. What is the name of CO_2? _____
22. What is the formula for ammonia? _____
23. How many atoms of hydrogen does ammonia have? _____
24. Water has one atom of oxygen. (a) True or (b) False
25. Carbon dioxide has one atom of carbon. (a) True or (b) False

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ACTIVITIES
Lesson 14:
Chemistry

Chemicals that Clean

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. Effective laundry products developed by chemists remove _____ while preserving fabric/garment _____ and _____.

2. Many cleaning products are from a group of compounds called _____ that release hydroxide ions with a _____ charge into water.

3. Bases have two distinct characteristics: they have a _____ and _____.

4. _____ represent another group of compounds in which hydrogen ions have a _____ charge.

5. _____ acids, such as those from citrus fruit and vinegar, have a _____ taste.

6. Strong acids such as _____ and strong bases such as _____ are ***corrosive*** and can cause serious damage if improperly used.

7. What is the best way to tell which compound is an acid and which is a base?

_____

(a) blow on it (c) test it with litmus paper
(b) observe it (d) touch it or taste it

Use the table found in your text to answer questions #8-12.

8. Ammonia turns blue ***litmus paper*** to red. (a) True or (b) False

9. Baking soda turns red litmus paper to blue. (a) True or (b) False

10. Lemon juice turns red litmus paper to blue. (a) True or (b) False

11. Orange juice is an acid. (a) True or (b) False

12. Soap is a base. (a) True or (b) False

13. What is the purpose of the ***pH scale***? _____

(a) to describe the purposes of acids and bases
(b) to describe the properties of acids and bases
(c) to describe the uses of acids and bases
(d) to describe the strengths of acids and bases

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14. A pH reading of 0-6 indicates a substance is an _____.

15. A pH reading of 8-14 indicates a substance is a _____.

16. A pH reading of 7 indicates a substance is _____.

17. What problem was Madame C. J. Walker trying to solve? _____
_____
(a) how to develop a better laundry detergent
(b) how to prevent hair loss
(c) how to prevent psoriasis of the scalp

18. Mrs. Walker's life proves that, by resourcefulness and perseverance, a person can rise above a background of hurts, disappointments and misfortunes.
(a) True or (b) False

19. Madame Walker became the first _____ in the country.

20. In the story, Mrs. Franklin was a very _____ person but not very _____.

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

Use the following table below to answer questions #22-26.

Chemical Reaction	Bases	Acids
What happens in water	releases hydroxide ions	hydrogen ions form
Taste	bitter	sour
Feel	slippery	no specific description
Litmus paper	turn red litmus to blue	turn blue litmus to red

22. An acid is a compound that releases hydroxide ions in water.
(a) True or (b) False

23. Describe the taste of a base. _____

24. Describe the taste of an acid. _____

25. Which compound forms hydrogen ions in water? _____

26. Which compound turns red litmus to blue? _____

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Use the following table to answer questions #27-30.

Formula	Name	Found In
$H_2C_6H_6O_6$	Ascorbic acid	vitamin C
$HC_2H_3O_2$	Acetic acid	vinegar
H_2SO_4	Sulfuric acid	batteries
NH_4OH	Ammonium hydroxide	household cleaner
$NaOH$	Sodium hydroxide	drain cleaner, soap

27. What is the formula for sodium hydroxide? _____

28. Where is sulfuric acid found? _____

29. Where is ascorbic acid found? _____

30. Write the formulas on this table for the two bases. _____
_____

You have finished Lesson 14 Activities. Score them now to ensure accuracy.

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Things that Matter

ACTIVITIES
Lesson 15:
Chemistry

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.***

Matching:

1. _____ ***Graphite*** (a) occurs extensively in the Earth's crust
2. _____ ***Titanium*** (b) a white or colorless compound
3. _____ ***Synthetic rubber*** (c) carbon-based material used in tennis racquets
4. _____ ***Silicon*** (d) strong, low-density metallic element used in golf clubs
5. _____ ***Boric acid*** (e) artificially produced substance that resembles the chemical and physical properties of natural rubber

6. Why was there such a demand for synthetic rubber? _____
   _____
   (a) A flood in rubber producing, Latin American countries depleted supplies for export.
   (b) Children were in need of more toys made of rubber to meet government standards.
   (c) The supply of natural rubber to the United States was cut down due to war.
   (d) The supply of sand for the United States to make silicon was cut down due to establishment of synthetic rubber plants.

7. What did the government hope that the General Electric Research Facility would develop?
   _____
   (a) Silly Putty (c) boric acid
   (b) synthetic rubber (d) a pH scale

8. What were the uses intended for the product General Electric Research Facility hoped to develop? _____
   (a) silicon, titanium or graphite lubricants
   (b) boric acid and other acid-based adhesives
   (c) truck tires, boots, airplane tires
   (d) bulldozers, ammunition, machine parts

9. With what substance was James Wright experimenting when he made a "soft, lumpy goo?"
   _____
   (a) graphite (b) silicon (c) titanium (d) neoprene

10. What acid did James Wright add to silicon? _____
    (a) citric (b) sulfuric (c) boric (d) ascorbic

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11. To see if his product was strongly acidic or basic, Mr. Wright ran a: _____.
    (a) tensile strength test (c) silicon test
    (b) pH test (d) graphic test

12. The test results indicated the substance was: _____.
    (a) an acid (b) a base (c) neutral (d) synthetic rubber

13. What were some of the properties of Mr. Wright's "lumpy goo"? _____
    (a) hard and brittle (c) soft and sticky
    (b) bounced and stretched (d) exposure to air produced air-bubbles

14. When the Director of Research saw the "silly toy," he gave Mr. Wright a promotion for his creative invention. (a) True or (b) False

15. With perseverance and a little creative thinking, Mr. Wright could have sold his invention and become a wealthy man. (a) True or (b) False

16. As it was, _____ took the discarded product, exercised creative thinking and persevered his way to success with what he called _____.

17. In the story, be**cause** of your _____ abilities and _____ skills, (**effect:**) Mrs. Franklin asked you to be in charge of the baseball field snack shop.

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

Use the following table below to answer questions #19-23.

Name of Synthetic Rubber	Date Developed	Uses
Neoprene	1931	hoses for pumping gasoline
Buna	1935	general purpose; tires
Butyl	1940	inner tubes in tires

19. Which synthetic rubber was used in inner tubes in tires? _____

20. Which synthetic rubber was designated as the general-purpose rubber for the war effort and used mainly for tires? _____

21. Which synthetic rubber was used in hoses for pumping gasoline? _____

22. When was Neoprene developed? _____

23. When was Butyl developed? _____

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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