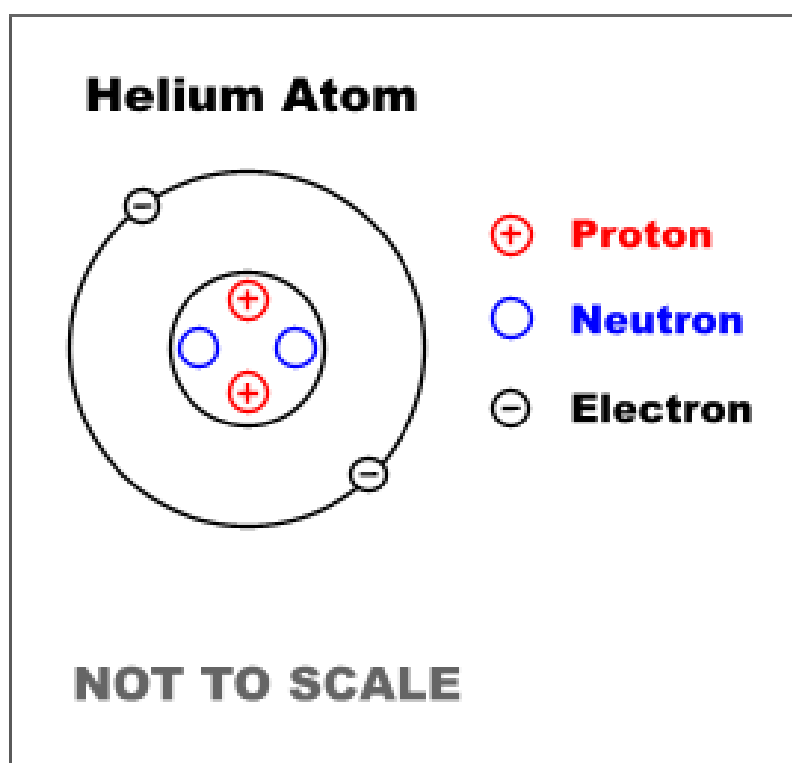


# Physical Science

Student Name: \_\_\_\_\_

Teacher: \_\_\_\_\_



Chemistry 2016-2017

# Classroom Rules & Expectations

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## Classroom Rules

1. Always ask permission to leave your seat.
2. Please wait to be called on before answering or asking questions.
3. Please come prepared to class which includes having items such as (**pen, pencil, Paper, etc.**)
4. Please ask permission to touch any equipment in the classroom. (**includes lab computers**)
5. Always be attentive and silent when the teacher or anyone is presenting in class.

## Classroom Expectations

<b>Be Respectful</b>	<ul style="list-style-type: none"> <li>• Talk at appropriate times using voice level 2-3</li> <li>• Choose positive words to express your thoughts/opinions</li> <li>• Wait your turn to speak</li> <li>• Ask permission to use materials belonging to others</li> <li>• Maintain personal space of others</li> </ul>	<b><u>Accountability:</u></b> 1. Up to 3 verbal/non-verbal warnings/prompts 2. Call home + ASD referral 3. Office Referral
<b>Be Safe</b>	<ul style="list-style-type: none"> <li>• Follow laboratory rules</li> <li>• Follow teacher directions</li> <li>• Report concerns to the teacher</li> <li>• Walk when needing to move in the classroom</li> <li>• Store personal materials under desk and away from walking areas</li> <li>• Keep hands/feet to yourself</li> </ul>	<b><u>Voice Levels:</u></b> 0 = Silent/voice 1 = Whisper 2 = Partner Voice 3 = Presentation/Speaking to the class 4 = Playing Outside
<b>Be Responsible</b>	<ul style="list-style-type: none"> <li>• Be on time to class</li> <li>• Turn cell phones off and store in book bag</li> <li>• Bring your charged laptop to class</li> <li>• Bring notebook, agenda book, and pencil to class</li> <li>• Put classroom materials back in their storage areas after use</li> <li>• Eat food and drink beverages in the cafeteria</li> </ul>	
<b>Be a Learner</b>	<ul style="list-style-type: none"> <li>• Listen to directions</li> <li>• Raise your hand to ask questions if there is something you don't understand</li> <li>• Start task within 30 sec. when a task is assigned.</li> <li>• Stay on-task using your personal best</li> <li>• Use voice level 0 when completing independent work</li> <li>• Complete homework when it is assigned</li> <li>• Keep an organized notebook</li> <li>• Use good study skills</li> </ul>	

## PURPOSE

Science is a hands-on laboratory class. However, science activities may have potential hazards. We will use some equipment and animals that may be dangerous if not handled properly. Safety in the science classroom is an important part of the scientific process. To ensure a safe classroom, a list of rules has been developed and is called the Science Safety Contract. These rules must be followed at all times. Additional safety instructions will be given for each activity.

No science student will be allowed to participate in science activities until this contract has been signed by both the student and a parent or guardian.

## SAFETY RULES

1. Conduct yourself in a responsible manner at all times in the science room. Horseplay, practical jokes, and pranks will not be tolerated.
2. Follow all written and verbal instructions carefully. Ask your teacher questions if you do not understand the instructions.
3. Do not touch any equipment, supplies, animals, or other materials in the science room without permission from the teacher.
4. Perform only authorized and approved experiments. Do not conduct any experiments when the teacher is out of the room.
5. Never eat, drink, chew gum, or taste anything in the science room.
6. Keep hands away from face, eyes, and mouth while using science materials or when working with either chemicals or animals. Wash your hands with soap and water before leaving the science room.
7. Wear safety glasses or goggles when instructed. Never remove safety glasses or goggles during an experiment. **There will be no exceptions to this rule!**
8. Keep your work area and the science room neat and clean. Bring only your laboratory instructions, worksheets, and writing instruments to the work area.
9. Clean all work areas and equipment at the end of the

experiment. Return all equipment clean and in working order to the proper storage area.

10. Follow your teacher's instructions to dispose of any waste materials generated in an experiment.
11. Report any accident (fire, spill, breakage, etc.), injury (cut, burn, etc.), or hazardous condition (broken equipment, etc.) to the teacher immediately.
12. Consider all chemicals used in the science room to be dangerous. Do not touch or smell any chemicals unless specifically instructed to do so.
13. Treat all preserved specimens and dissecting supplies with care and respect.
  - a. Do not remove preserved specimens from the science room.
  - b. Use scalpels, scissors, and other sharp instruments only as instructed.
  - c. Never cut any material towards you—always cut away from your body.
  - d. Report any cut or scratch from sharp instruments to the teacher immediately.
14. Never open storage cabinets or enter the prep/storage room without permission from the teacher.
15. Do not remove chemicals, equipment, supplies, or animals from the science room without permission from the teacher.
16. Handle all glassware with care. Never pick up hot or broken glassware with your bare hands.
17. Use extreme caution when using matches, a burner, or hot plate. Only light burners when instructed and do not put anything into a flame unless specifically instructed to do so. Do not leave a lit burner unattended.
18. Dress properly—long hair must be tied back, no dangling jewelry, and no loose or baggy clothing. Wear aprons when instructed.
19. Learn where the safety equipment is located and how to use it. Know where the exits are located and what to do in case of an emergency or fire drill.

**\*\*These rules and procedures are based on the Flinn Scientific, Inc Safety Contract. They are designed to ensure the safety of all instructors and students during labs. \*\***

**Violation of the laboratory rules and procedures could result in a zero for the lab activity, removal from the lab, and/or possibly losing privileges to all lab activities.**

## AGREEMENT

I, \_\_\_\_\_, (student's name) have read and understand each of the above safety rules set forth in this contract. I agree to follow them to ensure not only my own safety but also the safety of others in the science classroom or laboratory. I also agree to follow the general rules of appropriate behavior for a classroom at all times to avoid accidents and to provide a safe learning environment for everyone. I understand that if I do not follow all the rules and safety precautions, I will not be allowed to participate in science activities.

\_\_\_\_\_  
Student Signature

# Resources

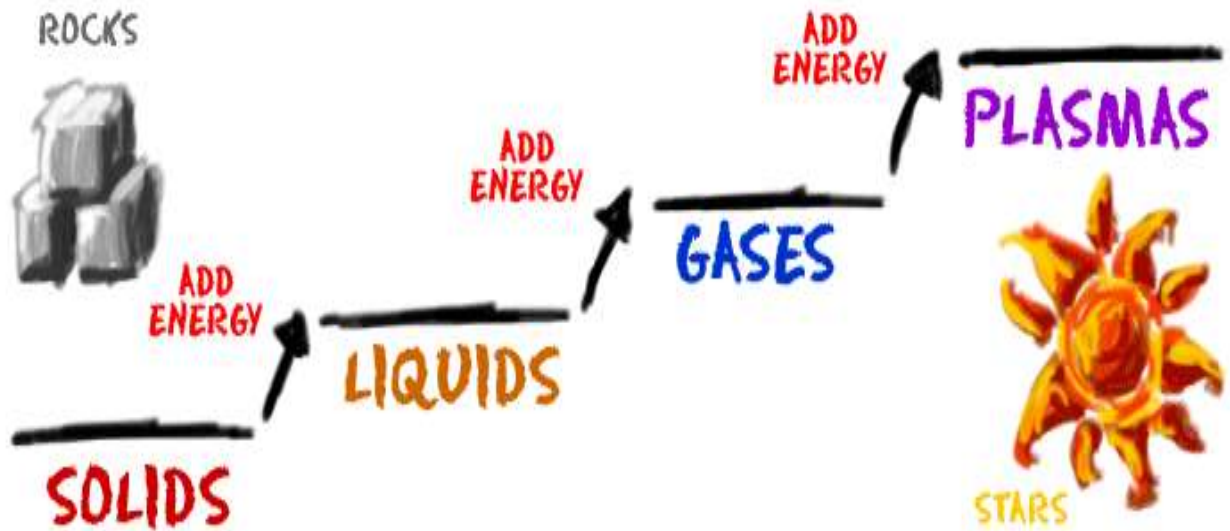
Resource	URL	Username	Password
Brainpop	<a href="https://www.brainpop.com/">https://www.brainpop.com/</a>	ccsdis	pop
PhET	<a href="https://phet.colorado.edu/">https://phet.colorado.edu/</a>		
Explore Learning	<a href="https://www.explorelearning.com">explorelearning.com</a>		
FOSS Student Web	<a href="https://www.fossweb.com/studenthome">https://www.fossweb.com/studenthome</a>		
Kahoot	<a href="https://kahoot.it/#/">https://kahoot.it/#/</a>		
Online Calculator	<a href="http://www.online-calculator.com/">http://www.online-calculator.com/</a>		
Online Stopwatch	<a href="http://www.online-stopwatch.com/">http://www.online-stopwatch.com/</a>		
Quizizz	<a href="http://quizizz.com/">http://quizizz.com/</a>		



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# States of Matter



THE STATE OF MATTER CHANGES AS YOU ADD MORE ENERGY

# Experimental Design Practice

**Directions:** You are given the independent and dependent variables for an experiment. Create a hypothesis to match. Remember to put in the “If.....then” format.

1. **Independent Variable:** The number of recycling posters.  
**Dependent Variable:** The total number of cans being recycled.

2. **Independent Variable:** Number of light bulbs on a front porch.  
**Dependent Variable:** Number of bugs at night on the porch.

**Directions:** You are given a hypothesis – you need to identify the independent and dependent variables in each question.

1. *If the amount of sugar added to water is increased, then the amount of hummingbirds attracted to the water will increase.*

Independent Variable: \_\_\_\_\_  
Dependent Variable: \_\_\_\_\_

2. *If the depth of Lake Erie increases, then the temperature will decrease.*

Independent Variable: \_\_\_\_\_  
Dependent Variable: \_\_\_\_\_

**Directions:** Using an experimental example to write a hypothesis and identify the variables

1. Kayla wanted to see if caffeine helped improve how her friends did on their science test. After making sure that they all studied the same amount, she gave Monica, Brittany, and Chelsea three Cokes a half hour before their test. She took Brandy, Jadia, and Shae and let them take their science test with no caffeine at all. They all took the test at the same time and in the same room.

## **Experimental Design Foldable**

# Metric Conversion Practice

**Directions:** Use the metric conversion ladder to complete the following chart.

<b>1</b>	1m	=		cm	<b>10</b>	1m	=		hm
<b>2</b>	1cm	=		mm	<b>11</b>	1mm	=		m
<b>3</b>	25m	=		cm	<b>12</b>	72m	=		dam
<b>4</b>	3km	=		cm	<b>13</b>	2.7km	=		m
<b>5</b>	4,500mm	=		m	<b>14</b>	700,000m	=		km
<b>6</b>	579km	=		cm	<b>15</b>	21,893cm	=		m
<b>7</b>	19,847cm	=		dam	<b>16</b>	869dm	=		km
<b>8</b>	596cm	=		mm	<b>17</b>	789mm	=		m
<b>9</b>	895dm	=		dam	<b>18</b>	324km	=		dm

## Metric Conversion Ladder

Use the phrase '**King Henry Doesn't Usually Drink Chocolate Milk**' to help you remember the order of the units for the metric system.

**K**- Kilo- **King**

**h**-Hecto-**Henry**

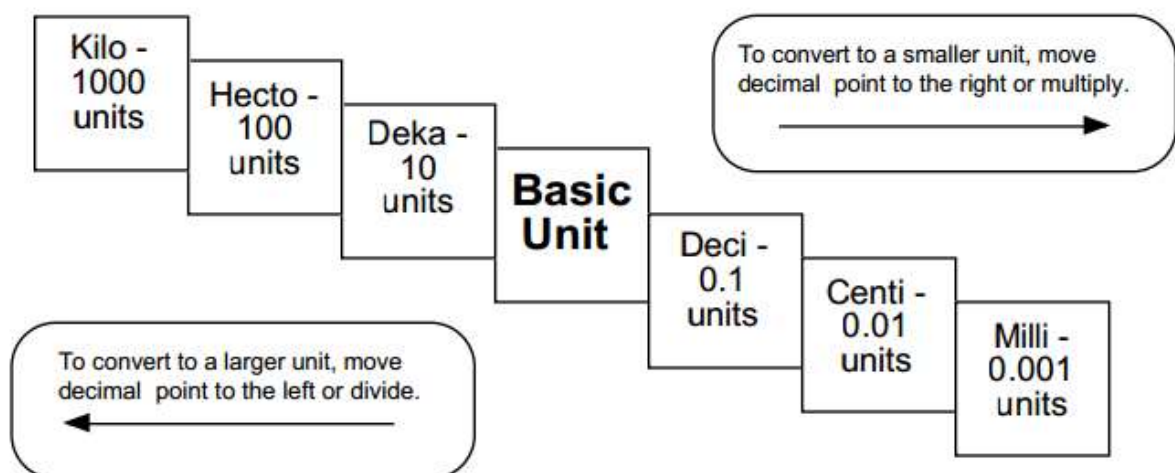
**da**-Deka- **Doesn't**

**U**-Basic Unit- **Usually**

**d**-Deci- **Drink**

**c**-Centi-**Chocolate**

**m**-Milli-**Milk**



## **Science Equipment Everywhere!**

Directions: Sort the pictures into the correct category.

<b><u>Mass</u></b>	<b><u>Volume</u></b>

---


**What equipment at how home do you use to measure mass and volume?**

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<b>Cornell Notes</b> 	<b>Topic/Objective:</b>	<b>Name:</b>
	Mass, Volume and Density	<b>Class/Period:</b>
		<b>Date:</b>

**Essential Question:** How do we measure mass and volume? What is density? How do we use density to identify substances?

<b>Questions:</b>	
What is mass and how is it measured?	Mass is a measurement of _____ <b>matter</b> is in an object.
	Mass is measured in _____, by a _____.
How are mass and weight different?	Weight is mass plus the _____ applied to that mass.
What is volume?	Volume is the amount of _____ a substance or object occupies.
How can volume be measured?	1. The volume of a liquid or gas can be measured with _____ using units _____.
	2. The volume of a regularly shaped solid can be calculated measuring the _____, and _____ and multiplying them together.
	A. Measure the amount of _____ in a _____.
How is water displacement used to measure the volume of an object?	B. Drop in the _____.
	C. Determine how much the water has risen.
What is density?	Density is the _____ of an object divided by its _____.
	density = _____ $\frac{\text{mass}}{\text{Volume}}$
How does solid water(ice) float on liquid water?	The density of ice is _____ than that of water, so it floats.

**Summary:**




## Density Problem Practice

1. Calculate the density of a material that has a mass of 52.457g and a volume of 13.5cm<sup>3</sup>. **(Don't forget units)**
2. A student finds a rock on the way to school. In the laboratory he determines that the volume of the rock is 22.7ml and the mass is 39.943g. What is the density of the rock? **(Don't forget units)**
3. A student has a chunk of silver with a mass of 136.29g and using water displacement they were able to determine the volume is 12.993ml. What is the density of the chunk of silver? **(Don't forget units)**
4. In the lab there is a block of pure Silicon that is 5cm wide, 7cm high, and 10cm long. The block has a mass of 817.6g, what is the element's density? **(Don't forget units)**

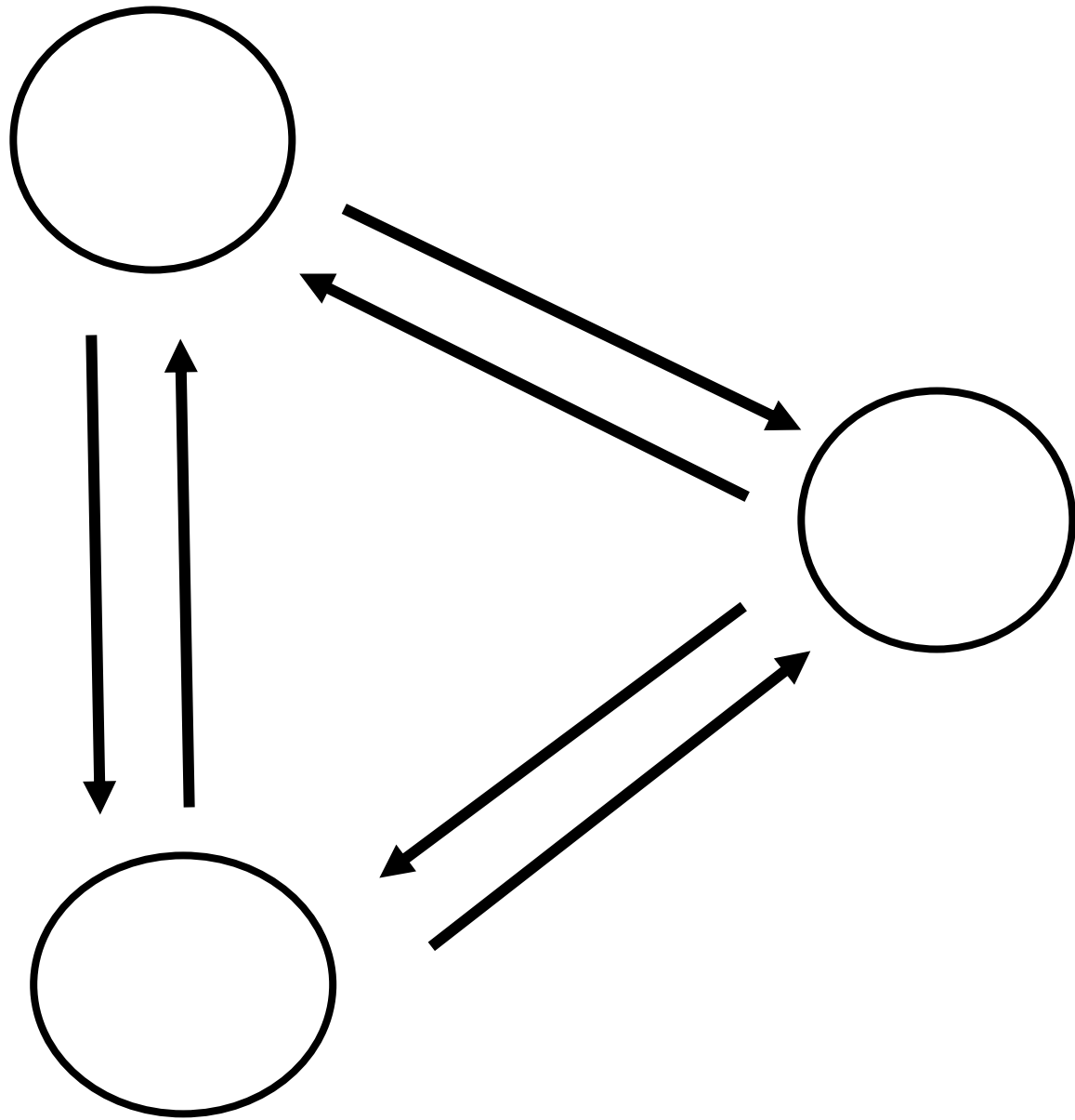
## **Density Foldable**

## **Phase Changes Practice**

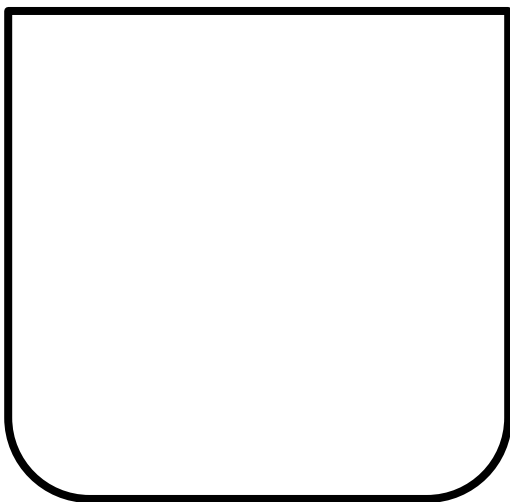
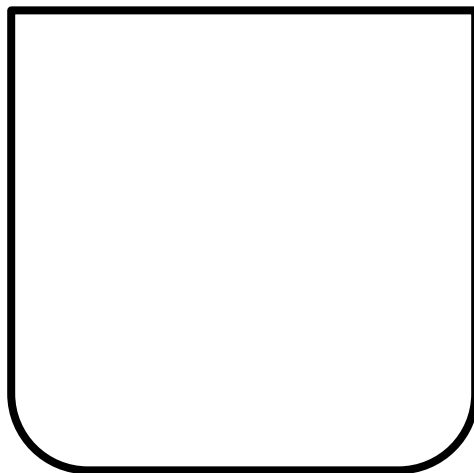
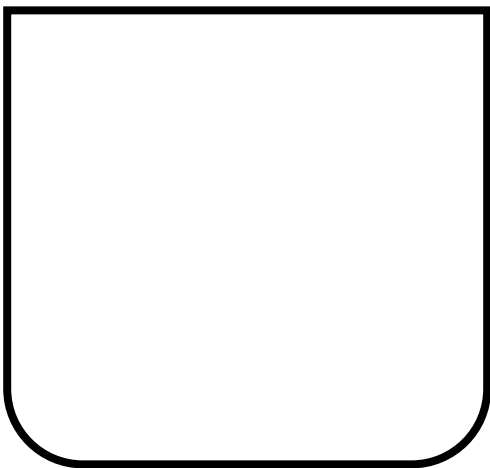
### **What phase changes are occurring in the following descriptions?**


1. Tea pot boiling water and steam is making a whistling sound.
2. Pouring hot silver into a mold and the silver forming into a heart shape solid.
3. A nice cold soda in a glass starts to have water droplets on the outside of the glass.
4. It was a cold Winter night and it started to rain but then the rain turned to snow.
5. On a hot Summer day, the rain on the ground slowly turned to steam.

## Phases & Phase Changes



## The Particle Theory Practice


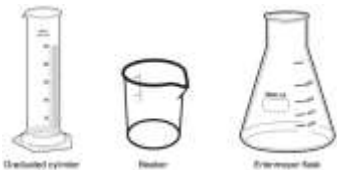






<b>Cornell Notes</b> 	<b>Topic/Objective: Particle Theory</b>	<b>Name:</b>
		<b>Class/Period:</b>
		<b>Date:</b>
<b>Essential Question:</b> How can The Particle Theory explain how all matter (liquids, solids, gases) are structured and how they react under certain conditions?		
<b>Questions:</b> 1. What are the 5 parts of The Particle Theory?    2. How do particles in a <b>GAS</b> behave?    3. How do particles in a <b>LIQUID</b> behave?    4. How do particles in a <b>SOLID</b> behave?    5. What particles make up particles in a pure substance called? 6. How are energy, temperature and speed of particles related?	<b>Notes:</b> 1. All matter is made up of very small _____. 2. There is _____ between particles. 3. All particles in a _____ are _____. 4. The particles in matter are always _____. 5. Particles are _____ to each other.  - Particles are _____ and have _____ spaces between them. - Particles move _____ in _____. - Have no definite _____ or _____; they _____ the container they are in. - _____ attraction between particles.  - Particles are _____. - Particles move _____ than _____. - Have a definite _____ but not shape; they _____ the container they are in. - Particles are _____ bonded and _____ over each other.  - Particles are _____. - Particles move _____. - Have a definite _____ & _____. - _____ attraction between particles = _____ bonds.  As energy is added to a substance, the _____ increases and the _____ of the particle increases.	
<b>Summary:</b>    		

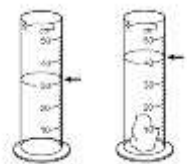
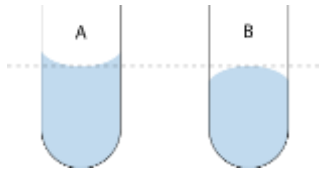

## Chemistry Vocabulary

**Directions:** Using the picture; come up with a sentence that explains the vocabulary word.

<u>Vocab Word</u>	<u>Sentence</u>	<u>Picture</u>
Scientific Method		<pre> graph TD     A([Ask a Question]) --&gt; B([Research])     B --&gt; C([Hypothesis])     C --&gt; D([Test with an Experiment])     D --&gt; E([Analyze Your Results])     E --&gt; F([Report Your Results])     E -- "Think about it &amp; try again" --&gt; C     E --&gt; G[Hypothesis is True]     E --&gt; H[Hypothesis is False]     </pre> <p>www.layers-of-learning.com</p>
Independent Variable		
Dependent Variable		
Matter		<p>Solid      Liquid      Gas</p> <p><small>© Copyright 2012 University of Illinois - Chicago. All rights reserved. www.uic.edu</small></p>

Mass		
Volume		 <small>Graduated cylinder      Beaker      Erlenmeyer flask</small>
Length		
Liquid		
Control		
Density		



<b>Water displacement</b>		
<b>Meniscus</b>		
<b>Constant</b>		?????
<b>Hypothesis</b>		

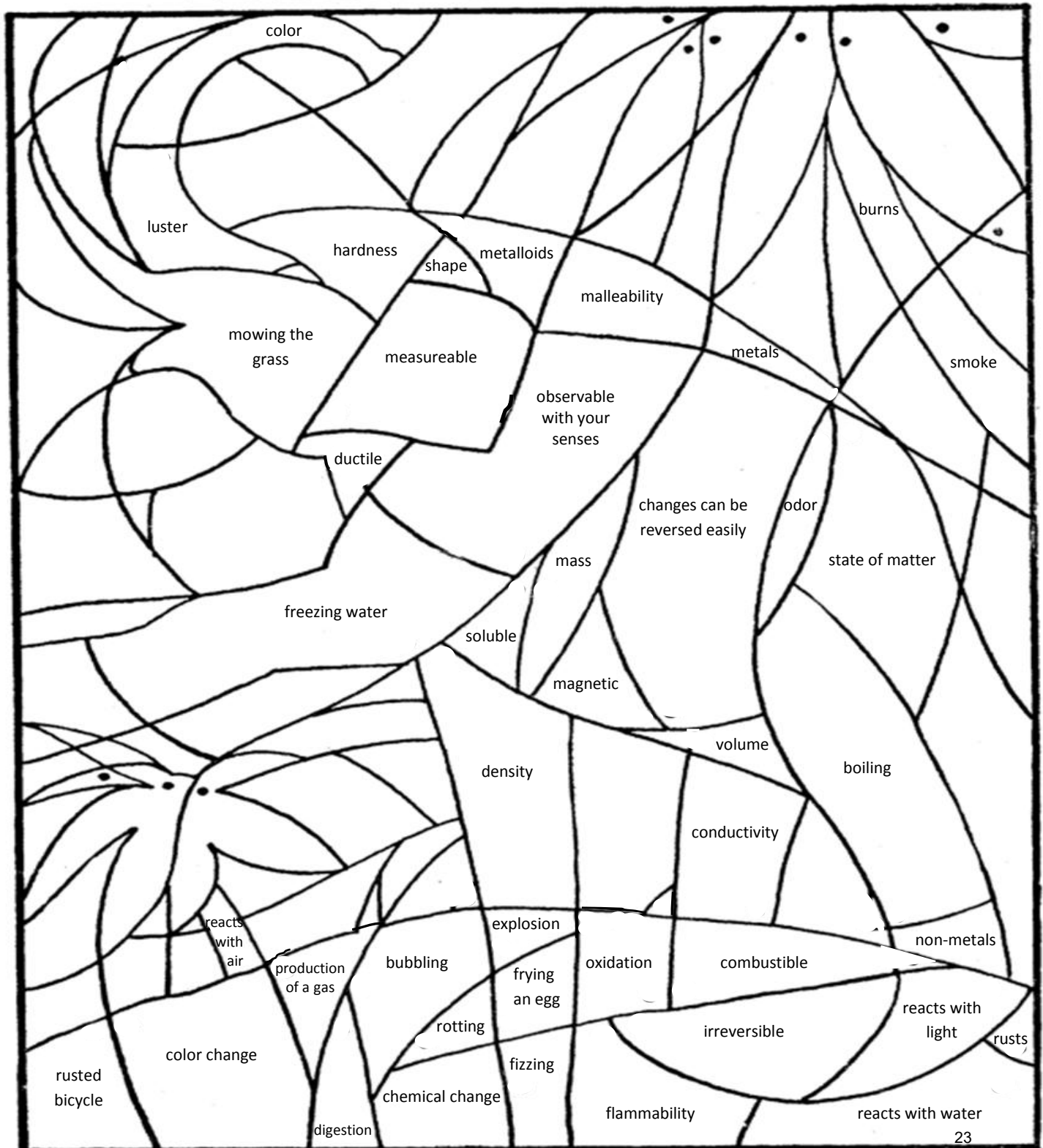
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Properties of Matter Hidden Mystery Picture

To reveal the hidden picture below, color the physical properties of matter gray, the chemical properties of matter brown, and the pieces with dots green. Color the empty pieces blue.



## Physical Properties


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## **Chemical Properties**


## **Physical and Chemical Changes Practice**

**Determine if the following descriptions are physical or chemical changes.**

<b>Change</b>	<b><u>P or C</u></b>	<b><u>Reason</u></b>
1. Rusting Iron		
2. Toasting Bread		
3. Evaporating Water		
4. Burning a candle		
5. Frost on a car window		
6. Boiling water		
7. Formation of clouds		
8. Baking a cake		
9. Breaking a stick		
10. Frying an egg		

---

**True or False. If false, correct the underline portion of the statement so that it is true.**

1. A physical change is a change of matter from one form to another without a change in chemical properties.
2. A physical change is a change that occurs when a substance changes composition by forming one or more new substances.
3. Color change is evidence that a chemical change may have occurred.
4. Fizzing or Foaming is evidence that a chemical change may have occurred.

## Properties of Matter Sort

Physical	Chemical



## Acid & Bases Sort

Acid	Bases

What is the most Acidic or Basic thing you've accidentally or on purpose eaten??

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## Acid & Bases

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**Draw the pH Scale**

## Draw examples of the following

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**Element:**

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**Compound**

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**Mixture:**

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## Elements, Mixtures and Compounds


## **Draw the particle description of the following**

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**Element:**

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**Compound**

---

**Mixture:**

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## **Elements, Mixtures and Compounds Foldable**

## **Draw the particle description of the following**

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**Element:**

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**Compound**

---

**Mixture:**

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## Elements, Compounds, and Mixtures

Classify each of the pictures below by placing the correct label in the blanks below:

A= Element

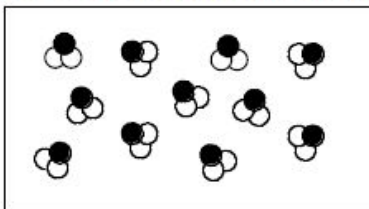
D= Mixture of compounds

B= Compound

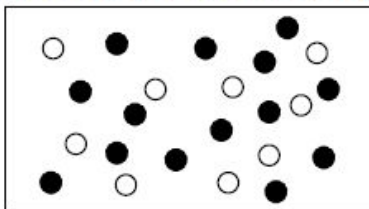
E= Mixture of elements and compounds

C= Mixture of elements

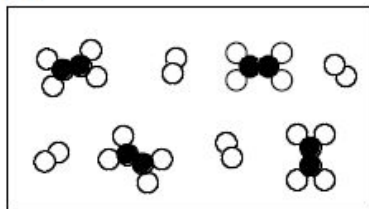
Each circle represents an atom and each different color represents a different kind of atom. If two atoms are touching then they are bonded together.



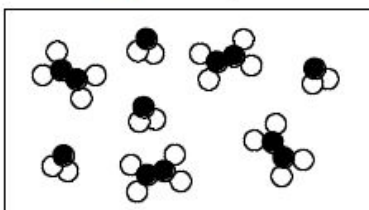
1) \_\_\_\_\_



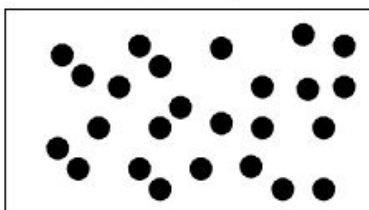
2) \_\_\_\_\_



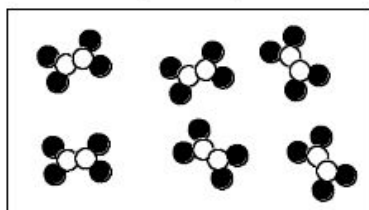
3) \_\_\_\_\_



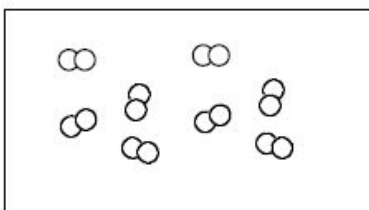
4) \_\_\_\_\_



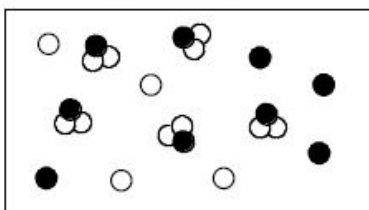
5) \_\_\_\_\_



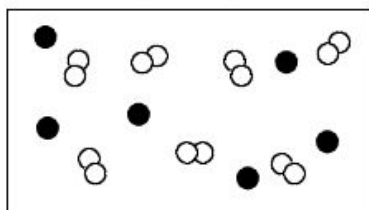
6) \_\_\_\_\_



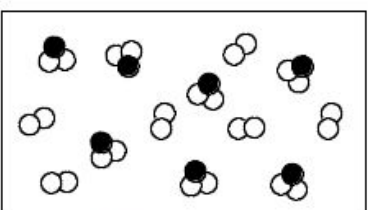
7) \_\_\_\_\_



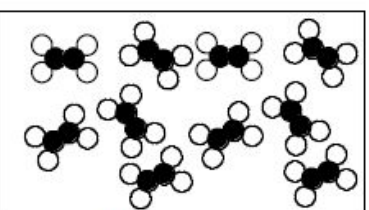
8) \_\_\_\_\_



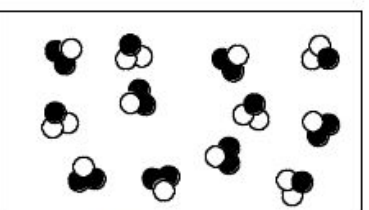
9) \_\_\_\_\_



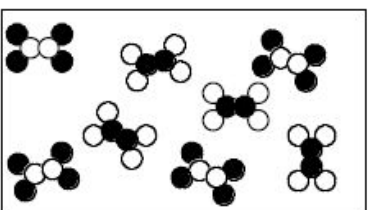
10) \_\_\_\_\_



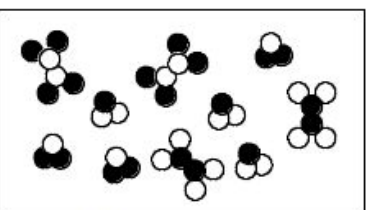
11) \_\_\_\_\_



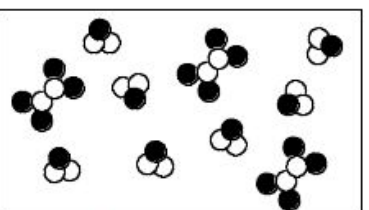
12) \_\_\_\_\_



13) \_\_\_\_\_



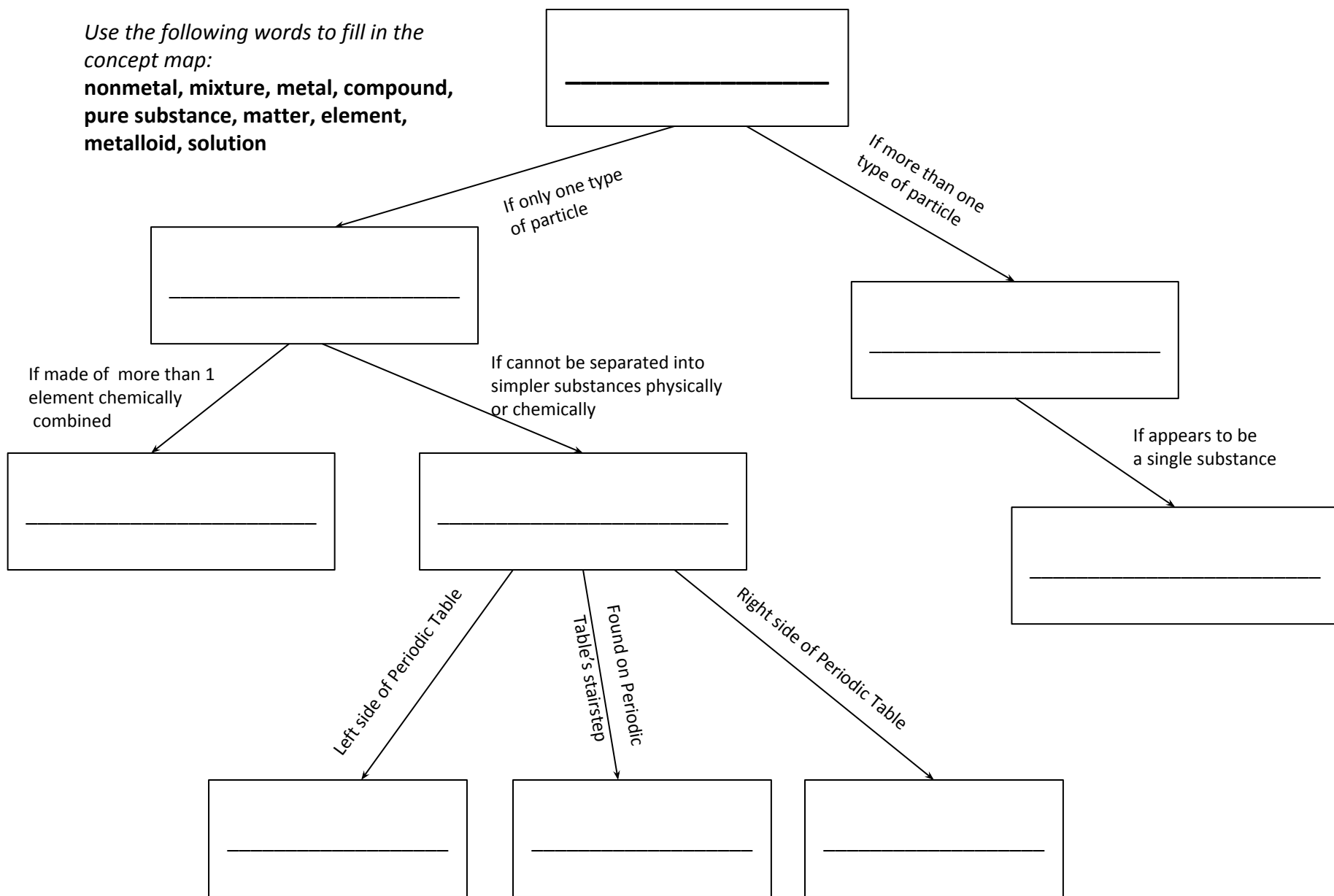
14) \_\_\_\_\_



15) \_\_\_\_\_

Use the following words to fill in the concept map:

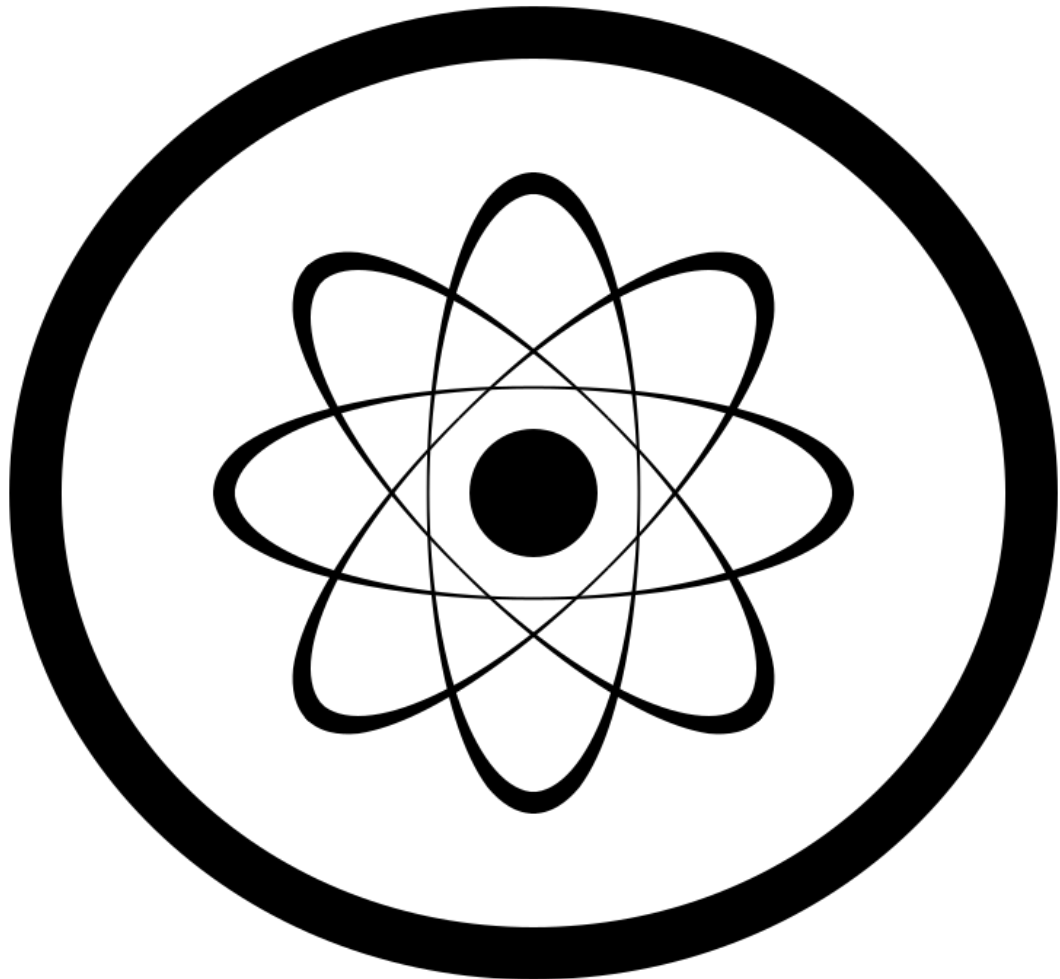
**nonmetal, mixture, metal, compound, pure substance, matter, element, metalloid, solution**



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# The Atom



## History of an Atom

Democritus

John Dalton

J.J. Thomson

Ernest Rutherford

## History of an Atom

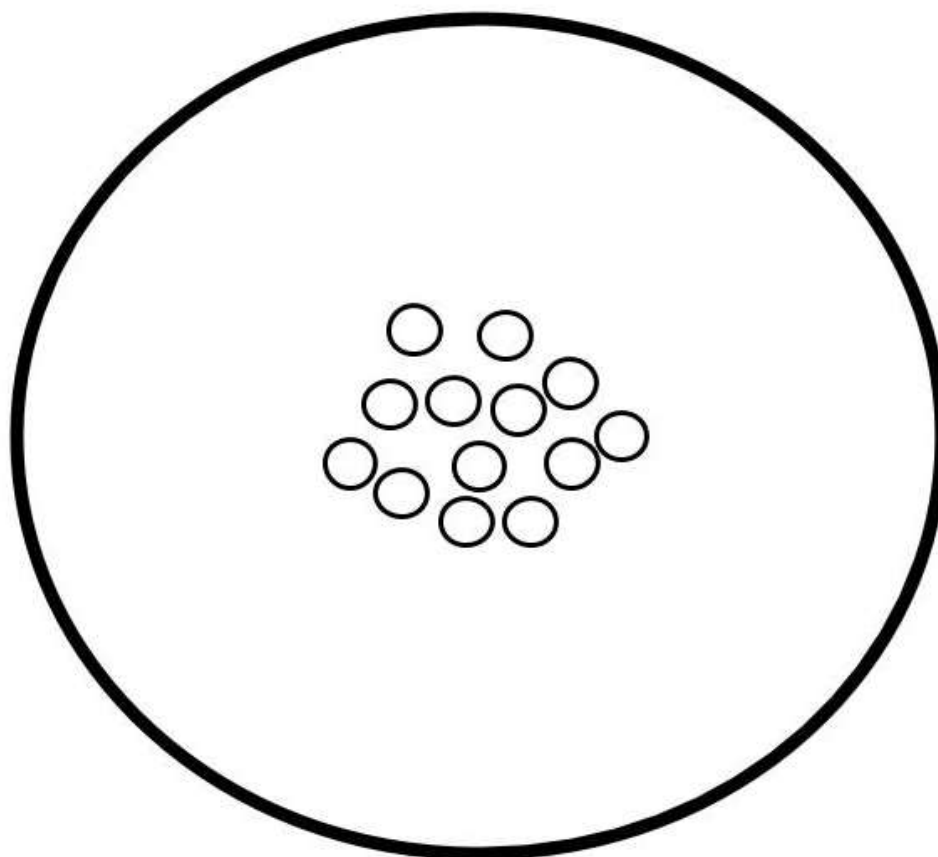
<u>Niels Bohr</u>	<u>Modern Theory of an Atom: Electron Cloud Model</u>
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## **Draw your own Atom!**

**Directions:** Now that we know the parts of the atom. Draw your own atom using as many protons, neutrons, and electrons as you want!

## Atom Diagram

**Directions:** Identify the parts of the atom.





## Atom Story

**Directions:** Create a story using the following vocabulary words electron, proton, neutron, nucleus, atomic number, atomic mass, atom, and atomic mass. **\*\*STORY**

**MUST INCLUDE ALL VOCABULARY WORDS!\*\***

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<b>Cornell Notes</b> 	<b>Topic/Objective:</b>	<b>Name:</b>
	Periodic Table, Bohr Model, Valence	<b>Class/Period:</b>
	Electrons, and Chemical Bonding	<b>Date:</b>
<b>Essential Question:</b> How can we use the periodic table and the Bohr Model of atomic structure to predict how atoms will chemically bond?		
<b>Questions:</b>		
How can we use the periodic table?	_____ created the periodic table of elements. We can use the periodic table to _____ substances, and _____ how they _____, based on their _____.	
How is the periodic table organized?	The columns of the periodic table are called _____. The rows on the periodic table are called _____. Metals are elements found on the _____ of the periodic table; nonmetals are found on the _____ of the periodic table; _____ are found between metals and nonmetals.	
How does the Bohr model describe atomic structure?	_____ and _____ are found in the nucleus of an atom. Electrons are filled in orbits also known as _____. Electrons are filled in the energy level _____ to the nucleus first then moving out.	
What are the two ways that atoms can chemically combine together?	The <b>1st</b> energy level can hold _____ electrons. The <b>2nd</b> energy level can hold _____ electrons. The <b>3rd</b> energy level can hold _____ electrons. _____ are electrons that are hanging out in the last energy level of the Bohr model	
	1. Two non-metals _____ valence electrons. 2. Metals become _____ charged by _____ valence electrons to nonmetals, which become _____ charged.	
<b>Summary:</b>		

## Periodic Table Broken Down

**Directions:** Using the periodic table, fill in the blanks with the correct information

1. The Vertical columns on the periodic table are called \_\_\_\_\_.
2. The horizontal rows on the periodic table are called \_\_\_\_\_.
3. Most of the elements in the periodic table are classified as \_\_\_\_\_.
4. The elements that touch the zigzag line are classified as \_\_\_\_\_.
5. The elements in the far upper right corner are classified as \_\_\_\_\_.
6. Elements in the first group have one outer shell electron and are extremely reactive.  
They are called \_\_\_\_\_.
7. Elements in the second group have 2 outer shell electrons and are also very reactive.  
They are called \_\_\_\_\_.
8. Elements in groups 3 through 12 have many useful properties and are called \_\_\_\_\_.
9. Elements in group 17 are known as 'salt formers'. They are called \_\_\_\_\_.
10. Elements in group 18 are very unreactive. They are said to be inert. We call these \_\_\_\_\_.
11. The elements at the bottom of the table were pulled out to keep the table from becoming too long. The first period at the bottom called the \_\_\_\_\_.

The second period at the bottom of the table is called the \_\_\_\_\_.

# Periodic Table of the Elements

Atomic number — 14  
 Symbol — **Si**  
 Atomic mass — 28.086  
 Silicon — Name

Group 1	2											13	14	15	16	17	18
1 <b>H</b> 1.008 Hydrogen																	2 <b>He</b> 4.0026 Helium
3 <b>Li</b> 6.941 Lithium	4 <b>Be</b> 9.012 Beryllium											5 <b>B</b> 10.81 Boron	6 <b>C</b> 12.011 Carbon	7 <b>N</b> 14.007 Nitrogen	8 <b>O</b> 15.999 Oxygen	9 <b>F</b> 18.998 Fluorine	10 <b>Ne</b> 20.179 Neon
11 <b>Na</b> 22.990 Sodium	12 <b>Mg</b> 24.305 Magnesium											13 <b>Al</b> 26.982 Aluminum	14 <b>Si</b> 28.086 Silicon	15 <b>P</b> 30.974 Phosphorus	16 <b>S</b> 32.066 Sulfur	17 <b>Cl</b> 35.453 Chlorine	18 <b>Ar</b> 39.948 Argon
19 <b>K</b> 39.098 Potassium	20 <b>Ca</b> 40.08 Calcium	21 <b>Sc</b> 44.956 Scandium	22 <b>Ti</b> 47.88 Titanium	23 <b>V</b> 50.942 Vanadium	24 <b>Cr</b> 51.996 Chromium	25 <b>Mn</b> 54.938 Manganese	26 <b>Fe</b> 55.847 Iron	27 <b>Co</b> 58.933 Cobalt	28 <b>Ni</b> 58.69 Nickel	29 <b>Cu</b> 63.546 Copper	30 <b>Zn</b> 65.39 Zinc	31 <b>Ga</b> 69.72 Gallium	32 <b>Ge</b> 72.61 Germanium	33 <b>As</b> 74.922 Arsenic	34 <b>Se</b> 78.96 Selenium	35 <b>Br</b> 79.904 Bromine	36 <b>Kr</b> 83.80 Krypton
37 <b>Rb</b> 85.468 Rubidium	38 <b>Sr</b> 87.62 Strontium	39 <b>Y</b> 88.906 Yttrium	40 <b>Zr</b> 91.224 Zirconium	41 <b>Nb</b> 92.906 Niobium	42 <b>Mo</b> 95.94 Molybdenum	43 <b>Tc</b> (98) Technetium	44 <b>Ru</b> 101.07 Ruthenium	45 <b>Rh</b> 102.906 Rhodium	46 <b>Pd</b> 106.42 Palladium	47 <b>Ag</b> 107.868 Silver	48 <b>Cd</b> 112.41 Cadmium	49 <b>In</b> 114.82 Indium	50 <b>Sn</b> 118.71 Tin	51 <b>Sb</b> 121.763 Antimony	52 <b>Te</b> 127.60 Tellurium	53 <b>I</b> 126.904 Iodine	54 <b>Xe</b> 131.29 Xenon
55 <b>Cs</b> 132.905 Cesium	56 <b>Ba</b> 137.33 Barium	57 <b>La</b> 138.906 Lanthanum	72 <b>Hf</b> 178.49 Hafnium	73 <b>Ta</b> 180.948 Tantalum	74 <b>W</b> 183.84 Tungsten	75 <b>Re</b> 186.207 Rhenium	76 <b>Os</b> 190.23 Osmium	77 <b>Ir</b> 192.22 Iridium	78 <b>Pt</b> 195.08 Platinum	79 <b>Au</b> 196.967 Gold	80 <b>Hg</b> 200.59 Mercury	81 <b>Tl</b> 204.383 Thallium	82 <b>Pb</b> 207.2 Lead	83 <b>Bi</b> 208.980 Bismuth	84 <b>Po</b> (209) Polonium	85 <b>At</b> (210) Astatine	86 <b>Rn</b> (222) Radon
87 <b>Fr</b> (223) Francium	88 <b>Ra</b> 226.025 Radium	89 <b>Ac</b> 227.028 Actinium	104 <b>Rf</b> (261) Rutherfordium	105 <b>Db</b> (262) Dubnium	106 <b>Sg</b> (263) Seaborgium	107 <b>Bh</b> (262) Bohrium	108 <b>Hs</b> (265) Hassium	109 <b>Mt</b> (266) Meitnerium	110 (269) Darmstadtium	Mass numbers in parentheses are those of the most stable or most common isotope.							

Lanthanide Series

Actinide Series

58 <b>Ce</b> 140.12 Cerium	59 <b>Pr</b> 140.908 Praseodymium	60 <b>Nd</b> 144.24 Neodymium	61 <b>Pm</b> (145) Promethium	62 <b>Sm</b> 150.36 Samarium	63 <b>Eu</b> 151.97 Europium	64 <b>Gd</b> 157.25 Gadolinium	65 <b>Tb</b> 158.925 Terbium	66 <b>Dy</b> 162.50 Dysprosium	67 <b>Ho</b> 164.930 Holmium	68 <b>Er</b> 167.26 Erbium	69 <b>Tm</b> 168.934 Thulium	70 <b>Yb</b> 173.04 Ytterbium	71 <b>Lu</b> 174.967 Lutetium
90 <b>Th</b> 232.038 Thorium	91 <b>Pa</b> 231.036 Protactinium	92 <b>U</b> 238.029 Uranium	93 <b>Np</b> 237.048 Neptunium	94 <b>Pu</b> (244) Plutonium	95 <b>Am</b> (243) Americium	96 <b>Cm</b> (247) Curium	97 <b>Bk</b> (247) Berkelium	98 <b>Cf</b> (251) Californium	99 <b>Es</b> (252) Einsteinium	100 <b>Fm</b> (257) Fermium	101 <b>Md</b> (258) Mendelevium	102 <b>No</b> (259) Nobelium	103 <b>Lr</b> (262) Lawrencium

**Use the periodic table to fill in the blanks correctly**

<u>Substance</u>	<u>Symbol</u>	<u>Atomic Number</u>	<u>Atomic Mass Rounded</u>	<u>Number of Protons</u>	<u>Number of Neutrons</u>	<u>Number of Electrons</u>
<u>Nitrogen</u>						
<u>Sodium</u>						
<u>Silicon</u>						
<u>Aluminum</u>						
<u>Iron</u>						
Magnesium						
<u>Chlorine</u>						
<u>Niobium</u>						
<u>Germanium</u>						
<u>Phosphorus</u>						
<u>Arsenic</u>						
<u>Krypton</u>						
<u>Xenon</u>						
<u>Titanium</u>						
<u>Cobalt</u>						

## Periodic Table Notes

lithium

3

Li

6.941

→

→

→

→

<u>Substance</u>	<u>Symbol</u>	<u>Atomic Number</u>	<u>Atomic Mass Rounded</u>	<u>Number of Protons</u>	<u>Number of Neutrons</u>	<u>Number of Electrons</u>
<u>Lithium</u>						
<u>Zinc</u>						
<u>Cobalt</u>						

## **Bohr Model & Valence Electrons**

**Directions:** Draw the Bohr model for the following elements and identify the number of Valence Electrons.

1. Li

4. O

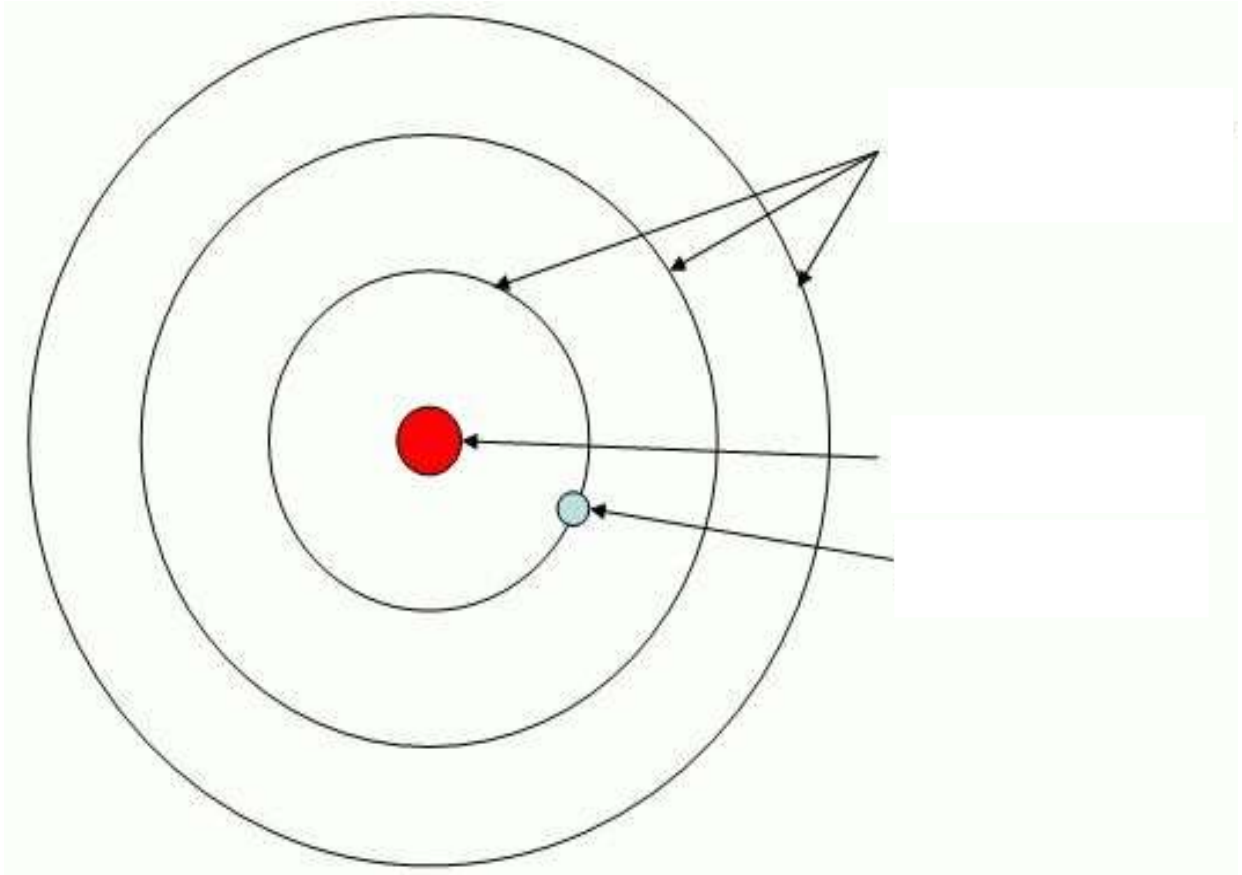
2. Na

5. S

3. P

6. Ar

## Bohr Model Diagram



1. The rings are the nucleus are the \_\_\_\_\_.
2. The \_\_\_\_\_ surround the nucleus.
3. The \_\_\_\_\_ stays in the middle of the atom.
4. \_\_\_\_\_ are always on the last level of the atom



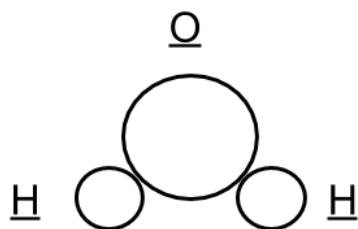
## Bonding Practice

**Directions:** Label the following chemical formulas with the correct bonds.

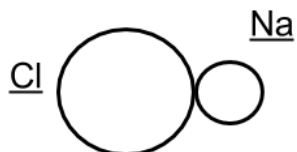
Types of Bonds	
CH <sub>4</sub>	
NaF	
P <sub>2</sub> O <sub>3</sub>	
LiBr	
SO <sub>3</sub>	
FeCl <sub>3</sub>	

Determine if the following molecular diagrams are ionic or covalent.

1.



2.

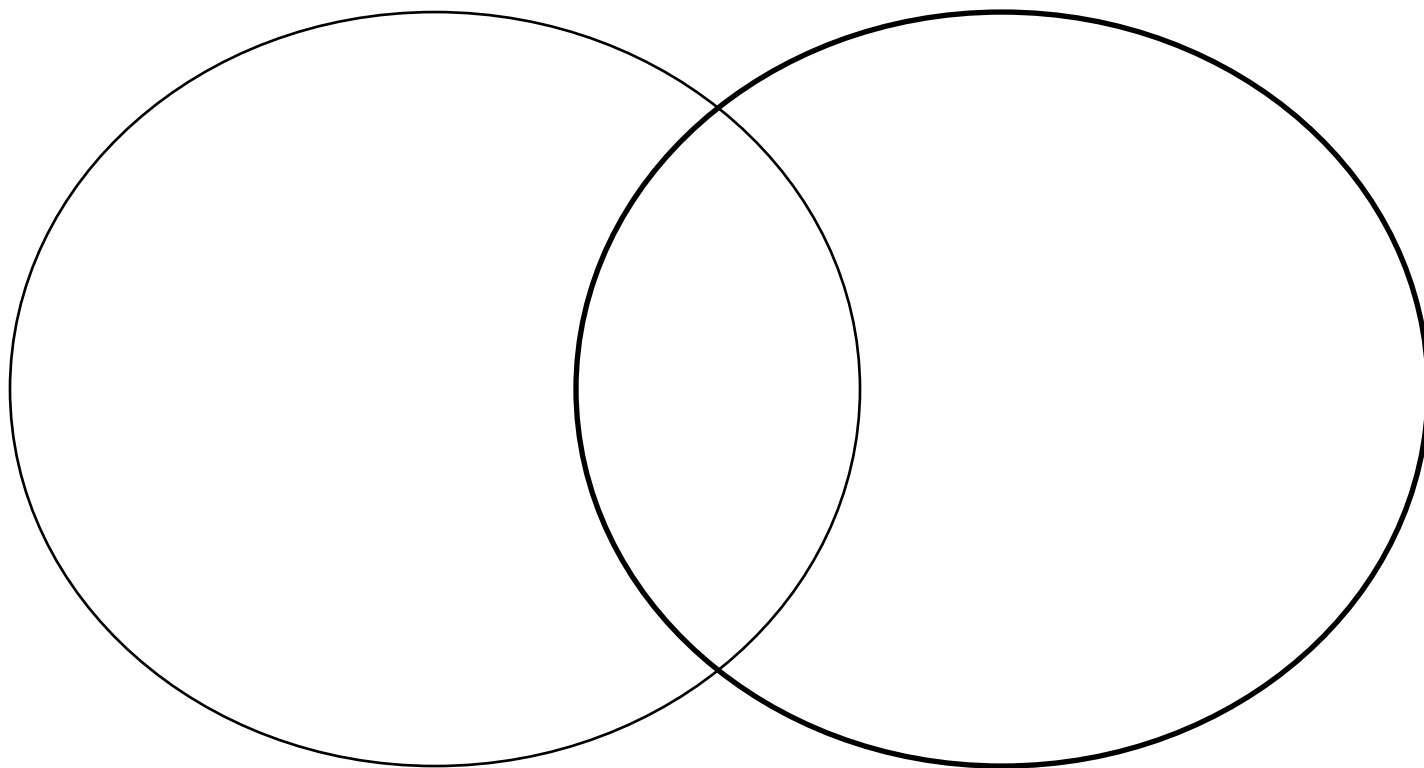


## Bonding

**Directions:** fill in the Venn diagram with the notes on bonding.

Ionic Bonding

Covalent Bonding



**Directions:** Mark a check next to the elements that will share or lose/gain electrons.

Element	Shared Electrons	Lose/Gain Electrons
Fe		
Cl		
Sn		
V		
P		

## Chemical Formulas Practice

**Directions:** Identify and determine the amount of elements and atoms for each of the following chemical compounds. Use the examples below to help you solve the remaining compounds.

Chemical formula	Elements	Atoms
$\text{HNO}_3$	Hydrogen, Nitrogen, Oxygen	1 Hydrogen, 1 Nitrogen, 3 Oxygen
$\text{Pb}(\text{SO}_3)_2$		
$\text{KMnO}_4$		
$\text{KCl}$		
$\text{Na}_2\text{SO}_4$		
$\text{Ca}(\text{NO}_3)_2$		

1.  $\text{KMnO}_4$

- a. K = \_\_\_\_\_
- b. Mn = \_\_\_\_\_
- c. O = \_\_\_\_\_

4.  $\text{Na}_2\text{CO}_3$

- a. Na = \_\_\_\_\_
- b. C = \_\_\_\_\_
- c. O = \_\_\_\_\_

2.  $\text{HCl}$

- a. H = \_\_\_\_\_
- b. Cl = \_\_\_\_\_

5.  $\text{NH}_4\text{Cl}$

- a. N = \_\_\_\_\_
- b. H = \_\_\_\_\_
- c. Cl = \_\_\_\_\_

3.  $\text{AlPO}_4$

- a. Al = \_\_\_\_\_
- b. P = \_\_\_\_\_
- c. O = \_\_\_\_\_

6.  $\text{BaSO}_4$

- a. Ba = \_\_\_\_\_
- b. S = \_\_\_\_\_
- c. O = \_\_\_\_\_

Name \_\_\_\_\_

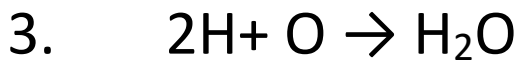
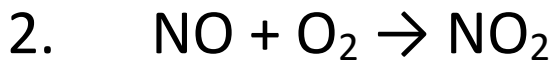
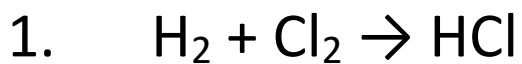
Period \_\_\_\_\_ Date \_\_\_\_\_


**ANALYZING SUBSTANCES**

Substance name	Chemical formula	Representation	Number of elements	Number of atoms

## Chemical Equations Practice

Direction: Identify which parts of the equation are reactants and products then list the type and quantity of each atom.



<b>Cornell Notes</b> 	<b>Topic/Objective:</b> Chemical Equations Describe what the parts of a chemical equation represent and how equations demonstrate the Law of Conservation of Mass.	<b>Name:</b> <b>Class/Period:</b> <b>Date:</b>
<b>Essential Question:</b> How do chemical equations represent chemical reactions and demonstrate the Law of Conservation of Mass?		
<b>Questions:</b>	<b>Notes:</b>	
What is a chemical reaction?	A <b>chemical reaction</b> is when two or more atoms or molecules _____ or _____ to form a new _____.	
What is a chemical equation?	A <b>chemical equation</b> is a symbolic representation of a _____.	
What are reactants and products and where are they represented in a chemical equation?	Chemical equations show _____, or what elements and compounds you start with on the _____ side of the equation.  Chemical equations also show _____, or what elements and compounds you end up with after the chemical reaction has taken place, on the _____ side of the equation.	
How do we know how many atoms and molecules are reacting and being produced in a chemical reaction?	_____ are numbers below and to the right of an element symbol that tell how many _____ are found in the molecule. $\text{H}_2$ $\text{O}_2$ Each molecule contains _____ atoms.	
How do I know when an equation shows a conservation of mass?	_____ are numbers found to the left of a chemical formula that tell how many _____ are used/produced in the reaction. $3\text{CO}_2$ Contains _____ $\text{CO}_2$ molecules	
<b>Law of Conservation of Mass</b> states that _____ is neither created nor _____ in ordinary chemical and physical changes.		
Chemical equations show conservation of mass when the number of atoms of each element are the same on the _____ and _____ sides of the equation		
<b>Summary:</b>		

## **Balancing Chemical Equations**

*Balance the equations below:*

- 1)    \_\_\_\_  $\text{N}_2$  + \_\_\_\_  $\text{H}_2$   $\rightarrow$  \_\_\_\_  $\text{NH}_3$
- 2)    \_\_\_\_  $\text{KClO}_3$   $\rightarrow$  \_\_\_\_  $\text{KCl}$  + \_\_\_\_  $\text{O}_2$
- 3)    \_\_\_\_  $\text{NaCl}$  + \_\_\_\_  $\text{F}_2$   $\rightarrow$  \_\_\_\_  $\text{NaF}$  + \_\_\_\_  $\text{Cl}_2$
- 4)    \_\_\_\_  $\text{H}_2$  + \_\_\_\_  $\text{O}_2$   $\rightarrow$  \_\_\_\_  $\text{H}_2\text{O}$
- 5)    \_\_\_\_  $\text{Pb}(\text{OH})_2$  + \_\_\_\_  $\text{HCl}$   $\rightarrow$  \_\_\_\_  $\text{H}_2\text{O}$  + \_\_\_\_  $\text{PbCl}_2$
- 6)    \_\_\_\_  $\text{AlBr}_3$  + \_\_\_\_  $\text{K}_2\text{SO}_4$   $\rightarrow$  \_\_\_\_  $\text{KBr}$  + \_\_\_\_  $\text{Al}_2(\text{SO}_4)_3$
- 7)    \_\_\_\_  $\text{CH}_4$  + \_\_\_\_  $\text{O}_2$   $\rightarrow$  \_\_\_\_  $\text{CO}_2$  + \_\_\_\_  $\text{H}_2\text{O}$
- 8)    \_\_\_\_  $\text{C}_3\text{H}_8$  + \_\_\_\_  $\text{O}_2$   $\rightarrow$  \_\_\_\_  $\text{CO}_2$  + \_\_\_\_  $\text{H}_2\text{O}$
- 9)    \_\_\_\_  $\text{C}_8\text{H}_{18}$  + \_\_\_\_  $\text{O}_2$   $\rightarrow$  \_\_\_\_  $\text{CO}_2$  + \_\_\_\_  $\text{H}_2\text{O}$
- 10)    \_\_\_\_  $\text{FeCl}_3$  + \_\_\_\_  $\text{NaOH}$   $\rightarrow$  \_\_\_\_  $\text{Fe}(\text{OH})_3$  + \_\_\_\_  $\text{NaCl}$
- 11)    \_\_\_\_  $\text{P}$  + \_\_\_\_  $\text{O}_2$   $\rightarrow$  \_\_\_\_  $\text{P}_2\text{O}_5$
- 12)    \_\_\_\_  $\text{Na}$  + \_\_\_\_  $\text{H}_2\text{O}$   $\rightarrow$  \_\_\_\_  $\text{NaOH}$  + \_\_\_\_  $\text{H}_2$
- 13)    \_\_\_\_  $\text{Ag}_2\text{O}$   $\rightarrow$  \_\_\_\_  $\text{Ag}$  + \_\_\_\_  $\text{O}_2$
- 14)    \_\_\_\_  $\text{S}_8$  + \_\_\_\_  $\text{O}_2$   $\rightarrow$  \_\_\_\_  $\text{SO}_3$
- 15)    \_\_\_\_  $\text{CO}_2$  + \_\_\_\_  $\text{H}_2\text{O}$   $\rightarrow$  \_\_\_\_  $\text{C}_6\text{H}_{12}\text{O}_6$  + \_\_\_\_  $\text{O}_2$
- 16)    \_\_\_\_  $\text{K}$  + \_\_\_\_  $\text{MgBr}$   $\rightarrow$  \_\_\_\_  $\text{KBr}$  + \_\_\_\_  $\text{Mg}$
- 17)    \_\_\_\_  $\text{HCl}$  + \_\_\_\_  $\text{CaCO}_3$   $\rightarrow$  \_\_\_\_  $\text{CaCl}_2$  + \_\_\_\_  $\text{H}_2\text{O}$  + \_\_\_\_  $\text{CO}_2$
- 18)    \_\_\_\_  $\text{HNO}_3$  + \_\_\_\_  $\text{NaHCO}_3$   $\rightarrow$  \_\_\_\_  $\text{NaNO}_3$  + \_\_\_\_  $\text{H}_2\text{O}$  + \_\_\_\_  $\text{CO}_2$
- 19)    \_\_\_\_  $\text{H}_2\text{O}$  + \_\_\_\_  $\text{O}_2$   $\rightarrow$  \_\_\_\_  $\text{H}_2\text{O}_2$
- 20)    \_\_\_\_  $\text{NaBr}$  + \_\_\_\_  $\text{CaF}_2$   $\rightarrow$  \_\_\_\_  $\text{NaF}$  + \_\_\_\_  $\text{CaBr}_2$
- 21)    \_\_\_\_  $\text{H}_2\text{SO}_4$  + \_\_\_\_  $\text{NaNO}_2$   $\rightarrow$  \_\_\_\_  $\text{HNO}_2$  + \_\_\_\_  $\text{Na}_2\text{SO}_4$

## **Balancing Equations Foldable**



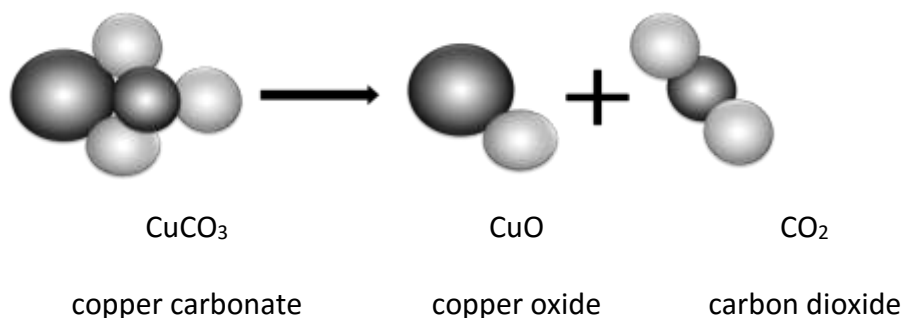
## Endothermic and Exothermic Reactions Practice

**Decide whether each of these reactions is exothermic or endothermic:**

- a) When two chemicals mix their temperature rises: \_\_\_\_\_
- b) A solid burns brightly and releases heat, light and sound: \_\_\_\_\_
- c) When two chemicals are mixed their temperature drops: \_\_\_\_\_
- d) Two chemicals will only react if you heat them continually: \_\_\_\_\_
- e) Plants take in light energy for photosynthesis: \_\_\_\_\_

1. During chemical reactions the bonds between atoms break and new bonds form. Energy must be absorbed to break a bond, so breaking bonds is endothermic. Making new bonds is exothermic because energy is released.

**When green copper carbonate decomposes, the equation is:**




Is the reaction exothermic or endothermic? Use ideas about bonds to explain why.

\_\_\_\_\_

2. A student wanted to compare the energy released when 4 different fuels burned. To make it a fair test she put 1 g of each fuel in a little dish. Then she burned each fuel under a calorimeter containing 200 cm<sup>3</sup> of water. These are her results:

Fuel	Temp at the start in °C	Temp at the end in °C	Temp rise in °C
methanol	25	56	
ethanol	18	53	
propanol	17	54	
butanol	23	63	

- a) Calculate each temperature rise and state which fuel releases most energy per gram.

<b>Cornell Notes</b> 	<b>Topic: Energy and Rates of Chemical Reactions</b>	<b>Name:</b>
	<b>Objective:</b> Comparing endothermic and exothermic	<b>Class/Period:</b>
	chemical reactions.	<b>Date:</b>

**Essential Question:** How do we classify chemical reactions in terms of energy and what factors affect the rates of these reactions?

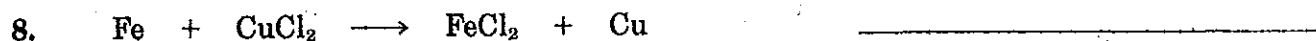
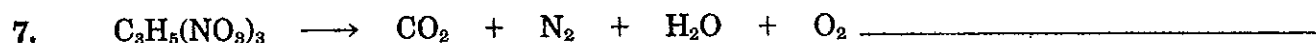
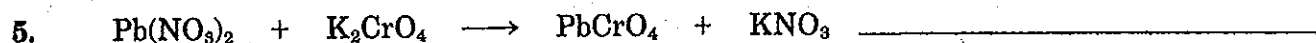
<b>Questions:</b>	<b>Notes:</b>
In terms of energy, what happens in a chemical reaction?	Energy is _____ when chemical bonds break in the reactant.
	Energy is _____ when new chemical bonds form in the product
What is an <b>exothermic</b> reaction?	An Exothermic Reaction has occurred when: A. Energy is _____ by the reaction. B. The energy of _____ is greater than energy of _____. C. Examples: _____, _____, _____, or _____ are released.
What is an <b>endothermic</b> reaction?	An Endothermic Reaction has occurred when: A. Energy is _____ by the reaction. B. The energy of _____ is greater than energy of _____. C. Examples: _____, _____, _____, or _____.
What is the Law of Conservation of Energy?	Energy is neither _____ nor _____ in chemical reactions.
	Activation energy is the _____ of energy needed for substances to react.
What is activation energy?	The rate of reaction is a measure of how _____ the reaction takes place.
What is the <b>rate of reaction</b> and what can affect this?	An <u>increase</u> in <b>temperature</b> _____ the reaction rate. An <u>increase</u> in <b>concentration</b> _____ the reaction rate. An <u>increase</u> in <b>the amount of exposed surface</b> _____ the reaction rate. A <b>catalyst</b> _____ the reaction rate by lowering the _____. An <b>inhibitor</b> _____ the rate of reaction.
<b>Summary:</b>	

## Types of Reactions

Chemical changes are characterized by the formation of new substances. The products of a correctly balanced chemical equation represent the number and kind of new substances formed. There are four general types of reactions: synthesis, decomposition, single replacement, and double replacement.

Examine each equation listed below and identify which type of reaction is taking place by filling in the blank space to the right of the equation.

Then balance the equation. Remember to use coefficients, not subscripts, to balance the equation.



## **Types of Reactions Foldable**

# Chemistry Glossary

**acid:** solution that tastes sour and has a pH of 0-7

**atom:** the smallest part of an element

**atomic mass:** the weighted average of the masses of all the naturally occurring isotopes of an element

**atomic number:** the number of protons in the nucleus of an atom

**balance/scale:** a device used to measure the mass of an object

**base:** solution tastes bitter, feels slippery, and has a pH of 7-14

**Niels Bohr:** 1913 proposed that electrons travel around the nucleus in specific paths found at different levels; planetary model

**boiling:** when a liquid vaporizes into a gas

**compound:** A pure substance composed of two or more elements chemically combined

**condensation:** The change of state(phase change) from a gas to a liquid

**constant:** The portion of the experiment that always remains the same

**contract:** To make smaller (decrease space between objects)

**control:** the variable of the experiment that the experimenter (scientist) uses to compare their findings to

**covalent bond:** the force of attraction between the nuclei of atoms and the electrons shared by the atoms

**John Dalton:** 1803 determined that atoms are the smallest particles of matter and cannot be divided and that atoms combine together to make new substances; bowling ball model

**Democritus:** ~400 BC proposed that all matter is made up of small particles called atoms

**density:** mass per unit volume of a substance

**dependent variable:** the variable in the experiment that changes due to the changes of the independent variable

**electrons:** the negatively charged particles found in all atoms; electrons are involved in the formation of chemical bonds.

**electron cloud model:** modern theory of atomic structure; electrons can be found in areas around the nucleus, but their specific path cannot be determined

**element:** a pure substance that cannot be separated or broken down into simpler substances by physical or chemical means

**evaporation:** the change of state (phase change) from a liquid to a gas

**expand:** to make larger (increase space between objects)

**freezing:** the change of state(phase change) from a liquid to a solid

**gas:** the state where matter does not have a definite shape or definite volume

**gram(g):** basic metric unit of mass

**group:** a column of elements on the periodic table

**independent variable:** the variable in the experiment the 'experimenter' (scientist) changes

**ionic bond:** the force of attraction between oppositely charged ions

**length:** the distance of an object, measured from end to end

**liquid:** phase of matter with a definite volume, but no definite shape

# Chemistry Glossary

- liter(L):** basic metric unit of volume
- mass:** amount of matter in an object
- matter:** anything that has mass and volume
- melting:** the change of state (phase change) from a solid to a liquid
- meter(m):** basic SI and metric unit of length
- metric units:** a system of units that are based on grams, liters, and meters
- mixture:** a combination of two or more substances that are not chemically combined
- nucleus:** the tiny, extremely dense, positively charged region in the center of an atom; made up of protons and neutrons
- metals:** elements that are shiny and good conductors of thermal energy and electric current; most metals are malleable and ductile
- metalloids:** elements that have properties of both metals and nonmetals; sometimes referred to as semiconductors
- molecule:** the smallest part of a compound; two or more elements
- neutrons:** the particles of the nucleus that have no charge
- noble gases:** the unreactive elements in Group 18 of the periodic table; their atoms have eight electrons in their outer level
- nonmetals:** elements that are dull and poor conductors of thermal energy and electric current
- particle:** a really small portion of matter
- period:** a horizontal row of elements in the periodic table
- products:** the substances formed from a chemical reaction
- protons:** the positively charged particles of the nucleus; the number of protons in a nucleus is the atomic number that determines the identity of an element
- reactant:** the starting materials in a chemical reaction
- Ernest Rutherford:** 1911 discovered the positively charged nucleus of atoms; negative electrons traveling around positive nucleus
- scientific method:** model or guide used to gather information and solve problems
- solid:** the state where matter has a definite shape and definite volume
- JJ Thomson:** 1897 identified electrons as particles found in every atom; plum pudding model
- volume:** amount of space something takes up
- water displacement:** a method of measuring the volume of an irregular shaped object by the amount of water it displaces
- watershed:** the area of land that includes a particular river or lake and all the rivers, streams, and tributaries that flow into it
- weight:** measure of the pull of gravity on an object
- wetland:** land that has a wet and spongy soil, such as a marsh, swamp, or bog
- x-axis:** the data that is plotted on the horizontal part of a graph
- y-axis:** the data that is plotted on the vertical part of a graph

## Chemistry Review

1. Physical Property: _____	A. The change of state from a solid to a gas.
2. Density: _____	B. Vaporization that occurs throughout the liquid.
3. Matter: _____	C. Vaporization that occurs at the surface of a liquid below it's boiling point.
4. Volume: _____	D. Change of state from a liquid to a solid.
5. Mass: _____	E. Change of state from a solid to a liquid.
6. Change of State: _____	F. State of matter that takes the shape of the container it is in.
7. Melting Point: _____	G. State of matter that does not have a definite shape or volume.
8. Boiling Point: _____	H. mass per volume
9. Vaporization: _____	I. the ability to dissolve in another substance.
10. Boiling: _____	J. The temperature at which a substance changes from a solid to a liquid.
11. Melting: _____	K. The state of matter that has a definite shape and volume.
12. Evaporation: _____	L. Property of matter that can be observed or measured without changing the identity of matter.
13. Solubility: _____	K. Property of matter that occurs when one or more substances are changed into entirely new substance.
14. Condensation: _____	L. The part of the experiment that you change.

15. Sublimation: _____	M. The part of the experiment that is the results or outcome.
16. Independent Variable: _____	N. The amount of matter that something is made.
17. Dependent Variable: _____	O. The amount of space that something occupies.
18. Liquid: _____	P. Anything that has volume and mass.
19. Solid: _____	Q. The change of state from a gas to a liquid.
20. Gas: _____	R. Change of state from a liquid to gas
21. Chemical Property: _____	S. The temperature at which a substance goes from a liquid to a gas.
22. Freezing: _____	T. The conversion of a substance from one physical form to another.

### True/False

*Indicate whether the statement is true or false.*

\_\_\_\_ 1. Matter is anything that has mass and takes up space.

\_\_\_\_ 2. A physical property can be measured without changing the identity of the substance.



## Multiple Choice

Identify the choice that best completes the statement or answers the question.

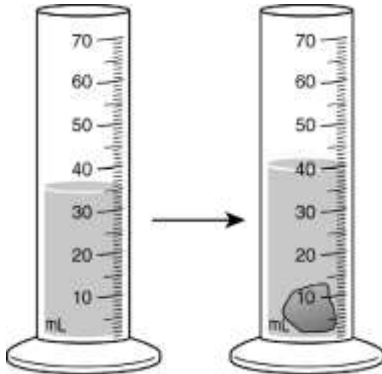
\_\_\_\_ 1. The density of aluminum is  $2.7 \text{ g/cm}^3$ . What is the volume of a piece of aluminum if its mass is 8.1 grams?

b)  $3.0 \text{ cm}^3$

d)  $2.7 \text{ cm}^3$

f)  $0.33 \text{ cm}^3$

\_\_\_\_ 2. A rock is dropped into a graduated cylinder filled with 35 mL of water.



What is the volume of the rock? (Hint:  $1 \text{ mL water} = 1 \text{ cm}^3$ )

b)  $40 \text{ cm}^3$

d)  $14 \text{ cm}^3$

f)  $5 \text{ cm}^3$

h)  $35 \text{ cm}^3$

\_\_\_\_\_ 3. Magnetism, solubility, and malleability are physical properties of matter. What makes these properties different from chemical properties?

- b) Physical properties relate to elements rather than compounds.
- d) Physical properties appear only after a chemical change occurs.
- f) Physical properties can be observed without attempting to change the identity of the substance.
- h) Physical properties describe elements in the solid state rather than in the liquid or gas state.

\_\_\_\_\_ 4. Which of these choices is a physical property that does not change when the size of the sample changes?

- b) mass
- d) volume
- f) density
- h) flammability

\_\_\_\_\_ 5. The pictures below show four objects—a paper clip, a pair of scissors, a needle, and a horseshoe. Assume that each object is made of the same metal.



\_\_\_\_\_ 6. Which of these is a chemical property of a sheet of paper?

- c) The paper can be burned.
- e) The paper can be crumpled.
- g) The paper does not attract a magnet.
- i) The paper does not conduct electricity.

\_\_\_\_\_ 7. Which of these statements describes a chemical property of an object?

- b) The object is white in color.
- d) The object has a powdery texture.
- f) The object's density is  $2.11 \text{ g/cm}^3$ .
- h) The object reacts with acid to form water.

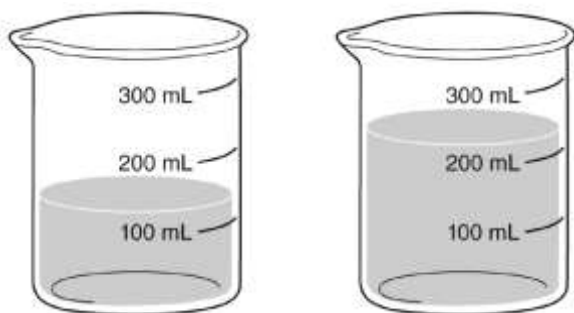
\_\_\_\_\_ 8. Some properties are the same in a substance no matter the amount of the substance. Which of the following properties does not change based on the amount of the substance?

- b) density
- d) mass
- f) volume
- h) Weight

\_\_\_\_ 9. All matter has physical and chemical properties. These properties can be used to identify the type of matter. Which of these statements describes a chemical property?

- b) A particular substance evaporates at 30 °C.
- d) A 2-ft.-long metal bar has a mass of only 176 g.
- f) A certain heavy metal turns to a liquid at room temperature.
- h) A metal is added to a beaker of water, and the beaker explodes.

\_\_\_\_ 10. The two beakers shown below contain pure water.



Which of these properties is the same for the water in both beakers?

- b) mass
- d) weight
- f) density
- i) volume

\_\_\_\_ 11. Which of these choices is an example of a physical property?

- b) the tarnishing of silverware
- d) the texture of a piece of chocolate
- f) the effect of acid rain on automobiles
- h) the combustion of gasoline in a car engine

\_\_\_ 12. Which of these statements best describes physical properties?

- b) Physical properties behave identically for all matter under the same conditions.
- d) Physical properties can be observed without changing the identity of a substance.
- f) Physical properties are observed by seeing how a substance reacts with other substances.
- h) Physical properties cause atoms and molecules to change structure when substances are mixed.

\_\_\_ 13. Which of these statements describes an example of a chemical property?

- b) A silver statue begins to tarnish.
- d) A painter coats a building with red paint.
- f) A freshly waxed floor has a bright shine.
- h) A metal turns to liquid at a certain temperature.

\_\_\_ 14. One chemical property that can be measured in a substance is its reactivity with water. What is another chemical property?

- b) density
- d) flammability
- f) malleability
- h) solubility

\_\_\_\_\_ 15. A beaker containing ice and water is placed on a warm hotplate. Will the ice in the beaker undergo a physical or chemical change?

- a) a physical change because it will change state
- b) a chemical change because it will change state
- c) a physical change because it will form a new substance
- d) a chemical change because it will form a new substance

**Short Answer**

1. An unknown substance has a volume of 2 cm<sup>3</sup> and a mass of 38.6 grams. What is the density of the sample?

Material	Density (g/cm <sup>3</sup> )
Water	1.0
Aluminum	2.7
Iron	7.9
Silver	10.5
Gold	19.3

Use the chart above to determine the identity of the unknown sample:

List three other physical properties that could be used to identify this sample.

2. Name a physical OR chemical property. Explain why this property is either physical or chemical.

**Fill in the blank using the following words: (*hint: some of your words might be used more than once*)**

**Element, Compound, Metal, Nonmetal, Particle, Metalloid,**

1. A pure substance must be either a(n) \_\_\_\_\_ or a(n) \_\_\_\_\_.
2. Elements that are brittle and dull are \_\_\_\_\_.
3. A (n) \_\_\_\_\_ is pure substance composed of two or more elements chemically combined.
4. A pure substance is a substance in which there is only one type of \_\_\_\_\_.
5. A (n) \_\_\_\_\_ is a pure substance that cannot be separated into simpler substances.
6. \_\_\_\_\_ are shiny, good conductors of thermal energy and electrical current.
7. \_\_\_\_\_ are semi-conductors that have properties of both metals and nonmetals.

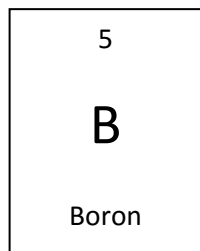
**Multiple Choice:**

1. Elements are divided into three categories:
  - a. Compounds, mixtures, and nonmetals
  - b. Mixtures, metals and compounds
  - c. Nonmetals, Metalloids, and Metals
  - d. Mixtures, Chemicals, and Compounds
2. Which of the following best describes chicken noodle soup?
  - a. Element
  - b. Mixture
  - c. Compound
  - d. Solution
3. Which of the following substances can be separated into simpler substance only by **chemical means**?
  - a. Sodium
  - b. Salt water
  - c. Water
  - d. Gold

4. What is the name of the element for Na as a symbol on the Periodic Table?
  - a. Magnesium
  - b. Radium
  - c. Niobium
  - d. Sodium
5. What is the symbol for Potassium on the Periodic Table?
  - a. Rb
  - b. P
  - c. K
  - d. Pb
6. What is the symbol for Vanadium on the Periodic Table?
  - a. Va
  - b. V
  - c. Vm
  - d. Vd
7. Ag is the symbol for which of the following metals?
  - a. Argentium
  - b. Gold
  - c. Silver
  - d. Antimony
8. Is Germanium a:
  - a. Metal
  - b. Nonmetal
  - c. Metalloid
  - d. Compound
9. Is Phosphorus a:
  - a. Metal
  - b. Nonmetal
  - c. Metalloid
  - d. Compound
10. Choose the combination of elements needed to create an Ionic bond.
11. Choose the combination of elements needed to create a covalent bond.



Draw a Bohr model of a Boron (B) atom.



*Scientists: Match the scientist/model with the description below. Each term will be used once.*

a. Electron Cloud Model

d. JJ Thomson

b. John Dalton

e. Niels Bohr

c. Ernest Rutherford

1. \_\_\_\_\_ First to say that different elements had different types of atoms
2. \_\_\_\_\_ This is the model that we use today. It shows areas where you *might* find an electron.
3. \_\_\_\_\_ He discovered the atom is mostly empty space.
4. \_\_\_\_\_ He had the “plum pudding model” with electrons suspended in positively charged material.
5. \_\_\_\_\_ His model, also called the “planetary model,” it shows the electrons “orbiting” the nucleus in an orderly fashion.

*Fill in the blanks with the following terms. Each word will be used once.*

Period	metals	groups	valence electrons	periodic table
energy levels	atomic number	nonmetals	metalloids	alkali metals

7. The periodic table is organized into vertical columns called \_\_\_\_\_.

8. These columns share the same number of \_\_\_\_\_.

9. It is also organized into horizontal rows called \_\_\_\_\_.

10. These horizontal rows share the same number of \_\_\_\_\_.

11. Atoms increase in \_\_\_\_\_ as you go across a row or down a column.

12. There are a large number of \_\_\_\_\_ on the periodic table. They are found on the left side of the stair-step.

13. The \_\_\_\_\_ are found on the right side of the stair-step.

14. The elements touching the staircase have some things in common with metals and some things in common with nonmetals. They are called \_\_\_\_\_ or semimetals.

*#15- 20 Fill in the chart. You may use a periodic table to answer these.*

Element Name	Element Symbol	# of Protons	# Neutrons	#Electrons
Calcium	Ca		20	
	Na		12	11
	Ag	47		47

*Fill in the blanks with the following terms. Some words may not be used!*

atomic number, negative, positive, neutral, proton, electron, neutron, nucleus, charge, group, period, noble, gas, atomic mass, alkali metals, periodic table

21. The center of an atom is called the \_\_\_\_\_.

22. A proton has a \_\_\_\_\_ charge.

23. A neutron has a \_\_\_\_\_ charge.

24. If I add a proton to an atom, I change its \_\_\_\_\_.

25. If I change the number of electrons on an atom, I change its \_\_\_\_\_ and make an ion.

**What You Need to Know (WYNTK):**

1. What is the difference between the independent variable and dependent variable?
2. What is the importance of constants in an experiment?
3. What is the function of the control?
4. What are the SI units for length, mass, volume, and temperature?
5. Convert 500 cm to kilo, deci, centi, milli meters
6. What does the Particle Theory of Matter tell us about matter?
7. Describe the properties of the three states of matter in terms of shape and volume (definite or indefinite)
8. Describe the movement of particles in solids, liquids and gases.
9. What is the formula for finding the volume of a rectangular shaped solid?
  - a. What is the metric unit for volume of a solid?
11. Describe how you would find the volume of an irregular shaped solid?

What is the metric unit for the volume of a liquid?

How do the metric units for the volumes of solid and liquid compare?

12. What is density?

13. How do you calculate density?

What is the metric unit for density? (p.27)

14. What is the difference between a physical and chemical property of matter?

15. Label a PP beside the following if it refers to a physical property and CP if it refers to a chemical property.

Rusting \_\_\_\_\_ Density \_\_\_\_\_

Expansion and contraction \_\_\_\_\_ Malleable \_\_\_\_\_

Combustible \_\_\_\_\_ Oxidation \_\_\_\_\_

16. Draw a pH scale from 0-14. On the scale label weak acid, weak base, strong acid, strong base and a neutral substance.

17. What is the smallest particle of an element?

18. What is the smallest particle of compound?

## Chemistry Review

**Directions:** Using the periodic table fill in the blanks with the correct information for each element.

<u>Element</u>	<u>Atomic Number</u>	<u>Atomic Mass</u>	<u>Protons</u>	<u>Neutrons</u>	<u>Electrons</u>
<u>N</u>					
<u>Br</u>					
<u>Kr</u>					
<u>V</u>					
<u>Ag</u>					
<u>Ge</u>					
<u>Cu</u>					
<u>Zn</u>					
<u>Ca</u>					
<u>K</u>					

# What's the Difference?

## Atom, Element, Molecule, Compound

Type of Matter	Definition	Sample Drawing	Symbol or Formula
ELEMENT	A pure substance made up of only one kind of atom that cannot be broken down into simpler substances.		
ATOM	The smallest particle of an element that still keeps the properties of that element		
MOLECULE	The smallest particle of a substance that has all the properties of that substance; made of 2 or more atoms that are chemically bonded		
COMPOUND	A substance made up of 2 or more different elements whose atoms are chemically bonded.		

# Atom? Element? Molecule? Compound?

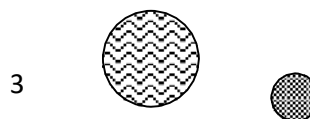
Directions: Study each picture below. In the spaces provided, identify how many atoms, elements, molecules, and compounds there are.



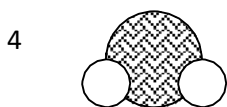
atoms \_\_\_\_\_  
elements \_\_\_\_\_  
molecules \_\_\_\_\_  
compounds \_\_\_\_\_



atoms \_\_\_\_\_  
elements \_\_\_\_\_  
molecules \_\_\_\_\_  
compounds \_\_\_\_\_



atoms \_\_\_\_\_  
elements \_\_\_\_\_  
molecules \_\_\_\_\_  
compounds \_\_\_\_\_



atoms \_\_\_\_\_  
elements \_\_\_\_\_  
molecules \_\_\_\_\_  
compounds \_\_\_\_\_



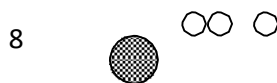
atoms \_\_\_\_\_  
elements \_\_\_\_\_  
molecules \_\_\_\_\_  
compounds \_\_\_\_\_



atoms \_\_\_\_\_  
elements \_\_\_\_\_  
molecules \_\_\_\_\_  
compounds \_\_\_\_\_



atoms \_\_\_\_\_  
elements \_\_\_\_\_  
molecules \_\_\_\_\_  
compounds \_\_\_\_\_



atoms \_\_\_\_\_  
elements \_\_\_\_\_  
molecules \_\_\_\_\_  
compounds \_\_\_\_\_



atoms \_\_\_\_\_  
elements \_\_\_\_\_  
molecules \_\_\_\_\_  
compounds \_\_\_\_\_



Bohr Model and Valence Electrons Practice

Directions: Use the periodic table to fill in the following table.

Element	Bohr Model	Valence Electrons
Carbon		
Chlorine		
Hydrogen		
Phosphorus		
Oxygen		

Sulfur		
Nitrogen		
Sodium		
Chlorine		
Beryllium		
Fluorine		

Lithium		
Oxygen		
Phosphorus		

# Chemical Bonds

**Directions:** Please determine why type of chemical compound is for each of the following compounds. Don't forget to use the periodic table to assist you.

CaCl <sub>2</sub>		MgO	
CO <sub>2</sub>		HCl	
H <sub>2</sub> O		KI	
K <sub>2</sub> O		NO <sub>2</sub>	
NaF		FeCl <sub>3</sub>	
CH <sub>4</sub>		P <sub>2</sub> O <sub>5</sub>	
SO <sub>3</sub>		N <sub>2</sub> O <sub>3</sub>	
LiBr		NaCl	

# Valence Electrons

**Directions:** Using the periodic table, determine how many valence electrons each of the following elements have?

Element	Valence Electrons
Fluorine	
Lithium	
Phosphorus	
Calcium	
Nitrogen	
Iron	
Argon	
Potassium	
Helium	
Magnesium	
Carbon	
Oxygen	

# Navigating the Periodic Table

**Directions:** Use the periodic table to answer the following questions.

1. Count the number of elements in the periodic table. Record your answer
2. Describe the different types of information each individual box contains.
3. What is meant by the atomic number? Where is this number found in each box?
4. What is the atomic number of Boron?
5. What is meant by the term chemical symbol?
6. What is the chemical symbol for Iron?
7. What is atomic mass?
8. What is the atomic mass of Oxygen?
9. What is the atomic mass of Uranium?
10. Explain why the atomic mass of Uranium is so much greater than the atomic mass of Oxygen?
11. Why are most of the atomic masses in the periodic table decimals? Describe how the atomic mass is arrived at in relation to the isotopes of a given element.
12. Describe the trend you notice regarding the atomic number as you go from left to right in the periodic table
13. What are the columns in the periodic table called?
14. Explain why the block of elements at the bottom of the table are separated from the rest of the table.
15. Which element has an atomic mass of about 12?

## *Periodic Table Scavenger Hunt*

### Directions:

Use the periodic table of elements and your text book to explore and learn to use the periodictable.

To answer each of the questions below, provide element name and atomic number. (Example: Carbon-12)

### Section 1: Names and Symbols

1. Find at least 3 elements named after countries
2. Find at least 3 elements named after scientists (and name the scientist)
3. Find 1 element named after a state and one named after a continent
4. Find 3 elements named after planets
5. Find 1 element that sounds like your name and 1 that sounds like it should be in a comic book
6. Find at least 5 elements whose symbols **do not** match their names
7. What is the only letter **not** appearing on the periodic table as a symbol or part of the symbol?

### Section 2: Families and Periods

Define:

1. Families:
2. Periods –

Without repeating the elements you found above, answer the following questions:

3. Find three elements in the same family
4. Find three elements in the same period

### **Section 3: Elements in every day life.**

1. Find the element that makes plumbing pipes. Is it a metal, nonmetal or metalloid?
2. Find the element that makes glowing signs, what special group is it in?
3. Find the element that makes milk good for your health. Is it a metal, nonmetal or metalloid?

## SECTION

## 3

## Reinforcement

## Drawings, Tables, and Graphs

**Directions:** Match the information in Column I with the best way to display it from Column II. Write the letter of the correct term in the blank at the left. A letter may be used more than once.

## Column I

- \_\_\_\_\_ 1. view of Earth from space
- \_\_\_\_\_ 2. amount of rainfall in an area each month for a year
- \_\_\_\_\_ 3. how the constellations change position over several hours
- \_\_\_\_\_ 4. percents of the most abundant metals in Earth's crust
- \_\_\_\_\_ 5. percents of the different gases in the atmosphere on Mars
- \_\_\_\_\_ 6. how far a hurricane moves each hour
- \_\_\_\_\_ 7. structure of the human ear
- \_\_\_\_\_ 8. daily high and low tide times for a week
- \_\_\_\_\_ 9. how a sound wave travels through the air

## Column II

- a. bar graph
- b. circle graph
- c. drawing
- d. line graph
- e. movie
- f. photograph
- g. table

**Directions:** Use the paragraph below to complete question 10.

Some animals can live much longer than others. For example, both the golden eagle and the blue whale have a maximum life span of more than 80 years, while a guppy's maximum life span is only 5 years. A giant spider may live 20 years, a lobster 50 years, and a crocodile may live 60 years.

10. Make a chart and draw a graph to display the data given in the paragraph.



Directed Reading for  
Content Mastery

**Section 2 ■ SI Units**  
**Section 3 ■ Drawings, Tables, and Graphs**

**Directions:** Write the letter of the correct term in Column II next to its description in Column I.

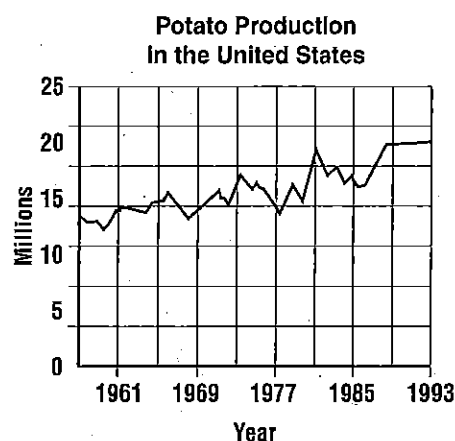
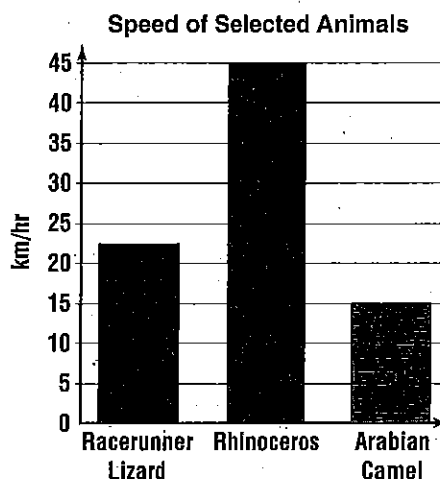
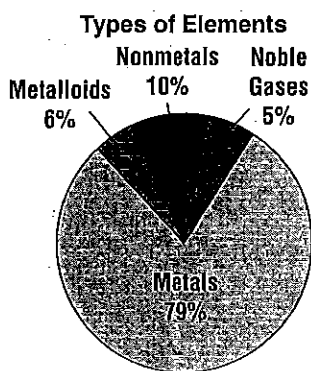
**Column I**

- \_\_\_\_\_ 1. amount of change of one measurement in a given amount of time
- \_\_\_\_\_ 2. instrument used to measure temperature
- \_\_\_\_\_ 3. SI unit of weight
- \_\_\_\_\_ 4. SI unit of length
- \_\_\_\_\_ 5. instrument used to measure mass
- \_\_\_\_\_ 6. unit used to express volume
- \_\_\_\_\_ 7. SI unit of time

**Column II**

- a. meter
- b. newton
- c. cubic meter
- d. pan balance
- e. thermometer
- f. second
- g. rate

**Directions:** Label each graph as a circle graph, bar graph, or line graph. Then complete the sentences below.



8. \_\_\_\_\_ 9. \_\_\_\_\_ 10. \_\_\_\_\_

11. The \_\_\_\_\_ graph shows relationships between two variables.
12. The \_\_\_\_\_ graph shows parts of a whole.
13. The \_\_\_\_\_ graph compares variables; one variable is divided into parts, and the other variable is a number.

## SECTION

## 1

## Reinforcement

## Description and Measurement

**Directions:** For each object below, list four questions that can be answered by making measurements.



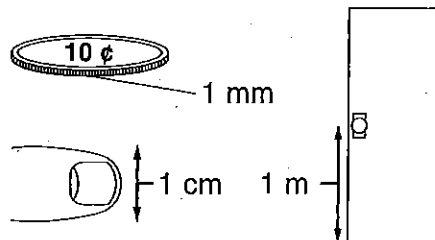
1. a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_



2. a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_

**Directions:** Use these measurements to help you estimate the measurement for each of the objects below.

3. length of a small paper clip \_\_\_\_\_
4. height of your classroom wastebasket \_\_\_\_\_
5. thickness of a staple \_\_\_\_\_
6. length of your thumb \_\_\_\_\_



**Directions:** Read the problem, then answer the questions that follow.

The length of a piece of string is known to be exactly 9.84 cm. Two students measured the string. Student A used a ruler marked in centimeters and got a measurement of 10 cm. Student B used a ruler marked in millimeters and centimeters and got a measurement of 9.8 cm.

7. Which student's measurement is more accurate? Why?

\_\_\_\_\_

\_\_\_\_\_

8. How precise is the ruler originally used to measure the string?

\_\_\_\_\_

\_\_\_\_\_

9. What is the length of the string to the nearest centimeter?

\_\_\_\_\_

10. What is the length of the string to the nearest tenth of a centimeter?

\_\_\_\_\_

# SECTION 3

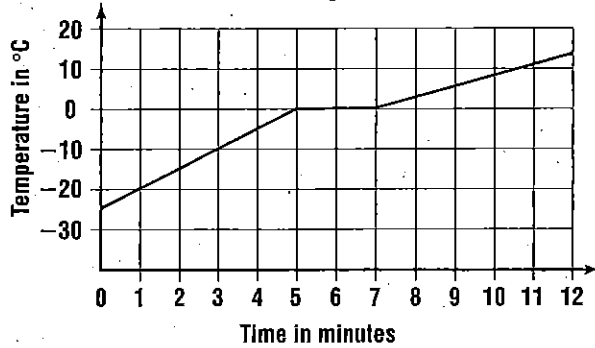
## Reinforcement

## Communicating with Graphs

**Directions:** Use the graphs below to answer the following questions.

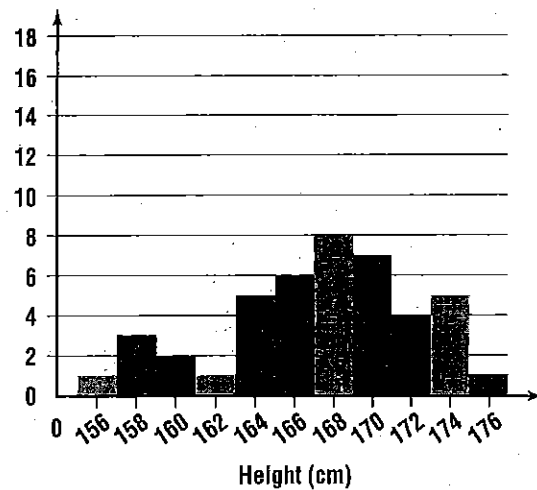
**Graph A**

Graph of Temperature versus Time  
for the Heating of Water



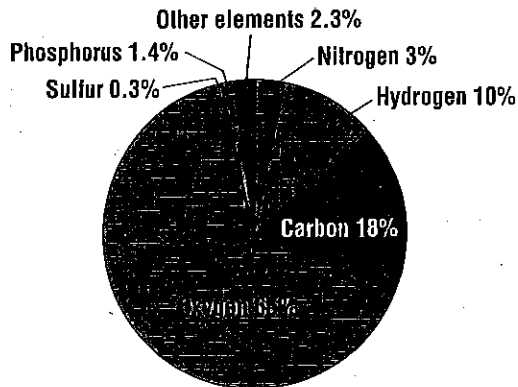
**Graph C**

Height of Students in Sarah's Class



**Graph B**

Elements Making Up Living Things



Meeting Individual Needs

1. What type of graph is shown in A? \_\_\_\_\_
2. What does graph A show? \_\_\_\_\_
3. What is the independent variable in graph A? \_\_\_\_\_
4. On what axis is the independent variable plotted? \_\_\_\_\_
5. On what axis is the dependent variable plotted? \_\_\_\_\_
6. What type of graph is graph B? \_\_\_\_\_
7. What information is shown in graph B? \_\_\_\_\_
8. What element makes up the largest part of living things? \_\_\_\_\_
9. What type of graph is graph C? \_\_\_\_\_
10. What information is shown on graph C? \_\_\_\_\_
11. What is the most common height for students in Sarah's class? \_\_\_\_\_

# SECTION 2

## Reinforcement

## Standards of Measurement

**Directions:** Complete the table below by supplying the missing information.

Measurement	Base unit	Symbol
1.	meter	5.
mass	3.	6.
2.	second	7.
temperature	4.	8.

**Directions:** In each of the following, circle the units that would most likely be used to express each kind of measurement. You may circle more than one answer for each term.

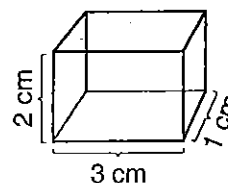
9. volume of a solid: mL m<sup>3</sup> cm<sup>3</sup> L
10. volume of a liquid: mL mg cm<sup>3</sup> L
11. density of a material: g g/cm<sup>3</sup> kg/m<sup>3</sup> L
12. temperature: °K K °C Kg
13. mass: kg K cm<sup>3</sup> mg
14. time: kg K s mm
15. length: K km m cm

**Directions:** For each pair of equations, write the letter of the equation that expresses an equal value.

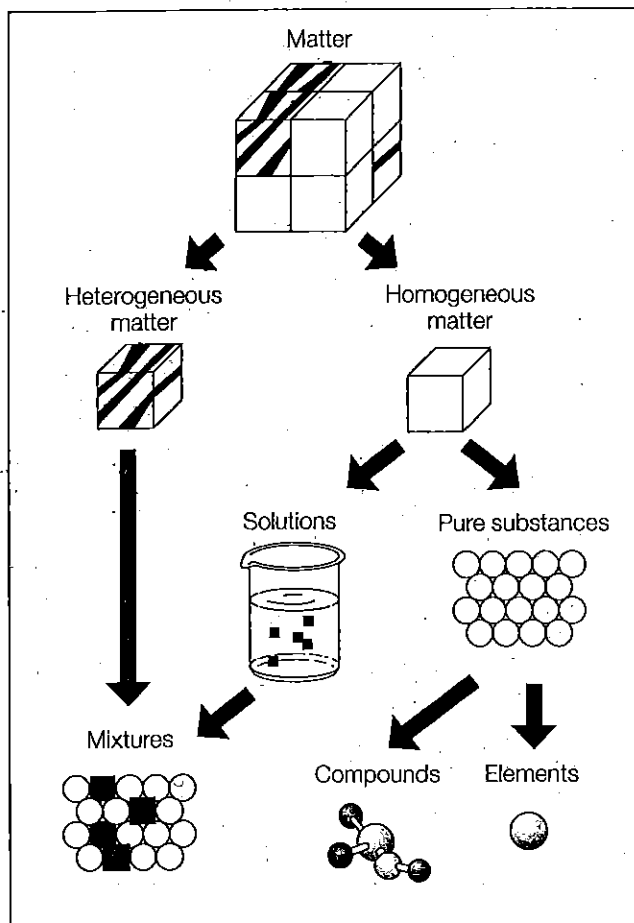
- |           |                             |                            |
|-----------|-----------------------------|----------------------------|
| _____ 16. | a. 1 L = 1 dm <sup>3</sup>  | b. 1 L = 1 cm <sup>3</sup> |
| _____ 17. | a. 1 mL = 1 cm <sup>3</sup> | b. 1 cm <sup>3</sup> = 1 L |
| _____ 18. | a. 0°C = -273 K             | b. 0 K = -273°C            |
| _____ 19. | a. 1 kg = 100 g             | b. 1,000 g = 1 kg          |
| _____ 20. | a. 400 cm = 4.0 m           | b. 400 cm = 0.40 m         |
| _____ 21. | a. 1 dm = 10 m              | b. 1 dm = 0.10 m           |
| _____ 22. | a. 100°C = 373 K            | b. 373 K = 10°C            |

**Directions:** Calculate the volume of the box in the diagram.

23. \_\_\_\_\_



# **USING SCIENCE SKILLS: Interpreting a Diagram**

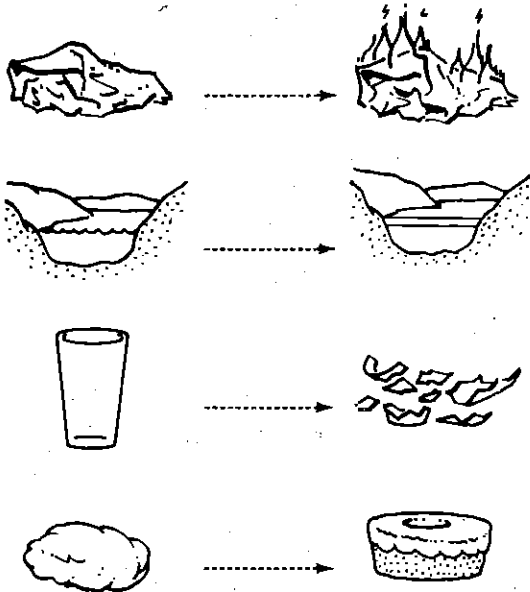


1. According to the diagram, when matter is classified according to makeup, what are the two major types of matter? \_\_\_\_\_
2. List the two main types of homogeneous matter. \_\_\_\_\_
3. List two kinds of pure substances. \_\_\_\_\_
4. List one kind of heterogeneous matter. \_\_\_\_\_
5. Where do solutions fit into this method of classification of matter? \_\_\_\_\_

# ACTIVITY ■ Physical and Chemical Changes

## Properties of Matter

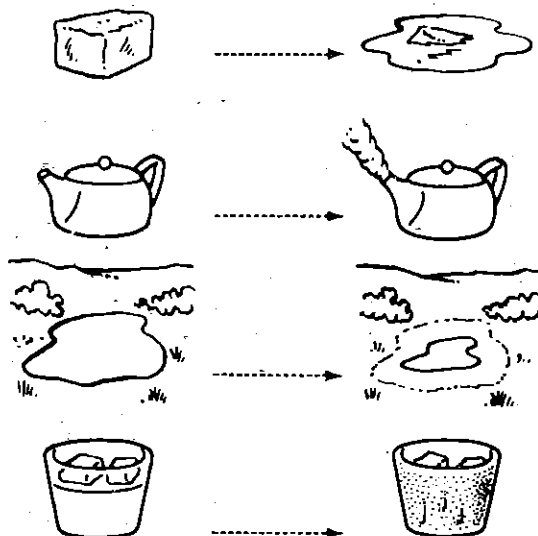
### Physical and Chemical Changes



### Type of Change

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

### Phase Changes



### Type of Physical Change in Molecular Movement

5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_



# **REVIEW and REINFORCEMENT** **Compounds**

## **Section** **4-4**

### **KEY CONCEPTS**

▲ Pure substances that are made of more than one element are called compounds.

### **Vocabulary Skills: Applying Definitions**

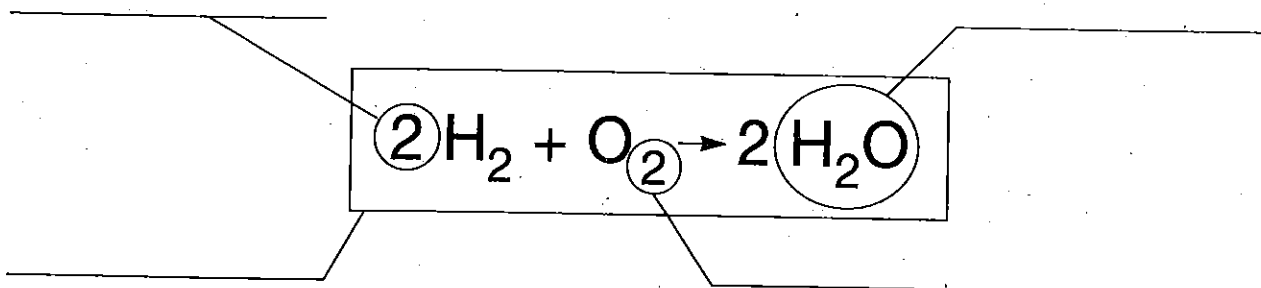
On the diagram below, label correctly each of the following:

chemical formula

chemical equation

coefficient

subscript



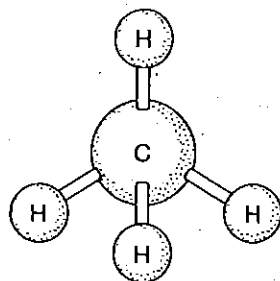
### **Elements, Compounds, and Mixtures: Reviewing the Main Ideas**

Complete the chart by filling in the correct answers to each question.

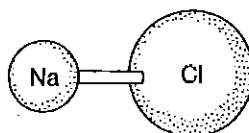
	Element	Compound	Mixture
What kind of particles make it up?			
How can it be broken down?			
Is it the same throughout?			

## ■ Writing Formulas: Applying the Main Ideas

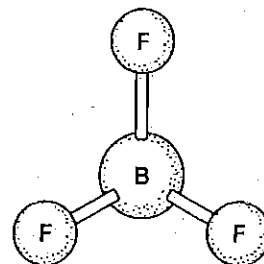
The drawings below show molecules of various compounds. Under each drawing, write the correct formula for the compound.



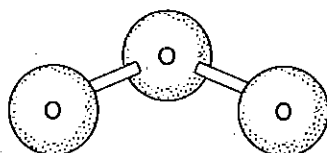
1. \_\_\_\_\_



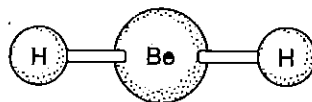
2. \_\_\_\_\_



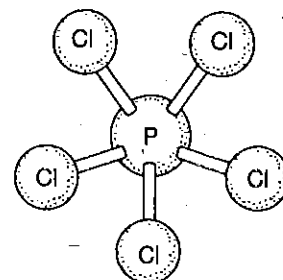
3. \_\_\_\_\_



4. \_\_\_\_\_



5. \_\_\_\_\_



6. \_\_\_\_\_



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