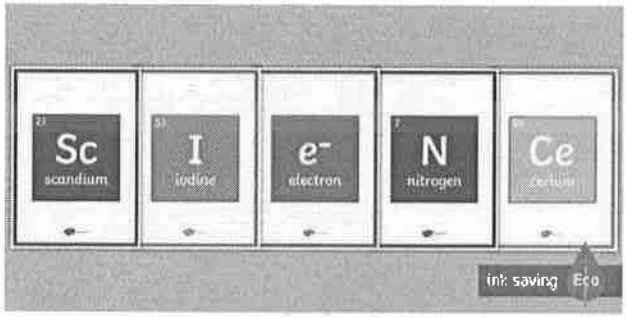

Physical Science

Grade 8

Ford & Meissner

Hello! We hope this packet finds everyone healthy and ready to continue learning! In this packet, you will find 7 lessons. Each lesson contains practice handouts and answer sheets for most assignments. You may check your own work. If you have any questions, feel free to contact either of us on email or remind.

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Remind code: ps8mei

Week 1 Science 8

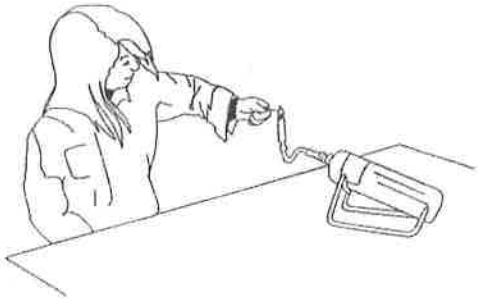
Name _____ Date ____ / ____ / ____

LABORATORY SAFETY

The pictures below show situations in which one or more safety violations are occurring, describe the problems with scenario shown.

1.

2.



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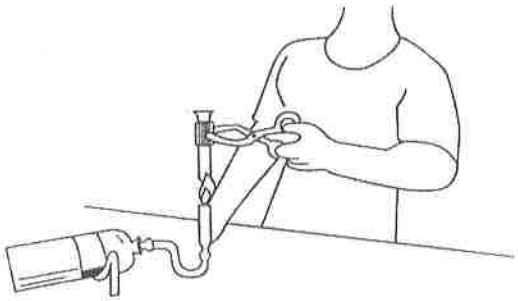

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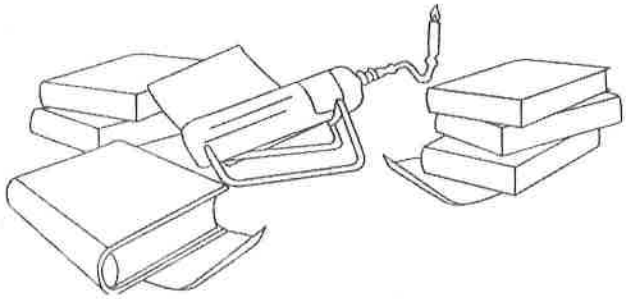


5.

6.

Name _____ Date ____ / ____ / ____

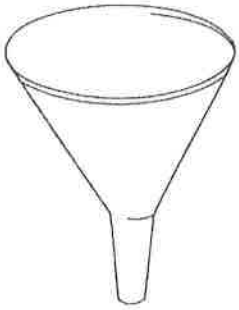
LABORATORY TOOLS AND EQUIPMENT

Using the names of pieces of lab equipment shown below, label the pictures.

a. balance **c. Bunsen burner** **e. funnel** **g. Ring stand** **i. test tube clamp**

b. beaker **d. Erlenmeyer flask** **f. graduated cylinder** **h. test tube** **j. tongs**

_____



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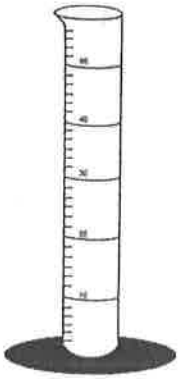

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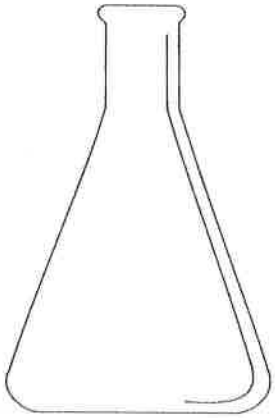

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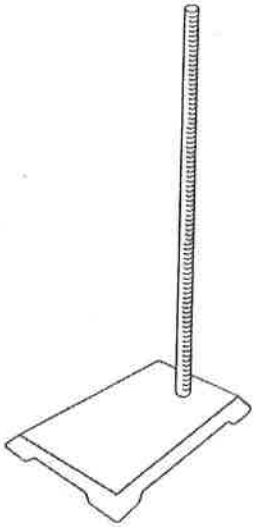

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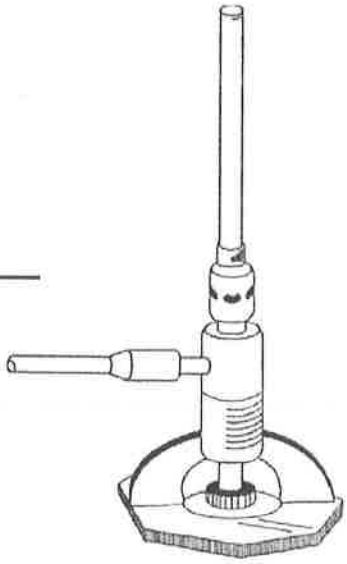

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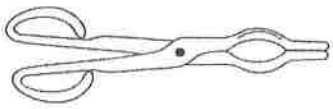

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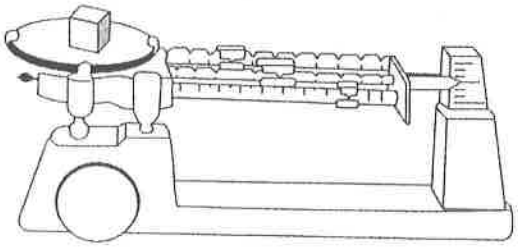

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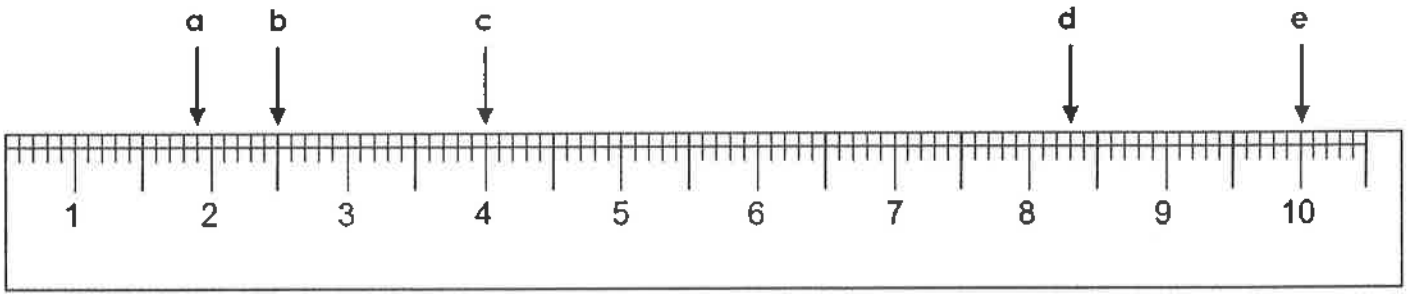
Name _____ Date ____ / ____ / ____

MEASURING LENGTH

Provide both the cm and mm lengths indicated on the ruler.



	cm	mm
a)	_____	_____
b)	_____	_____
c)	_____	_____
d)	_____	_____
e)	_____	_____

Use a ruler to measure the lines below.

f) _____

g) _____

h) _____

i) _____

j) _____

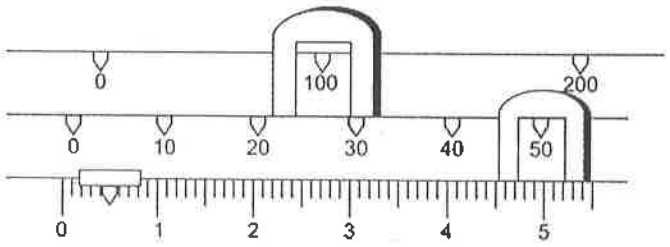
k) _____

l) _____

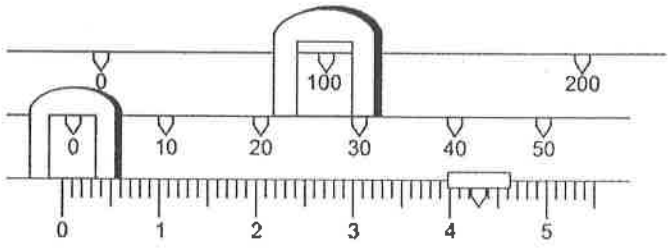
Name _____ Date ____ / ____ / ____

USING A TRIPLE BEAM BALANCE

To use a triple beam balance, we place weights on the riders on the beam until we find an arrangement when the pointer lines up with the center of the scale. Provide the mass indicated on each of the triple beam balances pictured below.



_____



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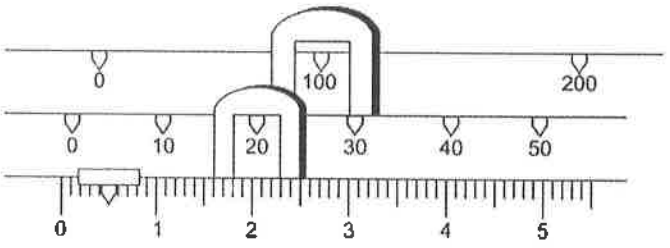

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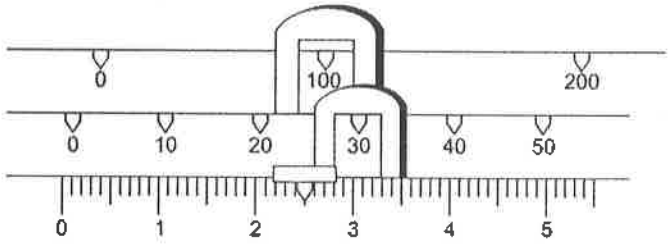

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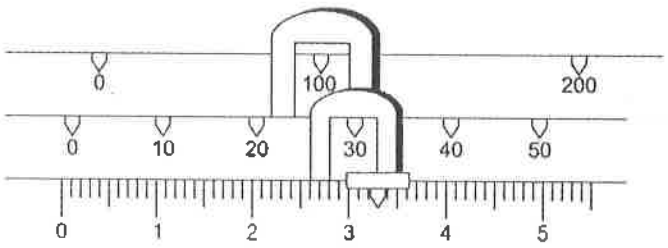

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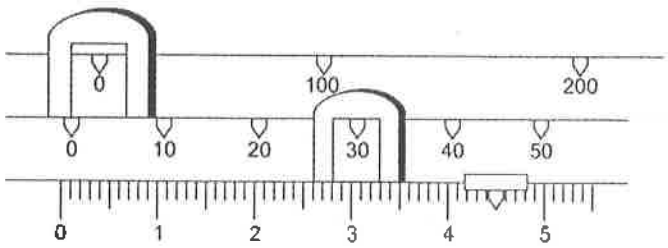
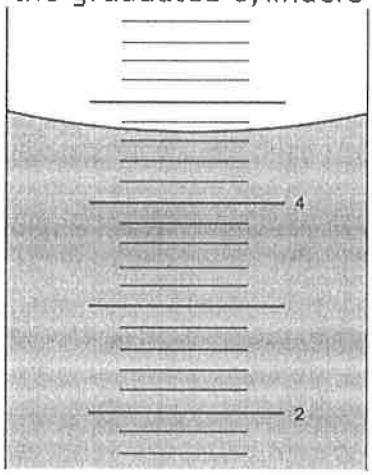


_____

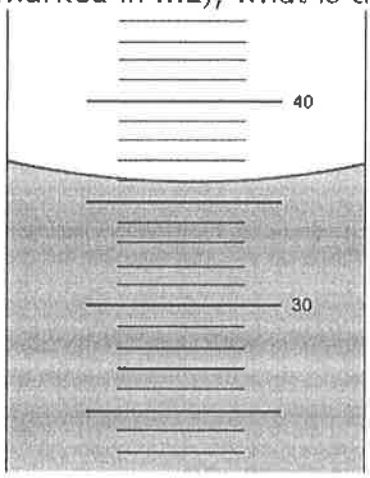
Name _____ Date ____ / ____ / ____

READING VOLUMES IN GRADUATED CYLINDERS

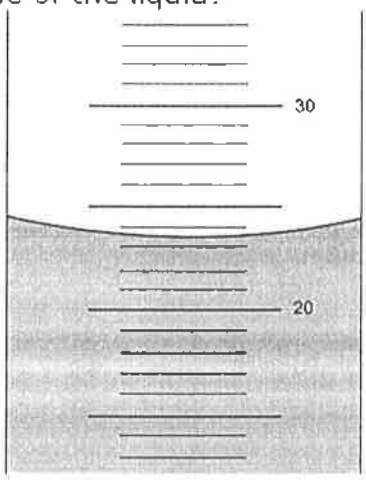
For the graduated cylinders below (marked in mL), what is the volume of the liquid?



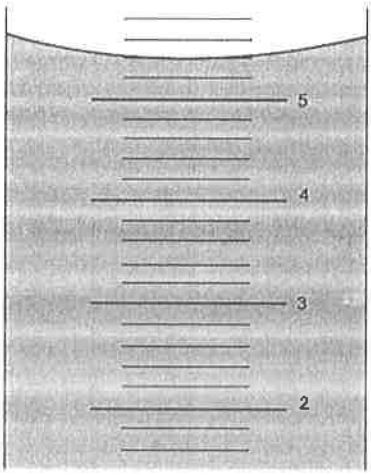
a) _____



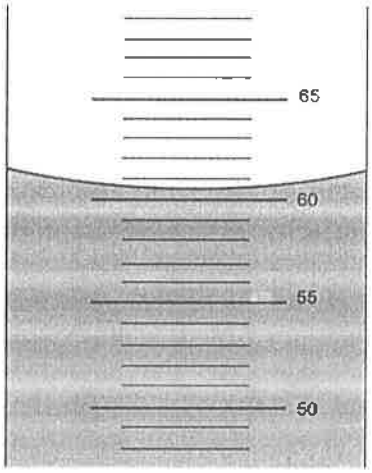
b) _____



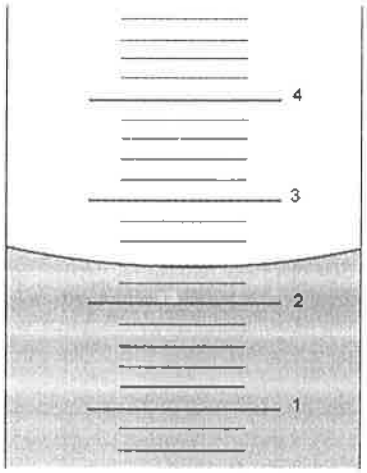
c) _____



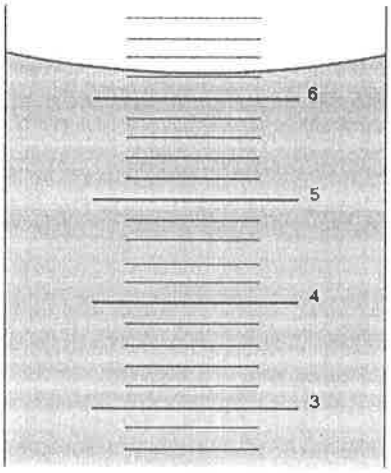
d) _____



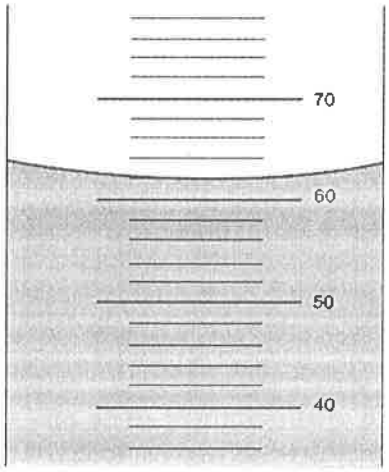
e) _____



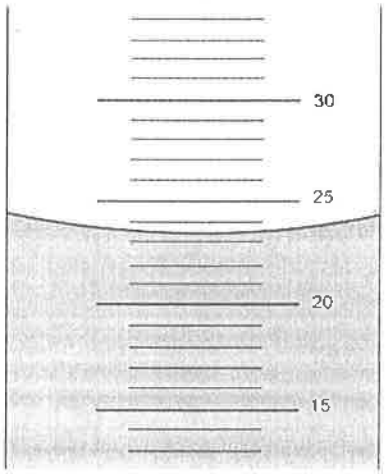
f) _____



g) ___6.21 mL___



h) ___60.2 mL___



i) ___20.33 mL___

Name _____ Date _____ / _____ / _____

DENSITY CALCULATIONS

Which is heavier, feathers or steel? Most people would answer steel, but this question does not have a real answer. To compare these two meaningfully, you need to know how much of each substance you have. A very large number of feathers could have a greater mass than a small amount of steel. To make a meaningful comparison, we must compare the masses of an identical volume of the material. Mass per volume is called density.

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

Provide the answers to the following questions.

1. If a stone with a mass of 25 g is lowered into a beaker holding a volume of water equal to 2.0 mL and the height of the water rises to 7.0 mL, what is the density?

   Answer:

2. What is the density of copper if a 10.0 cm^3 sample has a mass of 89.6 g?

   Answer:

3. What is the density of nitrogen gas if 0.256 g occupies a volume of 100 mL?

   Answer:

4. A wooden cube 3.0 cm on each side has a mass of 27 g. What is the block's density?

   Answer:

5. Assume that silver and gold have densities of 10.5 g/cm^3 and 19.3 g/cm^3 respectively. Which would have a greater mass, 5 cm^3 of silver or 5 cm^3 of gold?

   Answer:

6. Five mL of ethanol has a mass of 3.9 g whereas five mL of benzene has a mass of 4.4 g. Which liquid is denser?

   Answer:

7. Consider a block of iron with the dimensions of 2 cm x 3 cm x 2 cm. If the mass of this block is 94 g, what is the density of iron?

   Answer:

Week 1 Answers

Name _____ Date ____ / ____ / ____

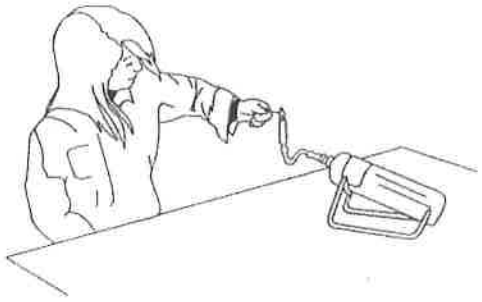
LABORATORY SAFETY

The pictures below show situations in which one or more safety violations are occurring, describe the problems with scenario shown.

1.

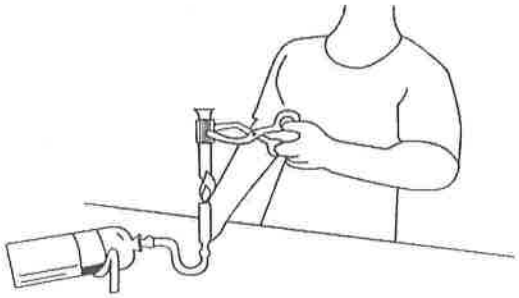
Student is not wearing safety goggles or a protective apron

2.



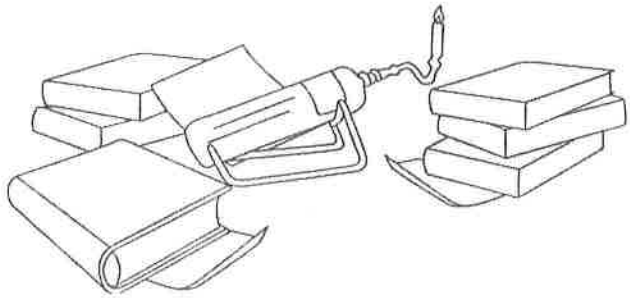
Student has loose dangling sleeves. Student's hair is not pulled back. No safety goggles or a protective apron.

3.



Position of tube is perpendicular and fire is heating directly from the bottom. No protective apron.

4.



Burner is left unattended close to flammable objects.

5.

Student is sniffing chemical too directly, the proper technique is to waft fumes lightly with hand.

6.

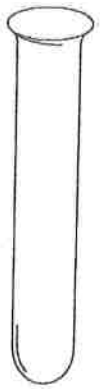
Students are playing and pushing each other, creating a dangerous situation.

Name _____ Date ____ / ____ / ____

LABORATORY TOOLS AND EQUIPMENT

Using the names of pieces of lab equipment shown below, label the pictures.

a. balance	**c. Bunsen burner**	**e. funnel**	**g. Ring stand**	**i. test tube clamp**
b. beaker	**d. Erlenmeyer flask**	**f. graduated cylinder**	**h. test tube**	**j. tongs**



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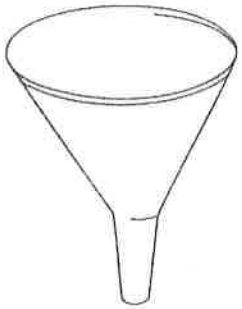
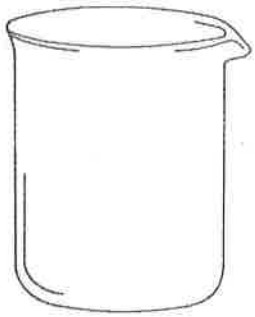
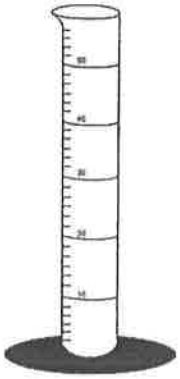


e

i



b



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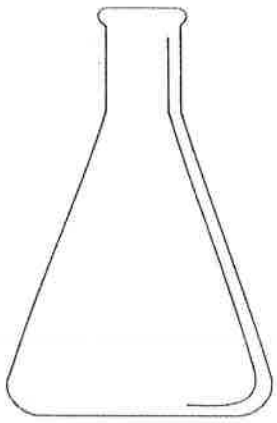

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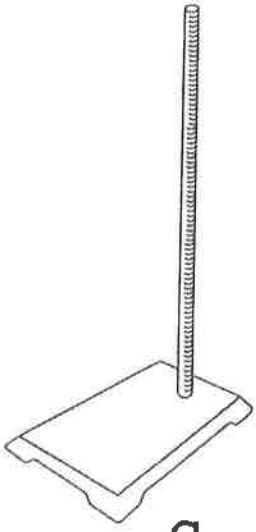
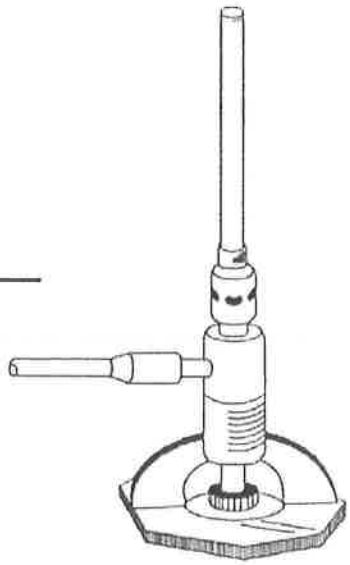
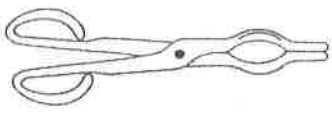


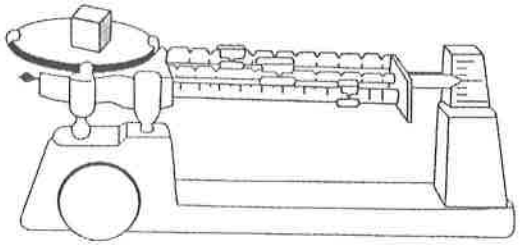
g



c



j

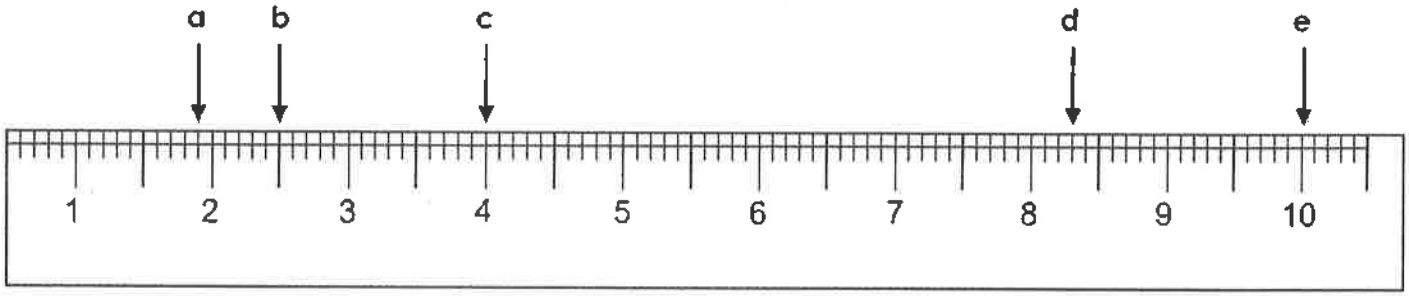


a

Name _____ Date ____ / ____ / ____

MEASURING LENGTH

Provide both the cm and mm lengths indicated on the ruler.



	cm	mm
a)	1.90	19.0
b)	2.50	25.0
c)	4.00	40.0
d)	8.30	83.0
e)	10. 00	100.0

Use a ruler to measure the lines below.

f) 1.6

g) 5.7

h)  12.6

i) 3.8

j) 0.5

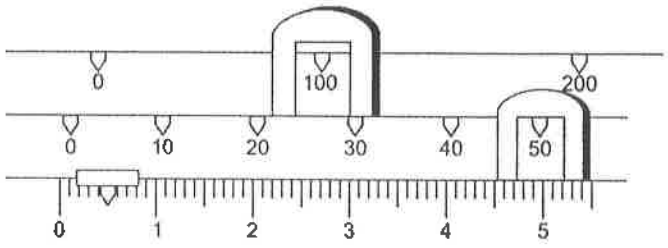
k)  10.8

l)  8.4

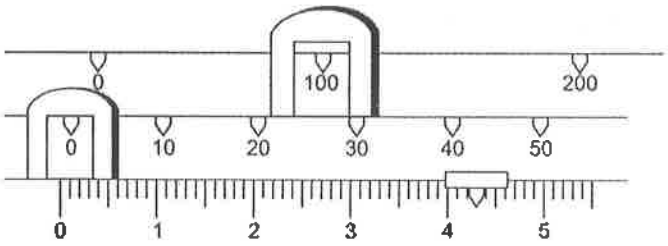
Name _____ Date ____ / ____ / ____

USING A TRIPLE BEAM BALANCE

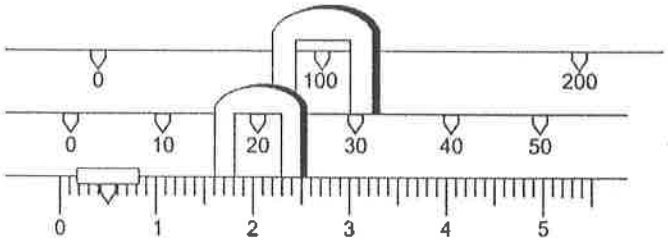
To use a triple beam balance, we place weights on the riders on the beam until we find an arrangement when the pointer lines up with the center of the scale. Provide the mass indicated on each of the triple beam balances pictured below.



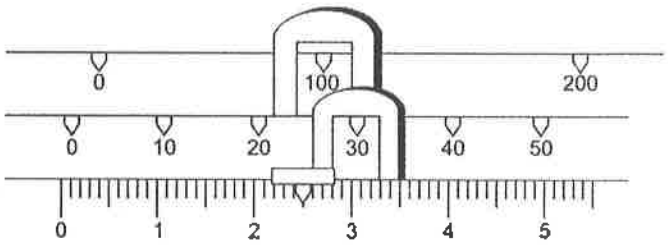
__150.5 g__



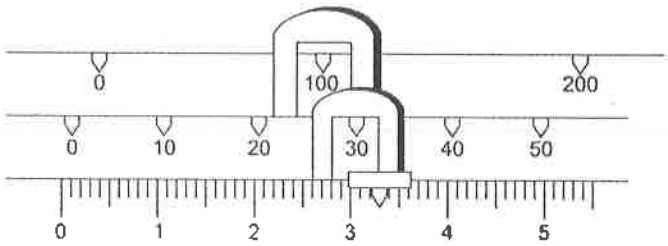
__104.3 g__



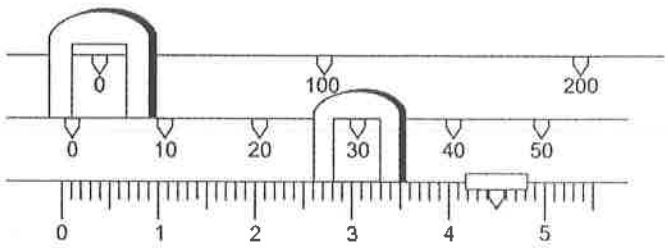
__120.5 g__



__132.5 g__



__133.3 g__

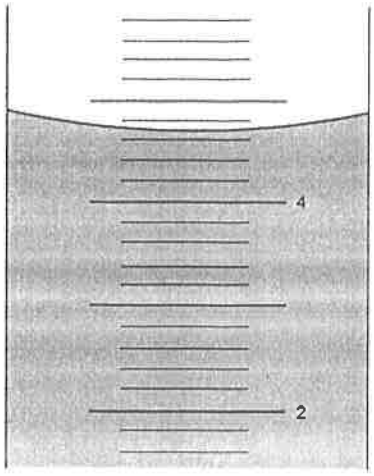


__134.5 g__

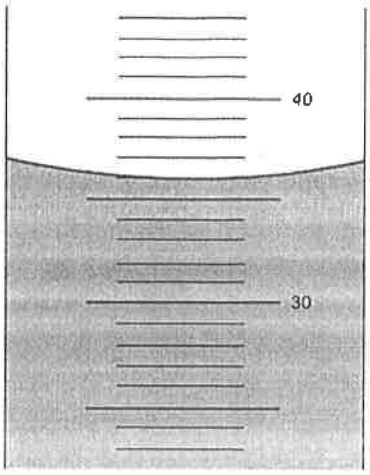
Name _____ Date ____ / ____ / ____

READING VOLUMES IN GRADUATED CYLINDERS

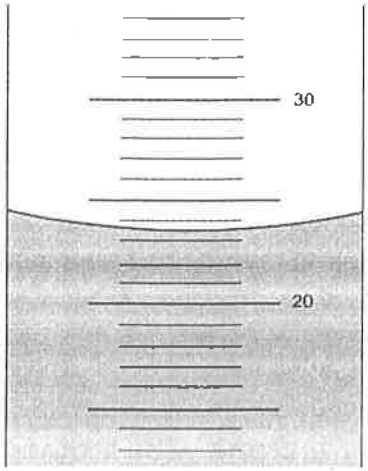
For the graduated cylinders below (marked in mL), what is the volume of the liquid?



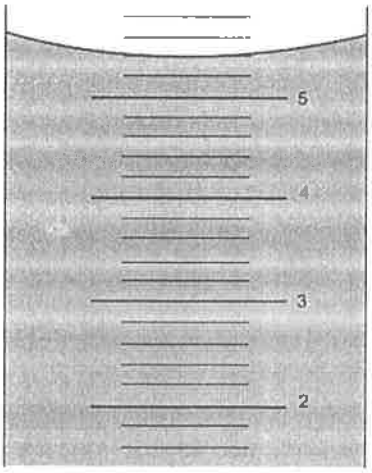
a) ___4.70 mL___



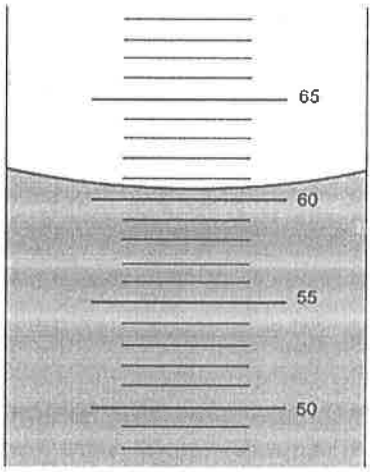
b) ___36.0 mL___



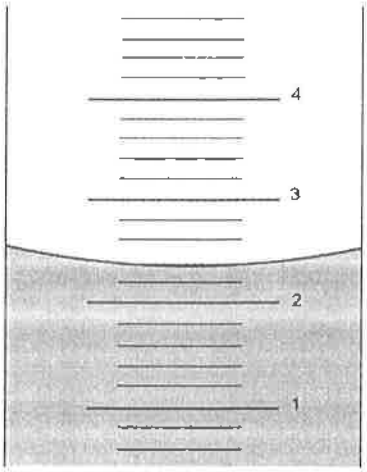
c) ___23.75 mL___



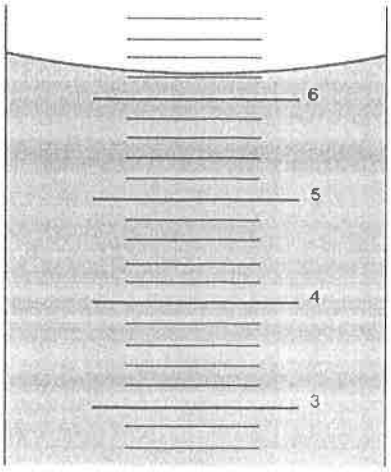
d) ___5.4 mL___



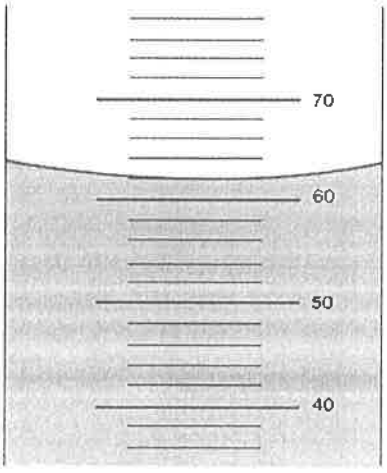
e) ___60.5 mL___



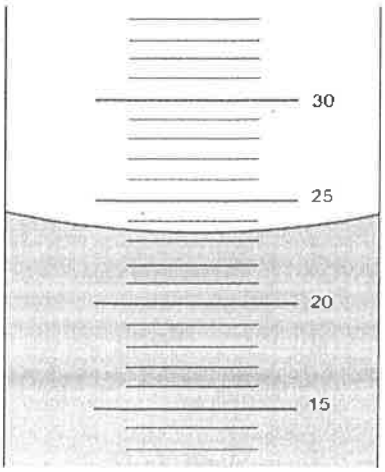
f) ___2.4 mL___



g) ___6.21 mL___



h) ___60.2 mL___



i) ___20.33 mL___

Name _____ Date ____ / ____ / ____

DENSITY CALCULATIONS

Which is heavier, feathers or steel? Most people would answer steel, but this question does not have a real answer. To compare these two meaningfully, you need to know how much of each substance you have. A very large number of feathers could have a greater mass than a small amount of steel. To make a meaningful comparison, we must compare the masses of an identical volume of the material. Mass per volume is called density.

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

Provide the answers to the following questions.

1. If a stone with a mass of 25 g is lowered into a beaker holding a volume of water equal to 2.0 mL and the height of the water rises to 7.0 mL, what is the density?

   Answer: **5.0 g/mL**

2. What is the density of copper if a 10.0 cm^3 sample has a mass of 89.6 g?

   Answer: **8.96 g/cm^3**

3. What is the density of nitrogen gas if 0.256 g occupies a volume of 100 mL?

   Answer: **2.56×10^{-3} g/mL**

4. A wooden cube 3.0 cm on each side has a mass of 27 g. What is the block's density?

   Answer: **1.0 g/cm^3**

5. Assume that silver and gold have densities of 10.5 g/cm^3 and 19.3 g/cm^3 respectively. Which would have a greater mass, 5 cm^3 of silver or 5 cm^3 of gold?

   Answer: **gold**

6. Five mL of ethanol has a mass of 3.9 g whereas five mL of benzene has a mass of 4.4 g. Which liquid is denser?

   Answer: **benzene**

7. Consider a block of iron with the dimensions of 2 cm x 3 cm x 2 cm. If the mass of this block is 94 g, what is the density of iron?

   Answer: **7.8 g/cm^3**

Week 2 Science 8

Name _____ Date ____ / ____ / ____

LOGIC OF SCIENCE AND THE SCIENTIFIC METHOD

Using the numbers 1-6, indicate the order of events in using the scientific method.

_____ Test the hypothesis by performing an experiment.

_____ Make observations and record data.

_____ Make a hypothesis and an experimental prediction.

_____ Identify the problem to be studied.

_____ Use data and results to support a conclusion.

_____ Perform background research on the problem.

Provide the letter of the definition that matches the scientific terms below.

_____ 1. control

_____ 2. conclusion

_____ 3. hypothesis

_____ 4. experiment

_____ 5. variable

_____ 6. data

_____ 7. theory

a) Using a set of observations to test a hypothesis.

b) an idea about the system being examined.

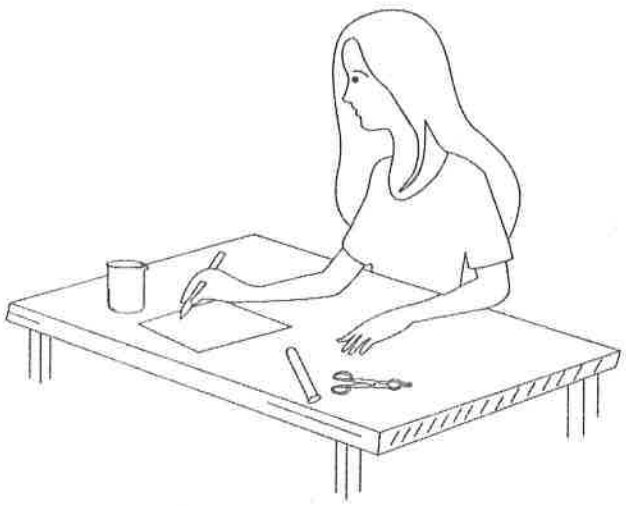
c) The numerical values recorded during an experiment or observation.

d) A decision based on the data from an experiment

e) A well-supported set of observations and explanations for natural events.

f) Set of observations used as a reference and compared to experimental observations in order to show that the result is due to the experimental treatment.

g) Name for the type of value measured that may vary in an experiment.



Name: _____ **Date:** _____

Practice with the Scientific Method

The scientific method has the following steps:

1. Ask a question
2. Form a hypothesis
3. List materials needed
4. Decide the steps in the procedure
5. Perform the experiment
6. Analyze the results
7. Draw a conclusion

In 1872 a wealthy railroad tycoon named Leland Stanford (Stanford University is named after him) made a bet with a friend about a galloping horse. Put the step number next to each step of the scientific method for this problem.

_____ Mr. Stanford proposed that the hooves of a galloping horse don't touch the ground at some point in time during the gallop.

_____ Before there were digital cameras the film in the camera needed to be developed into pictures.

_____ A racehorse, a jockey and a camera

_____ Some of the pictures showed that the horse's hooves were all in the air at the same time.

_____ Leland Stanford made a bet that the hooves of a galloping horse don't touch the ground at some point in time.

_____ Mr. Stanford decided to ask a photographer to take pictures of a horse galloping at the racetrack.

_____ The jockey rode the galloping horse around the racetrack.

_____ Mr. Stanford looked at the pictures the photographer brought him.

Name: _____ **Date:** _____

Practice with Dependent and Independent Variables

Remember –

The independent variable is what is controlled in the experiment.
The dependent variable is what is measured in the experiment.

Identify the dependent and independent variables in the following cases.

1. Hikers who wear light-weight boots can hike more hours that hikers who wear heavy boots.

   Independent variable: _____

   Dependent variable: _____

2. Sunflowers that get more water grow over six feet tall.

   Independent variable: _____

   Dependent variable: _____

3. Children who take asthma medication have fewer asthma attacks.

   Independent variable: _____

   Dependent variable: _____

4. Knee replacement patients who participate in physical therapy can climb stairs three days after surgery.

   Independent variable: _____

   Dependent variable: _____

5. People who are exposed to asbestos have a greater incidence of mesothelioma.

   Independent variable: _____

   Dependent variable: _____

Name: _____ Date: _____

Practice with Control and Experimental Groups

Remember –

The control group does not get the factor being tested.
The experimental group does get the factor being tested.

Identify the control and experimental groups in the following cases.

1. Hikers who wear light-weight boots can hike more hours that hikers who wear heavy boots.

   Control group: _____

   Experimental group: _____

2. Sunflowers that get more water grow over six feet tall.

   Control group: _____

   Experimental group: _____

3. Children who take asthma medication have fewer asthma attacks.

   Control group: _____

   Experimental group: _____

4. Knee replacement patients who participate in physical therapy can climb stairs three days after surgery.

   Control group: _____

   Experimental group: _____

5. People who are exposed to asbestos have a greater incidence of mesothelioma.

   Control group: _____

   Experimental group: _____

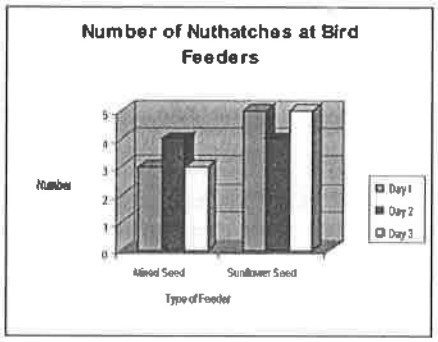
Name: _____ **Date:** _____

Practice with Experiment Conclusions

Write one sentence to the right of the graph that summarizes what the data shows in each of these experiments. Read the graphs carefully and understand the experimental values before you answer.

1. The bar graph below shows the results of an experiment conducted to determine the effects on healing time of covering a scrape with a band-aid and using antiseptic.

2. Your class is in charge of filling the bird feeders at the Nature Center at your school. You notice that the nuthatches seem to prefer to eat at the sunflower seed feeder more than they stop at the mixed seed feeder so you observe and count nuthatches at each feeder.



3. You conducted an experiment to find out if your classmates remember the first and last items in a list more than the middle items.

Scientific Investigation at Home!

Design an experiment to answer one of the following questions:

1. Which type of paper should be used to make a paper airplane fly the farthest?
2. Does adding weight to a paper airplane affect the distance it will fly?
3. Which type of tape (or glue) holds the most weight?
4. Do ice cubes melt faster in the microwave or on a stovetop?
5. Does salinity affect the boiling point of water?
6. How can you keep a cut apple from turning brown?

What is your hypothesis?

How could/will you conduct the experiment. Write out the procedures.

Independent Variable: _____

Dependent Variable: _____

Constants: _____

Control: _____

Results/Conclusion: If you are able, conduct the experiment at home. Create a graph of your results on the back and write out a conclusion.

Name _____ Date ____ / ____ / ____

LOGIC OF SCIENCE AND THE SCIENTIFIC METHOD

Using the numbers 1-6, indicate the order of events in using the scientific method.

4	Test the hypothesis by performing an experiment.
5	Make observations and record data.
3	Make a hypothesis and an experimental prediction.
1	Identify the problem to be studied.
6	Use data and results to support a conclusion.
2	Perform background research on the problem.

Provide the letter of the definition that matches the scientific terms below.

f	1. control
d	2. conclusion
b	3. hypothesis
a	4. experiment
g	5. variable
c	6. data
e	7. theory

a) Using a set of observations to test a hypothesis.

b) an idea about the system being examined.

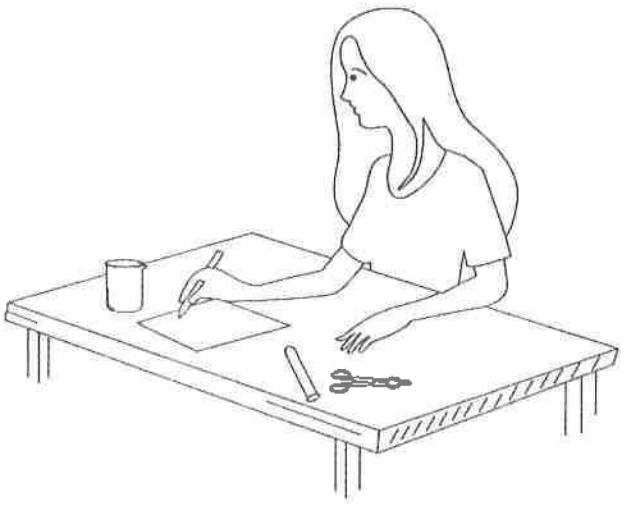
c) The numerical values recorded during an experiment or observation.

d) A decision based on the data from an experiment

e) A well-supported set of observations and explanations for natural events.

f) Set of observations used as a reference and compared to experimental observations in order to show that the result is due to the experimental treatment.

g) Name for the type of value measured that may vary in an experiment.



Answers

Practice with the Scientific Method

_2___ Mr. Stanford proposed that the hooves of a galloping horse don't touch the ground at some point in time during the gallop.
_4___ Before there were digital cameras the film in the camera needed to be developed into pictures.
_3___ A racehorse, a jockey and a camera
_7___ Some of the pictures showed that the horse's hooves were all in the air at the same time.
_1___ Leland Stanford made a bet that the hooves of a galloping horse don't touch the ground at some point in time.
_4___ Mr. Stanford decided to ask a photographer to take pictures of a horse galloping at the racetrack.
_5___ The jockey rode the galloping horse around the racetrack.
_6___ Mr. Stanford looked at the pictures the photographer brought him.

Answers

Identifying Dependent and Independent Variables

6. Independent variable: amount of water
   Dependent variable: height of plants

7. Independent variable: at-risk children who attend Head Start
   Dependent variable: grades in reading in second grade

8. Independent variable: smoking cigarettes
   Dependent variable: incidence of lung cancer

9. Independent variable: given vitamins
   Dependent variable: amount of weight gain

10. Independent variable: temperature of water
    Dependent variable: amount of dissolved sugar

Answers

Practice with Control and Experimental Groups

1. Control group: hikers wearing heavy boots
   Experimental group: hikers wearing light-weight boots

2. Control group: sunflowers getting less water
   Experimental group: sunflowers getting more water

3. Control group: children who don't take asthma medication
   Experimental group: children who do take asthma medication

4. Control group: knee replacement patients – no physical therapy
   Experimental group: knee replacement patients – physical therapy

5. Control group: people not exposed to asbestos
   Experimental group: people exposed to asbestos

Answers

Practice with Experiment Conclusions

1. The experiment shows that scrapes covered with a band-aid heal faster that scrapes not covered with a band-aid but using an antiseptic along with the band-aid does not decrease the healing time.

2. The experiment shows that nuthatches eat at the sunflower feeder more than they eat at the mixed seed feeder.

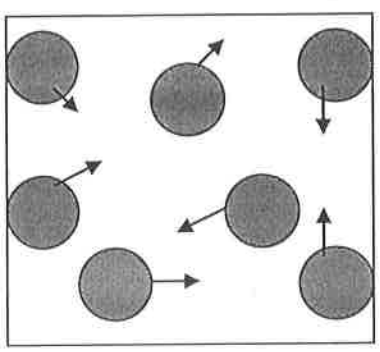
3. The experiment shows that classmates remember the first and last items of a list of words more than they remember to middle items of the list.

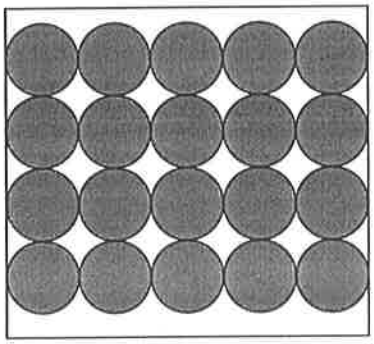
Week 3 Science 8

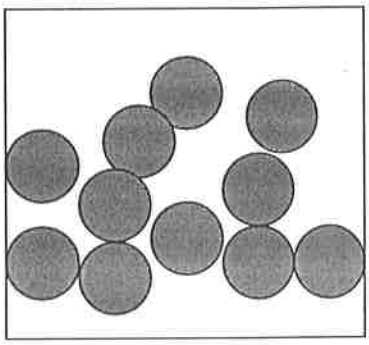
Name _____ Date _____

It's Just a Phase

1. Label the boxes solid, liquid, or gas.

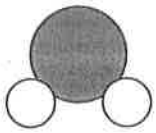






_____ _____ _____

2. Draw **four molecules** of **Water** going through all three phases.

Water Molecule 

Solid	**Liquid**	**Gas**

Name _____ Date _____

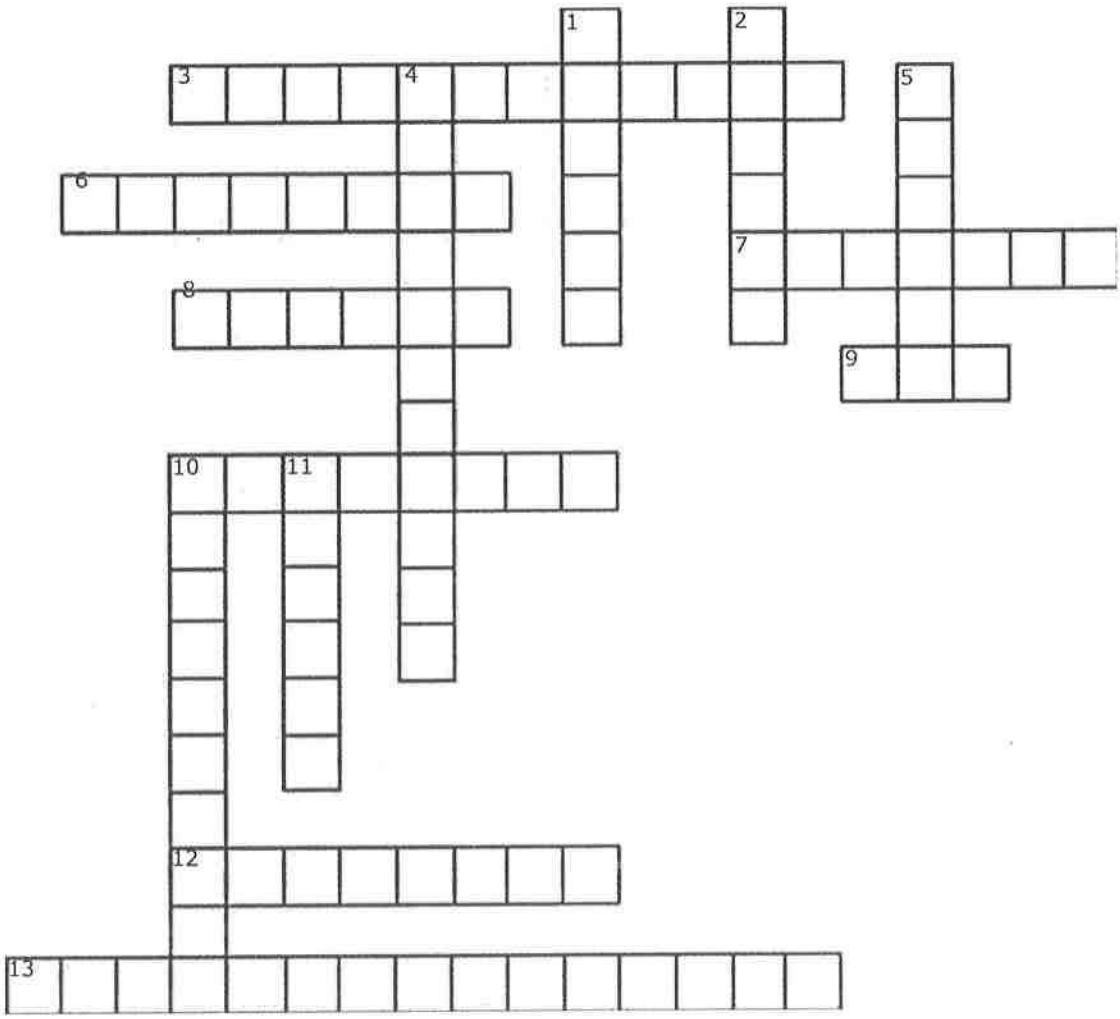
States of Matter

Circle the state of matter describe. In many cases, there can be more than one correct answer.

1. Has a definite shape.	Solid	Liquid	Gas
2. Can easily be compressed.	Solid	Liquid	Gas
3. Particles are very far apart.	Solid	Liquid	Gas
4. Particles are vibrating.	Solid	Liquid	Gas
5. Particles can flow past each other.	Solid	Liquid	Gas
6. Particles are moving quickly.	Solid	Liquid	Gas
7. Particles are very close together.	Solid	Liquid	Gas
8. The Sun is composed of matter in this phase.	Solid	Liquid	Gas

Name _____ Date ____ / ____ / ____

CROSSWORD PUZZLE: STATES OF MATTER



Across

3. Phase change for a gas into a liquid
6. A type of property can be observed without changing the substance
7. The mass of a substance per unit volume
8. Phase change for a liquid into a solid. Same as freezing
9. A state of matter with no definite volume or shape
10. A homogenous mixture
12. This type of change produces a new type of substance
13. When particles dissolved in a liquid fall out to create a solid

Down

1. A substance that has mass and volume
2. State of matter in which atoms or molecules are close together and arranged regularly
4. Phase change for a liquid into a gas
5. State of matter consisting of electrically charged particles
10. Term for materials made of the same element or compounds
11. A state of matter with a definite volume but no definite shape

Name _____

Period _____

Physical and Chemical Properties Worksheet

Classify the following properties as either chemical or physical by checking the appropriate column.

	Physical property	Chemical property
Blue color		
Density		
Flammability		
Dissolves in water		
Boils at 100 degrees		
Scratches glass		
Sour taste		
Rusting		
Exploding fireworks		
Melting point		
Reacts with H_2O to form gas		
Reacts with something to form H_2O		
Hardness		
Boiling point		
Luster (shine)		
Odor		

Matter Homework Packet

Name _____

Period _____

Physical and Chemical Changes and Properties of Matter Worksheet

Classify the following as chemical change (cc), chemical property (cp), physical change (pc), or physical property (pp).

1. _____ Heat conductivity
2. _____ Silver tarnishing
3. _____ sublimation
4. _____ magnetizing steel
5. _____ length of metal object
6. _____ shortening melting
7. _____ exploding dynamite
8. _____ Combustible
9. _____ Water freezing
10. _____ Wood burning
11. _____ Acid resistance
12. _____ Brittleness
13. _____ Milk souring
14. _____ baking bread

Identify the following as being true or false to the left of the sentence.

_____ 15. A change in size or shape is a physical change.
_____ 16. A chemical change means a new substance with new properties was formed.
_____ 17. An example of a chemical change is when water freezes.
_____ 18. When platinum is heated, then cooled to its original state, we say this is a physical change.
_____ 19. When milk turns sour, this is a physical change because a change in odor does not indicate a chemical change.
_____ 20. When citric acid and baking soda mix, carbon dioxide is produced and the temperature decreases. This must be a chemical change.

Identify each of the following as a physical or chemical change.

21. _____ You leave your bicycle out in the rain and it rusts.

22. _____ A sugar cube dissolves.

23. _____ Scientist break-up water into oxygen and hydrogen gas.

24. _____ Burning coal for a barbecue.

25. _____ Trimming a bush because it has grown too tall.

It's Just a Phase

Answer Key

1. Gas Solid Liquid

2. Answers will vary. From left to right, the molecules should spread out, move faster, and show a non-definite shape.

States of Matter

Answer Key

1. Solid

2. Liquid, Gas

3. Gas

4. All Phases

5. Liquid, Gas

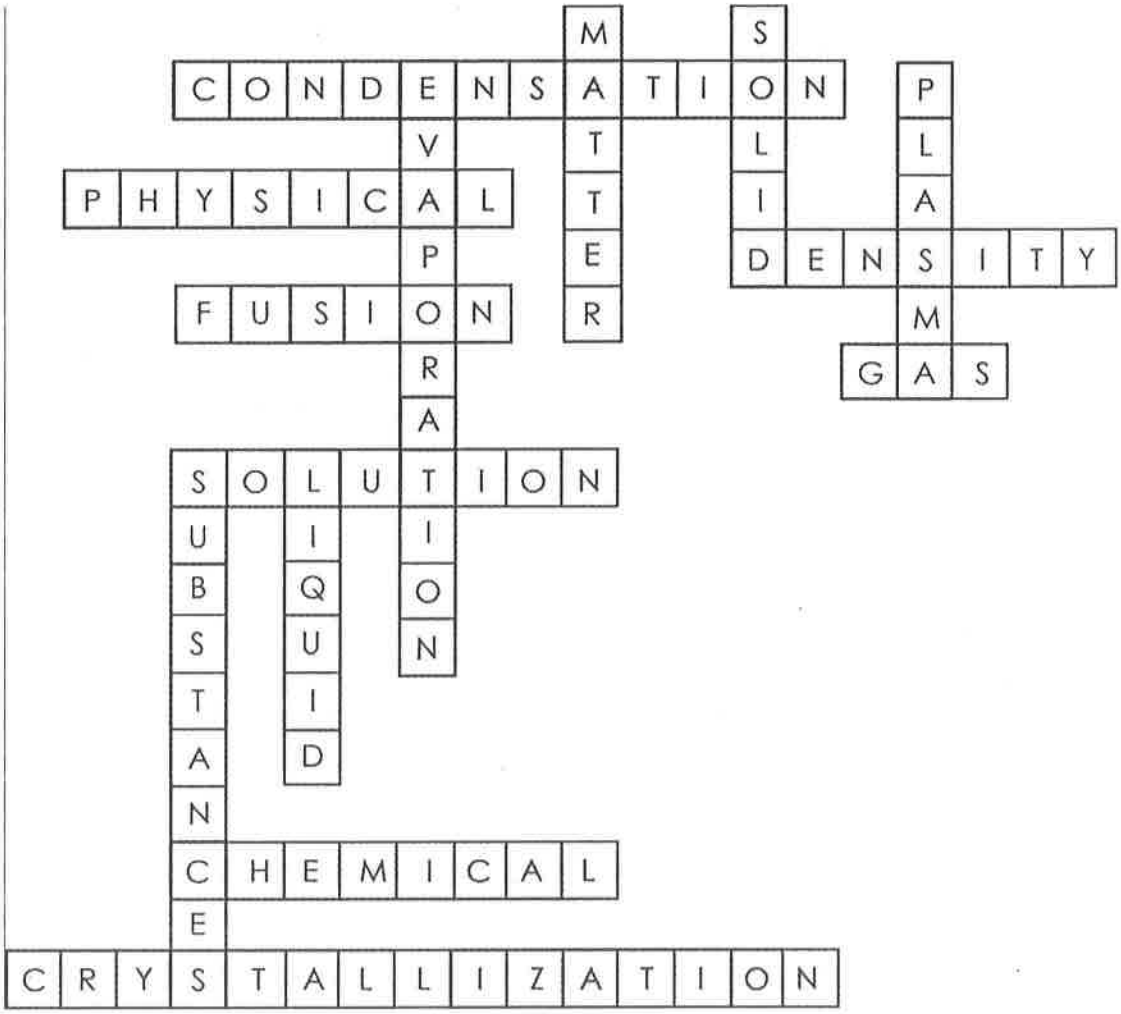
6. All Phases

7. Solid

8. Gas

Name _____ Date ____ / ____ / ____

CROSSWORD PUZZLE: STATES OF MATTER



Across

3. Phase change for a gas into a liquid
6. A type of property can be observed without changing the substance
7. The mass of a substance per unit volume
8. Phase change for a liquid into a solid. Same as freezing
9. A state of matter with no definite volume or shape
10. A homogenous mixture
12. This type of change produces a new type of substance
13. When particles dissolved in a liquid fall out to create a solid

Down

1. A substance that has mass and volume
2. State of matter in which atoms or molecules are close together and arranged regularly
4. Phase change for a liquid into a gas
5. State of matter consisting of electrically charged particles
10. Term for materials made of the same element or compounds
11. A state of matter with a definite volume but no definite shape

Name _____

Period _____

Physical and Chemical Properties Worksheet

Classify the following properties as either chemical or physical by checking the appropriate column.

	Physical property	Chemical property
Blue color	✓	
Density	✓	
Flammability		✓
Dissolves in water	✓	
Boils at 100 degrees	✓	
Scratches glass	✓	
Sour taste	✓	
Rusting		✓
Exploding fireworks		✓
Melting point	✓	
Reacts with H_2O to form gas		✓
Reacts with something to form H_2O		✓
Hardness	✓	
Boiling point	✓	
Luster (shine)	✓	
Odor	✓	

Matter Homework Packet

Name _____

Period _____

Physical and Chemical Changes and Properties of Matter Worksheet

Classify the following as chemical change (cc), chemical property (cp), physical change (pc), or physical property (pp).

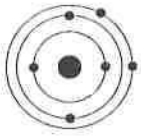
1. pp Heat conductivity
2. cc Silver tarnishing
3. pc sublimation
4. pc magnetizing steel
5. pp length of metal object
6. pc shortening melting
7. cc exploding dynamite
8. cp Combustible
9. pc Water freezing
10. cc Wood burning
11. cp Acid resistance
12. pp Brittleness
13. cc Milk souring
14. cc baking bread

Identify the following as being true or false to the left of the sentence.

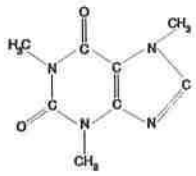
T 15. A change in size or shape is a physical change.
T 16. A chemical change means a new substance with new properties was formed.
F 17. An example of a chemical change is when water freezes.
T 18. When platinum is heated, then cooled to its original state, we say this is a physical change.
F 19. When milk turns sour, this is a physical change because a change in odor does not indicate a chemical change.
T 20. When citric acid and baking soda mix, carbon dioxide is produced and the temperature decreases. This must be a chemical change.

Identify each of the following as a physical or chemical change.

21. C You leave your bicycle out in the rain and it rusts.
22. P A sugar cube dissolves.
23. C Scientist break-up water into oxygen and hydrogen gas.
24. C Burning coal for a barbecue.
25. P Trimming a bush because it has grown too tall.



Elements, Compounds, and Mixtures



By Evan P. Silberstein

Elements are simple things
That can't be broken down.
When put together chemically,
They always form compounds.
But thinking of the usual way
That chemicals are found,
It's jumbled up in mixtures that
Most chemicals abound.

Chemicals are everywhere–
One of life's permanent fixtures.
Yes, chemicals really matter–
Those elements, compounds, and mixtures.

Elements are building blocks
From which all things are made.
There are over one hundred elements
In the element parade.
And they're all made of atoms
Just as Mr. Dalton said.
It's elements, pure and simple,
Nothing simpler, I'm afraid.

Chemicals are everywhere–
One of life's permanent fixtures.
Yes, chemicals really matter–
Those elements, compounds, and mixtures.

Compounds form from elements,
And, 'though it may seem strange,
When they form a compound,
Their properties all change.
As chemicals combine,
Their particles rearranged,
To form some different substances,
Their properties all change.

Chemicals are everywhere–
One of life's permanent fixtures.
Yes, chemicals really matter–
Those elements, compounds, and mixtures.

With mixtures, it's so different,
And there's one thing you can bet–
Put salt and water together,
It will still be salty and wet.
'Though you might be fearing changes,
There's no reason for to fret.
Without chemical combination
There's nothing new to get.

Chemicals are everywhere–
One of life's permanent fixtures.
Yes, chemicals really matter–
Those elements, compounds, and mixtures.

Chemistry: Form WS1.7.2A Name _____

TYPES OF MATTER Date _____ Period _____

Elements, Compounds, and Mixtures

Read the poem on the other side of this sheet. Then, answer the questions below based on the poem.

1. According to the poem, what are the three forms in which matter is found? _____

_____

2. In which form is matter most commonly found? _____

3. What are the main differences between elements, compounds, and mixtures? _____

_____

_____

_____

_____

4. Why is it that when you mix salt and water together, "It will still be salty and wet?" _____

_____

_____

5. Hydrogen is an explosive gas, and oxygen supports combustion? How is it possible, then, for water, which is composed of hydrogen and oxygen, to put out fires? Quote the lines in the poem that explain this. _____

_____

_____

_____

6. Indicate whether each of the following describes an element, compound, or mixture:

a. composed of more than one substance _____

_____

b. simple substance that can't be broken down _

_____

c. has different properties than the substances that compose it? _____

d. gold _____

e. air _____

f. juice _____

g. sugar _____

h. oxygen _____

i. table salt _____

Name _____ Date _____

Identifying Compounds, Elements, Mixtures through Chemical Symbols

Elements are substances that cannot be broken into simpler substances by chemical means. **Compounds** are composed of two or more elements that are chemically combined in definite proportions by mass. **Mixtures** are combinations of two or more substances that can be separated by physical means.

Directions: Place a check in the correct box to indicate the classification of each form of matter.

	Element	Compound	Mixture
Cu			
H_2O			
$C_6H_{12}O_6$			
$NH_3 + H_2O$			
B			
$CO + CO_2$			
Carbon Dioxide			
Air			
Oxygen			
Table Salt			
Salt and Pepper			

Name _____

Period _____

Classifying Matter Worksheet

Classify each of the following substances as an element, a compound, a solution (homogenous mixture), or a heterogeneous mixture.

1. Sand	2. Salt	3. Pure Water
4. Soil	5. Soda just opened	6. Pure air
7. Carbon Dioxide	8. Gold	9. Brass
10. Oxygen	11. Italian Salad Dressing	12. Salt Water
13. Raisin Bran	14. Silver	15. Lithium Iodide
16. Apple Pie	17. Kool Aid	18. Sugar Water
19. Chocolatechip Cookie	20. Gatorade	21. Gold
22. tacos	23.Lead	24. Ceasar Salad
25. Calcium	26. Whole Milk	27. Skim Milk
28. hydrogen peroxide	29. Potassium	30. Sugar

31. Raisin Bran Cereal with Milk

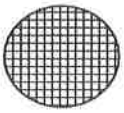
32. Raisin Bran Cereal without Milk

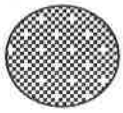
Name _____ Date _____

Molecule Models: Formula to Model

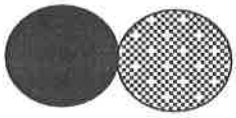
Using the model key for each element, draw the model of each molecule.


Hydrogen- H


Carbon- C


Oxygen- O

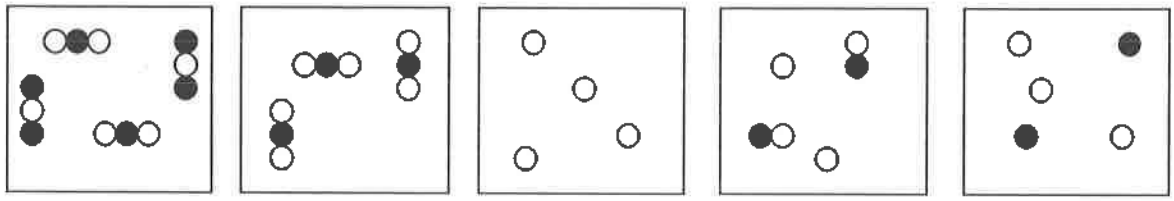

Nitrogen- N

1. **NO** 	2. **CO**
3. **N_2**	4. **H_2O**
5. **CO_2**	6. **NO_2**
7. **NH_3**	8. **O_2**

Name _____

ILS

Part 3: Match each diagram with its correct description. Diagrams will be used once.



A B C D E

___1. Pure Element – only one type of atom present.

___2. Mixture of two elements – two types of uncombined atoms present.

___3. Pure compound – only one type of compound present.

___4. Mixture of two compounds – two types of compounds present.

___5. Mixture of a compound and an element.

Part 4: Column A lists a substance. In Column B, list whether the substance is an element (E), a compound (C), a Heterogeneous Mixture (HM), or a Solution (S). (Remember a solution is a homogeneous mixture.) In Column C, list TWO physical properties of the substance.

Column A	Column B	Column C
1. Summer Sausage		
2. Steam		
3. Salt Water		
4. Pencil lead (Pb)		
5. Dirt		
6. Pepsi		
7. Silver (Ag)		
8. Toothpaste (Na_2HPO_4)		
9. A burrito		
10. Italian Dressing		
11. Chicken Soup		
12. Lemonade		

Name _____ Date _____

Answers - Identifying Compounds, Elements, Mixtures through Chemical Symbols

	Element	Compound	Mixture
Cu	X		
H_2O		X	
$C_6H_{12}O_6$		X	
$NH_3 + H_2O$			X
B	X		
$CO + CO_2$			X
Carbon Dioxide		X	
Air			X
Oxygen	X		
Table Salt		X	
Salt and Pepper			X

Name Key

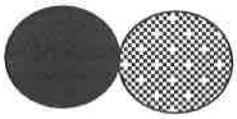
Period

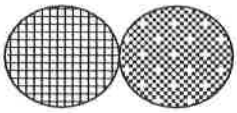
Classifying Matter Worksheet

Classify each of the following substances as an element, a compound, a solution (homogenous mixture, or a heterogeneous mixture.

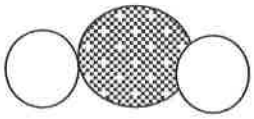
1. Sand - Hetero mix
2. Salt - C
3. Pure Water - C
4. Soil - Hetero mix
5. Soda just opened - Heteromix (see bubbles)
6. Pure air - Solution/ Homomix
7. Carbon Dioxide - C
8. Gold - E
9. Brass - Solution/ Homomix
10. Oxygen - E
11. Italian Salad Dressing - Heteromix
12. Salt Water - Solution
13. Raisin Bran - Heteromix
14. Silver - E
15. Lithium Iodide - C
16. Apple Pie - Heteromix
17. Kool Aid - Solution
18. Sugar Water - Solution
19. Chocolatechip Cookie - Heteromix
20. Gatorade - Solution
21. Gold - E
22. tacos - Heteromix
23. Lead - E
24. Ceasar Salad - Heteromix
25. Calcium - E
26. Whole Milk - Solution
27. Skim Milk - Heteromix
28. hydrogen peroxide - C
29. Potassium - E
30. Sugar - C
31. Raisin Bran Cereal with Milk - Heteromix
32. Raisin Bran Cereal without Milk - Heteromix

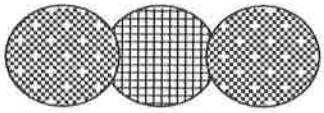
Answer Key **Molecule Models: Formula to Model**

1. 

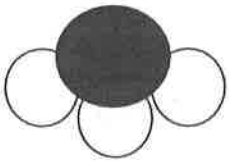
2. 

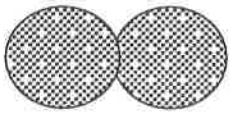
3. 

4. 

5. 

6. 

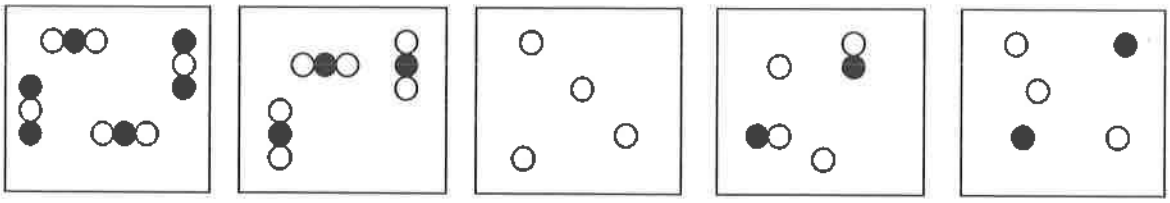
7. 

8. 

Name _____

ILS

Part 3: Match each diagram with its correct description. Diagrams will be used once.



A B C D E

_C_ 1. Pure Element – only one type of atom present.

_E_ 2. Mixture of two elements – two types of uncombined atoms present.

_B_ 3. Pure compound – only one type of compound present.

_A_ 4. Mixture of two compounds – two types of compounds present.

_D_ 5. Mixture of a compound and an element.

Part 4: Column A lists a substance. In Column B, list whether the substance is an element (E), a compound (C), a Heterogeneous Mixture (HM), or a Solution (S). (Remember a solution is a homogeneous mixture.) In Column C, list TWO physical properties of the substance.

Column A	Column B	Column C
1. Summer Sausage	HM	Chunky, Brown
2. Steam	C	Gas, Hot
3. Salt Water	S	Liquid, Clear
4. Pencil lead (Pb)	E	Grey, Solid
5. Dirt	HM	Brown, Solid
6. Pepsi	HM	Brown, Liquid
7. Silver (Ag)	E	Silver, Solid
8. Toothpaste (Na_2HPO_4)	C	White, Thick
9. A burrito	HM	Multi-colored, Solid
10. Italian Dressing	HM	Liquid, Greasy
11. Chicken Soup	HM	Liquid/Solid, Brown
12. Lemonade	S	Yellow, Liquid

Week 5

* pH less than 7

ACIDS

- produce Hydronium ions in a solution
- react with metals & carbonates (corrosive)
- taste sour
- turn Litmus paper red
- most formulas start with H
ex. fruit, stomach acid (citric acid) vinegar

SALTS

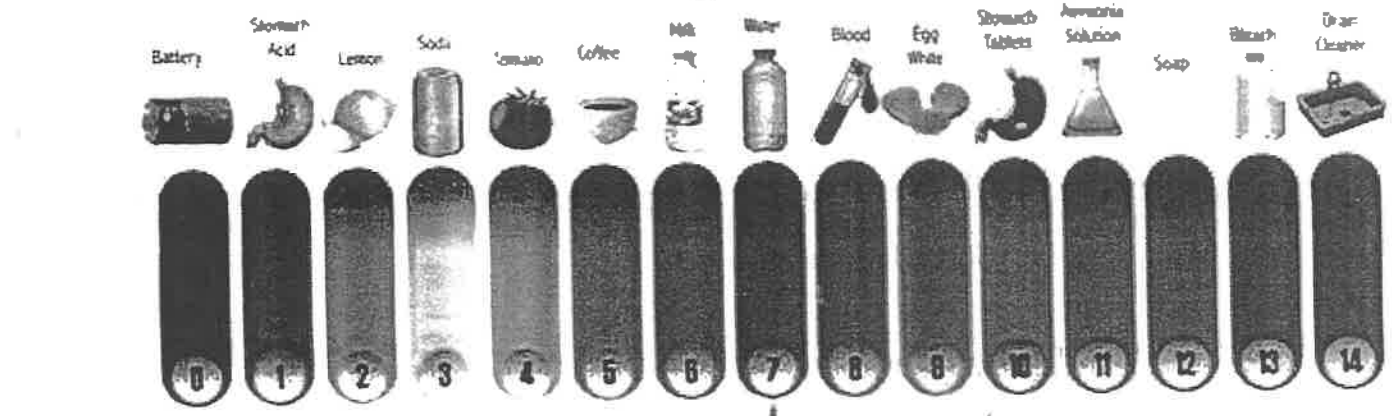
Acid + Base = Salt & water

* pH greater than 7

BASES

- produce Hydroxide (OH) in solution
- taste bitter
- feels slippery
- turns Litmus paper blue
- a lot of cleaning products
- most formulas end in OH
ex. soap, bleach, windex (Ammonia)

The pH Scale



Alkaline

strong acid ← weak acid — ACIDIC | NEUTRAL | BASIC — weak base → strong base

Name _____ Date____ / ____ / _____

INTERPRETING THE pH SCALE

The pH scale measures the acidity or alkalinity of solutions. The scale is centered around the pH value of 7. A pH value of **less than 7** indicates an acidic solution. A **pH of 7** indicates that a solution is **neutral**. A pH value of **greater than 7** indicates a basic solution.

Acidic pH < 7, Neutral pH ~ 7.0, Basic pH > 7

Chemical compounds that change color in the presence of certain ions are called **Indicators**. Phenolphthalein turns pink in the presence of a base, but stays colorless in the presence of an acid. Litmus dye turns red in the presence of an acid, but turns blue in the presence of a base.

Identify whether the solutions listed below are acids or bases. Write the color expected for each indicator (phenolphthalein, litmus dye) when immersed and indicate the pH range you would expect.

Solution	Acid or Base	Phenolphthalein	Litmus	pH Range
Ammonia				
Coffee				
Digestive juices				
Drain cleaner				
Human blood				
Laundry Detergent				
Lemon juice				
Milk				
Rain				
Saliva				
Shampoo				
Soda Pop				
Sour Candy				
Toothpaste				
Vinegar				
Vitamin C				

Name: _____ Period: ____

Acids, Bases Worksheet -I

1) List four properties of an acid.

_____

_____

2) What ions exist in acid solution?

_____

3) List three properties of a base.

_____

_____

4) What ions exist in base solution?

_____

5) What forms when an acid reacts with a base?

_____

6) What are some of the properties that acids and bases have in common?

_____

_____

7) I am a substance who turns blue litmus red, neutralizes bases, and tastes sour. What am I? _____

8) I am a species who turns red litmus blue, neutralizes acids, and tastes bitter. What am I? _____

9) In aqueous solution of an ionic compound turns red litmus blue. Conducts electricity, and reacts with an acid to form a salt and water. This could be

a. HCl b. NaI c. KNO_3 d. LiOH

10) Which substance can be classified as an Arrhenius acid?

a. HCl b. NaCl c. LiOH d. KOH

11) Which metal will react with hydrochloric acid and produce $H_2(g)$?

a. Au b. Cu c. Mg d. Hg

12) According to the Arrhenius theory, a substance that is classified as an acid will yield

a. OH^- b. NH_4^+ c. H^+ d. CO_3^{2-}

13) Which substance is classified as an Arrhenius base?

a. HCl b. NaOH c. $LiNO_3$ d. $KHCO_3$

Name _____ Date____ / _____ / _____

INTERPRETING THE pH SCALE

Solution	Acid or Base	Phenolphthalein	Litmus	pH Range
Ammonia	Base	Pink	Blue	> 7
Coffee	Acid	Colorless	Red	< 7
Digestive juices	Acid	Colorless	Red	< 7
Drain cleaner	Base	Pink	Blue	> 7
Human blood	Base	Pink	Blue	> 7
Laundry Detergent	Base	Pink	Blue	> 7
Lemon juice	Acid	Colorless	Red	< 7
Milk	Acid	Colorless	Red	< 7
Rain	Acid	Colorless	Red	< 7
Saliva	Acid	Colorless	Red	< 7
Shampoo	Base	Pink	Blue	> 7
Soda Pop	Acid	Colorless	Red	< 7
Sour Candy	Acid	Colorless	Red	< 7
Toothpaste	Base	Pink	Blue	> 7
Vinegar	Acid	Colorless	Red	< 7
Vitamin C	Acid	Colorless	Red	< 7

Test Review Acids, Bases & Equilibrium Name: Key

Properties of Acids & Bases

1. List four properties of an acid.
   1. Tastes sour 2. React with metals
   3. Contain hydrogen 4. Poisonous & corrosive
2. What ions exist in acid solution?
   H^+
3. List three properties of a base.
   1. Tastes bitter 2. Feels slipery
   3. Contain hydroxide ions 4. Poisonous & corrosive
4. What ions exist in base solution?
   OH^-
5. What forms when an acid reacts with a base?
   water and salt
6. What are some of the properties that acids and bases have in common?
   1. Many are poisonous
   2. Many are corrosive to skin
7. I am a substance who turns blue litmus red, neutralizes bases, and tastes sour. What am I?
   an acid
8. I am a species who turns red litmus blue, neutralizes acids, and tastes bitter. What am I?
   a base
9. In aqueous solution of an ionic compound turns red litmus blue. Conducts electricity, and reacts with an acid to form a salt and water. This could be
   a. HCl b. NaI c. KNO_3 d. LiOH
10. Which substance can be classified as an Arrhenius acid?
    a. HCl b. NaCl c. LiOH d. KOH
11. Which metal will react with hydrochloric acid and produce $H_2(g)$?
    a. Au b. Cu c. Mg d. Hg
12. According to the Arrhenius theory, a substance that is classified as an acid will yield
    a. OH^- b. NH_4^+ c. H^+ d. CO_3^{2-}
13. Which substance is classified as an Arrhenius base?
    a. HCl b. NaOH c. $LiNO_3$ d. $KHCO_3$

14. State whether the following observations indicate an acid or a base.

a. A solution conducts electricity and feels slippery. Base

b. A solution conducts electricity and reacts with metal. Acid

c. A solution is sour and turns blue litmus paper red. Acid

d. A solution reacts with an acid and produce salt. Base

https://www.youtube.com/watch?v=kR7mWaF0VXg

15. Circle one.

a. CH_3COOH is a(n) (acid, base, salt).

b. NH_4Cl is a(n) (acid, base, salt).

c. KOH is a(n) (acid, base, salt).

d. H_3PO_4 is a(n) (acid, base, salt).

e. $Ca(NO_3)_2$ is a(n) (acid, base, salt).

Neutralization Reactions

16. The generic products of an acid-base reaction are

Salt & Water

17. Complete the following reaction

$HCl + NaOH \rightarrow H2O + NaCl$

18. Write the balanced reaction for:

Hydrobromic Acid reacts with Aluminum hydroxide.

$HBr + Al(OH)3 \rightarrow$

$3HBr + Al(OH)_3 \rightarrow AlBr_3 + 3H_2O$

Sulfuric Acid reacts with Iron (III) hydroxide

$H2SO4 + Fe(OH)3$

$3H2SO4 + 2Fe(OH)3 > Fe2(SO4)3 + 6H2O$

Week 6

Name _____ Date _____

Parts of a 3-Dimensional Atom

1. Name

_____

2. Charge

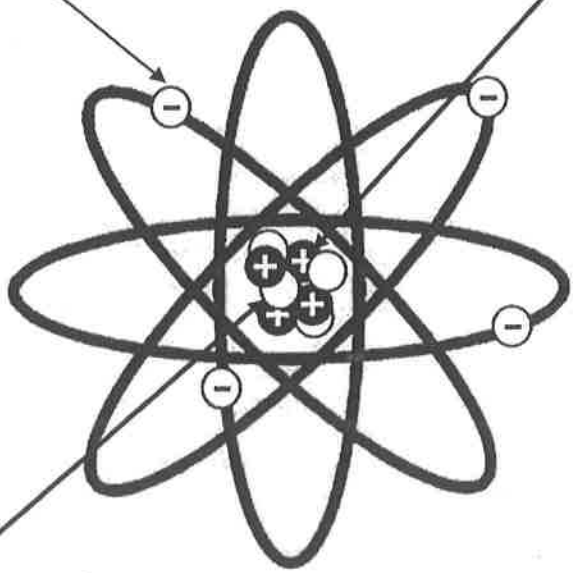
_____

3. Name

_____

4. Charge

_____



5. Name

_____

6. Charge

_____

7. How many **protons** does this atom have?

_____

8. How many **electrons** does this atom have?

_____

9. How many **neutrons** does this atom have?

_____

Name _____ Date ____ / ____ / ____

BOHR MODELS

Bohr models (or Bohr diagram) are diagrams that show the number of protons and neutrons in the nucleus and the electrons in each electron energy level around it. Draw the Bohr model for each of the elements below.

1.	$^{1}_{1}H$	2.	$^{4}_{2}He$
3.	$^{7}_{3}Li$	4.	$^{23}_{11}Na$
5.	$^{35}_{17}Cl$	6.	$^{64}_{29}Cu$

The Periodic Table of the Elements

1 **H** Hydrogen 1.00794																	2 **He** Helium 4.003
3 **Li** Lithium 6.941	4 **Be** Beryllium 9.012182											5 **B** Boron 10.811	6 **C** Carbon 12.0107	7 **N** Nitrogen 14.00674	8 **O** Oxygen 15.9994	9 **F** Fluorine 18.9984032	10 **Ne** Neon 20.1797
11 **Na** Sodium 22.989770	12 **Mg** Magnesium 24.3050											13 **Al** Aluminum 26.981538	14 **Si** Silicon 28.0855	15 **P** Phosphorus 30.973761	16 **S** Sulfur 32.066	17 **Cl** Chlorine 35.4527	18 **Ar** Argon 39.948
19 **K** Potassium 39.0983	20 **Ca** Calcium 40.078	21 **Sc** Scandium 44.955910	22 **Ti** Titanium 47.867	23 **V** Vanadium 50.9415	24 **Cr** Chromium 51.9961	25 **Mn** Manganese 54.938049	26 **Fe** Iron 55.845	27 **Co** Cobalt 58.933200	28 **Ni** Nickel 58.6934	29 **Cu** Copper 63.546	30 **Zn** Zinc 65.39	31 **Ga** Gallium 69.723	32 **Ge** Germanium 72.61	33 **As** Arsenic 74.92160	34 **Se** Selenium 78.96	35 **Br** Bromine 79.904	36 **Kr** Krypton 83.80
37 **Rb** Rubidium 85.4678	38 **Sr** Strontium 87.62	39 **Y** Yttrium 88.90585	40 **Zr** Zirconium 91.224	41 **Nb** Niobium 92.90638	42 **Mo** Molybdenum 95.94	43 **Tc** Technetium (98)	44 **Ru** Ruthenium 101.07	45 **Rh** Rhodium 102.90550	46 **Pd** Palladium 106.42	47 **Ag** Silver 107.8682	48 **Cd** Cadmium 112.411	49 **In** Indium 114.818	50 **Sn** Tin 118.710	51 **Sb** Antimony 121.760	52 **Te** Tellurium 127.60	53 **I** Iodine 126.90447	54 **Xe** Xenon 131.29
55 **Cs** Cesium 132.90545	56 **Ba** Barium 137.327	57 **La** Lanthanum 138.9055	72 **Hf** Hafnium 178.49	73 **Ta** Tantalum 180.9479	74 **W** Tungsten 183.84	75 **Re** Rhenium 186.207	76 **Os** Osmium 190.23	77 **Ir** Iridium 192.217	78 **Pt** Platinum 195.078	79 **Au** Gold 196.96655	80 **Hg** Mercury 200.59	81 **Tl** Thallium 204.3833	82 **Pb** Lead 207.2	83 **Bi** Bismuth 208.98038	84 **Po** Polonium (209)	85 **At** Astatine (210)	86 **Rn** Radon (222)
87 **Fr** Francium (223)	88 **Ra** Radium (226)	89 **Ac** Actinium (227)	104 **Rf** Rutherfordium (261)	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (263)	107 **Bh** Bohrium (262)	108 **Hs** Hassium (265)	109 **Mt** Meitnerium (266)	110 (269)	111 (272)	112 (277)	113	114				

58 **Ce** Cerium 140.116	59 **Pr** Praseodymium 140.90765	60 **Nd** Neodymium 144.24	61 **Pm** Promethium (145)	62 **Sm** Samarium 150.36	63 **Eu** Europium 151.964	64 **Gd** Gadolinium 157.25	65 **Tb** Terbium 158.92534	66 **Dy** Dysprosium 162.50	67 **Ho** Holmium 164.93032	68 **Er** Erbium 167.26	69 **Tm** Thulium 168.93421	70 **Yb** Ytterbium 173.04	71 **Lu** Lutetium 174.967
90 **Th** Thorium 232.0381	91 **Pa** Protactinium 231.03588	92 **U** Uranium 238.0289	93 **Np** Neptunium (237)	94 **Pu** Plutonium (244)	95 **Am** Americium (243)	96 **Cm** Curium (247)	97 **Bk** Berkelium (247)	98 **Cf** Californium (251)	99 **Es** Einsteinium (252)	100 **Fm** Fermium (257)	101 **Md** Mendelevium (258)	102 **No** Nobelium (259)	103 **Lr** Lawrencium (262)

1995 IUPAC masses and Approved Names from http://www.chem.qmw.ac.uk/iupac/AtWt
masses for 107-111 from C&EN, March 13, 1995, p. 35
112 from http://www.gsi.de/z112e.html

Name _____ Date _____

Atomic Structure

An atom is composed of protons, neutrons, and electrons. The protons and neutrons are found in the nucleus of the atom. The electrons are found in the electron cloud, which is an area that surrounds the nucleus.

A standard periodic table of elements can provide you with a great deal of insight into the composition of an atom. The atomic number is equal to the number of protons. The mass number is equal to the number of protons and neutrons. In a neutral atom, the number of protons and electrons are equal. When an atom is in a charged state (ion), the charge indicates the imbalance between protons and electrons. Too many electrons produces a negative charge, too few electrons results in a positive charge.

Example:

O^{-2}	Explanation:
Mass Number= 16 Atomic Number = 8 8 protons, 8 neutrons (16-8), 10 electrons (8+2)	Protons = Atomic Number Neutrons = Mass Number – Atomic Number Electrons = Charge (+/-) Proton Number.

Complete the following chart.

Element or Ion	Atomic Number	Mass Number	# of Protons	# of Neutrons	# of Electrons
Li		7			
Ba^{+2}		137			
Al^{+3}		27			
F^-		19			
Br		80			
Ru^{+3}		101			
Cr^{+2}		52			
S^{-2}		32			
Si		28			
C		12			
P^{-3}		31			

Historical Development of the modern model of the atom.

John Dalton (1766 – 1844):
John Dalton was an English chemist. His ideas form the atomic theory of matter. Here are his ideas.

*All elements are composed (made up) of atoms. It is impossible to divide or destroy an atom.
*All atoms of the same elements are alike. (One atom of oxygen is like another atom of oxygen.)
*Atoms of different elements are different. (An atom of oxygen is different from an atom of hydrogen.)
*Atoms of different elements combine to form a compound. These atoms have to be in definite whole number ratios. For example, water is a compound made up of 2 atoms of hydrogen and 1 atom of oxygen (a ratio of 2:1). Three atoms of hydrogen and 2 atoms of oxygen cannot combine to make water.

1. What is the name of John Dalton's theory?
2. What are elements made of?
3. An atom of hydrogen and an atom of carbon are
4. What are compounds made of?
5. The ratio of atoms in HCl is: a) 1:3 b) 2:1 c) 1:1

J. J. Thompson (Late 1800s):
J. J. Thompson was an English scientist. He discovered the electron when he was experimenting with gas discharge tubes. He noticed a movement in a tube. He called the movement cathode rays. The rays moved from the negative end of the tube to the positive end. He realized that the rays were made of negatively charged particles – electrons.

1. What did J.J. Thompson discover?
2. What is the charge of an electron?
3. What are cathode rays made of?
4. Why do electrons move from the negative end of the tube to the positive end?

5. What was Thompson working with when he discovered the cathode rays?

Lord Ernest Rutherford (1871 – 1937):
Ernest Rutherford conducted a famous experiment called the gold foil experiment. He used a thin sheet of gold foil. He also used special equipment to shoot alpha particles (positively charged particles) at the gold foil. Most particles passed straight through the foil like the foil was not there. Some particles went straight back or were deflected (went in another direction) as if they had hit something. The experiment shows:

- Atoms are made of a small positive nucleus; positive nucleus repels (pushes away) positive alpha particles,
- Atoms are mostly empty space

1. What is the charge of an alpha particle?

2. Why is Rutherford's experiment called the gold foil experiment?

3. How did he know that an atom was mostly empty space?

4. What happened to the alpha particles as they hit the gold foil?

5. How did he know that the nucleus was positively charged?

Niels Bohr (Early 1900s):

Niels Bohr was a Danish physicist. He proposed a model of the atom that is similar to the model of the solar system. The electrons go around the nucleus like planets orbit around the sun. All electrons have their energy levels – a certain distance from the nucleus. Each energy level can hold a certain number of electrons. Level 1 can hold 2 electrons, Level 2 – 8 electrons, Level 3 - 18 electrons, and level 4 – 32 electrons. The energy of electrons goes up from level 1 to other levels. When electrons release (lose) energy they go down a level. When electrons absorb (gain) energy, they go to a higher level.

1. Why could Bohr's model be called a planetary model of the atom?

2. How do electrons in the same atom differ?

3. How many electrons can the fourth energy level hold?

4. Would an electron have to absorb or release energy to jump from the second energy level to the third energy level?

5. For an electron to fall from the third energy level to the second energy level, it must _____energy.

QUESTIONS

1. Who first suggested the concept of atoms? _____.
2. John Dalton said atoms were the smallest _____.
3. The "pool ball" theory was invented by _____.
4. Which scientist discovered electrons? _____.
5. J.J. Thomson discovered which theory? _____.
6. Who proved the "Cookie Dough" theory incorrect? _____.
7. How did the scientist from #6 prove the theory was wrong?
8. In this experiment, which part of the atom did Rutherford discover? _____.
9. Why is Rutherford's model called "the peach"?
10. Who came up with the "solar system" model? _____.
11. In the "solar system" model, which part of the atom is the "sun"? _____.
12. What is the model that is accepted today called? _____.

Answer Key

Parts of a 3-Dimensional Atom

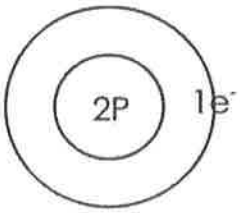
1. Electron
2. Negative
3. Proton
4. Positive
5. Neutron
6. Neutral
7. 4
8. 4
9. 4

Name _____ Date ____ / ____ / ____

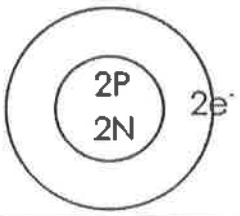
BOHR MODELS

Bohr models (or Bohr diagram) are diagrams that show the number of protons and neutrons in the nucleus and the electrons in each electron energy level around it. Draw the Bohr model for each of the elements below.

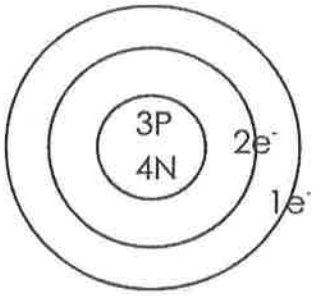
1. $^{1}_{1}H$



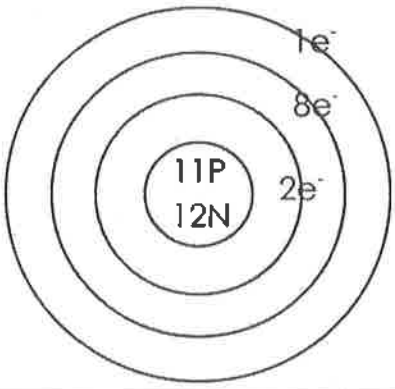
2. $^{4}_{2}He$



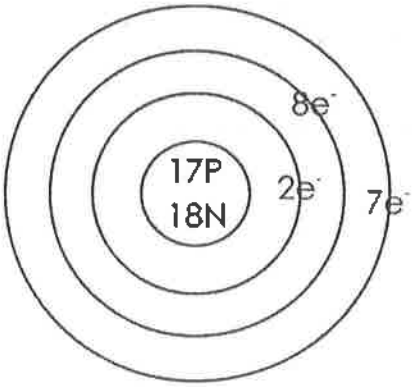
3. $^{7}_{3}Li$



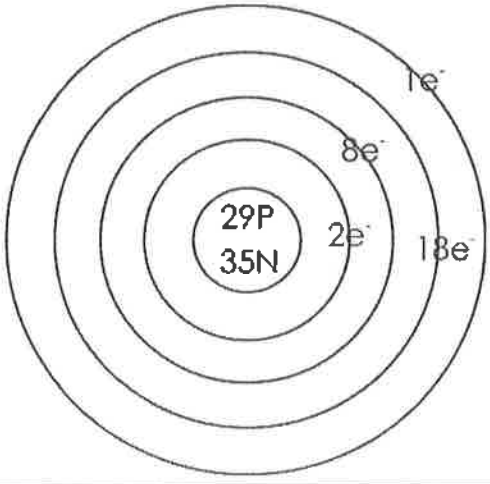
4. $^{23}_{11}Na$



5. $^{35}_{17}Cl$



6. $^{64}_{29}Cu$



Name _____ Date _____

Answers

Atomic Structure

Element or Ion	Atomic Number	Mass Number	# of Protons	# of Neutrons	# of Electrons
Li	3	7	3	4	3
Ba^{+2}	56	137	56	81	54
Al^{+3}	13	27	13	14	10
F-	9	19	9	10	10
Br	35	80	35	45	35
Ru^{+3}	44	101	44	57	41
Cr^{+2}	24	52	24	28	22
S^{-2}	16	32	16	16	18
Si	14	28	14	14	14
C	6	12	6	6	6
P^{-3}	15	31	15	16	18

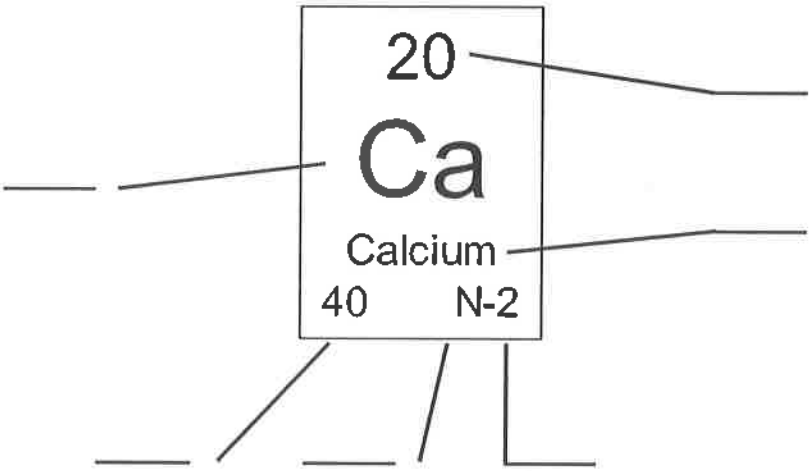
Week 7

Name _____ Date ____ / ____ / ____

PERIODIC TABLE INFORMATION

The entries in a periodic table are written to provide a lot of information about each of the elements. Use the values shown in the boxes below to label the parts of the picture of the entry for ~~Nitrogen~~. Calcium.

A. atomic mass	**C. element's symbol**	**E. symbol for outer electron shell**
B. atomic number	**D. element's name**	**F. Number of electrons in outer electron shell**



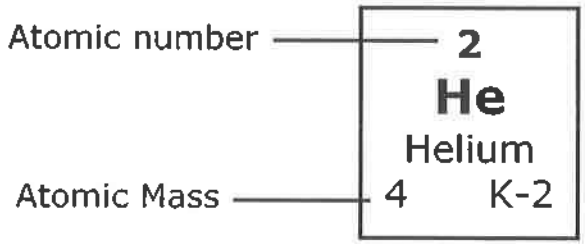
1 H Hydrogen 1 K-1									
3 Li Lithium 7 L-1	4 Be Beryllium 9 L-2								
11 Na Sodium 23 M-1	12 Mg Magnesium 24 M-2								
19 K Potassium 39 N-1	20 Ca Calcium 40 N-2	21 Sc Scandium 45 N-2	22 Ti Titanium 48 N-2	23 V Vanadium 51 N-2	24 Cr Chromium 52 N-1	25 Mn Manganese 55 N-2	26 Fe Iron 56 N-2	27 Co Cobalt 59 N-2	28 Ni Nickel 59 N-2
37 Rb Rubidium 85 O-1	38 Sr Strontium 88 O-2	39 Y Yttrium 89 O-2	40 Zr Zirconium 91 O-2	41 Nb Niobium 93 O-1	42 Mo Molybdenum 96 O-1	43 Tc Technetium 99 O-1	44 Ru Ruthenium 101 O-1	45 Rh Rhodium 103 O-1	46 Pd Palladium 106 O-1
55 Cs Caesium 133 P-1	56 Ba Barium 137 P-2	57-71 RARE EARTH ELEMENTS	72 Hf Hafnium 179 P-2	73 Ta Tantalum 181 P-2	74 W Tungsten 184 P-2	75 Re Rhenium 186 P-2	76 Os Osmium 190 P-2	77 Ir Iridium 192 P-2	78 Pt Platinum 195 P-1
87 Fr Francium 223 Q-1	88 Ra Radium 226 Q-2	89-103 ACTINIDE SERIES	104 *	105 *	106 *	107 *			

Name _____ Date ____ / ____ / ____

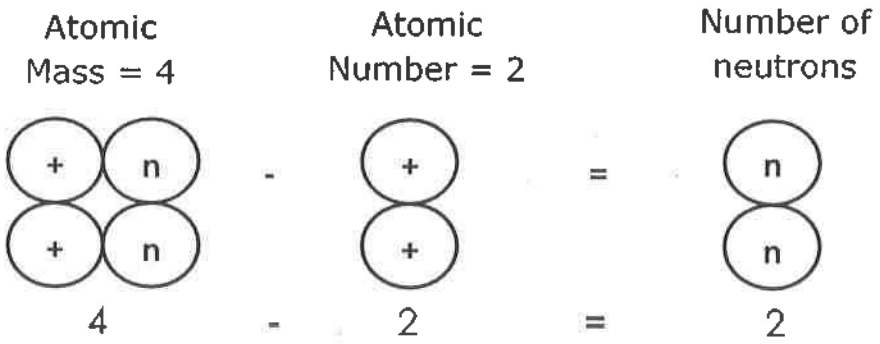
ATOMIC NUMBERS, PROTONS, NEUTRONS AND ELECTRONS

The number of protons in each atom of an element is its atomic number. The atomic number is also the number of electrons since atoms themselves are electronically neutral. Because neutrons and protons are almost the same mass, the total number of protons and neutrons in an atom is the atomic mass. Therefore, by subtracting the atomic number from the atomic mass you can calculate the number of neutrons.

This is why the mass number and atomic number, but not the number of neutrons, is shown in the periodic table entries such as the one for helium shown below. The diagram below shows how to calculate the number of neutrons from the table's entry.



Example: helium atom



Use this reasoning and the information provided below, to determine the missing values in the chart below.

ELEMENT	SYMBOL	ATOMIC NUMBER	ATOMIC MASS	PROTONS	NEUTRONS	ELECTRONS
Helium	He	2	4	2		
Nitrogen	N	7	14			7
Carbon	C	6	12			
Sodium	Na	11	23			
Iron	Fe	26			30	
Copper	Cu		64	29		
Silver	Ag	47	108		61	

Name _____ Date _____

Using the Periodic Table of Elements Sheet 1 Use the Periodic Table of Elements and your knowledge of chemistry to complete the blanks for atoms of each element. **Round Atomic Mass** to the nearest whole number.

Hydrogen	**Boron**	**Aluminum**
Atomic Number: _____	Atomic Number: _____	Atomic Number: _____
Atomic Mass: _____	Atomic Mass: _____	Atomic Mass: _____
Symbol: _____	Symbol: _____	Symbol: _____
# of protons: _____	# of protons: _____	# of protons: _____
# of electrons: _____	# of electrons: _____	# of electrons: _____
# of neutrons: _____	# of neutrons: _____	# of neutrons: _____
Sulfur	**Oxygen**	**Helium**
Atomic Number: _____	Atomic Number: _____	Atomic Number: _____
Atomic Mass: _____	Atomic Mass: _____	Atomic Mass: _____
Symbol: _____	Symbol: _____	Symbol: _____
# of protons: _____	# of protons: _____	# of protons: _____
# of electrons: _____	# of electrons: _____	# of electrons: _____
# of neutrons: _____	# of neutrons: _____	# of neutrons: _____
Potassium	**Sodium**	**Carbon**
Atomic Number: _____	Atomic Number: _____	Atomic Number: _____
Atomic Mass: _____	Atomic Mass: _____	Atomic Mass: _____
Symbol: _____	Symbol: _____	Symbol: _____
# of protons: _____	# of protons: _____	# of protons: _____
# of electrons: _____	# of electrons: _____	# of electrons: _____
# of neutrons: _____	# of neutrons: _____	# of neutrons: _____

Name _____ Date ____ / ____ / ____

PERIODIC TABLE PUZZLE

Group Number

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
I																	
	F														G	H	
C													B				A
								E				J					

		D											

The location of an element in the periodic table can give information about its properties. Provide the letter of the element in the table above that best fits the description below. (note that the letters are not the symbols for the elements). Each answer may be used only once.

1 A semimetal _____

2 An inner transition element _____

3 Has oxidation numbers of +1 and -1 _____

4 Most commonly has an oxidation state of -2. _____

5 The alkali metal _____

6 The alkaline earth metal _____

7 This is an active nonmetal _____

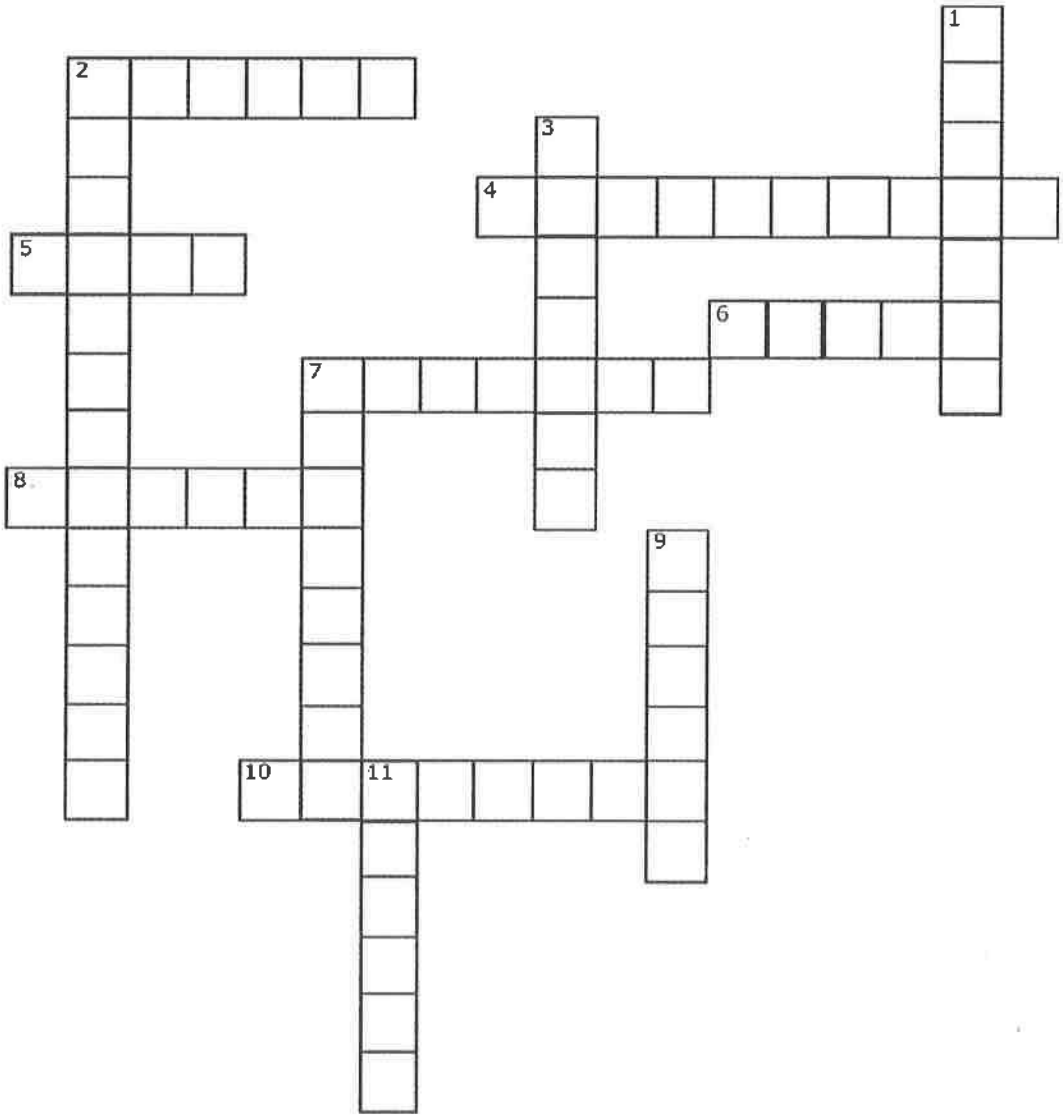
8 This is an inert gas _____

9 This metal has an oxidation number of +3 _____

10 This metal has more than one oxidation state _____

Name _____ Date ____ / ____ / ____

CROSSWORD PUZZLE: THE PERIODIC TABLE



Across

2. Name for the group I metals
4. The ____ metals are the elements in the middle of the periodic table.
5. The ____ number is the sum of the protons and neutrons.
6. The ____ gases are considered inactive.
7. The horizontal rows are termed ____.
8. Most elements are ____.
10. Nonmetals tend to form ions with a ____ charge.

Down

1. These are the most active nonmetals
2. Name for the group II metals
3. An element's atomic number is the number of ____ each atom has.
7. Metals tend to form ions with a ____ charge.
9. The atomic ____ is used to arrange the elements.
11. The vertical columns are called ____ or families.

Atomic History and Periodic Table Quiz **Name** _____
***USE A PERIODIC TABLE!**

_____1. Which element is atomic number 14 on the periodic table?

_____2. What is the element symbol for Californium? (check rare earth metals)

_____3. How many protons are in an atom of Bismuth?

_____4. To which element group does Argon belong?

_____5. Which period is Silver (Ag)?

_____6. Find the element in period 7, group 6.

_____ _____7. What do you call the element series from group 3-12?

_____8. Which element has a symbol that doesn't seem to match its English name?

Aluminum, Copper, or Gold

_____9. Which element has the lowest atomic mass?

_____ _____10.Group 18 elements are called _____ _____.

_____11.What is the first metalloid on the periodic table?

_____12.True or false: Tin and Antimony are in the same element group.

_____13.What is the heaviest alkali metal?

_____14.How many electrons are in a neutral atom of Magnesium?

_____15.Which of the following is **not** a nonmetal: sulfur, oxygen, silicon, nitrogen?

_____16.How many neutrons are in an atom of Fluorine?

_____17.Which element has an atomic mass of 106.42?

_____18.Which element is the lightest Halogen?

_____19.Which element has 3 energy levels and 5 outer electrons?

Use the names of the scientists who contributed to our model of the atom. (Democritus, Dalton, Thomson, Rutherford, Bohr)

_____ 20. Added the proton and nucleus to the atomic model.

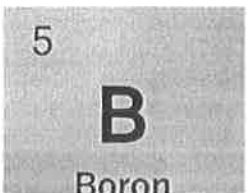
_____ 21. Had no subatomic particles in the nucleus. Also introduced the idea of compounds.

_____ 22. Model was a ball of positive material with negative electrons scattered throughout.

_____ 23. Electrons travel around the nucleus in set orbits.

_____ 24. Named the atom "atomos" meaning indivisible.

25. How many protons, neutrons, and electrons would an atom of Boron have?



Name _____ Date ____ / ____ / ____

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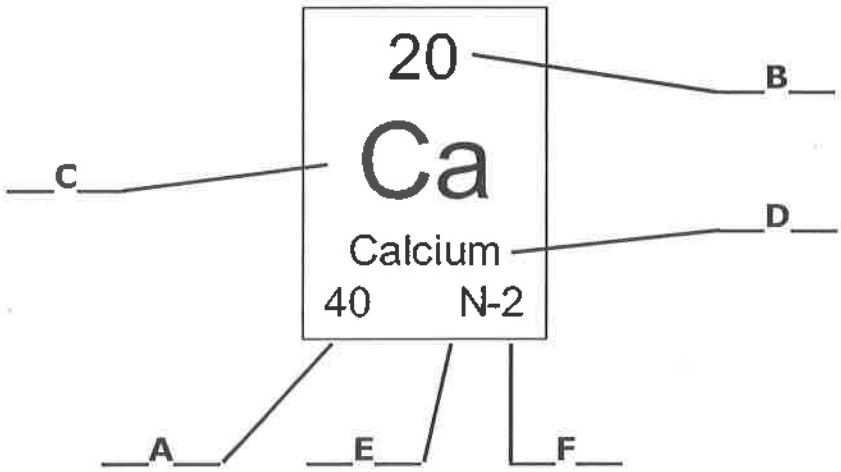
B. atomic number	**D. element's name**	**F. Number of electrons in outer electron shell**



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87 Fr Francium 223 Q-1	88 Ra Radium 226 Q-2	89-103 ACTINIDE SERIES	104 *	105 *	106 *	107 *			

Name _____ Date ____ / ____ / ____

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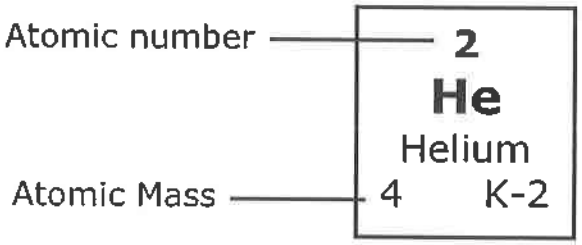
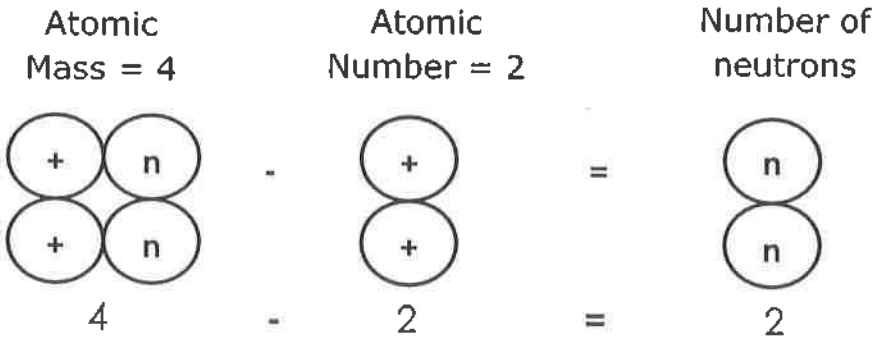


Example: helium atom



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ELEMENT	SYMBOL	ATOMIC NUMBER	ATOMIC MASS	PROTONS	NEUTRONS	ELECTRONS
Helium	He	2	4	2	**2**	**2**
Nitrogen	N	7	14	**7**	**7**	7
Carbon	C	6	12	**6**	**6**	**6**
Sodium	Na	11	23	**11**	**12**	**11**
Iron	Fe	26	**56**	**26**	30	**26**
Copper	Cu	**29**	64	29	**35**	**29**
Silver	Ag	47	108	**47**	61	**47**

Answer Key Using the Periodic Table of Elements Sheet 1

Hydrogen	**Boron**	**Aluminum**
Atomic Number: 1	Atomic Number: 5	Atomic Number: 13
Atomic Mass: 1	Atomic Mass: 11	Atomic Mass: 27
Symbol: H	Symbol: B	Symbol: Al
# of protons: 1	# of protons: 5	# of protons: 13
# of electrons: 1	# of electrons: 5	# of electrons: 13
# of neutrons: 0	# of neutrons: 6	# of neutrons: 14
Sulfur	**Oxygen**	**Helium**
Atomic Number: 16	Atomic Number: 8	Atomic Number: 2
Atomic Mass: 32	Atomic Mass: 16	Atomic Mass: 4
Symbol: S	Symbol: O	Symbol: He
# of protons: 16	# of protons: 8	# of protons: 2
# of electrons: 16	# of electrons: 8	# of electrons: 2
# of neutrons: 16	# of neutrons: 8	# of neutrons: 2
Potassium	**Sodium**	**Carbon**
Atomic Number: 19	Atomic Number: 11	Atomic Number: 6
Atomic Mass: 39	Atomic Mass: 23	Atomic Mass: 12
Symbol: K	Symbol: Na	Symbol: C
# of protons: 19	# of protons: 11	# of protons: 6
# of electrons: 19	# of electrons: 11	# of electrons: 6
# of neutrons: 20	# of neutrons: 12	# of neutrons: 6

Name _____ Date ____ / ____ / ____

PERIODIC TABLE PUZZLE

Group Number

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
I																	
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C													B				A
								E				J					

		D											

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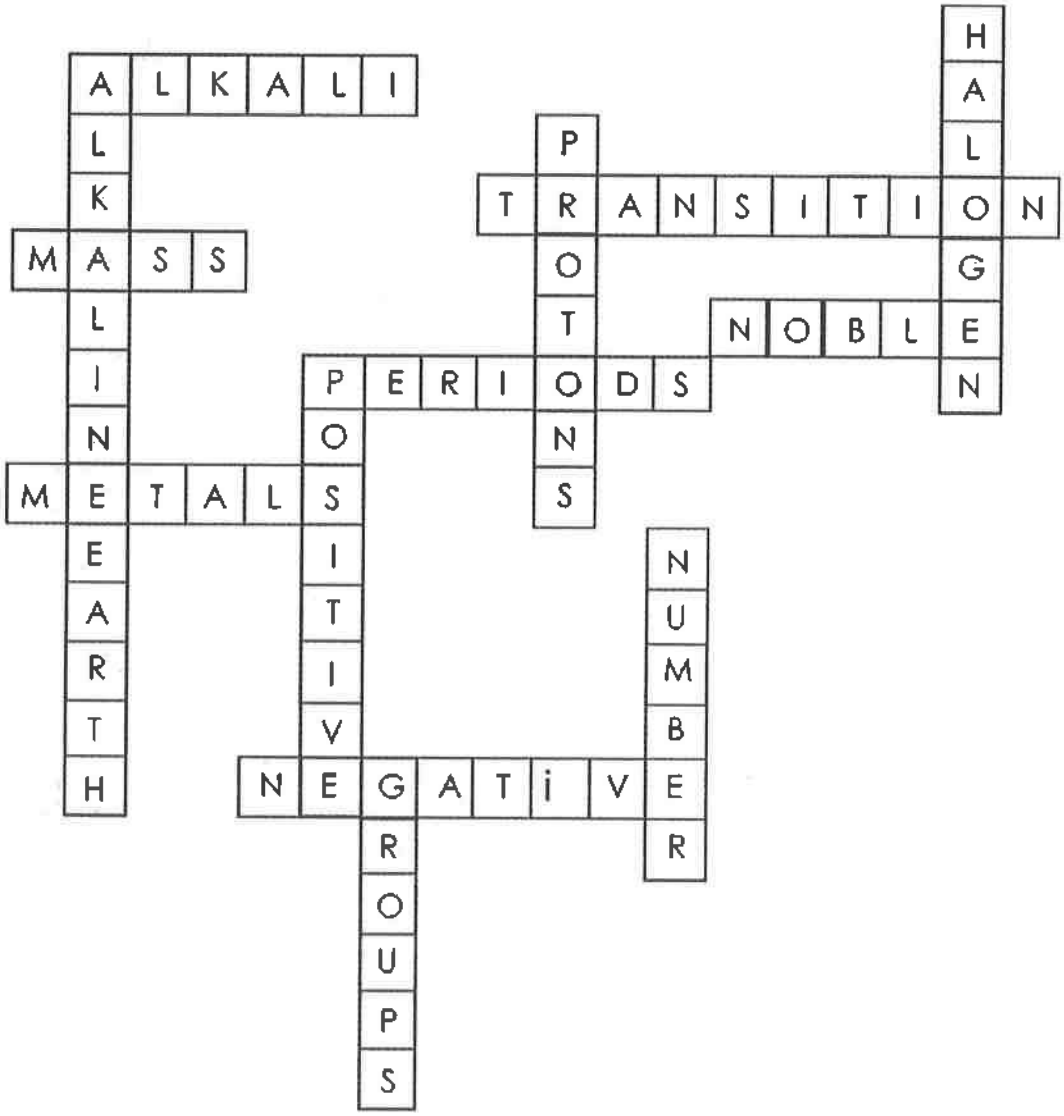
1	A semimetal	B
2	An inner transition element	C
3	Has oxidation numbers of +1 and -1	I
4	Most commonly has an oxidation state of -2.	G
5	The alkali metal	C
6	The alkaline earth metal	F
7	This is an active nonmetal	H
8	This is an inert gas	A
9	This metal has an oxidation number of +3	J
10	This metal has more than one oxidation state	E

Name _____ Date ____ / ____ / ____

CROSSWORD PUZZLE: THE PERIODIC TABLE



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2. Name for the group I metals
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8. Most elements are ____.
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Key

Atomic History and Periodic Table Quiz **Name** _____
***USE A PERIODIC TABLE!**

Si 1. Which element is atomic number 14 on the periodic table?

Cf 2. What is the element symbol for Californium? (check rare earth metals)

83 3. How many protons are in an atom of Bismuth?

18 noble gases 4. To which element group does Argon belong?

5 5. Which period is Silver (Ag)?

Sg or Pr 6. Find the element in period 7, group 6.

transition 7. What do you call the element series from group 3-12?

Gold metals 8. Which element has a symbol that doesn't seem to match its English name?

Aluminum, Copper, or Gold

H 9. Which element has the lowest atomic mass?

Noble gases 10. Group 18 elements are called _____ _____.

B 11. What is the first metalloid on the periodic table?

F 12. True or false: Tin and Antimony are in the same element group.

Fr 13. What is the heaviest alkali metal?

12 14. How many electrons are in a neutral atom of Magnesium?

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10 16. How many neutrons are in an atom of Fluorine?

Pd 17. Which element has an atomic mass of 106.42?

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Phosphorus 19. Which element has 3 energy levels and 5 outer electrons?

Use the names of the scientists who contributed to our model of the atom. (Democritus, Dalton, Thomson, Rutherford, Bohr)

R 20. Added the proton and nucleus to the atomic model.

D 21. Had no subatomic particles in the nucleus. Also introduced the idea of compounds.

T 22. Model was a ball of positive material with negative electrons scattered throughout.

B 23. Electrons travel around the nucleus in set orbits.

Democritus 24. Named the atom "atomos" meaning indivisible.

25. How many protons, neutrons, and electrons would an atom of Boron have?

5 p, 6 n, 5 e

5
B
Boron