

**Science**  
**eLearning**  
**Ms. Hammond**

**Name** \_\_\_\_\_  
**Date** \_\_\_\_\_

In the event that ACAS is closed due to inclement weather, students are expected to complete the assignments listed below. Should students have questions regarding these assignments, they may contact me by e-mail ([maryellenhammond@acalt.org](mailto:maryellenhammond@acalt.org)) between 9:30 a.m.-11:00 a.m. and 1:00 p.m.-2:30 p.m. to receive assistance. These assignments are due within two days of our return to school. **Failure to turn in all work within two days of returning to school will result in a zero for each day, and no seat hour will be awarded for the day(s) missed.**

Students should complete the attached worksheets.

Name \_\_\_\_\_

Section \_\_\_\_\_

Chem Day 1  
Date \_\_\_\_\_

1

# Matter and Change

## Critical Thinking Worksheet

### Classifying

#### Understanding the Skill

The process of classifying is fundamental to the understanding of chemistry. Not only does classifying make it easier to learn the principles of chemistry, but it also is an important tool in the quest for new knowledge. The periodic table of the elements at the back of your text is a product of the process of classifying. This table is so important that the text devotes a whole chapter to it, and much of what you will learn in this course can be traced back to insights provided by this great example of classifying.

Of course, you are already familiar with classifying. The "basic food groups" is an example of classifying. By classifying foods as "green vegetable", "dairy products", etc. nutritionists were able to consider what each group of foods contributed to health, and to better advise people on their meal planning. Roads are classified as "city streets", "interstates", etc., and this makes planning a trip much easier than if each road had to be described.

#### Learning the Skill

**Example** Start with an example in your community. You will classify the various jobs in your community into these categories: agricultural, technical, medical, clerical, and other. You will consider the advantages and limitations of this classification.

a. List some local jobs that can be classified as:

Agricultural \_\_\_\_\_

Technical \_\_\_\_\_

Medical \_\_\_\_\_

Clerical \_\_\_\_\_

Other \_\_\_\_\_

b. One use of classification is to group items in such a way that general statements can be made. Make at least one general statement about each of the job classifications above.

Agricultural \_\_\_\_\_

Technical \_\_\_\_\_

Medical \_\_\_\_\_

Clerical \_\_\_\_\_

Other \_\_\_\_\_

c. Every system of classification has its limits, and if these limits are not observed, using the system can lead to errors in classification. For example, many clerical workers work in hospitals. They could be classified under medical jobs or clerical jobs. Can you find some exceptions to the general statements you made about the job categories?

#### Applying the Skill

Most of the chemicals that you will use in the laboratory activities in this course will be either *elements* or *compounds*. All pure substances can be classified into one of these categories. Sometimes you will use *mixtures*. You can use this system of classification to organize your knowl-

edge about elements, compounds and mixtures. It may help to review Sections 1.6 and 1.7 before proceeding.

1. Before classifying it is important to define your categories. Write a clear definition for the categories below.

a. Element \_\_\_\_\_  
\_\_\_\_\_

b. Compound \_\_\_\_\_  
\_\_\_\_\_

c. Mixture \_\_\_\_\_  
\_\_\_\_\_

2. Give five examples of elements that are in this room.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Give five examples of compounds that are in this room.  
\_\_\_\_\_  
\_\_\_\_\_

4. Give five examples of mixtures that are in this room.  
\_\_\_\_\_  
\_\_\_\_\_

5. Now organize what you know about elements and compounds by making a comparison table. Examples of what might be compared are how an element, a compound and a mixture can be separated into simpler substances, or how many phases could be present. Use the space below.

**Reviewing What You Have Learned**

6. How can classifying matter into these three categories make it easier to study chemistry?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Elements	Compounds	Mixtures

# 2

## Scientific Measurement Critical Thinking Worksheet

### Recognizing Patterns

#### Understanding the Skill

You probably notice patterns often. You might notice a pattern in the tiles on the floor of a building. In some buildings you might see a pattern of alternating black and white tiles. It is possible, however, that someone might put black and white tiles on a floor, but just pick them out randomly and glue them down without noticing their color. In this case you might not be able to see any regular pattern. Sometimes there are visible patterns and sometimes there are not.

You can also notice patterns in numbers. Here is a group of four numbers: 2, 4, 6, 8. Do you notice a pattern? What do you think the next number would be if it followed the same pattern? You may be thinking of 10. It is the next number in a pattern of the even numbers.

In chemistry people often think about patterns of numbers. Patterns which involve numbers are called *quantitative* patterns. You have probably looked at a Periodic Table of the Elements on a wall of your classroom or in the back of your chemistry book. There are quantitative patterns in the periodic table. There is a number, called the atomic number, which is above each of the symbols for an element. Do you notice that this number follows a regular pattern? It increases one whole number for each element as we go across a row of elements. There is another number below each symbol. It is called the atomic mass number. The atomic mass follows a pattern too. It gets larger as you go across, but this number does not change as consistently as the atomic number does. It is harder to predict what an element's atomic mass will be because of this inconsistent pattern.

#### Learning the Skill

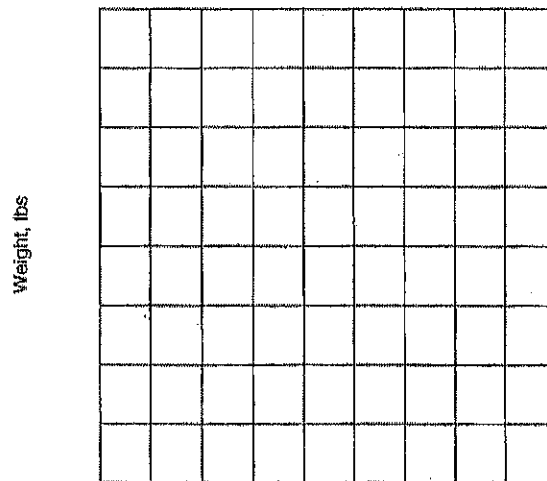
**Example** Sometimes there are patterns in pairs of numbers. Here are some heights and weights for a group of five people: 5'3", 110 lbs; 5'10", 165 lbs; 5'6", 145 lbs; 5'4", 135 lbs; 5'7", 150 lbs. Do you think there is a pattern, or relationship, between height and weight?

One good way to look for quantitative patterns is to arrange the numbers in a way which is easy to see. You could make a table of the heights and weights to help you see a possible pattern.

Height	Weight

a. Enter the heights and weights in the table. What pattern do you notice?

A graph is even more effective than a table when looking for quantitative patterns in pairs of numbers. You could use a graph with height on one axis and weight on the other.



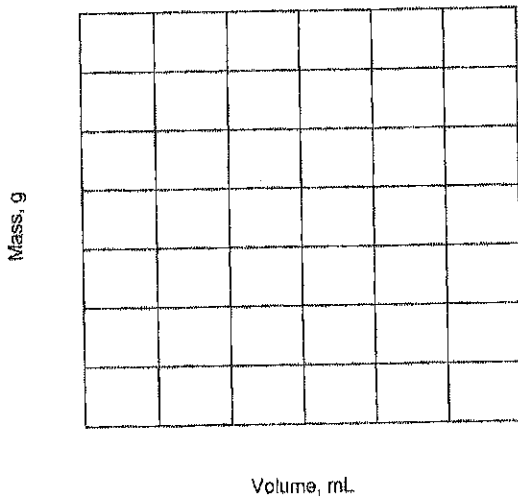
b. Enter the heights and weights on the graph. What pattern do you observe?

### Applying the Skill

A chemistry student found four different small objects which were all made of aluminum. She determined the mass and volume of each of these objects. Here is her data: object 1 - 29.7 g, 11 ml; object 2 - 19.0 g, 7 ml; object 3 - 35.2 g, 13 ml; object 4 - 68.2 g, 25 ml.

1. Try to find a pattern in these pairs of numbers. Start by making a table of the data. Then graph the volume on the horizontal axis and mass on the vertical axis. What pattern, or relationship, between mass and volume do you see?

Mass	Volume




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2. Compare the mass-volume pattern for aluminum with the height-weight pattern for people. Is one pattern more regular than the other?

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3. Suppose you were given just the height of a person. You could use your graph to predict the weight of the person. Likewise, if you were given just the volume of a piece of aluminum you could use your graph to predict its mass. Which of these predictions would you believe to be more accurate and why would you believe this?

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4. The slope of the mass versus volume graph is the ratio of mass to volume for aluminum. What is the special name for this ratio?

5. How would the mass versus volume graph for a very dense substance like mercury compare with the graph for aluminum?

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### Reviewing What You Have Learned

6. What is a quantitative pattern?

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7. What are some good ways to start if we want to find quantitative patterns in groups of numbers?

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8. You can use a quantitative pattern to make a prediction. Some quantitative patterns give you more faith in the accuracy of your prediction than others do. Why is this?

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