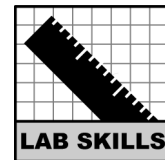


Name: _____

Date: _____



2.2 Recording Observations in the Lab

How do you record valid observations for an experiment in the lab?

When you perform an experiment you will be making important observations. You and others will use these observations to test a hypothesis. In order for an experiment to be valid, the evidence you collect must be objective and repeatable. This investigation will give you practice making and recording good observations.

Materials

- Paper
- Pencil
- Calculator
- Ruler

Making valid observations

Valid scientific observations are objective and repeatable. Scientific observations are limited to one's senses and the equipment used to make these observations. An objective observation means that the observer describes only what happened. The observer uses data, words, and pictures to describe the observations as exactly as possible. An experiment is repeatable if other scientists can see or repeat the same result. The following exercise gives you practice identifying good scientific observations.

Exercise 1

1. Which observation is the most objective? Circle the correct letter.

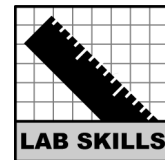
- My frog died after 3 days in the aquarium. I miss him.
- The frog died after 3 days in the aquarium. We will test the temperature and water conditions to find out why.
- Frogs tend to die in captivity. Ours did after three days.

2. Which observation is the most descriptive? Circle the correct letter.

- After weighing 3.000 grams of sodium bicarbonate into an Erlenmeyer flask, we slowly added 50.0 milliliters of vinegar. The contents of the flask began to bubble.
- We weighed the powder into a glass container. We added acid. It bubbled a lot.
- We saw a fizzy reaction.

3. Which experiment has enough detail to repeat? Circle the correct letter.

- Each student took a swab culture from his or her teeth. The swab was streaked onto nutrient agar plates and incubated at 37 C.
- Each student received a nutrient agar plate and a swab. Each student performed a swab culture of his or her teeth. The swab was streaked onto the agar plate. The plates were stored face down in the 37 C incubator and checked daily for growth. After 48 hours the plates were removed from the incubator and each student recorded his or her results.
- Each student received a nutrient agar plate and a swab. Each student performed a swab culture of his or her teeth. The swab was streaked onto the agar plate. The plates were stored face down in the 37 C incubator and checked daily for growth. After 48 hours the plates were removed from the incubator and each student counted the number of colonies present on the surface of the agar.



Recording valid observations

As a part of your investigations you will be asked to record observations on a skill sheet or in the results section of a lab report. There are different ways to show your observations. Here are some examples:

1. **Short description:** Use descriptive words to explain what you did or saw. Write complete sentences. Give as much detail as possible about the experiment. Try to answer the following questions: What? Where? When? Why? and How?
2. **Tables:** Tables are a good way to display the data you have collected. Later, the data can be plotted on a graph. Be sure to include a title for the table, labels for the sets of data, and units for the values. Check values to make sure you have the correct number of significant figures.

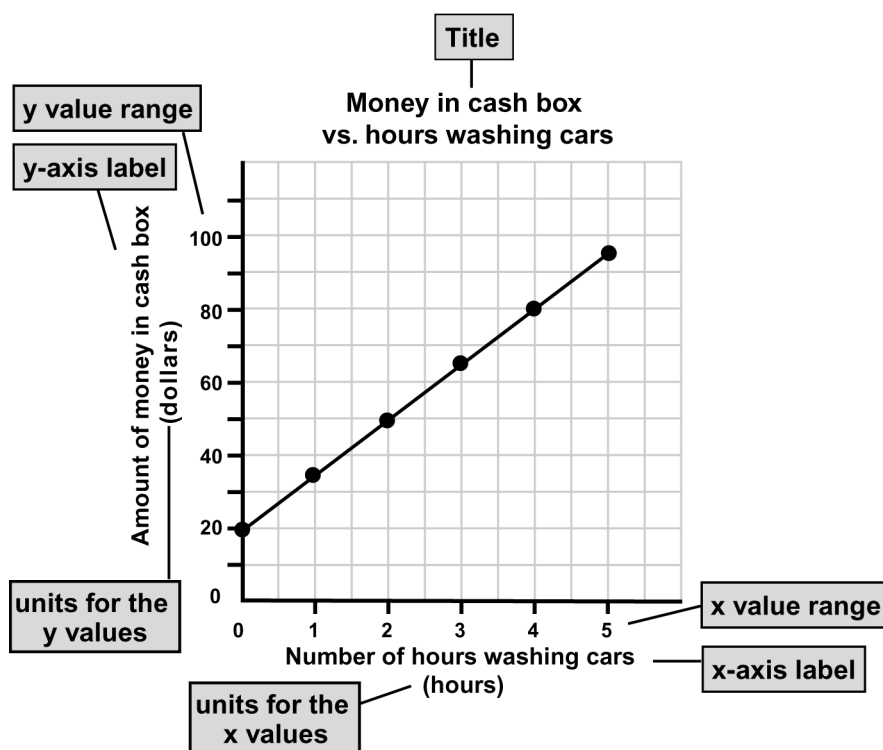
U.S. penny mass by year

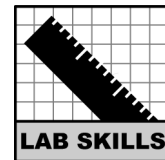
Year manufactured	1977	1978	1979	1980	1981	1982	1983	1984	1985
Mass (grams)	3.0845	3.0921	3.0689	2.9915	3.0023	2.5188	2.5042	2.4883	2.5230

3. **Graphs and charts:** A graph or chart is a picture of your data. There are different kinds of graphs and charts: line graphs, trend charts, bar graphs, and pie graphs, for example. A line graph is shown below.

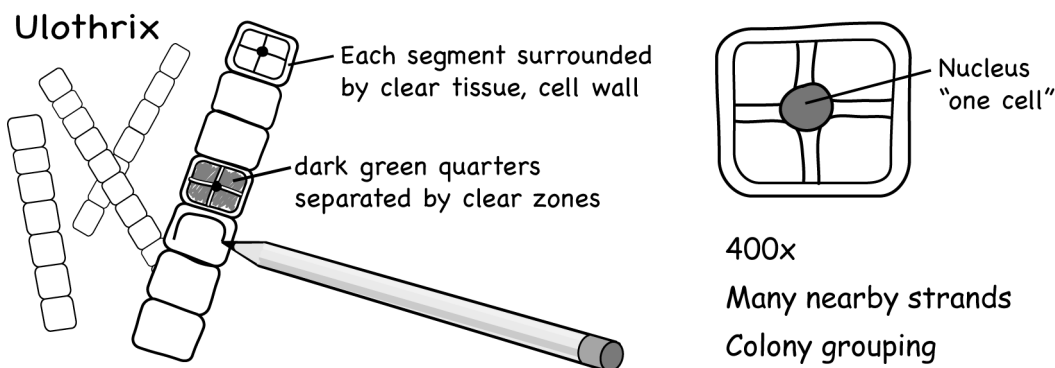
Label the important parts of your graph. Give your graph a title. The x-axis and y-axis should have labels for the data, the unit values, and the number range on the graph.

The line graph in the example has a straight line through the data. Sometimes data does not fit a straight line. Often scientists will plot data first in a trend chart to see how the data looks. Check with your instructor if you are unsure how to display your data.





4. **Drawings:** Sometimes you will record observations by drawing a sketch of what you see. The example below was observed under a microscope.



Give the name of the specimen. Draw enough detail to make the sketch look realistic. Use color, when possible. Identify parts of the object you were asked to observe. Provide the magnification or size of the image.

Exercise 2: Practice recording valid observations

A lab report form has been given to you by your instructor. This exercise gives you a chance to read through an experiment and fill in information in the appropriate sections of the lab report form. Use this opportunity to practice writing and graphing scientific observations. Then answer the following questions about the experiment.

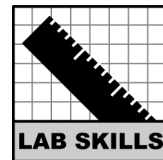
A student notices that when he presses several pennies in a pressed penny machine, his brand new penny has some copper color missing and he can see silver-like material underneath. He wonders, “Are some pennies made differently than others?” The student has a theory that not all U.S. pennies are made the same. He thinks that if pennies are made differently now he might be able to find out when the change occurred. He decides to collect a U.S. penny for each year from 1977 to the present, record the date, and take its mass. The student records the data in a table and creates a graph plotting U.S. penny mass vs. year. Below is a table of some of his data:

U.S. penny mass by year

Year manufactured	1977	1978	1979	1980	1981	1982	1983	1984	1985
Mass (grams)	3.0845	3.0921	3.0689	2.9915	3.0023	2.5188	2.5042	2.4883	2.5230

Stop and think

- a. What observation did the student make first before he began his experiment?



b. How did the student display his observations?

c. In what section of the lab report did you show observations?

d. What method did you use to display the observations? Explain why you chose this one.
