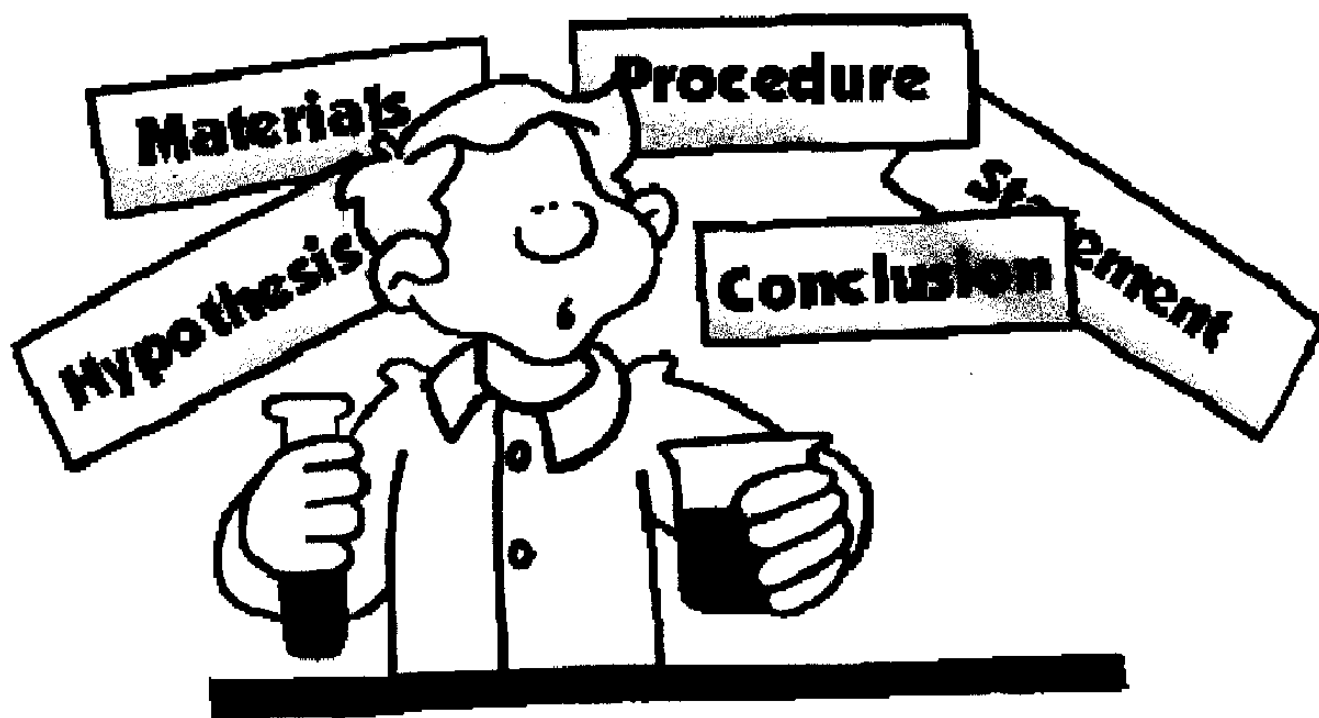


# The Nature of Science

Integrated Science

Highland High School

Unit 1



T O P E V C A L E T I U Y D Y Y X O C  
 N S N T T E E I I N N T T T O O C N R  
 E E C C C O D C T E E U T I Q M E P S  
 M I C D C P B X O S P O T G I C I P H  
 I D S L A A R X D A Q D P M I I H F U  
 R E C N E I C S E R U P N L A G Y N A  
 E X P E R I M E N T A L G R O U P U E  
 P R T N O I S U L C N O C O E C O C Y  
 X T I Q U A L I T A T I V E D A T A G  
 E C E R Y E T N E M I R E P X E H S O  
 D O H T E M C I F I T N E I C S E T L  
 E E S E Y A I L L P A I Y Y E L S B O  
 L F T O M E C I E S T P G Y R N I T N  
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 N I I E D H I I T Y A Y E W D S E S H  
 O T A C G T E C O N T R O L G R O U P  
 C U C C O I C E T S P A T G O R H A Y M

### Integrated Science Module 1 Key Terms

applied science	biology	chemistry
conclusion	control group	controlled experiment
data	experiment	experimental group
graph	hypothesis	law
msds	physics	pure science
qualitative data	quantitative data	scientific method
technology	theory	

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Integrated Science

Nature of Science

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

Lab: Measurement Challenge

Block: \_\_\_\_\_

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**Introduction:** Take the measurement challenge! Accurately estimate the length, width, and height of a small plastic block and calculate the block's volume. Then predict the mass of the block - without a balance - by using the block's known density.

**Background:** All measurements involve some degree of error or estimation. The measurements are based on the fact that the human eye can estimate to one-tenth of the smallest mark shown on a measuring instrument. Therefore, a ruler with only 1-cm increments shown can provide measurements that are estimated to 0.1cm, while a ruler with 0.1-cm increments shown can provide measurements that are estimated to 0.01cm.

In this activity, the first goal is to determine the volume of a plastic block. The volume of any regular solid can be calculated using the equation:

$$\text{Volume} = \text{Length} \times \text{Width} \times \text{Height}$$

Once the solid's volume has been calculated, the mass can be predicted using the known density and solving for the equation:

$$\text{Mass} = \text{Volume} \times \text{Density}$$

**Materials:**

calculator	metric ruler
plastic blocks	balance

**Procedure:**

*Pre-lab activity:*

1. Obtain a metric ruler. Take a close look at the markings on the ruler. What is the distance between the smallest markings on the ruler? \_\_\_\_\_
2. Most people can accurately estimate a measurement to one-tenth of the smallest mark on an instrument. Therefore, if a ruler has a marking every 1cm, a person can reliably estimate to the nearest 0.1cm. Likewise, if a ruler has a marking every 0.1cm, a person can reliably estimate to the nearest 0.01cm. With the metric ruler you have, what is the most reliable estimation that can possibly be made? \_\_\_\_\_
3. Use the metric ruler to measure the length of the following line segments. Be sure to estimate to the hundredths place for each measurement, and underline the digit that is estimated. Include the proper units.

Measure these line segments ↘

Measurement (cm or mm)

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

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

4. Use the metric ruler to measure the length and width of each of the rectangles below. Be sure to estimate to the proper decimal place for each measurement and include units.

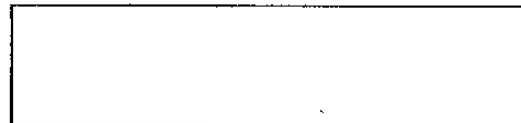


Rectangle #1

Length: \_\_\_\_\_

Width: \_\_\_\_\_

Area: \_\_\_\_\_



Rectangle #2

Length: \_\_\_\_\_

Width: \_\_\_\_\_

Area: \_\_\_\_\_

NOTE: Be sure your area calculation includes only the same number of decimal places as your least accurate measurement!

### Density Calculations:

- Obtain one plastic block per group from the teacher. Record the block number and color in the table below.
- Use the laboratory balance to measure the mass of the block. Record the mass in the data table.
- Use the metric ruler to measure the dimensions of the block. Record these values in the data table.
- Calculate the volume of the block using the volume equation from the background section. Record the volume in the data table. Include the units, and round the value to the same number of decimal places as the least accurate of the original measurements.
- Calculate the density of the block using the equation:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Record density in the data table and include the appropriate units.

- Repeat the steps above for two additional blocks of different colors.

Data Table:

Block Number			
Color of Block			
Mass (g)			
Length (cm)			
Width (cm)			
Height (cm)			
Volume (cm <sup>3</sup> )			
Density (g/cm <sup>3</sup> )			

**The Measurement Challenge:**

- Obtain a plastic block from the teacher. The block must be a different number than any of the above. Record the block number \_\_\_\_\_ and color \_\_\_\_\_.
- Use the density values below and the mass equation from the background information to predict the mass of the block. Show all work and calculations.

**Calculations:**

Color of Block	Density (g/cm <sup>3</sup> )
White	0.541
Black	0.985
Milky-white	0.908
Clear	1.18
Gray	1.42

Predicted Mass: \_\_\_\_\_ (don't guess → use the equation!)

- Measure the actual mass of the block using the balance: \_\_\_\_\_

- Use the following equation to determine the error of your estimation:

$$\text{Percent Error} = \frac{|\text{Predicted Mass} - \text{Actual Mass}|}{\text{Actual Mass}} \times 100 = \underline{\hspace{2cm}}$$

If your error is more than 20 %, re-do your calculations for step #12.

In science, data is gathered according to the guidelines of the scientific method. A large part of the scientific method procedure is based on hypothesis testing. In this lab experiment, you will propose a hypothesis and develop a test for your hypothesis. You will then carry out your test, analyze your resulting data, and reach a conclusion about your hypothesis.

**Materials needed per lab group:** 4 disposable cups, soil, seeds (2 corn and 2 bean or pea), marker

**Method:**

1. Make a list of five things plants need in order to grow.
  
2. Develop a hypothesis about one of the above necessary things. Your hypothesis should be in the form: If a plant does not have \_\_\_\_\_ it will not grow.
  
3. Develop an experiment to test your above hypothesis. You WILL be doing your experiment, so make sure it is workable! Describe your experiment:
  
  
  
  
  
  
  
  
  
  
4. Describe your experiment idea to your teacher. Once you receive approval of your idea, set up and conduct your experiment.
  
  
5. Every class time, gather and record the following data on the data table on the back of the page:
  - a. Length of each plant in centimeters (from the soil level to the tip of the stem)
  - b. Appearance of each plant (# leaves, leaf color)
  - c. Amount of water given in milliliters
  
6. At the end of the unit, compile a lab report that includes the following information.
  - a. Data, organized in a table in Word or a worksheet in Excel.
  - b. A computer generated (Excel) graph showing the growth of your plants over time.
  - c. Experimental Conclusion: Did the results agree with your hypothesis? If not, what might be an alternate explanation? What might have been a source of error in your experiment?



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**Integrated Science**

**Nature of Science**

**Name:** \_\_\_\_\_

**Intro Activity: Observation**

**Block:** \_\_\_\_\_

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One of the goals of science is to understand the world around us. This understanding comes from careful observations, which leads to questions and experimentation by scientists. Your task is to carefully observe the living organisms present in the classroom and make five observations. Then, write down one question that relates to each of your observations. Finally, write down an experiment that could be done to test your question. Explain your variable. Remember, the variable is the only thing that is different between the control group and experimental group in an experiment.

1. Observation:

Question:

Experiment:

Variable:

2. Observation:

Question:

Experiment:

Variable:

3. Observation:

Question:

Experiment:

Variable:

4. Observation:

Question:

Experiment:

Variable:

5. Observation:

Question:

Experiment:

Variable:

In the space below, choose one of your experiments above. Draw a picture of what the set-up for this experiment would look like. Include both an experimental group and a control group.

Picture for observation # \_\_\_\_\_

# Nature of Science -Introduction to Integrated Science

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## Key Terms

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>□ Scientific method</li><li>□ Hypothesis</li><li>□ Experiment</li><li>□ Data</li><li>□ Conclusion</li><li>□ Theory</li><li>□ Law</li><li>□ Controlled experiment</li><li>□ Control group</li><li>□ Experimental group</li><li>□ Quantitative data</li></ul> | <ul style="list-style-type: none"><li>□ Qualitative data</li><li>□ Pure science</li><li>□ Applied science</li><li>□ Technology</li><li>□ Biology</li><li>□ Chemistry</li><li>□ Physics</li><li>□ MSDS</li><li>□ Graph</li></ul> |
|---|---|
- 

### I. What is Science

- A. \_\_\_\_\_ is the gathering of information that adds to human knowledge
- B. \_\_\_\_\_ is the practical use of scientific information
1. Applied science is also known as \_\_\_\_\_

### II. Types of Science

- A. \_\_\_\_\_ is the study of living things
- B. \_\_\_\_\_ is the study of the structure of properties of matter
- C. \_\_\_\_\_ is the study of the relationships between matter and energy
- D. \_\_\_\_\_ is the study of the origin, structure and physical events of the Earth

### III. The Scientific Method

- A. The \_\_\_\_\_ is an organized way to figure something out
- B. The scientific method has four basic steps.

[Empty box]



[Empty box]



[Empty box]



[Empty box]

1. State the \_\_\_\_\_ to be solved or \_\_\_\_\_ to be answered

2. Form a \_\_\_\_\_ or educated guess about the answer to the problem of question.

a. \_\_\_\_\_ is often completed before a hypothesis is formed.

3. Set up an \_\_\_\_\_ to test the hypothesis

4. Analyze the results of the experiment and draw a \_\_\_\_\_

a. If the conclusion wasn't what was expected, form a new \_\_\_\_\_

C. A \_\_\_\_\_ is a generally accepted explanation of a concept of a broad explanation of a natural event or process.

1. Theories have \_\_\_\_\_ been proven

2. Evolution is a scientific theory

D. A \_\_\_\_\_ or principle is a description of a natural event or process that does not vary.

1. Laws \_\_\_\_\_ be proven

2. Gravity is a scientific law.

#### IV. Experimental Design

A. The \_\_\_\_\_ is a logical outline that guides the gathering and evaluation of information.

1. The experimental design is the \_\_\_\_\_ of any scientific investigation

2. This is the scientists plan for \_\_\_\_\_ a hypothesis

B. A good experimental design requires three main factors

1. \_\_\_\_\_ must be incorporated
  - a. The \_\_\_\_\_ is the group in which one factor is changed.
  - b. The \_\_\_\_\_ received the same treatment as the experimental group but nothing is changed.
  - c. The factor being changed is called the \_\_\_\_\_.
2. Experiments must be \_\_\_\_\_
  - a. Multiple trials of an experiment must be performed so data can be \_\_\_\_\_ and \_\_\_\_\_.
3. Experiments must not be \_\_\_\_\_
  - a. An experiment should not be influenced by personal opinions of researchers or research participants
    - i. In a \_\_\_\_\_ study neither the researcher nor the participant knows their part in the study
    - ii. A \_\_\_\_\_ may be given to help prevent bias

C. Researchers collect data during the course of an experiment

1. Two types of data can be collected
  - a. \_\_\_\_\_ data consists of descriptive information
  - b. \_\_\_\_\_ data consists of numerical information
2. Quantitative data can be displayed using a \_\_\_\_\_

- a. A \_\_\_\_\_ shows how data changes over time
- b. A \_\_\_\_\_ displays information collected by counting
- c. A \_\_\_\_\_ shows how a fixed amount is broken down into parts.

D. Experimental results are \_\_\_\_\_ and \_\_\_\_\_ are made

1. Reports are \_\_\_\_\_ in scientific journals or presented at national meetings
2. The work of the researchers is then available to the scientific community

#### V. Lab Safety

A. To ensure that students are not \_\_\_\_\_ during experiments, proper safety procedures must be followed

B. Chemicals must be handled carefully and should not come in contact with skin and/or clothing

1. Material Safety Data Sheets (MSDS) are available for every chemical that is used in the lab
  - a. The MSDS provides information about how toxic a chemical is and the safety precautions that should be taken
2. Wipe down the lab tables after you complete an experiment
3. Wash your hands before you leave the lab
4. No food or drink is allowed in the lab or on or near the lab tables
5. Wear your safety glasses any time heat and/or chemicals are used in the lab
6. Notify the teacher immediately if you spill any chemical or break any glassware

VI. Lab Equipment

- A. \_\_\_\_\_ - used to hold substances, provides approximate volume measurements
- B. \_\_\_\_\_ - used to make accurate measurements of liquid volumes
- C. \_\_\_\_\_ - used to heat small amounts of substances or to cover beakers
- D. \_\_\_\_\_ - attaches to ring stand to support glassware above table
- E. \_\_\_\_\_ - attaches to ring stand to hold test tubes or flasks above table
- F. \_\_\_\_\_ - used for heating substances to high temperatures
- G. \_\_\_\_\_ - used to pick up crucibles and crucible covers
- H. \_\_\_\_\_ - Used as a support for beakers on a support ring
- I. \_\_\_\_\_ - used to hold test tubes during gentle heating
- J. \_\_\_\_\_ - used to light a Bunsen burner
- K. \_\_\_\_\_ - provides heat source for high temperature heating
- L. \_\_\_\_\_ - provides heat source for lower temperature heating
- M. \_\_\_\_\_ - used to transfer solids
- N. \_\_\_\_\_ - used to measure the mass of a substance
- O. \_\_\_\_\_ - used to measure the temperature of a substance

- P. \_\_\_\_\_ - protect hands when holding hot glassware
- Q. \_\_\_\_\_ - used to rinse solids out of a container
- R. \_\_\_\_\_ - used to filter particles from a liquid when lined with filter paper
- S. \_\_\_\_\_ - used to measure the length, width, or height of an object
- T. \_\_\_\_\_ - used to hold specimens for viewing or for growing bacteria
- U. \_\_\_\_\_ - used to view objects too small to be seen with the human eye.

Each sentence below describes a step of the scientific method.  
Match each sentence with a step of the scientific method listed  
below.



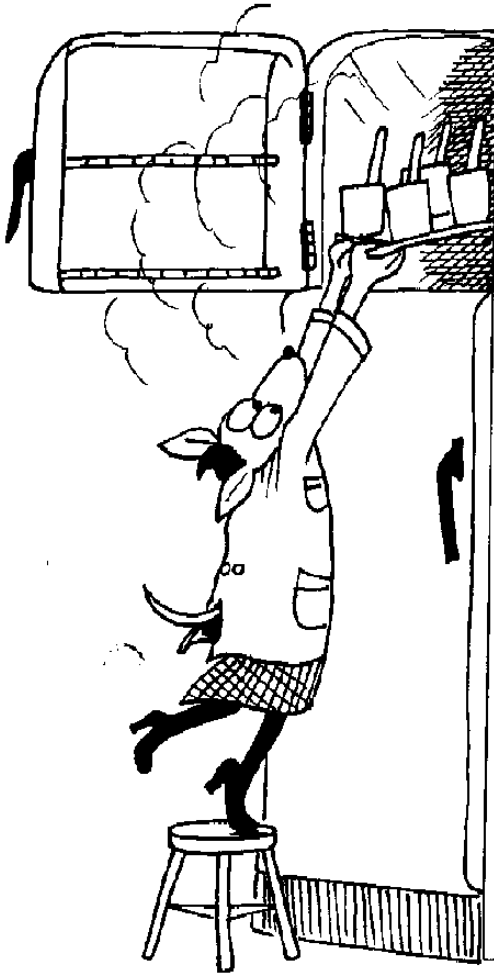
- A. Recognize a problem  
B. Form a hypothesis  
C. Test the hypothesis with an experiment  
D. Draw conclusions

- \_\_\_\_\_ 1. Stephen predicted that seeds would start to grow faster if an electric current traveled through the soil in which they were planted.
- \_\_\_\_\_ 2. Susan said, "If I fertilize my geranium plants, they will blossom."
- \_\_\_\_\_ 3. Jonathon's data showed that household cockroaches moved away from raw cucumber slices.
- \_\_\_\_\_ 4. Renee grew bacteria from the mouth on special plates in the lab. She placed drops of different mouthwash on each plate of bacteria.
- \_\_\_\_\_ 5. Kathy used a survey to determine how many of her classmates were left-handed and how many were right-handed.
- \_\_\_\_\_ 6. Dana wanted to know how synthetic fibers were different from natural fibers.
- \_\_\_\_\_ 7. Edward saw bats catching insects after dark. He asked, "How do bats find the insects after dark?"
- \_\_\_\_\_ 8. Justin wondered if dyes could be taken out of plant leaves, flowers and stems.
- \_\_\_\_\_ 9. Adam soaked six different kinds of seeds in water for 24 hours. Then he planted the seeds in soil at a depth of 1cm. He used the same amount of water, light, and heat for each kind of seed.
- \_\_\_\_\_ 10. Bob read about growing plants in water (hydroponics). He wanted to know how plants could grow without soil.
- \_\_\_\_\_ 11. Kevin said, "If I grow 5 seedlings in red light, the plants will grow faster than the 5 plants grown in white light."
- \_\_\_\_\_ 12. Angela's experiment showed that earthworms move away from light.
- \_\_\_\_\_ 13. Scott said, "If acid rain affects plants in a particular lake, it can affect small animals, such as crayfish, that live in the same water."
- \_\_\_\_\_ 14. Michael experimented with the diets of guinea pigs. He found that guinea pigs need vitamin C and protein in their diets.
- \_\_\_\_\_ 15. Kim's experiment showed that chicken egg shells became stronger if the hen ate feed to which extra calcium had been added.

# IN PURSUIT OF ANSWERS

## To DESIGN AN EXPERIMENT

is to make a plan to find an answer for a question or to test a hypothesis. The plan includes all the steps to take and equipment to be used in the process.



Dr. Igneous wants to make frozen juice pops for her picnic. She is curious about how long it will take for the pops to freeze. She knows that juice is a solution—not a pure substance. So, she wonders how the freezing time will compare to the freezing time of water. She assumes that the juice (a solution) will take longer to freeze than water.

Agnes makes a plan to answer her question about the freezing time of juice pops. She gets five small paper cups and five wooden sticks for "handles" for her frozen pops. She finds a measuring cup and measuring spoons, and a bigger spoon for stirring. Then, she opens a bottle of grape juice. She also has a pitcher of water handy, and a pen for writing on the cups.

On one cup, she writes *water*, and fills the cup with water. On the next cup, she writes *pure juice*. She fills this with juice. On the third cup, she writes *one-half juice*. She fills the measuring cup to the  $\frac{1}{2}$  cup mark with juice, and adds water to the 1-cup mark. After mixing this, she pours some into the third cup to fill it. On the fourth cup, she writes *one-fourth juice*. After emptying the measuring cup, she fills it to the  $\frac{1}{4}$  cup mark with juice, then to the 1-cup mark with water. She stirs this and pours some in to fill the cup. She writes *one-eighth juice* on the last cup. In the empty measuring cup, she measures two tablespoons of juice. She fills the cup to the 1-cup mark and stirs. Then, she pours this mixture into the last cup.

All the cups are placed in the freezer. Every 10 minutes, she will check the pops to see how the freezing is coming along. She will keep a record of what happens for each of the five cups.

1. What is her hypothesis? \_\_\_\_\_
2. What are the variables in the experiment? \_\_\_\_\_
3. What variable is controlled? \_\_\_\_\_
4. What measurement tools does she use? \_\_\_\_\_
5. How does her plan include the use of numbers? \_\_\_\_\_

# MORE THAN JUST A GUESS

To **HYPOTHESIZE** is to make an assumption in order to test an idea further.

Hypothesizing is more than just a guess. It is a smart guess that you arrive at after making some careful observations of facts or events.

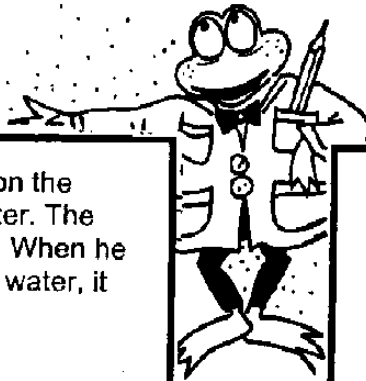
Read each description of an event. Then make a smart guess (a hypothesis) about each one.

Make sure the hypothesis is something that could be tested through scientific inquiry.

Ozzie left his plate out on the counter after lunch. On the plate he left a piece of an egg sandwich, some apple slices, a strawberry, a piece of banana, and some chips. When he returned two hours later, the plate was full of fruit flies. He noticed that the flies were mostly settled on the apples, strawberry, and banana.

1. Write a hypothesis that could be tested.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Ozzie sets a paper clip on the surface of a glass of water. The paper clip does not sink. When he sets a thumbtack on the water, it does sink.

Ozzie notices that his pet rat is not interested in a round toy that is sitting in the middle of the floor. When he kicks the toy and it rolls around, the rat perks up and chases it.

2. Write a hypothesis that could be tested.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Write a hypothesis that could be tested.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Ozzie slices some potatoes, because he intends to make potato chips. He lets them soak in very salty water. (He thinks this will make them into nice, salty chips when he fries them.) When he comes back several hours later to fry the chips, the slices are very limp.



4. Write a hypothesis that could be tested.

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When Ozzie is getting ready to wash dishes, he mistakenly bangs two pot lids together. He notices the sound. Then, while washing the lids, he bangs them together under water. He is surprised that the sound is louder and clearer than before.



5. Write a hypothesis that could be tested.

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Ozzie watched a friend do a magic trick. The friend filled a cup of water almost to the top with cold water. Then she floated a big ice cube on the top. The friend laid a piece of wet string across the ice cube. Then she sprinkled salt over the string and waited three minutes. When she picked up the ends of the string, she also picked up the ice cube because it stuck to the string.



6. Write a hypothesis that could be tested.

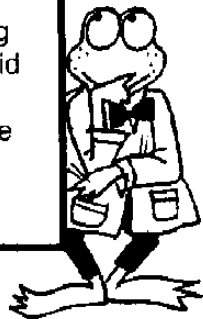
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Ozzie had a liter bottle full of water. He wanted to empty the water. He turned the bottle upside down. It took a very long time to empty. The water just did not seem to want to come out, even though he was holding the bottle directly upside down.



7. Write a hypothesis that could be tested.

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Integrated Science  
Nature of Science  
Graphing Pre-activity

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The purpose of this activity is to determine your familiarity with the elements necessary for properly graphing data.

For the following data, complete three graphs as follows:

1. Draw a bar graph that represents the data given below.
2. Draw a line graph that represents the data given below.
3. Draw a pie chart that shows the percentages of days in the 70's, 80's, and 90's for the week shown.

You may use either graph paper or plain white paper for your graphs. (on back)

DATA: Daily Temperature for One Week in the City of Stony Hill

DAY	HIGH TEMPERATURE
Monday	84 F
Tuesday	87 F
Wednesday	91 F
Thursday	90 F
Friday	94 F
Saturday	78 F
Sunday	81 F

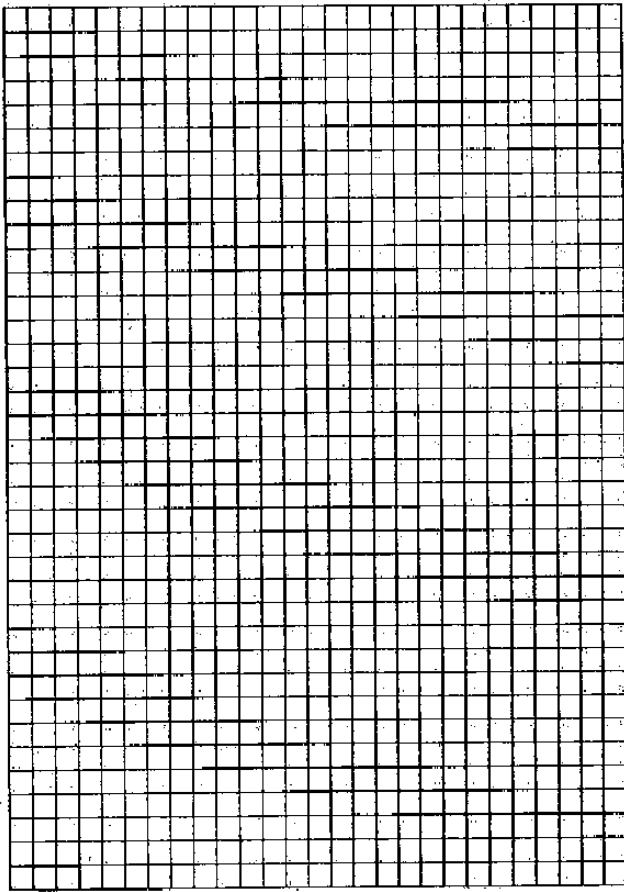
# LINE GRAPH:

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

Assignment: \_\_\_\_\_

From: \_\_\_\_\_ To: \_\_\_\_\_

Page No.: \_\_\_\_\_



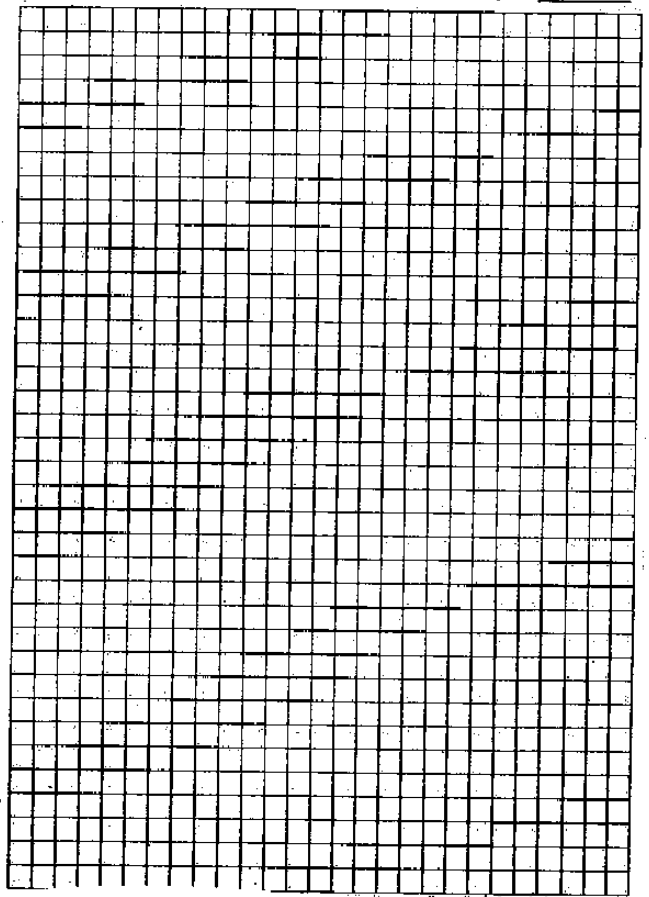
# BAR GRAPH:

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

Assignment: \_\_\_\_\_

From: \_\_\_\_\_ To: \_\_\_\_\_

Page No.: \_\_\_\_\_



1. Identify the following data as qualitative or quantitative.

- a. Bubbles are observed when two chemicals are mixed. \_\_\_\_\_
- b. The solution is clear blue. \_\_\_\_\_
- c. 25 mL of water remain after the reaction has taken place. \_\_\_\_\_
- d. 1.24 g of solid is filtered from solution. \_\_\_\_\_
- e. The beaker felt hot after the second solution was added. \_\_\_\_\_
- f. The temperature of the solution was 42.3°C. \_\_\_\_\_

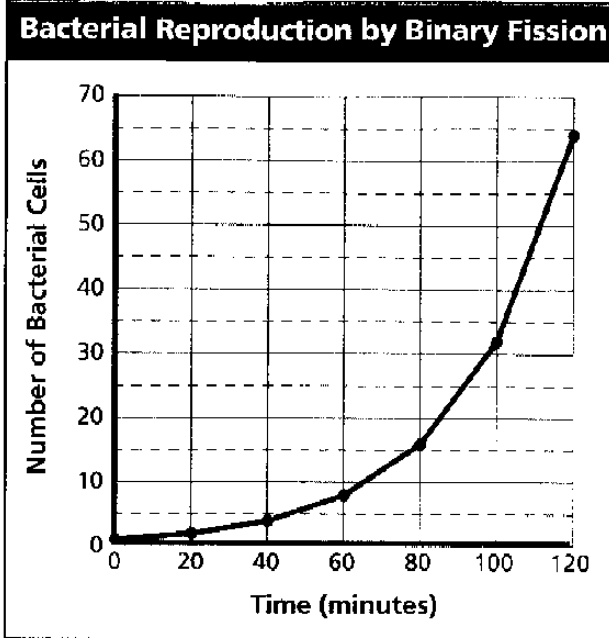
2. Identify the type of graph (line, bar, or pie) that would best represent the following data.

- a. Change in temperature of a solution over a 2 minute period. \_\_\_\_\_
- b. Growth of a bean plant over a two week period. \_\_\_\_\_
- c. Types of gases found in the Earth's atmosphere. \_\_\_\_\_
- d. Numbers and types of insects collected in a field study. \_\_\_\_\_
- e. The percent of different substances in a mixture. \_\_\_\_\_
- f. The pH of solutions in different test tubes. \_\_\_\_\_

# Math Analyzing Data

## Population Explosion

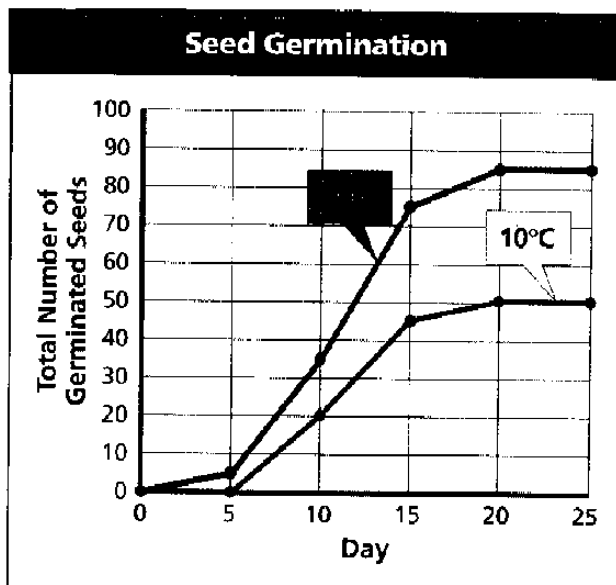
Suppose a bacterium reproduces by binary fission every 20 minutes. The new cells survive and reproduce at the same rate. This graph shows how the bacterial population would grow from a single bacterium.



- Reading Graphs** What variable is being plotted on the horizontal axis? What is being plotted on the vertical axis?
- Interpreting Data** According to the graph, how many cells are there after 20 minutes? 1 hour? 2 hours?
- Drawing Conclusions** Describe the pattern you see in the way the bacterial population increases over 2 hours.
- Predicting** Do you think the bacterial population would continue to grow at the same rate? Why or why not?

## Germination and Temperature

One hundred radish seeds were planted in each of two identical trays of soil. One tray was kept at 10°C, and one tray was kept at 20°C. The trays received equal amounts of water and sunlight. The graph shows how many seeds germinated over time at each temperature.



- Reading Graphs** What variable is plotted on the horizontal axis? What variable is plotted on the vertical axis?
- Interpreting Data** How did the number of seeds that germinated change between day 20 and day 25 at 10°C? At 20°C?
- Drawing Conclusions** According to the graph, at which temperature did more seeds eventually germinate? What can you conclude about the relationship between temperature and germination?
- Predicting** Predict what the graph would look like for a tray of 100 radish seeds kept at 5°C. Give a reason for your prediction.



How much do you think a bear cub might weigh at birth? What does it eat? How many brothers and sisters might it have of the same age?

To find the answer to these questions, read the paragraph below and then do the following:

- MAKE a bar graph showing a male bear's weight at different ages.
- MAKE a line graph showing a female bear's weight at different ages. (on back)
- How much weight do male and female black bears gain during each of the following intervals?
  - Birth to six months? Six months to one year? One year to 5 years?

A baby bear is called a cub. An adult female bear is called a sow. An adult male bear is called a boar. A boar usually impregnates a sow in May or June. Interestingly, the fertile egg does not begin active development until around October. In this way, the mother bear's body naturally slows down the development process so that birth can take place around January 1<sup>st</sup>. Contrasted with human fetal development of nine months, the mother bear is pregnant for about seven months, with the fetus actively developing for only about three months.

The sow has her cub or cubs in the shelter or den where she spends the winter months. A mother black bear usually has one or two cubs, although she may have as many as four. However, she won't have any cubs until she is four or five years of age, and then only every other year. From the time of birth, the mother's milk is the first food source for the young animals. At birth, a young cub has hair and weighs about eight ounces - about the size of a guinea pig. The bear cubs stay in the den with their mother until they are able to move around very actively. The bear cubs and their mother usually stay in the den until late April or early May. Boars and sows without cubs usually leave their dens a month earlier.

At the time the cubs leave the den with their mother, they are extremely dependent upon her. They still nurse, depending on mother's milk for food until the middle of summer, around six months. However, once out of the den, they quickly learn about other food sources. At six months of age, male and female bear cubs weigh around 15 pounds.

Black bears are omnivores. That means they eat plant and animal material. They tend to eat grass, nuts, and berries in late summer - and insects, grubs, fish and rodents when they can catch them! Although they do not normally eat carrion, they will turn over dead and decaying animals to find and eat the protein-rich maggots.

When black bear cubs reach one year in age, female cubs weigh about 40 pounds. Males weigh about 60 pounds. A mature 5 year old female bear will weigh about 170 pounds, and a male 5 year old bear will weigh about 275 pounds.

Assignment: \_\_\_\_\_

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

From: \_\_\_\_\_

To: \_\_\_\_\_

Page No.: \_\_\_\_\_

A large grid of graph paper, approximately 30 columns wide and 40 rows high, intended for calculations or drawing.

Assignment: \_\_\_\_\_

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

From: \_\_\_\_\_

To: \_\_\_\_\_

Page No.: \_\_\_\_\_

A large grid of graph paper, approximately 30 columns wide and 40 rows high, identical to the one on the left page.

1. Loose \_\_\_\_\_ must be pulled back.
2. Wash hands \_\_\_\_\_ and \_\_\_\_\_ handling chemicals.
3. Never handle any equipment until \_\_\_\_\_ to do so.
4. Never \_\_\_\_\_ or drink in the lab.
5. After an injury, first \_\_\_\_\_.
6. Put on \_\_\_\_\_ before turning on a bunsen burner.
7. Never \_\_\_\_\_ a hot Bunsen burner.
8. Always point glassware \_\_\_\_\_ from people.
9. Never \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_ a chemical.
10. Never eat or drink from \_\_\_\_\_.
11. Do not use \_\_\_\_\_ or chipped glassware.
12. Properly \_\_\_\_\_ and store glassware.
13. If you cut yourself, immediately \_\_\_\_\_.
14. Before you are finished in the lab you must \_\_\_\_\_.

Read the questions below and find the correct answers using the safety contract provided.

- \_\_\_\_\_ 1. When glass breaks in the lab, you should
- quickly pick it up with your hands before the teacher notices.
  - pick up the broken glass and throw it into the classroom trash can.
  - sweep up the glass with a broom and throw away in the designated disposal location.
  - ignore it and walk away.
- \_\_\_\_\_ 2. Upon approaching your lab station to observe to flasks with colorful liquids in them. You should
- not smell, taste, or touch them until specifically instructed to do so by the teacher.
  - pick up the flask, swirl it around and inhale deeply.
  - tell your partner to mix and see what happens.
  - dump them down the drain.
- \_\_\_\_\_ 3. Food, drink and gum are allowed in lab
- only on Fridays.
  - never.
  - when dangerous chemicals are not in use.
  - all the time.
- \_\_\_\_\_ 4. When using chemicals that produce volatile fumes or poisonous vapors, you should
- leave them at your lab station - tightly closed.
  - leave them at your lab station - open.
  - use them under the fume hood, keeping your head in the fume hood as well.
  - use them under the fume hood, with only your hands in the fume hood.
- \_\_\_\_\_ 5. When heating a test tube,
- always point the open end away from yourself and anyone else
  - always point the open end towards your body.
  - keep the tube capped at all times
  - never listen to the instructions by the teacher, do it your own way.

- \_\_\_\_\_ 6. Before using glassware,
  - a. don't bother checking it, the group before you did.
  - b. check it, but small cracks and a little residue are no big deal - go ahead and use it.
  - c. check it for cracks and residue - be sure it is clean and is not damaged.
  - d. check it and if it is broken or dirty, don't bother notifying the teacher, just put it back in the glass cabinet and get a better one.
  
- \_\_\_\_\_ 7. You should personally monitor your experiment at all times. You should
  - a. not wander around the room, distract others, or interfere with another group's experiment.
  - b. help your neighboring group with their work
  - c. compare answers with other groups in the room.
  - d. not care what is happening with your experiment and feel free to work on other homework.
  
- \_\_\_\_\_ 8. Contact lenses
  - a. should never be worn in to lab - bring your glasses.
  - b. should only be worn in lab with instructor's permission.
  - c. should be taken out and placed on lab table during the experiment.
  - d. should be placed in mouth and kept there until lab is complete.
  
- \_\_\_\_\_ 9. When using living organisms in class, you should
  - a. take them from the lab and put them in someone's locker.
  - b. treat them inhumanely and perform unauthorized experiments on them.
  - c. treat them with respect and in a humane manner.
  - d. leave them out on the table for the next group to use.
  
- \_\_\_\_\_ 10. When finished in lab,
  - a. Observe good housekeeping practices and push in lab stools, keeping the aisle clear.
  - b. Leave the station just as you found it, regardless of how clean or dirty it was.
  - c. Tell your partner to clean it up, since you did all the work during the lab.
  - d. Leave paper, trash and left over lab supplies at your station.
  
- \_\_\_\_\_ 11. Lab time and the material covered during it, is a part of class and is to be taken seriously. Therefore,
  - a. horseplay in lab is accepted.
  - b. practical jokes liven things up a bit.
  - c. Pranks whether dangerous or not are encouraged.
  - d. NONE OF THE ABOVE

- \_\_\_\_\_12. When given a new piece of equipment to use in class
- listen to all instructions and if you still have questions ask the teacher before using.
  - don't bother listening, you can figure it out yourself.
  - ask your partner or neighboring lab group, they probably know how to use it.
  - don't ask for instructions on how to use it or you won't have an excuse when asked, "Why isn't your lab finished?"
- \_\_\_\_\_13. When first entering the science room
- look around for anything that looks interesting and investigate it.
  - sit down and ask your neighbor for their homework, so you can quickly finish yours.
  - pick up any chemicals, equipment or lab materials that are out and visible.
  - do not touch any equipment, chemicals or lab materials, until told to do so by the teacher.
- \_\_\_\_\_14. If and when an accident happens
- pretend like nothing happened so you don't get in trouble.
  - assume it is no big deal and choose not to inform your teacher.
  - blame it on your lab partner.
  - notify your teacher no matter how trivial it may seem.
- \_\_\_\_\_15. Follow all written and verbal instructions carefully. If you do not understand
- try your best, how bad could it be???
  - only ask your lab partner, he/she is pretty smart.
  - try it first without asking the teacher since there is probably more supplies in case you need to conduct the lab again.
  - ask your teacher before proceeding .

True/False

- \_\_\_\_\_ 16. Conduct yourself in a responsible manner at all times in lab.
- \_\_\_\_\_ 17. Students are allowed into the science storage whenever they need to get something for class.
- \_\_\_\_\_ 18. Goggles are only worn when they match your outfit, look cool or the teacher is looking.
- \_\_\_\_\_ 19. When using sharp instruments, carry them with the tip down and away and grasp only by the handle.
- \_\_\_\_\_ 20. When you are finished with a lab, return any unused chemicals to their original container.
- \_\_\_\_\_ 21. If you finish with your assigned lab earlier, feel free to perform an experiment of your own design. Your teacher will be impressed with your ingenuity!
- \_\_\_\_\_ 22. Always know the location and operating procedures for all safety equipment, including the first aid kit, eyewash station, safety shower, fire extinguisher and fire blanket.
- \_\_\_\_\_ 23. If a teacher hands out a lab that you aren't doing until the next class period, don't bother reading it, you will just forget what you read anyway.
- \_\_\_\_\_ 24. Dispose of all waste appropriately. Chemicals should never be mixed in drains and solids should be disposed of in the assigned waste container.
- \_\_\_\_\_ 25. During lab, keep hands away from face, eyes, mouth and body while using chemicals. After using chemicals, preserved specimens, or other materials in lab, students should wash hands thoroughly.

## Lab Equipment Matching Worksheet

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

- \_\_\_\_\_ 1. balance
- \_\_\_\_\_ 2. beaker
- \_\_\_\_\_ 3. Bunsen burner
- \_\_\_\_\_ 4. clamp
- \_\_\_\_\_ 5. crucible
- \_\_\_\_\_ 6. crucible tongs
- \_\_\_\_\_ 7. funnel
- \_\_\_\_\_ 8. graduated cylinder
- \_\_\_\_\_ 9. hot hands
- \_\_\_\_\_ 10. hot plate
- \_\_\_\_\_ 11. metric ruler
- \_\_\_\_\_ 12. microscope
- \_\_\_\_\_ 13. Petri dish
- \_\_\_\_\_ 14. scoop
- \_\_\_\_\_ 15. striker
- \_\_\_\_\_ 16. support and ring
- \_\_\_\_\_ 17. thermometer
- \_\_\_\_\_ 18. wash bottle
- \_\_\_\_\_ 19. watch glass
- \_\_\_\_\_ 20. wire gauze
- \_\_\_\_\_ 21. test tube clamp

Name: \_\_\_\_\_  
 Block: \_\_\_\_\_

Write the name of the equipment (from the list) in the box under the matching picture. Write the full name, do not abbreviate.

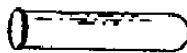
**Common Lab Equipment**



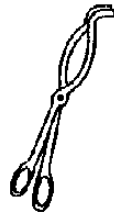
1. \_\_\_\_\_



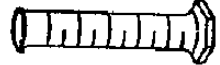
2. \_\_\_\_\_



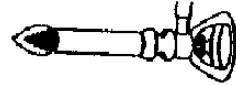
3. \_\_\_\_\_



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



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



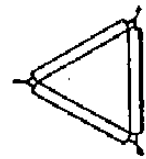
6. \_\_\_\_\_



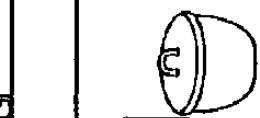
7. \_\_\_\_\_



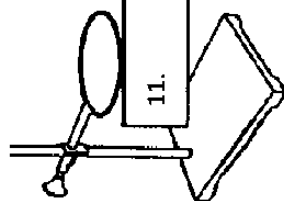
8. \_\_\_\_\_



9. \_\_\_\_\_



13. \_\_\_\_\_



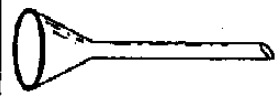
12. \_\_\_\_\_



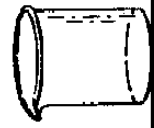
14. \_\_\_\_\_



15. \_\_\_\_\_



18. \_\_\_\_\_



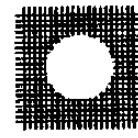
19. \_\_\_\_\_



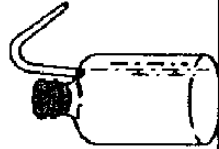
16. \_\_\_\_\_



20. \_\_\_\_\_



17. \_\_\_\_\_



10. \_\_\_\_\_



21. \_\_\_\_\_

**Equipment:**

- Beaker
- Bunsen burner
- Crucible
- Crucible tongs
- Flask
- Forceps/tweezers
- Funnel
- Glass stirring rod
- Graduated cylinder
- Ring clamp
- Ring stand
- Scoop
- Test tube
- Test tube brush
- Test tube clamp
- Test tube rack
- Utility clamp
- Wash bottle
- Watch glass
- Wire gauze
- Wire triangle

**INTEGRATED SCIENCE**  
**NATURE OF SCIENCE**  
**LAB: LAB TECHNIQUES AND EQUIPMENT**

**Introduction:** To be successful in a science classroom you must clearly understand how to use equipment properly. The best way to become familiar with lab equipment is to handle the pieces yourself. Great emphasis is placed on safety precautions that should be observed whenever you perform an experiment and use the equipment.

**Background:** Most safety rules that must be followed in the science lab involve common sense. If you are every unsure of a procedure or material, ask your teacher, who is there to help you. As with any other place, accidents can occur. Therefore, it is important to know the location and proper use of the safety equipment. This lab will emphasize the location of that safety equipment and the proper use of the lab equipment that will be used in this class this year.

**Procedure:**

**Part I: Identifying safety equipment in the lab**

1. Look around the lab and identify the location of the following safety equipment:
  - a. Fire blanket
  - b. Eyewash station
  - c. Safety shower
  - d. First aid kit
  - e. Fume hood
  - f. Fire extinguisher
2. In the lab safety data table: draw the location of the lab equipment above within the classroom using the color indicated below:
  - a. Fire blanket - color it pink
  - b. Eyewash station - color it green
  - c. Safety shower - color it orange
  - d. First aid kit - color it blue
  - e. Fume hood - color it gray
  - f. Fire extinguisher - color it red

**Part II: Measuring mass with an electric balance**

1. Make sure that everyone in your group is wearing goggles and has long hair tied up BEFORE you go any further.
2. Use the following procedure to obtain your chemical (one per group):
  - a. Make sure the balance is displaying units of "grams".
  - b. Place a plastic weigh boat on the balance pan.
  - c. Press the zero button.
  - d. Use a scoop to measure out 1.5 grams of levulose into the weigh boat.
  - e. Place the levulose into a 100ml beaker and set it aside.

**Part III: Measuring the volume of a liquid with a graduated cylinder.**

1. Obtain a 20ml graduated cylinder and fill it with 10ml of water.
2. To make sure you have 10ml, place the cylinder on a flat surface and fill it until the meniscus (the bottom of the curve) is right on the 10ml line. You can add or remove small amounts of liquid with a pipette to make sure you are accurate.
3. Pour the water into the beaker that contains the levulose.
4. Stir with a glass rod until the levulose dissolves.
5. Measure 5ml of Benedict's solution into a 10ml graduated cylinder using the procedure above.
6. Stir with a glass rod until mixed.

7. Record the color of the solution in the observations section of the data page.
8. Observe the solution for 2 minutes. After two minutes, record the color of the solution in the observations section of the data page.
9. Pour the solution into a test tube.
10. Place the test tube into the hot water bath at the front of the room.
11. Record the color of the solution after 2 minutes, 5 minutes, and 15 minutes in the water bath.
  - a. Between data readings, one person from the group should stay with the hot water bath.
  - b. One member of the group should clean the lab equipment used so far and set it out to dry.
  - c. One member of the group should set up the lab apparatus for the next section.

***Part IV: Filtering a solid out of a liquid.***

1. Obtain the following materials:
  - a. Ring stand with ring
  - b. Funnel
  - c. Filter paper
  - d. Clean 100ml beaker (same one you used before and washed)
  - e. Wire triangle
  - f. Test tube clamp
  - g. Wash bottle
2. Set up a filtration apparatus as shown in the front of the room.
3. Fold and place the filter paper into the funnel using the following directions:
  - a. Fold the filter paper in half and then half again.
  - b. Pull one side away, leaving three sides together - this will make a cone.
  - c. Make sure there are no openings or holes in the cone.
  - d. Place the cone into the funnel and wet it with the wash bottle so it sticks to the sides of the funnel.
4. After 15 minutes, or when the solution in the water bath is dark brown coffee color:
  - a. Use a test tube clamp to remove the test tube from the water bath.
  - b. Place the test tube into a test tube rack.
  - c. Carefully carry the test tube rack to your lab table.
  - d. Using the test tube clamp, CAREFULLY pour the hot liquid into the funnel.
  - e. Do not allow the liquid to overflow over the top of the filter paper.
  - f. Let the liquid drain completely.
  - g. Record your observations in the observations section of the data page.

***CLEAN UP:***

1. All solutions used in this lab can be disposed of in the sink. Run plenty of water to flush them down the sink drain.
2. Clean all of your glass and plastic COMPLETELY (must be squeaky clean, no residue!!) and place it on the drying rack by the sink. Do NOT leave any glass or plastic in the sink!
3. Put all reusable equipment (such as the ring stand) away.
4. Wash your table and your hands.
5. THEN (and only then) you can remove your safety goggles and put them away in the cabinet.
6. If the bell rings before you finish, you must STAY and finish cleaning up (you will be given a pass to your next class if this happens).

Integrated Science

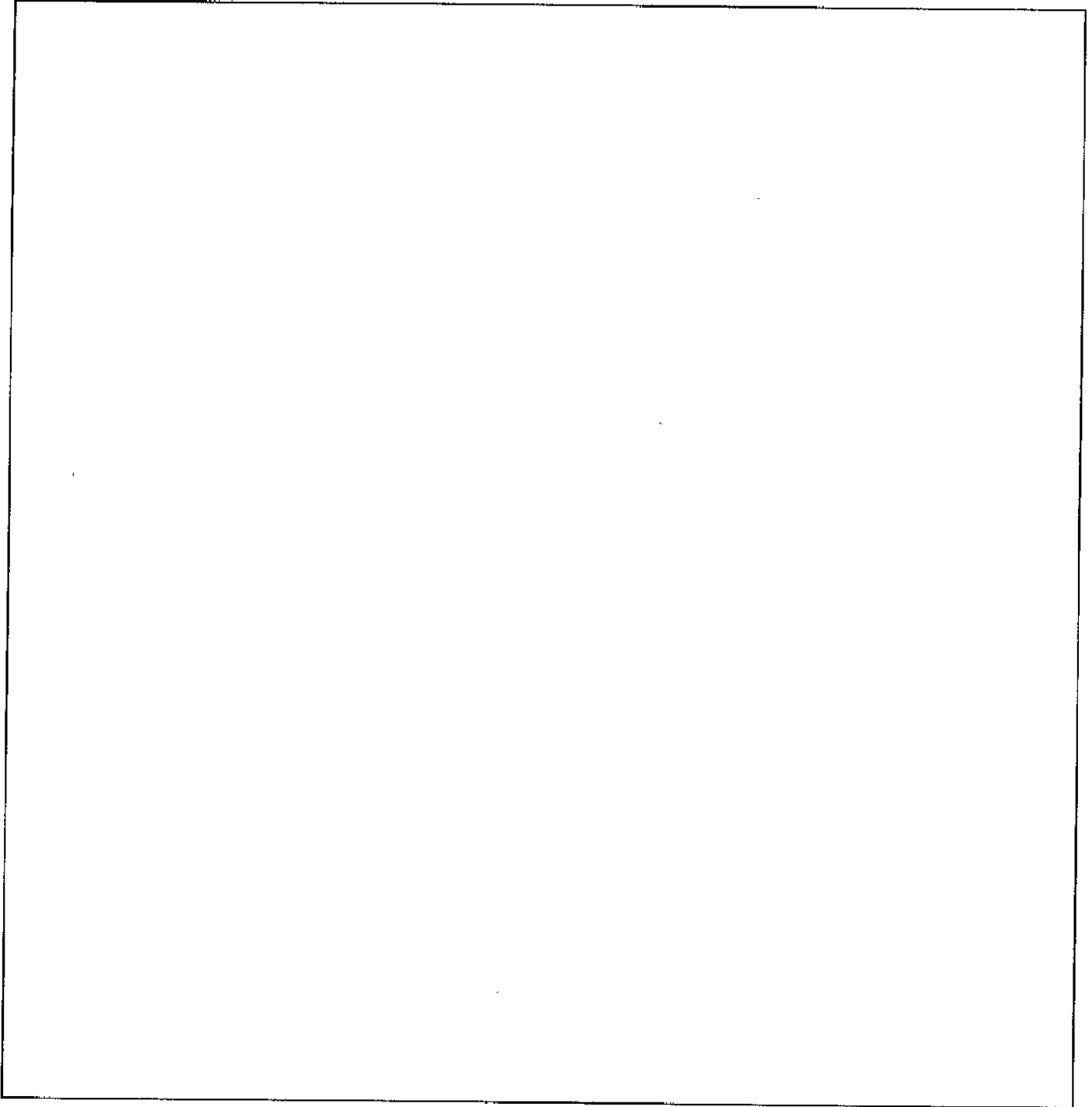
Nature of Science

Lab: Lab Techniques and Equipment Data Sheet

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

Block: \_\_\_\_\_

Lab Safety Equipment:



Room # \_\_\_\_\_

**Observations:**

Time	Color of solution	Clarity/Cloudiness of solution
Benedict's solution before mixing		
Solution 2 minutes after mixing		
Solution after 2 minutes in hot water bath		
Solution after 5 minutes in hot water bath		
Solution after 15 minutes in hot water bath		
Solution after filtering		

Describe the appearance of the filter after filtering:

**Questions:**

1. When using an electric balance, is the zero button pushed before or after the weigh boat is placed on the balance pan? \_\_\_\_\_

If the zero button is pressed before that time, will the mass of the chemical be too large or too small? \_\_\_\_\_

Explain why.

2. Is the liquid cloudy or clear before filtering? \_\_\_\_\_  
Is the liquid cloudy or clear after filtering? \_\_\_\_\_

If there is a difference, what caused the difference? (Be specific)

3. When pouring the contents of the test tube into the funnel, why is it important to not go above the level of the filter paper?

**INTEGRATED SCIENCE**  
**NATURE OF SCIENCE**  
**LAB: SCIENTIFIC METHOD**

**Introduction:**

"The world is full of obvious things, which nobody by any chance ever observes."

This quote is from Sherlock Holmes, talking about the importance of careful observation in detection. Careful observation is also the foundation of all experimental sciences, leading us to question what we have observed. How, what, why? The answers to these questions are sought in experiments, which may be described as observations made under controlled conditions.

**Background:**

The scientific method is also described as a linear, step by step process, when it is actually a dynamic and sometimes unpredictable process of discovery. Interactions between many variables cause different events to occur. These events can be described through observations. Experiments need to be designed in such a way that the effects of different variables on a substance can be studied independently from one another under controlled conditions. Controlled experiments make it possible to determine what factors are responsible for the observations being made.

**Purpose:**

In this experiment you will:

1. Make observations about the changes occurring when several substances are mixed.
2. Design controlled experiments to identify the substances responsible for each of the observed changes.

**Safety precautions:**

1. Wear safety goggles at all times.
2. Keep long hair pulled back at all times.
3. Do not eat or drink any chemicals!!
4. Wash your hands thoroughly when you finish with the lab.

**Procedure:**

**Part I: The Overall Reaction**

1. At the electric balance, place a weigh boat onto the balance pan and press the zero button.
2. Measure out 25 grams of calcium chloride ( $\text{CaCl}_2$ ) onto the weigh boat, then remove it from the balance.
3. Place another weigh boat on the balance and press the zero button.
4. Measure out 15 grams of sodium bicarbonate ( $\text{NaHCO}_3$ ) onto the second weigh boat, then remove it from the balance.
5. Return to your lab table and record your observations of the appearance of each of the substances in data table 1.
6. Using two clean 50ml or 100ml graduated cylinders, obtain 30ml of phenol red solution in one cylinder and 30ml of water in the other cylinder.
7. Return to your lab table and record your observations of the appearance of the phenol red solution in data table 1.

8. Obtain a small Ziploc bag and lay it flat on the lab table.
9. Scoop a small amount of calcium chloride, about 1/5 of what you have in the weigh boat, into one far corner of the Ziploc bag.
10. Fold the corner of the bag so the powder does not mix with anything else in the bag.
11. Scoop a small amount of sodium bicarbonate, about 1/5 of what you have in the weigh boat, into the other far corner of the Ziploc bag.
12. Fold the corner of the bag so the powder does not mix with anything else in the bag.
13. Obtain a 10ml graduated cylinder and pour 5ml of the phenol red solution into the small cylinder.
14. Pour the 5ml of phenol red into the Ziploc bag.
15. Eliminate air bubble from the Ziploc bag and zip it closed.
16. Lift the bag and mix the substances through the plastic with your hands until they are thoroughly mixed together.
17. Record your observations in data table 2.

### ***Part II: Controlled Experiments***

1. Rinse out the Ziploc bag in the sink, running plenty of water to flush the solution down the drain.
2. Continue to use the same Ziploc bag for your experiments, it out between them, as long as the bag does not have any holes. If the bag tears, get another bag from your teacher.
3. For the rest of this lab, you will attempt to determine what, specifically, causes each of the changes that occurred in the first experiment (temperature, color, gas production, etc.)
4. In order to determine the causes, mix together small quantities of two or three different chemicals and/or solutions until you can identify and predict the reactions that will occur.
5. Record your observations in data table 2.
6. When you are finished, answer the questions on the back of the data sheet.

### ***Clean up:***

1. All solutions used in this lab can be disposed of in the sink. Run plenty of water to flush them down the sink drain.
2. Ziploc bags can be thrown away once they are rinsed out. Weigh boats can be thrown away.
3. Clean all of your glass and plastic COMPLETELY (must be squeaky clean, no residue!!) and place it on the drying rack by the sink. Do NOT leave any glass or plastic in the sink!
4. Wash your table and your hands.
5. THEN (and only then) can you remove your safety goggles and put them away in the cabinet.
6. If the bell rings before you finish, you must STAY and finish cleaning up (you will be given a pass to your next class if this happens).



**Questions:**

1. Based on the results of your controlled experiments, what chemicals are mixed to cause each of the following effects?

Change	CaCl <sub>2</sub>	NaHCO <sub>3</sub>	Phenol Red	Water
Heat				
Cold				
Yellow color				
Pink color				
Bubbling				

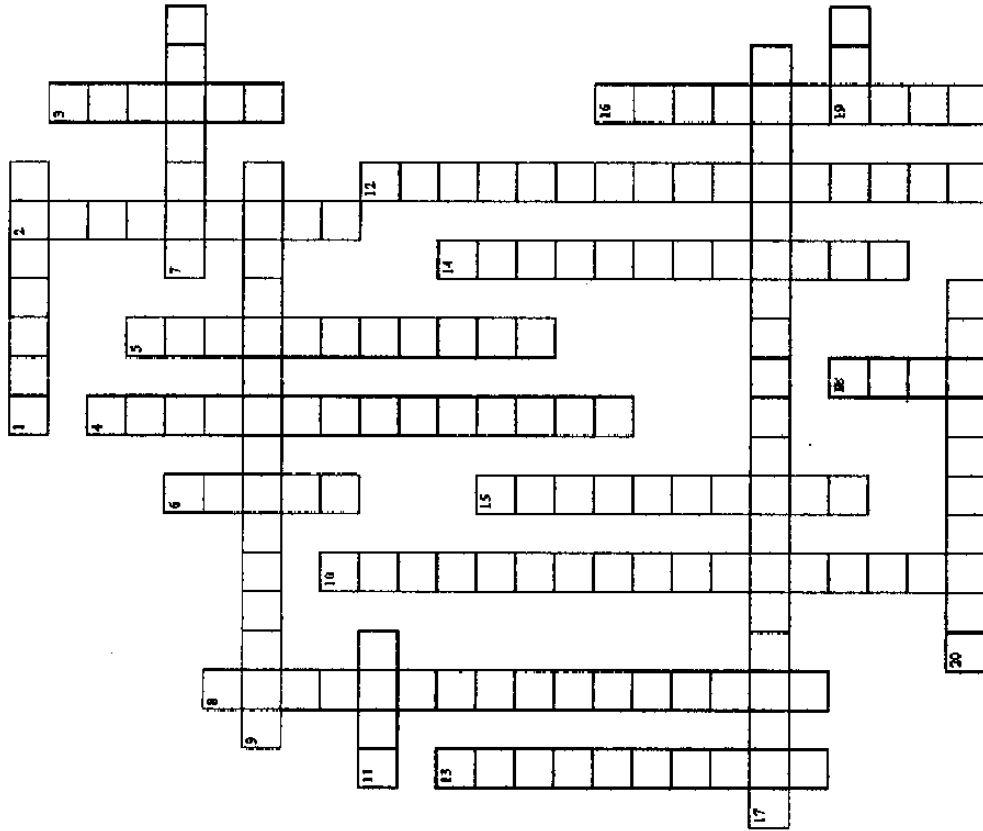
2. Do any of the above changes always occur at the same time? Explain.

3. Is the reaction of the solids when mixed with water the same as or different than their reactions when mixed with phenol red? Explain.

4. What is phenol red? (examine the bottle for the answer) What does using phenol red tell us about the reaction that is occurring?

5. Propose a hypothesis to explain why some reactions feel hot to the touch and some feel cold to the touch.

# Integrated Science Module 1 Key Terms



### ACROSS

- 1 The study of the relationships between matter and energy
- 7 The study of living things
- 9 Consists of descriptive information
- 11 Information collected during an experiment
- 17 A repeatable and unbiased experiment utilizing proper experimental method
- 19 Description of a natural event or process; does not vary
- 20 An educated guess

### DOWN

- 2 The study of the structure of properties of matter
- 3 Generally accepted explanation of a concept or a broad explanation of a natural event or process
- 4 Practical use of scientific information
- 5 Gathering information that adds to human knowledge
- 6 Display of quantitative information
- 8 Consists of numerical information
- 10 Group where one factor is changed for an experiment
- 12 An organized way to figure something out
- 13 Drawn after analysis of the results of an experiment
- 14 Group in an experiment that does not receive a change
- 15 Used to test a hypothesis
- 16 Another name for "applied science"
- 18 Material data safety sheets; available for every chemical used in the lab

1. What is science?
2. The practical use of scientific knowledge is called?
3. The four different types of science discussed in the notes are:
  1. \_\_\_\_\_ study of \_\_\_\_\_
  2. \_\_\_\_\_ study of \_\_\_\_\_
  3. \_\_\_\_\_ study of \_\_\_\_\_
  4. \_\_\_\_\_ study of \_\_\_\_\_
4. To figure out a problem scientists would use the \_\_\_\_\_
5. List the four basic steps to the scientific method and describe them below:
  1. \_\_\_\_\_ - \_\_\_\_\_
  2. \_\_\_\_\_ - \_\_\_\_\_
  3. \_\_\_\_\_ - \_\_\_\_\_
  4. \_\_\_\_\_ - \_\_\_\_\_
6. What is the difference between a theory and a law?
7. What is experimental design?
8. What are the three factors that is found in good experimental designs:
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
9. What is the control?
10. What is the variable?
11. What is a blind study?

12. List the two types of data that can be collected and define each below:

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

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

13. What type of graph would be used for the following information:

a. The number of fruit flies produced \_\_\_\_\_

b. The change in height of a plant over a three week period \_\_\_\_\_

c. The percentages of students in a class whose birthdays are in the same month \_\_\_\_\_

14. There are five safety rules that apply directly to lab behavior, list them below:

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

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

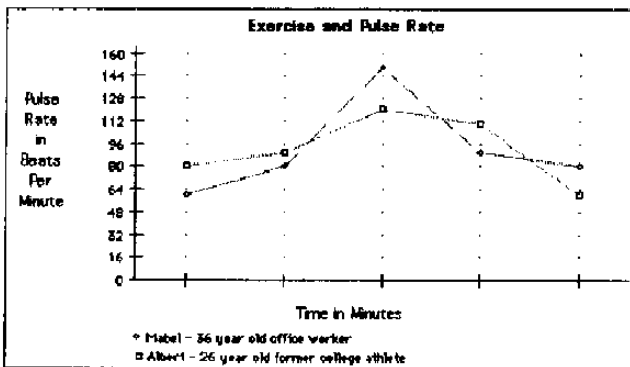
3. \_\_\_\_\_

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

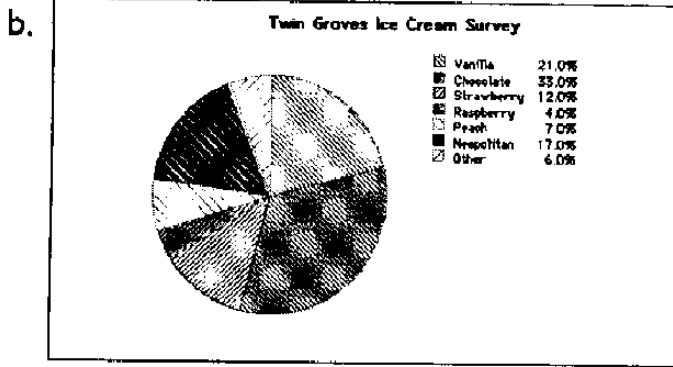
5. \_\_\_\_\_

15. Identify the type of graphs illustrated below:

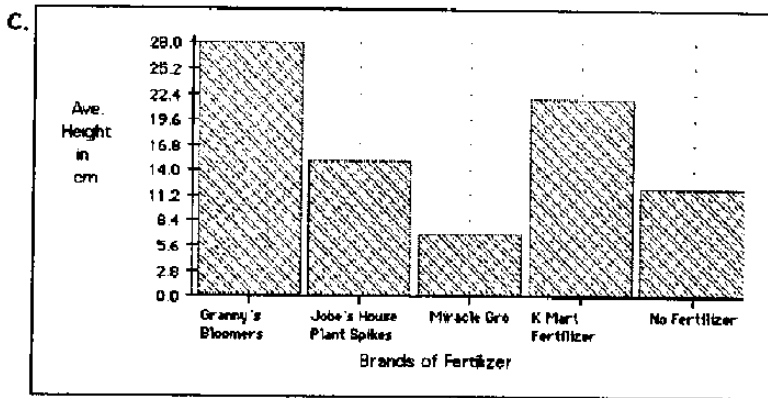
a.



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



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



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

16. For the list below, give either the definition or the term that is missing.

a.	Used to measure the temperature of a substance
b.	Protects hands when holding hot glassware.
c.	Used to hold substances, provides approximate volume measurements
d.	Used to view objects too small to be seen with the human eye.
e.	Used to transfer solids
f.	Used to light a Bunsen burner
g.	Used to measure the mass of a substance
h.	Used to hold specimens for viewing or for growing bacteria.
i.	Attaches to ring stand to support glassware above table.
j. Crucible tongs	
k. Graduated cylinder	
l. Bunsen burner	

m. Hot plate	
n. Wash bottle	
o. Test tube holder	

16. What type of lab equipment would you use to perform each of the following tasks?

- a. Measure the amount of liquid in a small glass \_\_\_\_\_
- b. Measure the length of a sheet of paper \_\_\_\_\_
- c. Measure the temperature of a liquid in a beaker \_\_\_\_\_
- d. Measure the mass of a rock \_\_\_\_\_
- e. Heat a test tube of water \_\_\_\_\_
- f. Measure a very small amount of water \_\_\_\_\_
- g. Inspect the details of a rock \_\_\_\_\_
- h. Protect your eyes from harm \_\_\_\_\_
- i. Transfer liquid from a large container into a smaller one \_\_\_\_\_
- j. Hold your test tubes \_\_\_\_\_
- k. Transfer a very small amount of liquid \_\_\_\_\_

**17. Scientific Method Practice:**

*Read the following information about a scientific experiment and answer the questions that follow.*

Students observed that bread dough left in a 40° refrigerator did not rise to as high of a height as did bread dough left at room temperature in a 75° room. The students hypothesized that the yeast in the bread dough was less active at lower temperatures. They designed an experiment to test this hypothesis. They divided a batch of bread dough into six small loaves. Three of the loaves were left to rise for two hours at normal room temperature in a 75° room. The other three loaves of bread were put into a 40° refrigerator for 2 hours. The students measured the change in height of the bread dough every half hour.

Which loaves of bread were the control group? \_\_\_\_\_

Which loaves of bread were the experimental group? \_\_\_\_\_

How often was data collected in this experiment? \_\_\_\_\_

What type of data was collected? \_\_\_\_\_

What was the hypothesis of the students? \_\_\_\_\_

What was the variable in this experiment? \_\_\_\_\_

**18. Graphing Practice:**

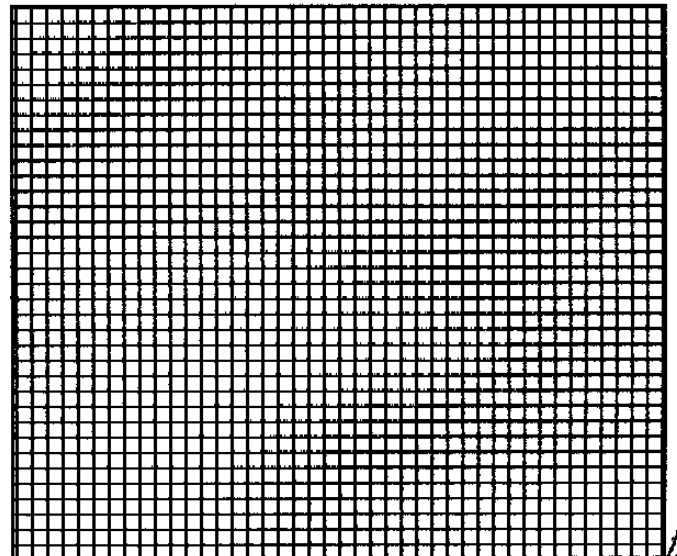
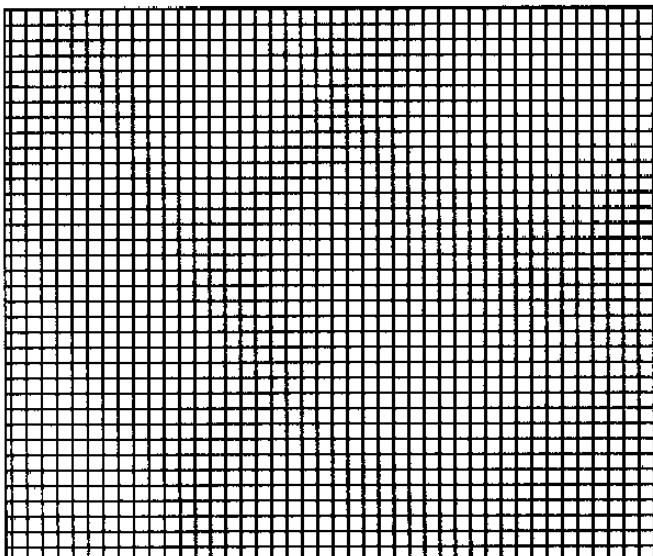
*On the grids below, make a graph for each of the following groups of data. Be sure to include all of the components of a good graph and choose the correct graph type.*

**Minutes of Television Watched One Saturday**

Mario	Yoshi	Toad	Peach	Daisy	Luigi	Bowser	Koopa
54	122	23	79	90	148	245	5

**Height of a Corn Plant in a Garden**

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
2cm	12cm	28cm	72cm	99cm	134cm	182cm



19. Write the name of the lab equipment item in the box next to its picture.

