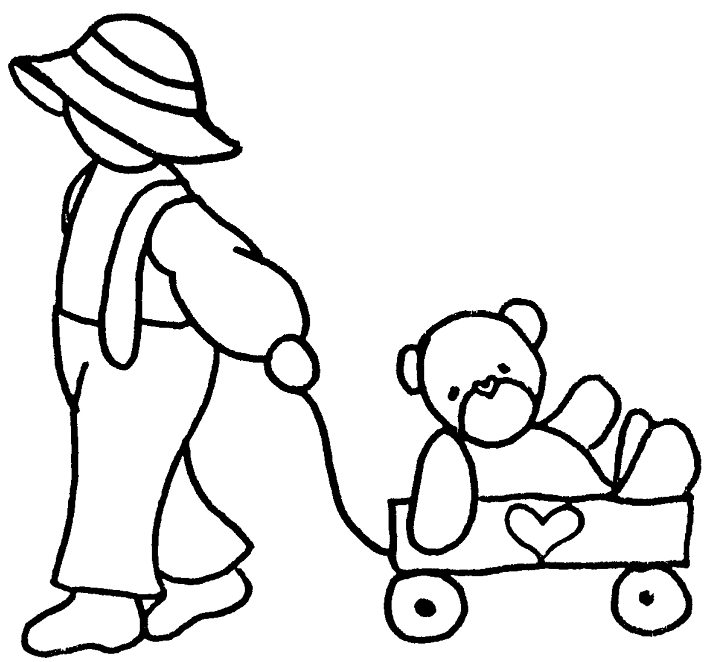
# Applied Science

Our Technological World

# FOURTH GRADE

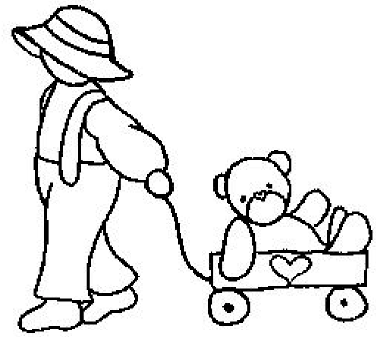
# SCIENCE AND MATH



3 WEEKS
LESSON PLANS AND
ACTIVITIES

**APPLIED SCIENCE**
**OVERVIEW OF FOURTH GRADE**

**SCIENCE AND MATH**



**WEEK 1.**
PRE: *Exploring conceptual science.*
LAB: *Predicting volume.*
POST: *Measuring linear and curved surfaces.*
**WEEK 2.**
PRE: *Collecting and analyzing data.*
LAB: *Comparing qualitative and quantitative data.*
POST: *Exploring optical illusions.*
**WEEK 3.**
PRE: *Comparing and contrasting the subfields of science.*
LAB: *Investigating human senses by collecting data.*
POST: *Comparing and contrasting inventors and scientists.*

**PHYSICS**

**WEEK 4.**
PRE: *Comparing electricity and magnetism.*
LAB: *Designing an electric circuit.*
POST: *Investigating the historical development of electricity.*
**WEEK 5.**
PRE: *Exploring magnetism.*
LAB: *Describing the force produced by a magnet.*
POST: *Exploring the uses of magnetism.*

**TECHNOLOGY**

**WEEK 6.**
PRE: *Investigating the electronic industry.*
LAB: *Constructing circuit boards.*
POST: *Comparing parallel and series circuits.*
**WEEK 7.**
PRE: *Investigating electromagnetism.*
LAB: *Designing an electromagnet.*
POST: *Exploring electrical power.*

**BUILT ENVIRONMENT**

**WEEK 8.**
PRE: *Exploring communications.*
LAB: *Discovering methods of communication.*
POST: *Exploring the uses of electromagnets.*

**APPLIED SCIENCE - SCIENCE AND MATH (4A)**

**PRE LAB**

Students use a worksheet to relate different sciences.

**OBJECTIVES:**

1. Exploring conceptual science.
2. Comparing how components of science are related.

**VOCABULARY:**

discover
experiment
observe
record

**MATERIALS:**

worksheet

**BACKGROUND:**

Students should be reminded that conceptual knowledge is more important than the details of a subject. The overall picture of how science works allows students to increase their knowledge of subjects year after year.

Students will be learning critical thinking and logic.Science is multifaceted and interwoven. Applied Science can be explained by the 5 interlocking cycles of: Universe, Plate Tectonic, Rock, Water, and Life.

Applied Science refers to technology, physics, and how science impacts on our society. Universe Cycle reveals possible ways that the Earth evolved through time. Plate Tectonic Cycle explains earthquakes and volcanoes. Rock Cycle looks at how the 3 different types of rocks are created. Water Cycle explains the atmospheres, oceans, and weather. Life Cycle reveals how living organisms interact with one another on this Earth.

Science is important in our everyday lives from the house we live in to the cars we drive. Medical advances have helped to keep our population from diseases and injuries. Understanding the physics and chemistry of our world has allowed humans to create technology that permits us to explore space as well as the deep oceans.

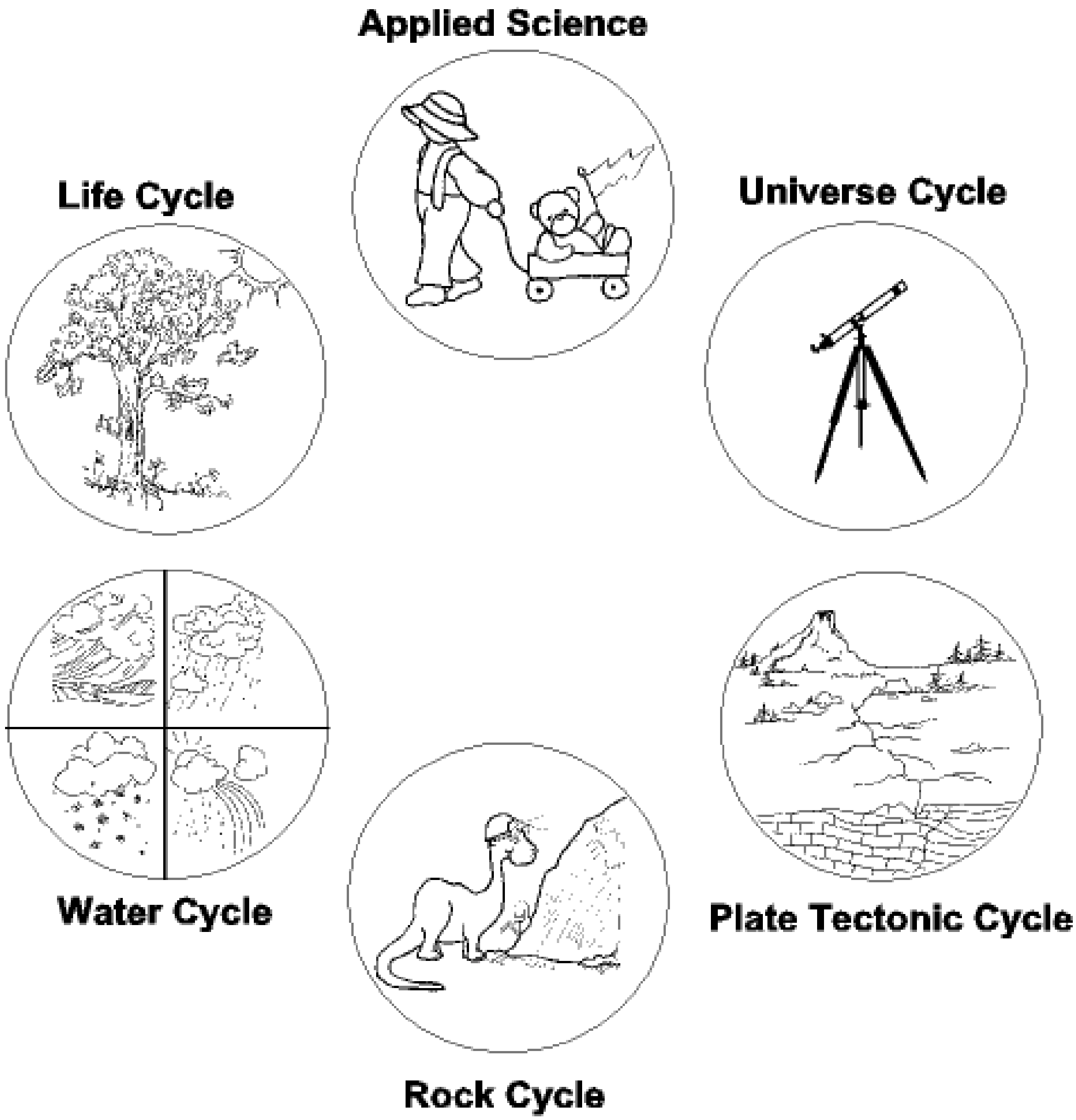
**PROCEDURE:**

1. Discuss how science is a way of thinking, observing, and experimenting. Ask students to make a list of products with the related scientific field. The following list is an example.

| EVERYDAY PRODUCT | EXPLANATION |
|---|---|
| lights | physics |
| clothes (polyester) | chemistry |
| food | biology |
| cement | geology |
| airplane | physics |

2. Use the enclosed worksheet to help discuss the overall philosophy science and how it is related to each other. Inquire if students see the connections, especially between Applied Science and the other cycles. For instance: without the movement of the Earth, we would not have 3 different types of rocks; without soil made from rocks, we would not have plants; without volcanoes, we would not have water (outgassing of steam); without water, we would not have life; if we did not have science, we would not have inventions. Have students make-up other examples.

**APPLIED SCIENCE - SCIENCE AND MATH (4A)**



**APPLIED SCIENCE - SCIENCE AND MATH (4A)**

**LAB**

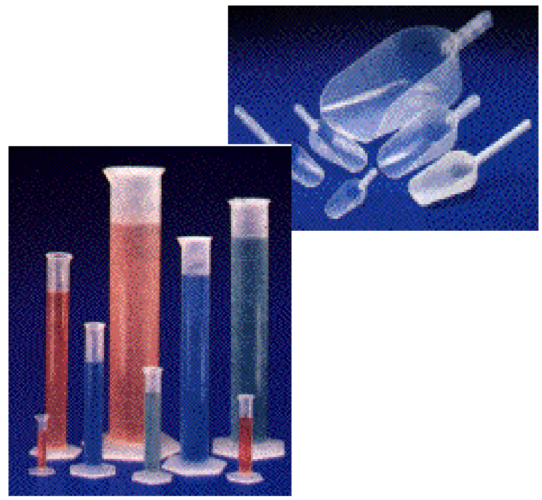
**OBJECTIVE:**

Students compare English and metric system of measurement.

1. Predicting volume.
2. Developing good lab procedures.

**VOCABULARY:**

beaker
metric
volume



**MATERIALS:**

Applied Science - Science And Math (4A)
4 containers per group
meat trays to catch spills

**BACKGROUND:**

Measurement has been used by ancient civilization for thousands of years. The first standard system of weights has been traced to the Egyptians and Babylonians. The Egyptians in about 3500 BC used scales to measure food. The imperial or English system that the United States uses today, developed in the 1300's with King Edward I in England. The metric, based on a system of 10, was developed and used in the 1790's.

There are two systems commonly used to measure things. The English system is used almost exclusively in the United States. The metric system is used throughout the world in people's everyday lives. Scientists use the metric system throughout the world. This helps to standardize observation and data collecting. The metric system is the preferred system of measurement because it is easier to work with. Sometimes you are asked to convert from one system to another. In this lab students will be converting from the English system to the metric system.

**PROCEDURE:**

1. Use a portion of this lab to go over science procedures specific to your classroom. If in a science lab, discuss safety, care of materials, and other lab procedures that are specific to the students' lab area. If in a classroom situation, give rules on how tables will be arranged, safety, and other procedures that are needed to make science "successful and enjoyable for all!" With any new group of students, discuss lab partners and working in cooperative groups. Emphasize that it is helpful to work with people to gain

their insight and knowledge when experimenting. In science research, it is very common for "working groups" to develop.

2. The second part of this lab is to help students become familiar with the measuring tools of science, with an emphasis on volume. Since these measurements involve liquids, make sure to consider spills. Suggestions to reduce spills in experiments include meat trays (from the grocery), a tub, or a sink. Students sometimes have trouble getting the "exact" level. Practice will solve this problem. Some students may realize they could have used math to figure out how many milliliters make up the given quantity.

3. Go over the difference between the metric and the English system. Metric uses base ten. English uses a unit of measurement that has a historical rather than mathematical basis. Metric measurement is the easiest to learn and remember.

4. In exercise 1, the students will measure a volume of water in English. They will then try to find out how much this equals in the metric system.

5. In exercise 2, use any containers as unknowns. Students may bring in 2 containers from home. The students should first predict and then measure the volume of their containers.

6. When the students have finished, go over the answers and discuss how many milliters are in each container. Explain that by measuring in one system and then finding the same volume in another system we can determine a conversion. Inform students that conversions are "mathematical." They will learn the 2 systems is by measuring with both systems to get a "feel" for the amounts.

7. ANSWERS:

250 ml = 1 cup; 500 ml = 2 cups; 62.5 ml = 1/4 cup; 125 ml = ½ cup; 15 ml = 1 tablespoon; 625 ml = 2 ½ cups; 312.5 ml = 1 1/4 cups

**APPLIED SCIENCE - SCIENCE AND MATH (4A)**

**PROBLEM:** How does metric volume compare with the English volume of measurement?

**PREDICTION:**______________________________________________________

**PROCEDURE:**
Exercise 1: Using the measuring devices on your lab table, determine the measurements for the following: (Use water to help you develop a way to find the correct number.)

| | |
|---|---|
| _______ ML | 1 CUP |
| _______ ML | 2 CUPS |
| _______ ML | 1/4 CUP |
| _______ ML | ½ CUP |
| _______ ML | 1 TABLESPOON |
| _______ ML | 2 ½ CUPS |
| _______ ML | 1 1/4 CUPS |

EXERCISE 2:
You have 4 unlabeled containers. Try and figure out how many ml can fit into each container. Before you measure the volume, predict how much liquid each container can hold.

| | PREDICTION | MEASURED AMOUNT |
|---|---|---|
| BOTTLE 1 | | |
| BOTTLE 2 | | |
| BOTTLE 3 | | |
| BOTTLE 4 | | |

**CONCLUSION:** How many ml make 1 cup? ____________ Since you figured out how many ml make 1 cup, how could you determine how many ml would fit into 3 1/2 cups?

______________________________________________________________________

**APPLIED SCIENCE - SCIENCE AND MATH (4A)**

**POST LAB**

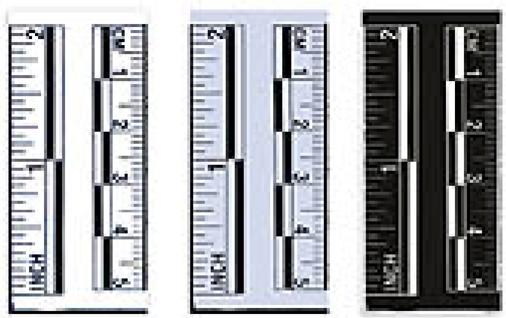
Students measure different surfaces.

**OBJECTIVE:**

1. Measuring linear and curved surfaces.
2. Estimating unknown quantities.

**VOCABULARY:**

centimeter
curve
estimate
inch
linear
predict



**MATERIALS:**

rulers
tape measure
string

**BACKGROUND:**

Students traditionally learn how to measure straight items, but most objects in the real world are curved. Metrology is the science of measurement and is a fundamental tool in all aspects of science and everyday living. Imagine a carpenter who doesn't know how to measure? Lord Kelvin (England) once stated "when you can measure what you are speaking about and express it in numbers, you know what you are speaking about and you know something about it; but when you cannot measure it, when you cannot express it, your knowledge is of a meager and unsatisfactory kind".

Measurement involves a comparison of an unknown to a known quantity. These known quantities are actually set standards derived by international agreement. There is no magic in a meter, a yard, a foot, or a kilometer. These lengths were arbitrary to start with and are subject to change. They were used as a way to keep track of distance. For instance, from 1889-1960, a meter was the distance between 2 marks on a metal bar. Now it pertains to a certain number of wave lengths in a particular spectrum line.

Students should also be aware that measurement is not always accurate, and many scientists take a margin of error into consideration. The purpose of this measurement exercise is to review how to measure straight and curved items. Students will practice predicting or estimating what each length will be. This skill needs to be practiced since many times a ruler is not available. Many carpenters can accurately predict measurements without a ruler because they practice linear measuring skills over and over.

**PROCEDURE:**

1. Us the worksheet to guide the activity.

2. Discuss how to measure curved surfaces by taking a string and calibrating the length (like a tape measure). Another method is to measure the object first with the string, then measure the length of string.

3. Ask students to get a partner and work their way through the worksheet following the directions carefully for Exercises 1-3. In Exercise 3, make sure that students realize that they measure with a string an object that is round, and then measure the length of the string to a ruler. If you have a tape measure, that will find the length without measuring the string.

4. When students are finished, go over the results and guide them through Exercise 4. The answers are ft. = feet; in.= inches; cm. = centimeters; yd. = yard; mm. = milimeters; km. = kilometers; m. = meters; mi. = miles.

**APPLIED SCIENCE - SCIENCE AND MATH (4A)**

SKILL: Learning about measurements.

SCIENTISTS NEED TO KEEP CAREFUL TRACK OF THEIR WORK AND ALSO NEED TO TELL OTHERS EXACTLY WHAT THEY DID AND WHAT HAPPENED. TO DO THIS, SCIENTIST FREQUENTLY USE MEASUREMENTS TO DESCRIBE THINGS.

LINEAR MEASUREMENTS

EXERCISE 1. This is one centimeter (1 cm.). Look at your pencil and estimate (guess) how long it is, in centimeters. Now measure its actual length. Record your estimate and the actual length for each of the following:

| | PREDICT LENGTH | ACTUAL LENGTH |
|---|---|---|
| pencil | | |
| your partner's shoe | | |

EXERCISE 2. This is one inch (1 in. or 1"). Do you know your height in inches? Write down what you estimate your height to be and then (with your partner's help) measure your actual height. Do the same for your arm span (from finger tip to finger tip).

| | PREDICT LENGTH | ACTUAL LENGTH |
|---|---|---|
| height | | |
| arm span | | |

EXERCISE 3. A curved surface is often difficult to measure using a straight ruler. Mark a string and then measure the following:

| | PREDICT LENGTH | ACTUAL LENGTH |
|---|---|---|
| wrist | | |
| head | | |

EXERCISE 4. Write the unit of measurement that each of the following abbreviations stand for:

| | | | |
|---|---|---|---|
| ft. = | in. = | cm. = | yd. = |
| mm. = | km.= | m. = | mi.= |

Circle the units above that are in the metric system of units.

## APPLIED SCIENCE - SCIENCE AND MATH (4B)

Students graph data obtained from worksheet.

### PRE LAB

### OBJECTIVE:

1. Collecting and analyzing data.
2. Interpreting data.

### VOCABULARY:

bar graph
data
graph
measure
plot
scale

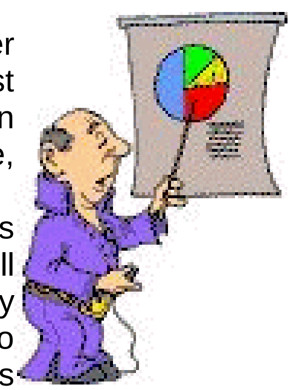
MATERIALS:

worksheets

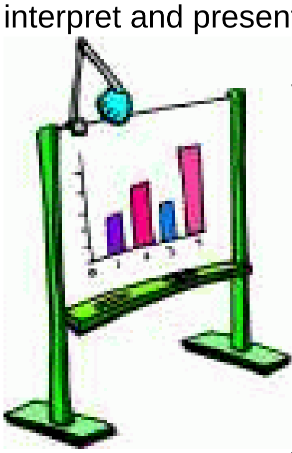

line graph

### BACKGROUND:

Scientists collect data and present it to other scientists. In order to present it in a way that others can understand, scientists must first analyze their data and interpret it. They can then present it in an interesting way. In this lab students will be asked to collect, analyze, interpret and present data.


pie graph

There are many different types of graphs that are used by the scientific community, as well as other professions. Economists, police, city officials, and many other people use graphs to help make people understand data that is collected.


bar graph

Pie graphs are used when the entire circle is divided into percentage. Each pie is a fraction or percentage of 100%. A line graph depends on how the axis is defined in the x and y direction. It is usually on a real number, and not percentage. Bar graphs are usually for a real number to compare different categories in a very visual manner. Students will be making a bar graph representation of flag poles using the appropriate worksheets.

**PROCEDURE:**

1. Give students the two worksheets. In this exercise, students measure and collect data. Students can also discuss characteristics of each flag.

2. Discuss the use of the scale on the worksheet with the flags. Ask the students to use their ruler and mark how long this length is on their metric rulers. Show them that if they don't have a ruler, they can mark the length on a small piece of paper and use that to measure the height.

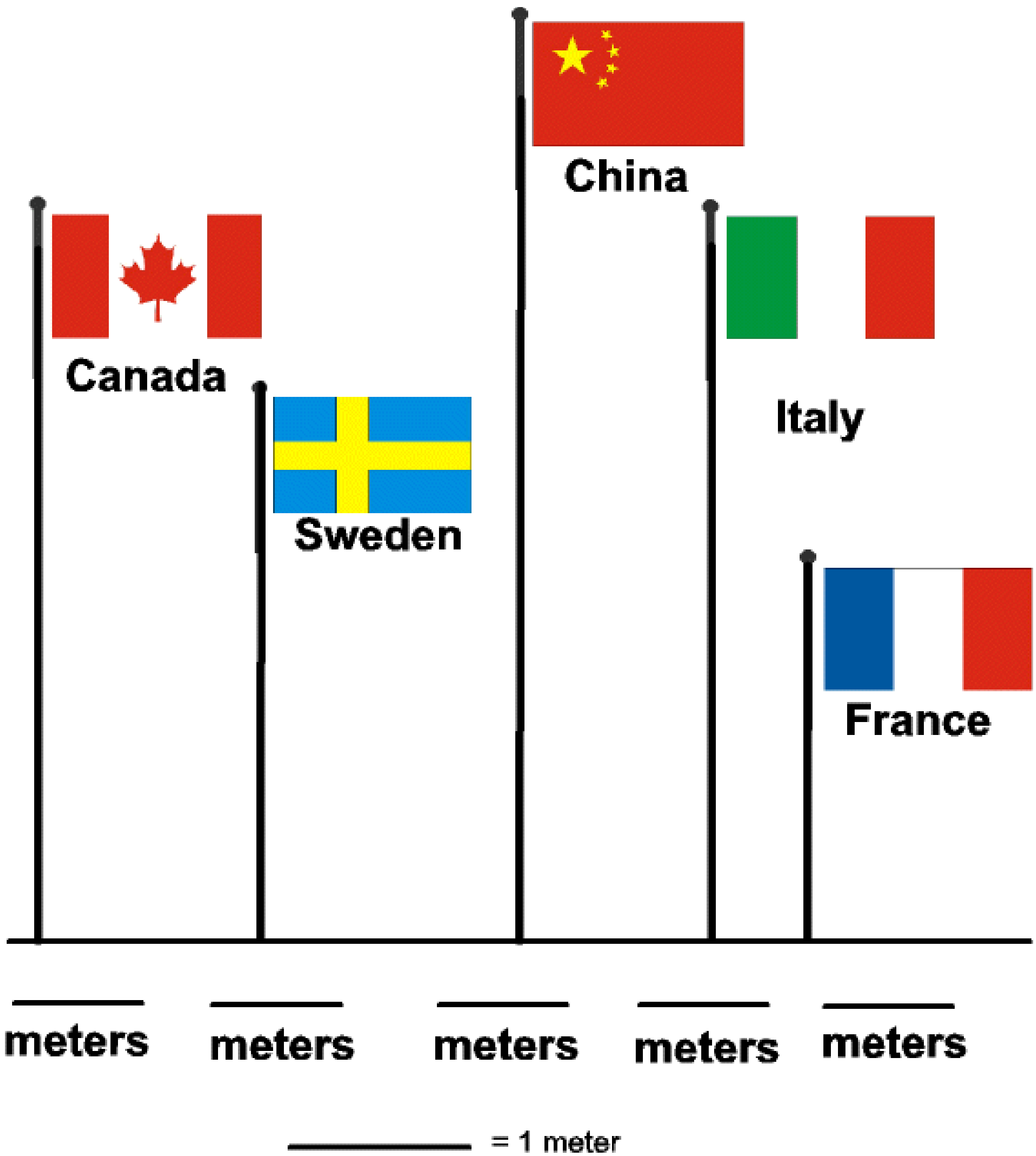
3. Have them measure each of the flags and record their answers in the space below each flag.

4. On the second worksheet, have students plot the data they have collected. They should plot each length above the appropriate country's name. Remind them that this is a bar graph. Have them color in each bar of the graph.

5. Inform the students that a bar graph is a very visual way of presenting data. By making each bar a different color a fellow scientist can easily see the differences between the lengths of the flagpoles.

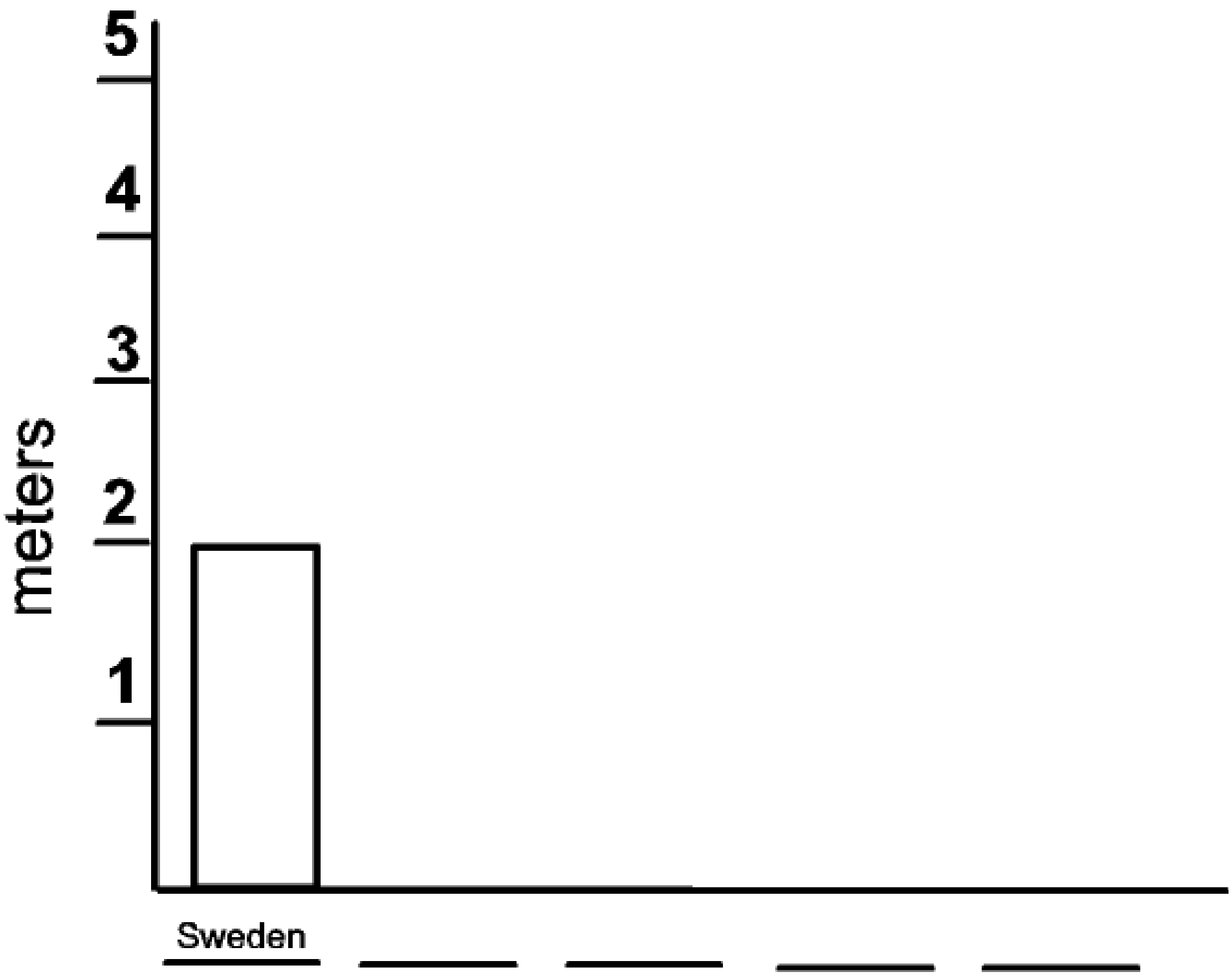
APPLIED SCIENCE - SCIENCE AND MATH (4B) PRE

Measure the height of each flagpole. Record the height below each flag pole.



**APPLIED SCIENCE - SCIENCE AND MATH (4B)**

Write the names of the countries on the bottom lines. Draw bars showing the height of the flag poles of each country. Color each bar a different color. See the example.




How does a bar graph help you to look at data.

| |
|---|
| |
| |
| |
| |

## APPLIED SCIENCE - SCIENCE AND MATH (4B)

Students will experiment with vinegar and baking soda.

**LAB**

**OBJECTIVE:**

1. Comparing qualitative and quantitative data.
2. Analyzing and interpreting data.

**VOCABULARY:**

experiment
mathematics
observation
qualitative
quantitative

**MATERIALS:**

25 ml graduated cylinders
baking soda
vinegar
spoons

**BACKGROUND:**

In this lab, students discover that many times there are qualitative and quantitative components to science experiments. Qualitative data describes the situation and reaction in descriptive terms. For example, qualitative involves the senses including sight, taste, hearing, touch, and smell. This would include color and shape. Quantitative includes those things that can be measured. For example, describing something as a square would be qualtitative, but measuring it and stating that it is 2 cm. by 2 cm. is quantitative.

In this experiment, students will be collecting both quantitative and qualitative data. They will be performing a chemical reaction caused by the mixing of vinegar and baking soda. Baking soda plus vinegar reacts to form carbon dioxide (the bubbles) and a liquid residue. The more baking soda students start with, the more vinegar they will need to complete the reaction. Even if more vinegar is added, a reaction will continue if there is more carbon dioxide to be released from the baking soda (sodium bicarbonate). (This experiment uses a lot of vinegar!)

When students record what happens during this reaction, they should be aware that they must be able to describe the reaction. They should be thinking: What do I see, hear, or smell? This is qualitative science. However, when they plot the data and interpret the result, it is quantitative science. Students will make a bar graph of their results.

**PROCEDURE:**

1. Prepare baking soda and vinegar in containers so that they can be easily distributed when ready. If there are time constraints this lab can be done in two periods. Students may do the hands-on portion one day and interpret the results on a subsequent day.

2. Discuss the difference between qualitative and quantitative data. Tell students that today they will be doing an experiment in which they need to record both qualitative and quantitative information.

3. Pass out the lab sheets. Review the lab procedure with the students. Remind them that they are not only recording quantities of vinegar and baking soda used (quantitative), but are also describing the reaction (qualitative). As they are performing the lab they should be asking themselves: What do I see, hear, or smell?

4. When the students have finished the lab, collect all the vinegar and baking soda. (If you leave these out on the tables the students will keep experimenting until they have to go home!) Explain how you would like them to do the bar graph. Remind them that each bar should be a different color to make it easier to read.

5. Review the conclusion questions with the students. Encourage the students to realize which part of the experiment was quantitative and which part was qualitative.

**APPLIED SCIENCE - SCIENCE AND MATH (4B)**

**PROBLEM:** How can a science experiment be both qualitative and quantitative?
**PREDICTION:** ____________________________________________________________
**MATERIALS:** 25 ml graduated cylinders, baking soda, measuring spoons, vinegar
**PROCEDURE:** Follow the steps below. Record your data and then graph the results.

TRIAL 1. In one graduated cylinder put 1 ml of baking soda; slowly add 5 ml of vinegar. Students may stir the liquid gently. Record what happens (below). After it stops fizzing, add another 5 ml of vinegar. Record what happens. Continue adding 5 ml of vinegar until there is no more fizzing. How many milliliters did you use?

TRIAL 2. In one graduated cylinder, put 1 ½ ml of baking soda and repeat the experiment above. Record your data.

TRIAL 3. In one graduated cylinder, use 2 ml of baking soda and repeat the experiment above. Record your data.

DATA (State whether it fizzed or not, any odor, etc.)

| | TRIAL 1 | TRIAL 2 | TRIAL 3 |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Make a bar graph of these results.

**CONCLUSION:**
Which portion of the experiment was qualitative?______________________________
Which was quantitative?__________________________________________________
If you add more baking soda would you add more or less vinegar? ________________

**APPLIED SCIENCE - SCIENCE AND MATH (4B)**

**POST LAB**

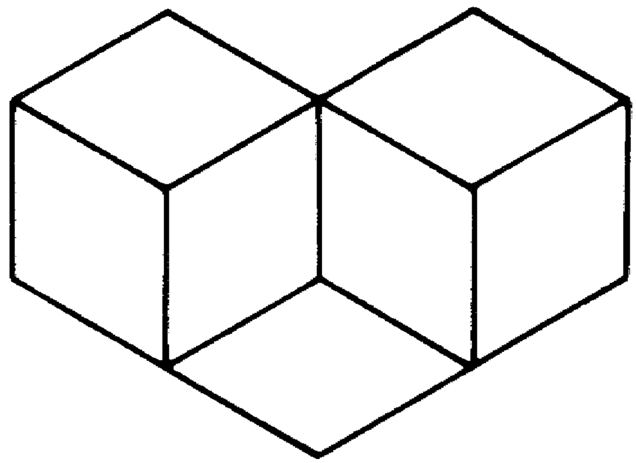
Students collect data on how people perceive optical illusions.

**OBJECTIVES:**

1. Exploring optical illusions.
2. Designing an experiment.

**VOCABULARY:**

optical illusions
perception
qualitative
quantitative



**MATERIALS:**

worksheet

**BACKGROUND:**

Optical illusions are caused with shapes and light interact with our sense of sight and make our brain interpret objects that may not be there. There are different types of optical illusions from camouflage to mirages. Camouflage refers to when objects, either two-dimensional or three-dimensional, blend into one another. Warriors and hunters have used this illusion to hide from their enemy or catch their prey. A mirage is when a deceptive appearance of objects is caused by refraction (bending of light) in layers of air of varying densities. Many magicians use this principle to help deceive our eyes.

Students will be looking at a visual illusion caused by geometric placement where shading, shape, and color confuse our sense of sight into seeing something two different ways from the same picture. Sometimes you train your eyes to look one way and you see one object, and then look another way and see another object.

**PROCEDURE:**

1. Experiments conducted by scientists are usually designed before data is collected. Data can be collected on just about anything as long as the data can be compared and contrasted. Ask students how they would design an experiment using optical illusions.

2. Explain that an optical illusion appears to be something that it isn't. That sounds "qualitative," or a least subjective. How can it be made quantitative? Compare girls and boys reactions and see if there is a pattern. Ask students if there is any other way. If they

don't come up with a better experiment, use the suggestion below.

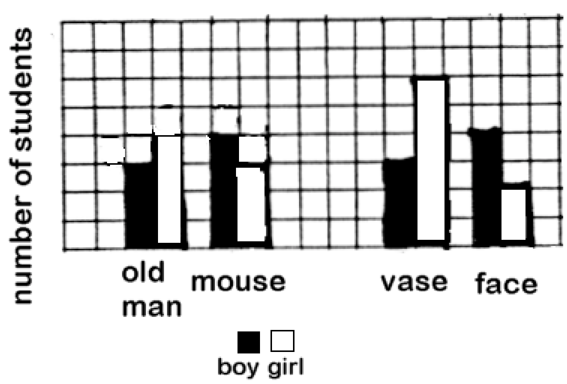
3. Show the optical illusions to the class of the mouse/man and vase/2 faces, and have them write down what they see.

4. Review what they saw and point out the possibilities of each picture. Record the data on the board. Subdivide their answers into girls and boys.

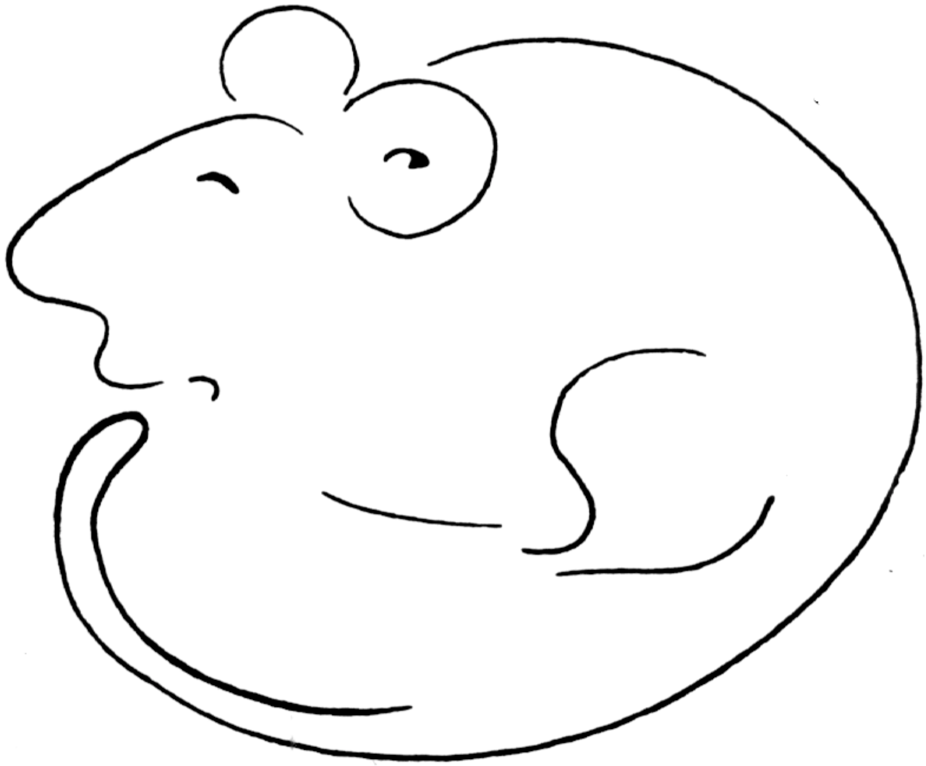
5. After going through the pictures, see if students' results can be made quantitative by putting numbers on the data. You can quantitate the results by collecting data that looks at groups of people by sex (in this case). Have students construct a bar graph. Collect the data from the class using the following format. Students will have to think how to construct such a graph because it has more variables than the previous exercise.

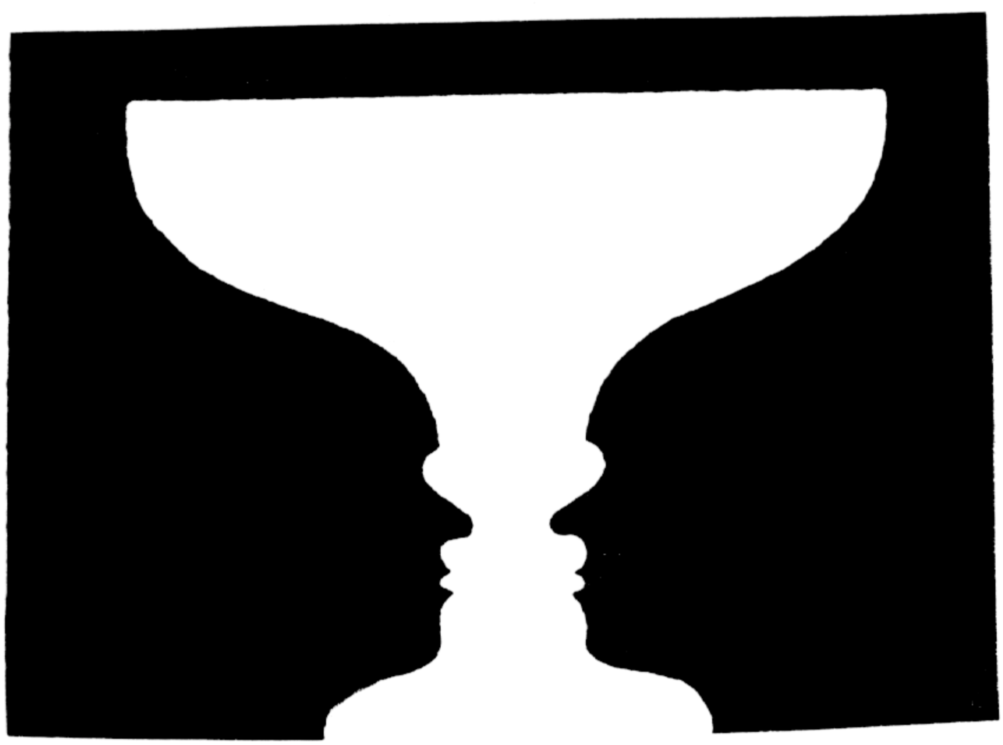
| | BOYS | GIRLS |
|---|---|---|
| mouse | | |
| old man | | |
| vase | | |
| 2 faces | | |

6. Below is a possible way in which students can graph the data. Notice this type of bar graph compares boys and girls. Discuss with students if you can interpret the data using the graph generated.



## APPLIED SCIENCE - SCIENCE AND MATH (4B) POST





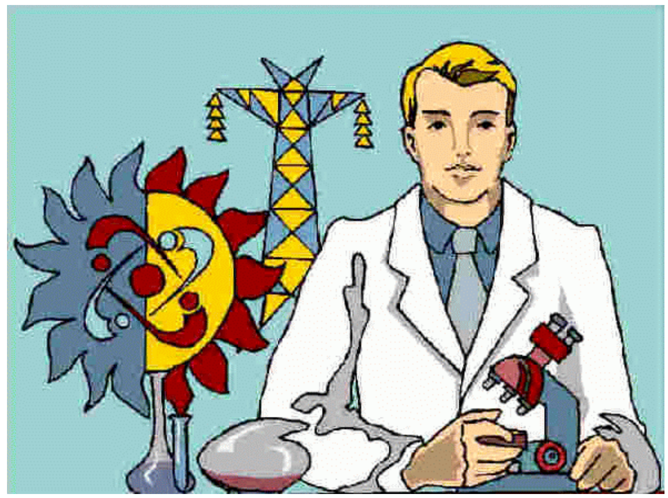
## APPLIED SCIENCE - SCIENCE AND MATH (4C)

Students use a worksheet to compare different fields in science.

### PRE LAB

### OBJECTIVES:

1. Comparing and contrasting the subfields of science.
2. Classifying sciences.



### VOCABULARY:

data
qualitative
quantitative
science

### MATERIALS:

Internet
reference material

### BACKGROUND:

Students should be familiar with the difference between qualitative and quantitative. Stress that qualitative is more observation (data is in the form of descriptive terms) and quantitative stresses repeatable experiments that collects numerical data. Quantitative is a mathematical treatment of observations. See if students can describe different fields of science and determine if the majority of that science is qualitative or quantitative. Discuss more details about each field and include the type of careers available in each of the sciences.

### PROCEDURE:

1. Discuss qualitative versus quantitative.

2. List the following sciences on the board and have students decide whether it is more qualitative or quantitative. Discuss what each of the sciences are and the meanings of the root words.

| FIELD OF SCIENCE | MEANING | TYPE (GENERALLY) |
|---|---|---|
| chemistry | chem = chemical | quantitative |

| | | |
|---|---|---|
| geology | geo = earth | qualitative |
| biology | bio = life | qualitative |
| physics | phys = physical | quantitative |
| astronomy | astro = star | quantitative |
| oceanography | oceano = ocean | quantitative/qualitative |
| hydrology | hydro = water | quantitative/qualitative |
| meteorology | meteor = atmosphere | qualitative |
| zoology | zoo = animal | qualitative |
| botany | bot = plant | qualitative |
| physiology | physio = nature | qualitative |
| psychology | psych = mind | quantitative/qualitative |

3. You can add to the list by giving students time (in computer lab or homework) to come up with more fields of science. You may want to include engineering and medical fields.

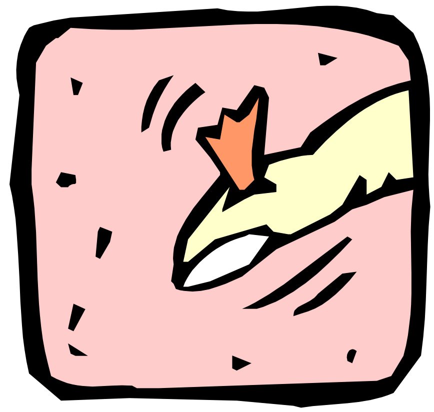
**APPLIED SCIENCE - SCIENCE AND MATH (4C)**

**LAB**

Students will find sensitive parts of the hand.

**OBJECTIVES:**

1. Investigating human senses by collecting data.
2. Interpreting data.



**VOCABULARY:**

discovery
interpretation
perception
senses
touch

**MATERIALS:**

Applied Science - Science and Math (4C)
or appropriate shapes

**BACKGROUND:**

Many people do not consider the study of perception as "science." However, to understand perception, we have to understand how humans perceive things. Dr. James Gibson, an American scientist, proposed that humans learn by interacting with a stimulus. One of his most important experimental works included "the great cookie-cutter experiment." This lab will reenact the experiment.

The different shapes represent a variety of options to make the experiment statistically observable. In the first experiment, shapes are pressed on the skin with standard pressure. In this condition, the participants (Gibson found) could manage correct identifications of the cutters in only 29% of the cases. But when the participants are permitted to explore with their fingers (as in the second experiment), 95% of the identifications were correct. Why is this so? There are more sensory "cells" in the fingers. The ability to touch the object fully transmits more of the senses to the brain to give a better interpretation.

**PROCEDURE:**

1. This experiment relates to the field of tactile experience, the way one feels the shapes and textures of things with one's hands. Have students do the experiment as described on the lab sheet.

2. Reinforce how important it is to do the experiments that see, feel, touch, and smell, in order to get the value of the entire experiment. Many aspects of science are "hands on" and are many times the only way to fully appreciate science.

3. Read the lab sheet with your students. The instructions need to be explained carefully. Two students test each other to evaluate whether the palm of their hand or their fingers can detect the shape of an object. Make sure that the partner who is guessing the shapes, closes their eyes and keeps their hand flat when their partner is testing the palm of their hand.

4. In the module are four different shapes. Go over the different shapes with the students.

5. Students will find that they can figure out the shape easier if they use their fingers. There are more sense cells in the fingers, so the brain gets more "clues" of what it is. This is also a reason why hands-on is so important, it allows the nerves to actually imprint what is being seen. All senses together help humans remember for a long period of time, whereas a reading assignment from a textbook does not have the same impact.

**APPLIED SCIENCE - SCIENCE AND MATH (4C)**

**PROBLEM:** How do people perceive things?

**PREDICTION:**___________________________________________________

**PROCEDURE:** This experiment has 2 parts.

**MATERIALS:** 4 different shapes per group

1. You have 4 shapes. Have your partner close their eyes and put their palm out and rest it on the table. Choose one of the shapes and with "normal" pressure, imprint the shape on the palm of your partners hand. Record what they call it. Repeat the experiment 5 more times with different shapes. Your partner will repeat the experiment with you. Write down what they called it.

| | YOUR RESULTS | | | PARTNERS RESULTS | | |
|---|---|---|---|---|---|---|
| TRIALS | PALM | FINGER | ACTUAL | PALM | FINGER | ACTUAL |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |

your result:_____ out of 6 were correct

partners result:_____ out of 6 were correct

**CONCLUSION:**

Look at your results. Describe the difference between putting the item on the palm and using your fingers? ___________________________________________________

___________________________________________________

Why is there a difference? ___________________________________________________

Are the class results similar to your findings? ___________________________________________________

___________________________________________________

**APPLIED SCIENCE - SCIENCE AND MATH (4C)**

**POST LAB**

Students write a report on their favorite scientist or inventor.

**OBJECTIVES:**

1. Comparing and contrasting inventors and scientists.
2. Investigating scientists and inventors.

**VOCABULARY:**

discovery
invention
inventor
scientist

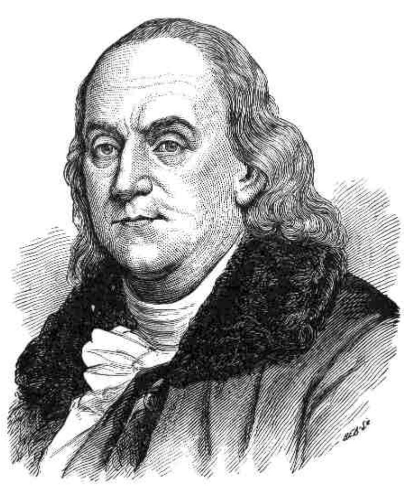
**MATERIALS:**

worksheet
Internet
reference material

**BACKGROUND:**

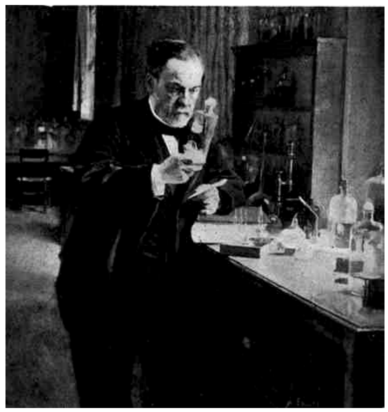
Inventions and science are closely intertwined. Both require creativity and the ability to solve a problem and logically develop conclusions. However, inventions focus more on a directed use of creativity which usually has a goal or is financially motivated.

Also note that many of these inventors are either European or American. That does not mean that other countries were not creative, just that times and needs were different in the various countries. Inventions and science built on the work of many people. Communications, sharing, and equipment are vital to any program. For instances, Charles Darwin would not have developed a theory on evolution if he did not have a chance to see the different forms of life around the world. He was fortunate to have been the naturalist on the HMS Beagle in the early 1800's. Refer to the article on "Technology" at the beginning of this book for background information. Also, some countries such as China invented many things like bridges, paper and mathematical procedures but because the transmittal of the written language had not been perfected, those individual inventors are not known to us. Remember, the most creative invention of all, the wheel, was invented by an unknown human somewhere on this planet.

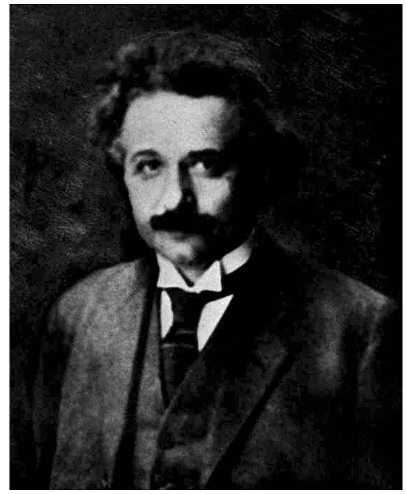


Ben Franklin

Marie Curie



Louis Pasteur



Albert Einstein

**PROCEDURE:**

1. Go over the scientists and inventors on the worksheet. Some of the people are noted for one particular thing, but many have also excelled in other areas. . Discuss each of these people. (Additional people can be added).

2. As a homework assignment, assign one of these people to each student and have them find out if the person is a scientist or an inventor. Sometimes it is very difficult to find out. Encyclopedia work is essential here.

3. In this exercise, learn with your students and continue this project as time permits. There were so many interesting people who helped develop the technology of today.

## APPLIED SCIENCE - SCIENCE AND MATH (4C)

### JUST A FEW INVENTORS AND SCIENTISTS

| | | |
|---|---|---|
| Carolus Linnaeus | (1707-1778) | classification system |
| Marie Curie | (1867-1898) | radioactivity, discovered radium and polonium |
| Galileo Galilii | (1564-1642) | gravity, telescope allowed him to discover many unknown features |
| Isaac Newton | (1643-1727) | laws of motion, calculus, optics, celestial mechanics |
| Louis Pasteur | (1822-1895) | spread of disease, pasteurization |
| Charles Darwin | (1809-1882) | natural selection, coral reefs, evolution |
| Jonas Salk | (1914- ) | vaccine for polio |
| Albert Einstein | (1879-1955) | relativity, photoelectric effect, quantum mechanics |
| George Washington Carver | (1861-1943) | agriculture, peanuts and sweet potato products |
| Robert Fulton | (1765-1815) | steamboat |
| Thomas Edison | (1847-1931) | incandescent lamp, electric power station, phonograph |
| Marconi Guglielmo | (1874-1937) | wireless telegraph |
| T'sai Lun | around 100 A.D. | paper |
| early North Africans | | writing, numbers |
| early American Indians | | agriculture |