Applied Science

Our Technological World

FIRST GRADE

SCIENCE AND MATH

3 WEEKS
LESSON PLANS AND
ACTIVITIES

APPLIED SCIENCE
OVERVIEW OF FIRST GRADE

SCIENCE AND MATH

WEEK 1.
PRE: *Discovering the importance of observation.*
LAB: *Comparing different magnifiers.*
POST: *Observing through a hand lens.*
WEEK 2.
PRE: *Measuring objects.*
LAB: *Weighing and measuring students.*
POST: *Investigating the use of a balance.*
WEEK 3.
PRE: *Investigating human senses.*
LAB: *Discovering the sense of sight and touch.*
POST: *Exploring the senses of taste, smell and hearing.*

PHYSICS

WEEK 4.
PRE: *Discovering how light moves.*
LAB: *Distinguishing refraction and reflection.*
POST: *Comparing different type of equipment that uses lenses.*
WEEK 5.
PRE: *Exploring motion.*
LAB: *Investigating how objects move.*
POST: *Comparing the human body to a machine.*

TECHNOLOGY

WEEK 6.
PRE: *Exploring how machines work.*
LAB: *Comparing simple machines in the kitchen.*
POST: *Investigating how simple machines are used in our society.*
WEEK 7.
PRE: *Exploring pulleys, wedges and levers.*
LAB: *Comparing and contrasting different tools.*
POST: *Exploring inventions.*

BUILT ENVIRONMENT

WEEK 8.
PRE: *Discovering the major types of garbage.*
LAB: *Collecting and measuring trash.*
POST: *Exploring how humans affect their environment.*

APPLIED SCIENCE - SCIENCE AND MATH (1A)

PRE LAB

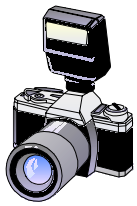
Students use a worksheet to observe objects.

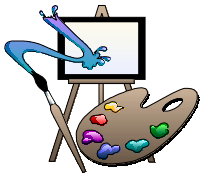
OBJECTIVES:

1. Discovering the importance of observation.
2. Observing objects in a small area.

VOCABULARY:

describe
discover
observation
science





MATERIALS:

worksheet
crayons

BACKGROUND:

Many scientists and all good learners "discover" while they are observing. When scientists describe a discovery, they must be able to record details of the observation. Scientists will use words, pictures, photographs, sound, and video to help capture that observation for others to experience.

Observation is very important in science and other subjects. It can help students look more closely at nature and learn to be more patient in everything they do. Some people are "natural" observers, while others need some guidance to appreciate their surroundings.

You can increase the observational skills of your students by carefully bringing out details of the object. For example, stating you see a fly is not good observation. Stating you see a living organism as large as a pea with two front wings, two back wings, and large eyes. This helps them to visualize the object and develop observational skills.

PROCEDURE:

1. Hand out the worksheet to students. The little boy/girl in the worksheet is looking at the grass and discovering new things. You can customize the child on the worksheet to reflect your student population. Have the student draw their own features on the face and draw in hair similar to their own.

2. Discuss what the child can see and make a list of the items on the board. As the

children are coloring, ask them to draw in any items that they might have observed in their grass. Give them clues such as worms, grasshoppers, ladybugs, and any other organisms that might be in your area.

3. To help your students "observe" more closely, suggest they lay down on the grass at home or at a park and carefully examine the grass. If your school has a grassy area, have the students go outside and observe before they start the exercise. The students should look at their surroundings very carefully and report to the class what they see.

APPLIED SCIENCE - SCIENCE AND MATH (1A)

LAB

Students learn how to compare different hand lenses.

OBJECTIVES:

1. Comparing different magnifiers.
2. Exploring organisms using a magnifier.

VOCABULARY:

hand lens
magnify
microscope
observation

MATERIALS:

Applied Science - Science and Math (1A)
additional hand lenses

BACKGROUND:

Observation is a trained skill. The more practice students have in observing details, the better they will be able to transfer the skill.

Students should be told that just to know the name of an object, does not mean that you understand what the significance of the object may be. All people named “John” or “Sally’” are not the same. The “Sally” that may be your friend has characteristics like size, age, and shape.

This lab looks at materials that they may not be familiar with to get them to describe the object and to use different types of magnifiers.

PROCEDURE:

1. Give each pair of students a bag of sealife containing a sea cookie, marine snail, seastar, and coral. Have students look at the bag of items before they use the magnifying glass. They can also draw what it looks like on paper or several students can use the board.

2. Next, give each student a hand lens. Demonstrate how to use a magnifying glass. Tell students to put the magnifying glass to one eye, and cover the other eye with their hand. When they look at an object they should move the object, not the hand lens. Most of your students will insist on moving the hand lens and it may be hard to convince them otherwise. Remember, you are just introducing the correct procedure. Don't demand

it. After a while it will become natural to look at objects that way. Students with glasses may find it more difficult.

3. Instruct students to look at the items in their bag of sealife. Make sure to explain the need of detailed observations. Have selected students come to the board and draw a picture of what they saw with the hand lens. Collect the magnifiers.

4. After the students have learned how to use a hand lens, see if students can determine which hand lens makes objects larger. Have the other set of different powered magnifiers at each station. Explain that the objective of the lab is to see which hand lens, from a choice of several magnifiers in the module, magnifies the largest. Don't tell the student the magnification of each. Let them observe the sealife with all the magnifiers. You may want the students to PREDICT which one they think makes the larger image before they actually look. Most children will predict that the larger the magnifier, the larger it magnifies. The magnifier with the 3 loupes (15 x) makes the objects the largest; each lens is 5x and when they are together you get the total magnification.

5. Have a discussion with the students of their observations. When observing the sea cookie, they should be able to see the little holes that are all over the organisms. The side with the two large holes is where the mouth (one in center) and its anus ("poop" hole) are located. The opposite side is where the star shaped pattern is. The coral has little holes all over where the individual coral "polyps" live. The clam lives in the marine environment. The seastar is related to the sea cookie, and it also has holes all over its structure. Little hair-like extensions come from these holes when the organism is alive. The extensions help the seastar move.

APPLIED SCIENCE - SCIENCE AND MATH (1A)

POST LAB

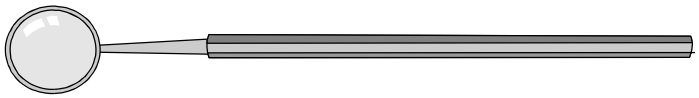
Students make a hand lens.

OBJECTIVES:

1. Observing through a hand lens.
2. Constructing a hand lens.

VOCABULARY:

hand lens
magnifier
magnify
observation



MATERIALS:

wire
crayons (or round sticks)
water

BACKGROUND:

There are many things that we cannot see with our eyes, but that doesn't mean they don't exist. Early humans did not know about protozoa, bacteria or viruses, so it was very difficult for them to know what happened to them when they got sick. The use of hand lenses in the 17th century allowed scientists to begin understanding what caused illness. Creating lenses was an art. Early microscopes used an understanding of physics to make several individual lenses to help see objects that humans cannot see with their naked eye. The more we observe about our world, the more we can understand.

Early people probably started to realize that clear substances could increase an object's image. As the science of glass making matured, glass could be used to help magnify objects. The glass has to be curved just right and be so thick in order to magnify .

PROCEDURE:

1. Students can make their own magnifying glass very easily. Twist a piece of wire around a pencil or cylinder-shaped object to make a small loop. Remove the object so the wire loop remains.

2. Dip the loop into a glass of water. When you take the wire out of the glass, a

drop of water will stay in the loop (due to surface tension). A little soap in a glass of water will make the water film tougher. Make sure to keep the diameter of the loop small.

3. Carefully hold the loop over a piece of newspaper. The letters, viewed through the water, look larger. You just made a magnifying lens! Discuss how a magnifying lens can be made of any material, as long as it enlarges an object.

4. Continue discussing observation with your students. Observation uses sight from eyes or the other senses of touch, taste, feel, or hearing. Increasing the observational powers of students requires exercises that assist a child observe more closely. Have the students describe the classroom and see if there are any objects that change from day to day. Discuss how observation can also be done on their way to school. Ask students to notice if the trees or flowers have changed color, if a new dog is on a street, or if someone moved from a house. There are many things happening in our lives, and we observe them as they are happening. Recognizing and taking a mental note of our surroundings helps encourage observational skills.

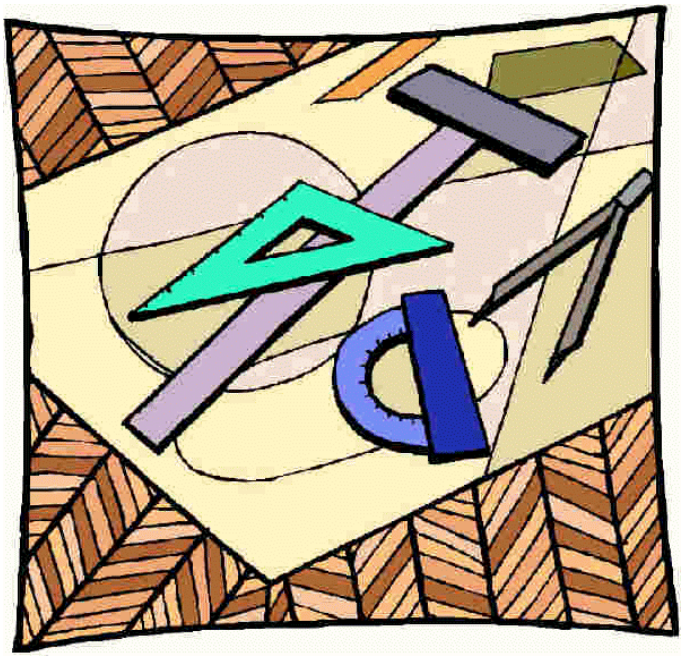
APPLIED SCIENCE - SCIENCE AND MATH (1B)

PRE LAB

Students use a metric ruler to measure.

OBJECTIVE:

1. Measuring objects.
2. Describing an object.



VOCABULARY:

centimeter
compare
describe
metric
millimeter
predict
shape
texture

MATERIALS:

rulers
worksheet
different objects

BACKGROUND:

Students need to learn the skills involved in describing the world around them. Some descriptions can be quantitative such as weight and measurement. Other descriptions are qualitative such as texture, color, and odor. In this exercise students will begin to describe an object quantitatively. They will learn to use a metric ruler to measure certain two-dimensional objects. They will see the difference between seeing something as "big" or "little" and seeing that the object has a definite measurements.

We highly suggest that you use metric rulers, especially for science. The international standard is metric in science, so it is just learning the tools of the trade. You can still use English, but the more you use metric independent of the English system, the children will become familiar with the scale.

Conversion is not necessary if a child has a “feel” for a centimeter, a meter, or a kilometer independent of an inch, a yard stick, or a mile.

PROCEDURE:

1. Inform the students that they will be learning how scientists describe things.

Scientists use the same methods you would to describe an object to another person. However, scientists can observe and describe in greater detail because they are trained.

2. Review basic descriptive words such as colors, shapes, sizes, textures, and other descriptive terms. Hold up objects like apples, erasers, or pencils, and have the class describe them. Tell them a Martian has arrived from outer space and he does not know what the items look like or feel like. Ask the students how they would describe the object so that the Martian would understand what it is ?

3. Pick a student to come to the front of the class. (Be sure to pick a student who is not sensitive.) Ask the students to describe him/her. Try to get them to use words dealing with size. Tell them that the words "big" and "little" sometimes do not give all the information we want. We need to measure them to be accurate. You may want to have the class compare the student with yourself or another student. Ask the question, “How much bigger is one person from the other?”

4. How do we measure? Give students a ruler and have them look at centimeters and millimeters.

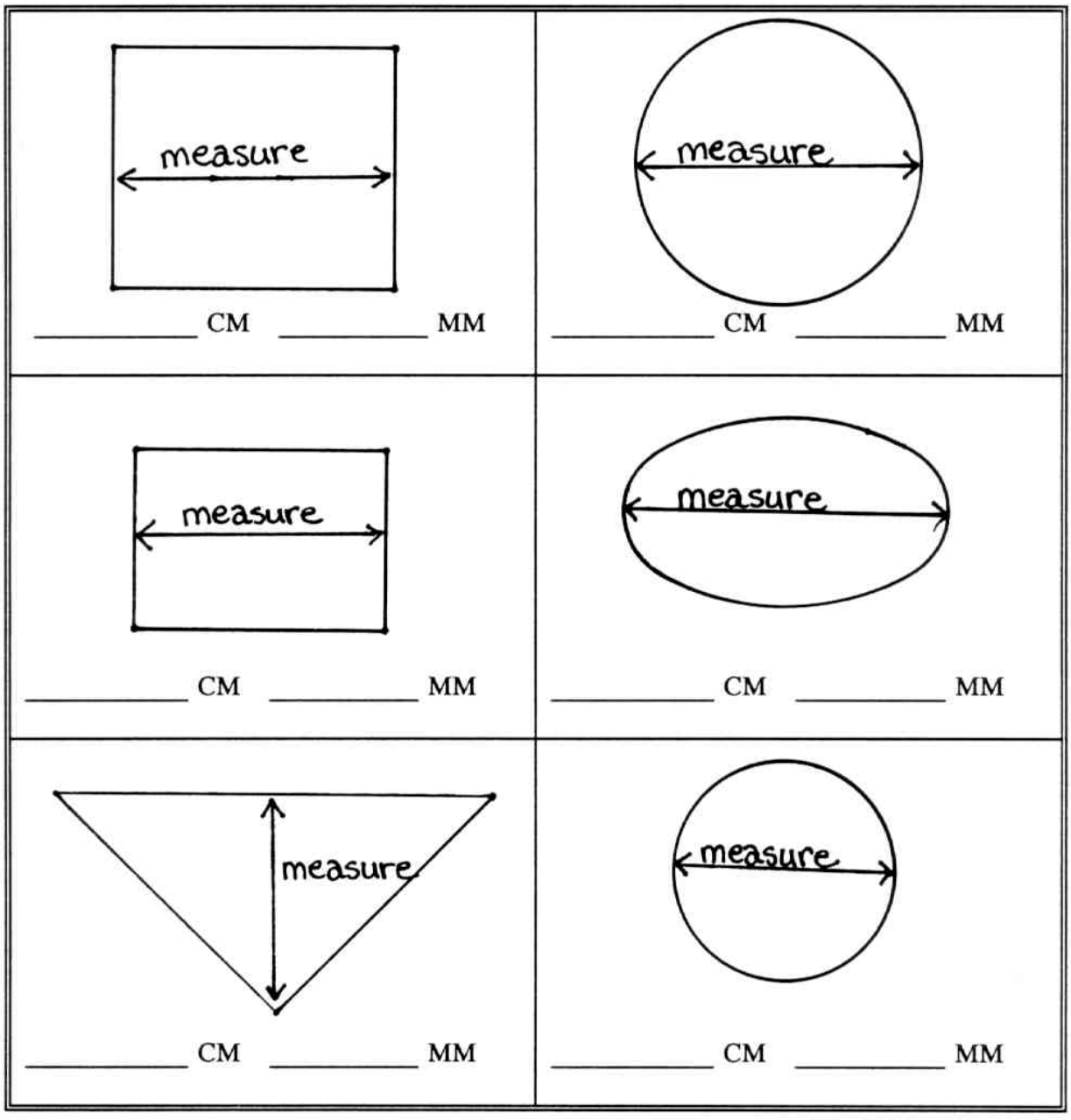
5. Show students different objects and ask them to predict how large they are. At the beginning they will not have a clue. After the students have given their answers, measure and tell the class. After about 5 or 6 of these measurements they may be able to predict a little better. You are increasing their observational skills by giving them knowledge to help them predict more accurately.

6. Measure different units in the doorway so the children can begin to estimate how tall a person is when they come through the door. In many areas, stores have the door marked. In case of a robbery, a person would be able to tell how tall the robber was.

7. Pass out the worksheet. The worksheet helps students measure two-dimensional objects. Inform the students that they will be measuring in the metric system. It is very easy to measure exactly using the metric system. Model how to measure the first object on the worksheet. Tell them cm = centimeter and mm = millimeter. Ask the students to write the large number first (before the letters cm.) and then count the number of little lines between the big numbers. We call these little lines "ticks". Each tick represents one mm. Ask the students to record their answers in the spaces below the pictures.

APPLIED SCIENCE - SCIENCE AND MATH (1B) PRE

MEASURE THE FOLLOWING OBJECTS AS DIRECTED. RECORD YOUR ANSWER IN CENTIMETERS AND MILLIMETERS.



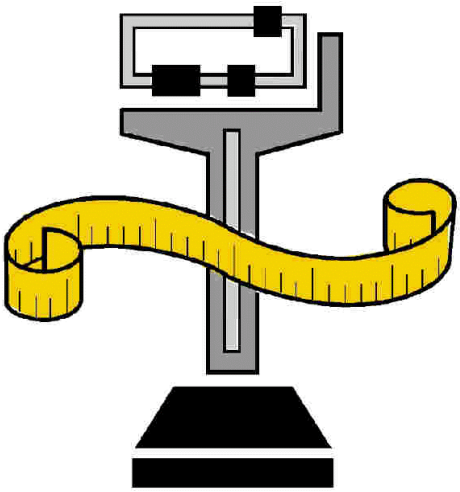
APPLIED SCIENCE - SCIENCE AND MATH (1B)

LAB

Students measure their body.

OBJECTIVE:

1. Weighing and measuring students.
2. Discovering how to read a scale.



VOCABULARY:

height
measure
bath scale
weight

MATERIALS:

metric rulers
tape measures (metric and English)
bathroom scale

BACKGROUND:

A scientist must learn to accurately describe objects that he/she is studying. A glass of water, for instance, might be described as a "clear cylindrical container, of 250 ml. capacity containing about 200 ml. of a clear, colorless, odorless liquid of unknown identity."

First graders do not yet have the vocabulary to make that detailed a description, but they can begin to use words that describe shape, size, color, smell, and feel. They can also begin to understand that "big" and "little" are good descriptive terms, but sometimes additional measurements are necessary. Measurements help us distinguish between a big elephant and a big house.

In this activity, students will measure their own height and weight in either metric or English (depending on your comfort level). (Metric measurement is strongly recommended). Parent volunteers able to help students with this lab are ideal.

PROCEDURE:

I. Request from parents prior to lab, the use of bathroom scales.

2. Record all the students name on the worksheet provided. Put the date for each of the weight and height. You will redo this exercise 6 months later to have students see if they have grown.

3. Give each group of students a ruler and a tape measure. Set-up stations in the classroom with the bathroom scale. At each station students will measure their weigh and record it on the sheet next to their name. .

3. There are several ways in which students can measure their height. You can have one student that is to be measured to stand with his/her back tot he wall. The other student should make a tick mark with the pencil horizontal with the head. Illustrate how to do this with children. You can either have them measure the tick mark by using the ruler and figure out how to add the rulers or you can have a pre-measured wall. You can use different increments on piece of butcher paper and

With a metric ruler or meter stick mark centimeter increments on the paper. You may want to have students also measure in the English system.

4. Students should weight themselves first. You may have a difficult time to find a metric scale in the United States, so you may use pounds. Make sure the students read the scale with the aid of an adult. Students will need guidance on how to read the scale. Write the amount on a piece of paper and tell the student that they will record the weight next to their height on the butcher paper.

After all the students have been weighed and measured have the students predict whether they will grow and gain weight in the next several months. Roll up the large sheets of paper and save these with the student's lab sheets for several months. In 3-6 months repeat this lab and model how to do the conclusion. This lab works well if done at the beginning of the year and then again at the end of the year.

APPLIED SCIENCE - SCIENCE AND MATH (1B)

name	weight _____	weight _____	height _____	height _____

APPLIED SCIENCE - SCIENCE AND MATH (1B)

POST LAB

Students weigh objects on a balance.

OBJECTIVE:

1. Investigating the use of a balance.
2. Comparing weight of two objects.

VOCABULARY:

balance
compare
weight

MATERIALS:

elementary balance
mass weights
pairs of objects to be weighed (apple and orange; eraser and pencil, etc.)

BACKGROUND:

The weight of an object is another measurement used to describe an object. In this lab students will be introduced to an elementary balance. They will have the opportunity to weigh a variety of objects using the balance.

PROCEDURE:

1. Describe how to use an elementary balance. Identify the parts with students. Show the balance and describe how it works. Demonstrate that the pan with the heavier object will be lower. When two items are the same weight, the pans will be the same height. On the figure below, you put the item to be measured in one bucket and in the other bucket you put the measured weights. When the buckets are "even," that is how much the item weighs.

2. Hold up two objects and have students predict by raising their hands which object will be heavier. Then place each pair of objects on the balance and figure out which object is heavier. Help students identify the heavier object and review their predictions. Explain that you can find out just how heavy an object is by putting known weights on one of the pans until the two

sides balance. Add up the weights to find out how heavy an object is. This is a good introduction to addition. Point out the weight of each of the weights as you add them up. Note that they are in grams.

3. Measure about five objects of various weights in front of the class. Ask for volunteers to add up weights and to tell the class the weight of the objects. This shows students that there is a reason for learning how to add.

APPLIED SCIENCE - SCIENCE AND MATH (1C)

PRE LAB

Students use their senses to describe objects.

OBJECTIVES:

1. Exploring the different senses.
2. Investigating human senses.

VOCABULARY:

hearing
senses
sight
smell
taste
touch

MATERIALS:

ice cube
warm water
plant in pot
2 different types of potatoes
(or other substitute items)

BACKGROUND:

We use five senses to observe our environment including sight, touch, smell, hearing, and taste. In this activity children will learn to use two of these senses to describe their environment.

Of the five senses, humans, rely most heavily on sight. When sight is missing, we substitute touch and hearing. We determine color, shape, size, distance and sometimes texture with our eyes. We can also examine things that are very large, or very small (with microscopes or magnifying glass) or very far away (with a telescope). With touch, we can determine texture (smooth, rough, sticky, hairy or fuzzy, slimy, wet, soft, and hard), shape (if the item can be handled), and weight and size within certain limits. We also feel heat, cold and pain.

PROCEDURE:

1. Discuss the five different senses and what parts of the body are required to use that sense. Remember the brain is the central area that interprets signals from the rest of the body. Ear drums within the ear detect sound. Taste buds on the tongue record the

type of taste. The cells within the walls of the nose detect different smells. Different parts of the skin detect touch. Eyes use light to concentrate an image that is transmitted to the brain.

2. Describing the senses requires a vocabulary that first graders are developing. Use items mentioned in the materials to help students to find the "correct" word. For instance, have several students feel an ice cube. They should feel the following sensations of cold, sting, icy, or tingly. But to help describe the feeling to another student they may say, "Very cold, like ice cream touching your tongue." Make students think about how else to describe this feeling.

3. Use warm water to have students describe water without feeling it. They will probably describe cool and not even think about warm.

4. A potted plant may be difficult because the students will have to describe the pot, the plant, and the soil. They may want to compare how the pot and the plant look together.

5. If you have two potatoes (red and Idaho, for instance), ask students why they are both called a potato, when they look so different.

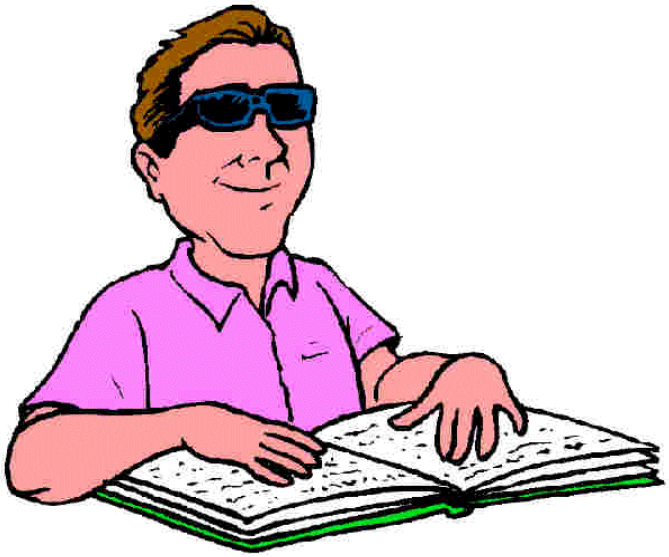
APPLIED SCIENCE - SCIENCE AND MATH (1C)

LAB

Students experience how to read without sight.

OBJECTIVES:

1. Discovering the senses of sight and touch.
2. Experiencing blindness.



VOCABULARY:

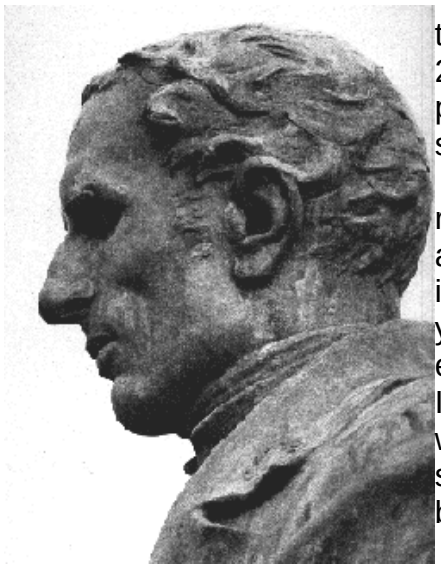
blind
braille
sight
touch

MATERIALS:

Braille Placemat
blindfolds
clay or seeds (lentils)

BACKGROUND:

Louis Braille was born on 4th January, 1809 near Paris, France. At three years of age an accident deprived him of his sight, and in 1819 he was sent to the Paris Blind School. . Here he made rapid progress in all his studies. He learned to read by embossed Roman letter, which was exclusively used at the time.



Louis Braille

Louis Braille revised M. Charles Barbier's character to two from 12 dots and thus produced his well-known 3 by 2. On this basis Braille was the first person to devise a practical scheme for printing and writing in tangible form, suitable to the tactile capacity of blind people in 1829.

It is sometimes difficult for young students to realize what it is like to not have all their senses. This activity helps them to understand how it changes their life if one sense is not working. If your eyes or the nerves to your brain are damaged you can become blind. If your ear drum is broken, you may not be able to hear clearly. If the cells of your nose or your tongue is damaged you will have difficulting smelling and tasting. If there is something wrong with the nervous system, you might not be able to touch something and feel it.

PROCEDURE:

1. The objective of this activity is to make students aware of which senses they are using, determine what sense organs are (eyes, skin) and how they might cope if a sense is missing.

2. Lead the children in answering these questions:
   a. What do you use to see with? (eyes)
   b. How many do you have?
   c. Do you need both of them to see?
   d. Is there any difference in what you see with two eyes compared to what you see with one? (You cannot tell distance easily with only one eye. You must use other clues.)
   e. What do you feel with? (skin)
   f. How do your senses of touching and seeing help protect you? (You won't bump into things).

3. Pair the children off. Have them shut one eye and stick out their forefinger like they were pointing. Let them try to touch their partner's forefinger. They will probably have trouble because they have no depth perception with one eye closed.

4. Again in pairs, have them roll a ball gently from one person to the other, trying to catch it with one eye closed.

5. Have each child try to touch his/her own two forefingers together with one eye closed. One finger will probably pass in front of the other.

6. Take children on a blind walk. (This is best done by one adult while another adult stays inside with the remaining children). Split the children into small groups--no more than 10 per group. Take children outside. Pair them off. One partner is to be "blind" (close his eyes) and one is to be his helper, always holding one hand.

NOTE: Stress safety!!! The helper is to warn his partner if he/she is about to run into something. Both must walk slowly and carefully.

Lead the children on a short walk in a safe area. Have the "blind" children feel textures on the walls, sidewalks, fences, and other objects. Ask them if they know where they are and which direction they walked. If they do know, ask them how they know. (If it is because they have the area memorized, tell them that this is what blind people do also). Change partners and walk again.

7. Back in the classroom, ask them how they felt and how successful they were at getting around. Explain that blind people develop better senses of touching and hearing than most people because they have to replace their sight.

8. Show students the BRAILLE PLACEMATS. Have them practice feeling the

different letters. See if they can pick out the letters in the words. This will take patience. You may want to do this over a week's time. Have the students determine how long it will take to learn just one letter.

9. Use the worksheet and have students put little bits of clay, or have them glue down lentils (a bean) to make their own Braille placemat.


a b c d e f g h i j k l m
n o p q r s t u v w x y z
, ; : . ! ( ) ? " HYPHEN DASH

APPLIED SCIENCE - SCIENCE AND MATH (1C)

POST LAB

Students identify smells and sounds.

OBJECTIVES:

1. Investigating the senses of taste and smell.
2. Exploring the sense of hearing.

VOCABULARY:

hear
sense
smell
taste

MATERIALS:

small keyboard with different pitches
blocks make noise
blindfold
small bottles containing items to smell (i.e. cinnamon, mint, small cubes of raw potato, pear, apple, onion, jellybeans)

BACKGROUND:

Children often do not realize how much information they can obtain with their ears. They can often identify things that make sounds, tell roughly how far away they are, and which direction they are traveling. Part of this ability comes because we have two ears; if hearing is damaged in one of them, it is often difficult to tell where a sound originates. The ability to tell the direction of travel and distance is due to the loudness of the sound compared to what we would expect if the sound were near us, as well as whether the sound is getting louder or softer, and rising or lowering in pitch.

The senses of taste and smell are closely related. If the nose is pinched closed (and eyes are closed), a child cannot tell whether he is biting into an apple or an onion. This is one reason why foods seem tasteless when we have bad colds. The sense of smell is powerful. In this exercise, children will try to identify smells to their origin and to associations it creates.

PROCEDURE:

1. Discuss the sense of hearing. Ask students what part of the body do we use to hear with and what we can find out by listening. Do we need both ears? Have children close their eyes and listen for a minute. Call names and ask what they hear. Ask them whether the sounds are loud or soft. Walk behind the children. Make a number of different

noises with objects that you may have. See if they can identify them. Play different notes on the keyboard. See if the children can tell which notes are higher and which notes are lower.

2. Have all the children sit in a large circle. Pass out several pairs of blocks or other objects. Have one child sit in the center with a blindfold on. Have different children click their objects together and the student in the center must try to determine where the sound comes from. Then have the student in the center close one ear and try to locate the sound. This is a little more difficult.

3. Talk about taste and smell and how they are related. Pick one child for a demonstration. Blindfold the student and pinch the nose. Give the student a piece of pear, apple, potato and onion. Ask the children if they can identify them or tell the difference between them. You may want to pair the children to get them to experiment with each other. Let them try to identify the smells in the little jars that you have prepared. See if any memories, good or bad, are triggered by the smells, for example alcohol with a hospital experience, or cinnamon with baking. Review what they have done. Identify the hidden smells and sounds.