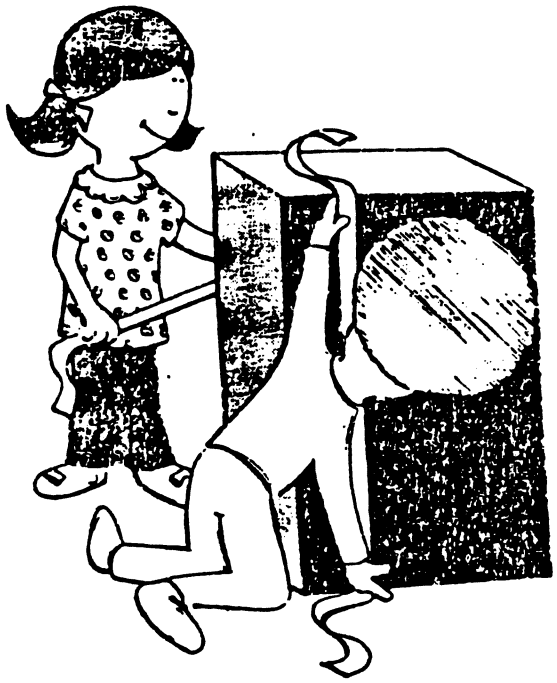
New York City Department of Education

NYSPET in Science Grade 4

Preparedness Guide



Prepared by the Multidisciplinary Resource Centers

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NYSPET in Science
Grade 4

Preparedness Guide

This document was written by the elementary science specialists at the Multidisciplinary Resource Centers to be used to help prepare administrators, teachers and their students for the *New York State Program Evaluation Test in Science Grade 4.*

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ESTIMATING STATIONS

Topic: Estimating measurement

Problem: How accurately can we estimate various measurements?

Processes: inferring, estimating, interpreting data, measuring

Materials: closed opaque container filled with sand, scale, 3 different sized clear containers each filled with a different quantity of liquid, measuring cups, meter sticks, tape measure, container filled with warm tap water, thermometer, Estimating Measurement Worksheet

Procedure:

1. Organize students into 5 groups.

2. Prepare 5 estimating stations:

   Station A: Estimate the mass of the can filled with sand. Mass the can. Compare the estimate with the actual weight.

   Station B: Estimate the distance between two bulletin boards in the classroom. Measure this distance. Compare the estimate with the actual distance.

   Station C: Predict which of the three different sized containers has the greatest quantity of water. Measure the quantity of water in each container using measuring cups. Compare the estimate with the actual measurements.

   Station D: Estimate the length and width of the chalkboard and compute the area of the chalkboard. Measure the length and width of the chalkboard. Compute the area. Compare the estimated area with the measured area.

   Station E: Estimate the temperature of the water in the container. Measure the temperature using a thermometer. Compare the estimate with the actual temperature.

3. Each group should work together at each station. Answers should be recorded on the *Estimating Measurement Activity Sheet*.

4. When all groups are finished compare the accuracy of each estimate. Discuss the need for accurate measuring devices.

Estimating Task A

1. Estimate the mass of the can.
2. Mass the can.
3. Compare your estimate with the actual weight.

Estimating Task B

1. Estimate the distance from bulletin board 1 to bulletin board 2.
2. Measure the distance.
3. Compare your estimate with the actual distance.

Estimating Task C

1. Predict which container is holding the most liquid.
2. Estimate the quantity of liquid in this container.
3. Measure the quantity of liquid in all containers.
4. Compare your estimate with the actual measurements.

Estimating Task D

1. Estimate the length and width of the chalkboard to determine the area.
2. Measure the length and width of the chalkboard.
3. Find the area.
4. Compare the estimated area with the actual area.

Estimating Task E

1. Estimate the temperature of the liquid in the container.
2. Measure the temperature of the liquid.
3. Compare your estimate with the actual temperature.

Name_____ Date_____

ESTIMATING STATIONS ACTIVITY SHEET

Problem: How accurately can we estimate various measurements?

Procedure:

1. Visit each station. Follow the directions at each station as written. Each team will work together to solve each problem.

2. Enter your estimates for each station in the appropriate column on the worksheet. (Do not use measurement devices at this time.)

3. Now use the appropriate measuring device to solve the problem.

4. Enter your measurements in the appropriate column on the worksheet.

5. Compare your recorded estimates with the actual measurements. In the last column, write a brief comment describing your accuracy in estimating.

STATION	ESTIMATE	MEASUREMENT	COMPARISON
1			
2			
3			
4			
5			

How accurate were your estimates?_____

MEASURING OPTICAL ILLUSION LINE SEGMENTS

Topic: Measuring line segments with a centimeter ruler

Problem: How can we compare the lengths of two lines?

Processes: estimating, measuring, comparing

Materials: centimeter rulers, Optical Illusion worksheets

Procedure:

1. Direct students to examine and discuss the lengths of the mouths of frogs A and B on Worksheet 1. Be sure to exclude the arrow portion of the line segment mouths. Predict which mouth is longer.

2. Use the centimeter ruler to measure the lengths of the two mouths. Compare the measurements with your predictions.

3. Direct students to examine and discuss the height and width of the hat on Worksheet 2. Be sure to examine only line segments A and B. Predict which line segment (A or B) is longer.

4. Use the centimeter ruler to measure line segments A and B. Compare the measurements with your predictions.

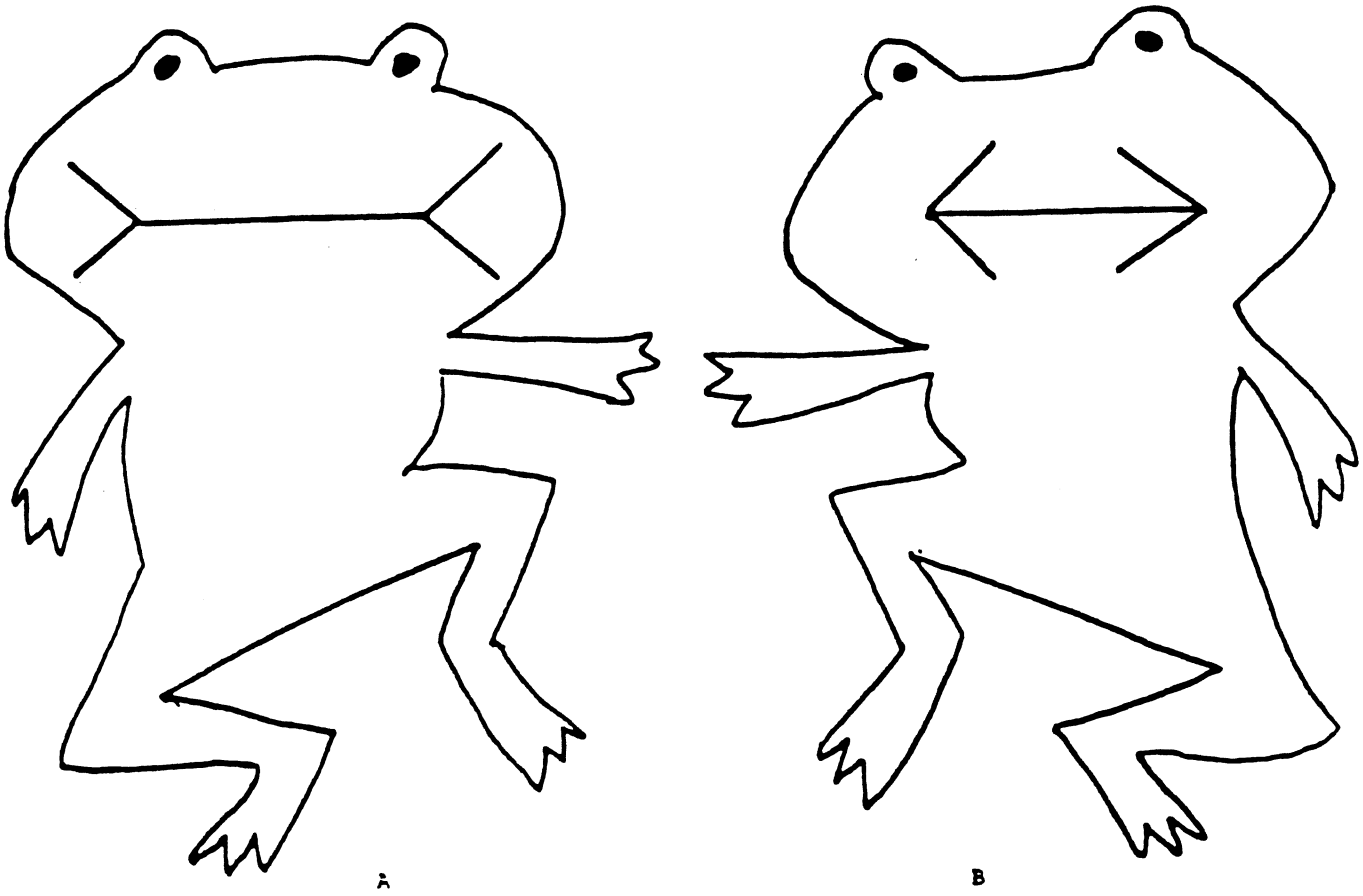
5. Discuss the importance of accurate measuring devices.

6. Have the students design original optical illusions to measure.

Name_____ Class_____

OPTICAL ILLUSIONS ACTIVITY SHEET 1

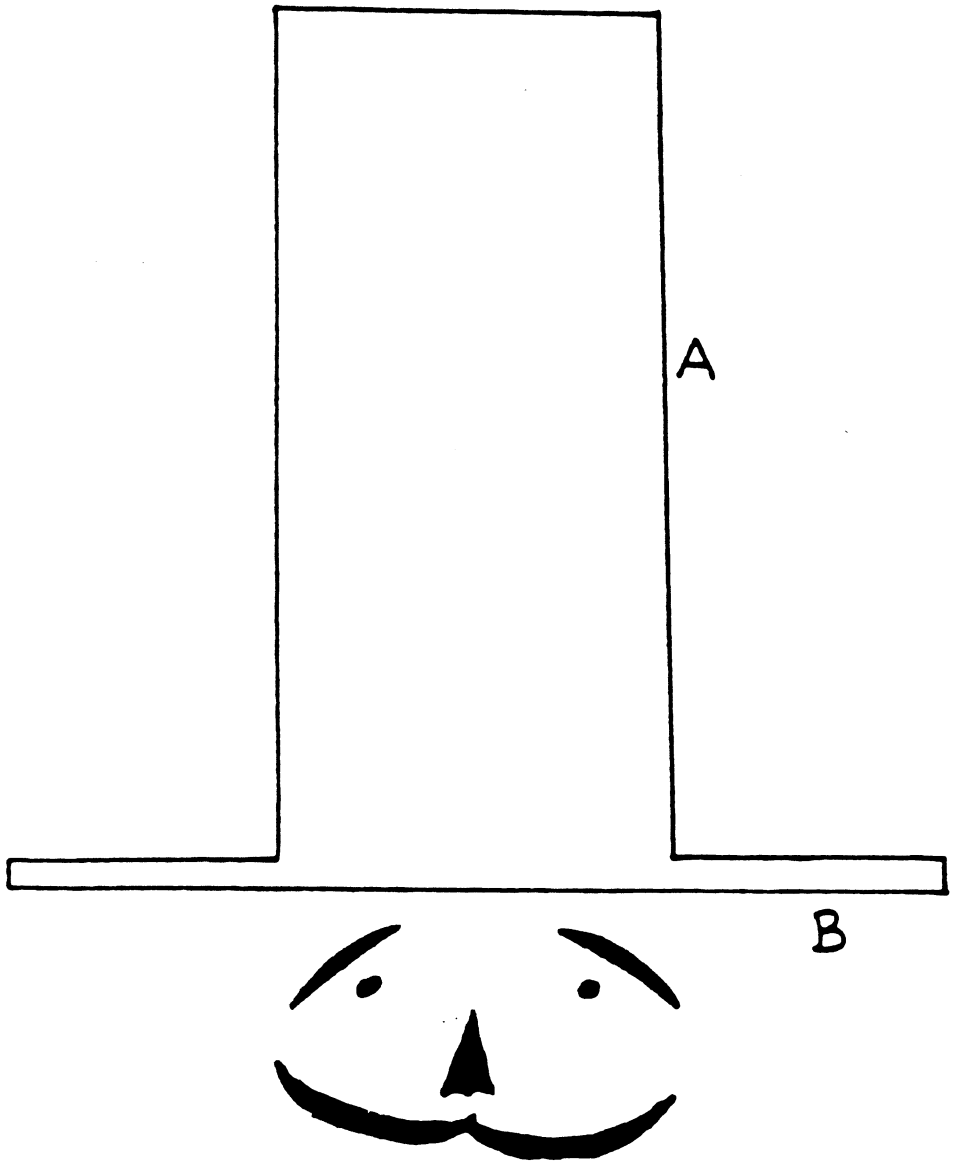
Which frog has the longer mouth?
Measure each mouth with your ruler.



Name_____ Class_____

OPTICAL ILLUSIONS ACTIVITY SHEET 2

Is the hat taller or wider?



Name_____ Date_____

LINEAR MEASUREMENT

FROGS

Using only your eyes, how do the lengths of the frog's mouths appear?

_____

Measure the lengths of the mouths of *frogs A* and B in **centimeters.**

Explain your findings. _____

_____

HAT

Look at the hat. Does the hat appear taller or wider? _____

Measure the length and width of the hat in **centimeters.**

Explain your findings. _____

_____

PAIL

Find the circumference of the top of the pail. _____cm

Explain how you found your answer.

_____

_____

COMPARING MASSES

Problem: How can we compare the masses of several objects using a pan balance?

Processes: observing, estimating, inferring, comparing, predicting

Teacher Background:

Mass and weight are different physical properties. Weight is a measure of the force of gravity acting on a body. As the force of gravity changes so does an object's weight. Mass is a measure of the quantity of matter a body contains. The mass of a body remains constant regardless of the forces (i.e. gravity) acting on the body. When using a balance scale you are comparing the masses of two different objects.

Materials: (for each group) 1 pan balance, 5 different objects (i.e. lead fishing sinker, wood block, large metal washer, plastic containerr, D-cell battery), *Comparing Masses* activity sheet

Procedure:

1. Organize students into groups of four to six.

2. Provide each group of students with an assortment of objects.

3. Direct students to order their objects from lightest to heaviest using their five senses.

4. Have students record their predictions on the worksheet provided.

5. Question students to identify the instrument(s) which may be used to test their predictions.

6. Demonstrate the proper use of a double-pan balance. Use a small piece of clay to balance the scale if needed.

7. Direct each group to design a plan for using the pan balance to help order their five objects from lightest to heaviest.

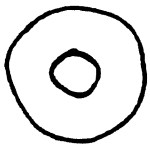
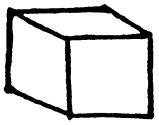
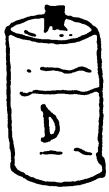
8. Test the plan.

9. Record the results on the worksheet.

10. Compare the original predictions with the actual measurements.

Name_____ Date_____

COMPARING MASSES

 WASHER	 PLANTER	 SINKER	 WOOD BLOCK	 BATTERY

ORDER THE OBJECTS FROM **LIGHTEST** TO **HEAVIEST**

PREDICTION	MEASURED

COMPARING MASSES USING NON-STANDARD UNITS

Topic: Using non-standard units and a pan balance to compare masses

Problem: How can we compare the masses of different objects using non-standard units and a pan balance?

Processes: observing, estimating, inferring, comparing, predicting

Materials: pan balance, large quantities of objects with small mass (i.e. paper clips, metal washers, pennies, marble, plastic chips), assorted larger objects, *Using Non-Standard Units* activity sheet

Teacher Background:

Students should begin the measurement of mass by using non-standard units. Almost any small available object (paper clip, washer, marble, penny) may be used as the unit of comparison. At a later time students will discover the need for the convenience and accuracy of standardized units.

Procedure:

1. Organize students into groups of four to six.

2. Provide each group with a large quantity of a small item (washers) to be used as a non-standard unit of measurement. Distribute student worksheets.

3. Direct students to predict the number of washers needed to balance an assortment of five objects. Each object should have a different mass. Record predictions on the activity sheet.

4. Test the actual number of washers needed to balance each object. Record results on the worksheet.

5. Compare the original predictions with the actual measurements.

6. Discuss why it is so important to have standard units of measurement.

Name_____ Date_____

COMPARING MASSES USING NON-STANDARD UNITS

Guess how many non-standard units are needed to balance each object. Use a pan balance and non-standard units.

Non-standard units used: _____

OBJECT	GUESS (PREDICTED MASS)	MEASURED MASS
D-cell battery		
1 oz. fishing weight		
metal washer		
planter		
wood block		

Pennies, metal washers, Unifix cubes or other small objects of uniform size, shape and mass may be used for this activity.

Name_____ Date_____

COMPARING MASSES USING STANDARD UNITS

Weigh the following objects using **gram weights**. Record their mass in grams.

OBJECT	MASS (in grams)
scissors	g.
large crayon	g.
pencil	g.
wood clothespin	g.
hole puncher	g.

Place the objects in order from lightest to heaviest.

_____

_____

_____

_____

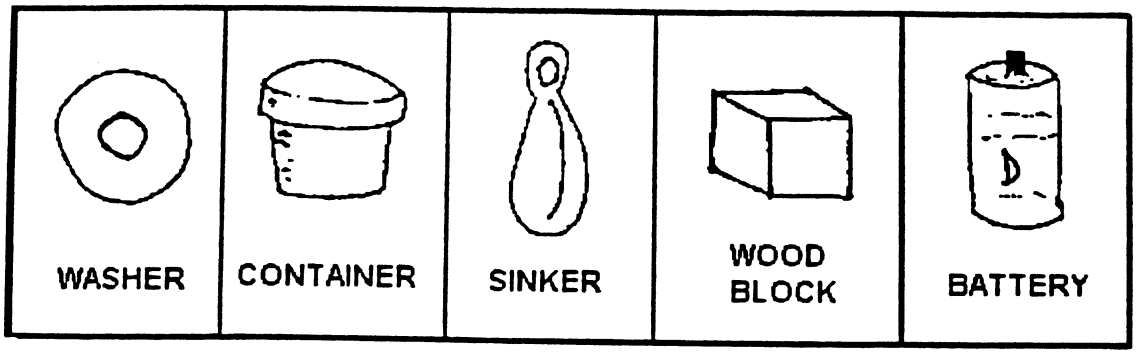
_____

How many grams heavier is the heaviest object from the lightest object?

_____g.

Name_____ Date_____

USING GRAM WEIGHTS



Order the 5 objects from **lightest to heaviest.** Record your predictions below.

Raise your hand and you will be given a bag of gram weights.

Measure the weight of the 5 objects in grams. Record their weights below.

	Predicted Order	Measured Weight
lightest		grams
		grams
		grams
		grams
heaviest		grams

Explain how you were able to measure the heaviest object in grams.

_____

_____

_____

THE BIG SQUEEZE

Topic: Comparing liquid measures

Problem: How can we compare the absorbency of several sponges?

Processes: predicting, measuring, recording data, comparing

Materials: large pail of water, several identical man-made and natural size sponges (identical in length, width, thickness), measuring cup, pail for waste water, basin, pan balance, Sweet and Low packets or other standardized weights

Background Information:

There is a wide variation in the absorbency of man-made and natural sponges.

Procedure:

1. Show students at least two sponges that are different in some way. Have them describe the properties of each sponge.

2. Direct students to mass the sponges (dry) on a pan balance using standardized weights (Sweet and Low packets).

3. Direct students to design an experiment to find out which sponge can hold the most water. Review the terms, variables, and hypothesis. Remind pupils to prepare a data sheet.

4. Students should be able to soak their sponges and squeeze them out into a container (measuring cup) where the amount of water wrung out can be measured. (A basin or a funnel may be helpful to collect all the water.)

5. Conclude which sponge(s) can hold the greatest volume of water. Discuss the properties that may account for the ability to hold more water.

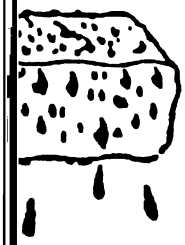
6. If natural sponges are available, discuss with the class why they are no longer frequently used in homes.

7. Follow-up question:

   If we wish to pick up spills in the classroom what other variables should we investigate? (i.e., cost, durability, availability)

Class_____

E ACTIVITY SHEET



	QUANTITY OF WATER HELD

ter? _____

ater this sponge held.

_____

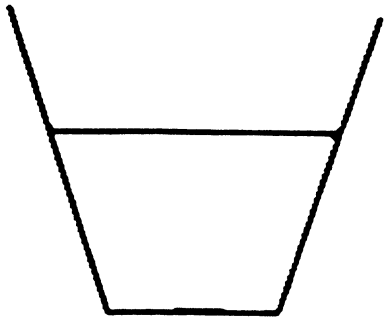
_____

_____

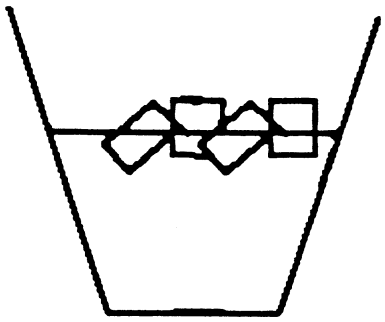
Name_____ Date_____

MEASURING TEMPERATURE

Measure the temperature in each cup carefully.
Record the temperatures below.



CUP A



CUP B

Temperature_____°C

Temperature_____°C

What is the difference between the two temperatures? _____ °C

Show your work here.

Pour 100 ml of water from each cup into Container C.

Predict the temperature of the water in Container C. _____ °C

Measure the temperature of the water in Container C. _____ °C

CLASSROOM TEMPERATURE MAP

Problem: Where are the hottest and coolest spots in the classroom?

Processes: predicting, recording data, interpreting data, creating a model

Materials: 10 thermometers, *Classroom Temperature Map* activity sheet

Teacher Background:

Temperature is a measure of the hotness or coldness of a body or substance. Temperature is actually a measure of the kinetic energy of the molecules that make up a substance. Kinetic energy is the energy of movement of the molecules. The addition of energy to an object causes the molecules to speed up, resulting in a rise in temperature.

Temperature differences may found in various locations in the classroom. These temperature differences may be due to proximity to heat sources (radiator), windows, drafts, amount of direct sunlight received and air currents in the room.

Advance Preparation:

Prior to presenting this lesson select and label 10 different sites in the classroom. Suggested sights include both above and below windows, above and below the radiator, a sunny spot, inside a closet, etc. Be sure to select sights at different heights in the same general locations. Label each site with a letter (A - J).

Procedure:

1. Place students into small groups. Distribute Classroom Temperature Map activity sheets. Review with students the proper procedures for using thermometers.

- Discuss what each mark on the scale represents (1 degree, 2 degrees).
- The scale should be read at eye level.
- Review the units Celsius and Fahrenheit.
- When taking a temperature reading remember to keep the thermometer in that substance (or air) for a period of time until the liquid in the tube stops rising or falling.
- Do not shake these thermometers. The temperature reading will adjust on its own.
- These thermometers must never be put in the mouth.
- If a thermometer breaks, students should tell the teacher. Students should not clean it up by themselves.

2. Direct each group to predict which of the ten sites in the classroom are the hottest and coolest. Students should record their reasons for their choices.

3. Direct each group to record the temperature of the air in one or more sites. (Teacher should select each group's sites.)

4. Collect the temperature data from each group and record data on the activity sheet. Discuss the reasons for the varying temperatures.

5. Compare predictions with actual readings.

6. Compute the average classroom temperature based upon the data collected from the 10 sites. Discuss how the temperature of an area is generally the average of several temperatures taken in various locations within a given area. Students may also compute the average warmest and coolest temperatures within the room.

7. Create a classroom map displaying the temperature readings in their appropriate locations.

8. Predict the temperature of an unmeasured part of the room. Take a reading with a thermometer. Compare prediction with actual reading.

Follow-Up:

1. Repeat the above procedure at different times of the day. Compare and explain the reasons for any temperature changes found in the same location. Which sites in the room showed the greatest changes? Why? Which showed the most consistent temperature readings.

2. Have students borrow a thermometer to take home. Have students predict the warmest and coolest locations in their homes. Students should take actual readings throughout their house. Compare their predictions with their actual readings.

3. Examine newspaper weather maps for the New York area. Note the temperature differences in various regions. Research and try to explain why certain areas are cooler than others. Also note the listings of high and low temperatures.

4. Devise a method of equalizing temperatures in an area (classroom, home, office, factory, etc.) so no hot or cool spots are created.

Name_____ Date_____

CLASSROOM TEMPERATURE MAP ACTIVITY SHEET

Look around the classroom at the 10 labeled (A-J) sites. Work with your group to answer the following questions:

1. Predict which of the 10 sites in the room is the hottest. _____

   Why does your group think this site is the hottest?

   _____

   _____

2. Predict which of the 10 sites in the room is the coldest. _____

   Why does your group think this site is the coldest?

   _____

   _____

3. Take the temperature readings at the sites your group is assigned. On a separate sheet of paper draw a map of the classroom. Be sure to include the windows, door, desks, furniture, etc. After all temperature readings have been placed on the board enter the readings in their corresponding locations on the classroom map.

4. Which site had the hottest temperature? _____

5. Which site had the coolest temperature? _____

6. How accurate were your predictions?

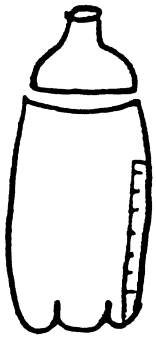
   _____

   _____

Name _____ Date _____

Sinkers

1. Using a scissor, carefully cut off the top of a clear plastic .5 liter (water) bottle.



2. Place a piece of masking tape down the side of the bottle.

3. Using a ruler and marking pen, mark three lines on the tape at these distances from the bottom of the cylinder: 2.5 cm, 5 cm, 7.5 cm)

4. Slowly pour cooking oil into the glass up to the 2.5 cm mark on the tape.

5. Fill the measuring cup with colored water and slowly pour the colored water down the inside wall of the bottle containing the oil until the liquid level is at the 5 cm mark.

6. Observe the positions of the water and oil in the glass.

7. Slowly pour enough light corn syrup into the bottle to bring the top surface of the liquid level to the 7.5 cm mark.

8. Observe the position of all three liquids in the bottle.

9. Describe what you see. Explain why the liquids appear the way you described.

_____

_____

_____

10. Predict what will happen when three different objects (i.e., large paper clip, 1 cm plastic cube, a cork) are released in the bottle.

_____

_____

_____

11. Observe and compare your prediction to what you observed.

12. Explain why the objects behaved the way you observed.

Name _____ Date _____

Sinkers Part 2

1. Give each pair of students two containers of colorless liquids and two equal sized pieces of candle .

2. Predict what will happen when one candle piece is put in each of two containers.

_____

_____

_____

3. Describe what happens.

_____

_____

_____

4. Give each pair of students two different size pieces of candle. Place one piece in each container.

5. Describe what you observe.

_____

_____

_____

6. Reverse the placement of the candles.

7. List any ideas or explanations you can offer to explain what happened.

_____

_____

_____

Classifying Objects

1. Place 8 objects in the "Objects Box."

2. Test all the objects in a tank filled with water.

3. Place all the objects that float in box #1 and write the property word "float" on the line.
   Write the names of all the objects that floated in box #1.

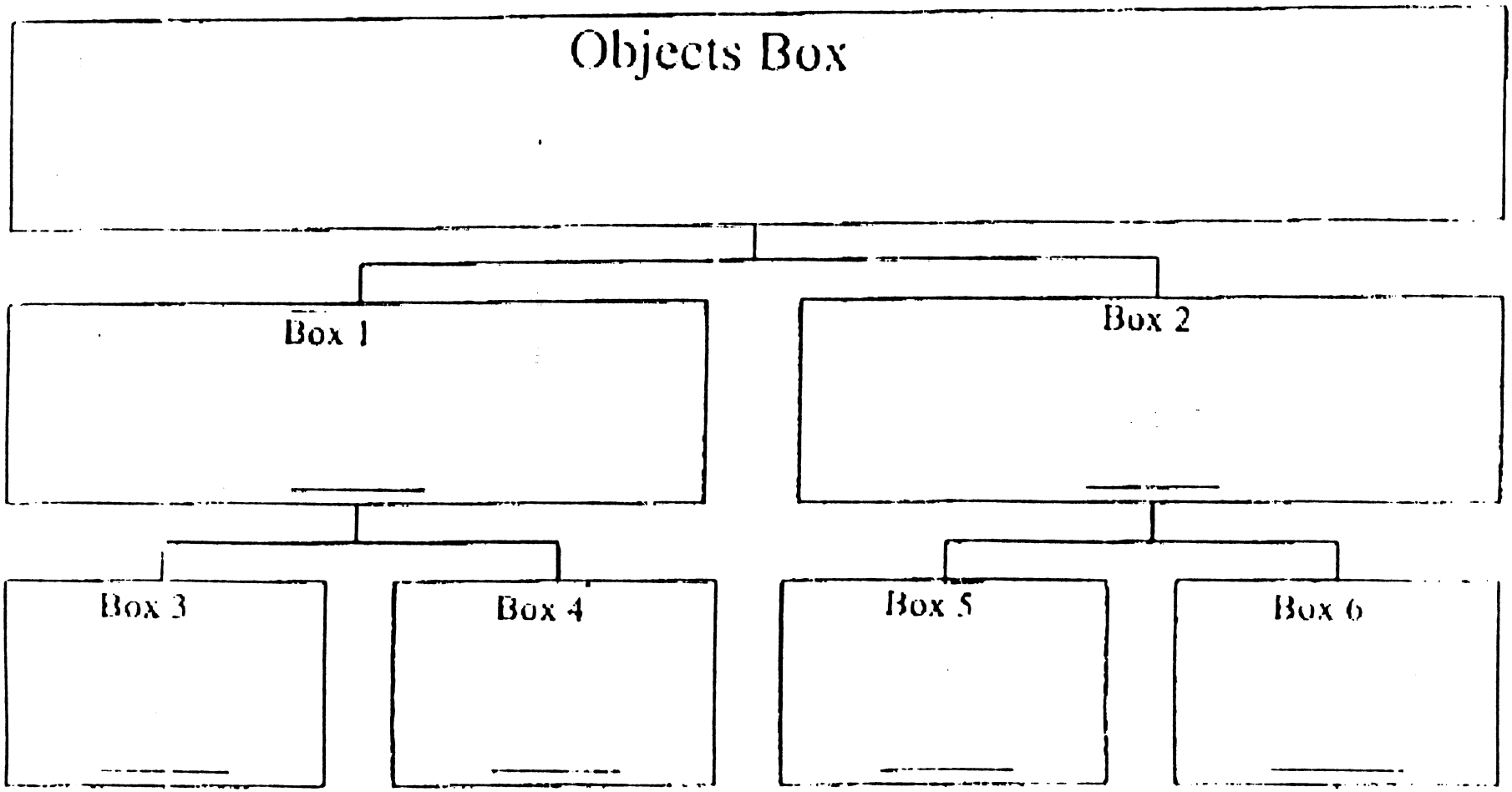
4. Place all the objects that sink in box #2 and write the property word "sink" on the line.
   Write the names of all the objects that sink in box #2.

5. Look at the objects in box #1. Sort these objects into two new groups. Think of a set of properties that you can use to do this sort. Place one group of objects with the same property into box #3.
   Write the name of the property you sorted by on the line in box #3.
   Write the names of the objects in box #3.

6. Place the rest of the objects from box #1 into box #4 and write the name of the property you sorted by on the line.
   Write the names of the objects in box #4.

7. Look at the objects in box #2. Sort these objects into two new groups. Think of a set of properties that you can use to do this sort.
   Place one group of objects with the same property into box #5.
   Write the name of the property you sorted by on the line in box #5.
   Write the names of the objects in box #5.

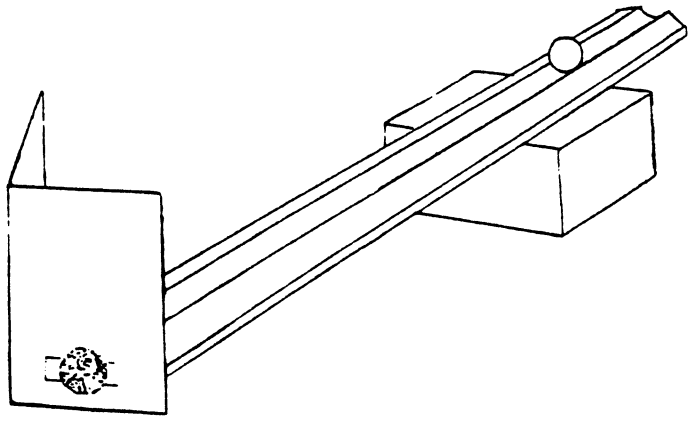
8. Place the rest of the objects from box #2 into box #6 and write the name of the property you sorted by on the line.
   Write the names of the objects in box #6.


Objects Box
Box 1
Box 2
Box 3
Box 4
Box 5
Box 6

Rolling Balls

1. Construct the "catcher" by folding a 3" x 5" index card in half (the short way).
   Tape two pennies to the bottom half of each side of the card.

2. Construct the ramp using a wooden block or oaktag support, grooved ruler, and catcher. Elevate the ruler approximately 9 cm off the table.



Make sure the equipment is set up exactly as it looks in the diagram above.
***** The balls must roll into the catcher.*****

3. Place the catcher at bottom of the grooved ruler.

4. Lay the tape measure next to the point where the grooved ruler and catcher meet. Make sure the tape measure does not interfere with the movement of the catcher. Tape it down.

5. Release the marble from the top of the ruler so it rolls down the groove and strikes the catcher.

6. Measure, in centimeters, the distance the catcher is pushed. Record your measurement on the data table.

7. Repeat the above procedure for two more trials.

8. Repeat steps 5-7 using the rubber ball.

9. Refer to your data and answer questions 2-4 on the answer sheet.

Name _____ Date _____

1. Record your measurements on the data table below.

Distance the catcher moved in centimeters

Object	TRIAL 1	TRIAL 2	TRIAL 3
Marble			
Rubber Ball			

2. Examine the data. Write a statement about the relationship between the two balls and the distances the "catcher" moved. Base your statement on the data from the chart above.

_____

_____

_____

3. Write a sentence explaining why the 2 balls produced different results.

_____

_____

_____

4. Examine ball "X". Do not take this ball out of the bag. You cannot test ball "X". Predict how far ball "X" will move the "catcher". Explain how you got your answer.

_____

_____

_____

MAGNETIC SORT

Problem: What can a magnet stick to?

Materials: for each group: magnet (any shape or size), bag of magnetism test items containing small magnetic and non-magnetic items (i.e. steel paper clip, iron nail, rubber band, copper penny, brass fastener, plastic button, wood pencil, wax crayon, piece of aluminum foil), *Magnetism Sort* activity sheet

Vocabulary: magnet, steel, plastic, iron, rubber, copper, brass, wax, attract, sort, group, predict, guess

Advance Teacher Preparation:

Prepare clear plastic zip lock *magnetism sort bags* containing assorted small magnetic and non-magnetic objects prior to the start of this lesson.

Procedure:

1. Show students a magnet and ask what special things this magnet can do. Select volunteers to demonstrate with one or two magnetic objects how magnets are able to attract these objects. Introduce the word *attract*. Have volunteers try to describe the feeling of attraction.

2. Place students into small groups and distribute a magnetism sort bag to each group.

3. Elicit or introduce, one at a time, the correct name of each object in the magnetism sort bags. Introduce or review the word predict (guess what will happen).

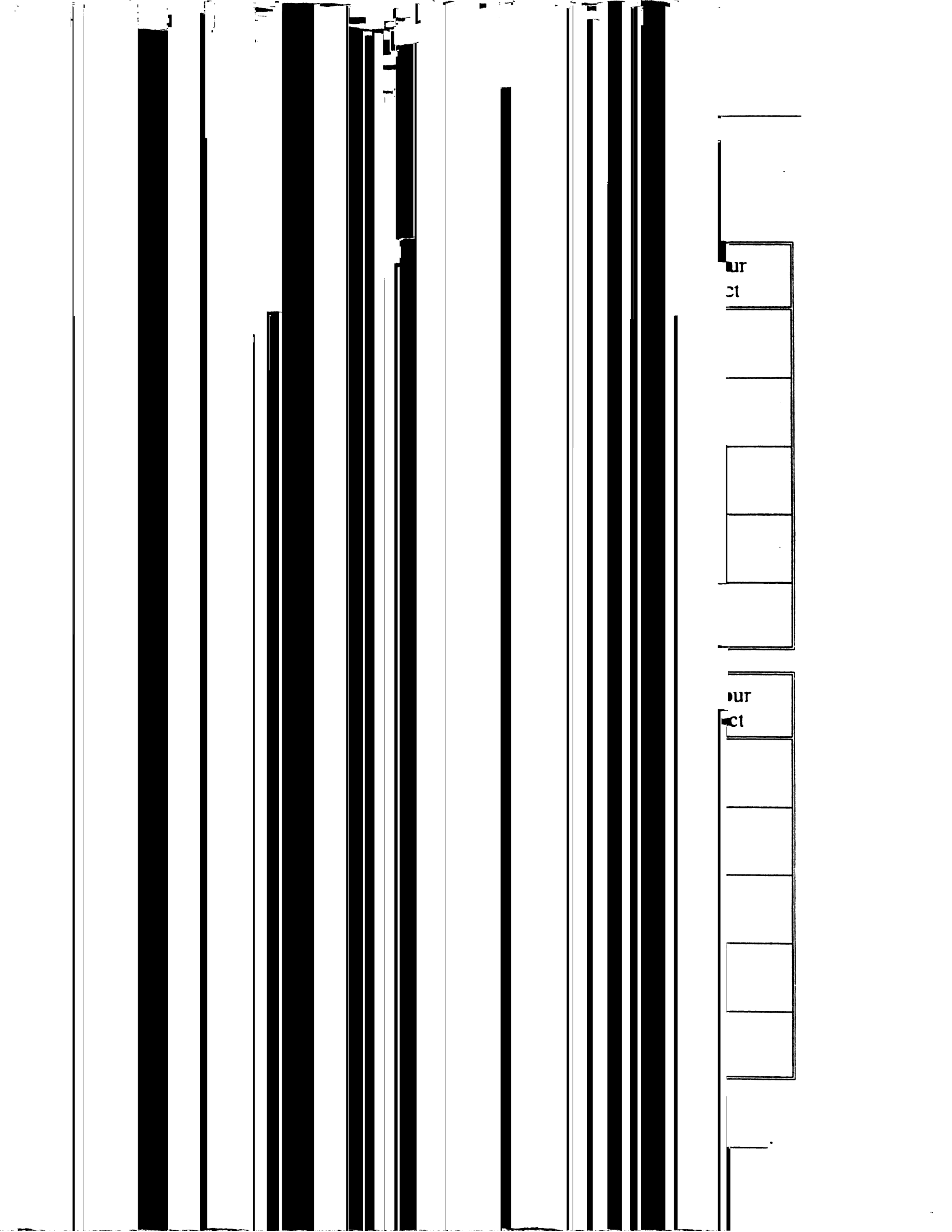
4. Direct children to examine the small objects in their bags. Have students sort the items into two groups. In one group they should place the objects they think will stick to a magnet. They should place the items they predict will not stick to a magnet in the second group.

5. Have students record their predictions on the *Magnetism Sort* activity sheet.

6. Distribute a magnet to each group and have students test each item, one at a time, to find out if their predictions were correct. On the activity sheet, place a check next to all correct predictions.

7. Review results with the class. Were all predictions correct? Were there any surprises? Which kinds of materials do magnets attract? Do magnets attract all objects made of metal? (no)

8. Review with the class which common metals are attracted to magnets. (iron and steel) Identify which metals are not attracted to magnets.



ITY

b holder, two 20 cm
iece of oaktag or
fasteners, scissors, ruler

num foil, copper penny,
ıss fastener, rubber band,

cm piece of oaktag. Insert
at the bottom prongs of the
f wire to the bottom part of

ier, one battery and battery

s and observe whether the
the circuit is now closed.
paper clips completing the

ct students to test each item
ical conductor or insulator.

ctrical conductors. (metals)
electric wires are generally

Name_____ Date_____

ELECTRICAL CONDUCTIVITY

Problem: Which materials are able to carry electric current?

Procedure: Use your conductivity tester to identify each material to be tested as either an *electrical conductor* or *insulator*. List each material tested. Place a check in the appropriate box.

MATERIAL TESTED	CONDUCTOR	NON-CONDUCTOR (INSULATOR)

List the common properties of electrical conductors.

_____

_____

Suggested Activities to Practice Descriptive Writing

1. **Journal or Log Writing**

Have students conduct several on-going investigations during the year, which require the recording of observations over a period of time. Check journals for accurate, careful descriptions, which include appropriate levels of detail. Make sure written descriptions are of actual observations and not stereotypical expectations.
Examples:

- observing a germinating seed
- observing the colors in a soap bubble
- observing the life cycle of a mealworm or butterfly
- observing a tree through the seasons

2. **Descriptive poems**

Have students write descriptive poems, such as a cinquain, describing an animal, flower, rock, tree, food, or automobile.

3. **Graphic Organizers**

Make use of different graphic organizers, such as a *Property Chart* to help introduce and organize new descriptive words and phrases

4. **Mystery Tools**

Collect an assortment of rare and unusual tools that are used in a variety of jobs (i.e. engineer, seamstress, plumber, carpet installer, cook) or hobbies (i.e. calligraphy, artist, craftsperson). Distribute a *mystery tool* to each small group of students. Have students describe their tool in detail in writing. What might it be used for? Who might use this tool? Give the tool a name.

Collect tools and written descriptions. Have students try to match the mystery tool with the correct descriptions. Have each group show their tool to the class and read their description. The teacher should then provide the correct name of the tool and explain its purpose.

5. **Lost and Found Advertisements**

Missing Pet Rock:

Assemble a collection of interesting rocks. Have small groups of students select a favorite rock and carefully observe it. Have students imagine that their favorite rock has been lost. Direct students to write a Lost and Found advertisement that could be placed in a local newspaper to help find their missing rock. Encourage students to include as many properties as they can in their advertisement.

Collect all the rocks and place them in a lost and found box. Have groups exchange their Lost and Found advertisements. Have students try to correctly match the rock being described in each advertisement with the correct rock in the lost and found box. If the rock cannot be correctly matched with the advertisement the original advertisement should be revised. The edited advertisement should include a better description of the rock.

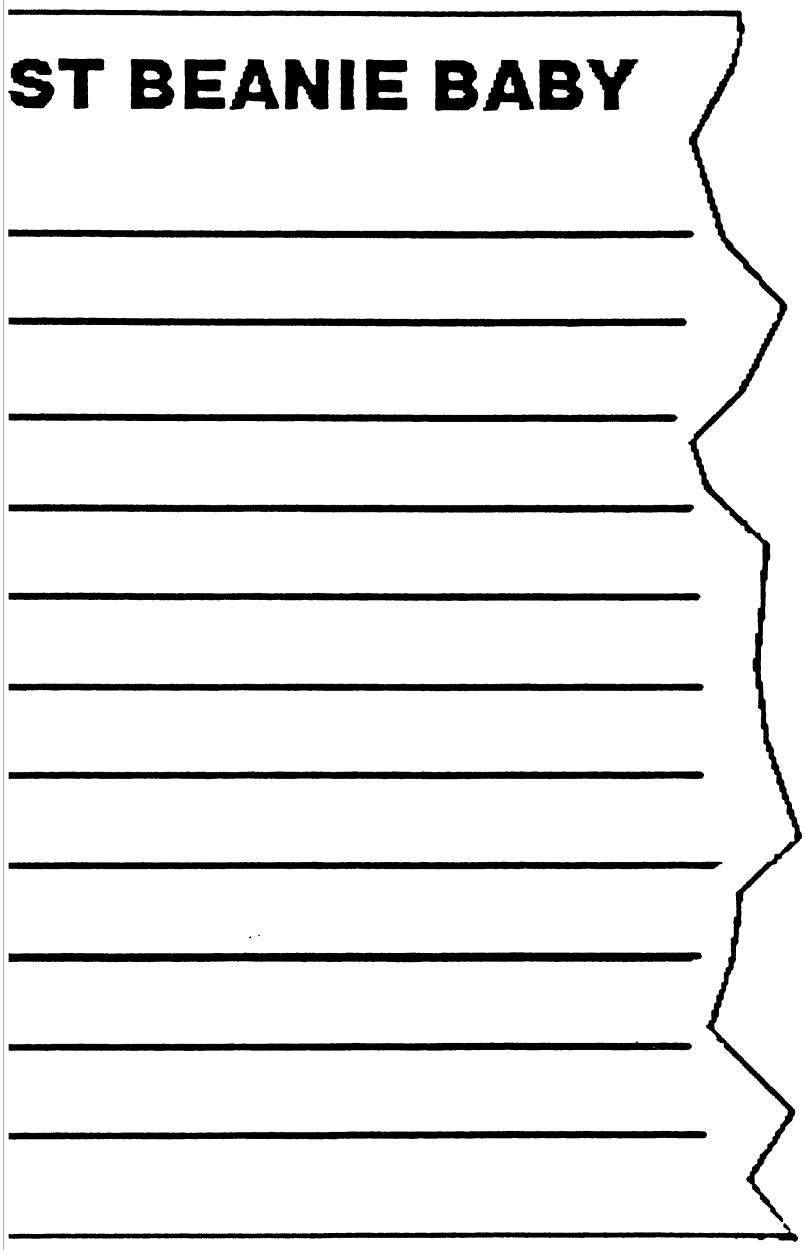
PROPERTY WORD CHART

COLOR WORDS	SHAPE WORDS	SIZE WORDS	TEXTURE WORDS	WEIGHT WORDS	OTHER WORDS

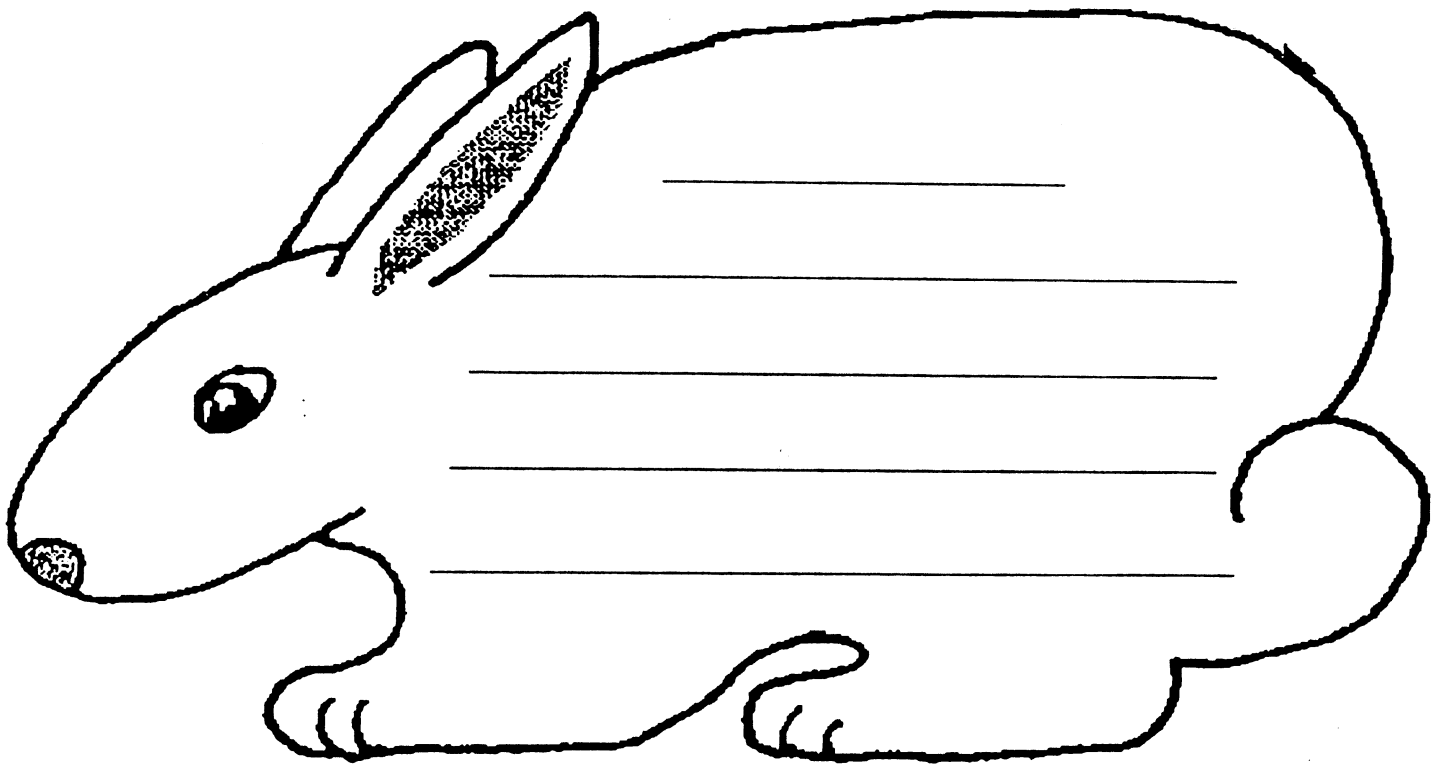
Date_____

SING BEANIE BABY

favorite *Beanie Baby* and that you need help finding it.
the ***Lost and Found*** column of your newspaper.



RABBIT CINQUAIN



FIRST LINE - ONE WORD TITLE
SECOND LINE - TWO DESCRIPTIVE WORDS
THIRD LINE - THREE ACTION WORDS
FOURTH LINE - FOUR FEELING WORDS
FIFTH LINE - ONE WORD REFERRING TO TITLE

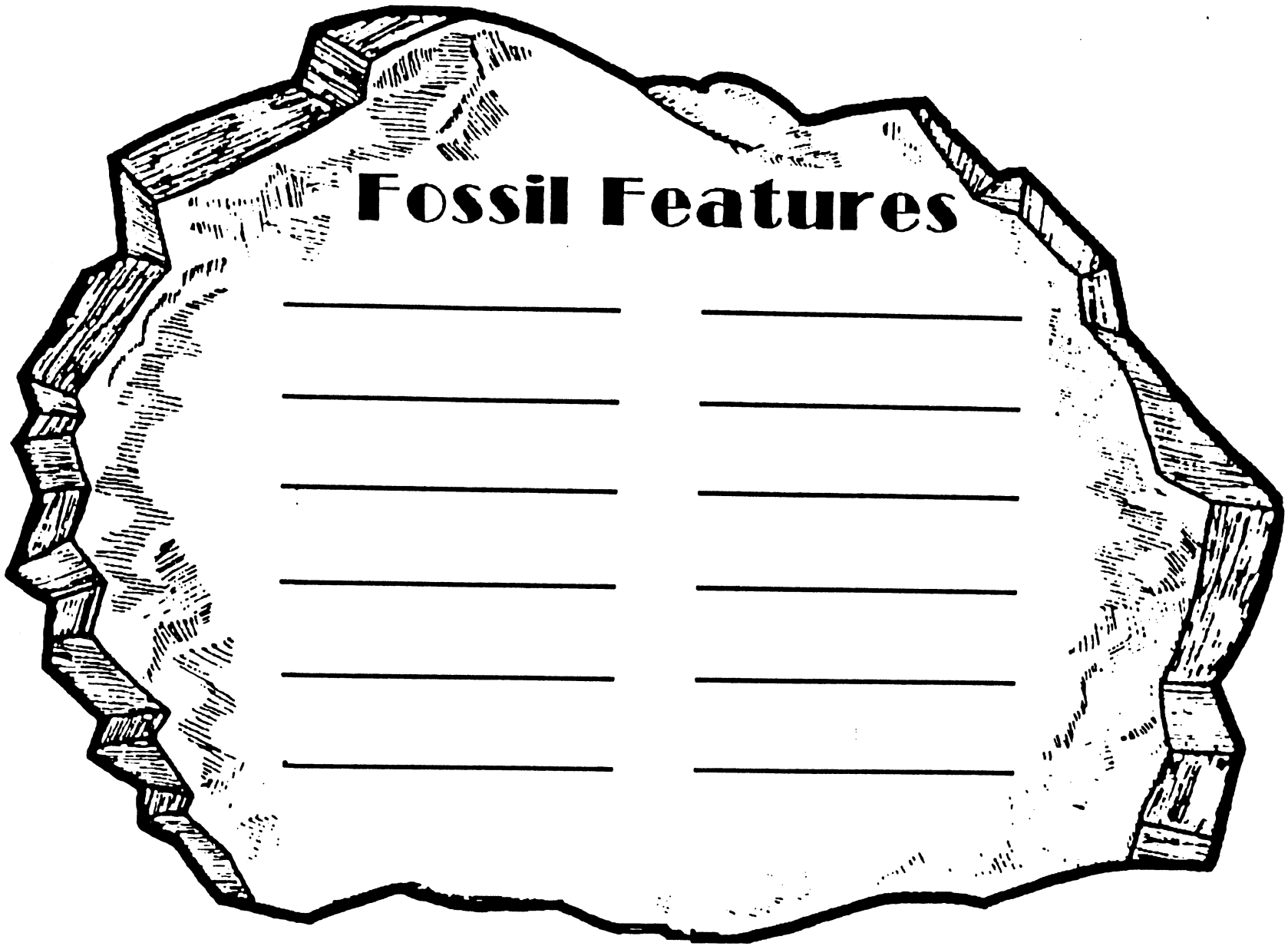
Date_____

NG PET ROCK

orite rock and that you need help finding it.
Lost and Found column of your newspaper.

k! _____

Name _____



Carefully observe your *fossil*. List as many descriptive words as you can about the fossil.

Today's Weather:

High 50°
Low 34°
Wind 5mph

$.50

The

FOSSIL TIMES

New York City
March 12, 2002

Sections

A. NEWS
B. STYLE
C. SPORTS

$.50

EXTRA! EXTRA!

Using the who, what, where, when, and why of newspaper journalism, write a newspaper headline (below the "Extras") with an accompanying article (on a separate sheet of paper) informing readers of your great fossil find. Add an illustration to your headline. Include the following information in your article: Where was this fossil found? Who found it? How did it get there? How old is it? Is it a plant or animal? Is it a complete organism or only part of a larger organism? What secrets does it reveal?

Suggested Activities to Practice Working in Pairs

1. **Clay Boats**

Place a ball of clay in a plastic tank filled with water. Challenge the students to figure out a method to get the clay to float. Conduct a contest to build a boat that can carry the most pennies before sinking.

2. **Passing Through**

Discuss with students whether they think magnetism can move through materials. If they think it can, ask them to predict which kinds of materials it might move through. Place students in pairs and have them develop a plan to carry out the test. Students should assemble different kinds of materials and then test them. One student can hold the material being tested while the other student holds a magnet and a paper clip on opposite sides of the tested material. Observations should be recorded in a data table indicating which materials magnetism was able to pass through and which it wasn't.

3. **Turn-On**

Materials: for each pair: one D-cell battery, one 20 cm piece of insulated wire, one bulb (miniature lamp), *Turn-On* activity sheet

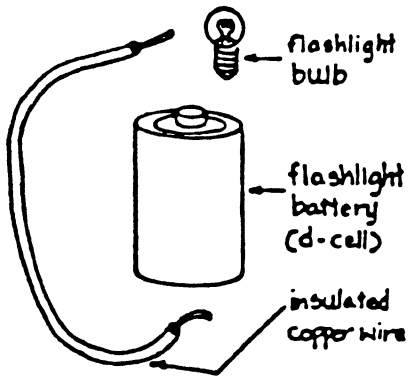
Procedure:

A. Place students in pairs. Distribute materials to each group.

B. Challenge each pair to light their bulb using only one wire and one battery. Direct students to arrange the materials in a variety of different ways.

C. Have students draw labeled diagrams of their successful and unsuccessful set-ups.

D. After allowing sufficient time for experimentation, have student volunteers demonstrate how they were able to get their bulb to light. Have students draw diagrams of their successful arrangements on the chalkboard.



E. Elicit answers to the following questions:

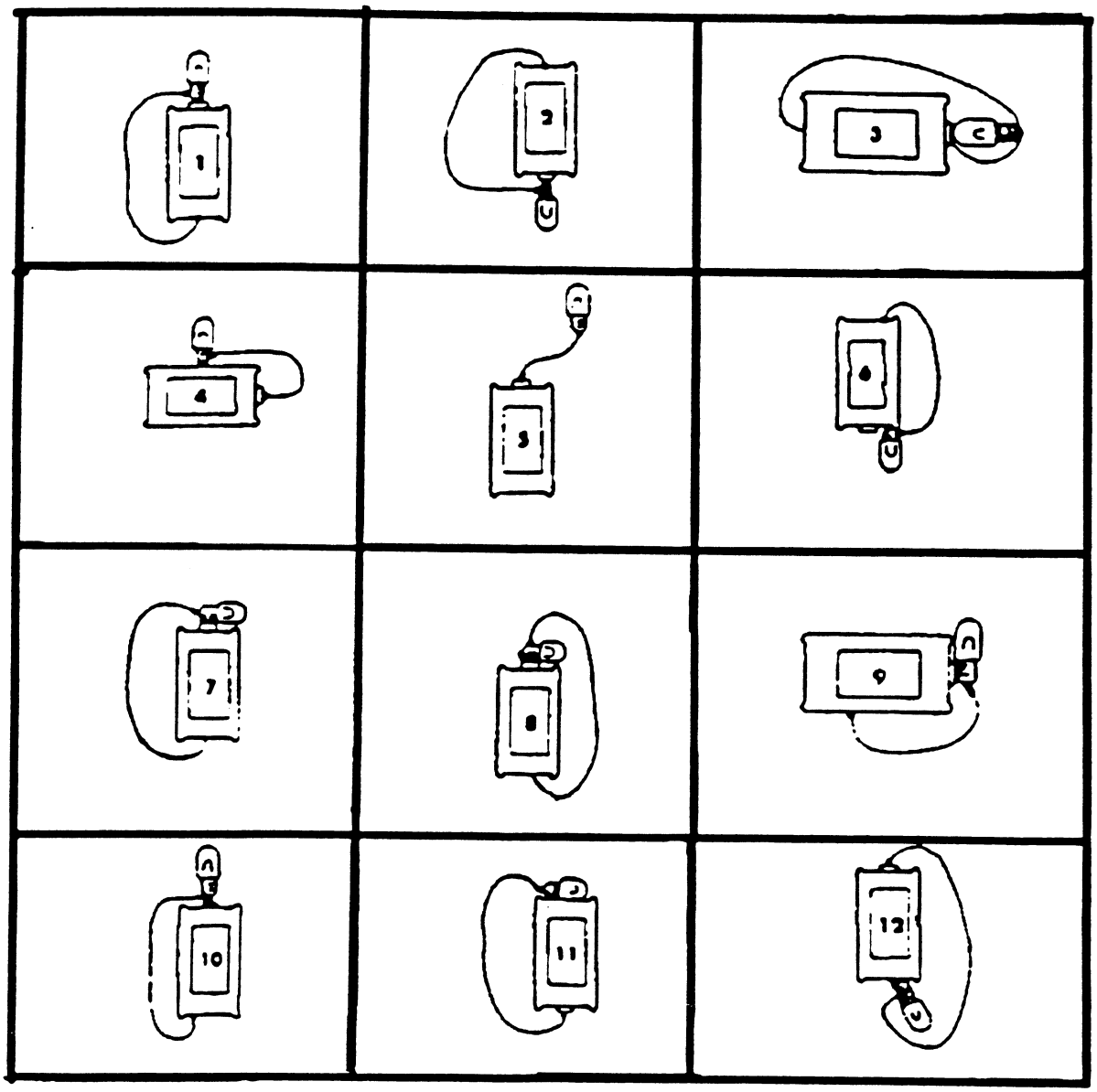
- How were you able to get the bulb to light?
- How many different ways can the materials be arranged and the bulb still light?
- What is the name given to the set-up that lights the bulb? (simple circuit)
- Compare the different set-ups. Ask why some set-ups were able to light the bulb while others were unable.

F. Distribute the *Turn-Ons* activity sheet. Direct students to predict which arrangements will light the bulb. Check predictions by arranging the battery, bulb and wire as they are depicted on the activity sheet.

Name_____ Date_____

TURN-ONS

Look at the diagrams below. If you predict the bulb will light draw a **circle** around the set-up. Do not draw a circle if you predict the bulb will not light.



How well did you do? Were your predictions correct?

_____

_____

Review of Topics for Science Test

Refer to the NYS Science Core Curriculum K-4

1. Set up of experiments – problem statement, hypothesis, procedure, results, conclusion

2. Measurements – use of measuring cup (volume), pan balance (mass), graduated cylinder (volume), ruler (length), thermometer (temperature), time
Unit of measurement – milliliter - ml, gram - gm, centimeter - cm, etc. average

3. Read charts, tables, graphs

4. Sorting and classifying

5. Matter – describing objects and materials by their properties, absorption, states of matter (solids, liquids and gases), changes in states of matter (evaporation and condensation), physical and chemical changes, floating and sinking (changing shapes of objects to make them float)

6. Energy – magnetism (strength of different kinds of magnets, attract-repel), electricity (conductors and insulators), sound, light, heat (conductors and insulators), mechanical energy (force and motion), simple machines (inclined planes), friction-different surfaces, energy transformations

7. Animals – parts and functions of animals, adaptations – camouflage, classification, population, community, food chains and food webs, life cycles (stages of development), life spans, metamorphosis

8. Plants – parts and function of plants (roots, stems, leaves, flowers, seeds), life cycles, life spans, seed dispersal, growing plants without seeds (tubers, runners, parts of plants)

9. Interdependency between plants and animals – food webs, food chains

SUGGESTED ESPET VOCABULARY LIST

Students should be familiar and understand the use and context of the following words and terms by the end of fourth grade.

absorb: to take in or swallow up liquids or energy (i.e. the sponge absorbs water)

adaptation: a structure or behavior that helps a living thing survive in its environment (i.e. the webbed foot of the duck is adapted for swimming)

balance: an instrument used for comparing the mass or weight of two or more objects (also known as a double-pan or pan balance)

behavior: what an animal does; the way a living thing acts; a living things reaction to its environment

camouflage: an adaptation of an organism that enables it to blend it with its surroundings

carnivore: a meat eater; a consumer that eats **only** other consumers

Celsius: a metric unit for measuring temperature (^{0}C)

centimeter: a metric unit for measuring length (cm)

characteristic: a property or special feature; (i.e. oranges have a characteristic smell)

circuit: the path electricity flows through

classify: to place into groups based on similar (or different properties); to sort

community: a group of different plants and animals, living in a particular area, depending upon each other for food and other needs

condensation: the changing of a gas into a liquid

conductor: a material through which electricity can pass; a material through which heat can pass

consumer: a living thing that depends upon plants (producers) or other consumers (usually animals) for food; a living thing that cannot make its own food

decomposer: an organism that breaks down dead plant or animal materials

ecology: the study of the interrelationship between living things and their environment

energy: the ability to do work; different types of energy include mechanical, electricity, magnetic, heat, light, sound, chemical, and nuclear

environment: the total of all surroundings - air, water, vegetation, wildlife, and humans - which affect and influence living things

evaporate: to change from a liquid state to a gas state

food chain: the path energy and material take in a community; energy is passed from the sun to green plants and on to animals; animals that eat plants may become food for other animals

food web: a complex network of two or more food chains; the flow of energy and material through connected food chains

force: a push or pull

friction: a force that occurs when one object rubs against another object

function: a normal action or use (i.e. the function of the leaves is to manufacture food for the plant)

germination: begin to grow or develop; sprout

gram: metric unit for measuring mass or weight (g)

habitat: the place where an animal or plant naturally lives or thrives

herbivore: a plant eater; a consumer that eats only producers

hibernation: to spend winter in a state in which the body's metabolism greatly slows down (i.e. bears hibernate through the winter)

hypothesis: what you think the answer to a problem or question may be; an educated guess

insulator: a material through which electricity cannot pass; a material through which heat cannot pass

kilogram: a metric unit for measuring weight (kg) [1 kg = 1000 g]

life cycle: the stages in the life of a plant or animal (i.e. the butterfly life cycle begins as a caterpillar and ends as an adult butterfly)

life span: the length of time a plant or animal lives

mass: the amount of matter or material and object has in it

matter: the stuff that things are made of; matter is composed of atoms (atoms join together to form molecules); solid, liquid and gas are the three states of matter

migration: seasonal movement by animals in search of water, food, a warmer climate or a particular location for mating

milliliter: a metric unit for measuring volume, usually liquid volume (mL)

movement: the motion of an object such as sliding, rolling, tumbling, bouncing and vibrating

object: something that can be seen or observed, touched, heard, smelled, tasted and described

observe: to gather information using the senses: sight, touch, taste, smell, and hear

offspring: the reproduced young of a particular person, animal or plant; progeny

omnivore: a consumer that eats both plants and animals

organism: any living thing

pendulum: a object suspended from a fixed point, such as a from the end of a string, which is free to swing back and forth

photosynthesis: the process by which a plant uses sunlight, carbon dioxide and water to produce its own food

pole: the ends of a magnet where the greatest power is found; the ends are called the north and south poles

pollen: the tiny grains produced by flowers that are transferred by wind, insects, animals and water that, when combined with a flower's ovules (egg) produce seeds; usually produced by the stamen of the flower

population: the number of one kind of plant or animal living in a community or habitat; the inhabitants of an area

prediction: a guess bases on observation, experience, reasoning; a foretelling of what you think will happen

producer: a living thing that uses the sun's energy to make food; green plants are producers

property: characteristics of an object such as shape, color, size, texture, weight, density, etc.

purpose: the function; the job or use of an object, thing or part

recycle: to process or treat something so that it may be used again (i.e. empty soda bottles are recycled)

reflect: to bounce off or send back

seed dispersal: the way in which seeds are spread from one location to another by wind, water or animals

sequence: number of events following one another; succession or order of succession

sort: to group or classify according to properties; arrange in groups

structure: anything composed of parts arranged together; the functional union of parts, tissues and organs of a living plant or animal

system: an orderly combination or arrangement of parts into a whole; a group of interacting objects (i.e. digestive system, solar system)

thermometer: tool used to measure temperature

transfer: to move from one location to another

units of measure: standard quantity used as a basis for measuring (i.e. centimeters, millileters, degrees, meters)

volume: the amount of space an object takes up

SUGGESTIONS FOR REVIEWING VOCABULARY

1. Include selected words or terms as part of your regular weekly vocabulary word list.

2. Have students create crossword and word search puzzles around words in this list. Specific computer software is also available for this purpose.

3. Play "*visual vocabulary*" with these words. Give students handouts with words and definitions on them. List all words on small pieces of paper and place them inside a container. Divide class into groups. Each group draws one word from the container, reviews the definition using the handout, and decides how to pantomime that word. Each group gets a chance to pantomime one or more words to the class. Using the handout as a guide, the rest of the class must guess the word being mimed.

4. Construct an electric quiz board to match a word or phrase with its correct definition.