

APPENDIX A

Safety in Elementary Science

Safety in Elementary Science

The following guidelines on safety should be reviewed before starting any science activity.

1. Glass should always be handled carefully and, when possible, plastic should be used in its place. Some objects (e.g., glass mirrors) should have their edges taped to avoid sharp cutting edges.
2. Children should not carry heavy loads (e.g., buckets of water).
3. Some animals cause allergies. If animals are kept as pets in the classroom, be fully aware of the medical and safety implications.
4. Tasting things should not be allowed except under strict supervision.
5. Children should know that some plants are poisonous and they should be aware of what these are.
6. Plastic bags may cause suffocation and are potential hazards.
7. Caution should be advised when using cutting devices.
8. Even with household chemicals (e.g., Alka Seltzer tablets, vinegar, etc.) care is needed. Pressure can cause chemicals to shoot out. Safety goggles should be used.
9. With open flames (e.g., lighted candles, matches) children should be warned about long hair, loose clothing coming near the flame. Candles should be firmly fixed in stable holders.
10. Propane burners should not be used by children. The flames of alcohol burners are not easily seen and pose a potential hazard.
11. Pupils should not look at very bright lights, (e.g., a projector beam, direct sunlight, lasers).
12. Lenses can focus light and heat. Children should not look at intense sources of these through lenses or any devices with lenses (e.g., binoculars, telescopes). Pupils must not look directly at the sun through such lenses. Convex lenses and concave mirrors can, in strong sunlight, cause fires if heat is focused onto something flammable.
13. Caution should be exercised when using hot substances.
14. Thermometers should be used carefully because the bulb is very thin. Mercury thermometers should be avoided. Do not use thermometers as stirring rods.
15. Liquids which produce flammable vapors (e.g., methylated spirits, alcohol, gas) should not be used by children.
16. Some glues can be hazardous due to their flammability and toxicity (inhalation).
17. Pupils should use only low voltage supplies (e.g., flashlight batteries) in electricity and magnetism activities. Even low voltages can cause short lengths of thin wire to become hot, even to glow and ignite things.
18. Although not a hazard to pupils, magnets can affect other equipment (e.g., watches, computer discs).
19. Moulds should be grown in sealed bags or closed containers.
20. Always be mindful of leaving the outdoor environment as you found it (e.g., field trips, gathering leaves, rocks).

* For a more complete set of safety guidelines, check the *Newfoundland & Labrador Science Safety Manual*.

APPENDIX B

Field Trips

Field Trips

Suggestions for Planning/Conducting

(Jacobson & Bergman, 1987, pp. 42-43)

1. Have the children think through the purposes of the field trip.
 - a. What kinds of information will be obtained?
 - b. What kinds of questions should be asked?
 - c. How important is the information? How can it be used?
 - d. Will the field experience benefit others as well as us? A community-service project, such as a conservation project, can be an important field experience.
2. Visit the site before the field trip.
 - a. What observations should be stressed?
 - b. Where should the group make stops?
 - c. What precautions need to be taken?
 - d. How should the resource people be briefed so that the children will gain the maximum benefit from the experience?
3. Organize carefully for the field trip.
 - a. Clear your plans with the school administration. Most school systems have standard policies regarding field trips. These should be adhered to.
 - b. Obtain parental permission. Parents have a right to know when their children leave school, and it is usually wise to obtain written permission on simple duplicated forms.
 - c. Arrange for transportation. Many school systems have school buses or other modes of transportation that can be used for trips.
 - d. Invite other adults, such as parents and other teachers, to accompany the class on the trip.
 - e. Make advance arrangements for visits to the park, museum, factory, or farm.
4. Brief the group for the field trip.
 - a. Suggest appropriate dress.
 - b. Discuss responsibilities for science equipment, first-aid kits, maps, cameras, tape recorders, and notebooks that may be taken on the field trip.
 - c. Present an overall picture of the field trip using maps and charts.
 - d. Discuss behavioral and safety standards required. Some orientation to conversation aspects of the trip may also be necessary.
 - e. Discuss and further clarify the purposes of the trip.
5. Make the field trip as educational as possible for all the children.
 - a. Help the students keep the purposes of the field trip in mind. In this way they may “see where they have only looked before.”
 - b. Encourage children to make observations that may not have been anticipated in the previous discussion. At times “freelance browsing” can be quite fruitful.
 - c. Make certain that all members of the group hear explanations and discussion. At times it may be necessary to interpret the remarks of experts and relate them to the children’s previous experiences.
 - d. Check that the planned information, specimens, pictures, recordings, and notes have been obtained.
6. Back in the classroom it is important to help children derive meaning from their field trip. Have them do the following:
 - a. Analyze the data collected.
 - b. Discuss the meaning and implications of various observations.
 - c. Evaluate the field trip and discuss how future experiences can be made more effective.
 - d. Write thank you letters, when appropriate.

APPENDIX C

Predator-Prey Population Simulation Game

Predator-Prey Population Simulation Game

Appropriate for (301-1, 301-2) 10 see guide p. 38

Objectives:

The student simulates the interactions between a predator population of lynx and a prey population of rabbits in a meadow. After collecting the data, the student graphs the data and then extends the graph to predict the populations for several more generations.

Background:

Before playing this game students should be able to define a food chain, population, immigration, predator and prey.

Materials:

- one 7.5 cm cardboard square (the lynx);
- about 250 2.5 cm construction paper squares (the rabbits);
- a 61 cm square section of table top (the meadow);
- masking tape (to mark off the meadow);
- data table;
- graph paper.

Procedure:

1. Distribute 3 rabbits squares in the meadow.
2. Toss the lynx square once in the meadow in an effort to catch a rabbit. In order to survive, the lynx square must touch (eat) three rabbit squares. Any rabbit squares that are touched (eaten) must be removed. At this point in the activity there is no way that the lynx can catch the 3 rabbits that it needs to survive and reproduce. The lynx is not allowed to skid and the rabbits should be distributed evenly in the field.
3. Complete the data table for generation #1. The lynx will starve and there will be no surviving lynx or new baby lynx.
4. At the beginning of generation #2 (and

subsequent generations) double the rabbits left at the end of the last generation. A new lynx immigrates into the meadow. Be sure to disperse the rabbits in the meadow. Toss the lynx square into the field to see if it can catch the three it needs to survive. Fill in the table for generation #2, and repeat step 4.

5. Eventually the rabbit population increases to a level that allows the lynx to catch 3 rabbits in a single toss. If the lynx catches 3 rabbits it not only survives but it reproduces too! It has one baby lynx for each 3 rabbits that it catches. Therefore, if a single lynx catches 6 rabbits it will have 2 babies.
6. As the number of lynx increases throw the cardboard square once for each lynx. Record the number of rabbits caught by each lynx. The simulation is more realistic if the number of new baby lynx is based on each lynx's catch rather than merely the total number of rabbits caught in a generation.
7. There are always at least 3 rabbits at the beginning of a generation. If and when the entire rabbit population is wiped out, then new rabbits immigrate into the meadow.
8. Remember that the number of rabbits in the meadow needs to be correct at all times. Remove the rabbits caught and add new ones as indicated by your data table.
9. Model about 14 generations and predict 6 more or up to a total of 20 generations. Base the prediction on the pattern observed during the first 14 generations.

Analysis:

Graph the data for 20 generations. Place both the rabbit and lynx data (the first two columns of the data table) on the same graph so that the interrelationship can be easily observed. Label the vertical axis "Number of Animals" and the horizontal axis "Generations". Use one kind or color of line for rabbits and another for lynx.

Predator-Prey Simulation

| Generation | Rabbits | Lynx | Rabbits Caught | Lynx Starved | Lynx Surviving | New Baby Lynx | Rabbits Left |
|------------|---------|------|----------------|--------------|----------------|---------------|--------------|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | | | | | | | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | | | | | | |
| 20 | | | | | | | |

APPENDIX D

Supplementary Work Sheets

Date: _____ **Name:** _____

Let's Experiment!!!

The question that I want to investigate is:

Hypothesis (What do I think I'll find out?):

Materials (What will I need?):

Variable (What do I change? What stays the same?):

Procedure (How do I find out?):

Observations (Attach any drawings or diagrams to this sheet):

Results (Attach any charts, tables, or graphs to this sheet):

Conclusion (What did I find out?):

Date: _____ **Name:** _____

Science Experiments!!!

Hypothesis:

Procedure:

Materials:

Results:

Conclusion:

Date: _____ Name: _____

Let's Design!!!

The problem that I want to solve is:

Materials tested or considered:

Materials chosen:

Plan chosen for solving the problem (Attach any drawings to this sheet):

Problems encountered:

How these problems were solved:

Results of testing design (Attach any charts, tables, or graphs to this sheet):

Portfolio Assessment

Name: _____ **Date completed:** _____

Student comments on work at time of completion:

Student comments later in the school year:

Portfolio Assessment

Name: _____ **Date completed:** _____

Student comments on work at time of completion:

Student comments later in the school year:

APPENDIX E

Unit Materials

The following represents a suggested list of materials for each unit. The amounts may vary because of class size or student grouping. Common classroom materials, such as; construction paper, glue, etc., are omitted. More details regarding materials can be found in the student textbook and teacher's resource book.

Grade 4

Healthy Habitats

- measuring tapes (per class)
- string
- newspapers
- pipe cleaners
- crickets
- sowbugs
- magnifiers (per group)
- sand
- soil
- leaves
- gravel
- grass seed
- Cabomba (water plant)
- cactus plant
- snails

Sounds Good

- safety goggles (per class)
- rubber bands
- paper clips
- paper cups
- plastic wrap
- metal cans (per class)
- cereal box
- trays (tin foil) - class set
- pebbles (per group)
- combs (per group)
- container for water eg. dishpan
- beans (bag for class)
- shoe boxes (per group)
- cotton balls
- tin foil

Light

- flashlights (per group)
- “D” cell batteries (per group)
- magnifiers (per group)
- insulated copper wire
- rubber tubing
- flexi drinking straws
- aluminum foil
- push pins (per student)
- tracing paper
- rubber bands
- flat mirror (per group)
- paper cups (2 per group)
- clear plastic cups (2 per group)
- fluorescent materials
- 3 piece size mirrors
- concave lens (per group)
- convex lens (per group)
- cardboard tubes (per student)
- spoons (per student)
- dish detergent
- modelling clay
- thin wire (“rabbit wire”)
- bucket
- compass
- cellophane
- sunprint paper
- aluminum pan
- cardboard box (per student)
- tea bags
- clock or watch
- phosphorescent plastic toys

Rockhound

- plastic bags (per student)
- baggies (per student)
- old paintbrushes (per student)
- magnifiers (per group)
- rock samples
- mineral samples
- streak plates or ceramic tiles (per group)
- steel nails (per group)
- a box of table salt
- spoons (per group)
- string or thread
- clear containers (per group)
- dishpan (per group)
- ball bearings or marbles (per class)
- 2 L container of sand
- 2 L container of soil
- 2 L container of gravel
- 2 L container of small pebbles
- metal pie plates (per class)
- measuring cups (per group)
- butter containers for bowls (per class)
- sponges (per group)
- old newspapers
- wax paper
- modelling clay (container)
- limestone chips
- vinegar (bottle)
- clear plastic cups

Grade 5

Body Works Pack

- magnifier (per class)
- prepared slides of human cells (3 types)
- maple or other leaves
- variety of cereal boxes
- crackers
- plastic cups
- zipper bags
- iodine w/eye droppers
- small pieces of several foods
- paper towels
- small balloons (per student)
- paper towels
- big balloons (per student)
- modelling clay
- pipet bulb (per class)
- plastic tubing
- selection of bones ie chicken, fish
- ribbon
- paper fasteners (per class)
- plastic forks (per class)
- marbles (per class)
- dominoes

Weather Pack

- large plastic container
- clear graduated plastic cup
- medicine cups
- 2 shoe boxes (per student)
- thermometer (per class)
- clear 3 L bottle (plastic) - per child
- shallow pan
- milk carton (one half per student)
- 2 L plastic bottle (per student)
- soil (4 L)
- self sealing bag ziplock™ (per class)
- lamp (per class)
- modelling clay
- plastic cups (250ml)
- food coloring
- jars with lids (per class)
- popsicle sticks
- towel (per student)
- ball (1 per 2 students)
- plastic wrap
- balloons
- rubber band
- straws (per class)

What's the Matter

- 2 L plastic bottles (per group)
- large containers (eg garbage pails) - per group
- alcohol thermometers (per group)
- roll of aluminum coil
- roll of plastic wrap
- roll of waxed paper
- egg cartons (per group)
- box of straws
- plastic/styrofoam cups (per group)
- pencils (per group)
- buttons (per group)
- sugar cubes (per group)
- ball bearings (per group)
- carpet scraps (per group)
- wood blocks (variety of per group)
- small plastic tubs (per group)
- measuring cups (per group)
- Epson salts (per group)
- graph paper (per group)
- soft drink bottles - 500 ml (per group)
- balloon (per group)
- balance scales (per group)
- rocks, small (quantity per group)
- soil (quantity per group)
- gravel (quantity per group)
- safety goggles (per student)
- baking soda (per group)
- vinegar (per group)
- scalable plastic bags (per group)
- shovel (per group)
- bucket (per group)

Putting It In Motion

- toys that move (cars, slinky, marbles)
- box of straws
- scissors (per student)
- rulers (per student)
- ball of string
- small blocks of wood (per group, sanded)
- ramp (per group)
- roll of masking tape
- coins (per group)
- balls (variety of sizes)
- textured surfaces (foil, sandpaper, rough board)
- wooden towels (per group)
- screw driver (per group)
- pulleys (per group)
- gears (per group)
- spring scales (per group)
- nails/screws (variety of)
- corrugated cardboard (per group)
- push pins (per group)
- metal bottle tops (per group)
- geared gadgets (mixer, can opener)
- rope (light, per group)
- broom handles or hockey stick handles (per group)
- plastic lids (per group)
- miniature model (ship, airplane, car)
- hammer (per group)
- petroleum jelly (per group)
- pipe cleaners (per group)
- paper plates (per group)
- cups (plastic/styrofoam) (per group)
- egg cartoons (per group)

Grade 6

Diversity of Life

- arthropod samples (live, preserved, or pictures) of insects
- food coloring
- two rubber/plastic pans
- roll of plastic wrap
- straws straight and bendable (per class)
- clothespins (per class)
- small sponge
- animal samples (life, preserved, or pictures)
- prepared slides of micro organisms
- microscope
- 2 zip up plastic bags per student
- package of yeast
- 1 package each of white, red, spotted and black beans
- fossil kit
- supply of leaves from various plants
- small plastic cups (3 per group)
- cup of sugar

Flight

- balloons (10 - 12)
- strong thread/string (5 meters)
- long dry - cleaning bag
- hair dryer
- food tray (per group)
- roll of plastic wrap
- index cards (per class)
- straight pins (10 - 12)
- empty thread spool
- drinking straws (per class)
- clothes pins (per class)
- weights such as metal washers
- stopwatch or clock with second hand
- 2 L plastic pop bottle (2 - 3)
- styrofoam plates (per class)
- roll of aluminum

Electricity

- balloons (10 - 12)
- wool (10cm x 10cm sample per group)
- plastic wrap (10cm x 10cm sample per group)
- silk (10cm x 10cm sample per group)
- paper (10cm x 10cm sample per group)
- felt (10cm x 10cm sample per group)
- goggles (per student)
- lemons (2 per group)
- copper penny (per group)
- nickel (per group)
- aluminum foil (per group)
- other metals (per group)
- table knife (per group)
- alligator clips (3 per group)
- LED (per group)
- 1.5 volt D batteries with holders (2 per group)
- 1 meter of uninsulated copper wire
- 1 meter of red insulated copper wire
- 1 meter of black insulated copper wire
- a collection of common insulators
- a collection of common conductors
- 1.5 volt flashlight bulbs with holders (2 per group)
- sand paper (1 sheet per class)
- nail (per group)
- compass (per group)
- bar magnet (per group)
- cardboard tubes (per group)
- graphite rod (per group)

Space Science

- model making materials such as balloons and styrofoam balls of various sizes
- 1 litre plastic bottle
- empty spool
- light bulb in lamp socket or base
- styrofoam ball
- flashlight
- large plastic tub (like a litter box)
- bag of flour
- tempera paint powder
- various spheres to act as impactors (eg. marbles, ping pong balls)
- books about stars and constellations
- astronomy magazines
- binoculars
- lenses (per class)
- package of sticky putty
- diffraction grating
- candles (4)
- balloons (per group)
- clothespins (per group)
- small rubber ball (per group)
- modelling clay
- cardboard tubes