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ABSTRACT

This teaching guide is a collection of environmental education activities written by various educators and environmentalists. The activities are designed for use i grades K-12, each activity being identified by grade level. The guide contains over 80 activities that are listed in a short introductory guide that precedes the actual activities. The activities in the introductory guide are identified by grade level and are annotated to help the teacher identify appropriate activities for the group or situation. Activity topics such as dandelions, shadows, rain, mathematics, food chains, erosion, creative writing, and values are included in the guide. All of the activity topics include appropriate grade level for activity use, objectives, background information, a pre-activity, a field trip, a procedure or experiment, and follow-up activities. Some of the activities also contain tables, diagrams, illustrations, sample stories, or resource people. (TK)

CLASSROOM ACTIVITIES

FOR

THE INTERLAKES ENVIRONMENTAL AND OUTDOOR EDUCATION PROGRAM

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COLORS IN NATURE

Written by Rita Brown, Secretary-Instructor, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416. (Revised 2-22-72).

Grade Level - Kindergarten-2

Best time of year - Spring, Summer, Winter, Fall (Fall is probably the best time)
A nice warm September afternoon is a great time

OBJECTIVES:

1. To introduce students to various colors and their identification in nature.
2. To help students understand that seasonal changes often result in color changes.
3. To assist students in recognizing colors and color changes in nature.

BACKGROUND:

Color changes tell us a lot about nature. When we see leaves on a tree change colors, we know that something important has happened to the tree to cause this change. When the weather changes, colors often change. For example, each season of the year has a whole new set of colors.

In the spring, the weather starts getting warmer and the color we see most often is green.

In the autumn or fall, the weather becomes cooler again. The green grasses and leaves turn to shades of brown, yellow and orange.

When the cold winter comes, no green grass, trees or flowers are left. The ground is covered with snow. What color is snow? What other colors can we find in the winter?

PRE-ACTIVITY:

To insure that students ~~are able~~ to identify colors a short activity should be done in which they do color matching. Some suggested activities are as follows:

(1) Bring various fruits and vegetables (real or artificial) to the classroom. Have the students sort them according to colors -- putting all of the red together, etc.

(2) Empty several boxes of crayons together and have the children sort them according to colors.

(3) Assemble the children on the floor in a circle. Place three shoe boxes in the center of the circle. On one shoe box, tape a piece of red construction paper, on a second a piece of blue, and on the third, a piece of yellow. Cut several pieces of paper in these three colors. Scatter them around the circle and ask the children to place the pieces of paper in a shoe box which has the matching color. You might [illegible] animals of the several colors as an [illegible] variation of this game.

(4) Give each child a piece of colored paper and a catalog or an old book. Have him find as many items as he can in them that are the same color as his sheet of paper. For motor coordination exercise, have the students cut out the pictures that they find.

FIELD TRIP:

Ask the following preparatory question for the field trip:

1. What causes things to be different colors?
2. Are some plants or animals several colors? Why?
3. Can we change the color of things? How? (Dye materials, pick fruits and let them ripen, burning, etc.)
4. Why do things change colors?
5. How can things be two different colors at once?

Before going on the field trip have the students bring a paper bag and the teacher can pin or staple two colored pieces of paper or material onto it, one common color and one rare one, so that each child can be successful.

Take the students out to an area where there is a large variety of plant life -- grassland and woodland. Have the children collect all of the things they can which are the same colors as the tags attached to their bag. Litter counts also, in fact, some colors may be found only on litter of some type.

Take the bags back to the classroom.

POST-ACTIVITY:

Have the students empty the stuff out of their bags and study it. Have them count the number of each kind of thing they found. Which thing did they find most frequently? Have them make posters. Ask them to take their crayons and try to duplicate the colors of the natural items they found.

Take the students on consecutive field trips in the winter and spring and/or summer. The students should be able to conclude that they will find different colors at different times of the year.

Following are suggestions for natural objects which exhibit colors:

Blue - (certain) aster flowers
purple prairie clover
blue vervain
water (from a distance)

Green - grasses and leaves in many shades
some eutrophic water with lots of algae

Red - wild rose fruits and stems
wild plums
some goldenrod galls

Yellow-Gold - goldenrod flowers
(some)aster flowers
black-eyed susans
sunflowers
bumble bee
some spiders
willow leaves

White - (some) aster flowers

thistle down
milkweed down

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Purple - Canadian thistle flowers
bull thistle flowers
weed stems
purple prairie clover
(some) goldenrod galls

Black - dirt on gopher mound
parts of a bumble bee
bird feathers

Brown - sunflower seeds and flower head
prairie cone flower heads
bird feathers
milkweed seeds

Silver - Russian Olive
prairie sage
milkweed pods

Orange - Monarch Butterfly
wild plums
wild rose hips

Additional Activities:

Color Wheel

Find a sample of a color wheel in an art store or book.Draw a big one on a large piece of cardboard and color it.

Then take the group out to find objects that match the colors on the wheel, bring them back and match them up. It may take a long time to fill some of the color sections, but it is fun to work on it.

Color Family

The youngsters see how many names they can think up for any color. How many words meaning red? Or green? Blue? Yellow? Black?

They take turns naming a word that describes one color, (such as pink, rose, scarlet, crimson, etc.) When somebody misses, he gets a point against him. Five points and he pays some sort of forfeit.

They take turns naming items (such as flower, fruits, birds, etc.) When somebody misses, he gets a point against him. Five points and he pays some sort of forfeit.

They take turns naming items such as flowers, fruits, birds, etc.of special colors. It says, "Red!" and points to someone. That person must answer by giving the name of something red before It can count to ten.

PINK RHYMES WITH MINK

By Jean Conder Soule -- This poem was taken from JACK & JILL MAGAZINE, August, 1972

Pink rhymes with mink
And a strawberry drink
To sip, like soda, through straws.

Blue rhymes with shoe
Of a pet kangaroo
Who wears snow-white gloves on her paws,

Green rhymes with queen
And a funny machine
That turns out the silliest hats!

Red goes with sled
And the cap for my head
That matches my baseballs and bats.

But where in the world,
Oh, where do you go
For a rhyme for orange --
Say, do you know?

White rhymes with kite
And a firefly's light
That winks on and off in the dark.

Black goes with shack
Where an old witch named Clack
Lives with goblins called Seymour and Mark.

Gray rhymes with day
When the sun's gone away
And rain patters down our street.

Brown rhymes with clown
In a patchy old gown
And too-big shoes for his feet.

But where can I look
And where can I go
For a rhyme for purple --
Oh, do you know?

Yellow and mellow
Both rhyme with this fellow --
A pumpkin with a candle inside.

Gold goes with bold
Like the pirates of old
Who sailed on the seas far and wide.

Maroon rhymes with moon
Or a fat, round ballon
That they sell on a stick at the fair.

I'll buy one, of course,
That is shaped like a horse
Or maybe a lion or bear.

But where could I look
Up high or down low,
For a rhyme for silver --
Please do you know?

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Tan rhymes with fan
That they use in Japan
Where ladies wear satin and silk.

There they drink tea
Just as prim as can be,
Without any lemon or milk.

Pearl goes with curl
And a dressing-up girl
Who is wearing her mother's best clothes.

Earrings and beads
Are all that she needs
And slippers with buckles and bows!

But oh -- can you find
Something to show
There's a rhyme for violet?
Oh, do you know?

Turquoise rhymes with toys
For girls or for boys --
A bright-colored tractor or train.

This color is fine
For a dollhouse design
Or maybe a big model plane.

Jet rhymes with pet,
The kind you can get
In a shop with hamsters and fish.

Indigo goes with bow
Like the one on the toe
Of a shoe that a dancer would wish.

But where, tell me where
Could I look if you please
For rhyme words to go
With such colors as these --

Purple and orange
And silvery white
And violet too;
For I can't make them right!

So please, if you will,
Help me look, if you've time
Then all of our colors
Will properly rhyme!

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THE FOOD CHAIN

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, South Dakota. 57016 Phone: 489-2416. (Adapted from the Environmental Education Project Activity Booklet, Poudre, R.I. Schools). (Revised 2-23-72)

Grade Level - K-2

Best time of year - Fall or Spring

OBJECTIVES:

1. To acquaint students with the laws of nature.
2. To establish the importance of all living organisms.

BACKGROUND:

According to an article in the Brookings Register, approximately 90% of the creatures that lived on the earth at one time have become extinct. The evolutionary process operates on the basis of survival of the fittest. Those creatures that have a narrow limit of tolerance have a hard time adapting to the changing world. Pollution speeds this evolutionary process along by elimination of these species which cannot adapt. Therefore, pollution is not all that bad -- right? Wrong! Why should one species (man) eliminate any living thing? We depend on other forms of life and we need them for our survival. All living organisms have a place on the earth and contribute to a complex balance. We should not try to disrupt this balance any more than we absolutely have to.

Finding and identifying food chains on field trips is not easy. It takes some preparation and planning. Once you find an example it will change daily and disappear without a moments notice. However, center the students attention on evidence of links in the food chain. Dead animal remains, piles of feathers, bird and animal manure, regurgitated owl pellets, teeth marks on corn and branches, etc. all are examples of evidence to support a food chain concept. It is also possible to construct a short food chain using insects (peanut butter, ants and a spider; flour or other grains, flour beetles and a spider; fruit, fruit flies and ground beetles.)

PRE-ACTIVITY:

Introduce the activity with questions similar to the following:

1. Does anyone know what a food chain is? Explain it with a diagram.
2. What do insects eat? Do they eat plants? Do they eat other insects?
3. What do birds eat? Do they eat grain or weed seeds or do they eat insects?
4. What does a cow eat?
5. What do people eat?
6. Has anyone heard of the saying, "survival of the fittest?" What happens to a deer herd in the winter when there is a food shortage? Do they all die? Why do some live? Do you suppose it is the same for all living things?

FIELD TRIP:

Take the students to a marshy or grassy area or woodlot. Ask them to find examples of insects eating plants and insects, or of birds eating insects and plants and/or plant parts, point out livestock eating grass or the other kinds of plants, and show students examples of nests and cover areas.

POST-ACTIVITY:

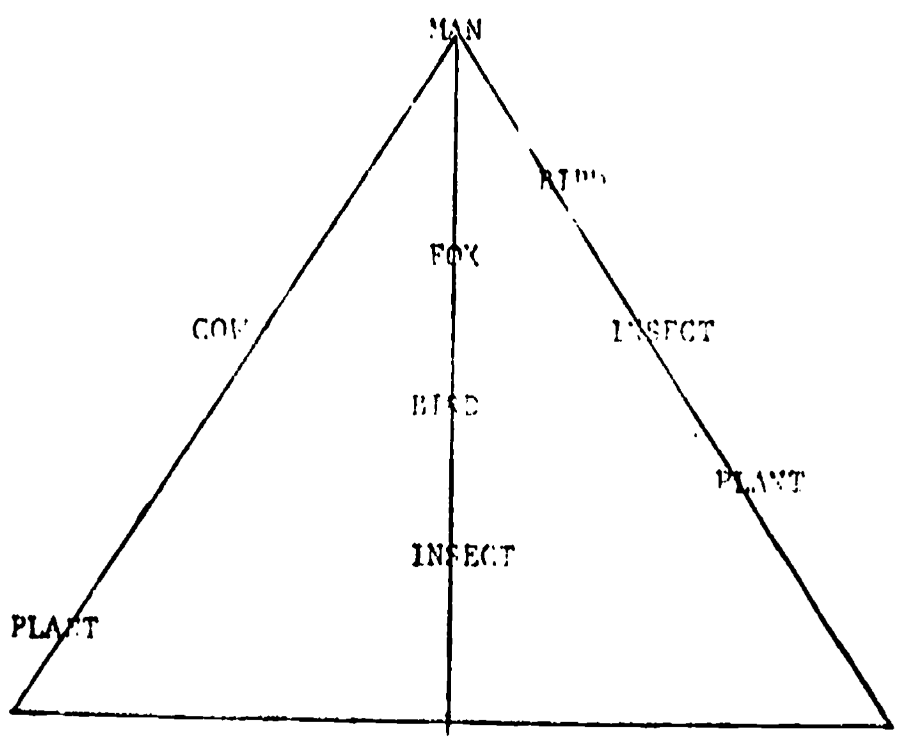
Set up a chart with all the examples of mammals, insects, plants, birds etc. seen on the field trip. Describe the things they ate or what eats them. The students should all be able to contribute a constructed pyramid when they finish. Have them make a large poster of this pyramid. Some simple examples are as follows:

grass -- cow -- man

grass -- insect -- bird -- fox --
killed by man for fur, bounty or sport

grass -- insect -- grouse - man

CONSTRUCT A PYRAMID:



A LARGE PYRAMID COULD BE CONSTRUCTED WITH PICTURES EITHER DRAWN BY THE STUDENTS OR CUT FROM OLD MAGAZINES.

MODIFIED COAL GARDEN

Written by Rita Brown, Instructor and Carol Borchardt, Kindergarten Teacher, Chester Area Schools, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. Revised 6-7-72.

Grade Level - K-2

Best time of year - any time - especially good rainy day activity

OBJECTIVES:

1. To introduce the students to the beginning concepts of chemical reaction.
2. To encourage students to become interested in and curious as to why the coal garden grows and why it needs to be "watered" in order for it to remain growing.
3. To introduce a method of setting up scientific experiments.

BACKGROUND:

Perhaps it has been a long time since you have thought about making a coal garden -- probably because it is almost impossible to find coal any more. However, this unit allows the same reactions to take place without using coal. Brick and synthetic foam rubber or cellulose sponge have been substituted in its place.

Some day when you have planned a field trip or when it is rainy and not fit to do any outdoor studies, why not let the children help you construct a coal garden -- or better yet, make several and let them compare the differences between them and discuss why the coal gardens all look different.

EXPLANATION OF THE CHEMICAL REACTION WHICH TAKES PLACE:

The principle is similar to the reaction which occurs when stalactites or stalagmites are formed. The solution mixed up contains some dissolved solids. The solution is poured over a porous material which soaks up some of the solution to allow controlled expansion or growth in the coal garden. Crystals are formed as the liquid passes into the porous material. The solution now "feeds" the crystals and allows them to grow. Growth will take place until all of the solution is used up. If you wish the garden to grow, you will need to add more solution. The porous material will soak up the liquid and feed the crystals to allow more controlled growth, etc.

This is an excellent experiment for showing some basic physical and chemical forces in nature. Have the students (especially upper grade ones) look up and study the following words and see how they apply to this particular experiment:

1. percolation
2. absorption
3. evaporation
4. diffusion

PRE-ACTIVITY:

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Discuss what a coal garden is and explain the ingredients that are used. Ask a few simple questions similar to these:

1. What is a coal garden?
2. Why is it called a garden?
3. Will it grow like your garden does at home?
4. Will it need to be "watered" like your garden does?
5. What will happen if you don't add the necessary ingredients at the appropriate time?
6. What causes the garden to grow?

ACTIVITY:

Build a castle! This one is as old as the hills, but we have a new way of making it that should be a delight to everyone.

People used to call this a coal garden, but we found that chunks of broken brick (about the size of a large can), porous rocks, (not slick ones) and pieces of synthetic foam rubber or cellulose sponge were even better. Sponge is great because it can be cut in any shape you desire. We made one the shape of a little Christmas tree with branches and all.

Wash your pieces of brick in plain water until they are thoroughly wet. If you use sponge, wet it and wring it out.

Place in a shallow glass bowl (do not use metal of any kind), and arrange the damp pieces to fit your fancy, placing some on top of one another. Don't throw away any little pieces or granules, just dump them on top and wonder what is coming!

Into a glass fruit jar, put four tablespoons of water, four tablespoons of laundry bluing and four tablespoons of ammonia. Pour this over the wet rocks, making sure all are dampened with the mixture.

Put a few drops of food coloring (just one color or several different colors) and add a few drops of bluing on one or two of the bricks. Now, take four table-spoons of salt and SPRINKLE this evenly all over the broken chunks of brick, rocks or sponge. If you have an old plastic flower, it is darling if it is stuck into the arrangement. It will make your coal garden look like an oriental garden.

NOTE: Coal gardens in which only one color of the food coloring is used are much more attractive. The gardens in which several colors are used tend to become very dark colored and not as pretty.

Within a few hours, snowflakes begin to form. If you sit and watch closely you can actually see them grow.

After two days, add two more tablespoons of water and two tablespoons of ammonia. Be very careful not to pour it over the pretty crystals, but along the edge of the bowl.

POST-ACTIVITY:

Discuss results and set up experiments. A few suggested experiments are as follows:

1. Make one with brick and one with cellulose sponge. Another can be made of synthetic foam rubber. Watch to see if there is any difference between the three.

2. Try to experiment with the use of the food coloring. Who can make the most colorful garden?

3. Leave out the ammonia or some other ingredient and see what happens.

4. Don't add any more ammonia after the first two days and see what happens to your coal gardens.

5. Use some other kinds of rocks or other materials and see if the garden will grow as well as if brick, cellulose sponge and synthetic foam rubber are used.

6. Set some of the coal gardens in a well ventilated place and others where there is little movement of air and see if there is any difference between them.

7. Stir the ingredients after the coal garden is mixed up and watch to see what will happen. Will the garden still grow?

8. Does a coal garden need sunlight to grow? Or, isn't it like the garden you have at home. Find out. Put one of the coal gardens in a dark place and the other in direct sunlight.

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A FISHLESS AQUARIUM

Written by the staff of the Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-[illegible] (Adapted and modified from the Outdoor Activity Booklet prepared by the Environmental Science Foundation, Golden Valley, Minnesota. (Revised 2-2-72)

Grade Level - K-8

Best time of year - An excellent activity to do at any season or better yet, once during each season.

OBJECTIVES:

1. To introduce students to the variety and complexity of the aquatic community.
2. To introduce them to the use of equipment needed to study aquatic life in detail.
3. To acquaint them with local water bodies, the differences between them and how plants and animals vary according to the varying conditions they offer.
4. To introduce students to the concept of pollution and demonstrate what it means and what importance it has to the students.
5. To introduce and demonstrate the concept of food chain.

BACKGROUND:

Hours of intriguing investigation result from a simple pond water aquarium. Children are fascinated by the creatures found in pond water and can easily become familiar with them. As children compare jars of pond water and, later, the water from different ponds, they begin to understand that living things are different in different environments. It gives a teacher an excellent opportunity to introduce the concept of environment and what environmental damage does to the [illegible] on it. This activity has [illegible] done with at least fifty classes in the Interlakes Environmental and Outdoor Education Program and has been an exceptionally good one. It is an activity that can be started in September and completed in May, or it can be done in two hours or one afternoon. The one essential part of this activity is finding a good source of aquatic life. In the Fall and Spring, any lake, pond, creek or slough shore line will have an abundance of life. Look under and on rocks, in algae clumps, in the mud, on aquatic plants. You will find an abundance of micro water life of an amazing variety. During the winter, good samples can be taken at springs, riffles in streams which do not freeze, or under the ice near the shore line.

PRE-ACTIVITY:

Discuss water and different water types found in this area. Some suggestions for discussion questions:

What do men use fresh water for? (consumption, recreation, etc.)
What different types of water can you think of? (river, pond, etc.)

A MATHEMATICAL EXERCISE USING YOUR FISHLESS AQUARIUM.

ESTIMATION OF ORGANISM NUMBERS

1 QUART = 2 PINTS = 4 CUPS = 16 CUPS

HELP THE CHILDREN ESTIMATE THE NUMBER OF DUCKWEEDS OR LARGE AQUATIC ANIMALS IN THEIR MICROAQUARIUM.

ACTIVITY: FILL THE MICROAQUARIUM TO THE FULL QUART LEVEL WITH DISTILLED WATER REPLACING EVAPORATED WATER.

1. PUT ON A WATER TIGHT LID AND SHAKE VIGOROUSLY.
2. IMMEDIATELY REMOVE THE LID AND TAKE OUT A 1/4 CUP SAMPLE WITH A KITCHEN MEASURING CUP.
3. POUR THIS SAMPLE ON A PAPER PLATE OR LARGE WHITE DISH.
4. SEPERATE THE PLANTS AND ANIMALS INTO GROUPS IF POSSIBLE AND THEN COUNT THEM.
5. CALCULATE NUMBER OF PLANTS IN TOTAL SAMPLE BY SETTING THIS SIMPLE RATIO EQUATION UP:

$$\frac{\text{18 DUCKWEEDS}}{\text{1 1/4 CUP}} = \frac{\text{X DUCKWEEDS}}{\text{16-1/4 CUPS}}$$

IF THERE ARE 18 IN ONE CUP, HOW MANY IN 16 CUPS?

18 DUCKWEEDS X 16 - 1/4 CUPS = $\frac{288}{1}$ = 288 DUCKWEEDS IN TOTAL SAMPLE

THE SAME EQUATION WILL WORK FOR ESTIMATING NUMBERS OF OTHER ANIMALS AND PLANTS.

FOR A STILL BETTER ESTIMATE, COUNTS COULD BE MADE OF 4, 1/4 CUP SAMPLES: THOSE COUNTS AVERAGED, AND THE TOTAL ESTIMATE CALCULATED USING THE FOUR SAMPLE AVERAGES.

DATA CHA[illegible] OF A FISHLESS AQUARIUM AND [illegible]UTION

NAME ____________________

DATE ____________________

TEAM NUMBER ____________________

POLLUTANT USED: (one drop or pinch of salt per day)

DATE	# DROPS (Pinches)	COLOR	CLARITY	SMELL	#SNAILS	#INSECTS	#SCUDS	#COPEPODS
*First Day	0							
Second Day	1							
Third Day	2							
Fourth Day	3							
Fifth Day	4							
Sixth Day	5							
Seventh Day, etc.	6							

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A FISHLESS AQUARIUM AND POLLUTION

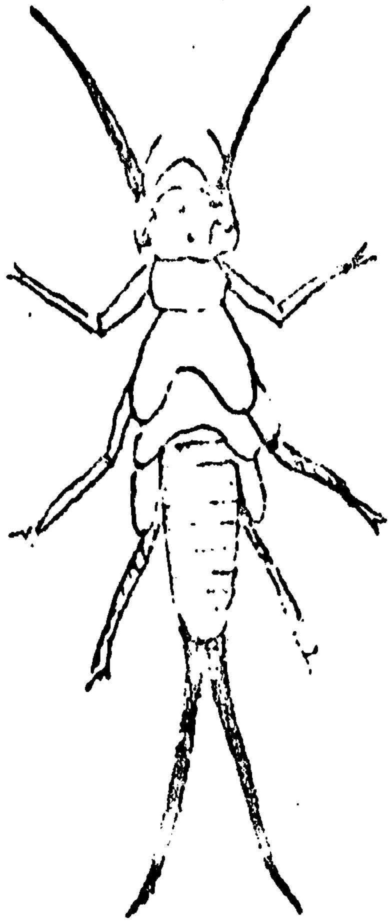
WATER FROM CLEAR, FRESH PONDS WITH LOTS OF AQUATIC LIFE SHOULD BE USED FOR ALL OF THE SAMPLES.

TEAM NUMBER	POLLUTANT	DIRECTIONS
1	table salt	add 1 drop of saturated NaCl solution per day
2	sheep manure	add 1 sheep pellet every second day
3	iodine	add one drop per day
4	soap - liquid	add one drop per day
5	detergent - granular	add one small pinch per day
6	disinfectant - lysol	add one drop of recommended solution for household use
7	a control	add nothing but distilled water or non-chlorinated water only

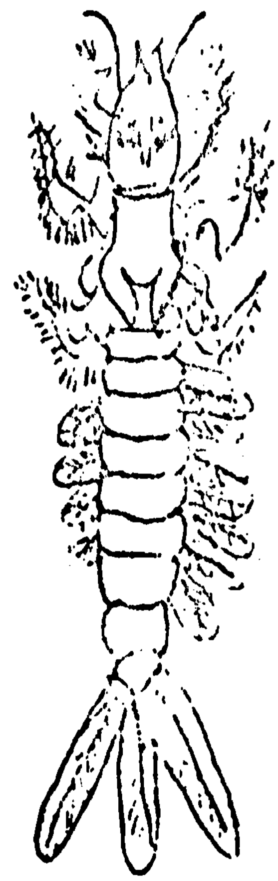
USE THE SAMPLE CHART ATTACHED FOR RECORDING WHAT HAPPENS.

ALSO, YOU COULD USE AN INSECTICIDE, 24-D, ATRIZINE, ETC.

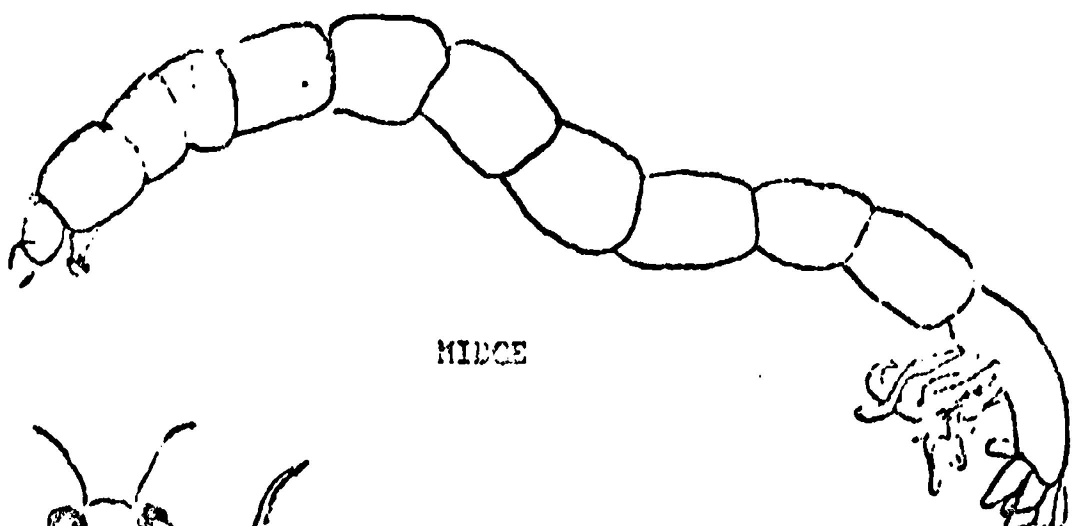
STONEFLY



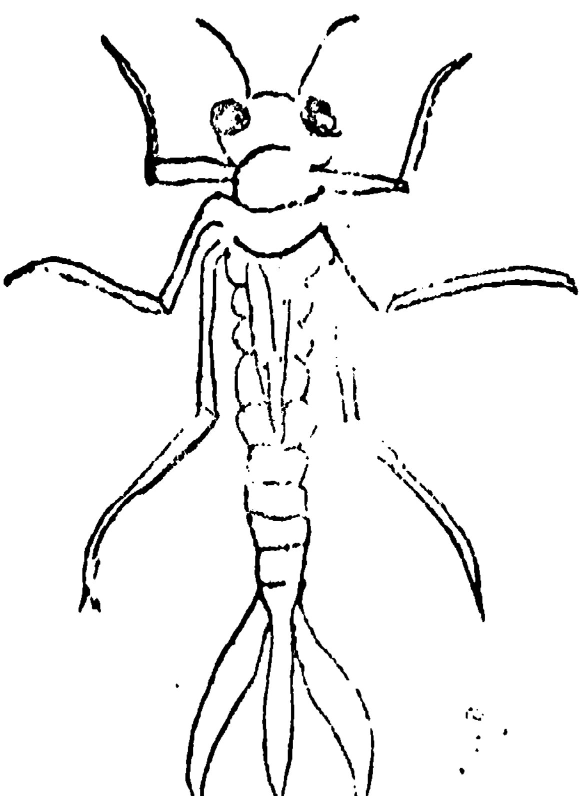
MAYFLY



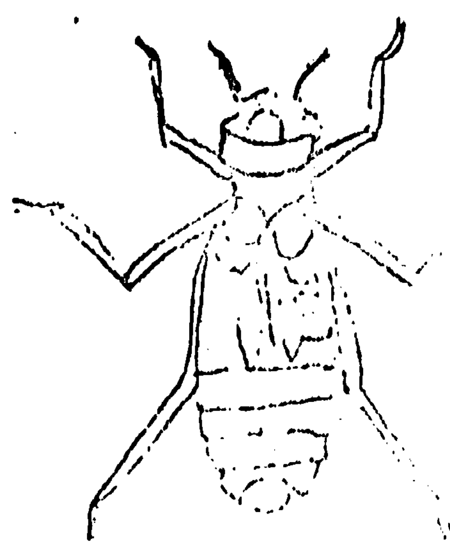
CADIS FLY



MIDGE



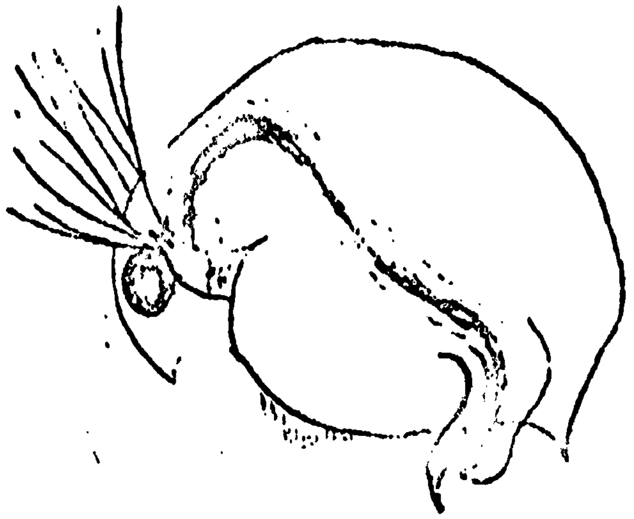
DAMSEL FLY



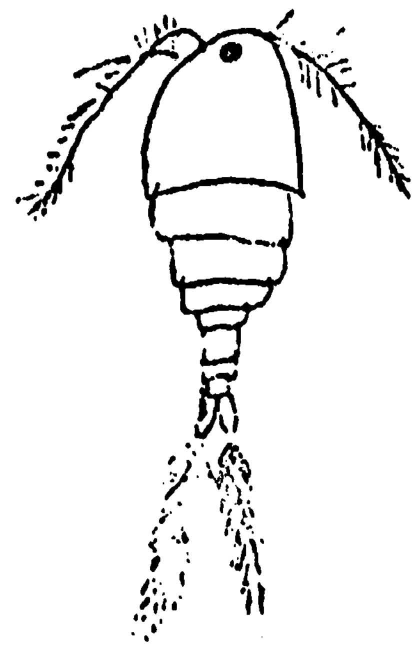
DRAGON FLY

What kind of animal do you have? In your water samples you will commonly find 4-6 animals that you can see without the microscope. See if you can identify them by using the following pictures:

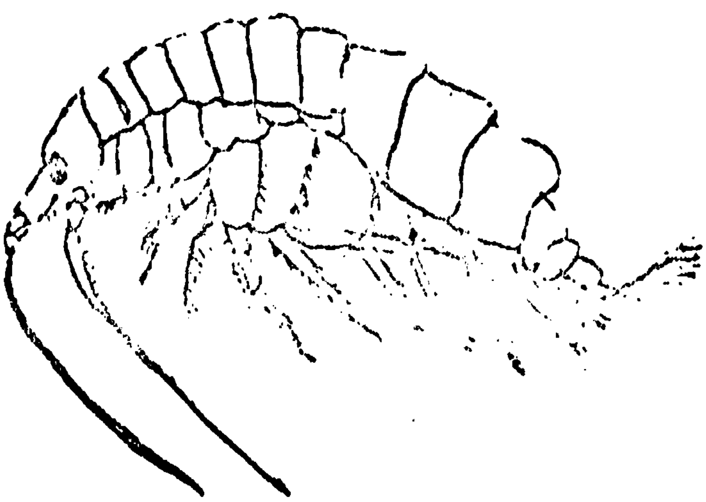
WATER FLEA - DAPHNIA



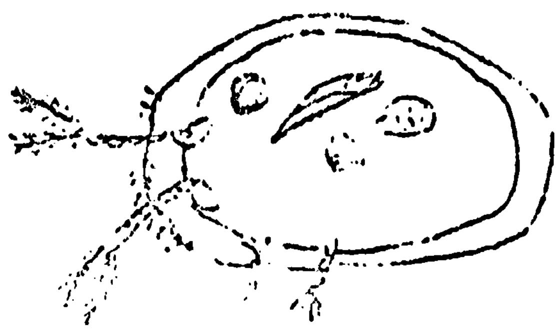
COPEPOD - CYCLOPS



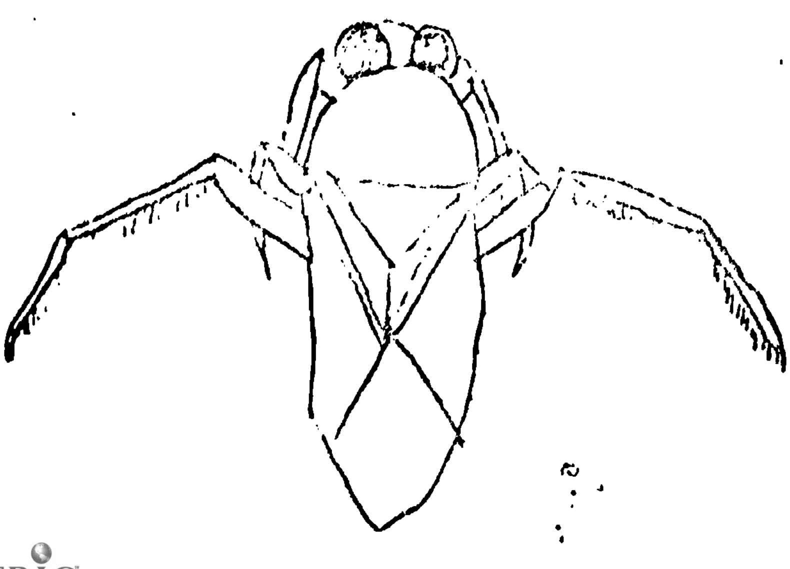
SCUD - SIDESWIMMER



SEEDSHRIMP - OSTRACOD



WATER BOATMAN



WATER BEETLE

AN EXPERIMENT FOR FISHLESS AQUARIUM USING ENVIRONMENTAL MANIPULATION

SET UP TEAMS WITH THE CLASS -- HAVE THE TEAMS COLLECT A JAR OF WATER FROM THE SAME SOURCE OF WATER

CONDITIONING	TEAM NUMBER	WATER TYPE
1. Cool place - Sunlight	1	Pond water
2. Warm place - Sunlight	2	Pond water
3. Cool place - Dark	3	Pond water
4. Warm place - Dark	4	Pond water

USE A MODIFIED DATA CHART LIKE THE PROCEDING TO RECORD CHAGES THAT TAKE PLACE.

USE THE SAME TYPE OF WATER SAMPLE SO THAT RESULTS WILL BE CAUSED ONLY BY CHANGES IN THE ENVIRONMENT YOU HAVE CREATED.

DATA CHART [illegible]

NAME ____________________

KIND OF SAMPLE WATER ______________

DATE	COLOR	CLEARITY	SMELL	#SCUDS	# LARGE ANIMALS	# MICROSCOPIC ANIMALS
1st day	brownish	muddy	manure like	5	18	hundreds
end of first week	greenish	clear	musky	7	27	thousands
2nd	greenish	cloudy	musky	9	45	millions
3rd	pea soup	cloudy	musky	3	17	hundreds
4th	brown	cloudy	smells very bad	0	3	a few
5th	dark brown	very cloudy	musky	0	0	none

A chart like this can be completed by each student and team.

If different water samples are used, students should be encouraged to compare their results between types.

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MATERIALS:

1. Microscopes with 4, 10 and 43 magnification.
2. Microscopes with 10 and 20 magnification.
3. Hand lenses.
4. Hanging drop and microscope slides and cover slips.
5. Methyl cellulose (a solution for slowing down aquatic life so it can be studied more easily)
6. Identification books for aquatic life.
7. Eyedroppers
8. Water chemical testing kits for:
   - detergents
   - salt
   - nitrates
   - phosphates
   - pH - acid, base
   - dissolved oxygen
   - CO_2
9. Paper plates

Please contact the Interlakes Office one to two weeks prior to this activity so that appropriate scheduling of time and equipment can be made. We are also available to help you plan and carry out the activities with your classes.

Microscopes or magnifiers can be brought out when the children have exhausted the observations they can make with their eyes. If you only have a few microscopes, these might be placed in a quiet corner of the room where the children can go after finishing with other work. Encourage them to record their observations with pictures and words. These might be put on a bulletin board.

Pass out a large paper plate of sturdy construction (like the Chi-Net brand) to each student, have them make their desks level. Pass out one glass slide and an eye dropper to each child. Have them mix up the contents of their jars and pour some of the contents into the paper plates. Students can then examine closely the critters in their jars. They can catch the animals and put them on the glass slides with the eye droppers and study them under microscopes or magnifying glasses.

If you wish, permanent slides can be made of the materials with some special chemicals available from the Interlakes Office.

When the study possibilities of the samples are exhausted, have the children empty the plates back into their jars. Fill the jars with distilled water or pond water, leave the covers off, and set them in a window where they will stay cool and in the sun if possible. These aquariums will stay active for many weeks.

1. Does my jar have the same creatures as every else?
2. Does my jar have as many creatures as someone else?
3. Is the population changing in my jar? Is the number of one creature increasing or another decreasing?
4. Is the color of my water the same as everyone else's?
5. Is my mud the same as everyone else's?

These aquariums will last for several weeks. To assure this, some precautions should be taken. (1). Don't add food to the water, (2). Keep some distilled water or non-chlorinated water on hand to add as the pond water evaporates, Keep the jars in the light and cool. Don't put much mud or plant material in the jars.

OTHER ACTIVITIES:

1. Many of these organisms are beautiful and could serve as subjects for an art lesson. Encourage the children to draw, color, and describe what these creatures look and act like.
2. Record numbers of types of animals they see, and the numbers of individuals of each type. Then they will be able to compare between the different types of water.
3. Have the students record the color of the water, whether it is clear, or cloudy, the odor, etc. on successive days or weeks.
4. You may want to set up experiments with your aquariums so that you can determine what happens when pollutants are introduced. (salt, ammonia, soap, detergents). See Sample Chart #3.
5. You may wish to help the students set up data charts: several examples are attached.
6. A wrap up activity on the experiments would be a discussion of their results; what is bad and what is good for water and animals can be discussed; what can people do to help keep waters from becoming like their samples.

What does water smell like? (no smell, musky, skunky, stinks)
What color is water? (green, blue, brown, no color, etc.)
What lives in water?
Can you think of water that you would not drink? Where is it?
Where does our water come from?
What do tiny baby fish eat?

You might finish up the discussion with a statement that soon the class will take a trip to get different types of waters to study.

FIELD TRIP:

Materials for this activity can be collected while engaging in another activity or may compose the entire activity. The object is for the students to collect a water sample, notice the vegetation and animal life around and in the different types of water. It is recommended that several types of water be visited. However, this isn't essential. Samples of other water types can be brought from home by the students.

In preparation for the outing, ask the children to bring a clean one quart glass jar with a water tight lid to the outing. It is also adviseable to ask them to wear rubber boots. Each child will collect a sample of water, perhaps if more than one water type is to be visited, the child can be assigned the water type he will collect.

Collect the sample this way:

1. Remove the lid, rinse out the jar with water from which the sample is to be taken.
2. Take a small handful of mud, gravel or bottom material and place in the jar. This material can be scraped up with the jar or the hands. Do not put more than ½-1 inch of this material in the jar.
3. The remainder of the jar will be filled with clear water from one area with a lot [illegible]. [illegible] covered with small [illegible] floating plants (duckweed) is very productive; try to get some of the duckweed with the sample. A very satisfactory aquarium can be obtained with a sample from a duckweed area without bottom material or with a small amount of vegetation only.
4. Look for snails, clams, insects and other animals that can be added to the aquarium.
5. Close the lid tightly and return to the classroom.
6. Remove the jar lid, and set the jar in a cool place in the light. This will keep plants healthy and the aquarium in good shape.

POST-ACTIVITY:

After the mud has settled, children can study the jars' contents closely. Now the fun begins!

1. Does the container have creatures swimming in the water?
2. Are there creatures on the sides of the jar?
3. Are there creatures on the surface of the mud?

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MAKING MICROSCOPIC SLIDES

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota.
Phone: 489-2416 (Revised 2-8-72)

Grade Level - 3-12

Best time of year - anytime

EQUIPMENT:

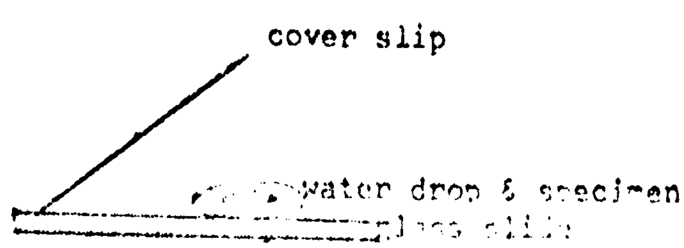
1. One glass slide per student
2. One cover slip (tiny cover glass) per student
3. One eye dropper per every two students
4. Supply of methyl cellulose - a chemical for slowing animals down
5. Water sample, dirt, insects, sand, hair, etc. (any sample collected)
6. A supply of Turtox CMC-10 Mounting Media (optional)
7. Microscopes - 4-43 power - any magnifier will do.

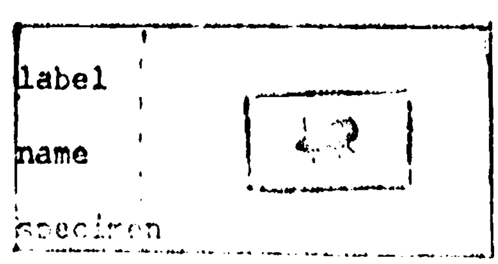
PRE-ACTIVITY:

Explain that the students will be making preparations for looking at tiny things under a microscope. We will make slide preparations of different things. Each of them can make a slide of their own (or many if desired) and look at it under a microscope or magnifying glass.

Demonstrate the technique of making a good slide preparation to the students. Diagram it on the blackboard.

1. Step one, select a clean glass slide and cover slip.
2. Take an eye dropper and place one drop of water or mounting media on the center of the slide.
3. If the specimen is not in the water, then place it in the media or water drop.
4. Place the cover slip on the glass slide at an angle and move it until the bottom edge touches the water or media drop. Then carefully lower the cover glass to the drop.
5. The slide should then be labeled with a grease pencil, crayon or masking tape. It is then ready for view under the microscope.
6. If a mounting media is used, the slides should be viewed immediately, and then allowed to dry overnight and viewed again the next day.
7. Store slides separately and do not stack them. They will stick together and are difficult to separate.





Temporary mounts made with water are best for younger children. They can wash and re-use the slides and cover slips over and over. It is best if you can arrange for one microscope for every five children if possible. NOTE: Cover slips are very delicate and must be handled very carefully.

For grades K-2, it is best to not use cover slips at all. Wet mounts can be used at lower magnification without distracting from the experiment.

For a follow-up activity, you might have the children draw pictures of the organisms they mounted.

Contact the Interlakes Office for any materials or assistance you may need.

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TRAPPING INSECTS AND KINDS OF BUGS

Adapted from activities in Transect Activities II, Environmental Science Center, Golden Valley, Minnesota by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016 Phone: 489-2416 (Revised 2-3-72)

Grade Level - 1-6 (Adaptable to all grades)

Best time of year - Spring or Fall, whenever temperatures are warm enough for insect activity.

OBJECTIVES:

1. To acquaint students with insects. A great variety of insects are present around us, most of which we are unaware and most of which are beneficial.
2. To acquaint students with the concepts that different insects eat different things and live in many different places.
3. To acquaint students with methods of catching and studying insects.

MATERIALS:

1. glass jars, coffee cans
2. baits
   a. sugar syrup
   b. molasses
   c. dead mice, gophers, birds, etc.
   d. meat
3. several hand spades
4. insect sweep nets (see instructions for making nets on page 9).
5. various other materials, depending on the follow-up activities. (see other activities section of this unit).

BACKGROUND:

Insects are the most numerous land animals on earth. There are over a million species (different kinds of insects) present. Insects occur in nearly every kind of place, on nearly every kind of plant and animal. Some kinds of insects can be found which eat any kind of plant or animal product.

Most insects are beneficial to us. Bees pollenate our fruits, vegetables and crops and give us honey. Ants eat other insects, aeriate the soil and clean up waste products. Dung beetles eat manure and cause it to rot up and become soil. Carrion beetles eat dead animals and cause them to rot and become soil. Water insects serve as fish food.

A very few insects actually harm man and his crops. These are, however, serious problems to us and man must control and kill these harmful insects at times.

Insects are interesting to study and are very easy to use as study creatures. Many very valuable ideas can be reached using insects related to food habits and habitat needs.

Procedure: The procedure suggested here is but one of many which can be used to achieve the same goals. See other suggestions and activities section.

PRE-ACTIVITY:

Introduce the topic of insects (bugs) with questions similar to the following:

1. What is an insect like?
2. How is it different from a bird?
3. How is it different from a mammal?
4. How many legs do bugs have?
5. Do bugs fly? Do they have wings?
6. Where do you find bugs?
7. How can you catch bugs?
8. List all of the kinds of bugs the class can think of.
   - a. flies
   - b. mosquitoes
   - c. beetles
   - d. grasshoppers
   - e. worms
   - f. butterflies
   - g. moths
   - h. caterpillars
   - i. fleas
   - j. dragon flies
   - k. etc.
9. Where do you find these kinds of bugs?
10. What do these bugs eat? How do you know that is what they eat?
11. How are beetles different from butterflies?
12. Are all beetles the same?
13. How many good bugs can the class think of? List them. How do they know the bugs are good?
14. List bad bugs. Why are they bad?
15. What is the best way to catch bugs? Where could we go to find the most kinds of bugs?

Suggest a field trip to investigate bugs. Set up a bug trap line. Have each student bring a jar or smooth sided can. Have each child bring some type of bait.

FIELD TRIP: 3/4 to 1½ hours - two or more field trips - one to set traps and subsequent trips to check them.

Set up a 100 ft. transect and mark start and end (several transects may be set up in different habitats). Have each child dig a hole and bury his can or jar with the mouth or lip level with the ground surface. Place bait in the bottom of the jar. When all traps are set and baited, look around the area for insects and collect every type you can find. Record the habitats they were found in.

Habitat Examples:

1. in wood
2. leaves in woods
3. ground under bush
4. in rotting bird
5. in water

Return to the classroom. Discuss and study the insects and suggested "A Field of Insects" activity below.

After a two-three day interval, take another field tirp. Have the children sneak up and cover their jars with a lid. Then dig out the cans or jars and look at their contents. Fill in the holes and return to the classroom. Kill the insects by pouring hot water into the jar or placing the jars overnight in a freezer. Remove the insects from the jar and paste them on a piece of paper with glue or pin them to cardboard sheets with common pins. Have the students fill out data sheets on their results. See sample data sheets attached to this unit.

POST-ACTIVITY:

Complete the data sheets, identify unknown insects and compare the information collected. Put best insect collections on the blackboard. Answer the questions posed in the pre-activity.

A FIELD OF INSECTS

You are lucky if you have open, grassy fields available. During the spring, summer and fall, different groups of plants come into blossoms, go to fruit, go to nuts, and then die off. During these stages, insects visit the plants for a variety of reasons. A study of insects that visit the blossoms can be made with an insect net. There are many plans in science books for the construction of insect nets. You can make your own nets using one of these plans. Otherwise, ready made insect nets can be purchased from biological supply houses for as little as $4.00 each.

When the field is in bloom the students may sweep certain flowers (all of one kind) with the nets. Warn them that they may not see the insects until they are in the nets.

Make a sample killing jar by simply pouring about three tablespoons of denatured alcohol into a plastic bag and closing it with a wire twister. (A solvent-cleaner like Synasol works well as a killing solution and is inexpensive. It is available in hardware and paint stores).

To mount the insect collections, give the students heavy paper or cardboard and white glue. Allow insects to dry before mounting. Mount each insect by placing a drop of glue on the paper, place insect on top of the glue on the paper, and gently settle it into the drop. Glue dries almost clear. The insect is visible and probably in better shape than if ten awkward fingers had tried to pin point it.

A pressed, dried sample of the bloom to accompany the insect collection is valuable. Press the flower in newspaper beneath heavy books for one week (longer for their petals). Place a square of transparent plastic food wrap over the flower and tape onto a flat surface.

If there are several flowers (weed, bushes, grasses, etc.) in bloom at the same time repeat the sweeping procedure on each flower. Be sure to keep collections separte, dated and labeled.

Later in the season still other flowers will appear. As each plant blossoms, it should be studied by the class. A series of collections for each blossoming plant can be made for the field.

Questions which arise as the class studies the collections include some of the following:

1. Is there one kind of insect which is found in great numbers for each blossom?
2. Are there some blossoms which insects do not seem to visit?
3. Do some insects appear in greater numbers than others for several types of blossoms?
4. Does the type of accompanying insect change more with the type of blossom or the time of season?
5. Are there some insects which are not found at all in collections during certain times of the season?
6. Are insects that visit "bad smelling" flowers different than the insects that visit "good smelling" flowers?
7. Do certain types of insects visit only one color or flower?

A LIGHT IN THE NIGHT

Objective: Changing the "balance" of the normal environment by placing light and heat where it would not normally be predicted.

Materials: light bulb socket and extension cord
100 watt light bulb
wooden stake, one foot long
string

Procedure: Pound the stake two or three inches into the ground at the edge of a brushy overgrown area. The edge of a vacant lot will work, or the brushy edge of a lake or pond, or the edge of a woods.

Fasten the light socket to the top of the stake with string. Put in the bulb, then attach the extension cord, being careful not to short or ground the electrical connections. A three wire grounded cable should be used for greatest safety.

Leave the light on overnight on a calm, warm night. The light will attract insects (mostly moths). This alone is a change in the normal interaction of natural factors. The heat from the light plus injury and exhaustion will kill many insects which will drop to the ground in a pile by the stake. This accumulation of dead organic material will affect other factors and may in turn cause a change in local conditions.

Mice may be attracted to feed on the dead insects, flies may lay eggs on the decaying pile, decay may cause a change in soil and plants around the stake.

A calendar record of observations, mainly any observed change of conditions, should be kept from observations made periodically during the day and night time for one or several nights.

The record of change is a documentation of succession caused by a lightbulb.

Invertebrate Collection - Sorting

Materials

killing jar
70% alcohol
baby food jars

PROCEDURE:

Many invertebrates can be found living within leaf litter, dead and rotting logs, under stones, within bark crevices, etc. This kind of collecting requires a good eye and a quick hand. The organisms are captured by hand and placed in the killing jar. After movement has ceased, they may be put into 70% alcohol for preservation. The preserving bottle is labeled designating the interval from which the organisms were taken. Some of the more decomposed leaf litter and rotting logs may be studied using the Berlese funnel in a fashion similar to the way in which it was used with the soil samples.

Invertebrate Collection - Fly paper

Materials

fly paper or strips

PROCEDURE:

Cut the fly paper into small squares 1 1/2 inch. These may be fastened to plants and other objects along the transect. The students might attach the papers to rocks, leaves, flowers, bark, etc. Some interesting assumptions about the habits of the invertebrates may result. For example, if a certain type of insect were collected several times from the same kind of plant, the children might assume that the plant is of some importance to the life of that type insect.

Invertebrate Collection - Fall Trap

Materials:

garden trowel
soup cans
70% alcohol

PROCEDURE:

The fall trap may be made from soup can, buried so the top edge is flush with the ground surface. About one inch of 70% alcohol is poured over the ground surface. One can for each transect interval should provide a complete collection. Collection from the cans may be made daily. Organisms from each interval should be maintained to separate containers and these containers labeled with the symbol designating the interval. Comparisons may be made between transect intervals and between transects in regard to types of organisms and numbers of these types.

Invertebrate - Plaque Method

Materials;

plastic tiles or flat stones
killing jar or container of 70% alcohol

PROCEDURE:

Many invertebrates which live at the soil surface seek damp, cool places. They are attracted to flat objects which provide such a situation. This behavior can be taken advantage of by placing weighted tiles or other flat objects such as rocks along the transect. Do not disturb the objects for three days to a week. After that period of time you may begin making daily collections.

Invertebrate Collection - Netting Method

Materials:

insect net
killing bottle
insect pins
fly paper

PROCEDURE:

A standardized procedure for collecting with an insect net must be established and observed by the class. The children might "sweep" the area along a transect interval by holding the net opening parallel to their bodies and swinging it quickly from one side to the other a [illegible] [illegible] of times per transect interval. After each sweep, the nest contents should be emptied into the killing jars. When a transect interval has been completely swept, and after all movement in the killing jar has ceased, the organisms collected from that interval are placed in a container of 70% alcohol. The container may be labeled with the symbol designating the interval from which the collection came. Comparisons may be made with regard to types of insects collected and numbers of [illegible].

Materials: Berlese funnel
garden trowels
70% alcohol
plastic sandwich bags
balance

Procedure: Remove a scoop of soil with the garden trowel from each transect interval and place it in the plastic bag. Each sample should be labeled with the symbol of the transect interval from which it was taken.

Return to the classroom and place the samples into Berlese funnels. Take care so that the transect interval source designation is not lost in this transfer. The application of heat and the resulting dryness drive the soil organism deeper into the soil sample. They eventually move out the end of the funnel and into a vial of alcohol preservative.

The study of the soil organisms can be made more quantitative if the amount of soil placed in the Berlese funnel is of a specific weight. For example, the class might study only eight ounces of soil from each interval. This makes it possible to compare both types and numbers of types between transect intervals and between transects. It must be remembered, however, that the water content of the soil has not been considered when weighing out the samples.

SAMPLE DATA SHEET

STUDENT'S NAME ____________

TRAP NUMBER ______ (Quart jar)

BAIT dead mouse

HABITAT weeds

BUGS CAUGHT

1. Two large orange and black beetles
2. Three medium sized gray beetles
3. Five small black beetles
4. Seventeen large green flies
5. Eight large purple flies
6. Seven small brown flies
7. One caterpillar
8. Eleven small red ants

STUDENT'S NAME ____________

TRAP NUMBER ______ (Quart jar)

BAIT (Karo syrup

HABITAT (weeds)

BUGS CAUGHT

1. Seven honey bees
2. One black beetle
3. Many small red ants
4. Ten big black ants
5. One caterpillar

SAMPLE CARDBOARD DISPLAY OF TRAPPING RESULTS

LABEL (Pinned Insects)

WOODS - PEANUT BUTTER

Beetles - 8
Flies - 5
Ants - 4
Caterpillars - 2
Butterflies - 1
Spiders - 6
Crayfish - None
Snails - None

PASTURE - PEANUT BUTTER

Beetles - 30
Flies - 3
Ants - 17
Caterpillars - 1
Butterflies - None
Spiders - 9
Crayfish - None
Snails - None

CREEK - PEANUT BUTTER

Beetles - 3
Flies - None
Ants - 1
Caterpillars - None
Butterflies - None
Spiders - None
Crayfish - 3
Snails - 9

WOODS - HONEY

Beetles - 6
Flies - 1
Ants - 28
Spiders - 1
Bees - 9
Snails - None
Cr[illegible] - None
Sh[illegible]

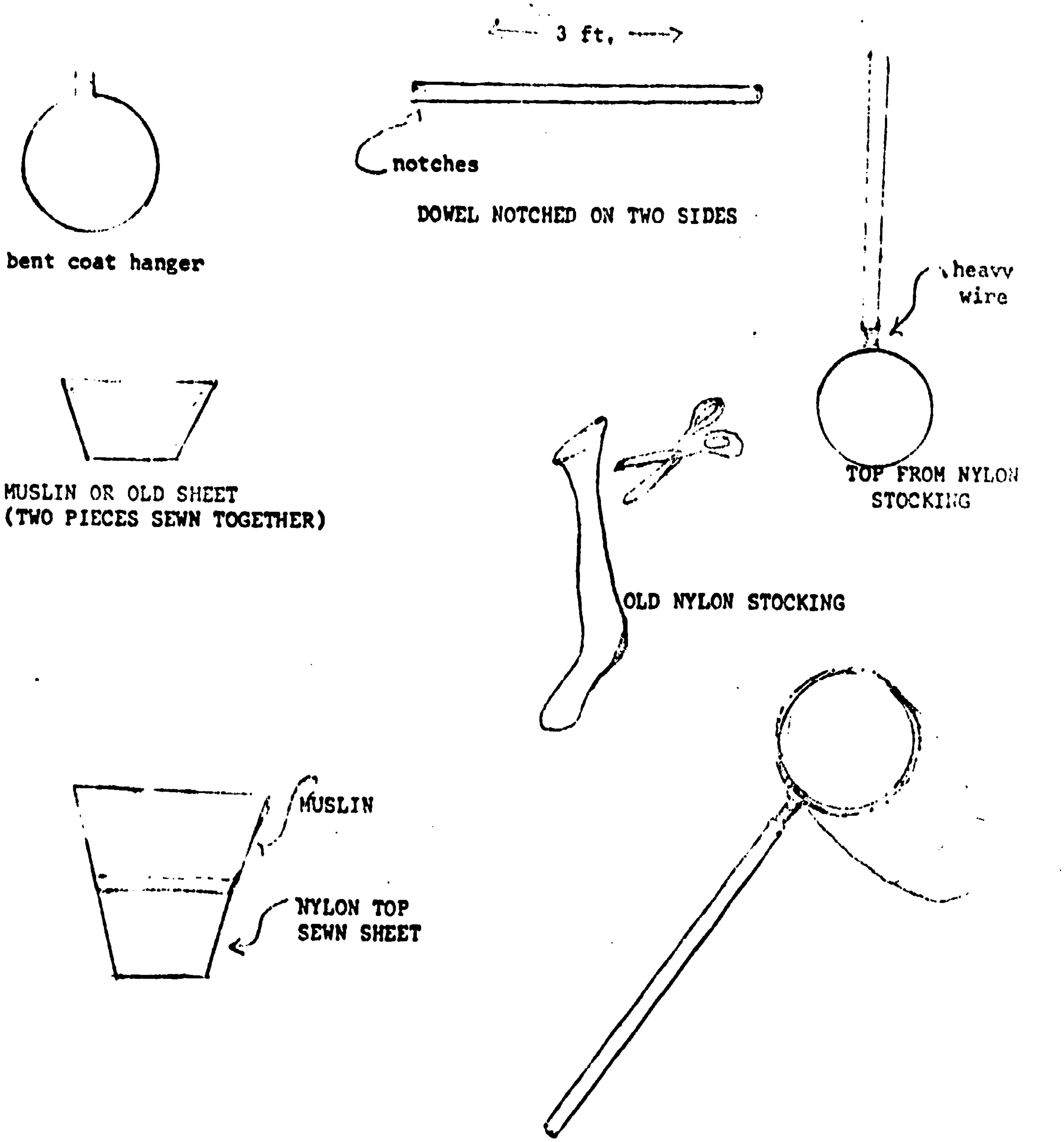
PASTURE - HONEY

Beetles - 5
Flies - 10
Ants - 30
Spiders - 5
Bees - 15
Snails - None
Crayfish - None
Shr[illegible] - 2

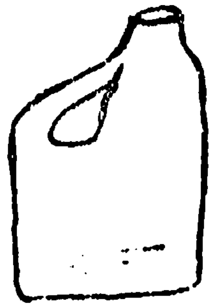
CREEK - HONEY

Beetles - 3
Flies - 1
Ants - None
Spiders - 8
Bees - 2
Snails - 9
Crayfish - 1
Shrew - 1

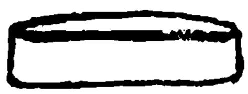
IMPROVISED INSECT NET



BERLESE FUNNEL

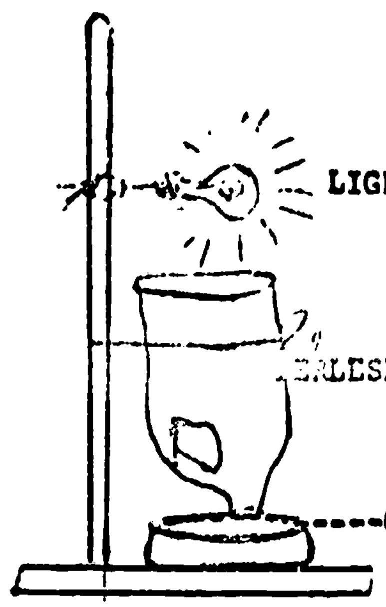


ONE GALLON PLASTIC CONTAINER



PLASTIC LAB DISH

IMPROVISED BERLESE FUNNEL



MONOCOT OR DICOT?

Written by the Fifth Grade Workshop participants of the September, 1972 Workshop. Interlakes Environmental and Outdoor Education Program. Chester Area Schools, Chester, South Dakota. 57016.

Grade Level - 5

Best time of year - Fall

OBJECTIVES:

1. To develop an understanding of the terms, monocot and dicot.
2. To be able to identify the difference between monocots and dicots by:
   a. Leaves
   b. Stems
   c. Flowers
3. To be able to draw the structures that show the two types of flowering plants.

MATERIALS:

Knife
Paper bags
Microscopes
Ink or Stain
Hand lens
Hand spades
Reference books

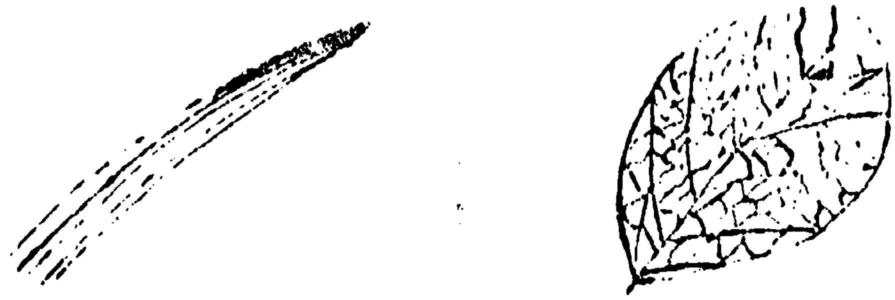
BACKGROUND:

This activity can normally be taken within walking distance of the school building. Fifth Grade Science curriculums deal with different types of plants. Normally they cover flowering and non-flowering plants as well as the types of flowering plants - monocots and dicots. Monocotyledonous plants are plants with one (mono) seed leaf (cotyledon). Dicotyledonous plants are plants with two (di) seed leaves (cotyledons). Examples of monocots which are very important to us are the grasses, especially the cultivated grasses, including corn, wheat, rice, oats, barley, rye, millet and sorghum. Important dicots include peas, beans, peanuts, and many others. Many dicots and monocots are available for study and can easily be collected on an outdoor activity.

Determination of monocots and dicots is accomplished by examining stems, leaves and flower parts.

Stems of monocots have the transporting tubes scattered throughout the stem instead of in a cylindrical arrangement such as the dicot has.

Leaves of monocots have parallel veins instead of webbed veins, which are characteristic of dicots.



Flower parts of monocots are in threes or multiples of three. Dicot flower parts are in fours and fives, or multiples thereof.

PRE-ACTIVITY:

1. What is a dicot or a dicotyledonous plant?
2. What is a monocot or a monocotyledonous plant?
3. Can you give examples of monocots; dicots?
4. How can we tell a monocot from a dicot?
5. How does leaf structure tell us whether a plant is a monocot or a dicot?
6. How do flowers tell us whether the plant is a monocot or a dicot?
7. How do plant stems tell us whether the plant is a monocot or a dicot?
8. Where can we find examples of monocots and dicots?
9. How can we tell from seeds whether a plant is a monocot or dicot?
10. From what we've learned, let's try to each collect one example of a dicot and one example of a monocot, bring it back to class, and dissect and draw the characteristics that make it a monocot or dicot.

FIELD TRIP:

The field trip for this outdoor activity can probably be taken within walking distance of the school yard. If you have an adequate amount of time, I would suggest a field trip to relatively natural prairie areas for a greater variety of monocots and dicots. Hand spades, if available, enable the students to bring the entire plant back.

POST-ACTIVITY:

The post activity will involve dissection of both the monocots and the dicots that each student collected. The students should be able to diagram the parts of the plant they dissect to show why they think their plant is a monocot or dicot.

Another post activity would be to bring from home a different type of [illegible] and vegetable seed and germinate them to see how many seed leaves they [illegible].

A MATH NATURE HUNT

Written by Mrs. Bev Poppen and Barb Hyland, Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, S.D. 57016
Phone: 489-2416

Grade Level - K-2

Best time of year - Fall or Spring

OBJECTIVES:

1. To use nature as a vehicle to develop beginning thoughts in math sets.
2. To encourage an aesthetic appreciation for nature and one's environment.
3. To assist students with counting and identifying different objects as to color, shape, and texture.
4. To introduce the concept of "sets".

BACKGROUND:

This activity is a good unit to not only introduce "sets", but also to create an awareness of a few wonders of our own environment. Students will learn to observe the many colors, textures, and shapes of their environment. Built into the fun of this activity is a good math lesson.

MATERIALS:

Paper sacks
Data sheet

PRE-ACTIVITY:

Review the concepts of counting, colors, shapes, and textures. Talk about and encourage student participation concerning things that one could look for in the out-of-doors. With the help of the students, compile a data sheet. Each child can make his own, or the teacher can make them ahead of time.

Example - Kindergarten

3 red leaves	2 circles
2 brown leaves	3 squares
4 yellow leaves	5 rough objects
3 buds	6 pieces of paper
1 feather	2 bugs
8 tiny rocks	0 bottles
1 large rock	3 soft things
1 triangle shaped object	

(For Kindergarten students, you may have to draw the object and color it, such as 3  's, color the leaf red and so forth, or have the students do this.)

First Grade:

10 seeds
5 red leaves
6 green leaves
10 leaves with holes in them
4 bugs
5 medium rocks
8 tiny rocks
7 feathers
7 pieces of bark

8 buds
2 triangle shaped objects
3 circles
6 squares
5 cup shaped objects
8 straight things
2 rough things
1 shiny thing
3 cylinder shapes

FIELD TRIP:

Go to a park, school yard, or any place with a variety of material for the children to find. Check the area before taking your class.

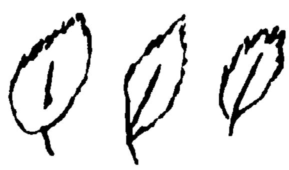
FOLLOW -UP:

Bring the collected objects back to the classroom, discuss the things found, allow students to make comparisons, check for complete sets, and note unusual objects. The students may want to mount the objects for an art project, take their collection home, or save them for another math class.

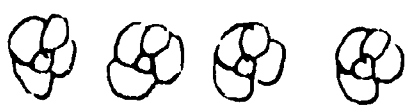
OTHER MATH ACTIVITIES:

1. One to One Correspondence

Have the students make a set from some of their gathered materials. Then, with another set of objects, have the students demonstrate one to one correspondence. Example:



Set of Leaves



Set of Flowers

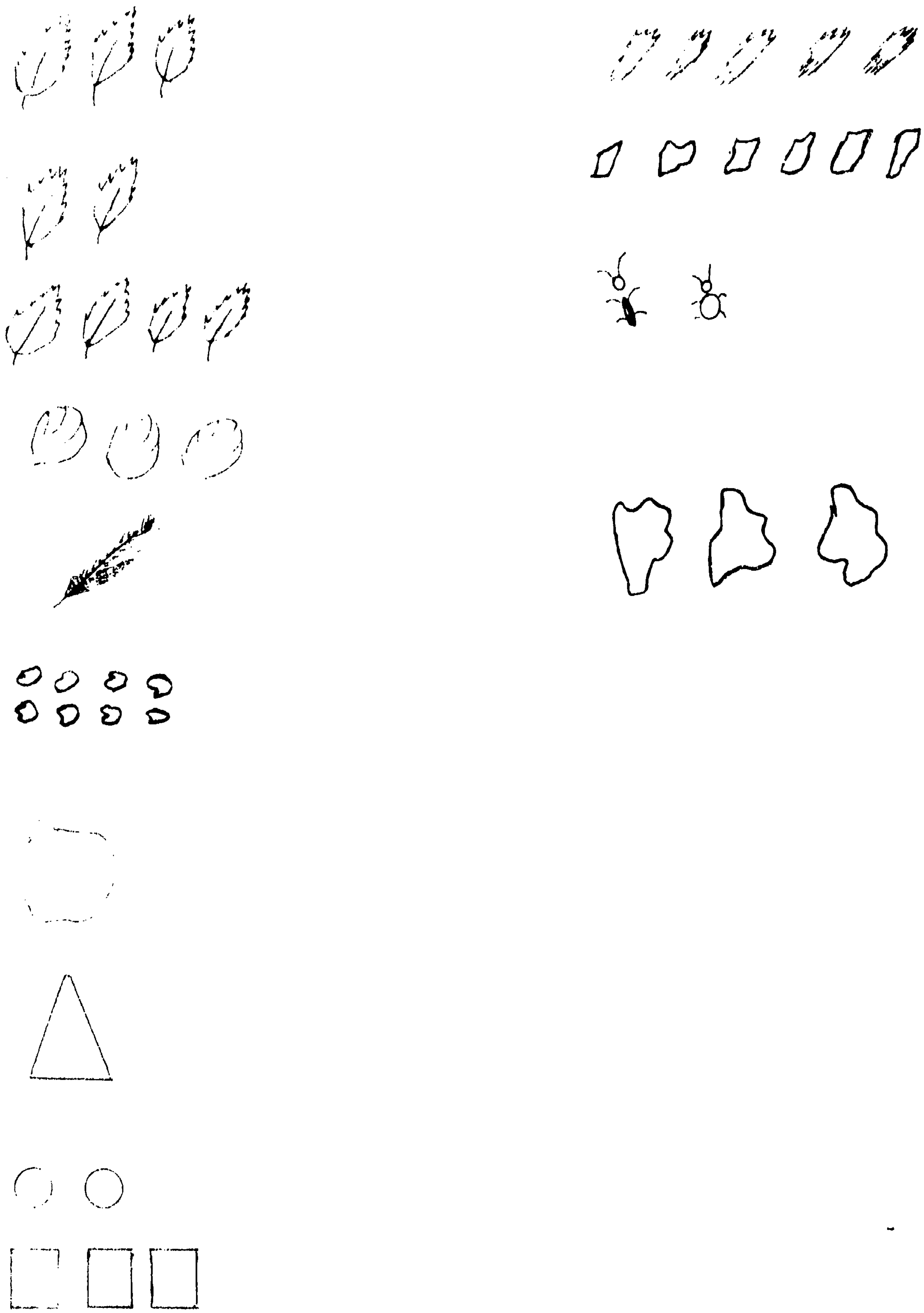
2. For the first set of objects you could have the students draw or cut pictures from magazines and then with natural objects demonstrate one to one correspondance.
3. Give each child a large sheet of paper with a numeral from 1-10 on it. Have the children find in nature a number of natural objects to match the numeral on their paper.
4. Introducing concepts of quantity. Have the children find objects or demonstrate the following:

big -- little	many -- few
long -- short	more --- less
tall -- short	some -- not any or none
high -- low	
wide -- narrow	

This unit introduces some of the first steps in math readiness, but is also a very good review for other grades.

SAMPLE DATA SHEET

KINDERGARTEN



STUDYING NATURAL MOVEMENT

Written by Mrs. Bev Poppen, Barb Hyland and Rita Brown, Interlakes Environmental and Outdoor Education Program Chester Area Schools, Chester, South Dakota. 57016 Phone:489-2416.

Grade Level - K-2

Best time of year - Anytime

OBJECTIVES:

1. To develop an awareness of natural movement.
2. To intrigue student imagination concerning creative and dramatic movement.

BACKGROUND:

Much too often we take for granted the movement of the world around us. Almost everything around us moves -- if not on its own, by some other force. Movement is natural; almost everything moves and needs to move. People need to move, for many reasons. One reason is to communicate with other people. Simple gestures add a lot to what a person says. The expression of his eyes and face mean so much to the receiver.

As long as children like to move, why not encourage them to use their imagination when manipulating their bodies. Thus, through simple activities, the child begins to understand the space and design of his environment.

PRE-ACTIVITY:

Introduce the activity to the children by discussing movement with them.
How do you move around? (feet, cars)
How do animals move? (legs, wings, feet, fins)
How do plants move? (wind, breeze, animals, grow)
Do plants move from place to place?
How do they move?
Does everything move the same way?
Can you name different ways?
  Animals - walk, crawl, run, fly, hop, swim
  Plants - sway, bend, fall
Can you describe a —
  falling raindrop?
  falling snowflake?
  blooming flower?
  bird leaving its nest?

FIELD TRIP:

Go to an area where there is a lot of mammal, bird, insect and plant life. Have the students watch for movement and as they see anything, have them move as much like the object as possible.

FOLLOW-UP:

The teacher can make a list of different movements. Then for an exercise or dramatics class, have the children act the movements out. Let the children move to music in a creative, dramatic way -- the music selected should have sufficient changes of tempo to provide for diffeient movements. A general idea may be selected to fit the music. For example, "going on a field trip, scavenger hunt, nature hunt, etc. Encourage children to express their moods and feelings through music. Encourage creative movement. Use your whole room and your imagination. Do not demonstrate! Examples which might be used are as follows:

1. Show me how tall you can be.
2. Show me how wide you can be.
3. Show me how tall and thin you can be.
4. Show me how long and thin you can be.
5. Show me how wide and short you can be, etc.
6. Standing in your own place, make your feet move fast; slow.
7. Move your hands fast; slow.
8. Show me how slow you can walk and then how fast.
9. Be a bud unfolding
   falling leaf
   bee in flight
   grain in the field
   cloud
   wind
   tornado
   bird hatching
   spider spinning its web
   ant in an ant hill
   creeping caterpillar
   frog
   fish
   falling raindrop
   falling snowflake
   thunder storm
   the sun
   any other natural object whose movement could be imitated by the students
10. Have the students act out some short fingerplays, poems or stories. Some examples are as follows:

WHIRLING LEAVES

The little leaves are whirling round, round, round,
The little leaves are whirling round, falling to the ground.
Round, round, round, round,
Falling to the ground.

CATERPILLAR

Roly poly caterpillar
Into a corner crept
Spun around himself a blanket
Then for a long time slept
Roly poly caterpillar
Wakening bye and bye
Found himself with beautiful wings
Changed into a butterfly.

RAIN

On stormy days
When the wind is high
Tall trees are brooms
Sweeping the sky.

They swish their branches
In buckets of rain
And swish and sweep it
Blue again.

SNAIL

The snail is so slow, the snail is so slow.
He creeps and creeps along.
And as he does he sings his song;
The snail is so-o-o-o-o-o-o s-l-o-w.

LITTLE CHICKEN

I think when the little chicken drinks
He takes the water in his bill
And then he holds his head way up high
So the water can run down hill.

ANIMALS

Frogs jump
Caterpillars hump

Worms wiggle
Bugs jiggle

Rabbits hop
Horses clop

Snakes slide
Seagulls glide

Mice creep
Deer leap

Puppies bounce
Kittens pounce

Lions stalk

But ---

I walk!

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FLYING KITES

Since it is such a windy spring day, let's go fly our kites. Everyone grab your kite from the wall and run outside. Now that we are outdoors let's all pretend we are throwing our kites in the air and unwind the string. Goodness! The wind has caught our kites and thev are madly flying in the air. Can you all swing like a kite that is flying in the sky. Oh my! The wind has gone down and our kites are slowly tumbling to the ground. Let's all be like the kites that are falling to the ground. Oh dear, it is time to go back to school, quickly get up and take your kite and let's all form a line and be like marching soldiers. We will march to school.

A WALK IN THE WOODS

Today boys and girls we're goind to take a walk in the woods to see all the wonderful animals that live there. Let's all hold hands and follow me as we wind our way deep into the woods. (Here the children would take one another's hand and follow the instructors as they go into the woods.)

Do you see any animals yet? Oh, there, I saw one! Why it's a baby rabbit hopping along. Can you hop around like the little rabbit? Let's try it.

Shh! Be very quiet and we can all see a butterfly. A great big beautiful butterfly with all different colors on his wings.

Oh, there she goes flying away. Let's be butterflies and flap our pretty wings in the air. Here we go, flap ...flap.

That was fun, I wonder what else we can see? Oh, look, there goes a fox running through the woods. See how fast he can run! Let's be foxes and run through the woods, here we go, run fast! I think we were all very good foxes and now it's time to go home.

SPRING

Spring is coming, isn't it? And all sorts of new things are growing: the grass is coming up through the black dirt. Let's all be a little grass blade pushing his way through the dirt to the sunlight.

And in spring flowers blossom. Let's pretend we're a little flower blossom beginning to open.

There's a mother robin gathering twigs for her nest. You gather twigs as if you were a mother robin. Oh, and there are some baby birds learning to fly. Now you fly as if you were a baby bird. Now, everybody be a cloud and gently float away in the sky.

THE WEATHER

Let's pretend we're the sun today. Stretch up your arms in a big circle. Stretch up high and wide! Oh, oh, the wind has started to blow. Swing your arms like the wind. Turn yourself around and around. Don't forget to swing your arms! The wind has finally stopped blowing and now it's beginning to rain. Try to run around the room softly and make your feet go pitter patter like the raindrops. Run on your tip toes. Pitter patter. Look! The rain has turned into hail. Hail is little balls of ice that fall like rain. Let's hop around now like the hail bounces on the ground. Hop and hop. The hail has finally stopped, but it's snowing now. Stand still and raise your arms up. Bring them down softly as you wiggle your fingers. Do it again! Be quiet though because the snow doesn't make any noise when it comes down!

PLANTING - SCIENCE

We are going to plant a garden today. You can plant flowers, or trees, or vegetables, anything you want.

First we have to pick up our hoe and dig a row in the dirt. Dig, dig, dig. Is your row ready for your seeds? Turn around and pick up your seeds. Now drop them in the straight row you made. Drop, drop, drop the seed. Does everyone have their seeds in their row? Everyone's doing such a good job.

Next, spread your dirt over the seeds. Push the dirt over your row of seeds, push, back and forth. Make sure you cover all of your seeds.

Now we're going to water our seeds. They get thirsty just like we do. Every one pick up their sprinkling can. It's right behind you (turn around). It's very heavy because it's full of water so we can sprinkle it over our seeds. Sprinkle, sprinkle, swish, swish. Our seeds will need sunlight, too. Then they will pop up above the ground.

Now we'll have to wait for our seeds to turn into plants. We'll come back again and see what kind of plants we have. Let's leave our garden and go back to the school.

JOY IN THE GARDEN

Come along with me for a walk in my garden. First we have to push the heavy gate open. Stay on the path. Stay in a line. Be careful. Do not step on the flowers. Look at that bright red tulip. Isn't it pretty? Oh, what is that on the tulip's petal? It is a beautiful blue butterfly. There he goes now into the sky. Let's fly high into the sky and try to catch him. I guess he flies too high for us. Here is a patch of clover. Doesn't it look soft? Let's roll over and over in the clover. Now we are ready to walk again. Stay on the path. Oh, remember to take a jump over that old tree stump on the path! Here we are in the field of tall bright sunflowers. I wonder how tall they are. Let's stretch up and reach the top of the sunflower's cup. The sun is setting now for the day, let us sit down and watch it. Now let's follow the path to the gate. Remember to pull the heavy gate closed. We will come to the garden on another beautiful day, and we will play again.

MAKING A TERRARIUM

Written by Karen Hemre and Barb Hyland, Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, S.D. 57016

Grade Level - K-8

Best time of year - Any season, why not try to maintain it throughout the school year?

MATERIALS:

glass box
or/ 5 pieces of glass, cookie sheet, tape
plaster of paris
soil
one pint of gravel
one pint of sand
one pint of vermiculite
powdered charcoal
1 small lid
plants
one small animal, such as a toad or a similar animal

PRE-ACTIVITY:

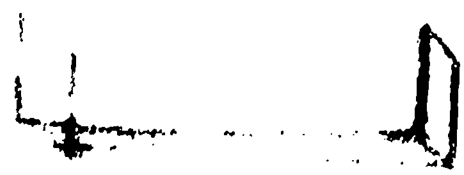
Explain to the students that a terrarium is a created environment, where plant and animals live together. By having a terrarium in the classroom the children can see how the plants and animals grow and discover how each relies upon the other.

PROCEDURE:

If a glass box is not available, you can improvise with 5 pieces of glass, a cookie sheet, and tape.

1. Tape four pieces of glass together:

2. Make a thin paste mixture of plaster of paris in the cookie sheet. Then carefully set the glass frame into cookie sheet.



When plaster is hard, the terrarium is ready for preparation.

3. Place about one pint of gravel on the bottom of the terrarium. On top of this pour about one pint of sand.
4. Mix the soil, vermiculite and charcoal together and pour this over the sand and gravel.
5. Push the jar lid, or pie pan, filled with water, into the soil, (this will be like a small pond in the terrarium). Place a small piece of wood near the water.
6. Now place plants in a careful arrangement. Moss, fern, violet, and creeping snowberries are good plants to use. All of the plants, although different, will be able to live together.
7. Add a small toad, frog, salamander, snails, turtle, or insects, if desired. The plants are similar to their natural surroundings, and there is a place for them to hide and a pond for them. One small animal is plenty in a small terrarium.

OBSERVATIONS:

Watch the terrarium each day. Record some of the things that are happening.

1. Are the plants turning away or towards the sun?
2. What is happening to the water in the pond?
3. Is there water on the glass cover of the terrarium? Why?
4. What does the animal eat?
5. Does he have teeth?
6. How does he catch his food?

The life cycle of the toad could also be studied, (toads, eggs, tadpoles.) How do toads breathe when they are small and when they are adults?

SOIL EROSION AND SERIOUS ENVIRONMENTAL PROBLEMS

Written by Major L. Boddicker, Environmental Education Director, The Interlakes Environmental and Outdoor Education Program, Chester Area Schools No. 34, Chester, S.D. 57016.

Grade Level: K-8

Best time of year: Various activities of this unit are suitable for any time of year.

OBJECTIVES:

1. To create in students an awareness of the types of soil erosion: Wind and water.
2. To introduce to students methods of measuring and quantifying soil erosion.

BACKGROUND:

Soil erosion is perhaps one of the most serious environmental problems faced in South Dakota. We have had very serious soil erosion problems during the 90 or so years the white man has been living here. Peak problems occurred during the "dust bowl" days of the 1930's. We have many shelterbelts, contours, terraces, and watershed management projects which attest to efforts we have made to combat soil erosion. But these efforts have not been enough. Lake Herman is silting in at a very rapid rate. In addition, the soil coming into the lake is carrying heavy doses of chemical fertilizers and pesticide-herbicide residues, which add to the pollution of this lake. This is unfortunate for we know how to eliminate this problem. We are not prepared, however, to make the commitments and spend the money to eliminate the problems. It is important that we prepare our children to be better stewards of our land than we have been. That is the purpose of this unit.

Whenever soil is left exposed to wind and water, erosion results. The amount of exposure, the slope of the land, type of soil, the velocity of wind or the amount of water, all determine the amount of soil that will be eroded. We are all familiar with days when there are heavy loads of dust in the air from wind erosion. Most of us have seen dirt drifts in ditches during the winter and spring.

Fall plowing and summer fallowing contributed to soil erosion. Soil is exposed for long periods of time to both wind and water. Often this soil is not protected from wind or water run off. The result is heavy deposits of dirt in lakes and ditches.

Measuring the amount of soil movement is not difficult. We will explore some simple experiments which will enable you to determine the magnitude of soil movement by wind and water erosion.

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RESOURCE PERSONS:

Soil Conservation Service
County Agent
Soil Conservation District Officers

EQUIPMENT:

1. A baby scale or accurate gram scale measuring in ounces or grams.
2. 4-8 old cookie sheets, pie pans, or any kind of flat, shallow metal pan.
3. 4-8 wooden stakes - marked off in 1/16" sections - old yard sticks will work well.
4. 4-8 flags.
5. 2-4 small spades or shovels.

PRE-ACTIVITY:

Discuss soil, why it is important, why we depend on it for food, clothes and recreation. What happens when the fertile soil is gone or its fertility destroyed? What makes soil move around? List the ways. How can we keep soil from moving around? How do you know soil is being moved around? Do you know of places where soil is moving that we could go to study erosion? How would we measure or tell how much soil has been moved or eroded?

Plan an experiment to measure soil erosion.

EXPERIMENT A:

Locate a fall plowed field near a road ditch, preferably a field which is not protected by a shelterbelt and has exposure to west and northwest winter winds. Place the shallow pans along the fence line in the ditch; protected by the vegetation, but not covered by it. Record the date the pan is set out and mark the spot by tying a flag on the fence above the pan. Now place 4-8 pans near a plowed field protected by a shelterbelt, or next to a pasture or place where there is a plant cover on the ground. Put the pans down and mark them just as we did the others. Leave the pans undisturbed for 2-3 months, from February to May 1st. Return and scrape the soil and other materials in the pan into a sturdy plastic bag, or bags, and return to the classroom. Weigh each dirt sample. Total the sum of the weights and average. Determine the area covered by the pans in square inches or feet. Calculate the amount of dirt that was deposited on the pans by dividing the square feet into the average soil weight.

8 pans X 6"X12" = 4 square feet

8 bags of soil = weight of soil + weight of bags - weight of bags = 500 grams

4 square feet $\overline{)500 \text{ grams}}$ = 125 grams/square foot

How many square feet in the ditch along that field?
Measure from fence to the road edge - 30 feet.
Measure the length of the field -500 feet.
15000 square feet

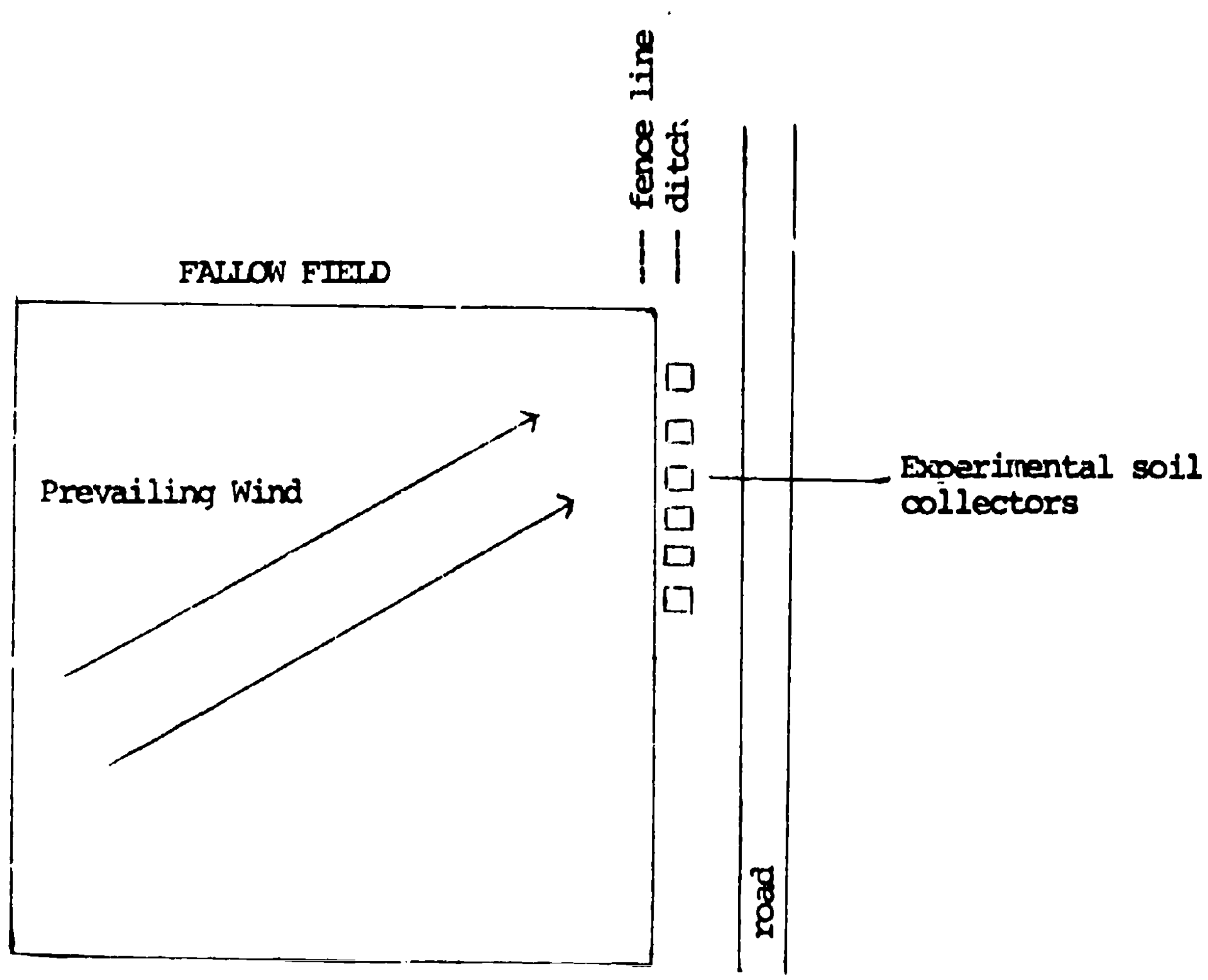
How much soil dropped in the ditch from the field?

  125 grams/square foot
X 15000 square feet
 625000
125
1,875,000 grams = 4,185 pounds
2 + tons of dirt and top soil

FOLLOW UP:

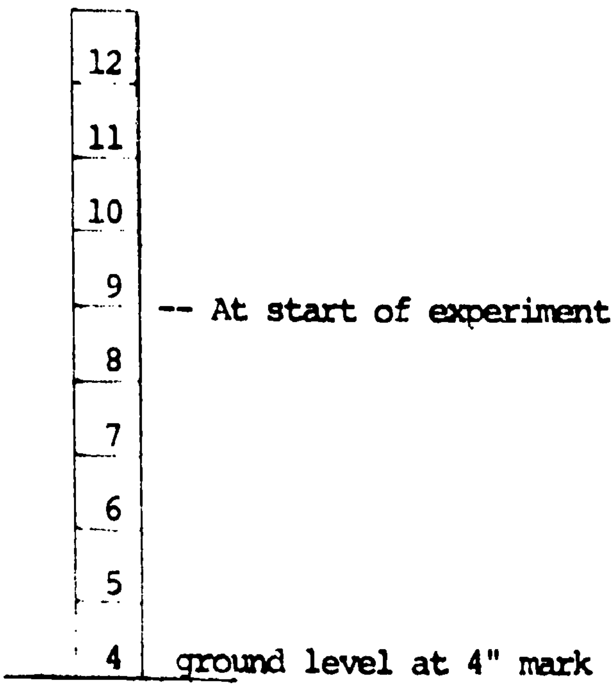
Is soil moving? How much? Is that important? Why? Do you farm the ditches? Does you neighbor get your best soil? How could we stop this erosion? Was there less dirt in the pans by the fields with plant cover? What does this mean to you? What should you do to stop this kind of erosion?

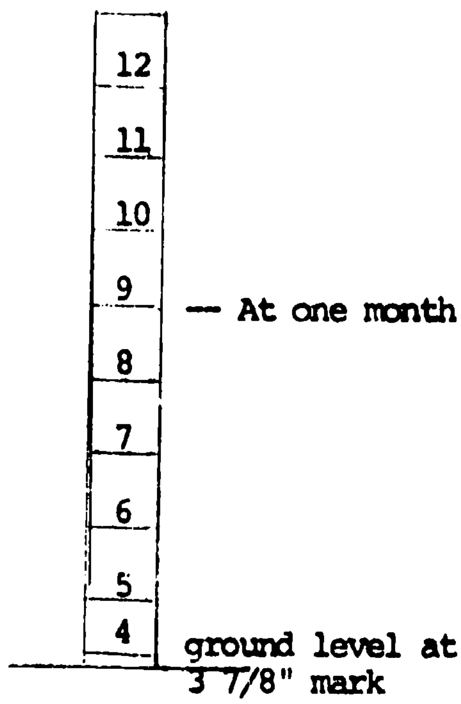
EXPERIMENT A:

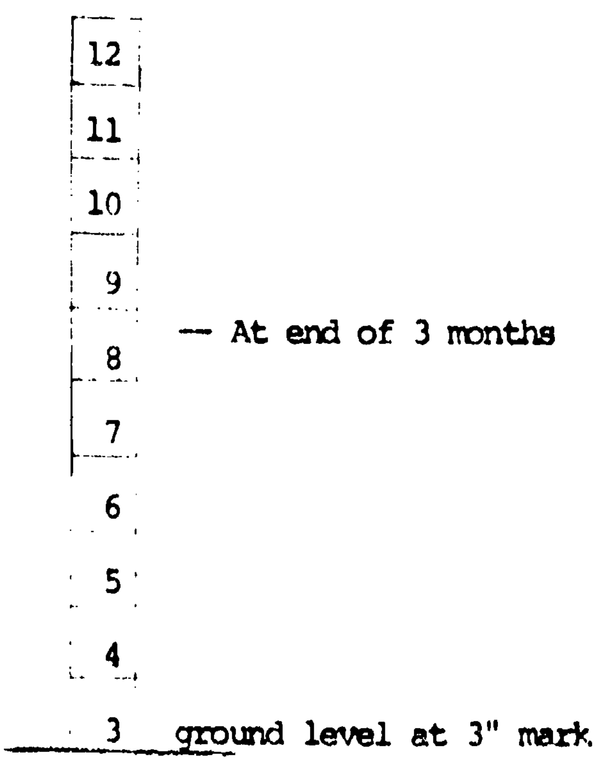


EXPERIMENT B:

Find a fall plowed field with a wind exposed hilltop. Drive into the ground 4-8 rulers, yardsticks or calibrated stakes. Turn the stake so that the narrow side faces the prevailing wind. Record the measurement at ground level. Check once each month and record the measurement at ground level. If a great deal of wind erosion is taking place, soil will erode out away from the yardstick or stake and you can measure the erosion.







FOLLOW UP:

Average the amount of soil that has been eroded from the 8 stakes.

1 - 1/16"	5 - 1/16"	
2 - 1/2"	6 - 1/16"	= 29/16 - 1 13/16 = 1.85"
3 - 1/4"	7 - 1/8"	
4 - 1/4"	8 - 1/2"	

$8 \overline{)1.85}$ = .23

.23 inches of soil, average soil loss from entire field.

How much is that in pounds or tons?

.23" of soil X 300 ft. x 200 ft. =

.23" of soil X 60,000 square feet

.23" X 8,640,000 = 1,987,200 cubic inches
= 1,150 cubic feet of soil

Weigh a cubic foot of dry soil, then multiply that weight by 1,150 cubic feet. This will give you the pounds of soil that have blown or washed away from the field.

Can you afford to lose that amount of soil?

Ask questions as in Experiment A.

OLD BIRD AND ANIMAL NESTS

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416.
(Revised 2-8-72)

Grade Level - 2-4

Best time of year - Fall, Winter

OBJECTIVES:

1. To acquaint students with different types of bird nests and nesting materials.
2. To introduce students to bird preferences in height and type of tree.
3. To introduce the idea of animal dependency on other animals.
4. To introduce the idea of plant dependency on other animals.

MATERIALS:

large paper bags - one per student
one or two step ladders

BACKGROUND:

1. Different bird and animal species use different materials for nests.
2. Different bird and animal species use different nest patterns.
3. Different bird and animal species use nests at preferred heights in preferred trees at preferred sights.
4. Certain insects and mites depend on nests for places to hide in the winter and for food.
5. Mice and shrews use bird nests for storage bins, resting platforms and nests.
6. Nests many times contain seeds which will grow with the help of fertilizer from the nest when the nest falls.
7. Old nests are not used the following year by birds found in the area. You need not worry about harming the environment by collecting them.

PRE-ACTIVITY:

Discuss birds and animal nests. List bird nests of different kinds, shapes, materials, places and heights. Ask the students if birds and animals prefer certain nesting places or do they nest anywhere.

The following are questions you might ask:

1. What happens to the nest when the birds have abandoned it?
2. Do any other birds use it?
3. Do any mammals use it?

4. Do any insects use it?

Let's study and find out.

FIELD TRIP:

Go to a nearby park or natural area and look for old nests. (Mice, squirrel and/or bird nests; collect one or two per person or team). Give each child a data sheet for collection purposes similar to the one attached.

Collect nests after observations are made on height of the nest, type of tree, shape of nest and guess or estimate what bird made it.

FOLLOW-UP:

1. Make a nest display collection - determine the kind of nest.
2. Make up a story about each type of nest including evidence the students found in it. Some examples of evidence are listed below:

    a. mouse droppings
    b. feathers
    c. seeds
    d. insects
    e. mud
    f. pieces of plastic
    g. skeletons and egg shells

3. A sample story is included in this unit.
4. Dissect nests to see what they are made of. List the things that you find. For example:

    a. twigs
    b. grass
    c. mud
    d. feathers
    e. string
    f. plastic
    g. horse hair
    h. wool, etc.

5. Plant some nests as you would seeds and watch to see what kind of plants grow and how many seeds grow from each nest.
6. Set up a Berlese Funnel experiment to extract worms, insects, spiders and mites. Compare numbers from each kind of nest.
7. Follow-up with a review session on what you discovered by having the kids read their stories.
8. Ask the following questions:

    1. What kinds of nests did you find?
    2. Which kind had the most seeds in it?
    3. What was the favorite nesting material?
    4. How many kinds of animals used the bird nest?
    5. How many kinds of birds used animal nests?
    6. Which nest had the most bugs in it?

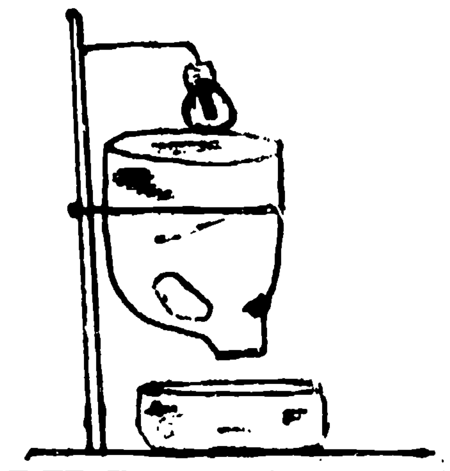
DIRECTIONS FOR MAKING A BERLESE FUNNEL

EQUIPMENT:

1. Plastic Hilex or Chlorox bottle per person
2. Pair of large scissors or knife
3. Pieces of wire or string
4. Goose-neck lamp or clamp on lamp
5. A stand with a right angle upright or rather large box
6. Pliers for cutting wire and tightening

DIRECTIONS:

1. Cut off bottom of a Chlorox bottle for catch pan.
2. Invert remainder of bottle to use for funnel and attach to upright two or three inches above catch pan.
3. Put sample carefully into funnel. Center over outlet.
4. Clean out catch pan and replace and fill with ¼ inch rubbing alcohol and water (mixed half and half).
5. Attach lamp above funnel two or three inches away from funnel and sample; turn on lamp and leave 24-48 hours.
6. Look in catch pan for bugs; study with a microscope and draw and identify.



SAMPLE STORY

Last spring two grown-up robins came to South Dakota from Texas. They wated to raise a family of little robins. They needed to build a nest to protect the eggs. So they looked for a place. They found it in a cedar tree at Lake Herman State Park. The nest was built from grass, string and mud. It was placed about four feet from the ground in a flat fork of a low limb. It was on the southeast side of the tree so it would be protected from the wind that blows in from the lake. Robins probably laid four eggs in the nest. The mother and father robin sat on the nest for many days until four homely, cute fuzzy babies hatched out. Then the robins fed their babies worms and insects until they were ready to fly. The robins all flew away and went south again for the winter.

The nest stayed and pretty soon little insects found it and thought it would be a nice place to hibernate. So, they crawled inside. Then, a little mouse found it and thought it would be a very fine place to sit and eat his dinner. Then ____(name)____ found it and thought, "Oh, what a fire old nest to study!" And I picked it up and here it is for everyone to study.

Next year the robins will come back and build a new nest.

UNDERLINED WORDS WERE EVIDENCE AROUND OR IN THE NEST

NESTING MATERIALS

DATA SHEET

NAME____________________

KIND OF NEST	MATERIALS
Robin	string grass mud wool plastic bag
Goldfinch	thistle down feathers grass
English Sparrow	straw feathers string grass
Mourning Dove	twigs
Squirrel	leaves grass ferns twigs corn husks
Blackbird	grass string plastic bag
Field Mouse	grass paper

SAMPLE DATA SHEET

TYPE OF NEST	KIND OF TREE	KIND OF FORK	NEST SHAPE	NESTING MATERIAL	HEIGHT OF NEST ABOVE GROUND
ROBIN	CEDAR	Y SHAPED	CUP	MUD & GRASS	5 ft.
DOVE	PINE	FLAT	SAUCER	TWIGS	4 ft.

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WIND

[illegible] and the staff of the Interlakes Environmental and [illegible] Program, Chester, South Dakota 57016. Phone: 489-2416. (Revised [illegible]).

Grade Level - 3-8

Best time of year - any time as long as there is wind

OBJECTIVES:

1. To acquaint students with good and bad characteristics of wind.
2. To develop in students an awareness of what causes wind.
3. To acquaint students with the different effects wind from different directions has on the weather.
4. To encourage students to discover why the wind speed is different at different places, for example, next to a building, in an open field, in a shelterbelt or near some trees, etc.

BACKGROUND:

Wind is a definite benefit to man and his environment in several ways. For example, it helps to pollinate various plants and aids in the dispersal of seeds. Wind brings the clouds that give us rain and other forms of moisture. In some areas, windmills are used to pump water. Wind may be used for recreational purposes such as sailing, gliding, kite flying, etc. Wind controls our weather.

What causes wind? Wind is caused by an interaction of warm and cold air masses. Hot air rises leaving a vacuum effect and the cooler air "blows" in to replace it. Extremes in weather are caused by extreme, unequal heating of parts of the earth.

In addition to being beneficial to man, wind can also create conflicts for man with his environment. For example, wind often blows away the topsoil when man has not taken proper care of the land. Tornados and hurricanes cause extensive damage. These are called windstorms. Although we don't all see tornados or hurricanes, we can see miniature examples of them. In the summer when we see whirl winds or dust devils we are seeing the wind in action.

MATERIALS:

Dwyer wind gauges (available at the Interlakes Office)
5-6 helium filled weather balloons
5-6 self-addressed postcards with directions for returning the information.

PRE-ACTIVITY:

Talk to the students about the wind and weather. Ask them questions similar to the following:

1. What is air?
2. Can you taste it?
3. Can you feel it?

4. Can you see it?
5. Does it have weight?
6. Is air heavy?
7. Can you see it?

8. When is air "hard?"
9. When is air heavier?
10. What is wind? What does it have to do with air?
11. How is wind like running water?
12. How is wind good to us? List the ways.
13. How is wind harmful to us? List the ways.
14. How is wind affected by other things?
15. Does a shelterbelt slow down wind? How?
16. Do buildings slow the wind down? How?
17. Is the wind speed the same on all sides of the school house on a windy day?
18. How do we know that the wind blows?
19. What causes the wind to blow?
20. How can we tell wind direction?
22. Why is it important to know about wind speed?
23. What is wind chill?
24. How can we find out what the wind chill temperature is?
25. Is the wind chill the same on all sides of a building?
26. What does man do to modify the effects of the wind?
27. Does man's modification of the wind benefit anyone besides man?

Show the students the wind gauges and ask them if they know what they are for. If there is a fan in the room, turn it on and demonstrate the effect of the wind on the little ball in the wind gauge. Give the students a chance to take the wind speed of the fan. This will be good practice for them and will show how wind speed of the fan effects the gauge. This will also allow them an opportunity to see how the readings will vary as they position the gauge in different places in front of the fan.

Suggest a field trip to study wind. Is the wind speed the same on the ground as it is in the air? Why or why not?

Introduce the use of the wind gauges and suggest a few different places where they might take wind readings. List student suggestions for wind readings.

It might be interesting for the students to send up a helium filled balloon (these can be fixed up with baggies tied on with postcards containing a name, address, purpose, etc.). Have the students release the balloons with the possibility of getting some of them back by people who found them.

Have the students ever heard of a helium filled balloon? Would you like to send a couple of them up? How can we find out where they go? Let's send postcards along so if someone finds the balloon, they can send it back. How far do they think the balloon will travel?

In addition, the students might guess which direction and how far he thinks his balloon will travel with the aid of a map of South Dakota.

FIELD TRIP:

Have the children divide into working groups of three or four each.

This activity can be done in the school yard. Have the students take wind readings for direction and speed at designated places and heights. One student in each group should record the data collected. Temperatures may also be taken and the wind chill determined by reading a wind chill chart.

Each group should then release their balloons and observe the direction in which they go.

NOTE: Have the students release their balloons in an area clear of trees, high lines, etc.

POST-ACTIVITY:

Put the wind readings for different locations on the board and discuss the variations and why they exist. Ask questions from the pre-activity over again.

Find out wind direction and once again with the map indicate direction in which the balloons went; further speculate about where the balloons may be found.

If the field trip is done in conjunction with a field trip on winter temperatures, the students can find wind chill readings and determine where they would stay the warmest the longest on a winter day.

See wind chill chart on attached page:

WIND CHILL CHART

Actual Thermometer Reading (F)

Estimated wind speed in m.p.h.	50	40	30	20	10	0	-10	-20	-30	-40	
Calm	50	40	30	20	10	0	-10	-20	-30	-40	
5 mph	48	37	27	16	6	-5	-15	-26	-36	-47	-57
10 mph	40	28	16	4	-9	-21	-33	-46	-58	-70	-83
15 mph	36	22	9	-5	-18	-36	-45	-58	-72	-85	-99
20 mph	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110
25 mph	30	16	0	-15	-29	-44	-57	-74	-88	-104	-118
30 mph	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125
35 mph	27	11	-4	-20	-35	-47	-67	-82	-98	-113	-129
40 mph	26	10	-5	-21	-37	-53	-69	-85	-100	-116	132

Wind speeds greater than 40 mph have little additional effect	LITTLE DANGER (for properly clothed persons)	INCREASED DANGER	GREAT DANGER

A FOURTH GRADE PSALM . . .

1 I thank you, Lord,

2 For the smell of green pine needles and the feel of the sun on me when I lie in the grass,

3 For the sound of the crust on the snow, and the feel of snow as it falls upon my clothes,

4 For the feel of sand between my toes, and the smell of a garden after a rain,

5 For the smell of wild honeysuckle when I go hiking, and the sound of sheep-bells in far-away pastures,

6 For the feeling of a little chicken, and of a little rabbit's fur,

7 For the feel of rain on me when I go swimming, and the wind on my face when I see the stars from a tall house at night,

8 For the smell of the woods when the flowers are coming out, and the sound of the band jumping in my heart,

9 For the feel of flies creeping on me, and the feeling of my dress when someone is fixing it,

10 For the sound of the baseball when it hits the catcher's mitt, and for the feel of the ball hitting the bat,

11 For the sound of a lawn mower, and for the smell of candy on the stove when mother is cooking,

12 For the feel of lard between my fingers, and the smell of the basement after the fruit has been put up,

13 For the feel of a toothbrush in my mouth, and cold water on my face in the morning,

14 For the smell of rust out of an old gun,
and the feeling of clippers cutting my
hair,

15 For the mud squashing up between my
toes after a rain, and the peep of little
birds when their mother brings them
food,

16 For the feel of the teacher's hand touch-
ing me, and the prickle of grass when
I go bare-footed,

17 For the feel of swinging high and for
wind blowing through my hair,

18 For these, and all the other lovely
things, I thank you, Lord.

. . . Written by fourth graders
Time, place and publication unknown

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YOUR COMMUNITY HISTORY

Written by Mrs. Cosette Nicholson, Elementary Instructor, Franklin Middle School, Chester Area Schools, Chester, South Dakota. Adapted by the Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, S.D. 57016. Phone: 489-2416.

Grade Level: 4-8

Best time of year : Anytime

AIMS:

1. The study should arouse the pupils interest in their own community, county and state.
2. They should want to learn more about the growth and history of their area.
3. The study should provide an opportunity to differentiate between concepts of early settlers and the people of today.
4. They should better understand that people living in large cities, small communities or remote areas all have the same basic problems of living.
5. They should be more aware of how different their lives would be had they grown up in another community, or area in the United States.

OBJECTIVES:

1. To learn what a community is and how it grew.
2. To provide for a series of related experiences that will give the child an awareness of the history of his community.
3. To give them a better sense of appreciation for the heritage which is theirs.
4. To develop an understanding of the way the people in the community have adapted their way of living to their environment.
5. To assist the child to a greater awareness of the need for cooperation.

BACKGROUND:

In 1870, all there was to see in Franklin Township was mile after mile of waving prairie grass, jack rabbits, prairie chickens, wolves, and coyotes. A few buffalo wallows where the buffalo used to be still existed. Caravans of Indians passed through every spring from the Rosebud Reservation to Pipestone, Minnesota to get the redstone to carve into pipes, tomahawks and all kinds of trinkets. In the fall they would return following the trail, as the crow flies. The men riding and the women walking, carrying their babies on their backs.

As they traveled through this area they left signs of their culture; arrowheads, hammer heads of stone, pottery and knives.

The first settlers came in covered wagons; some came alone; some came in caravans. The wagons were drawn by oxen. Many of the settlers homesteaded and the land still belongs to a younger generation. Some of the settlers bought the relinquishment from another settler. Free land was given if you set out trees. This was known as a tree claim. Many of the trees were saplings taken from Brandt Lake.

The pioneers built sod houses with dirt floors. They twisted hay for fuel to heat the homes and to bake and to cook. The children were kept busy picking up cow chips to burn. Many of the people traveled by "shank's mare". They used the leech barrel, slept on mattresses made of corn husks and straw and used the muzzle loading shotgun.

After reading the above true story to the children, they are well motivated, their interest is high and they are ready to find out more about their community.

PRE-ACTIVITY:

Read the poem Indian Children and discuss it. Most of them will memorize it.

INDIAN CHILDREN

by - Annette Wynne

Where we walk to school each day -
Indian children used to play.
All about our native land,
Where the shops and houses stand.

And the trees were very tall,
And there were no streets at all,
Not a church and not a steeple -
Only woods and Indian people.

Only wigwams on the ground,
And at night bears prowling round.
What a different place today,
Where we live and work and play.

There are many other pre-activities. Use pictures and books to learn about Indians that settled in your community. Use pictures to show the types of implements the early settlers used by the early settlers compared with the modern machinery of today.

Locating resource people: Look for people in your own community who can come to school and talk with the children. Many of them will have old pictures and books to show with them. Many families still have antiques in their home. Some of the children may have seen them. Have them tell about what they've seen.

Let the children help in the planning of the activity. They can ask some good questions.

1. Where is Franklin located?
2. How old is this community?
3. How did the community get its name?
4. Who were the first settlers and from what countries did they come to this community?
5. What attracted the settlers to this area?
6. What were their homes like, their food and transportation?
7. How did certain plants get started? Who brought them and from where did they come?
8. What was the first crop planted?
9. What were the prices of crops, livestock and farm land?

Early settlers who came to the grasslands had problems that they had to face. Why were they problems and how did they solve them?

1. building homes
2. raising cows
3. prairie fires
4. plowing
5. heating homes
6. blizzards
7. drought
8. depression

Early settlers provided for education:

1. Who built and paid for the schools?
2. What do you think the children learned at school?
3. How long was the school term?
4. Where did the teacher live?

Were there Indians in this area?

1. What tribe of Indians were there?
2. Did they camp here or nearby?
3. Have you found signs that Indians were in this area?

What did the settlers do for recreation?

1. Did they dance and play cards?
2. Did they hunt and fish for pleasure or for food?
3. Were there many fish and game birds?

FIELD TRIP AND SPEAKER:

A trip to the museum may be planned. Invite the curator to visit your school and talk with the children regarding early history of their community and state.

POST-ACTIVITY:

Make a booklet of all the information gathered. Draw pictures of Indians, covered wagons, homesteads, birds and animals.

Compare modern living with early life:

1. What do people today do for a living?
2. Are there churches in your community?
3. Is there a shopping center near your home?
4. Where do you get your mail? What branch of service (government) does he represent?
5. How do law officers serve in your community?
6. Where do the children go to school? What kind of school? Is there a college near you?

SKILLS TO BE STRESSED:

Map reading with particular emphasis upon reading local and state maps. Research by finding out more about local community and state. Applying historical and geographical knowledge to the local community. Cooperative group enterprises.

QUESTIONS FOR THOUGHT:

1. Did the early settlers utilize the natural resources? Did they conserve the soil? How did the trees get started out here?
2. Why plant groves and fruit trees (orchards)? Did this save the soil from washing away?
3. Did they rotate crops?
4. Did they have radio and television to tell of storms? How did they tell if a storm was coming?
5. Did they have weeds, insecticides, pollution and throw away cans, etc.?

This activity has unlimited possibilities. Old Atlases from 1905 to the present time were studied. Township maps were used - locating the sections the first settlers settled on and the location of school land. How many acres in a section, how big is a section, and why do farmers build dams, stock ponds and shelterbelts?

ANIMAL POPULATIONS

Written by Jerry A. Larsen, Assistant Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416
(Revised 2-8-72)

Grade Level - 5-8

Best time of year - Summer, Fall

OBJECTIVES:

1. To acquaint students with a method of estimating animal populations.
2. To acquaint students with the natural increases and decreases in population levels.
3. To determine movement in populations.

BACKGROUND:

Animal populations are dependent on many factors. Predator populations will affect the population levels of its prey to a certain extent. The effect of the predators is to keep a healthy population of the prey by eliminating inferior members of the gene pool (those individuals which are not physically and mentally capable of existing). Healthy individuals are also killed by predation, but this is minimized when proper habitat is present. This concept can be demonstrated by scientific experiments using insects. Rises and drops in population density can be demonstrated by collecting individuals, marking them, releasing them and recapturing them again. Movement from one area to another can also be demonstrated. When the food supply drops, animal populations have a couple of alternatives. They can either move to another area where there is sufficient food and habitat to support them or they can hold a constant level or drop to the level that the existing habitat can support. This is where the predators role comes in. The predator will eliminate the individuals that are in excess of the carrying capacity of the available habitat (those that the habitat will not support). If there are no predators to curb the rising populations, starvation results. Regardless of the manner in which the animals die, starvation or predation, the habitat will only support a certain number.

We will use the grasshoppers or other large insects as a tool for measuring populations and noting movement and natural rise and fall of the populations.

MATERIALS:

- insect nets
- glass jars
- stakes and string or twine
- tape measure - optional
- fingernail clippers

PRE-ACTIVITY:

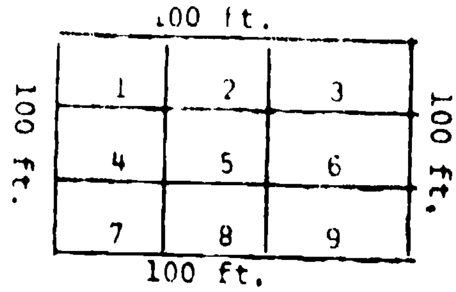
Introduce the activity with questions similar to the following:

1. What do grasshoppers eat?
2. When do you see grasshoppers?
3. Are there more in the spring or in the fall?
4. What eats grasshoppers?

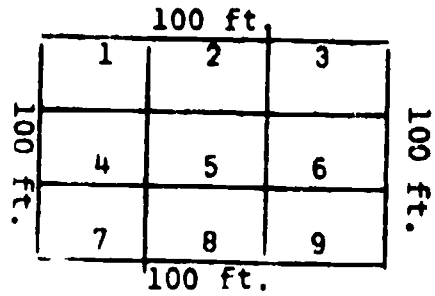
5. Do grasshoppers do any harm?
6. Do grasshoppers do any good?
7. How do grasshoppers move from one area to another?

FIELD TRIP:

First day -- set out stakes 100 feet apart with a twine string between stakes to separate areas as shown below:



Stake out areas side by side, one area for each group of two or three people. If you don't have a tape measure, step off about 40 steps between the stakes. The area will resemble the following:



IDENTIFICATION OF MARKINGS:

Number 1 - left middle leg clipped
Number 2 - right middle leg clipped
Number 3 - left antenna clipped
Number 4 - right antenna clipped
Number 5 - left wing cover clipped
Number 6 - right wing cover clipped
Number 7 - left front leg clipped
Number 8 - right front leg clipped
Number 9 - both middle legs clipped

Try to include different types of habitat such as grass, alfalfa, confield, etc.

Have each group collect as many grasshoppers as possible in 15 minutes and put them into jars.

Take the grasshoppers to the center of each area, clip the insects wing, leg, antenna or whatever part that is easily identifiable and not disable seriously or kill the insect. Use the above marking code. Release the grasshoppers in the areas where they were captured. Record the number of grasshoppers marked and released.

Second day -- have each group collect as many grasshoppers as possible in 15 minutes. Put the grasshoppers in jars.

Count the total number of grasshoppers and the number of marked grasshoppers; record the part which has been marked.

Third day -- (optional) this can be continued to determine a rise or drop in population movement of grasshoppers back and forth to the other areas.

POST-ACTIVITY:

Set up a Lincoln Index formula for each area and determine population levels. Ask the students about movement of grasshoppers from one area to another. Ask about difference in populations and why. If the study is continued, ask why the change in population.

LINCOLN INDEX FORMULA:

$$\frac{\text{number captured second day}}{\text{estimate of the grasshopper population}} = \frac{\text{total recaptures}}{\text{total marked grasshoppers}}$$

Could you use this technique to estimate how many fish there were in a lake, or pheasants in Lake County?

For example: Let's say you catch and mark 150 grasshoppers the first day. The second day you capture 225 grasshoppers and of those 50 were marked. The equation would read as follows:

$$\frac{225}{X} = \frac{50 \text{ recaptures}}{150 \text{ total marked}}$$

$$50\,X = 150 \times 225$$

$$X = 675 \text{ grasshoppers}$$

WHAT DO WILD CRITTERS EAT?

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416. (Revised 2-8-72).

Grade Level - K-3

Best time of year - Anytime. This would be a good activity to do in the Fall, Winter, and Spring.

OBJECTIVES:

1. To introduce students to the ideas of the dependency of plants and animals to each other.
2. To allow students to discover that some wild animals, birds, and insects harvest crops intended for livestock and man.
3. To show students that birds and mammals need plants,but most plants do not need birds and mammals for their existence.
4. To increase childrens' awareness of things going on in the out-of-doors so that they will begin to look for them,study and draw conclusions from their observations.
5. To help children to learn how to investigate.

BACKGROUND:

One of the first questions asked by children after they discover what a bird, animal, or insect is, is "What do they eat?"

In man's management of the environment it is essential that he is careful to include food for wild things as well as for man.

Many creatures have very limited feeding habitats. Some insects will eat only milkweed sap. If we destroy that food source, they will eat nothing else. Man has done this to many creatures. Did you know that the passenger pigeon ate almost nothing but acorns, hazel nuts, hickory nuts, beech nuts and other mast? And in the 1800's man destroyed vast areas of nut tree forests. Some scientists believe that our destruction of the forests for lumber and firewood was as important in destroying passenger pigeons as market hunters.

It is an interesting exercise to have children look for signs of what animals eat, the plants they favor, and what they leave behind.

MATERIALS:

1. paper bags or cloth sacks
2. magnifying glass or dissecting scope

PRE-ACTIVITY:

Introduce the activity as a scientific study of food for creatures. Use this study in conjunction with your regular bird, insect, or mammal units. Ask the children to help you think of foods for different kinds of animals. List them The following questions might help:

What do sparrows, pigeons and doves eat?
What do robins, wrens, warblers and blackbirds eat?
How do you know? Did you watch them eat? Or hear that someone else saw one eat?
What do hawks and owls eat?
Why don't hawks and owls eat corn?
Why don't pigeons and doves eat meat?
Do most birds eat meat or plants? Why?
Where do you see most birds eating? Why?

Repeat the above questions for mammals and insects adding the following:
Did you see any evidence that plants ate insects, mammals or birds?
Did you find any evidence that plants needed animals or birds for anything?

If we scare all of the birds away, how can we tell what they have been eating? Let's be scientific detectives and make a field trip to find out. Let's look for clues and evidence.

Make a list of evidence and clues. Ask the students to do the listing.

1. Seeds on the ground.
2. Holes in seeds or plants or bark.
3. Holes in leaves and fruits.
4. Manure piles
5. Feathers and bones.

FIELD TRIP:

Evidences of feeding birds, insects and animals can be found anywhere. The Madison Waterfowl Production Area, Lake Herman State Park, Buffalo Slough or the school grounds will do.

Ask the students to look carefully and study. Pick up clues to bring back to class.

The Interlakes Office can provide you with help in locating study areas and help you to identify clues so you will feel more prepared to assist your students. Some clues are tough to find and subtle. They are some of nature's secrets themselves that we can unlock for the children. We can help students unlock these secrets by themselves.

POST-ACTIVITY:

Make posters showing the evidence collected. Sort evidence into animal, bird and plant categories. Follow-up with pre-activity questions. Here are a few you might find helpful:

1. What kinds of food do lots of animals eat? Do we eat that type of food?
2. Did you find food that just one kind of animal eats? Why? Do people eat that for food?
3. Do most animals eat plants or other animals?
4. Do most birds eat plants or other animals?
5. Do most insects eat plants or other animals?
6. Did you find places where there were no signs of animals eating things? Why?

Try to piece together picture stories of **critters** all eating food in a shelterbelt like at a banquet table.

Try putting out food stations, bird feeders, etc. to study eating habits of birds and mammals.

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GHOSTS OF THE PAST

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. Phone: 489-2416. (4-20-72)

Grade Level - K-4

Best time of year - spring or fall

Best place - A plowed field which has been rained upon, near a lake or river and stream with a history of Indian activity or early settler activity.

OBJECTIVES:

1. Provide children with first hand knowledge of evidence of the activities of native Americans in their home town areas.
2. To acquaint children with the concept that people throughout history lived on and used lands and waters that filled basic needs and that this thread connects all of us.
3. To acquaint students with tools, awareness and interest which will cause them to explore their own heritage.

BACKGROUND:

The lakes, creeks and hills of eastern South Dakota were once the domain of various tribes of Indians back into history. The Sioux Indians present when the first settlers came into this area just over 100 years ago, were preceded by other Indians which left signs of their activity. As the time widens between the peoples and cultures which preceded us, more and more of their history becomes irretrievable. The history of our forebearers for the most part has been lost as well. Many of us know very little about who our grandfathers were and what they did during their lives. We know much less about our great-grandparents and nothing of their parents.

Most of us do not know when our forebearers came to this continent or what role they played in the history and development of this country. This activity is primarily intended to interest children in the history of people in this area and give them the idea that history is recorded in the environments in the things man has done and in the signs he has left.

Man has generally congregated around areas that provided for him food, water and shelter. We still congregate in these places. Man through time eternal has left signs of this activity (litter) on the landscape. Some of it remains after hundreds and thousands of years to testify to man's presence. Hundreds and thousands of years from now man will be finding signs of our activity from the litter we have left.

In most any plowed field near a body of water, you can find evidence of native Americans. Chips of arrowheads, arrowheads, thumb scrapers, fleshers, hammer heads, pieces of pottery, animal bones can be found indicating the presence of Indians. Old pieces of farm implements, glass, shotgun shells, cartridge cases, cans, wire, etc. may be found as an indication of more recent history. A study of the landscape will show where men dug trenches, piled rocks, drove ox carts and wagons, built railroad grades and farmsteads, all of which were long ago abandoned and have been forgotten. We need to develop a tradition and roots in this area. We need to look at history not only what we have done as a country, at what Presidents and war heroes have done, but what we have done here.

The problem which is then identified in this activity and will be expanded on in other activities is to develop a process for students to use in which they can develop their history and develop their thinking into considering their impact on the future, the history they will make. This activity is just a beginning. Depending on the county and the community in which you live, there may be excellent sources for historical information at hand. Many older members of our communities have done a great deal of chronicling the events of their lives and those of their forebearers. Invite them to your classroom to discuss this historical information. Perhaps they will let you borrow books or photos to help you.

MATERIALS:

small paper sacks
Indian or other historical relics

PRE ACTIVITY:

This can be done in many ways. Perhaps you have a unit in which you study Indians and pioneers already in your routine. That is an excellent pre-activity. Try to include in this study relics of Indian activity in the area. Most communities have persons with collections of arrowheads and other artifacts. They may also have antique collectors with a wide variety of pioneer tools, utensils, furniture etc. Arrange for demonstrations of these items. The following are questions which you might use to stimulate interest and include the children in the planning of the activity.

Who lived in this area 50 years ago?
Do you know anyone who did?
Do you know anyone who lived here 100 years ago?
Do you suppose Indians lived here?
How do you know that people lived here 100 years ago? Do books tell us? Do people tell us?
How can we find out for ourselves?
Where do you suppose Indians lived here?
Where do you suppose Indians used to camp around here?
Have you ever found signs that Indians lived here?
What were they? Where did you find them?
Did you find signs of pioneers there too?
What are some signs of pioneers that you might find?
Do you really believe that Indians lived here a long time ago?
How many really believe it? How many don't? How can we find out?

Let's go looking for evidences for ourselves.

What shall we look for? (Make a list and show students examples of these things if you can arrange for them).

1. arrowheads
2. flint chips and pieces of arrowheads
3. scrapers, knives and hammer heads of stone
4. bone pieces and implements
5. pieces of pottery

Ask the students for suggestions about where you might go to find such things.

FIELD TRIP:

Arrange for a one half to one hour trip to a cultivated field near a lake or large stream. Be sure the owner has been notified and permission obtained. Also be careful not to harm any crops that might be planted. It is best to go in early Spring before the crops are planted or in the fall after the crops are harvested. Hunting is best done after a hard rain has fallen on a plowed and disked field. Lake shores are also productive at times.

Have the students spread out and look for Indian and pioneer signs. If the students find something, have them place it in their bags or have them notify the rest of the class to take a look at their treasure and then leave it. Keep records of what was found and where.

Note also that it is illegal to collect and take home arrowheads etc. on Federally owned lands like National Parks, Indian Reservations, National Grasslands, etc. It is not illegal to look for and find them. It is not illegal to collect and take home artifacts from private lands. Use your best judgement as to what you do with your class. Perhaps it would be best to return the artifacts to the area they were found in after studying them. Or, perhaps you will want to keep them for future reference and "seeding" for your classroom use.

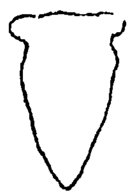
POST-ACTIVITY:

Display the artifacts and evidences you collected.

Write a description of each.

Make a museum display.

EXAMPLE:



Arrowhead - bird point made of agate stone
by South Dakota Sioux Indians

Found on the northeast corner of Lake Madison
4-25-72 on shoreline by J. Smith

Buffalo bone vertebrate

Found on the east bank of Buffalo Slough in an old garbage pit from an Indian Camp ground.
4-27-72 by J. Smith

Following are questions you might use as a follow-up:

Who was the best artifact hunter?
Where did you find the most artifacts? Why?
Did you find more artifacts of Indians or of pioneers or modern people?
Did you find Indian artifacts made of metal? Why or why not?
Who lived in this area 50 years ago?
Do you know anyone who did?
Who lived here 100 years ago?
Do you know anyone that did?
How do you know that people lived here 100 years ago?
What historical things do books tell us?
Can people tell us about historical events?
How can we find out for ourselves?
Do you suppose Indians lived here?
Where do you suppose the Indians' towns or villages were located?
Do you know where Indians used to camp around here?
Have you ever found signs that Indians lived here?
What were they? Where did you find them?
Did you find signs of pioneers there too?
What are some signs of pioneers which you might find?
Do you really believe that Indians lived here a long time ago?

Write a historical story based on the evidences you found.

If you are interested in trying this activity, contact the Interlakes Office --489-2416. We have the support materials to help you get started.

WHAT LIVES IN WATER? BEST COPY AVAILABLE

(A Fishless Aquarium)

Written by Barb Hyland and Rita Brown, Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, S.D. 57016. Phone-489:2416

Grade Level - K-2

Best time of year - Anytime

OBJECTIVES:

1. To introduce students to the use of microscopes and a study of microscopic animals that live in water.
2. To introduce students to the concept of pollution and how it relates to the food chain.

BACKGROUND:

Hours of investigation can result from a simple pond water aquarium. Children are fascinated by the creatures found in this water and can easily become familiar with them. In addition, it gives the teacher an excellent opportunity to introduce the concept of the different environments. This activity can be started in September and finished in May, or it can be done in one afternoon.

The essential part of this activity is finding a good source of water life. In fall and spring any lake, pond, creek, or slough shoreline will have an abundance of life. Look under and on rocks, in algae clumps, in mud, and on water plants. During the winter, good samples can be taken at springs, riffles in streams which do not freeze, or under ice near the shoreline.

PRE-ACTIVITY:

1. Introduce the study of water animals. Make a bulletin board on the different animals that live in water. This builds up the curiosity and adds to the enthusiasm of the students.
2. A finger play "Five Little Animals"
   Five little animals, swimming in the lake --
   The first one said, "Swimming is great." (Swim with hands)
   The second one said, "Hey, wait!"
   The third one said, "Let's swim away." (Swim with hands)
   The fourth one said, "Let's stay."
   The fifth one said, "Come over and play." (Motion with finger)
   Then along came a big fish. (Make hands look like fish)
   And the five little animals swam away. (Swim away with hands)
3. A story on the different animals could be read-for example: "The Scud Book"
4. The following questions might be asked:
   Where is water found? (Lakes, streams, ponds, rivers, etc.
   What do we use water for?
   What color is water?
   What does water smell like?
   What lives in water?

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FIELD TRIP:

In preparation for the outing ask the students to bring a clean jar, with a lid. The students should wear rubber boots on the field trip. Take the students to a nearby pond and have each student collect a water sample. Each student should try to get some gravel and mud in the bottom of the jar. Then get some water with plant and animal life in it. (If this is impossible, the teacher could collect one large sample for the entire class.)

POST-ACTIVITY:

After the mud has settled, children can study their water samples.

1. Does the container have creatures swimming in the water?
2. Are there creatures on the surface of the mud and rocks?
3. Are there creatures on the side of the jar?

After this brief discussion, set up microscopes for a more detailed study of the animals. Give each student a sturdy paper plate to put his water sample on. (The Chi-Net Brand is good), an eye dropper, and a glass slide.
Explain what to do and how to use the equipment. Students will observe the animals for hours. If you want to keep the aquariums, put the water back in the jars and keep in a sunny, cool place. Otherwise, just throw the water samples out. If you keep the samples, make observations every-day.

1. Does my jar have the same creatures as everyone else?
2. Does my jar have as many creatures as the day before?
3. Is the color of my water the same as everyone else?

These aquariums will last for several weeks. To assure this, some precautions should be taken, (1.) Don't add food to the water; (2.) Add distilled water, if the pond water evaporates; (3.) Keep the jars in a sunny and cool place.

OTHER ACTIVITIES:

1. Many of these organisms are beautiful and could serve as subjects for an art lesson.
   (a) Encourage the students to draw, color, and describe what these creatures look like and act like.
   (b) Fishy Finger Painting. (refer to art booklet)
   (c) Fishless Aquarium with waxed paper. (refer to art booklet)
2. Set up a pollution activity by adding different substances to the water, such as soap or detergents. Add a drop of one of these to the water each day, and watch the change. Discuss what happens.
3. As part of the field trip, try this game:
   "Fish Eye View"
   At the pool, beach, pond, or lake, look at the world from water level. What can a fish see?
4. Tell a story about the activity.
5. If you keep the aquarium - try to count the animals each day to see if they vary from time to time.

MATERIALS:

1. Microscopes
2. Hand lens
3. Microscope slides
4. Methyl cellulose (a solution for slowing down aquatic life so you can study it more easily.)
5. Pictures of water life for identification
6. Eye Dropper
7. Paper plates (Chi-Net)

A MATCHING GAME

SUITABLE FOR K-2

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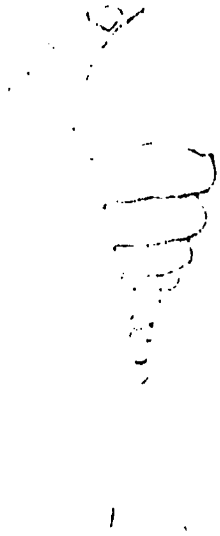

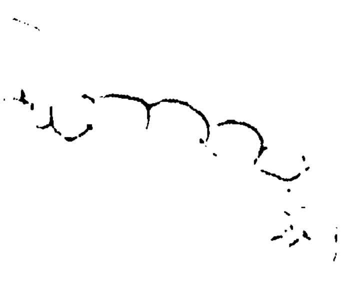

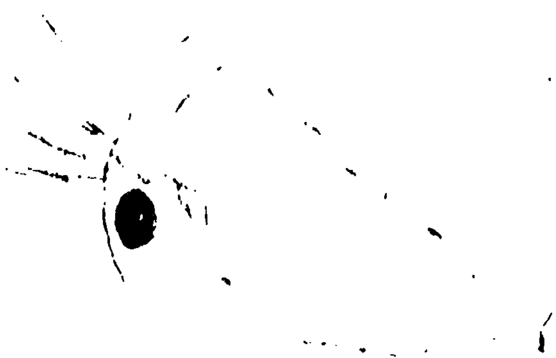

UNSCRAMBLE THESE WORDS
(Suitable for K-2)

m o r s w

g u b s

y e e - d e r o p p

s l a m i n a

l i d e s s

s c o p e m i c r o

w e e d d u c k

e r t a w

s a s r g

s d e s e

Use these words to unscramble the words above:

bugs

animals

microscope

water

grass

seeds

duckweed

slides

eye-dropper

worms

Find the hidden words

b u g s e c g k t s z w o r m s

v a c e d f k m b o p z v x i a

a b l e i z c y c l o p s x c b

n o m d f g x u v c w a t e r c

i e b s w g t r s d a r o s o f

m y b l i r k e a l t l e v s k

a a p t c a a r b r e i s d c z

l e i l e s f r u a r m r e o o

s l i d e s e l l i f w f t p e

g w a t e r b e e t l e o r e t

a e a i d u c k w e e d o u i l

b n e r a a t i c x a e e d t z

c b a c r d p a s c u d v c v

e w a s e e d s h r i m p g t s

d w a t e r b o a t m a n k o n

e y e - d r o p p e r w t v m n

See how many of these words you can find.

scud	microscope
seedshrimp	water
cyclops	grass
water flea	seeds
water boatman	duckweed
water beetle	slides
bugs	eye-dropper
animals	worms

Find the Hidden Words

ANSWER SHEET

b u g s e c g k t s z w o r m s

v a c e d f k m b o p z v x i a

a b l e i z c y c l o p s x c b

n o m d u v c w a t e r c

i e b s w g t r s d a e o s o f

m y b l i r k e a l t l e v s k

a a p t c a a r b r e i s d c z

l e i l e s f r u a r m r e o o

s l i d e s e l l i f w f t p e

g w a t e r b e e t l e o r e t

a e a i d u c k w e e d o u i l

b n e r a a t i c x a e e d t z

c e b a c r d n a s c u d v c v

e w a s e e d s h r i m p g t s

d w a t e r b o a t m a n k o n

e y e - d r o p p e r w t v m n

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WHAT LIVES IN A SHELTERBELT?

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota Phone: 489-2416
(Revised 2-8-72)

Grade Level - K-4

Best time of year - Fall, Spring, Winter

OBJECTIVES:

1. To acquaint students with the different types of trees.
2. To acquaint the students with the plant, animal and insect life associated with trees.
3. To acquaint the student with the effect a shelterbelt or grove has on surrounding areas.
4. To acquaint the students with the concept of seasonal changes in weather and the effect it has on plants and animals.

MATERIALS:

pencils
drawing paper and/or data sheet (see attached sample)
paper bag

BACKGROUND:

Trees are a very important part of our surroundings. They are very pretty to look at and are also homes for birds, insects and mammals. We all know that trees are a good windbreak for us in the winter and summer. They are fun to climb and have tree houses in. When we hear birds singing in the morning and evening, we can appreciate the fact that there are trees around. Let's study trees and their effect on our surroundings.

PRE-ACTIVITY:

The pre-activity will vary with the time of the year and the part of the study being concentrated on. This is a very good activity to carry out in all three seasons. Also, it would be good to keep the same groups together for each field trip. The questions you ask the students will vary with the different seasons.

PRE-ACTIVITY FOR THE FALL:

1. Why is it important to have trees?
2. What kinds of trees can you name?
3. What types of birds do you find in a tree?
4. What types of mammals?
5. What kinds of insects do you find in a tree?
6. Why do these birds, insects and mammals live in these groves or shelterbelts?
7. Let's find out what lives in a shelterbelt.

FIELD TRIP:

Have the students form groups of three or four. Each group should be sent to a different part of the shelterbelt. Each student should pick out a tree in his own particular working area. Try to get the students to select different kinds of trees. Ask them to draw the tree and make a map so that they will be able to find the tree again. Tell them to select a leaf from the tree to bring back to class in order to try to identify their type of tree. (If this activity is done in the fall and there are many leaves on the ground, be sure to check to see that the students pick up the right leaf to correspond with their tree and not one that has been blown from another tree). After the students have completed this, let them look around the shelterbelt for mammals, birds, and insects and other plant life.

POST-ACTIVITY:

List all other signs of life in the various categories. Try to classify the leaves they brought back. Have the children color the pictures they drew previously of their tree.

You may want to run another field trip during the fall while the leaves are in the process of dropping. This will give the students a chance to draw their trees again with part of the leaves left and with the many different colors. Have them collect leaves from the ground and compare them to the leaves they collected earlier to see if they are from their tree or from another type of tree.

Ask the students to check for signs of other life and list these again as done previously. Also, have them color their trees again.

PRE-ACTIVITY FOR WINTER: Best after a fairly fresh snow.

1. Do you remember our field trips to the shelterbelt last fall?
2. What do you think our trees will look like now?
3. Do you think there will be any birds there now?
4. Will they be the same kinds of birds?
5. Are there any animals around in the winter?
6. Are there insects around in the winter?
7. Let's follow our maps and go back to the same tree that we visited last fall. Let's list all forms of plant, mammal, birds and insects we find. Draw another picture of your tree and see if there is any change in it since the last time you drew a picture of it.

FIELD TRIP:

Let the students find their groups and their own areas by themselves. (They should be able to follow the maps they have drawn). As soon as they have found their tree and drawn a picture of it, have them look around for other forms of life. Let them draw pictures of the tracks they see in the snow. Ask them to list any animals or birds they see. Ask them to look for insect signs such as galls. Suggest that they look for animal droppings in the snow.

POST-ACTIVITY:

Students can color their tree drawings and compare them to the pictures thev colored in the fall. If there are any evergreens in the group, ask them why their trees didn't change and others did. Have the students list the animal signs that they found. Ask them if they found any insect signs. Take a book of animal tracks out and let them try to find the tracks that they saw and drew. Ask them if they saw any birds and/or bird signs. Were the birds they saw the same type of birds as those seen in the fall?

PRE-ACTIVITY: (For Spring)

This works best after the leaves have started to show.

1. What happens to trees in the spring?
2. Have you seen any birds lately?
3. What have the birds been doing?
4. Remember the trees we visited and drew last fall and last winter?
5. What do you suppose they look like now?
6. Do you think there are any birds or animals living in them now?
7. Let's go visit them again to see what we can find out. Find the same tree again, draw it, and look it over closely to see if anything is living there that hasn't been before.

FIELD TRIP:

Ask the students to find their own tree and draw it again. Have them list any changes in their tree. Also ask them to list any sign of other types of life in the shelterbelts.

POST-ACTIVITY:

Ask the students to color their trees again and compare the three or four pictures they have drawn. Ask them to list the difference in colors and any other variations that they find. Ask them when the best time is to find signs of birds, animals, and insects. Ask the students why one time of the year is better than another for finding each type of life.

WHAT LIVES IN A SHELTERBELT?
DATA SHEET

NAME______________________

DATE______________________

KIND OF TREE______________

OTHER SIGNS OF LIFE NEAR YOUR TREE:

__________PLANT

A.
B.
C.
D.
E.

__________MAMMAL

A.
B.
C.
D.
E.

__________BIRD

A.
B.
C.
D.
E.

__________INSECT

A.
B.
C.
D.
E.

__________OTHER

A.
B.
C.
D.
E.

DATA SHEET
PAGE 2

USE THIS PAGE TO DRAW A MAP OF YOUR TREE SO THAT YOU CAN FIND IT AGAIN THE NEXT TIME WE DO THIS ACTIVITY.

DATA SHEET
PAGE 3

USE THIS PAGE TO DRAW A PICTURE OF YOUR TREE. YOU WILL HAVE A CHANCE TO COLOR YOUR PICTURE LATER.

DATA SHEET
PAGE 4

USE THIS PAGE TO ATTACH LEAVES WHICH YOU COLLECTED FROM YOUR TREE. REMEMBER TO COLLECT SOME LEAVES FROM THE GROUND UNDER THE TREE ALSO.

GETTING TO KNOW THE THERMOMETER

Written by Rita Brown, Instructor/Secretary, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota, 57016. Phone: 489-2416.
(Revised 2-4-72)

Grade Level - K-2

Best time of year - Winter

OBJECTIVES:

1. To introduce the students to various types of thermometers and how they are used.
2. To help the students understand the basic mechanics of how and why the thermometer reacts as it does to hot or cold substances.

BACKGROUND:

The children could learn the following riddle and act out the action parts of it. For example, they might crouch down to indicate falling temperatures and stretch high to depict a rise in temperatures, etc.

THERMOMETER RIDDLE

My blood is red,
When it's cold I fall;
When it's hot I rise,
I'm useful to all.

The teacher and the students might also construct a "fake" thermometer to use as a visual aid in showing the children the simple mechanics of how a thermometer works. (This same thermometer could be used to demonstrate temperature fluctuations in the above riddle also).

To make a thermometer for kindergarten use, simply cut two pieces of white tagboard in the shape of a thermometer. Cut out a thin rectangular shape and run a piece of bright ribbon (one of red and one of white connected) through the middle to depict the mercury. Then, the teacher or the students can pull the ribbon either way to depict temperature rises and falls.

It is suggested that numerals be printed on the thermometer to indicate the different temperatures even though the kindergarteners can seldom read them at the beginning of the school year. However, as the year progresses, there might be added interest if students can read the various degrees they can depict by pulling the ribbon from either the top or the bottom of the thermometer. The important thing (whether or not the students can read) is that they be able to make a comparison of what the reaction would be to either hot or cold substances.

The thermometer is a good instrument to use to introduce kindergarteners to the wide area of science. Students can begin unlocking their own door to scientific research and discovery by using the thermometers to test any variety of things for temperatures. Children might be interested in seeing and using the many various types of thermometers there are (outdoor, people, candy, meat, etc.). Perhaps it would be fun to station a thermometer outside of the classroom window where the students could keep a watch on temperature fluctuations.

It might also be fun to make a batch of candy (letting the children do the measuring, etc.) to help them to understand the practical use of the thermometers in our every day lives. After using the thermometer and experimenting with it, the children will be able to conclude rather quickly that the thermometer will show a temperature rise almost instantly when it touches the boiling candy. An added treat will be eating the candy that all of the children have helped to make.

The following is a recipe which is a simple enough recipe for kindergarteners to help make. In addition, it is almost impossible to have a failure with this particular fudge recipe.

FANCY FUDGIES

2 cups sugar 1 cup evaporated milk ½ cup butter or oleo	Bring to boil and boil ten minutes
*************	
1 cup chocolate chips 3/4 cup flour 3/4 cup nuts (optional) 1 cup graham crackers (crushed) 1 teaspoon vanilla	Add and beat well. Spread into buttered pan.

PRE-ACTIVITY:

A brief explanation might be given concerning the mercury and why it reacts as it does to hot or cold substances.

Then, the children might be given an introduction to thermometer use by allowing them to test various things in the classroom. Perhaps the teacher will want to provide some things so that there is enough variety and temperature variation in order for the students to be able to begin to make generalizations about how hot or cold things effec. the thermometer. (Snow and the human body express temperature differences which may serve well in demonstrating the thermometer).

The following questions might be asked:

1. Have you ever used a thermometer? For what?
2. Why or how do we use the thermometer?
3. What things can a thermometer tell us?
4. If something is hot, will the mercury rise or fall? If it is cold?
5. How many different kinds of thermometers can you think of? List them.

FIELD TRIP:

Take the children outdoors and have them test a large variety of things for temperature fluctuations and differences. It would be especially interesting to measure air, land and water for comparisons, for example.

FOLLOW-UP:

As a culminating activity, children might enjoy listening to and discussing the following poem. (Or, you may have them try to make up a simple poem or song of their own).

THE THERMOMETER

If we can read thermometers, they help us all to know
The way to dress, and where to go, and the kind of games to play.
If that red line is pretty high -- at 70° or so,
It's summertime, and we all know it's a very pleasant day.

When autumn comes it's cooler; it may be 50 degrees.
The summer's gone, the leaves are brown and we are back in school.
It's fun to play outside each day; we like the nice cool breeze.
"Wear a sweater or jacket," we all know is a good health rule.

Soon autumn days are over, and winter is here again.
The thermometer stays below 30, and we say, "It's pretty cold!"
The weatherman is never sure whether to let it snow or rain.
Our coats and caps and boots feel good; we don't need to be told.

Some days the wind blows fiercely, and the snowdrifts pile in rows.
The thermometer stands at zero, and sometimes below it goes.
We can ice-skate when it warms a bit, if we wear our warmest clothes.
But we must be careful all the time, or we'll freeze our ears and nose.

The above poem taken from an Instructor handbook entitled, Skill Games for Mathematics by Clyde G. Corle.

THORNTON THE THERMOMETER

By Marion Vosburgh -- Taken from INSTRUCTOR MAGAZINE, February 1971

This short primary story can be used to either introduce or complete a unit on weather. Present it as a flannelboard story or just read aloud. Additional suggestions: Use the story as a basis for opening a discussion about weather. Make and keep a classroom "Thornton." Let each child act out how Thornton would behave during the season of the year he likes best; or suggest that the children write a poem about Thornton, the weather, or one of the seasons.

Once upon a time there was a very sad thermometer, named Thornton. He was unhappy because it was winter and his little red line was stuck at freezing -- thirty-two degrees. Every time he cried, his tears would turn to icicles.

Thornton wanted to be a good thermometer. He wanted to tell all the boys and girls the right temperature, so they would know how to dress each day. Thornton was afraid the children would catch cold if they didn't know whether it was warm or cold outside.

One day the sun shone very bright and the snow began to melt. Thornton began to feel very warm. Suddenly he looked down at his red line that had been stuck for so long at thirty-two degrees -- it began to move! He watched the short red line grow longer and longer. Thornton was so happy! He was working and he wasn't freezing anymore! It was spring!

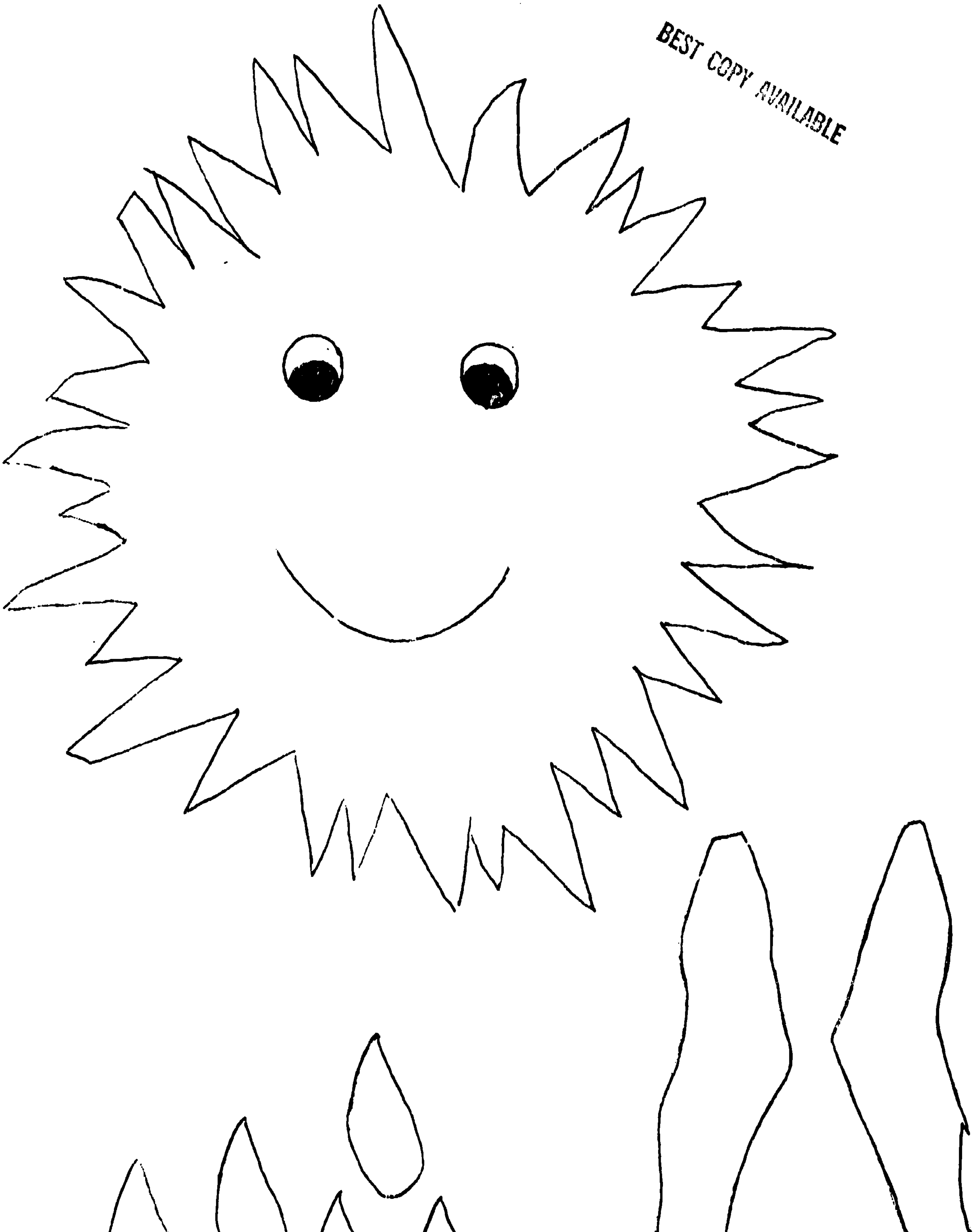
This was Thornton's first year as a thermometer. He didn't know that during the winter even the best thermometers hardly ever go above thirty-two degrees. Winter is the coldest season.

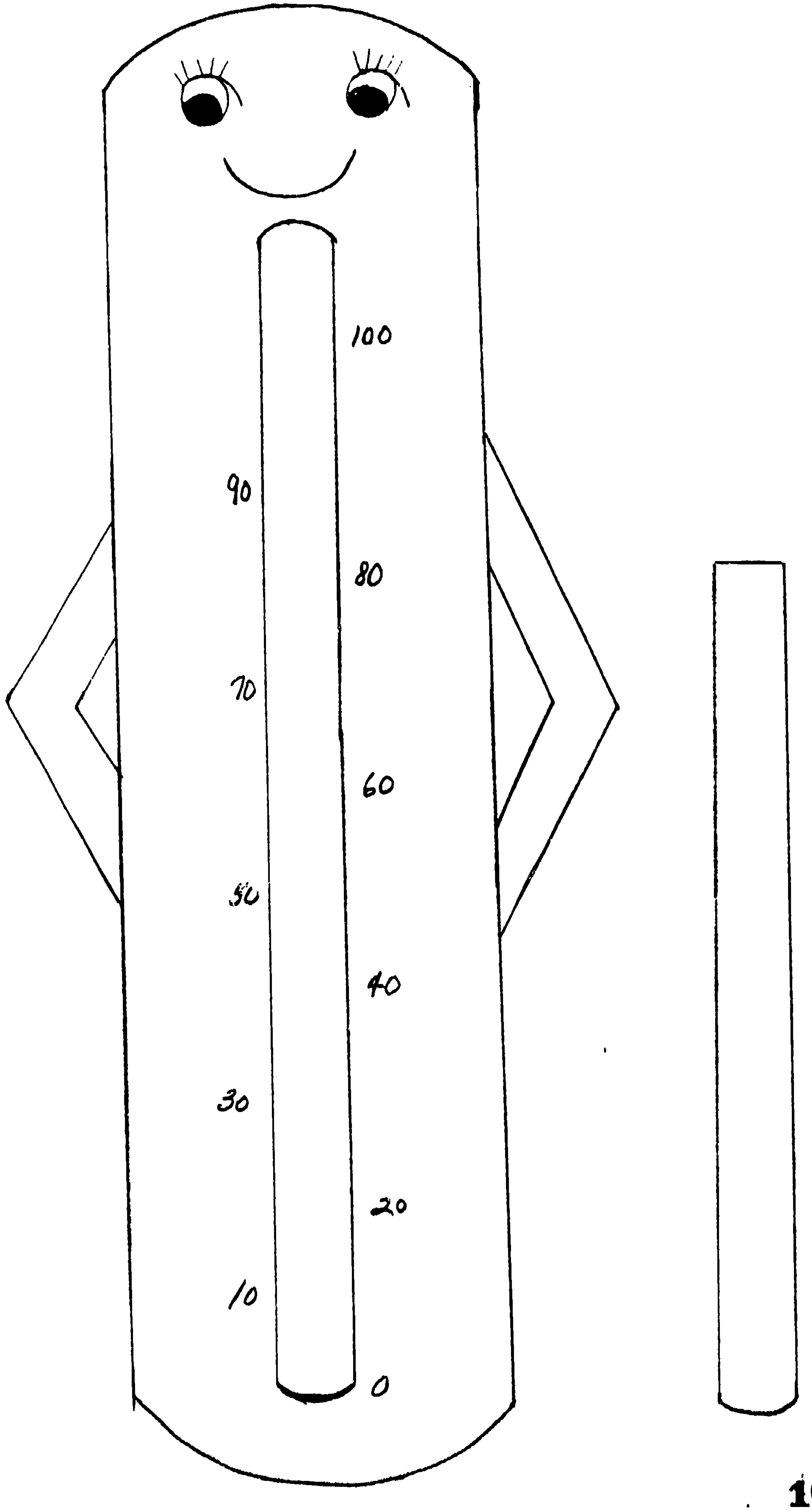
As the days passed, Thornton's red line grew longer and longer. He was so hot, and some days he was afraid his red line would go right up through the top of his head.

Each day during the warm weather Thornton would watch the children playing in their bathing suits. They had lots of fun taking turns with the water hose. They'd squirt each other first, and then take turns running in and out of the cool-looking spray. He wished he could get cooled off too! But it was summer, the hottest time of the year.

One day the children weren't playing outdoors anymore. They had all gone back to school. All the leaves were turning to orange, red, and yellow. And Thornton's red line started to grow shorter again. It was fall and he was glad that it was not hot anymore.

Thornton wasn't sad because winter was coming. He knew that when the snow came he wouldn't be stuck at thirty-two degrees forever, because -- when the snow melted and the robins began to sing and his red line grew longer -- it would be spring again!





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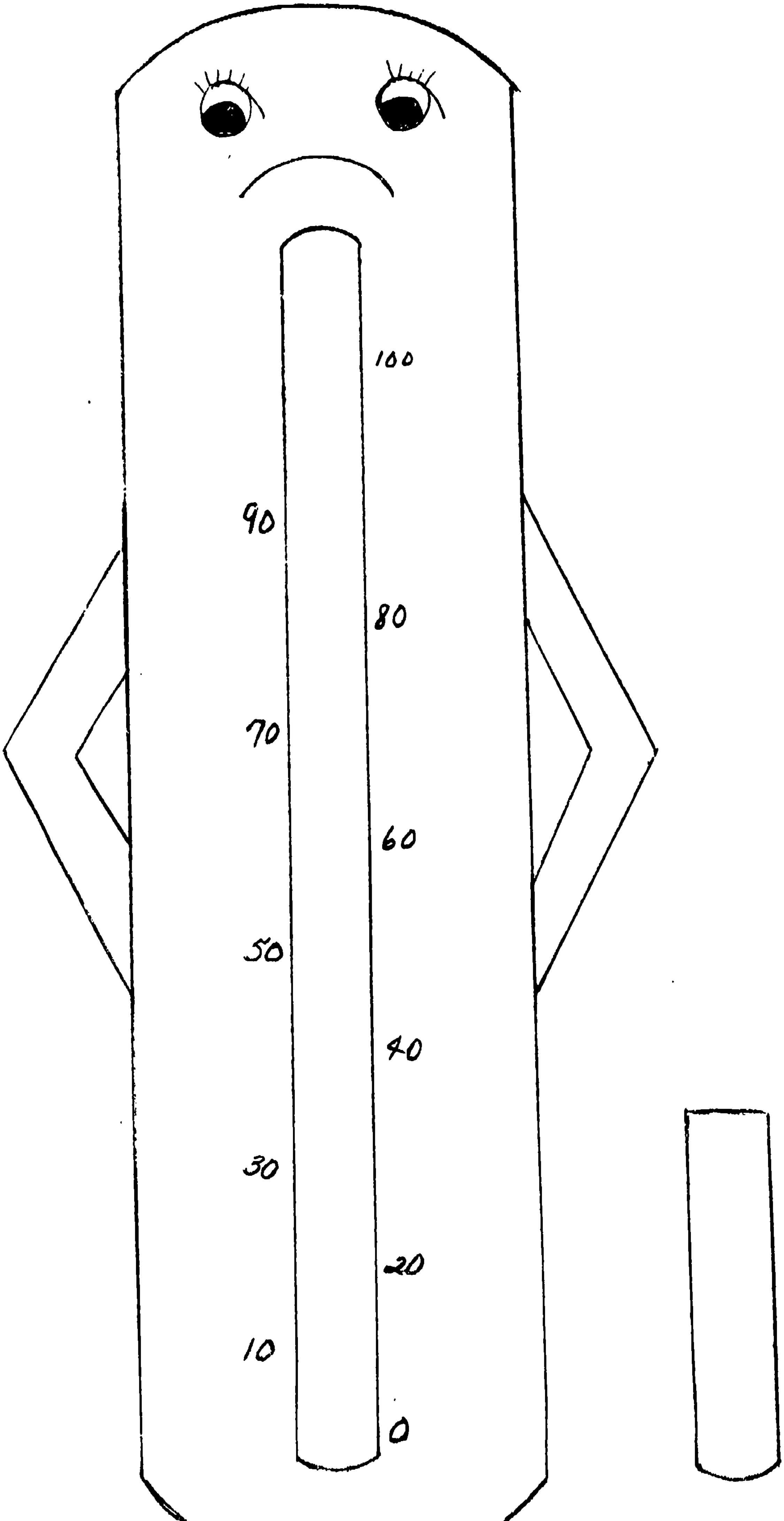
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SHADOWS

Written by Rita Brown, Secretary-Instructor, Interlakes Environmental Education Program, Chester, South Dakota. 57016 (adapted from Environmental Science Center Curriculum) Phone:489-2416

Grade Level - Kindergarten

Best time of year - Fall, Summer, Spring, Winter

OBJECTIVES:

1. To introduce the students to a simple exploration of shadows.
2. To allow students an opportunity to experiment with spatial relationships.
3. To help students to understand that shadows change depending on the available source of light.

BACKGROUND:

Have you ever seen your shadow? Shadows are caused by a light source such as the sun outdoors or the lights indoors. The size and shape of our shadow depends on where the light source is.

PRE-ACTIVITY:

Read the poem Shadows and discuss it.

SHADOWS

By Robert L. Stevenson

I have a little shadow that goes
  in and out with me.
And what can be the use of him
  is more than I can see.
He is very very like me from the heels
  up to the head.
And I see him jump before me, when I
  jump into my bed.
The funniest thing about him is
  the way he likes to grow--
Not at all like proper children, which
  is always very slow;
For he sometimes gets so little that there's
  none of him at all.
One morning, very early, before the sun
  was up,
I rose and found the shining dew
  on every buttercup;
But my lazy little shadow, like an arrant
  sleepy head,
Had stayed at home behind me and was fast asleep
  in bed.

Take the students outside and let them experiment with their shadows. Let them play some games with their shadows. (After sometime, they should be able to manipulate their shadows in order not to be tagged).

Some games the students might like to play:

A. Shadow Tag

1. "It" touches his shadow to the shadow of another person.

2. "It" touches another's shadow with his foot.

3. Use either of the above and make the shadow of a stationary building as a safe place.

B. A Shadow Keep Away Game

1. Establish boundries and limit the class to them. Choose a partner and try to keep that person from stepping on your shadow.

FIELD TRIP:

Two field trips ideas are suggested -- either can be used.

1. Have each child bring to school a large, light object such as garbage can covers, hoola hoops, umbrellas, brooms, inner tubes, cardboard boxes, etc.

Divide the children into teams of two. Give each team a piece of chalk and a huge peice of white paper. Have them spread out over a parking lot or some other paved area. One of the children will manipulate the object he brought from home while the other sketches an outline of it. How many different shapes can the children create from one object? How large can they make the shadow? How small can they make their shadow? How skinny or fat can they make the shadow?

2. Shadow People

a. Have the children divide into teams of two children each and make sketches of their bodies in different positions. Have them make monster people.

b. Combine every team of two into groups of four. Have them take turns being the person who does the outlining. The other three children can construct some design or picture using their shadows. See how many different shadows and designs they can make. Can they make animals?

POST - ACTIVITY:

Have the children spread out the large pieces of paper on the floor and create an artistic picture from it. Perhaps they can make animals, etc.

Let the children experiment with hand shadows on the classroom walls. What kinds of things can they create?

WHAT DOES A SEED NEED?

Written by Rita Brown, Secretary/Instructor, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416 (Revised 2-8-72)

Grade Level - Kindergarten-2

Best time of year - Fall

OBJECTIVES:

1. To acquaint students with the various types of seeds and where they can be found.
2. To give students an opportunity to plant seeds and to come to a basic understanding of seed germination.
3. To further student understanding of what is needed for a seed to grow.

MATERIALS:

wide variety of seeds collected on field trip
paper bags
soil for planters
milk cartons (these can be cut lengthwise, with the pouring end taped shut, and decorated with whatever the students wish. The planters may also be painted by using tempera paint mixed with liquid soap instead of water)

BACKGROUND:

Kindergarteners are sure to be fascinated by this activity if they are allowed to come to their own conclusions about seeds and what a seed needs to grow. Children often grow plants in their classrooms and teachers often tell them that the basics a seed needs to grow are:

1. Soil
2. Water
3. Sunlight

WHY NOT LET THE CHILDREN MAKE THESE DISCOVERIES BY THEMSELVES?

PRE-ACTIVITY:

Introduce the topic with either of the following fingerplays:

SEE THE LITTLE SEED I BOUGHT.
(Hold up imaginary seed between left thumb and forefinger)
I'LL DIG A HOLE AND PLANT IT.
(Dig a hole with right hand, plant seed with left hand)

I'LL SMOOTH THE EARTH WITH LITTLE PATS,
(Do so using both hands on a flat surface)
AND WATER IT WITH CARE.
(Pretend to hold watering can in right hand)
THE SUN WILL SHINE ON IT,
(Make the sun with one or both hands held high)
AND ONE DAY I WILL SEE
A TINY GREEN SHOOT,
(Use right forefinger to represent the shoot)
AND THEN A LEAF OR TWO,
(Bring right thumb up beside forefinger, bring up middle finger)
AND FINALLY A FLOWER.
(Make a circle of left thumb and forefinger, hold it above right forefinger)
IT WILL NOD IN THE BREEZE.
(Keeping the flower just formed, wave it back and forth)
I WILL SMELL ITS PERFUME.
(Bend head over flower and sniff)
THEN THE PETALS WILL FALL.
(Let fingers of left hand represent petals and flutter downward)
SOON THE SEEDS WILL SCATTER.
(Let fingers of right hand be seeds, fingers will show fluttering downward motion)
SOMEDAY THERE WILL BE MORE FLOWERS.
(Lift all ten fingers to represent flowers)

A LITTLE SEED

A LITTLE SEED SO SOFT AND ROUND,
(Fingers form a circle)
I'LL DIG A HOLE AND LAY YOU DOWN;
(Digging motion)
AND YOU MAY REST BENEATH THE GROUND
(Cup one hand, lay the other over it)
UNTIL YOUR LEAVES COME UP,
(Point upward)
AND YOUR ROOTS GO DOWN.
(Point downward)

The following are questions which might be used:

1. What are seeds?
2. What do people use them for?
3. What do animals use them for?
4. Where do they come from?
5. What kinds of seeds can you think of? (Make a list)
6. Have you ever planted a seed? What kind? Did it grow? Where did you get it? What did you do to make it grow?
7. What kinds of seeds does your father plant? Your mother in her garden?
8. Would you like to try and grow some seeds?
9. Where should we get some seeds to grow?

FIELD TRIP:

Give each student a small paper bag. Take them on an outing and have them collect as many kinds of seeds as they can find. (The fall is a perfect time of year for this activity because of the great abundance of seeds which are found on many kinds of plants).

POST-ACTIVITY:

Have the students empty the contents of their sacks on papers on their desks and sort them into various groupings -- for example, kinds, sizes, colors, shapes, etc.

Next, have the children plant one of each kind of seed in the planter. (It might be a good idea to tape or paste the seed which will correspond to the plant on the side of the planter so that the students are able to see later which seed the plant grew from).

Discuss what was needed for the seed to grow. To emphasize certain elements basic to plant growth, divide the class into groups and set up various seed germination conditions which will eliminate or adjust the following conditions:

1. moisture
2. sunlight
3. covering for cartons
4. temperature extremes

The children should be able to make a reasonable conclusion concerning the basics that a seed needs to grow.

It may be a good idea for each student to have several planters. Each planter should have all the ingredients it needs for growth. Since some seeds will not grow it is advisable to have more than one kind planted. This also provides a better chance of each child having a successful experience.

RAIN

Written by Cynthia Vance and Barb Hyland, Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, S.D. 57016. (8-4-72)

Grade Level - K-1

Best time of year - Fall

OBJECTIVES:

1. To help students understand the "mystery" of rain.
2. To study the importance of rain and the rain cycle.
3. To measure the amount and size of rain.

BACKGROUND:

To young children rain is a mystery -- something that falls from the sky and stops their play. This activity is designed to help students understand rain. It introduces basic concepts of rain and includes simple experiments to measure the size of raindrops.

PRE-ACTIVITY:

Discuss rain. What is rain? Where does it come from? How does it get there? What are good aspects of rain? -- bad ones? Name some forms of rain. What does rain sound like? How does rain feel? How does rain fall? What is rain good for? What kinds of clouds bring rain? Are all raindrops the same size? What happens when it rains?

RAINDROPS

Rain is falling down,
Rain is falling down,
(Raise arms, flutter fingers to ground, tapping floor or palm of hand)
Pitter-patter, pitter-patter,
Rain is falling down.

or:

Pitter-pat, pitter-pat, pitter-pat,
Oh so many hours
(Patter fingers on floor, table, etc.)
Although it keeps me in the house,
It's very good for flowers.
(Cup hands--extend slowly upward)

UP GOES THE WATER

Up goes the water
Up to the sky!
From pools and mud puddles
Soon sunbaked and dry.

Up to form clouds
That turn into rain,
Then come down and make
Mud puddles again.

--Jean B. McKinney

FIELD TRIP:

On a rainy day, go outside and observe the different things about rain.

Listen to the rain -- describe it.
Feel the rain -- describe it.
What color is rain?
What happens to the trees, plants, grass, etc. when it rains?
Do they get washed off like we do when we take a shower or bath?
How does the rain help the trees, plants and other things.
How does rain come down? In what form? (drops)
Are all raindrops alike?

The following is a simple experiment in which students may measure the size of raindrops:

Put flour on the bottom of a pan and hold it out in the rain, making certain several drops fall on the flour. Bring the pan indoors and let it set for one-half hour. Sift the flour. The remains in the sifter represent the raindrop sizes.

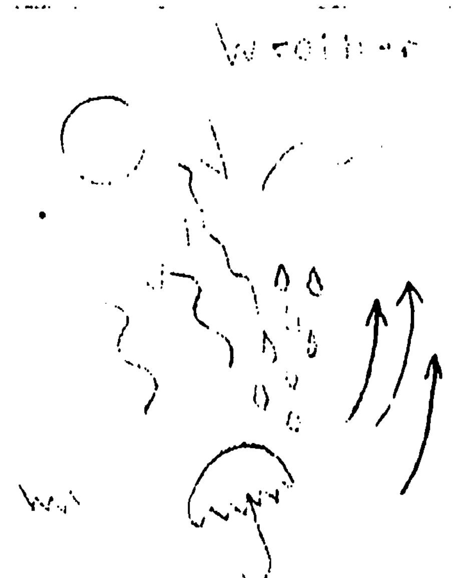
Measure how much it rained by putting a can outside to catch the rain. Put the rain water in a covered jar. Do this several days and measure the different amounts of rain.

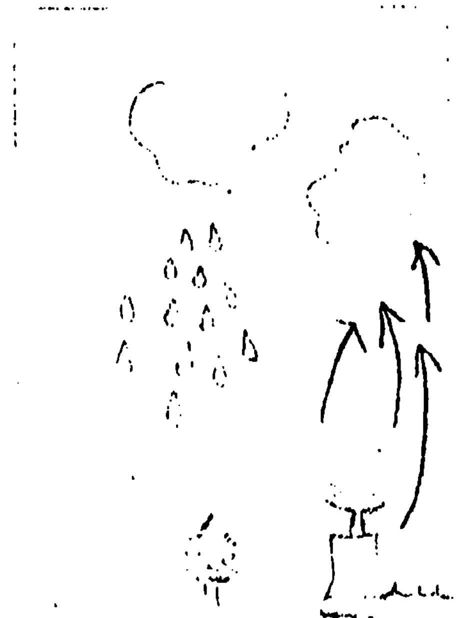
Test to see what type of clothing is best to wear in the rain, with several articles and sprinkling bottle. Pretend its raining. Which articles of clothing does the rain penetrate? Which ones stay dry?

FOLLOW-UP:

Summarize data and conclusions from the simple experiments above. Let the children describe what rain feels or sounds like. Encourage the use of descriptive words.

The following are blackboard ideas that could be used with this unit:





The Water Cycle

LISTEN

Written by Barb Hyland and Rita Brown, Adapted from ideas contributed by Jerry Larsen, Interlakes Environmental and Outdoor Education Program, Chester Area Schools. Chester, South Dakota. 57016 (August 3, 1972)

Grade Level - K-2

Best time of year - Fall, Spring

OBJECTIVES:

1. To create an appreciation and awareness of the sounds of nature.
2. To give students specific exercises and experiences in hearing discrimination.
3. To demonstrate to students how much they can learn about an area by using only their auditory sense.

BACKGROUND:

We often take for granted the importance of our ears in our daily lives. We rely on them very heavily for signals and communications. We need to develop in young children a process by which they learn to listen and associate meaning to what they hear. We are guilty of saying, "in one ear, and out the other." Maybe we should try to develop a better attitude in our children about the importance of listening.

PRE-ACTIVITY:

The following are suggested activities which may be used to motivate students:

1. Use a tape recorder and have a pre-taped set of sounds recorded on it. Use a variety of sounds, both common and unusual. Let the children guess what the sounds are. The Interlakes Program has several records of bird, animal, and insect sounds to loan. A tape recorder is also available from the Interlakes Program for use with this activity.
2. Ask the students to close their eyes and listen carefully. After the teacher makes a sound, the children are asked to do just as she did. Some ideas are as follows:
   a. three slow claps
   b. complete silence
   c. two fast claps
   d. clap, snap, clap
   e. snap, snap, clap
   f. stamp, snap, slap
   g. stamp, stamp, pause, clap, pause, snap, etc.
3. During quiet periods, encourage students to listen to the different sounds in the classroom. For example: tick of clock, chair squeaking, cough, shuffling feet, etc. Discuss the sounds, which ones were loud? Which sounds were softer? Sounds fr[illegible] the environment may be studied in the same way. Or, instead of doi[illegible] this activity for an extended period of time, do it several times throughout the day. In changing from one activity to another, just say, "Stop, listen. What do you hear?"

4. Give each child a toy animal. If you do not have enough toys, pictures may be substituted. Ask them to listen carefully. The teacher makes an animal sound. When the students hear the sound their animal would make, they bring the toy or picture to the teacher. Another way to do this is to point to a child to make a sound. The one who has that animal must then switch animals with the one who called. It is then their turn to make a sound.
5. Ask the children to imitate various human sounds. Examples: laughing, singing, crying, shouting, whispering, etc.
6. Have the students imitate animal sounds - Read a story in which the children fill in the appropriate sound. Sing "Old McDonald's Farm."
7. Talk about the sounds of weather. Examples: Wind, thunder, lightening, etc. Does snow have a sound?
8. Birds Fly
   An old game, always popular because it demands a quick response to hearing.

   Everybody stands informally, at arms length from one another. "It" tries to fool them by naming not only objects that fly, but also those that don't fly. Players must flap their arms every time a flying object is named, such as: "geese fly" "planes fly", etc. They must not flap their arms when "It" calls, "dogs fly", "Pigs fly", etc., even though "It" flaps his arms and tries to fool them into imitating him.

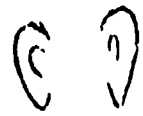
9. Indian Hike
   Go single file V-E-R-Y carefully. Try not to make a sound. Avoid stepping on dry twigs or through dry leaves. Don't talk above a whisper. Stop frequently to listen as well as look. What sounds can be heard? Listen for wind, song of a bird, rustle of some small animal, a distant plane, water running, leaves rustling, squirrel chattering, insect humming, etc. Look for sources of all sounds.
10. Have the students look at "action" pictures. Can they "see" sounds? Make a list of them.

FOLLOW-UP:

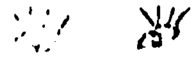
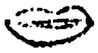
Following are several ideas -- any of which would be suitable for a follow-up activity:

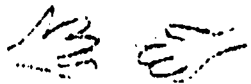
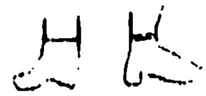
1. Play the recording back from the field trip. Have the students identify the sounds they hear.
   Which sounds were most common?
   Which sounds can you imitate?
   Which sounds were hardest to distinguish?
   Make a list of the various sounds on the recording.
   Which sounds were natural?
   Which were man-made?

2. In addition, the class might enjoy the following poem:

We listen with our  of course,

But surely it is true

That our  and 

And  and 

Help us listen too.

3. Another good follow-up activity is to give the students some clay or play dough and have them mold some of the sounds they hear. The idea is to have them make a mold of what they think the sound would look like. Some of the students will catch on to this easily, while others may need more explanation. You may be surprised at their creativity.

HEARING IS A PART OF LEARNING

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. (Adapted from Environmental Education Project Activity Booklet, Poudre R. I. Schools). Phone: 489-2416.

Grade Level - K-2

Best time of year - Fall, Winter, Spring

OBJECTIVES:

1. To show the students how much they can learn about an area by the use of their ears alone.

BACKGROUND:

We often take for granted the importance of our ears in our daily lives. We rely on them very heavily for signals and communications. We need to develop in young children a process by which they learn to listen and associate meaning to what they hear. We are very guilty of the saying, "in one ear and out the other". Maybe we should try to develop a better attitude on our children about the importance of listening.

PRE-ACITVITY:

Borrow a tape recorder and have a pretaped set of sounds recorded on it. Use a variety of sounds, both normal and some unusual. Let the children guess what the sounds are. The interlakes office has several records of bird, animal and insect sounds to loan. A tape recorder is also available for use on this activity.

FIELD TRIP:

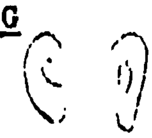
Take the students to an area where there is alot of mammal, bird, and insect activity. It is a good idea to try this activity early during the day when it is not too windy. Have the students sit very quietly and listen for various sounds. Have them make a list of the sounds they hear. If you have a good tape recorder, you could record this session also.

POST-ACTIVITY:

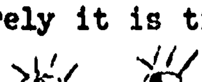
Have the students list all of the sounds they heard. Now play the recorder and see if there are any that they missed. You may want to have the students imitate the sounds. Have the students make posters with the animals or insects they heard and the sounds they made.

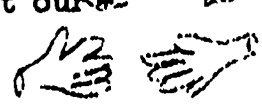
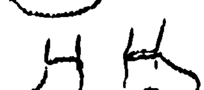
In addition, the class might enjoy the following poem:

LISTENING

We listen with our  of course,

But surely it is true

That our  and 

and  and 

SIMPLIFIED ROCK STUDY

Written by Rita Brown, Instructor/Secretary, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416
(Revised 2-8-72)

Grade Level - K-2

Best time of year - Anytime

OBJECTIVES:

1. To introduce students to simple methods of rock classification.
2. To assist students in discovering different properties of various kinds of rocks.
3. To acquaint the students with the basic concept that it takes thousands of years for rocks to form and that rocks eventually become soil.
4. To develop aesthetic appreciation for the value of rocks.

BACKGROUND:

Rocks are an interesting topic for study. Even in the lower elementary grades, students can learn to classify rocks in many simple ways. For example, hard-soft, bubbly-non-bubbly, smooth-rough, big-small, like-different, by various colors, dull-sharp, etc.

This is an expecially good activity to use at the beginning of the school year since most children have had an association with rocks and are quite familiar with them. In addition, it is very easy to locate an area for a field trip since a good variety of rocks can be found almost anywhere.

PRE-ACTIVITY:

Open a discussion on where rocks can be found. Some responses might include:

1. Along a lake or seashore
2. The bottom of a little stream
3. On a gravel road
4. On the school grounds
5. In a gravel pit
6. At home in the backyard

Continue the discussion using the following questions or others that are appropriate:

1. What are rocks?
2. Where do they come from?
3. What's in a rock?
4. Why are some large and some small?
5. Do rocks always stay the same size or do they become larger or smaller?
6. How are rocks alike?
7. How do they differ?
8. Are they dull or sharp?
9. Are they smooth or rough?
10. What colors are they?
11. Why are they different colors?
12. How do they smell?

FIELD TRIP:

Give each child a strong sack (preferably not plastic) and take them to a gravel pit or an area where there is a great abundance of rocks. Encourage them to collect many different kinds. Return to the classroom.

FOLLOW-UP SUGGESTIONS:

Set up areas in the classroom for children to display the rocks they have collected. For example, put the hard rocks together, the smooth, the bubbly, etc.

Allow the children to test rocks for hardness by using a nail or by rubbing rocks together. Use the following to classify them:

1. Very soft rocks can be scratched with a fingernail and often break very easily.
2. Soft rocks can be scratched with the edge of a penny, but these rocks won't scratch a piece of glass.
3. Medium rocks can be scratched with a knife, but the rocks will barely scratch a piece of glass.
4. Hard rocks cannot be scratched with a knife and will scratch a piece of glass.
5. Very hard rocks will scratch a knife and a piece of glass easily.

Rocks can be tested further for hardness by rubbing them against each other and then noticing which one scratches the other.

Allow the students to study the rocks with a magnifying glass. The students may want to break a rock open to examine it further. (Wrap the rocks in a piece of cloth before striking them with the hammer so that chips don't fly all over or perhaps get into your eyes).

Use a piece of ceramic tile for testing color. Test for rock color by rubbing each rock on a piece of tile. Let the students discover which side of the tile works best.

Roll rocks over in a shallow pan of water. The water will make some rocks smell differently. For example, a slate rock will smell like mud. (This kind of activity correlates well with studies of the senses).

Students can classify rocks as bubbly or non-bubbly by dropping them into water or vinegar and watching to see if they bubble or not. Let the students try to dry them after removing them from the water and discover that this is not easily done. Why?

70 Copies

TEXTURE OF A NATURAL OBJECT

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416
(Revised 2-8-72)

Grade Level - K-2

Best time of year - early Fall

OBJECTIVES:

1. To acquaint students with the feel of natural objects.
2. To assist them in discovering the various textures of natural objects.
3. To increase students' awareness of the environment.

MATERIALS:

large paper bags

BACKGROUND:

Natural objects all have certain types of textures associated with them. There is a definite reason for the texture of each natural object. The reason something has a certain texture is as important to a child as being able to distinguish between the different textures. This activity is an excellent way of introducing an awareness to young children of the fantastic variety of shapes, forms and textures of objects found in nature.

PRE-ACTIVITY:

Ask the children the following questions or some similar to them:

1. What does an egg feel like? Is it rough or smooth? Is it hard or soft? Is it solid or spongy? Is it prickly or dull?
2. Name something natural that is rough.
3. Name a natural object that is soft.
4. Name a natural object that is spongy.
5. Name a natural object that is prickly.

List answers on the board along with any other textures that the students might be able to distinguish.

Perhaps their responses will be similar to the following poem which might be read to the class:

HOW DOES IT FEEL?

Sticky is the paint Daddy put on the door.
Sticky is the chewing gum dropped on the floor.

Soft are the marshmallows so round and white.
Soft is the pillow for my head at night.

Smooth is the ice on which you skate.
Smooth is the pudding which you just ate.

Hard is the raw carrot on which you crunch.
Hard is the lollipop to lick after lunch.

Hot is the soup when your first sip you take.
Hot is the oven when a cake's to bake.

Sharp are the quills of the porcupine.
Sharp are the icicles in the wintertime.

Rough are the edges of a sharp-toothed saw.
Rough is Daddy's beard all around his jaw.

Round is the ball which you throw so far.
Round are the tires on the fast, new car.

Wet is the dog's tongue as he licks your face.
Wet is the water you spilled in your haste.

FIELD TRIP:

Take the children out on a field trip. Ask them to collect as many objects as they can which feel differently. Have them put the items into their sacks and bring them all back to the classroom.

The teacher might also like to play the following game as a variation of the above field trip.

OBJECT CHARACTERISTIC HUNT

Instructions: Objects (pebbles, sticks, leaves, your dog, your cat and other things) have certain things distinctively theirs such as color, shape, feel, etc. These things are called the characteristics of an object.

You and your teammates are to chose one characteristic (for example, all red, all round, all with points, etc.). Collect objects showing this property. Don't tell anyone but your partner what characteristics the objects you are collecting show. Bring back your collection and have the other students guess what characteristics you were looking for.

Students should take a plain piece of paper out on their field trip and sketch objects which cannot or should not be brought back into the classroom.

POST-ACTIVITY:

Ask each student to show what they found in each category. Have them arrange their articles in the various categories on a work table and then put them to work comparing the different textures present.

Who found the most different kinds of feelings?
Who found the most unusual kinds?
Do some of these things feel sticky and rough?
Do some of these things seem smooth and sharp at the same time?

Some natural objects available in the Fall which will show these characteristics are as follows:

Sharp -- thorns on wild roses
barb wire
hooks on cockle burs
hooks on wild licorice
thorns on thistles

Round -- fruits of wild rose (rose hips)
galls in goldenrod stems
berries in cedar trees

Sticky -- sap of milkweed plants
sap on cedar trees
inside of rose hips

Rough -- rock
wild licorice burs
cockle burs
bur dock
tree bark

Soft -- milkweed fluff
cattail fluff
different weed seed parachutes
spider webs
caterpillars

Hard -- rock
weed seeds
wood

Jagged -- leaf edges
cedar trees

Smooth -- milkweed leaves
old cans and bottles
rose hips

Wet -- mud
water
milkweed sap
dew

Slimy -- salamander
frog
worms

Spiny -- wild rose bush
thistles
wild plum tree
barb wire

Shiny -- snowberry berries
some leaves of plants
old cans and bottles

ADDITIONAL SUGGESTED IDEAS FOR THE POST-ACTIVITY:

Suggest that the students pull out each item they collected and feel and smell it.

Have them segregate the items in piles of like feelings.

Have the students tape items to poster paper and tape on labels describing the textures. Discuss and question students about what they found. Some possible questions follow:

1. Who found the most different kinds of feelings?
2. Who found the most unusual kinds?
3. Do some of these things feel sticky and rough at the same time?
4. Do some of these things seem smooth and sharp at the same time?

Have the students look very carefully for secrets on the plants like hidden insects, leaf structures, insect damage, etc.

BEST COPY AVAILABLE

[illegible]

[illegible] Winter

[illegible]

1. [illegible]
2. [illegible]
3. [illegible] a [illegible] of [illegible]ation.

[illegible]

[illegible] by [illegible] teacher. [illegible] or [illegible] much [illegible] our [illegible] e.g., [illegible] (necessary) or a polluted river (unnecessary).

[illegible]

Intro[illegible] the activity with questions:

1. What do you think [illegible]? Make a list.
2. What can you think of [illegible]? Make a list.
3. What can you think of [illegible]? [illegible] a list.
4. [illegible] Make a list.
5. [illegible]?
6. [illegible] out of? Let's take a field trip and [illegible], make a list of what [illegible] [illegible] are good, bad, etc. List things that [illegible].
7. Have them bring some things from home that smell and compare them.

[illegible]

[illegible] students [illegible], etc.

[illegible]

[illegible]

IN WHAT SHAPE IS YOUR ENVIRONMENT?

Ideas for this unit were contributed by Mrs. Vernice Towlerton and Mrs. Mildred Severson, adapted to the Interlakes Environmental and Outdoor Education Curriculum by Barbara Hyland and Rita Brown, August 2, 1972.

Grade Level - K-2

Best time of year - Fall, Spring, Summer

OBJECTIVES:

1. To introduce the concept that our environment is made of many different shapes.
2. To introduce to students various shapes and their identification in nature.

BACKGROUND:

Most things have a definite shape. Some are simple, while others are more complicated. Our environment is made up of many different shapes — cylinders, circles, triangles, squares, rectangles, octagons, etc. However, they are seldom perfectly shaped. Usually, the likeness is great enough to enable most students to find and identify them in nature.

PRE-ACTIVITY:

To insure that all students know the various shapes and can recognize them, a pre-activity in which students identify and match various shapes is suggested.

A few examples of simple games which might be used are as follows:

1. Have the students identify different shapes in the classroom by telling the object and its shape.
2. Give the students construction paper shapes and have them sort them into piles of the same shapes.
3. Ask some preparatory questions:
   a. What is the shape of a circle? Can you show me?
   b. What is the shape of a square? Show me.
   c. What is the shape of a triangle, cylinder, rectangle, etc.?
   d. Can you name something that is circular, square, cylinder, etc. shaped?
   e. Can you name something that is triangular shaped?
   f. What is the shape of a cottonwood leaf?
   g. What is the shape of an elm leaf?
   h. What is the shape of a rock? Do rocks have various shapes?

MATERIALS:

large paper sacks for each student

FIELD TRIP:

Go to a park, school yard, wetlands or any place which has a good variety of plant life and natural objects. Have the students collect as many different shaped objects as they can find.

Take the paper sacks back to the classroom for further investigation.

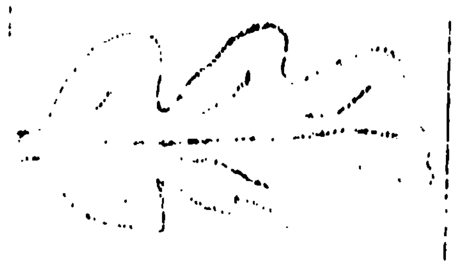
FOLLOW-UP:

Have the students empty the stuff out of their sacks and study the shapes, count the different shapes and discuss those which were easy to find and those which were more difficult to find.

If desired:

Mount the shapes either by giving the children a sheet of paper with the shape on it and/or putting large sheets up for the whole class to see.

Have the students find a natural object to fit the shape of construction paper . . . . or mount the natural object on a piece of paper and trace the shape around the object. See diagrams below:



Ideas for a physical education or movement experience follow-up:

1. Ask the children to move their bodies (or parts of their bodies) into a specific shapes. For example, rolling up like a ball for a circular shape.
2. Take the children outdoors on a bright, sunny day and let them experiment with their shadows, making them into various shapes by manipulating their body parts.
3. Have the children work in groups to form basic shapes as directed by the teacher or group leader.
4. Give the students a huge, circular elastic rope and let them experiment making the various shapes by using their bodies to shape the rope into the desired shape.

Shape rhymes to be used with this unit:

<u>Suzy Circle:</u>

I'm Suzy Circle
Watch me bend
Round and round
From end to end

<u>Sandy Square:</u>

Sandy Square is my name
My four sides are just the same
Count one side, and then count more;
Count to two, then three, then four.
Turn me around; I don't care
I'm always the same
I'm Sandy Square.

<u>Tommy Triangle:</u>

Tommy Triangle is
The name for me
Tap my sides
One, two, three

<u>Ricky Rectangle:</u>

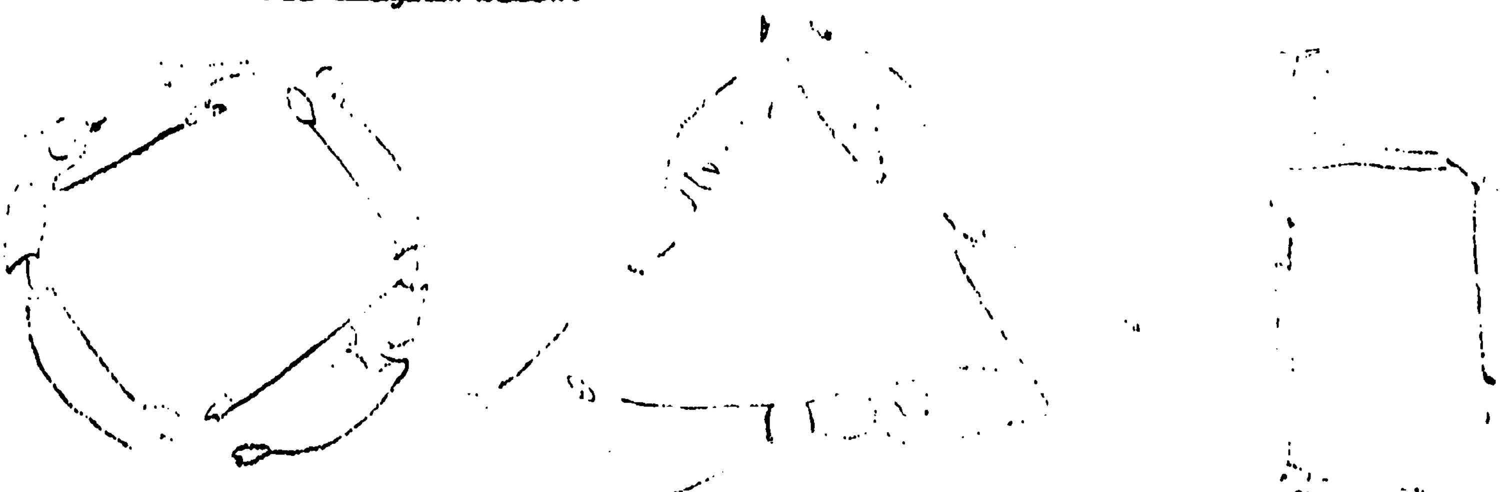
Ricky Rectangle is my name
My four sides are not the same
Two are short and two are long
Count my sides, come right along
One, two, three, four
Turned this way
I look like a door:
One, two, three, four
Turned this way,
I'm a window in a store.
One, two, three, four

<u>Cindy Cylinder:</u>

I'm Cindy Cylinder
Tall as a pole
Round as a silo
Or a long jelly roll

Activities to reinforce form perception:

1. Use masking tape to make geometric shapes on the floor. Instruct the children to walk around the tape outlines. Make circles, squares and triangle.
2. Create the various geometrical shapes by using the whole class. Children stand, or lie, forming the outlines of the figures. See diagram below:



3. Children trace around geometrical forms with fingers. Forms may be made of cardboard or small sticks glued on cardboard.
4. Children make shapes by using toothpicks or "pick-up sticks."
5. Place round, square and triangular objects into a bag or box. Children reach into the bag and tell which shape they are holding. Children remove the objects to see if they were correct. Try to secure things from the classroom if possible for use in this game.
6. Cut large colored magazine pictures into geometrical shapes. Children must attempt to reassemble them. (In order to make the created puzzle more durable and easier for the smaller children to fit together, mount the picture on construction paper or light weight cardboard. Then, cut your picture into the desired shapes. This also prevents curling up and tearing of the corners.
7. Use geometrical templates on chalkboard. Using chalk, children trace around the templates.
8. Children make geometrical shapes out of building blocks. Let the children copy the experiment. Use all dimensions. By this we mean that you can stack the blocks in various ways or make a shape with each block touching the table surface. When the child is copying your design, make sure he sits so that he may readily see the shape from all angles. Those who are slower will need to sit directly in front of them.

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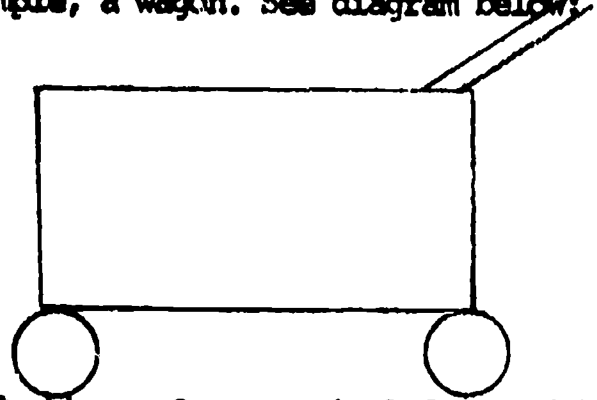
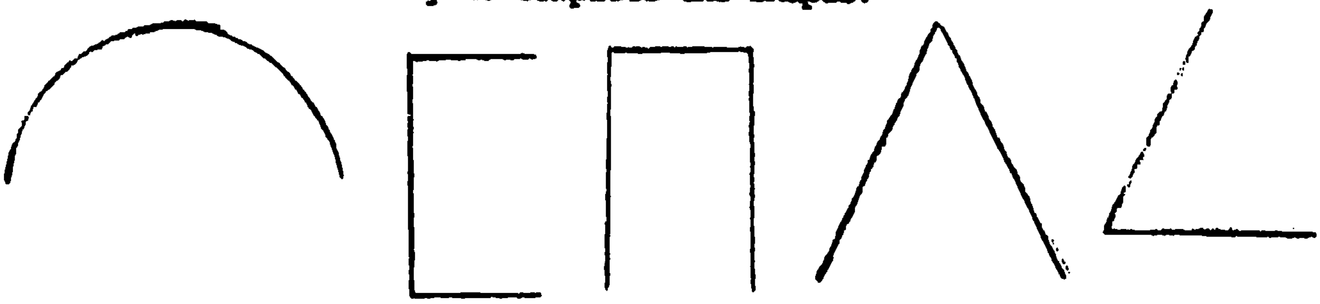
9. Create collage pictures using only geometrical forms. Use large forms which are easy for the children to cut out.

As an introduction to this session, the teacher could put together several shapes making an object that would be familiar to the children — for example, a wagon. See diagram below.



10. Make reproductions of geometrical forms with missing lines. Have the children try to complete the shapes.



11. Cut paper strips 1/2 inch wide. Give each child three or four strips of paper and ask them to paste the strips onto another piece of paper in the shape of a triangle or square.

* All of the form perception activities were taken from Daily Sensorimotor Training Activities, A Handbook for Teachers and Parents of Pre-School Children by William T. Braley, Geraldine Konicki, and Catherine Leedy, Educational Activities, Inc. Freeport, N.Y. 11520

MATH READINESS, LINEAR MEASUREMENT

Written by Rita Brown, Instructor/Secretary, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. Phone: 489-2416. Revised 5-25-72)

Grade Level - K-4

Best time of year - Anytime

OBJECTIVES:

1. To introduce basic mathematical concepts as related to measuring and taking measurements.
2. To encourage students to develop the ability to make rational comparisons and conclusions from the data they collect.
3. To develop concepts such as larger-smaller, more-less, many-few, long-short, narrow-wide, etc., as related to measuring.

BACKGROUND:

Students in the early primary grades are generally not sophisticated enough to be able to work efficiently with ruler, yardsticks, or other measuring devices. However, this need not prevent them from learning about and experiencing linear measurements. Simple devices which are more easily understood by primary children can be improvised to show comparisons rather than a specific measurement in inches or feet, etc.

This unit has been designed to give primary teachers some basic ideas about simple measurements they can use with their students. It is hoped that the teacher will add others which would more appropriately serve their needs.

PRE-ACTIVITY:

Discuss how and why things are measured.

What devices are used for linear measurements?
ruler, yardstick, tape measure, meter

Why do people measure things?
How big is an inch?
How big is a foot?
How big is a yard?
How big is a meter?
What is the difference between a meter and a yard?
Which is bigger, an inch or a foot?
Which is bigger, an inch or a yard?
Which is smaller, an inch or a meter?
How long is a mile?
What instrument or device is used to measure miles?
What does a mile measure?

A cute way to introduce this activity to your class is by asking them questions concerning their measurements.

How big are you?

Are you bigger than the person sitting next to you?
Are your hands the same size or are they larger or smaller?
Are your feet the same size or are they larger or smaller?
Are you littler or bigger than the person sitting next to you?
Are you shorter or taller?

A fingerplay on measuring which may be read and discussed is as follows:

MEASURING

When we find something little, just about so.
We use an inch to measure it; this we know.
When it gets a little bigger, about this long,
If we all say a foot, we won't be wrong.
A big piece of ribbon, red or white,
Let's call it one yard, that's about right.
When we ride on our car, for a little while,
We can't show you how far; it's a mile.

(The above poem was taken from an Instructor Handbook entitled, Skill Games for Mathematics by Clyde C. Corle).

FIELD TRIP:

(This activity can be done on the school grounds)

Explain to the children that they will be doing experiments on linear measurements. Explain that linear measurements are measurements taken along a line.

Begin the experiment by asking the children to count their steps beginning at their desks and going to a specified place such as the front steps, etc. Stress the importance of remembering how many steps it takes; the last number he counts.

Now, ask each child to give the number of steps it takes for him to get outside. Compare the largest number with the smallest. Why is there such a difference?

"Lead" The children to the conclusion that foot size is the deciding factor in whether or not it took a few or many steps to reach the specified destination. Allow them to measure different foot sizes with a plain piece of cord or string. The children may also trace around their shoes or feet on a large piece of paper and compare sizes of different children's feet. An interesting classroom bulletin board could be made by having the children write their names on the paper feet they traced and arrange them from the largest to the smallest, etc. A fitting title for such a bulletin board might be "We Are This Big."

Next, try to discover whether or not there is correlation between foot size and body height. Measure two students (one short and one tall) by simply putting a narrow piece of paper from the floor to a reasonable height on the wall. Have the students stand against the marker and record their name at the appropriate height. The children can then see which of the two is the tallest and which is the shortest. Then, have the same two children compare their shoe or foot size. Who has the largest foot? Is the one with the largest foot the tallest or the shortest? The children should conclude that the tallest person has the larger foot showing that foot size and body height do correlate. Let the children experiment to see if hand size, head size, etc. also correlate with the height of a person.

FIELD TRIP VARIATIONS:

After the children have become familiar with the terms inch, foot, yard, meter and/or mile, take them outdoors and let them measure natural objects. Some suggestions are as follows:

1. Length of a shadow of a building, tree, car, etc.
2. Width of a shadow of a building, tree, car, etc.
3. Width of a sidewalk
4. Length of a sidewalk
5. Width of a block
6. Length of a block
7. Width of a leaf
8. Length of a leaf
9. Length of a tree
10. Width of a tree
11. Height or width of various plants

Experiment with personal measurements:

1. Arms length
2. Arm span
3. Leg length
4. Height
5. Head measurement
6. Pace, etc.

FOLLOW-UP:

From the conclusions made on the field trip, write a simple story problem and ask the students for a solution to them. An example is as follows:

John is five feet tall, Jane is four feet three inches tall. Which one is taller? Which one probably has the largest feet? Who has the smallest feet? Who would probably have to take the greatest number of steps to get across the room? Which one probably wears the biggest shoe? Why?

SUGGESTIONS:

1. Have the children work in pairs.

2. Have the students take their shoes off before tracing their feet. Check to be sure that they trace the right foot on the page which asks for the right foot and the left foot also on the appropriate page.

3. When the students trace their hands, have them hold their fingers together so that it will resemble a mitten after it is traced. Once again, it works much better if the children work in pairs.

MY OWN SPECIAL MEASUREMENTS

BY ____________

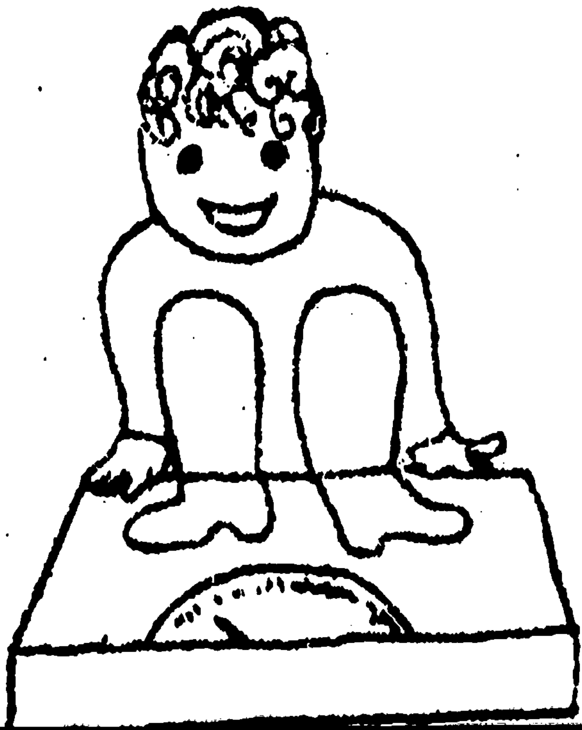
AGE ____________

GRADE ____________

THIS IS ME; I AM SPECIAL!

IF I STRETCH, I AM
______FEET ______INCHES
TALL.

I WEIGH
_____POUNDS.



I HAVE TWO HANDS. THEY ARE THIS BIG. (_____ INCHES LONG, _______ INCHES WIDE.

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THIS IS MY LEFT FOOT. IT IS ______ INCHES LONG AND ______ INCHES WIDE.

THIS IS MY RIGHT FOOT. IT IS ________ INCHES LONG AND ________ INCHES WIDE.

SOME OF MY OTHER MEASUREMENTS--

HEAD ________

CHEST ________

WAIST ________

WRISTS ________

ANKLES ________

ARMS ________

LEGS ________

IF I STRETCH MY

ARMS WAY OUT,

MY ARM SPAN IS

________ INCHES — THE

SAME AS ________ FEET,

________ INCHES.

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I CAN JUMP

REALLY HIGH!

__________ FEET AND

__________ INCHES.

I CAN JUMP

EVEN FURTHER!

__________ FEET,

__________ INCHES.

DANDELION WATCH

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. Phone: 489-2416.
(Revised 5-22-72)

Grade Level - K-8

Best time of year - spring or summer

OBJECTIVES:

There are many times that you would like to take the kids outdoors just to get out of the classroom in the spring. This activity is designed for that type of day. Usually, it can be done on the school grounds. While dandelions may not excite you too much, they are a valuable learning device for students. There are many different studies that can be done with dandelions. They are cheap to use, are normally abundant and are usually close at hand. For that reason, this activity is good to consider in the spring. It is not necessary to limit the activity to just dandelions. Any spring flower will work equally well.

PRE-ACTIVITY:

The kind of questions and preparations you use will depend on the grade level you are working with. Some suggested questions are as follows:

1. What is a dandelion?
2. What color are its leaves?
3. What color is the flower?
4. Does the flower change color? Why?
5. What color is it when it changes?
6. What is it called when it has changed color?
7. How many leaves does the plant usually have?
8. What kind of soil does it grow best in?
9. How long does it take the plant to flower?
10. How long does it take for the flower to change to a seed head?
11. How many seeds does it produce?
12. What is the white stuff in the leaves?
13. Can the white substance be used for anything?
14. How many dandelion plants are on the lawn?
15. How can we find the number of dandelions there are without counting all of them?
16. Could we find out the number of dandelions there are in **an acre** ?
17. How many new dandelion plants could be grown if all of the seeds grow into new plants?
18. What are dandelions used for?
19. What is germination?
20. How long does it take for dandelion seeds to germinate?
21. Do all of the seeds germinate?
22. How long does it take for the dandelions to germinate?
23. Do they all germinate at the same time?
24. What is the average length of germination?
25. How many generations could be produced on a 90 day growing season?
26. If they all lived, how many plants would that be on an acre?

FIELD TRIP:

This activity can be carried out on the school grounds if necessary. Many people will volunteer their lawns as study areas for dandelions if you will have the children pick them after the study is over. The area you study works best if it is secluded. For the early primary grades, identification of the dandelions and watching them change their life cycle will be sufficient. They will be fascinated by the change in the dandelion. They can all pick out a plant to watch. A little flag can be used as a marker to help them identify their plant. They should return to the dandelion at least twice a week so that they can notice the gradual change in the dandelion. The upper primary grades can get involved in population counts, germination rate and percentage, anatomy, length of life cycle and needs of the dandelions. You may be able to think of other possibilities. With this age group, you will need to set up a study area. You may be interested in only part of the activity so you should set up the study area accordingly. The abundance of the flower you are using for study will dictate how big an area you will set up. It may vary from five feet by five feet to twenty feet by twenty feet square or may be even larger. The area should be set up similar to the one below:

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

The number of study plots will depend on your class size. The plots will vary depending on the number of flowers present. It is important that the study plots are nearly the same size.

POST-ACTIVITY:

For the primary children, a good post-activity would be to try growing some dandelions in the classroom with the dandelion seeds from the plant they watched grow. They can also time this process to see if everything is the same indoors as it was outdoors.

The older children are fascinated by the mathematics activities which can be done around this unit using percentages, fractions and numbers in the thousands to millions. This will give them a chance to use the mathematics they have learned in a practical way.

DIRECTIONS FOR MAKING A LIVE ANIMAL TRAP

MATERIALS:	COST:
1. Empty coffee can - any size	----
2. Small screws and bolts - two per trap	.02 each
3. Metal or wire cutter	----
4. Mouse traps	.15 each
5. Hardware cloth (1/8 inch mesh works very well)	.25
6. Very fine wire	.20 per roll

PROCEDURE:

Cut two slits one inch long and one half inch apart in the open end of an empty coffee can. Drill two holes in it the size of the two screws on opposite sides of the pad of the mouse trap. Bend the cut piece of the coffee can back into the coffee can, and slide the pad of the trap into the opening formed. Drill two holes in the coffee can to match the ones cut in the trap.

Cut the hardware cloth so that there will be about a one-half inch overlap around the can. Cut off a half inch on one side of the wire circle. Attach the hardware cloth to the wire of the trap using the fine wire. Attach it in eight places at least. Make sure to attach the hardware cloth so that it is on top of the trap wire when the trap is set. This is done so that when the trap is sprung the hardware cloth will fit flat against the can opening. Using the screws and bolts secure the trap to the can. The wood base of the trap should be outside of the can.

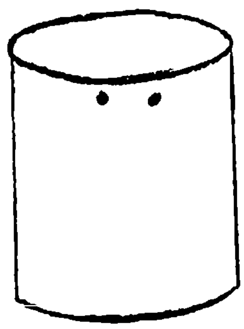
Set the trap in the usual manner poking the trap wire through one of the holes in the hardware cloth.

See following pages for more specific directions.

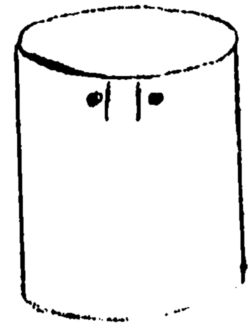
(Revised 2-8-72)

DIRECTIONS FOR MAKING A LIVE ANIMAL TRAP

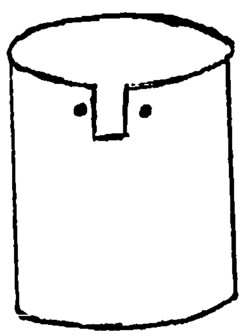
1. Coffee, or other can - size depends on how large a trap you want. Drill two, 1/8 " holes 3/4 " back from the can lip, one inch apart.



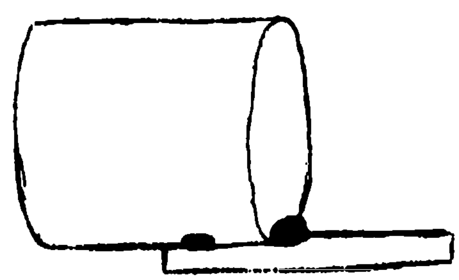
2. Cut two slits one inch long and one-half inch apart between the holes.



3. Bend the cut piece back into the can.



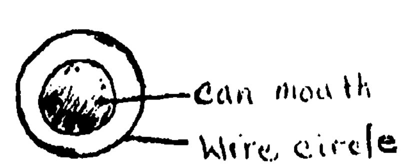
4. Place the can on the mouse trap and slide the slit back over the trap trigger until the lip of the can fits snuggly against the trap spring. Then mark the wood platform of the trap with a pencil through the holes drilled in the trap.



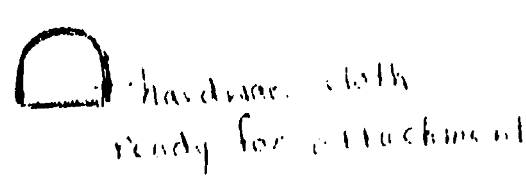
5. Drill holes in the trap platform the same size as those in the can at the pencil marks.

6. Cut hardware cloth so that there will be a one-half inch overlap around the can lip to cover the can opening. Cut off one-half inch from one side of the wire circle.

a.

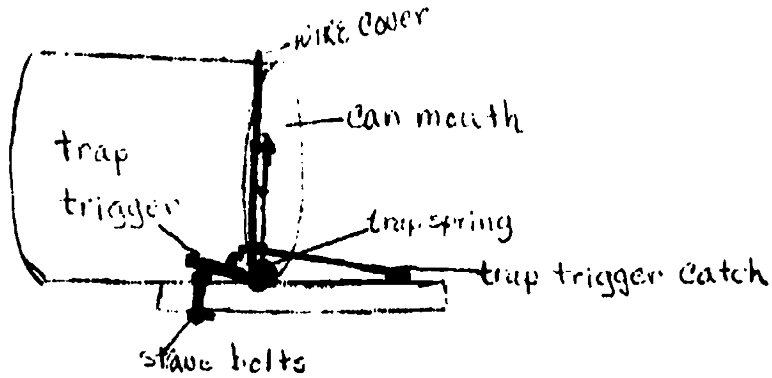


b.

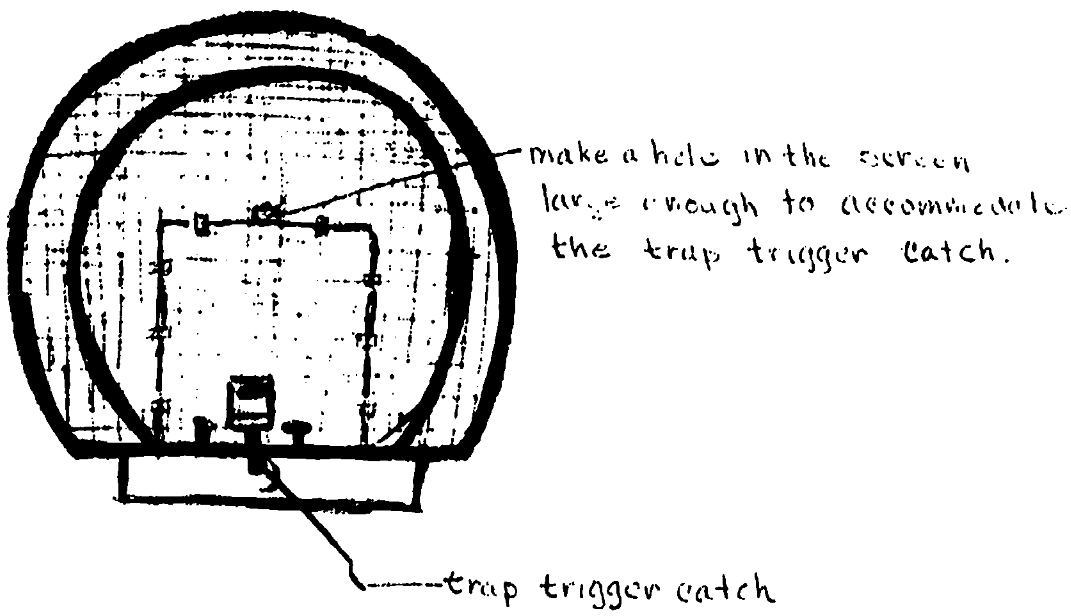


7. Attach wire to the inside of the trap wire with small wires, attach in at least eight places and fasten tightly.

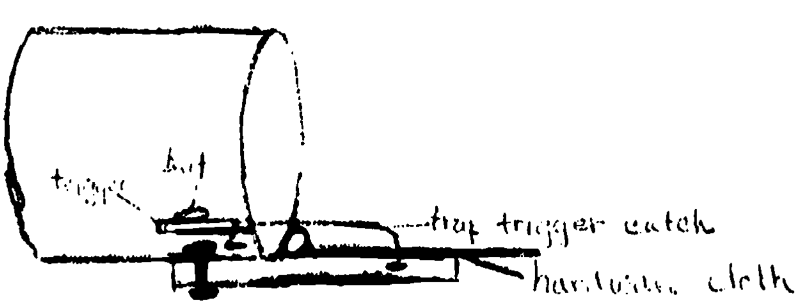
8. Then attach the trap to the can with two bolts, be sure the can fits snuggly against the trap spring. Tighten the stave bolts.



9. Set the trap by running the trap trigger catch through a hole in the hardware cloth just above the trap wire and setting it as you normally would a mouse trap.



If you wish to make a very large live trap, use a rat trap and a five gallon oil or gas can with the top cut out.



MATH WITH SNOW

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota, 57016. Phone: 489-2416. (Revised 3-27-72)

Grade Level - 6-8 (adaptable from K-8)

Best time of year - Winter

OBJECTIVES:

1. To give children practice with calculating areas, percentages, volumes and averages.
2. To give children some positive experience with snow.

BACKGROUND:

This activity would be a good one for a nice, warm, sunny afternoon. It is essentially an exercise in science or math and it is intended to fortify the problem-solving approach and individual responsibility concentration of environmental education projects. The Bureau of Reclamation Corps of Engineers and Civil Defense people do essentially the same type of projects to find out how much water will result from the Spring thaw of the snow. This way, they can forecast floods. Ranchers in Wyoming also use snow management to calculate and change the amounts of snow runoff that will go into their stock dams.

MATERIALS:

15 yardsticks or measuring sticks
100 foot tape measure or cord with knots or 1 foot markings
8 gallon jars, milk cartons or plastic gallon, large mouth jars
some type of scale
10 plastic garbage bags

PRE-ACTIVITY:

Discuss the plan; the following questions might help:

How much water is contained in the snow we have on the ground?
How could we find out?
How much does snow weigh?
How could we find out? (by sampling and measuring and weighing)

Discuss the procedures and assign jobs.

FIELD TRIP:

1. Choose an area of the playground or a neighboring area which contains undisturbed snow which represents the amount of snow over the general area.

2. Measure out a square area either 10 foot square or 100 foot square.

Or, use the whole block, measure and calculate the dimensions of it. This area will serve as a sample area and will represent the snowfall for the town, township, or county.

3. Have two teams of four people take ten depth readings, each at ten random places in the sampling area. To get random samples, have the children shut their eyes, turn around and throw their sticks. Wherever it falls is where the measurement is taken. Then, the same process is repeated nine times.

The data collected might be recorded as follows:

Sample Number \ Student's Number	1	2	3	4	5	6	7	8	9	10	11	etc.
1	10"											
2	6"											
3	14"											
4	11"											
5	10"											
6	10"											
7	3"											
8	2"											
9	7"											
10	10"											

TOTAL 83"

AVERAGE 8.3" = .69 Feet

Calculate the average depth of snow each student found. Then, average the averages to get a representative snow depth figure.

Now, you have length, width and heighth: 10' X 10' X Average Depth in Ft. = Volume of snow in cubic feet, = 100 X .69 or 69 cubic feet of snow

Now, have two teams of four students take gallon jars. Have them measure out one cubic foot of snow, taking snow from the surface to the ground. Have each student stuff the snow into the jar and bring it back into the classroom with them. Let the snow melt and measure the amount of water for each cubic foot of snow. Average the amounts of water yield to get the average water content of snow. Now you have the measurements you need to calculate the snow melt runoff.

EXAMPLES:

10' X 10' X 1' = 100 cubic ft. of snow

1 cubic foot of snow = 1.5 quarts of water

quarts of water in 100 $ft.^3$ of snow = 100 X 1.5 = 150 qts. or 37.5 gallons

Now figure how many gallons of water in the snow on the whole block, the township, the city, a field, the county, etc.

How much does the snow weigh on an area? Have two groups of four kids measure out eight cubic foot areas of snow, collect the snow in plastic bags and weigh it. Or, use the water from the other part of the experiment and weigh it. Average all of the samples to get one representative figure.

1 cubic foot of snow = 3 lb. or 1,360.8 grams (estimate only)

100 cubic feet of snow = 300 lb. or 136,000 grams

Now, how much does the snow you have on the roof of your house weigh?

Calculate the percentage of volume the water in the snow has to the volume of the snow.

Have eight children or more fill a container with snow. Don't pack the snow, just get a representative sample. Now, measure the height of the snow column in each container. Record the time the snow is brought into the classroom. Record the time it takes it to melt. Does all of the snow melt at the same rate? Why or why not?

Now, measure the height of the water column. What percentage of snow is water? Have each child calculate the percentage of water in his sample.

Snow column = 12 inches

Water column = 1 inch

Percentage = 12 inches into 1 inch X 100 = .083 X 100 = 8.3%

Average all percentages. Why did the percentages differ?

You may wonder why we try to plan many rather repetitious activities into these units. You could arrive at some of the same figures and estimates taking one sample. However, we include the taking of many samples for several reasons. It gives each child an important part of the work. His work is averaged into the final answer. It emphasizes the natural variation of sampling and averaging. It points out in a subtle way that one observation is not necessarily sufficient evidence with which one can form a valid conclusion.

IDEAS FOR FOLLOWING UP THIS ACTIVITY IN AREAS OTHER THAN SCIENCE AND MATH:

Communications:

Essay on the importance of snow as providing water to the area. Collecting evidence and data and writing a scientific report on snow depth, water content and distribution.

Social Studies:

Explore the cost of snow management in a city or county. How much does it cost to remove it, what do they do with it, what chemicals do they use, do these chemicals pollute the lakes?

Snow Management:

How do you manage snow? Shelterbelts, snowfences, residual crops, level bench terraces in the soil, etc.

Planning farmsteads for snow and temperature management and snow runoff. Protecting livestock from snow, wind and cold temperatures.

The effect of snow runoff to the siltation of lakes and recreation value. Try to estimate the value of snow or losses caused by snow.

STORY TELLING AND WRITING

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota, 57016 (Revised 3-28-72) Phone: 489-2416

Grade Level - K-8

Best time of vear - Any time

OBJECTIVES:

1. To encourage students to construct stories; true and fictional.
2. To acquaint students with the structure of stories.
3. To acquaint students with different wavs of expressing suspense, surprise, emotion, fear, etc.
4. To focus attention on the importance of story telling as a personal means of expression.
5. To stress the usefulness and importance of outlining in communications.

BACKGROUND:

Everyone enjoys a good, well written or spoken story. It is part of everyone to want to express the events which they have experienced or dreamed about. Just about everyone learns to tell or write stories from reading or listening to other people tell them. Very few people realize that good stories have definite characteristics and very well defined patterns. If we learn these little structures and tricks, we can tell and write stories in a much better way. All of our communications skills come to bear in story construction.

This activity is certainly nothing new to teachers; you've been doing this type of activity as part of your regular classroom routine. The purpose of this is to give you some ideas and perhaps stress the importance of story telling to kids.

MATERIALS:

Any natural item that would stimulate the imagination. The child can bring something he has had an experience with and that will serve to remind him of that experience.

1. fur
2. feathers
3. deer horns
4. fish scales
5. wasp nest
6. ant hill
7. pictures of local polluted streams
8. sacred landmark or natural play area

PRE-ACTIVITY:

Form a half circle, teacher sitting on a chair in the middle. Take a short period to tell about stories giving the children an introduction to the parts of a story.

Parts of a story:

1. Title: Why have one?
   What does it do?

2. Introduction: When, where, who, what
   Preparation for the story

3. Body: Events leading to a peak of action. This is where you tell the story and develop the theme. Illustrate things with short anecdotes. Stories may be of mystery, danger, happiness, sadness, horror, madness, humor, etc.

4. Ending: Finish the story and stress the point
   Bring the moral out

Discuss how things are expressed in telling stories. For example, whispering, shouting, sneaking, screaming, growling, yelling, waving the arms, making a funny face, drawing pictures, etc.

FIELD TRIP:

This activity could be a follow-up to another activity or you could take a field trip to find a suitable story. Look for where a fox caught a mouse or rabbit, where a bird found a cozy nest, where a rabbit was hit by a car, or a tree was cut or a car wrecked. Or, let the kids pick up any ten objects and write and/or tell stories using them in the story. Stories shouldn't be long, however, some may be. Let the younger children make a story out of pictures from an old catalog or magazine. Give everyone a chance to write and/or tell a story. Approach the field trip in a way that the student reports what he finds in story form.

POST-ACTIVITY:

Tell and write stories.

Practice illustrating story themes with drawings or pictures. Stories are such an individual undertaking and thus a pretty important assignment that it is important to tone down grading and comparisons between students and emphasize success, helpful hints and individuality.

Let the children experiment and develop this ability over several activities related to this activity.

NOTE:

We would appreciate very much having examples of the stories your class composes and comments from you on this particular activity.

STORIES AND ANECDOTES TO ASSIST IN ILLUSTRATING STORY CONSTRUCTION:

MATERIALS:

bear teeth (Keep hidden until after the story is completed)
bear skin

(Since these are not generally available to anyone outside of the Interlakes Program, it may be necessary to improvise some types of substitute teeth or fur or change the story to fit what you can find).

A BOY WENT HUNTING

This story is mostly true. It happened about ten years ago in the northern forest of Minnesota. It happened to a boy -- a big boy about the size of your oldest brother or cousin.

Jack was going deer hunting. He needed to shoot a deer to get food for the long winter. Also, Jack's uncle and five other older men went hunting with Jack. They drove up north from southern Minnesota after work so it was very dark when they reached the old trail which led back into the quiet, snowy forest.

It was snowing very hard when Jack and the other men loaded their equipment on their backs and into sleds and started the long walk to the cabin. The night was so dark, the men could barely see each other as they trudged along. They didn't talk much, they just listened to the moaning wind and the mysterious night sounds.

It was five miles to the cabin. The shack was nestled snuggly in a thick grove of large pine trees, which looked like huge Christmas trees. The trees protected the cabin from the cold, moaning wind that moved restlessly along. The men were very cold and happy to see their snug, little camp. In a few minutes, a toasty fire crackled and snapped in the old iron, potbellied stove. In the dim light, the old stove looked like a big, fat man squatting in the kitchen. Jack made some hot chocolate and coffee for the men. They sat there talking and laughing about where they were going to hunt the next day. The wind groaned and whistled and shook the tree tops all around the cabin. Huge snowflakes drifted down through the trees. Everything was fine. Jack was very happy. He loved this country and these men and this place. The men all crawled into their bunks and shut off the old kerosene lamps and went to sleep.

NOTE: This is a good break. That was the introduction. It tells who the story is about, when it happened, where it happened and it sets the stage for further action. It injects mystery and suspense, comfort and happiness.

An old alarm clock sat ticking softly on the kitchen table. When the minute hand reached twelve and the hour hand five, the alarm clock rattled the whole cabin. Bud, Jack's uncle, climbed out of bed. Bud was a huge man, like a big, jolly Santa Claus without a beard. His nose was red and shiny and looked like a large sausage. He laughed and yelled, "Get up!" "Roust Meiner Deutsche!" (Which means, get up my Germans). "The big bucks will be moving this morning. Jack, get your fanny out of bed, get some wood on the stove and get the fires going. Move it, move it, move it!"

Oh, that cabin was cold, the floor hurt his feet as Jack crawled out of the warm bunk. His breath made a white cloud in the dark cabin. Pants were cold, socks were cold, and he said, "My goose bumps are so big I can't get my shirt on over them!" It sure was hard to get up. But, he was anxious to get started hunting.

The fire crackled and popped in the cook stove while sausages, eggs and pancakes fried and steamed. The cabin warmed up quickly. Gordie was the cook's helper, Bud was the cook. Gordie was a good friend of Bud, and a very good hunter. They made a delicious meal which everybody ate until they were stuffed. Guess who had to do the dishes? Jack. He didn't like that much, but since he was the youngest, he had to do all that bad stuff.

By 6:30 everyone was ready to go hunting. It was a very cold morning -- about 10° below zero. The wind was but a whisper in the trees. There was no snow falling except once and awhile; without warning, a big chunk of snow would fall from a tree. It was really dark. Jack walked along an old familiar trail that snaked and twisted through the woods and swamps to his tree stand.

In the deep woods, to hunt deer you must find a trail that the deer follow and stand beside it until the deer run by. It was a lot different than hunting deer here in South Dakota. Jack was walking back to his favorite stand, a high old stump of a tree which was cut seventy years ago. The stump was so high that you had to climb up to get on it. It was so wide you could lay down on it without your feet hanging over the edge. It was the biggest tree stump Jack had ever seen.

Jack walked alone, it was scary in the woods. He walked slowly and listened carefully and thought about scary things, about bear, wolves, ghosts and stupid stuff like that. He started through the Black Swamp, it was a tangled mess of trees, with water and moss.

"Chick-chick-chickadee-dee-dee," a little chickadee chattered and scolded Jack. Jack jumped, that little bird sure startled him. Jack walked silently, bending and turning to get around the snow covered trees.

"Craawk-craawk, craawk," a big black bird suddenly flew up. " What was that? "Jack had never seen one of these before. "It must be a raven. Boy, that scared me, it sure is dumb to be so jumpy," he thought.

Jack was getting near his stand. It was beginning to get light, but it was cloudy. The old sun wouldn't be peeking through for a long time. He silently trudged along, kicking up little swirls of snow.

"Cheeeck, cheeck, chic-chic-chuk-chuk," a little red squirrel piped up and startled Jack for the third time. The little critter really put up a fuss. Jack jumped, then shook his head and sighed.

"Sure is dumb to be scared," he muttered.

Jack crawled up one side of the big stump, brushed the snow off and settled down to wait for a deer to come. He checked over his rifle to make sure there was no snow in the barrel, action or sights. He wanted to get the biggest deer in the woods so he could brag to Bud, Gordie and the others.

No deer came. Jack waited. He stamped his feet on the stump to try to warm them up. Stamp, stamp, stamp. That was the only sound in the woods. Another hour passed and no deer came. Stamp, stamp, stamp. Jack waited patiently, looking around carefully for a deer. Another hour creeped by. Jack was cold and growing a little impatient. Stamp, stamp, stamp.

"Grooor! Grooor! Roar! Row!

Jack jumped into the air, whipped his head around and saw a huge, snarling, ferocious, black bear three feet from his rump. He spun around and fired just as the bear lunged for him. The bear dropped out of sight. Jack leaped off of the stump and ran as fast as he could back to the cabin. He never stopped to look behind him. He was so frightened. He had never been so scared before!

Jack burst into the cabin, completely out of breath, looking wild and terrified. The other men were sitting around the table eating lunch, for it was now noon.

"What happened to you? Looks like you've seen a ghost," Bud said.

"Shot a bear; it almost got me! Don't know if its dead or not," Jack croaked between his heavy breaths.

"Well take it easy,"Gordie said. "We will figure this all out; have a sandwich."

Jack sat down not knowing what to say next. He was tired, scared, disappointed and happy all at once. He told the men the story. They laughed and talked about the bears they had hunted and shot.

"Well," Bud said after an hour of eating and story swapping, "somebody should go out and check out Jack's yarn. If that bear is wounded it could be a real danger to us and other hunters."

Jack was feeling better now. "I'll go back, but I want someone to come along and help me. That bear dropped out of sight, probably into a hole under the stump. I sure don't want to check this out alone."

"Well, it looks to me like you're about big enough to take care of yourself," Bud said. "Looks to me like real hunters get themselves out of spots like this."

"I'll go along," Gordie said, "I haven't seen a bear for five years. Anyway, I want to hunt the west edge of Black Swamp this afternoon."

Jack and Gordie picked up their rifles, knives and two ropes, waved good-bye and headed down the trail to Jack's stand.

NOTE: Here is another break in the action. The story and action have peaked. Now there is a pause and continue into a finish or ending.

Jack and Gordie stood silently by the big stump, on the north side of the stump was a huge hole. A tunnel ran down deep into the earth and back under the stump. There was no blood or hair to show that the bear was wounded or dead. There were no bear tracks in the snow indicating that the bear had run away. The bear was in the den, too far back in the cave to be seen.

Jack had a big lump of fear and disappointment in his throat. He was silent. He couldn't think of a thing to say. He didn't know what to do.

"No way I'm going down into that hole," Gordie said.

"Let's stick a limb down there to see if we can get the bear to move, or make noise," Jack said quietly.

They pushed a long limb into the hole and twisted and poked it around. Not a sound. They listened for sounds of breathing. Not a sound.

"Well," Jack said, "Looks to me like I'll have to go down in the den to check it out."

"You're nuts!" Gordie exclaimed.

"Well, what else can I do?" Jack asked. "I'll tie a rope to my leg and crawl down there with my .22 pistol and take the other rope. If the bear is dead, I'll tie the rope on it and we will pull it out. If the bear is alive and gives me trouble, pull me out with the rope. How is that for a plan?"

"You're more nuts than I thought!" Gordie said.

"Well," Jack said, "I sure would like a bearskin, and I don't want to leave a wounded bear."

Jack was scared stiff, but he was also brave. He tied the rope to his leg, took out his .22 pistol and held onto the rope with his right hand. Then, he started crawling into the cave.

As he crawled slowly into the cave, his body shut off the light by filling up the hole. It was too dark to see the bear or anything. Jack inched his way down, always feeling out in front of him with his right hand, which was holding the rope. He paused and listened for the breathing of the bear, silence. Downward he crawled, inching further and further always feeling ahead with his hand. His hand touched fur!

"Now what?" he thought. He had goose bumps and he was very scared. He pinched a couple strands of hair and pulled them. The bear didn't move Silence. Jack grabbed a big handful of hair and shook it. The bear was too heavy to shake, but he didn't move.

"He's dead!" Jack yelled. "Yippee!"

Jack crawled into the cavern with the dead bear and felt around for its head. It was a very large bear. Its head was tucked under its paws; and it laid there just like it was asleep. Jack lifted the big paws off its head, the claws were huge and sharp.

"Sure is a good thing the bear was dead," Jack said, "He sure would have made hamburger out of me." He made a big loop and slipped it around the bear's head and scrambled up the tunnel and out of the den.

"Wow, I'm sure glad it's over with!" Jack said, smiling and still trembling.

"That's darned near the dumbest thing I've ever seen a man do," said Gordie.

"Well, what would you have done?" asked Jack.

They pulled the bear out of the cave. It was very large with beautiful shiny black fur. Snow was beginning to fall again. Large gobs of flakes fell into the black fur.

"Well, I'm heading north; should be some deer moving there this afternoon," said Gordie.

"Yes, I'll see you back at the cabin," Jack said.

Jack sat for a long time on the stump looking at the bear. Snow was falling heavily. It was hard for Jack to describe how he felt; he was very happy and tired. He felt very brave and daring, and a little foolish. He felt sorry for the bear, but knew he could hunt again and hunt for other bears. He felt he had saved his life by shooting the bear and he risked his life going down into the den to get it out.

Jack dressed the bear out, washed the insides out with fresh, clean snow, and began the long pull back to the cabin. The bear slid along easily in the snow behind him. It was getting darker now, and the wind was moaning through the trees.

"It sure will be nice to have some hot chocolate," Jack thought.

NOTE: The ending is as important as the introduction. It should be one which leaves the listeners with a feeling of completion, or maybe not. Perhaps it should leave the listener with the thought that tomorrow a new story will begin. Remember that in a story telling, innovations in design, subject matter, and delivery are measures of excellence and should be encouraged.

Expressing things takes descriptive words. The use of descriptive words and the way and place you use them makes a big difference. Good story tellers use all kinds of expressions, voice fluctuations, facial expressions, hand gestures, and even the movement of their feet.

Let's tell two very short stories to illustrate. The stories are the same in some ways, only there is a big difference. Which one is the best? Why?

TAKIN' CARE OF THE PIGS

One night, my Dad said, "Boy, go look at the pigs. See if they are alright. Shut the door when you leave."

"O.K.," said Joe.

It was very nasty outside. Joe turned on the yard light. It was snowing. Joe walked to the hog house and opened the door. A dog was in with the pigs. There were dead pigs laying all over the floor. Joe shut the door and ran back to the house.

"Dad!" Joe yelled, "There is a dog in the house. It's killing the pigs!"

"Oh," said Joe's dad, "I'd better get my rifle and shoot the dog."

So Joe and his dad went out and shot the dog.

O.K. That is the first way. Is it a good story? Read the next story and see if you think it is better. Is it?

TAKIN' CARE OF THE PIGS

One night in November, Joe's dad said, "Hey, little fella, go out and look at the new baby pigs. See if they are alright. Be sure to shut the big creaky door when you come back."

"O.K.," Joe said, "But it sure is boring. I have to go out there all of the time and those baby pigs are always O.K."

It was very cold and windy. The wind was howling through the shelterbelt and the old windmill squeaked and banged. Joe turned the yard light on. He could see the snow being whipped and driven by the wind. Snow was so heavy in the air that he could barely see the hog house. Joe struggled through the deep snow, fighting against the wind toward the gray, old hog house. As Joe approached the hog house, he heard the old sows "wuffing" and squealing in terror. Something was wrong! He climbed the fence and pulled on the creaky, heavy door. He moved it just a sliver, just so he could look in.

Screams and squeals of baby pigs pierced the air. Sows were squealing and wuffing. A strange, huge, vicious dog was ripping, crushing and biting the baby pigs. It was killing those poor little pigs as fast as it could. The mother sows were trying desperately to fight the dog, but the dog was too fast. He cut and bit them, many sows were bleeding, two looked dead and lay in pools of blood on the floor.

Joe was scared, he didn't know what to do. He knew that the dog might attack him, so he knew he had better get help. Joe turned and ran back to the house as fast as his little legs would plow through the snow.

He burst into the house yelling as loud as he could, "Dad, get the gun, there's a dog in the hog house! It's killing the pigs!"

Joe's dad jumped to his feet, put his boots on over his socks, grabbed his deer rifle, and ran out into the snowy night with just his long johns on. Joe ran right behind him. Joe's dad got to the hog house before Joe. Joe saw him raise the deer rifle and fire. Blaam!

The strange dog was dead. He laid right in the middle of seven little baby pigs which it had killed. Joe started to cry, cause it was sad to see the pretty dog and all of those innocent little pigs laying there dead.

Joe's dad stood there quietly for a minute, panting from the run. He was very mad and disgusted. "Joey," he said, "That dog just killed our Christmas presents."

Joe and his dad piled up all of the dead pigs outside the door. Then, they straightened things up, shut the door and went to the house to call the veterinarian.

O. K. This is the same story. How is it different? Do you like it? Is it better? Why? If you were telling this story and it had happened to you, which way would you tell it? How did expressive words and gestures change the story? Suppose you can remember to use these kinds of words and expressions in your own stories?

The use of memories and imagination may be all you need for writing or telling stories. However, it is really helpful to have things in your stories which are real and which you can show to the people to which you are telling a story. You can do this with pictures or little drawings or faces or sounds you make or with objects that played a part in the story.

Isn't it better to tell a story about your dog, when your dog is there? Or about a friend when your friend is there? Why? How do they make a story better? Which do you like best, a story with pictures or one without them?

For a little practice, why not write a story about 5-10 objects you find outside on your field trip. For example, find clues to life in the snow. Pretend that you are an animal whose tracks you found, or a bird whose nest you saw, or the fox who ate the rabbit and left its fur.

During the summer of 1971, the sixth grade class at Chester, South Dakota took a field trip to the White River Badlands south of Wall, South Dakota. We had many things happen to us which we could write stories about. There were two very excellent things to write stories about. They were a huge buffalo skull and a large rattlesnake. The buffalo skull was not in itself a subject for a story, but the history of the skull was. Let's put together a story from the evidence we found. Evidences we found are on the next page.

1. large buffalo skull
2. a 200 foot cliff
3. a stone hammer head
4. a large arrowhead
5. charcoal
6. fresh water spring
7. caves
8. bones.

Let's plan the story. What do we need first ? Is it true or fictional (pretend) or both ?

I. Title
II. Introduction
  A. When
  B. Who
  C. Where
  D. What
III. Body. What happened? How did it get there? Use the evidence in the story. Pretend it is real people, or it is happening to you.
  A. People lived in caves.
  B. Used stones for tools
  C. Used arrows for weapons
  D. Had fires
  E. Chased buffalo over cliffs
  F. Smashed buffalo bones with stone hammers
  G. Made camp with fire beside fresh water stream

IV. Ending

Write a story for me using this evidence and pretend. Use pictures, too. Draw them or cut them from a magazine in school or after school. Send them to me.

Why not go out on your own field trip to find evidences for writing a story? Or, you might sit down and plan a story from some experience you have had.

The second story is true and is exciting enough just like it happened. The evidence is a dried rattlesnake skin.

Let's try something which will help you write your own stories, or letters or reports. Below is an outline of a story. It is like a skeleton, we can build the story around and attach it to the outline or skeleton of the story.

I. Title
II. Introduction
  A. What happened?
  B. When did it happen? June, 1971
  C. Where did it happen? Pine Ridge Indian Reservation in Badlands
  D. Who did it happen to? Sixth grade class

III. Body of story - What happened?
   A. Boys went to check traps
   B. Boys checked traps and started back to camp
   C. Saw a big rattlesnake next to his leg
   D. Ran back to camp and told adults
   E. Went back with adults to find snake
   F. Looked for snake
   G. Found snake
   H. Killed snake

IV. Ending
   A. Milked snake venom
   B. Skinned snake
   C. Cooked and ate snake
   D. Reflections

Why don't you write me a story in which you use this outline? Just write in what you think might have happened.

Do you think outlines help in writing stories?

Practice writing an outline and then write a story using your own outline.

WHAT'S IN A GOLDENROD GALL?

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. (Adapted from Outdoor Activities Booklet, Environmental Science Center, Golden Valley, Minn. Phone: 489-2416 (Revised 2-2-72)

Grade Level - K-12

Best time of year - last two weeks of February and the month of March or the first two weeks in April

OBJECTIVES:

1. To introduce the concept of environment into a tangible media.
2. To introduce the process of environmental manipulation.
3. To introduce experimentation to demonstrate the effects of environmental damage to the survival of organisms.
4. To introduce the concept of plant-animal dependencies.

BACKGROUND:

What is a goldenrod gall? It is a weed stalk with an egg shaped swelling. The tall, common goldenrod plant remains standing throughout the winter, even though it is dead and dry. You find patches of these weeds in pastures, along railroad tracks, ditches, shelterbelts, stream banks and sloughs. Some of the weeds will have a large round swelling on the stem. This is a goldenrod gall.

A wasp, fly or midge starts the gall. The gall swellings are caused by goldenrod wasps, midges or flies which lay their eggs in the stem during the summer when the plant is green and growing. The inner lining of the gall is eaten by the insect larvae and serves as the only food of the developing insect after it hatches from the egg. The activities of the insect stimulates the goldenrod plant to produce this special formation. This gall then becomes the environment for the insect for eleven months of its life. This gall provides food, water, shelter from elements, protection from birds, predator insects and prevents it from drying out.

This tiny complete "environment" is much fun to work with and is very well adapted for use by elementary students learning about environment. The tiny grubs which are found in the galls have no legs or extremely tiny ones. They are generally of two body types. They are active in the galls during very cold weather and adapt themselves well for manipulations we subject them to. The insects do not bite or sting.

During the period of the experiment, the grub will change into a pupae or chrysalis for several weeks and then emerge as an adult. The children can prepare these galls so that they can view all of these happenings. The students might also experiment with these insects to test how changes in the insects' environment will affects its survival.

PRE-ACTIVITY:

The pre-activity may be fairly short. Show the students several galls and ask them what they think they are. Ask them to tell what they think is inside the gall. Ask them to draw a picture of the gall. Ask them if they have ever seen galls before and where. Question them as to what they think environment is. What makes an environment?

This activity should be conducted in February or March for best results. Plan the field trip to an area that has been located beforehand and in which goldenrods are abundant. Take a paring knife or hunting knife along to cut off the tough weed. Put the galls in paper bags to carry the galls back to the classroom. Have each student find and collect at least two galls.

Set up teams before hand to carry out experiments, prepare jars and conditions of experiments during pre-activities. Present this to them as planning a scientific experiment.

FIELD TRIP:

This trip would not have to last very long and could be done in very bad weather. Children can be taken on a hike to look for birds, animal tracks, bird and animal nests, burs and seeds, etc. However, make the hunt for goldenrods the first priority and "lead" them into gall areas without pointing them out. Collect about 1-3 per student depending on your class size. If more are needed than you can find, the Interlakes staff will supply what you need. Carry the galls back to the classroom. You can store them for a week or so or use them right away.

POST-ACTIVITY:

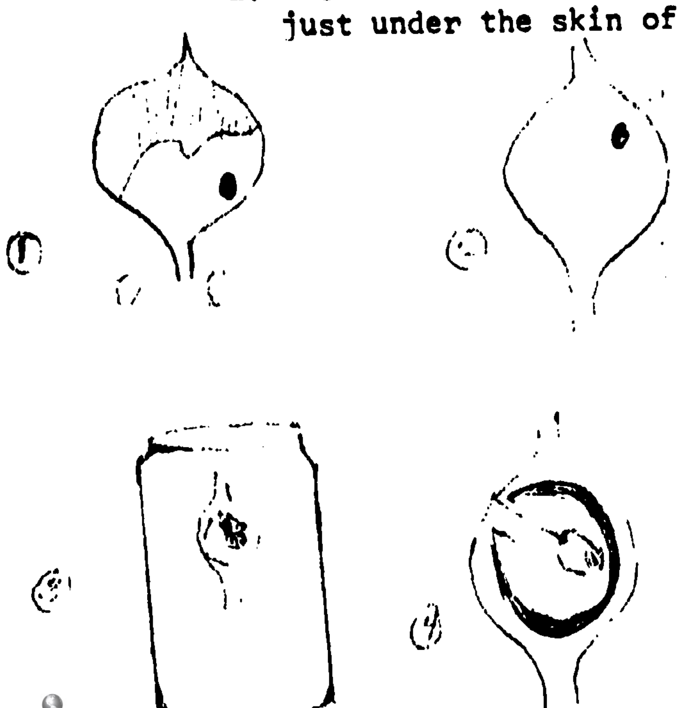
There are many experiments you can carry out using these galls. The following are some experiments you might wish to try. You may want to develop your own experiments with them.

Preparation I

Equipment: 1-3 galls per student
sharp knife for cutting galls (razor blades also work)
wide mouth jar
six outdoor-indoor thermometers
old sponge
old nylon sock
glue
dark construction paper

Make four preparations (or more) in four different jars as follows:

a. The larvae has dug a tunnel to the outside of the gall. The entrance lies just under the skin of the gall. Peel the gall until you find the entrance.

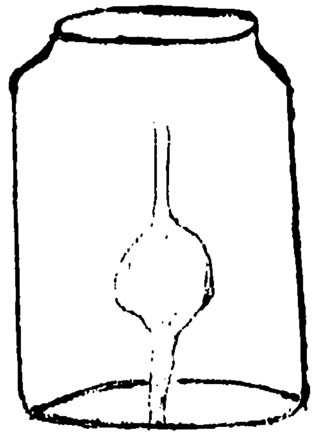


Then cut off radial slices of the gall tissue until the larvae and tunnel are exposed totally. This will leave ½ of the gall intact with the insect securely working in its tunnel open to view over its entire length.

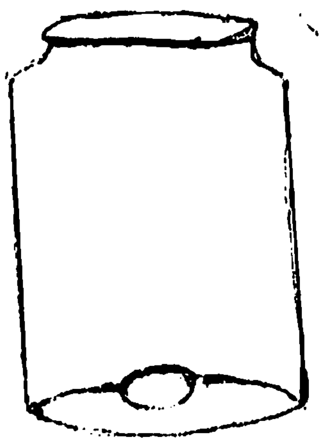
Trim the cut side to fit snuggly against the side of the jar. Place glue around the outside edge of the gall, away from the entrance hole and larvae, and glue the preparation to the side of the jar. A lot of alternative preparations work as well. See attached page.

Preparation II

Use four jars again. Place uncut, undisturbed galls in four jars (2-3 per jar).



Preparation III



Use four jars again. Cut open galls and remove the larvae and place them on a paper towel in the bottom of the jars. You should have a total of at least 12 jars; four with window preparations and four with undisturbed galls and four more with larvae on paper on the jar bottom.

Now cover the jars with pieces of old nylon stockings. You just wait for 2-3 weeks to see what happens. Encourage the children to record what they see in drawings and words. See attached sample chart. Children may be asked to keep records. You may also decide to go ahead and experiment.

We have found that the glue preparations are messy and often very difficult to do by the younger children. Instead of gluing the ½ gall onto the side of the jar, try this. Take a three inch piece of clear celophane tape. Cut off one inch and tape it to the middle of the two inch piece. Then place the smooth, nonadhesive side against the tunnel and larvae and tape it fast. Procede with the experiments.

Or, use a petri dish or pie pan with a clear glass or plastic top. Lay the ½ galls in the pan and prop them up with paper towels so that the lid of the pie pan presses firmly on the galls. No glue is needed and the results are the same. The environments can be very easily manipulated. Be sure to wait until late February, March or early April to try this unit.

When Environment Changes -- What Then?

Light, moisture, temperature, air movement -- these are some of the things that make up environment. What happens to living things when these change?

Will the larvae in the goldenrod galls be affected?

Depending on the number of galls you have collected, make some or all of the following tests. Maybe you can think of some others. See chart number two.

Test I: Does the amount of light affect the development of the larvae?

Fasten dark paper around containers of galls from Preparation I, Preparation II and Preparation III.

Leave an equal number of galls in the light.

<u>Test II:</u> Does the amount of moisture affect the development of the larvae?

Keep dampened sponges in one set of containers. Moisten the sponges every day.

Run this test on containers of galls from Preparation I, Preparation II and Preparation III.

<u>Test III</u>: Does temperature affect development of the larvae?

Take several thermometers and find spots in the room which stay at different temperatures. (like a window or air vent)

Check these temperatures each day for several days, to make sure they are nearly the same (a variation of five degrees is permissible).

When several spots have been found, place containers of galls from each of the three preparations in these places.

Don't forget to check the containers daily. Keep a daily temperature record. Record what's going on in each container every time you check. Include data and preparation number of each container, also. Use record sheets like the one below.

SAMPLE RECORD SHEET
FOR
GOLDENROD GALL EXPERIMENTS

PREPARATION I

Date Temp.	Observations Test I	Date Temp.	Observations Test II	Date Temp.	Observations Test III
____ ____		____ ____		____ ____	
____ ____		____ ____		____ ____	
____ ____		____ ____		____ ____	

SAMPLE DESIGN FOR GALL EXPERIMENT

NAME______________________

DATE______________________

TEAM NUMBER	ENVIRONMENTAL MANIPULATION	UNCUT GALLS	WINDOWS	UNPROTECTED LARVAE
1.	Water - No cover	1 jar, 3 galls	1 jar, 3 preps	1 jar, 3 bugs
2.	No Water - No cover	1 jar, 3 galls	1 jar, 3 preps	1 jar, 3 bugs
3.	Water - Cover	1 jar, 3 galls	1 jar, 3 preps	1 jar, 3 bugs
4.	No Water - Cover	1 jar, 3 galls	1 jar, 3 preps	1 jar, 3 bugs
5.	Kerosene - No cover	1 jar, 3 galls	1 jar, 3 preps	1 jar, 2 bugs

Any number of experiments can be arranged by simply changing the environmental manipulations. Moisture and light are used here, also you can use temperature, use toxic chemicals instead of water, too much water, etc.

DATA CHART ON GALL EXPERIMENT FOR EACH STUDENT

NAME____________________

DATE____________________

PREPARATION - WINDOW

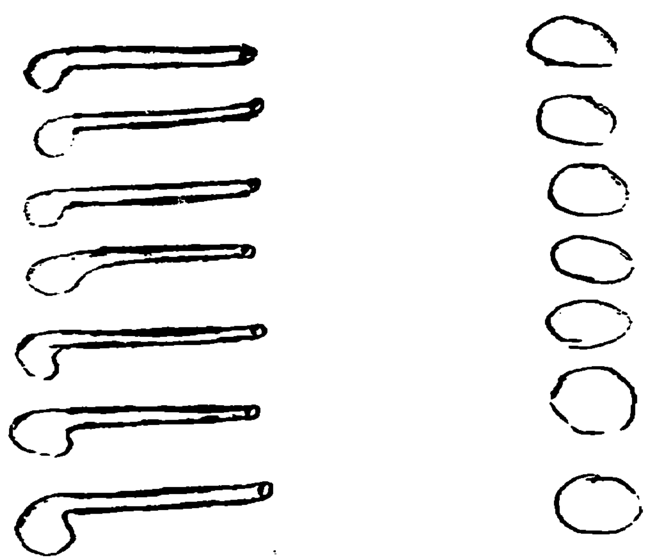
DATE	SHAPE	POSITION	ACTIVITY	COLOR	OTHER OBSERVATIONS
1st day	round	at entrance	eating	cream	leaving crumbs on glass
5th day	round	in tunnel	sleeping	cream	plugged entrance
10th day	peanut shaped	in chamber	sleeping	brownish	mold growing on outside
15th day	peanut shaped	in chamber	not moving	brown	no change
20th day	peanut shaped	in chamber	not moving	brown	no change
25th day	peanut shaped	in chamber	not moving	brown	no change
30th day	insect	in jar	flying around	blue & green	hatched and crowded out of the entrance

DATA CHART FOR GOLDENROD GALLS

NAME ______________________

DATE ______________________

	MOVEMENT & POSITION		SHAPE	
TEAM	WINDOW TUNNEL	JAR BOTTOM	WINDOW	JAR BOTTOM
DATE				
FIRST DAY				
SECOND DAY				
THIRD DAY				
FOURTH DAY				
FIFTH DAY				
SIXTH DAY				
SEVENTH DAY				



HAVE EACH CHILD DRAW THE TUNNEL OF HIS INSECT IN A ROUGH WAY TO USE FOR RECORDING MOVEMENTS.

NOTES TO THE LEADER:

Try to maintain as much suspense as possible during the investigation.

It is not necessary to tell the children what they will find when they cut the galls open.

The fact that this little worm-like creature is called a "larvae" is not even too important.

And, it certainly is not necessary for them to memorize that the larvae become a pupa, which becomes an adult wasp or fly. They will see this happen.

About two to three weeks after bringing galls in, wasps and flies will begin to emerge. If the children do not know that a wasp will make his appearance, they will be much more excited when he does.

The more galls the better as not every gall will successfully produce a wasp or fly.

OTHER SURPRISES:

The children will make other discoveries -- usually without urging.

For example:

The larvae eats out an "escape tunnel" for the wasp before the larvae becomes a pupae.

The pupae is hard and oval, and does not move.

The wasp pushes through the skin of the gall by inflating a balloon on his head.

The wasp has folded, wrinkled wings immediately after emerging. After emerging, the wasp sits on the gall until his wings straighten out and the balloon on his head collapses.

THE WRAP UP:

Discuss with the children their results. Count the number of emerging insects in each experiment. Which conditions were the most successful? Why? How do these experiments apply to us? What will happen when our environment is damaged? Where do larvae spend most of their time. Did they crawl out of the gall? What did the dead ones look like, etc.?

Materials available from the Interlakes Office:

1. galls and locations of gall patches
2. razor blades and knives
3. ten to twenty power microscopes
4. book on galls for teacher reference

If you have questions or need assistance in planning the pre-activity, the field trip or post-activity, please contact us at least ten days prior to the activity.

MAKING SNOWDRIFTS

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Adapted from Snow and Ice Activities Booklet by the Environmental Science Center, Golden Valley, Minnesota. Phone: 489-2416 (Revised 2-2-72)

Grade Level - 1-2

Best time of year - Winter

OBJECTIVES:

1. To acquaint students with the relationship of wind and wind action on snow distribution.
2. To acquaint students with the concept that obstructions or objects slowing down wind and changing direction of wind, result in the creation of different shapes of snowdrifts.
3. To introduce the concept of experimental design and standardization.

MATERIALS:

A variety of different shaped objects: balls, toys, cans, boxes, etc.
A measuring tape (50-100 ft.) or string

PRE-ACTIVITY:

The purpose of the pre-activity is to create an excitement, to create questions and curiosity in the students.

Ask questions and effect partial answers, leave open ends which will be answered by the students. The following is a series of questions which may be useful:

1. What is snow?
2. What does it feel like?
3. What color is it?
4. Is it hard or soft, warm or cold?
5. Does it taste good?
6. Where does it come from?
7. What is snow made from?
8. What happens to snow after it falls? Does it always stay where it falls? What happens to it? Where does it go?
9. What are snow piles called? What makes up a snow pile?
10. There are three things which are needed to make a snowdrift. List them. (snow, wind and some object)
11. Are there different shapes of drifts? Why are they different shapes?
12. Are they all deep? Long? Wide?
13. Do men purposely make snowdrifts? yes, snow fences along highways Don't attempt to get definitive answers from the students. Leave things up in the air.

Suggest doing an experiment finding out about these things. Ask each child to bring some item from home for the experiment -- preferably one which will not need to be returned in case it is lost or misplaced outside. The bigger the object, the greater the chance for a good snowdrift.

FIELD TRIP:

1. Instruct the children to dress warmly.
2. The activity takes 15-20 minutes at a maximum and can be done at any temperature or under any weather conditions.
3. Have two boys or girls mark off a 50-100 ft. line. Have them prop up the objects at 3-5 foot intervals along the straight line. (the objects should be propped up to provide maximum surface to the wind).
4. Return to the classroom. Instruct the students to leave the objects and area around the objects undisturbed to let nature do its work.

POST-ACTIVITY:

Wait for snow and wind, allow for drifting to occur. When this has occurred, prepare for another outdoor activity by asking the children the following questions:

1. Who had the longest drift? Why was his longer than anyone else's? (The length of a drift is that point where the snow levels out and maintains a consistent depth. The depth can be measured by sticking a yardstick straight down into the snow (no. 1 end down) until it hits the ground. The number at this point which is level with the surface of the snow is the depth of the snow at that point. The length of the drift will depend upon the height of the obstruction, how directly it faced the wind, and its shape.

2. Who had the widest drift? Why was his widest?

3. Did anyone cause the wind to dig a hole in the snow? Rounded objects will cause the wind to whip the snow out creating a hole.

4. Who had the deepest drift? This will depend on not only the height of the barrier, but also on how directly it faces the prevailing winds.

5. Who had the tiniest drift?

6. What happens when the wind blows snow around something with no corners? The children may answer this by using round objects such as basketballs, tires, etc.

7. What happened when the wind blew snow around a cube shaped object? Someone may have shoved the open end of a cardboard box into the snow and observed the drifts that developed around it.

You might want to serve as a judge and have a contest among the children to find:

1. Who can create the longest drift?
2. Who can create the widest drift?
3. Who can cause the wind to dig the deepest hole in the snow?
4. Who can create the deepest drift?
5. Who can create the tiniest drift?
6. Who can create the greatest number of different kinds of drifts using the same object? Try a shoe box.

7. Who can create the oddest shaped drift? A very asymmetrical object like a toy doll might be best.

Summarize the preceeding questions and tabulate the results on the blackboard:

Who had the longer drift? How long? What object made it?

Who had the oddest shaped drift? What shape? What object was used?

Who had the widest drift? How wide? What object was used?

Who had the deepest drift? How deep? What object was used?

Discuss drifts and how they are important to us.

A. Problems - plug our roads

B. Provide places for wildlife to live in the winter

C. Store up moisture for spring

D. Protect ground from the cold and wind

E. Fun to play in and on

TIPS: Place the object out in a very open field and check after each windy day and storm. If any kind of drifts are present, finish it up.

Weight boxes and light objects down with snow or dirt clods.

Don't set up this experiment on the ice of a lake.

We haven't had what you could call an outstanding success with this experiment, but it is fun and I believe you accomplish the objectives whether or not you get drifts.

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KINDS OF SNOW

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. (Adapted from the Environmental Science Foundation curriculum, Golden Valley, Minnesota. Phone: 489-2416 (Revised 2-2-72)

Grade Level - 1-3

Best time of year - Winter - late Winter (February-April is best)

OBJECTIVES:

1. To acquaint students with the different shapes, sizes textures and water contents of snow of different age classes.
2. To introduce temperature concepts and use of a thermometer.

MATERIALS:

1. thermometer - 20°-100°F
2. quart jars for collecting snow samples
3. magnifying glass
4. a shovel

PRE-ACTIVITY:

Prepare the students for the outing with questions. Propose experimenting to find the answers.

Review questions on what snow is, where it comes from, what heppens to it, etc.

Does snow get old? What happens if it gets old?

Does snow change shape? What is the difference in shape between snow that is old and that which is new? What causes the change?

Do you know where to find different kinds of snow? List the places.

A snowdrift will normally have layers from different snows or windy days. Each layer should yield snow at a different stage, shape and water content.

Split the class into groups, have each group find and collect one type of snow in a quart jar. Pass out thermometers and practice using them. Explain temperatures and how we use them.

FIELD TRIP:

1. Take the children into the school neighborhood and look for different textures and ages of snow.
2. Have them feel the snow crystals from different layers. Have them taste and feel the texture of the snow with their tongue.
3. Have each group collect one age of snow.
4. Look at crystals with magnifiers of each snow type.
5. The activity will not take more than 15 minutes or can be extended to a 45 minute session or an hour if the weather permits.

FOLLOW-UP:

Return to the classroom and follow some of the following activities which are suitable to your grade level.

Which melts faster; an ice cube or a snowball (each of which weighs the same) How much water, at different temperatures, does it take to melt a cup of snow? (Water at 40°F will melt only 5.5% of its weight in snow; at 60°F only 20%).

How many cups of snow are needed to make one cup of water? Snow will be fluffy and least packed on the top of an accumulated layer on the ground. Fresh fallen snow has a lot of air between the crystals. Ten cups may be needed to make a cup of water. Snow found within the accumulated layer will be packed by both the weight of the snow above and by the recrystalization into more dense particles. It may take only three to five cups of the denser snow near the ground to melt to a cup of water.

Will a foot of new fallen snow be equal to a foot in depth one week later? Drifted snow will contain broken crystals of new fallen snow and although it is made up of very fine particles it may become densely packed as these little fragments of crystals can fit tightly together. Test drifted snow for density by seeing how many cups of snow it takes to make a cup of water. When snow crystals become tightly packed together and then evaporate and recrystalize they can become frozen together where they touch each other. We can say that this snow is cemented together. It holds together well enough to be cut into blocks with a shovel or blade. Snow blocks are handy to use for building snow houses, forts, and windbreaks. Unfortunately, cemented snow is not always easy to find.

When snow begins to melt it does not drip and run like an ice cube. The porous nature of snow allows the water to be soaked between the crystals as in a blotter. A good guessing game can be provided by sticking a snowball on a pencil (in a heated room) and making students guess how long it will be before the first drop of water falls off the snowball. It may take as long as one hour.

What temperature is the snow when you bring it into class and it starts to melt? When it is half melted? When it has all melted? Why do you suppose it is always about the same temperature?

Where does the air in the jar come from? You filled the jar with snow.

Which type of snow melts to give the most water?

Which type of snow melts to give the least amount of water?

Draw the crystals of different aged snow.

Describe how the different snow feels in the hand.

Describe how the different snow feels in the mouth.

Have the students take temperatures of the snow in their jars. Snow can be helped to melt by submerging the jar under warm water until the glass is warm, then taken out of the water and shaken. This must be done carefully for water too hot and applied too fast may cause the jar to break.

The studente should learn that snow of different ages does have different texture and water content. He will learn that ice melts faster than snow with a given weight. Snow soaks up water and shrinks. It takes much heat and time to melt snow. Snow from the time it starts to melt until the last snow melts remains at 32°F or 0°C.

Make a chart to show the different water yeilds of one gallon pail of snow or ice. (See following example)

KIND OF SNOW	CUPS OF WATER
NEW SNOW	FOUR CUPS
CRUSTY LAYER	SIX CUPS
THIRD LAYER	SEVEN CUPS
FOURTH LAYER	EIGHT CUPS
JUST ABOVE GROUND	EIGHT AND ONE-HALF CUPS
SNOW MOBILE PACKED SNOW	TEN CUPS
CHIPPED ICE	FIFTEEN CUPS

NOTE: The above are simply guesses.

AN AUTUMN SEED AND BUR ACTIVITY

Written by the staff of the Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. (Adapted from the Outdoor Activities Booklet by the Environmental Science Foundation, Golden Valley, Minnesota) Phone 489-2416. (Revised 2-2-72)

Grade Level - 1-6 (adaptable from K-8)

Best time of year - Fall and early Winter

OBJECTIVES:

1. To introduce concepts that plants have developed hooks, spines, and needles on seeds and seed pods which enable seeds to attach to passing animals and thus disperse. It draws attention to the interaction of plants and animals in a positive sense.
2. This activitv helps children become aware of a variety of the plant adaptation for dispersal of their seeds; parachuting types, bright seed pods to attract animals and birds who eat them and distribute the seeds, etc.
3. Children become aware of the protective function of seed pods. (Do birds eat cockle burs, burdock burs or buffalo burs?)
4. To introduce the concepts of seeds, seed growth and survival dependent on natural and induced conditions.

BACKGROUND:

This activity is intended to be for grades 1-3. It is simple. Determine what type of cloth collects burs and stick tight seeds best. Have the children wear these and go on a field trip. Upon returning to the classroom, pick off the burs and seeds and examine them. Do some follow-up experiments with growing, the seeds and identification of them.

PRE-ACTIVITY: Time: 20-45 minutes

Children may be requested to bring different samples of scrap fabrics from home, or they may use the clothes they are wearing for the pre-activity.

A selection of the types of burs commonly found in the area of South Dakota are available from the Interlakes Office at Chester, or perhaps children can be encouraged to bring some from home.

Introduce the activity to the children as a study of plants and seeds. Mention that they will be going on a field trip to study them where they grow. Question them about plants: Where do they grow? What is the student's favorite kind of plant? What kinds do deer, pheasants, doves, etc. eat? Ask them how many ways they can think of that plant seeds get scattered.

Discuss with them in preparation for the field trip that they should know what type of clothes to wear for collecting plant seeds. Pass around the different types of cloth the children brought from home, or a selection is available from the Interlakes Office. In addition, the students may use the clothing they are wearing.

Pass around a selection of burs collected previously and have the students determine which type of cloth burs stick to best.

Encourage them to wear that type of clothing for the field trip. Hopefully, they will find that wool or rough cotton will catch burs best. Leggings can be made by cutting the toe out of a pair of their father's old work socks, long johns, or wool pants and pulling them up over the trousers so that the socks cover the child's socks and lower legs. This protects the childrens' clothes. The old sock can be taken off with the burs attached and saved for later use. This minimizes bur picking from the school clothes upon return from the field trip.

We suggest that the students concentrate on bur producing plants. However, they will collect every plant with stickers and many without.

FIELD TRIP: Time: 1 hour

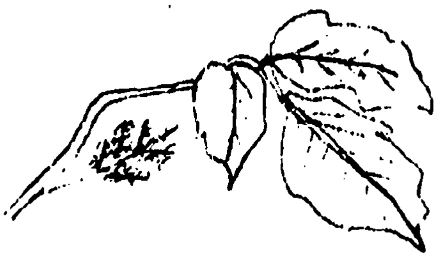
Where to go - just about any shelterbelt, slough border or weed patch will have a variety of burs in it. However, it is adviseable to call the Interlakes Office prior to the trip for suggestions on specific good bur collecting locations near your school.

Materials needed:

1. assorted, enthusiastic, adventurous children in old bur attracting clothes
2. crisp fall day
3. large sheets of white paper (one per person -- leave in the classroom)
4. two large paper bags per student

Procedure:

Pick out a nice, weedy, brushy area in which to have the Bur-In activity. A vacant lot or an old field that has grown up to weeds will also be fine. The teacher may want to ask the class for suggestions on good places for a Bur-In. Check out the area before the field trip. If there is a poison ivy patch in the area, you will have to take some precautions such as warning the kids not to pick the white berries. If you are not familiar with poison ivy, check with the Interlakes Office. We will check out the field trip prior to use for poison ivy patches.



Poison ivy leaves are often bright red or mottled red and yellow in autumn.

Making a big deal out of poison ivy will tend to inhibit the kids and make them reluctant to go through the area.

Go to the site of the Bur-In. Roll, walk, run, skip in the grass. Play hide-and-seek, pick up litter, look for interesting discoveries, walk through tall weeds, form a long line and walk side by side, arms distance apart across the area (this procedure might also scare up some mice, rabbits, birds, etc.)

Collect samples of as many kinds of plants which produce burs or sticky seeds as the children can find. Put them in paper bags to take back to the classroom.

If you plan to follow through with the planting experiments, assign one or two students to collect a pail full of dirt from a fox or gopher mound in the area to use for planter dirt.

Upon return to the classroom, remove the socks, roll them up and place them in paper bags. Pick off burs from other clothing and place them in the bag with the socks. This is a good place to stop for a day or two before proceeding into the follow-up activity.

FOLLOW-UP:

Return to the classroom and have each child remove the burs from his clothing and put them on his sheet of white paper.

Glue examples of each type of sticky seed to a large poster board or a long sheet of white shelf paper or butcher paper. If anyone has a sample of the plant that a particular bur came from, glue it up beside the bur.

Determine who has the most different kinds of burs and reward them appropriately. There might also be a reward for the person who has the largest number of individual burs on his sheet of paper.

Discuss everybody's burs. Some points for discussion might be:

1. Why do burs stick to people?
2. Do burs stick only to people?
3. What's inside a bur?
4. Which burs are the most effective?
5. What might happen to a bur that got caught on a fox's tail?
6. What kind of bur is mot common?
7. Did different kinds of burs come from different locations?

Look at some of the burs under a magnifying glass.

A very helpful book for identifying South Dakota plants is South Dakota Weeds, and Plants of South Dakota Grasslands by the Agriculture Extension Service. The Interlakes Office has copies available to you.

Planting burs:

Materials needed:
- paper, styrofoam coffee cups, or coffee cans may be used as planters
- burs collected on field trip
- soil and gravel
- access to a refrigerator

Procedure for Planting Burs:

Put some of the burs in the refrigerator for about a week. If you have a cold winter in your area, the seeds may need to be cold and dormant before any of them germinate. You may even want to plant some seeds in the refrigerator and see which ones grow best.

Put a little gravel in the bottom of each box, then add the soil.

Also plant unrefrigerated seeds in the soil, marking each kind of seed on the cup.

Water the seeds occasionally -- very lightly, just to keep the soil from drying out.

Once they start to grow, the plants will probably need a lot of sunshine. It is not necessary to grow them for a long time.

Do a sketch of the plants at different stages of their development. Do the plants look like any you have seen before?

These plant growing activities will give the children some interesting lessons in care of living things, about growth and growing conditions. They may also stumble across other concepts.

1. Burs don't always grow; seeds within the bur grow.

2. Insects live in, eat and destroy the seeds within the burs; especially burdock and cockle bur.

3. Plants grow at different rates. A great deal of variation is found between individual plants in growth rate, size, shape and even color.

4. Plants do not require sunlight for growth for the first week or so; after that they die if they do not have sunlight.

The following are some suggestions for experimental designs for use with the upper grades (4-6).

1. During the post-activity, divide the children into teams.
2. Each team will separate their burs and seeds and pool them according to species.
3. Each team and child will then be asked to volunteer for a variation of an experiment (see below) using burs they collected.
4. Each team and child will be required to keep records of the growth and conditions of his experimental plants.
5. Each team and child will be responsible for identifying, counting, planting and caring for seeds. He will measure and observe his part of the experiment.

Experiment #1 - Plant growth under varied conditions

Materials - 1 type of bur per student (5 students - five different seed types)
2 cups per student
dirt - fill cups 3/4 full
water - it is best to use distilled, rain or snow water
plant according to directions on pages 3 and 4 (one inch below soil surface)

Experiment #1 - Team #1 - Conditions - sunshine, adequate moisture
Student #1 - Cup #1 - 3 cockle bur seeds
Cup #2 - 3 cockle bur seeds

Student #2 - Cup #1 - 3 beggars ticks
Cup #2 - 3 beggars ticks

Student #3 - Cup #1 - 3 burdock seeds
Cup #2 - 3 burdock seeds

Student #4 - Cup #1 - 3 buffalo bur seeds
Cup #2 - 3 buffalo bur seeds

Team #2 - Experiment #1 - Conditions: no light, adequate moisture

Student #1 - Cup #1 - 3 cockle bur seeds

Repeat the sequence of Experiment #1. Change only the conditions.

Team #3 - Experiment #1 - Conditions: sunshine, inadequate moisture (moisture only at planting time)

Repeat student participation as in Experiment #1.

Team #4 - Experiment #1 - Conditions: no light, inadequate moisture

Repeat student participation as in Experiment #1.

Students may make data sheets to record their results.

Many interesting experiments can be set up using the same design and varying the conditions under which the plant is to grow.

a. use herbicides and pesticides in the water used for the seeds.
b. use detergents and soaps in the water used for the seeds.
c. set planters in places at extreme temperatures.

You can develop some mathematic manipulations around these experiments:
1. calculating % of seeds that grow.
2. averaging sizes of individual plant characteristics.
3. determining average growth rates and survival times.
4. measuring growth rates and weight gains.

You may develop art projects around the seed and bur activities;
1. drawing burs and seeds.
2. drawing insect parasites of seeds.
3. drawing plant leaf designs, plant vein systems, etc.
4. making pictures from arrangements of seeds and burs
5. constructing center pieces as Thanksgiving or Christmas gifts from burs

   a. cockle bur dolls
   b. tumbleweed Christmas tree

CLUES TO LIFE IN THE SNOW

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone 489-2416
(Revised 2-24-72)

Grade Level - 1-6 (3rd and 4th are best)

Best time of year - Winter (after a fresh snow)

OBJECTIVES:

1. To acquaint the student with winter birds, mammals and insects.
2. To acquaint the student with techniques of finding and recognizing these animals by the signs they leave in the snow.
3. To acquaint the student with concepts that birds, animals and insects require different habitats, food and homes.

MATERIALS:

1. jars
2. magnifiers for studying clues
3. notebook and pencil
4. A Field Guide to Animal Tracks and Field Guide to Mammals and Animal Tracks and Hunter Signs are available from the Interlakes Office

INTRODUCTION:

Students are particularly interested in living creatures and all of them will be excited about hunting animals and birds during the class time. In the winter, in this area, winter birds and animals are hard to find in any variety, particularly with 15-30 noisy children looking for them. The answer then is to hunt for clues like a detective or wildlife biologist. Clues left by wildlife are very important to the management of our hunted wildlife. Tracks give us an indication of the species, locations and home ranges, habitat preferences, numbers and even sexes of the birds or animals making them. Manure will give us an indication of the numbers, sizes, food habits, and species of birds and animals. Songs and flight patterns help us to identify species of birds. Nests tell us something of the sizes, species and habitat preferences of the birds. Holes in trees, snow and soils give indications as to habitats and species. Feathers, fur and body parts are also indicators of age, sex and species of birds and mammals. There are lots of clues to life everywhere around us. Bark of trees will show the signs of woodpecker, squirrel and insect work. Children will find a remarkable variety of clues, if properly prepared and with a little guidance from you.

PRE-ACTIVITY:

Introduce the students to clues to life in the snow by asking them questions. Make a list of their answers.

1. How many kinds of birds have you seen this winter?

2. Which ones stay around all winter?

List

1. pheasant
2. sparrow
3. pigeon
4. starling
5. downy woodpecker
6. junco
7. skylark, etc.

3. How many kinds of mammals stay round all winter?

4. How many have you seen?

List

1. dog
2. cat
3. rabbit (jack)
4. rabbit (cottontail)
5. mice (house)
6. mice (field)
7. muskrat
8. fox
9. squirrel
10. mink, etc.

5. Now let's think of kinds of clues they leave around in the winter.

List

1. tracks
2. manure
3. holes in the snow
4. nests
5. feathers
6. fur
7. peck marks in trees
8. pieces of bark on the snow
9. gnawed branches and corn

6. How many bugs have you seen? (flies, box elder bugs in the house, etc.)

7. Can you think of clues we might find?

Clues

1. webs
2. holes in things, leaves, branches, stems
3. cocoons
4. dead bugs

Instruct the students to bring paper bags or jars for a field trip. Mention that a contest will be held, prizes for most bird clues, most animal clues and total clues, most unusual clues, etc.

FIELD TRIP:

Arrange to have a mother or two take a group. Split up to search different areas; one group in a residential area, one in a marsh, one in a field and one in the woods. Adjust the number of groups to the number of students, supervisors or habitats. Have each group search a different habitat area. Have clues to be studied in the classroom.

Any weather will be fine; just adjust the time outside to the wind chill and temperature. Time 20-60 minutes.

FOLLOW-UP:

1. Study the clues, compare and talk about them.
2. Have students make lists of birds, animals and insects they saw.
3. Have students make lists of clues to birds, animals and insects they found.
4. Collect these lists and grade them for the contest winners.
5. Construct a chart which records types of birds and animals and clues found in each habitat type. See sample charts attached.
6. Discuss the differences between habitat types and animal and bird use.
7. Discuss the importance of signs in the snow to hunters, trappers and farmers.
8. Discuss nuisance animals (what kind killed a sheep or chickens?)
9. Discuss the discovery of what birds and animals are eating so that we can provide food and cover plants for them.
10. Is it necessary for man to trap, hunt and kill some animals and birds?

After filling out the data sheets attached, discuss the following questions pertaining to the difference in totals and species between the habitats.

Which habitat has the most kinds of birds? Why?

Which habitat has the most kinds of mammals? Why?

Which habitat has the most kinds of insects? Why?

What does that mean to you if you like pheasants?

What does that mean to you if you like ducks?

What does that mean to you if you like rabbits?

Draw a map of each area the class studied and locate on it the different animals sign locations. Are there any patterns in the animal and bird activities.

SAMPLE DATA SHEET

GROUP NUMBER ______

NAME________________________

DATE________________________

	LIFE ACTUALLY SEEN			CLUES	
MAMMALS	INSECTS	BIRDS	MAMMALS	INSECTS	BIRDS
1. squirrel	none	sparrow	squirrel tracks	spider webs	old nest - robin
2. dog	none	pigeon	dog manure	cocoon	sparrow manure
3. cat	none	starling	cat tracks	none	sparrow song
4. cottontail	none	none	cottontail tracks, holes		
			house mouse manure		
			rat tracks		
			horse tracks		

TOTAL DIFFERENT KINDS OF BIRDS AND ANIMALS SEEN, LIVE AND CLUES______________

SAMPLE DATA SHEET

DISTRIBUTION OF LIFE IN DIFFERENT HABITATS

	TOWN	SHELTERBELT	MARSH	CORNFIELD	WOODS	PLOWING
BIRDS	1. sparrow 2. pigeon 3. starling 4. robin	1. junco 2. nuthatch 3. downy woodpecker 4. meadow lark 5. great horned owl	1. junco 2. pheasant 3. partridge 4. horned lark 5. meadow lark	1. meadow lark 2. pheasant 3. downy wood-pecker 4. pigeon 5. hawk	1. downy wood-pecker 2. junco 3. 4. 5.	1. horned lark 2. crow 3. 4. 5.
MAMMALS	1. squirrel 2. dog 3. cat 4. cottontail 5. mouse (house) 6. rat 7. horse	1. squirrel 2. cottontail 3. deer mouse	1. muskrat 2. meadow vole (field mouse) 3. deer mouse 4. mink 5. weasel	1. deer mouse 2. shrew jackrabbit 4. fox	1. squirrel 2. cottontail 3. white-footed mouse	1. jackrabbit
INSECTS	1. spider 2. caterpillar	1. spider 2. ants 3. boring beetles	1. spider 2. gall insects	1. corn borers	1. tent cater-pillars 2. spiders 3. ants 4. boring beetles	

TOTAL - YOU SHOULD GET DIFFERENT SPECIES AND TOTALS FROM EACH HABITAT TYPE

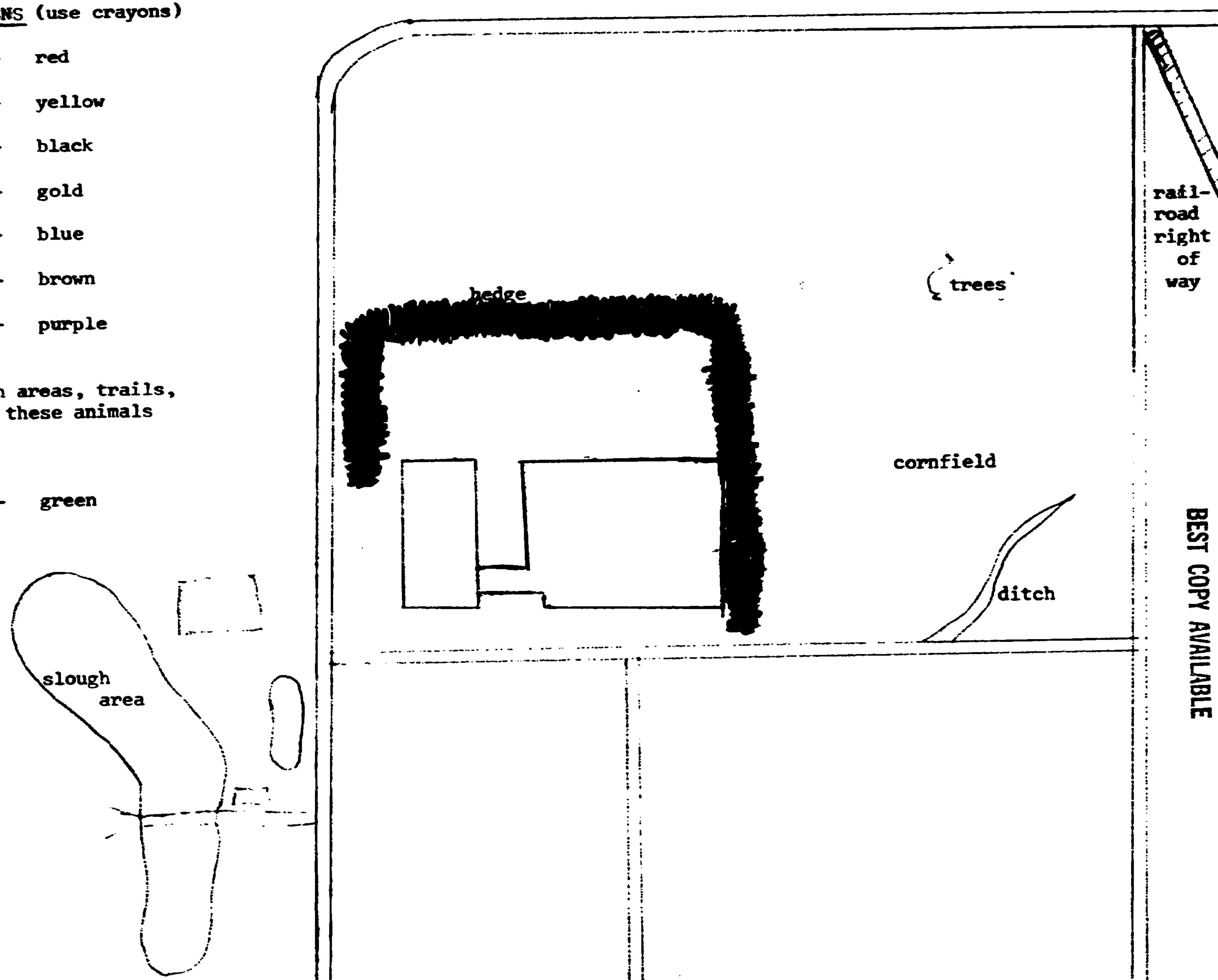
SAMPLE MAP OF CLUES TO LIFE IN THE SNOW

ANIMAL SIGNS (use crayons)

rabbit	-	red
pheasant	-	yellow
dog	-	black
sparrow	-	gold
mice	-	blue
muskrat	-	brown
cat	-	purple

Shade in areas, trails, etc. that these animals use.

trees & hedges- green



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LET'S STUDY LITTER

Adapted from Trash is Taking Over, Environmental Science Center, 5400 Glenwood Avenue, Minneapolis, Minnesota, by Rick Sterling and Major L. Boddicker, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416 (Revised 2-3-72)

Grade Level - 1-6 (Adaptable from 1-12)

Best time of year - Fall or Spring; this is an excellent study for late March or early April

OBJECTIVES:

1. To acquaint the students with the harmful and negative effects of litter.
2. To acquaint students with the concepts that there are many different types of litter and each type has a different potential effect on man and his environment.
3. To make the student aware that refuse should be disposed of in the proper place and manner.
4. To make the student aware of the quantities of litter present in our area and the costs of cleaning litter up.

BACKGROUND:

Nearly everyone considers litter as bad. They also can see and quantify litter as being a serious local problem. They may also be aware of the costs of cleaning litter up from road right of ways. But how many people consider the hidden costs which litter creates? A ruined tire, a beer can going through farm machinery, cuts and injuries to man and animals, smothering of plant life, fire hazard, disease transmission, breeding places for pests (flies, mosquitoes, rats and mice), etc. Litter is an eyesore, but that is the least of its damaging characteristics.

Litter can be classified in many ways. Here is a classification which puts litter in categories of residual effect and damage.

Short term organic wastes.

1. paper
2. waste food products
3. human and animal wastes
4. discarded plant materials

Long term organic wastes.

1. plastics, rubber, other synthetic materials made from organic origin, oil, grease, etc.

Long term inorganic wastes.

1. metals
2. glass
3. minerals, stone, concrete

In terms of cost and danger to man, the metal, glass and mineral wastes are the most serious. Garbage and short term organic wastes are serious eyesores, periodic fire hazards, breeding places for mosquitoes, flies and disease, but they rot. The rotting process takes this material back into the food chain and it is recycled. It is important that these materials rot. However, there are proper methods for disposing of this material. Tossing it out at random is not the way.

It takes years, even centuries to recycle the metal and glass wastes we throw away. As these materials pile up, they become more serious hazards and remain hazardous until they are removed or buried by plants growing over them.

This activity was designed to educate our children about litter and the consequences and impact litter has on the environment.

PRE-ACTIVITY:

Introduce the topic of trash and litter and ask the following questions:

1. What is trash?
2. What is litter?
3. What is garbage? Are they the same thing?
4. Are there different kinds of litter? Soft litter? Hard litter? Rotting litter? Smelly litter? Ask the kids to list things they throw away in columns of whether it rots or not.
5. How much litter does the family throw away in a week?
6. Where do you find litter? Where do you see the most litter?
7. Is litter harmful? Ask the children to list the ways they think litter is harmful.

Make a chart for each student to take home to complete and bring back for the post-activity. On the chart, have the students record the number of cans and bottles each family throws away a day. A chart form is suggested below:

NAME ______________________

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	TOTAL

Collect the charts and calculate how much litter the families of the class throw away each week and each year.

60	X	52	X	3120
Total number of bottles and cans thrown away by your class per day		weeks per year		no. cans & bottles thrown away by your class per year

3120	X	12	X	37,440
no. bottles & cans thrown away by your class per year		no. classes in your school		no. cans & bottles thrown away by children in your school per year

Just how much is that?

If you were to set the cans and bottles in a long line, how long would it be? Follow this method to find out.

1. Mark off distance 10 feet in class (use masking tape or chalk).
2. Bring some cans and bottles from home to set along the line. Be sure they are clean. Try to get different sizes of cans and bottles.
3. How much could fit along the line side by side?

   ______________ = 10 ft.
   #cans and bottles

4. Now divide the number of bottles and cans in 10 feet into total number thrown away by children in your school in a year.

How many tires were ruined?

Multiply times $15.00 - $50.00 per tire?

Calculate total cost of litter per class per year.

Some additional questions:

1. How much land does litter cover that is not available for plants to grow.
2. Do you think disposal of all this trash may be a problem?
3. Where does it go? (You may need to call the City Hall to answer this question).
4. Could reuseable containers help to solve this problem?
5. Is it worth it to have to pay for returnable bottles rather than handier disposable ones? (You and your classmates may disagree. Also ask your parents for their opinion)
6. What kind of litter is most abundant? How do you account for this?
7. Many of the items the children find can be used for art projects.

TIPS: Don't use plastic bags. They contribute to the litter.

Bring some band-aids and disinfectant for minor cuts.

Ask the children to bring old gloves to wear when picking up trash.

Don't be alarmed at some of the items the children find, the selection is unbelievable ranging from chicken bones to birth control devices.

FIELD TRIP: 1 hour

Place - a preselected road ditch or litter strewn area.
Equipment - very large paper bags or burlap 50 lb feed sack size (paper bags are very poor for this activity)
Organize students into pairs. Have each pair collect litter for twenty minutes. Have one record each type of litter and classify it as to what harm it is doing or may do. Use a notebook.

After twenty minutes, have the students collect and talk about litter they have found. Count the numbers of kinds and numbers of each kind of litter.

Collect the bags and travel to a garbage can or bus to the dump and dispose of the litter

Be sure adequate safety measures have been taken to guard against danger from traffic.

POST-ACTIVITY: ½ - 1 hour

Collect and review notes and results.
What was the most common type of bottle found? Why do you suppose there are so many of those?
Why do you suppose there are so many cans found?
Who found the most bottles or cans?
What did you find in and around the litter? Spiders and bugs, worms, mouse nests? Do plants grow under litter?

How much did it cost to clean that area up?

1 hour for 25 students = 25 hours of work
25 hours X 50¢ per hour = $12.50 to clean up that much garbage.

If a grown man did it, it would cost
$1.50 to $2.50 per hour - $62.50 to clean up the same garbage.

How many bottles between Madison and Chester on Highway 19 and County Highway if 1/4 mile had 74 bottles and cans on one side of the road? There are 19 miles or 76, 1/4 miles between Chester and Madison. 76 X 74 = 5624 bottles and cans on one side of the road.

The total number of bottles and cans = 5624 X 2 = 11,248 estimated number of bottles and cans

How much does litter hurt?
How many of the students have scars from bottles and cans? How many have cuts which were infected or needed stiches?

Multiply the number of stitches times $2.50 per stich, $5.00 per doctor visit and total this up for the class.

Have the children ask their parents how many flat tires they have had during the year caused by nails, broken glass or metal? Total the number of flats times $1.00 per tire.

BUGS AND BUG HOMES

Designed by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Pnone: 489-2416 (Revised 2-4-72)

Grade Level - 2-4

Best time of year - Spring, Fall or Winter

OBJECTIVES:

1. To acquaint the student with the concept of animal dependency on its habitat.
2. To acquaint the student with the concept of insects constructing homes, caves, tunnels holes to provide them with protection from predators and weather. Some insects modify the environment to better increase their chances for survival much the same as people do.

MATERIALS:

1. plastic bags - one per student
2. various sized glass jars
3. hand spade - 2 or 3 per class
4. jack or paring knife - 2-3 per class
5. pieces of old sponge
6. nylon stockings (old)

BACKGROUND:

Many insects construct living quarters in which they are relatively secure from the elements, predation and disease. Ants, gall insects, wood boring beetles, tent caterpillars, spiders, etc. fall into this category. Examples of these insect homes can usually be found and studied to benefit the students' conception of the interdependency of life. Insect homes or activities can be found in or on just about everything in nature if you observe carefully.

PRE-ACTIVITY:

Introduce the activity with questions about insects.

1. What is a bug. How is it different from a bird or animal?
2. What do bugs eat? Do you like bugs?
3. List the different kinds of bugs you can think of.
4. Where do you find bugs?
5. Do insects have homes? List the kinds of homes they have.
    1. cocoons
    2. ant hills
    3. tent caterpillar tents
    4. galls
    5. bee and wasp nests
    6. tunnels in wood
    7. holes in the ground

Suggest to the students that you take a field trip to find different kinds of insects and their homes.

Make a contest out of it. Give rewards to:

1. The one who finds the most insect homes.
2. The one who finds the most unusual insect home.
3. The one who finds the most kinds of insect homes, etc.

Places to look for insect homes:

1. Under rocks, logs, trash.
2. Under bark of dead trees and crevasses in live trees.
3. In weed stems and burs.
4. In old buildings and on old building siding.
5. Ant hills can be found most anywhere.
6. In water you may find caddis fly larvae that carry their own homes.
7. Tree limbs (Plum and Willow trees often times have tent caterpillar nests).
8. Inside old cans, fence bracing, etc.
9. Water is home for many insects, particularly during the winter.

FIELD TRIP:

Go out and look for insect homes, collect as many as you can to discuss and observe in your classroom. Collect only those which are not stinging insects or if they are, the adults are not present. Have the students take field notes on where they find each type of home.

POST-ACTIVITY:

List, on the blackboard, the types of insect homes found.

1. Cocoon
2. Tent caterpillar tent
3. Gall
4. Wasp
5. Mud dobber nest
6. Ant nest, etc.

Have the students study and compare the homes. What kind of insect made the home? How do you know? How big was the insect that made it? Is the insect still inside? How can you tell?

Extract one or two of the insect larvae or adults and study them. Leave some of the insect larvae for later development.

Place the homes in large jars with the lids in place or with pieces of nylon stocking stretched over them. Watch these homes for emergence of adult insects. Be sure to keep a piece of sponge in the bottom of the jar and keep it wet. Record what happens in the jars.

Ask the students questions similar to the following:

Did you find tent caterpillars in water? Why not?

Did you find galls in old buildings? Why not?

What do the insects eat that are living inside the cocoons, galls, or mud nests? How do they stay alive?

Can other insects or birds get in to harm those bugs in their homes?

Make a list of homes according to where they were found. See the attached sample.

Which insects are found in the most places?

If you have questions about insects and insect homes, please contact the Interlakes Office at Chester, phone: 489-2416.

SAMPLE DATA SHEET

BUG HOMES

HABITAT TYPES

NAME ______________________

DATE ______________________

OLD BUILDING	WOODS	PASTURE (WEED)	SOIL	SLOUGH
mud dobber nest	tent caterpillar	galls	worm holes	cocklebur seed
yellow jacket nest	cocoons	sunflower stems	under rocks	cattail seed head
cocoons	spider webs	spider webs	ant hills	cattail stems
spider webs	willow tree bark	cow pie		
	burdock seeds			

WHAT ARE YOUR VALUES?

Written by Shari Dayton, Third Grade Teacher, Lincoln Elementary School, Madison, South Dakota. Edited and adapted by the Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, South Dakota. 57016

Grade Level - 2-4

Best time of year - Anytime

OBJECTIVES:

1. To emphasize the development of positive attitudes and values of our environment.

BACKGROUND:

Our values permeate our thoughts and play a deciding factor in our life style. It is these values that have led us to our present environmental crisis and will now, hopefully, guide us from it. Our values need to be questioned, evaluated, and the consequences of them understood. The classroom is an ideal setting for this probing to occur. Therefore, this unit deals with values as they relate to the environment.

A value is defined as "biologically determined and culturally engendered predispositions to thought and action". It is not known for certain how or when values are formed, but it is believed they are formed in a child's early years through personal experience with influence from training. Values cannot be taught -- a child has to experience and internalize possibilities before accepting certain values.

The students will engage in activities both indoors and out that will cause them to understand what values are, to question, analyze, explore the consequences, and reach new understandings of their own values.

ACTIVITIES:

Begin with a discussion of values, the purpose being to survey the students' ideas and formulate and agree on a common definition of value.

Can anyone use it in a sentence?

How would you explain "value" to someone who didn't know what it was?

From their suggestions a definition should be formulated that shows value is something one likes and thinks is important, what one believes about things.

Do you have values?

How do you know?

Do your values ever change? Do you think or behave differently from last year?

Do other people have values?

How can you tell?

Are their values the same as yours?

Do you think people should have the same values as you?

Why or why not?

Explain to the students that they are to use their five senses at school, home, and outdoors to decide upon the things they place high value on. Prior to the listing of these values, take the class for a walk and observe things in the environment that can be valued, such as buildings, parks, cars, plants, streets, etc. Have them list the things they place value on. Keep these lists for future reference.

This activity involves clarification of the term "Environment".

Has anyone heard of the word "environment"?

What does it mean to you?

Following the discussion, formulate a definition of environment. It should convey the idea that it refers to everything around us.

Prior to the following outdoor activity, explain that the students will be observing their environment and deciding what the townspeople value.

What will we look for in the outdoor environment that will tell what our town values? (number of parks, industries, sports areas, conditions of houses, yards, amount of litter, etc.) Because the students cannot walk through the entire town, this would be an ideal time for using a city map.

Following the walk, discuss what values they think the townspeople hold in relation to the areas they discussed above.

What are your own values in relation to those above?

Are they the same or different?

Do your values affect our outside environment? How?

FIELD TRIP:

The students will go outside and, if possible, bring back to class something ugly and something beautiful in the environment. If they can't be brought they should remember them for discussion purposes. After returning, they may show them as they discuss and later label and display them.

What do you think is beautiful? Why?

Do your values affect it's beauty?

Why do you think it is ugly?

Do your values affect it's ugliness?

If your values changed, would it change it's ugliness or beauty?

Return the lists of things valued that the students wrote at the beginning of the unit.

Do you want to make any changes in your list?

If so, they could cross out and make any additions.

POST ACTIVITY:

Using the above lists, the students will write a cinquain about the thing they value the most.

From your new list, pick the thing you value the most.

Write a 5 line description about it.

Use 1 word to name what it is.
Use 2 words to describe it.
Use 3 words to tell about what it does.
Use 4 words to describe how you feel about it.
Use 1 word which to you means the same as the first.

walls
big small
fences stops divides
keep one from another
tall

The students will make a collage depicting what they place high value on. It may take whatever form they want -- words, pictures, etc. They may draw in appropriate pictures which can't be found.

Upon completion the students can discuss if their values affect the environment, and how. The collages can then be placed around the room for a "mini art show". They will browse and have the opportunity to verbalize about their values and support them.

MAN'S PART IN THE PLANT AND ANIMAL COMMUNITY

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416 (Revised 2-7-72)

Grade Level - 2-6 (adaptable to all grade levels)

Best time of year - Anytime

OBJECTIVE:

1. To determine what man's effect has been on our plant and animal communities.
2. To affect a awareness in students about man's responsibilities to our environment.
3. To fortify the concept that every change man makes in the environment affects something else.

BACKGROUND:

The vast great plains area of the United States has acquired a very different face since the time when the buffalo roamed freely throughout the prairies of South Dakota. Most of this change has come about because of man's interaction with nature. Whether this has been a good or bad change depends on each individual's point of view. Large native animal populations in South Dakota (such as buffalo) have been drastically reduced in numbers but they have been replaced by other species which are now much more abundant. What was once a treeless prairie region, now has many small belts of trees dotting it. Each tree belt is a complex ecological community in itself and has introduced new animal and plant populations. Some native communities have been destroyed. The important thing to remember is that man has to make responsible decisions about what we do in the future. We must learn as much about the natural processes which are going on as possible. We must know the effects of the introduction of new species will have on our environment.

PRE-ACTIVITY:

Ask the students the following questions:

1. What has man done to change the face of the prairie?
2. Why has man done things to change the environment?
3. What effect has the change had on your lives?
4. Can man live in harmony with nature and survive?
5. Will he perish if he doesn't?
6. How does man change the environment? Do you change the environment by anything you do?

Let's go out and visit some plant and animal communities and see what man's effect has been on them.

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Take the class out to a variety of plant and animal communities. Examples of some are: alfalfa fields, shelterbelts, pastures, corn fields, sloughs, etc. Have the students list the components of each community and what man's effect has been on the community.

POST-ACTIVITY:

Make a list on the board of the various communities and their components. In your study, the shelterbelt may contain the most different species and students may come to the conclusion that the entire prairie should be planted to shelterbelts. However, it should be stressed that all of the communities are important and necessary. We must be sure to include each type of community in our over-all picture of the environment.

A sample data sheet is attached.

Map the communities. Which plants has man introduced? What evidence is present in the community of man's changing it?

PLANT AND ANIMAL COMMUNITIES YOU MIGHT VISIT:

1. Slough - marsh land
2. Dry prairie land - native hay land
3. Over grazed pastures
4. Alfalfa field
5. Soil bank
6. Shelterbelt - evergreen
7. Corn field
8. Oat, barley, rye, wheat fields
9. Park area
10. Lake shore
11. City area with yards, gardens, etc.
12. River or creek bottom lands

Some animals will be found in many or all of these communities. Some will be found in only a few. Plants will also show a definite preference for certain of these communities and won't be present in others. The size of plant and animal community changes with the specific unit you address. The plant community which man, deer or fox interact with is much larger than that of a mouse or muskrat.

SAMPLE DATA SHEET

NAME ______________________

DATE ______________________

PLANT AND ANIMAL COMMUNITY TYPE (slough)

PLANTS	BIRDS	ANIMALS	OTHERS
cattails	marsh wren	mink	bullheads
cord grass	red-wing blackbird	muskrat	carp
white top grass	yellow-headed blackbird	deer	frogs
sedge		beaver	toads
algae	blue heron	rabbits	water bugs
cockle bur	ducks	mice	salamanders
smart weed	bittern	fox	snails

HOW DO SEEDS TRAVEL?

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. Phone: 489-2416

Grade Level - 3-4

Best time of year - Fall

OBJECTIVES:

1. To introduce the methods of seed dispersal to elementary students.
2. To show plant dependence on animals.

BACKGROUND:

We are familiar with methods of dispersal among animals because we have had more experience working with them. The students may be very interested in this subject because they probably haven't had much experience with plants and seeds. Just the idea that seeds are able to travel miles without any power of their own is intriguing.

PRE-ACTIVITY:

1. Do you think that birds have any trouble moving from one grove of trees to another?
2. How does a deer move from one area to another?
3. How about a seed? How do they move? Can they run or fly?
4. What happens when a seed gets ready to move to a new home?
5. How do we know that seeds move? (They must by able to move to a new area because plants spread -- they don't always stay in the same field.)

Let's go to an area where there are lots of plants and see if we can find seeds moving to a new home.

FIELD TRIP:

Take the students to a weedy area and let them walk around and collect seeds. Find weeds such as milkweed or cattails that have a fluffy seed. Show them that the wind will transport light seeds very easily and very well. Check their clothes to see if they have any burs and other weed seeds attached to them. Ask them if that might be a method for seeds to move. The third method of seed dispersal may be a little more difficult to find, but it will be in the area if one looks closely. When birds or animals eat fruits and berries, the seeds will not all be digested. Their manure will contain undigested seeds. Have the students collect examples of the different ways seeds move.

FOLLOW-UP:

Discuss methods in which seeds move. Have the students write short stories of make believe such as "if I were a seed I would----" etc. Also, the students might be allowed to collect various types of seeds to be used in creating a seed picture of some kind.

The story of Johnny Appleseed might be read and discussed.

Plant examples of the different seeds that the students have collected. Keep some of the samples, put them in the school deep freeze for a month and plant them. Chances are that some of the burs and seeds which didn't grow earlier will grow now!!

STUDYING PARTS OF AN INSECT

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416 (Revised 2-8-72)

Grade Level - 3-4

Best time of year - Summer, Fall

OBJECTIVES:

1. To acquaint the students with the basic anatomy of insects by studying the grasshopper.
2. To assist students in comparing the differences between long-horned and short-horned grasshoppers.
3. To introduce students to the complexity and function of life.
4. To introduce to students that living things are made of many functioning parts.

MATERIALS:

insect nets (optional)
jars

BACKGROUND:

Insects are the most abundant group of animals on the earth. They are present everywhere on the earth that man has been. Apparently none were present on man's recent journeys to the moon. The reason that they have global distribution is their ability to adapt to various situations. It is very evident that they have evolved differently when you compare the looks of a butterfly or an ant. They definitely don't look much alike. However, they have basic parts which are comparable. All insects have three pair of legs, three body regions, jointed appendages, compound eyes and a variety of other characteristics.

Because the insects are very abundant and are an available source of materials for scientific studies, they are used extensively for experiments. Many of the factors which control insect populations are also controlling factors in larger animals. The students will be interested in examining the insects under a microscope. This will enable them to distinguish different parts, designs, colors, etc. The grasshopper appears to be widely accepted as an example of a typical insect. We will use the grasshopper to demonstrate the different parts of an insect. They are very abundant in the early fall, so this is an ideal time to study them. We will compare the two types of grasshoppers we have in this area. The students may happen to capture both types.

PRE-ACTIVITY:

Introduce the activity with questions similar to the following:

A. How do insects move around?

2. Do they always move the same way?
3. Do all insects look alike?
4. Do they have eyes?
5. How many legs do they have?
6. Do they all have wings?

Let's go out and collect some grasshoppers and look them over. Where do you think we could find some grasshoppers?

FIELD TRIP:

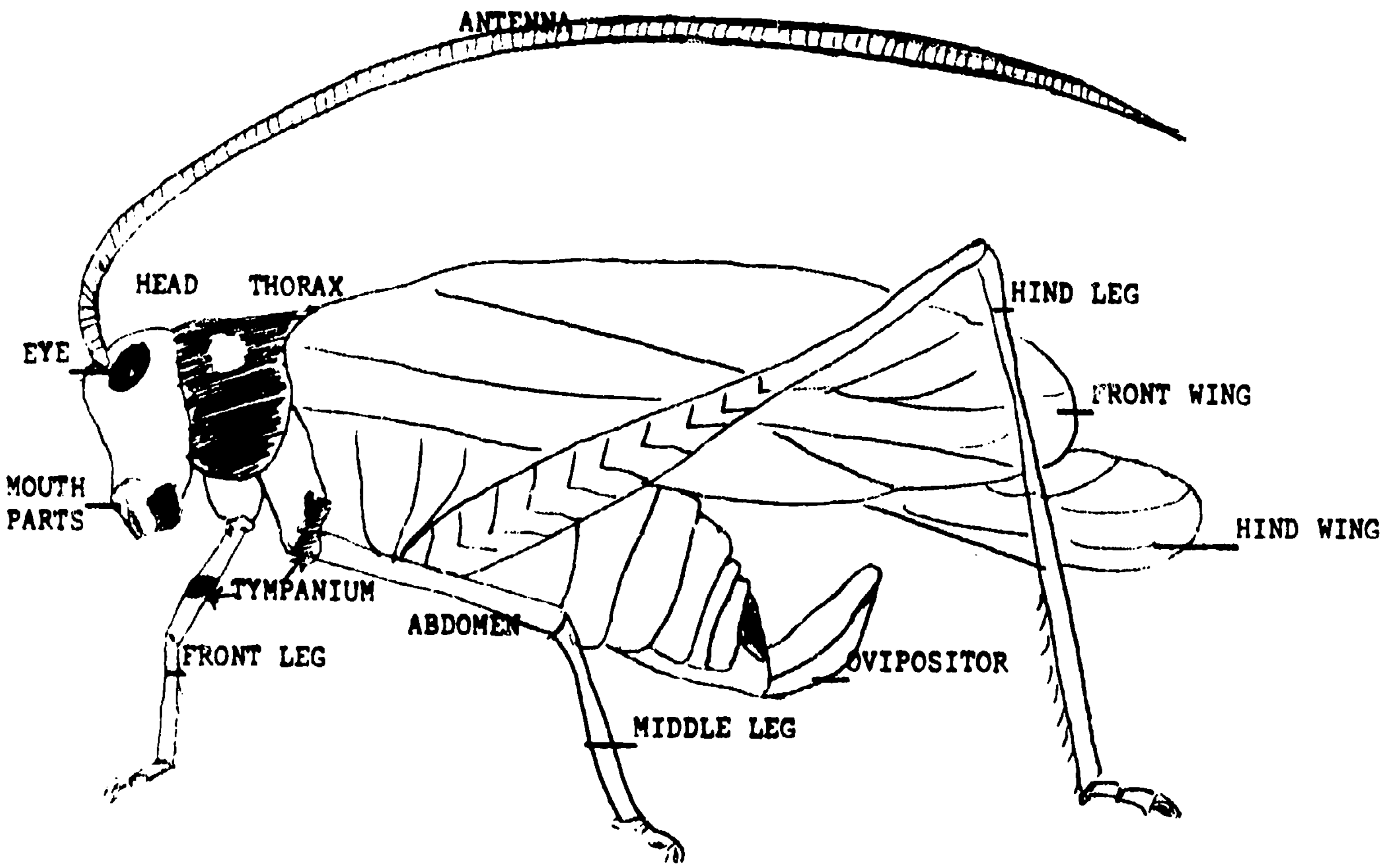
Give each student a chance to collect three or four grasshoppers each and put them into jars. If enough nets are available, this should take only 10-15 minutes for the entire class. The variations of the individual grasshoppers will be interesting for the students to see. Many of the grasshoppers will vary in color and size, but will be the same kind of grasshopper.

POST-ACTIVITY:

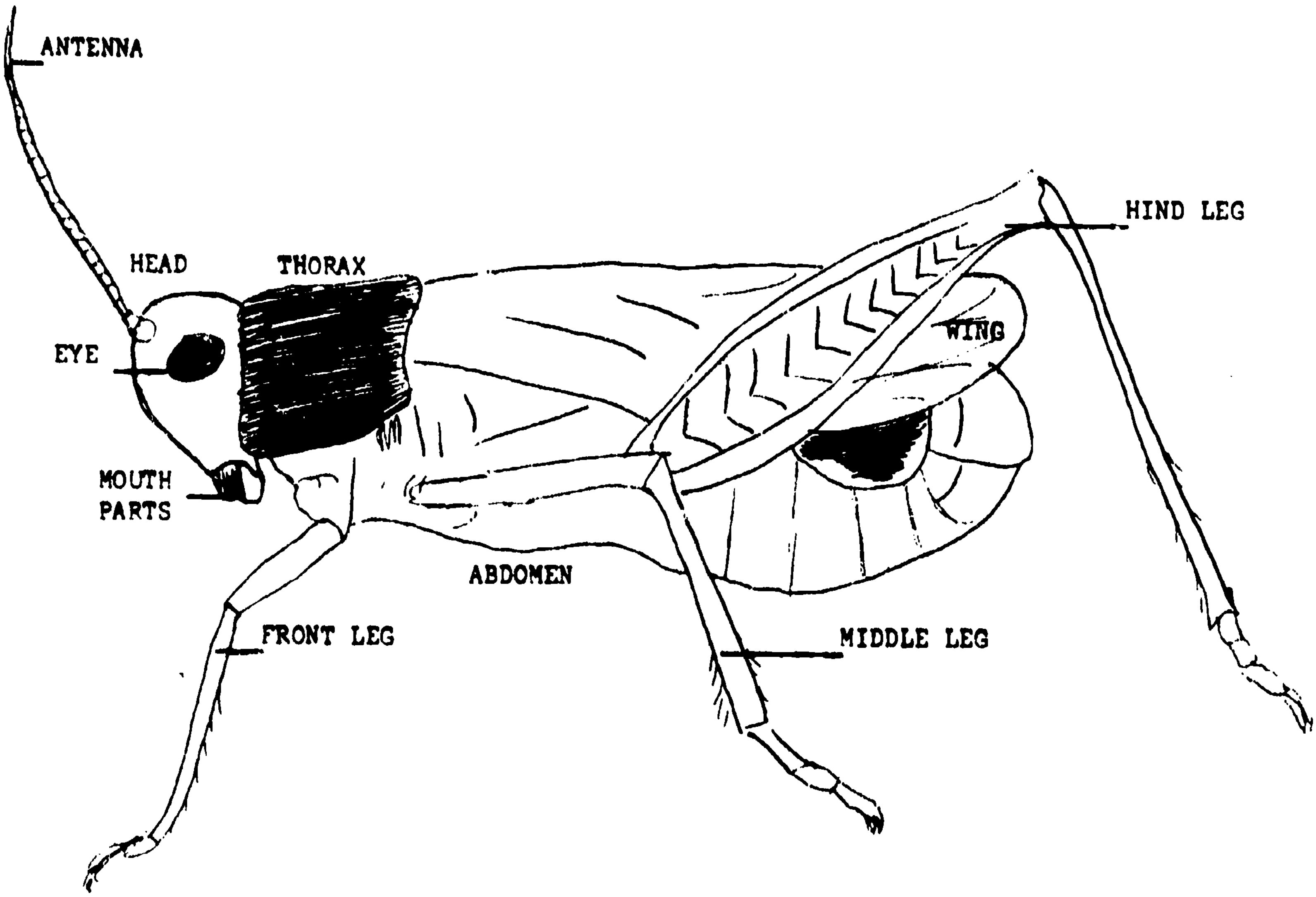
Kill the grasshoppers by putting hot water into the jars. Two to three minutes should be sufficient if the water is very hot. Let the students determine which type of grasshopper they have by comparing the insect under the microscope with the diagrams attached to this activity. After the students have correctly determined the type of grasshopper, they can start dissecting them and finding all of the parts on the diagram. Let them find as much as they can by themselves. When they have done as much as they can by themselves, give them a hand with what they have left. If they have any other insects, let them examine them under the microscope and see if they can identify any of the parts.

Have the students draw a diagram of the grasshopper and label as many parts as they can.

LONG-HORNED GRASSHOPPER



SHORT-HORNED GRASSHOPPER



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NONFLOWERING PLANTS

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416. (Revised 2-8-72)

Grade Level - 3-5

Best time of year - Fall, Spring (Winter activities would be difficult, but not impossible)

Best Area: Madison Wetlands or local woodland or wetlands area.

OBJECTIVES:

1. To acquaint the students with the type and characteristics of nonflowering plants which are important to them.
2. To introduce students to an awareness of what these organisms are and where they can be found.
3. To provide students with methods of studying them.
4. To acquaint the students with the ways these organisms have an impact on our lives.

BACKGROUND:

Among the organisms which play an essential role in the good health of the environment is the diverse grouping called nonflowering plants. Generally, these include the diverse groups of algae, fungi, mosses, ferns and lichens. Most of us recognize some of the common types on our yards but few of us realize the importance of these organisms to humans and more important, to the health of the environment.

Types of algae which are common in our area are the blue-green, green, motile flagellates and diatoms. These are found in all of our water, moist soil, moist bark, etc. They are perhaps the easiest group to find and study.

Common fungi are the toadstools, mushrooms, shelf fungi on trees, molds and puff balls. These usually require moist places to grow, and at times many of these organisms are difficult to locate. They can be found, grown and studied in detail with little effort if proper preparations are made.

Mosses and ferns are found in moist habitats in this area. Mosses grow on the north side of roofs in the shade, on tree bark, old stumps, etc. Ferns can be found in densely shaded wet areas, but are not abundant generally in this area.

The lichens are very abundant and can be found on nearly every rock and tree in this area. There are several common types of lichens present which are found on tree bark and old wood. Several other types are found commonly on rocks.

Algae serve to take the nutrients out of the water and energy of the sun and start them into the food chain. Algae serve as fish and insect food. It also provides oxygen for the air and water.

Fungi are parasitic and saprophytic. They must get their food from dead or living organisms. Fungi which feed a living organism are athlete's foot and ringworm. Most of the fungi we are familiar with feed on dead organic materials. And in feeding on this material, fungi serve to break it down into elemental forms which can be used as food for flowering plants. Fungi serve to put some elements and nutrients back into the food chain.

Lichens are algae and fungi living together in a very close relationship called symbosis. You can put lichens on a food material which poisons the algae and get a fungi growth which is much different in color and shape than the lichen. The same can be done with the algae. Lichens are exceptionally tough. They live in in the most hostile climates and thrive. Lichens are very important to us for they break rock into elemental forms and soil which can be utilized by other plants. They are also instrumental in the decay of wood.

Mosses and ferns play a diminished role in this area as decomposers of organic matter. It is generally too dry on the prairies to support vigorous moss and fern growth. They are present and interesting to study. In the more humid areas of the country, they are extremely important as decomposers and even as food for higher animals.

The shapes, forms and ecologies of these organisms are interesting to study.

MATERIALS:

one jar per student, rubber boots, plastic or paper bag, a knife or a screwdriver may be handy.
dissecting scope and slide making equipment

PRE-ACTIVITY:

Assign students to looking up information on algae, fungi, lichens, mosses and ferns. Have them bring pictures. Spend some time discussing these plants and the importance of them to our environment. Here are some questions which might be helpful:

1. What is algae?
2. Where can you find it?
3. How is algae different from grass?
4. Describe algae.
5. How is fungi different from algae, mosses, and ferns? Where do you find the different kinds of fungi?
6. How are molds and fungi important to us?
7. Desribe a lichen.
8. What makes up a lichen? How is it different from algae or fungi?
9. How is it different from a weed?
10. Why are lichens important? Where can they be found?
11. What do mosses look like and where do they grow?
12. Where can mosses be found?

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FIELD TRIP: ½ to 1 hour

Collect algae at the edge of a slough or creek. Lots of algae grows on rocks and other plants in our local lakes and streams. Have them put a little glob of algae in the jar along with some pond water.

Lichens are found in abundance on old fence posts, tree bark, rocks and logs. Shelf fungi and fungi associated with dead or dying trees are the most common in this area. The woodlot on the west side of the Madison Wetlands area is an excellent place to look for fungi. An older shelterbelt or tree stand is also a good place to explore.

Mosses are also abundant on the shaded sides of tree and stump bases in the Wetlands woodlot. Ferns are more difficult to find in the area. As of this writing, I know of no natural stands of ferns in this area. I would appreciate help if you know of one. Lichens, mosses and fungi can be placed in plastic bags and returned to the classroom for study.

The teacher should act as a guide to help find the fungi and other plants. Caution the children to take small samples of the fungi and moss, there is some danger of depleting the fungi supply in an area for other classes if children collect all they find.

POST-ACTIVITY:

Algae can be best studied using compound microscopes available from the Interlakes Office. There are many shapes, forms and colors of algae. Some swim like animals. They fascinate children. Let kids make slides and draw the different kinds of algae they find.

Lichens have beautiful shapes and colors and have sculpturing reminiscent of sand dunes. Have the children compare colors and shapes to determine how many kinds were found.

Fungi can be examined microscopically and compared as to types, colors and textures. Molds and other microscopic fungi can be studied with the aid of microscopes used on the algae.

The shapes and structures of mosses and ferns can be compared and posters might be made of the different types.

Repeat the questions asked in the pre-activity. How are these plants important to man? What were they doing in the places you found them?

PLANT AND ANIMAL COMMUNITIES

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416. (Revised 2-2-72)

Grade Level - 3-6

Best time of year - Spring or Fall

OBJECTIVES:

1. To acquaint the students with characteristics of plant and animal communities which will enable the student to recognize them.
2. To introduce the students to study of these communities in a systematic manner so to bring out differences in a graphic manner.
3. To acquaint the student with the relationships and interdependency of plants and animals.

BACKGROUND:

Plant and animal communities are everywhere. We are part of one. However, to go out to find a visible plant and animal community for detailed study is not easy. The relationships which make up a community of things of this type are very subtle ones and difficult to bring out visually. In the Wetlands, there are several communities which may be vivid enough to practically study. Contact Mr. Dave Gilbert of the Madison Wetland Office or the Interlakes Office for specific study sites.

A community is much easier to show someone than to describe. Generally, a plant community is a rather easily identifiable unit. The animals which are there pretty much are dependent upon the plants and the food and shelter they provide. If you wish to do a study of plant and animal communities, then you must find a selection of identifiable plant communities, like a cornfield, a pasture, a creek bottom, a slough or a shelterbelt. The animal life which are dependent on each of these will leave signs which will indicate how they are dependent on the plants and also how the plants depend on them. For example, a plum thicket may have many signs of raccoons in manure piles scattered around under the trees. Coons use plums for food, and in eating the plums they help the plum plants by distributing the seeds and depositing them away from the parent tree with a good rich source of fertilizer to help the seed grow.

The size of the plant and animal community will vary with the animals with which you are dealing. The plant and animal community of which man is a part, is a much larger entity than that of a cottontail rabbit.

Generally, there are three plant and animal communities in a small area on the hill directly west of the visitor center at the Redfield Slough.

The slough edge contains a plant community which includes prairie cord grass, bulrush, cattail, cocklebur and many other plants. The animal community associated with those plants are muskrats, mink, raccoons, water and shore birds, aquatic insects, mollusks and sometimes fish.

On the lower and damper parts of the hill and back away from the aquatic vegetation zone is found an area dominated by Kentucky blue grass, dandelions and brome grass. In this plant community is found the tunnels and signs of meadow mice and thirteen-lined gophers. There should also be signs of predatory birds and animals associated with the community. On the top of the hill is another zone of plants which includes Blue Gramma Grass, Kentucky blue grass, Side Oats Gramma Grass and other more dry land types. Associated with this plant groups is a colony of Richardson's ground squirrels (flickertails). Also in this community will be found signs of fox and badger which visit the colony to dig out the flickertails.

To meaningfully study these communities, there will be two very essential ingredients. Identifying the plant zones and plant species found in them is the first priority. The second priority will be to locate them and identify the dominant animal forms present in each community. It will then be necessary to relate the two. Animals can be shown to be dependent on the plants by examining the scats or manure and finding that these animals eat these plants. They also use the plants for nesting materials and for protection as hiding places.

MATERIALS:

1. paper bags
2. measuring tape

PRE-ACTIVITY:

Introduce the topic of plant and animal communities by asking questions and discussing man's communities and the plants which support him. Sample questions are as follows:

1. Is man part of a plant and animal community?
2. How can you tell?
3. What are the plants which we are dependent on in our community? For food? For protection? For nesting (houses of wood, cotton and blankets and clothes) For recteation?(lows, trees, flowers)
4. Do we help the plant communities? How?
5. Do our plant communities grow without help?
6. What are other animals which live in our community which we are dependent upon?

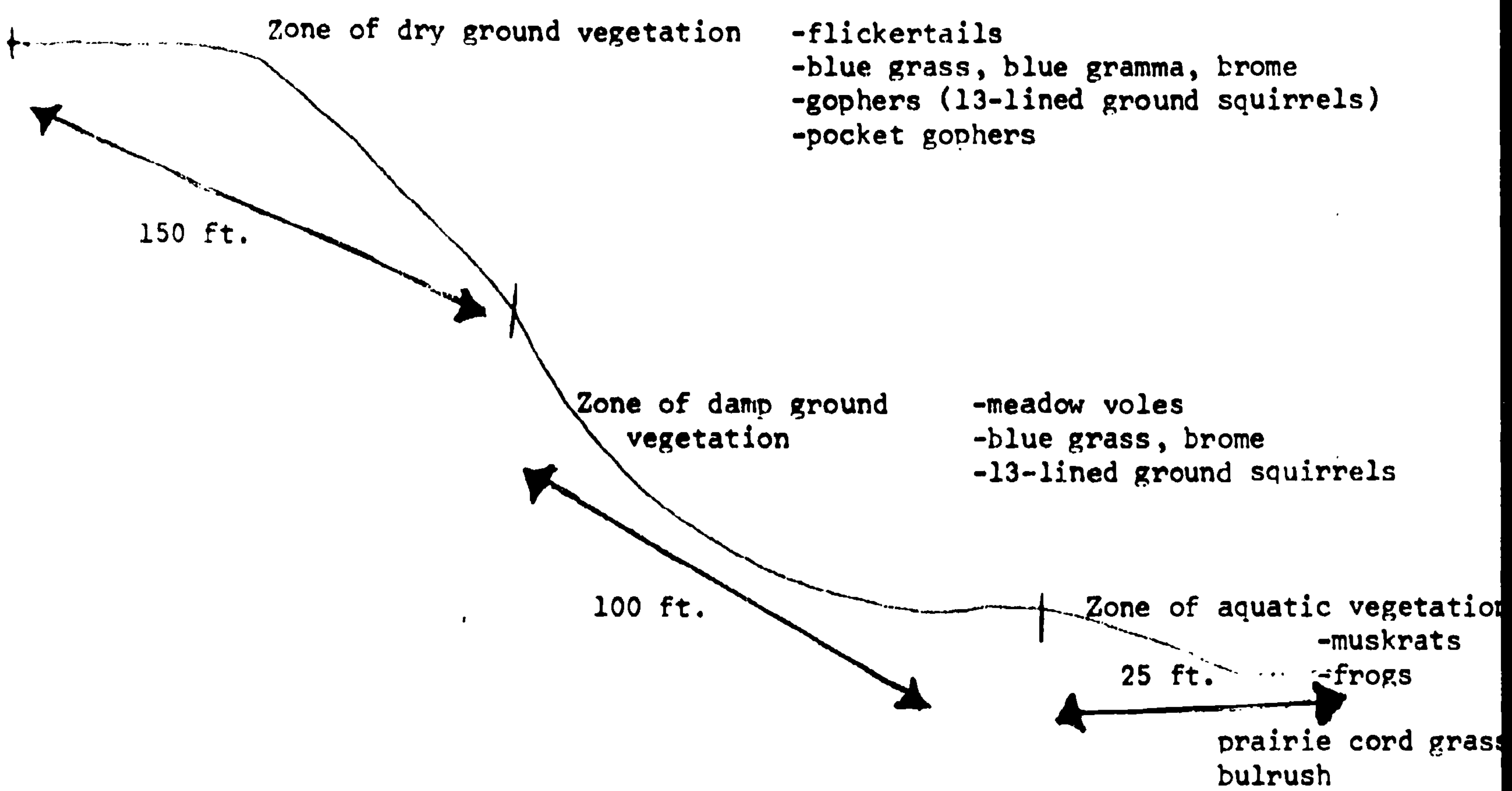
List plants in our community which we depend upon or our livestock depends upon.

Are wild animals found in communities, town or cities?
Have you ever heard of a prairie dog town?
How do animals help plants? (scatter and bury seeds, thin out crowded plants and allow light in for others, eat insects which damage plants, fertilize and air out the soil)

Split the class up into two teams; one which is responsible for plant collection and identification; the other is responsible for finding, identifying and recording animal signs.

Explain a mapping technique. Explain the identification of plant zones and mapping them. (See example on next page)

MAPPING PLANT AND ANIMAL COMMUNITIES



Have the students measure a strip 100 feet wide from the top of the hill to the edge of the slough. Have them measure the length of the different zones. Have the plant group collect plants from the different zones and identify the plants and list the most common types. Map the different zones as to plant location. Have the animal group look for animal signs in each area, listing each type and the most common type. They should also collect scats, nests, etc. They might also record by mapping the location of the outstanding animal signs.

FIELD TRIP: 1 hour

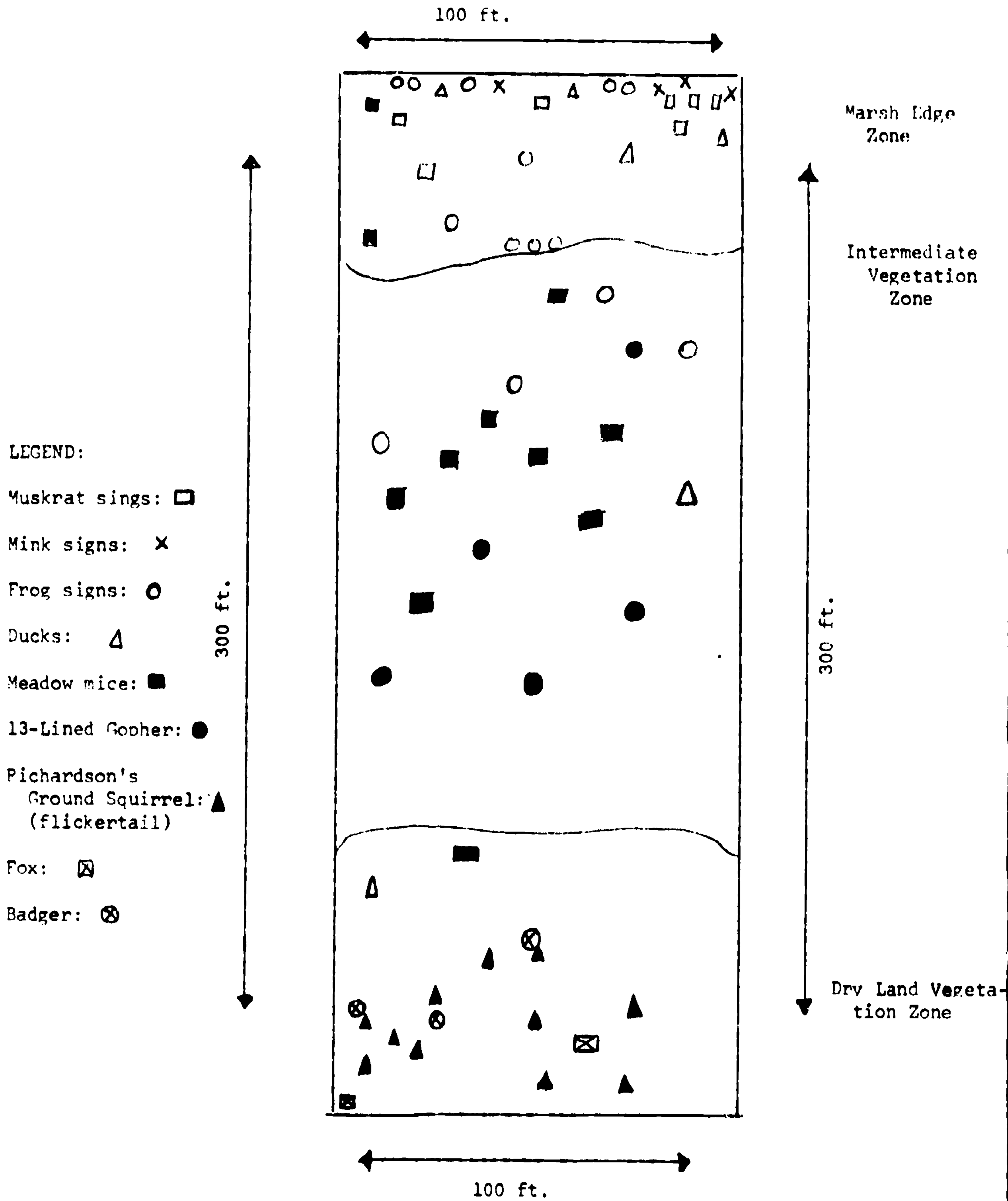
Allow the groups to accomplish their projects. Some will need help getting started. Follow procedures outlined in the pre-activity explanations.

Mouse runways may be difficult to locate during late spring and early fall. They are there, it takes some persistence. Often the marsh edge zone will be short of mammal signs but should always have dead fish, aquatic insects and tracks for clues to what has been there.

FOLLOW-UP:

Complete and discuss the maps. Complete the identification of plants and animal signs. Have the children investigate the animals and plants in reference books. Have the children prepare posters of plants of different plant zones. Wrap the activities up by repeating questions of the pre-activity. Ask the students to define a plant and animal community. Ask the students to identify the things which make up a community. Ask the students to describe and list the components in the plant and animal community of which they are a part.

SAMPLE MAP OF THREE TYPES OF PLANT AND ANIMAL COMMUNITIES:



BIRD NESTS AND PLANTS

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone 489-2416.
(Revised 2-7-72)

Grade Level - 3-8 (adaptable from K-12)

Best time of year - May

OBJECTIVES:

1. To introduce the students to birds and bird nests.
2. To help the student discover that birds depend on plants for their nest sites and nest materials.
3. To acquaint the students with reasons why birds select certain places to nest and the different ways which they nest.
4. To acquaint the students with the beauty and delicateness of life.
5. To acquaint the students with the protective instincts and reactions of nesting birds.
6. To acquaint the students with the idea of providing nesting habitat for birds.

BACKGROUND:

Most birds depend a great deal on plants and plant materials for nesting materials and sites. Also most birds will nest at fairly characteristic heights and places in trees and brush or on the ground. Why do birds favor one height or type of tree cover over another? No one knows for sure and birds don't tell us those things. But, there are theories about bird nesting behavior and it might be of interest to you and your class to investigate and formulate your own theories.

There are many beautiful things to see in the spring. Some of the most beautiful things are nesting birds, eggs and newly hatched young. The delicateness and beauty of them are conveyed by sight alone. Normally when a nest is disturbed, the adult birds will make some defensive effort to drive off the intruder.

The best places to look for birds' nests are in parks and areas with low trees and brush. Evergreen trees are very attractive nesting sites for robins, purple grackles and mourning doves. Nests will be found in these trees which are low enough that youngsters can see and study them without climbing the trees or damaging the nests. Most bird species will lay a fairly consistent number of eggs per nest and the eggs will have a characteristic size and color.

May is the best month for seeking bird nests. Shelterbelts, parks, hedge rows, overgrown fence rows, etc. are the best places to look for nests. It would be beneficial to make a survey trip to locate nests prior to the field trip and flag the trees so nests can be found again.

MATERIALS:

1. Several binoculars
2. A light step ladder
3. Paper and clipboards for data collecting
4. A few paper bags for collecting empty or abandoned nests

PRE-ACTIVITY: 15 minutes to 1 hour

Introduce the activity with questions. Also you might build up to this activity by studying birds from books and a field trip from the school grounds.

What are birds? Describe one to me. List its characteristics. Some examples are as follows:

1. feathers
2. two wings
3. two feet with claws
4. bills
5. warm blooded
6. lays eggs
7. builds nests

How are birds different from mammals or insects?
Have children list as many kinds of birds as they can think of. (See attached sheet for list of birds)
What does each kind of bird eat?
Where do they stay or live? Do they migrate or stay here all winter?
Where does each kind of bird nest? In trees, in bushes, on the ground?
How many eggs does it lay? What color are the eggs?
What does each bird make its nest out of?

Suggest a field trip to answer the questions they haven't aswered and check the answers they have given. Have a contest of who can find the most nests, most different kinds of nests, most unusual nests, etc.

You may want to make this a long activity and have a picnic lunch. Be sure to stress that the students do not disturb the nests anh more than possible. It generally does no harm to frighten the bird off the nest and look at the contents as long as they aren't touched.

FIELD TRIP:

Lake Herman State Park would be a good place for a field trip. There are a number of good evergreen plantings and brush which should have many bird nests. There are also some good areas of grass in which students may find pleasure looking for pheasants, meadow larks and duck nests. Take a camera and take some pictures of the nests and trees the nests are found in.

Have the students spread out in pairs to look for nests. If you have already surveyed the area, you might discretely guide some of the laggers into finding nests. When the nests are found, have each student record data about the nest and the bird that was in it. (See attached data sheet). Stop the nest seeking after 45 minutes and have everybody collect at a comfortable spot. Sit down and discuss for about 10 minutes what you have found.

POST-ACTIVITY: Time: ½ to 1 hour

Make a data chart which answers the questions posed in the pre-activity. Review the questions and discuss them. Examples of data charts are attached to this unit.

Following are suggested questions that might be used:

1. Did you find pheasant nests in trees? Why or why not?
2. Robins' nests on the ground? Why or why not?
3. If you wanted more pheasants to build nests what kind of places would you make for them?
4. What kind of trees did you find the most nests in?
5. What kind of trees had the most different kinds of nests?
6. What kind of trees should you plant if you wanted lots of birds around?
7. Did you find duck nests in trees? Why or why not?
8. When did you find duck nests? If you wanted lots of ducks around, what kind of places should you provide for them?
9. If you wanted more doves to nest around your house, what could you do?
10. How many birds nested in grass or made nests of grass? Is grass important to nesting birds? Which birds get the maddest? Which birds are the best parents?
11. Which birds lay the most eggs?
12. Which birds' nests were hardest to find?

If you need assistance with planning or carrying out an activity, contact the Interlakes Office, phone number 489-2416.

BIRD NEST DATA SHEET

(This should be modified to suit your needs)

BIRD	FOOD	LIVING PLACE	# NESTS FOUND	NESTING PLACE	#EGGS	COLOR	NESTING MATERIAL
Robin	insects, worms, fruit	around trees	3	trees, bridge, buildings	4	blue-green	mud & grass
Mourning Dove	weed seeds, (doves rarely eat insects)	everywhere	6	trees, brush, ground, (evergreen trees)	2	white	twigs
Purple Grackle	insects, fruit	around trees	9	evergreen trees	5-6	blue spotted with black	grass, string
Pheasant	seeds, insects	fields	1	ground	8-14	olive	grass
Sparrow	seeds, insects	buildings, towns, farms, around trees,	3	buildings & trees	6	white & brown	grass & feathers strings
Wren	insects	around trees	1	holes in trees, wren houses	4-6	brownish white with spots	twigs, grass
Sparrow Hawk	birds, mice & insects	open prairies with a few trees	1	holes in trees	4-5	?	?
Ducks	grain, aquatic plants & animals	open prairie with few trees	2	ground in tall grass	4-6	usually white	grass

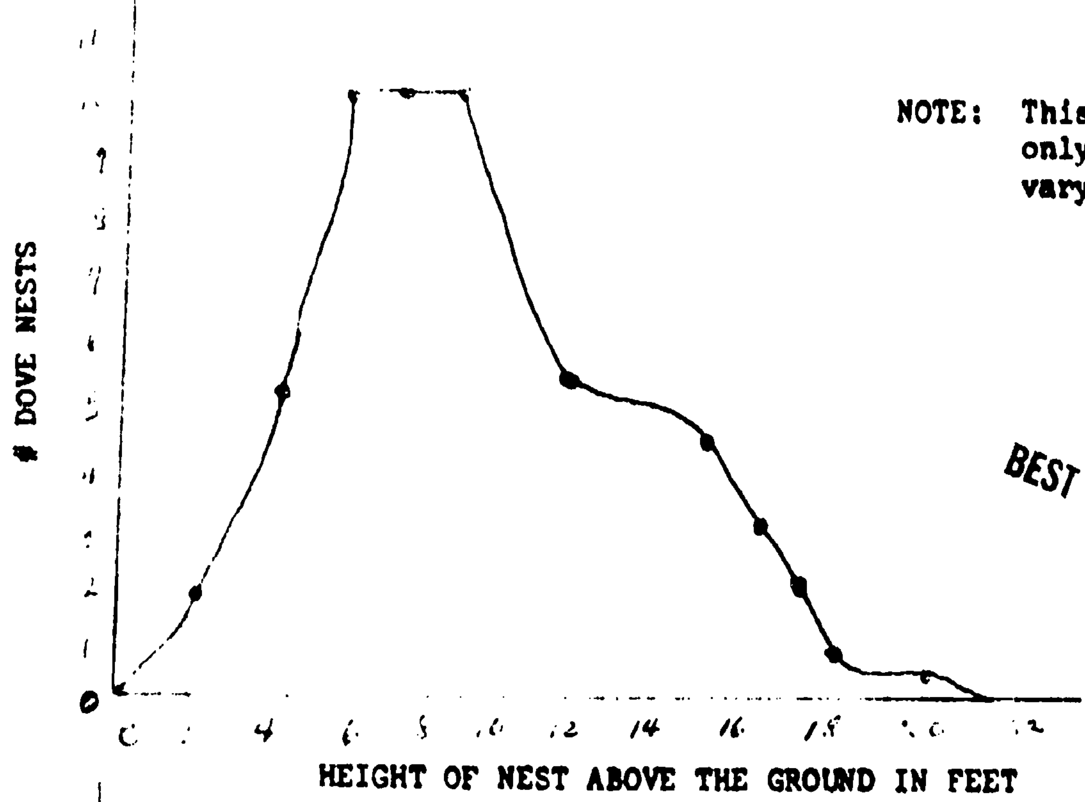
DATA SHEET
BIRD NESTS AND PLANTS

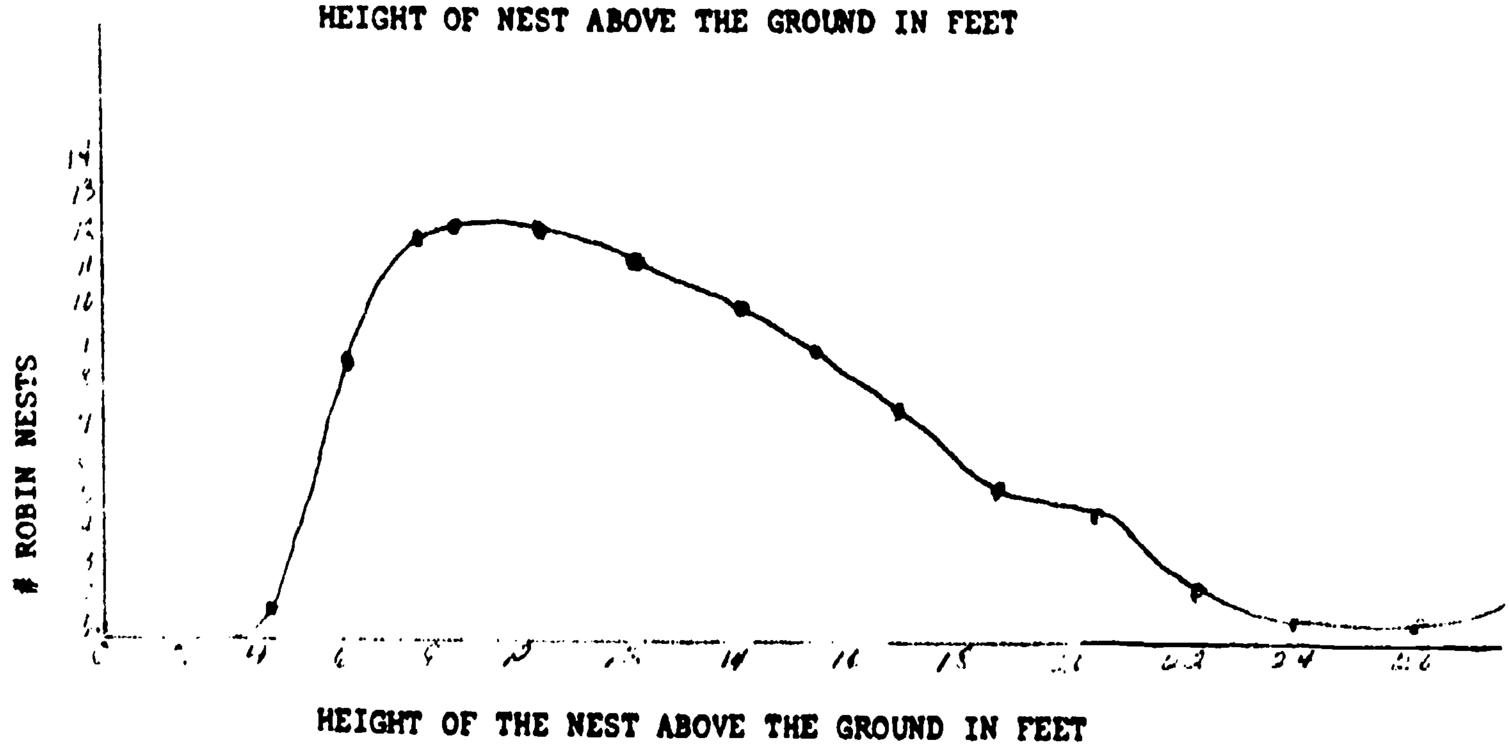
STUDENT'S NAME ____________________
DATE ____________________

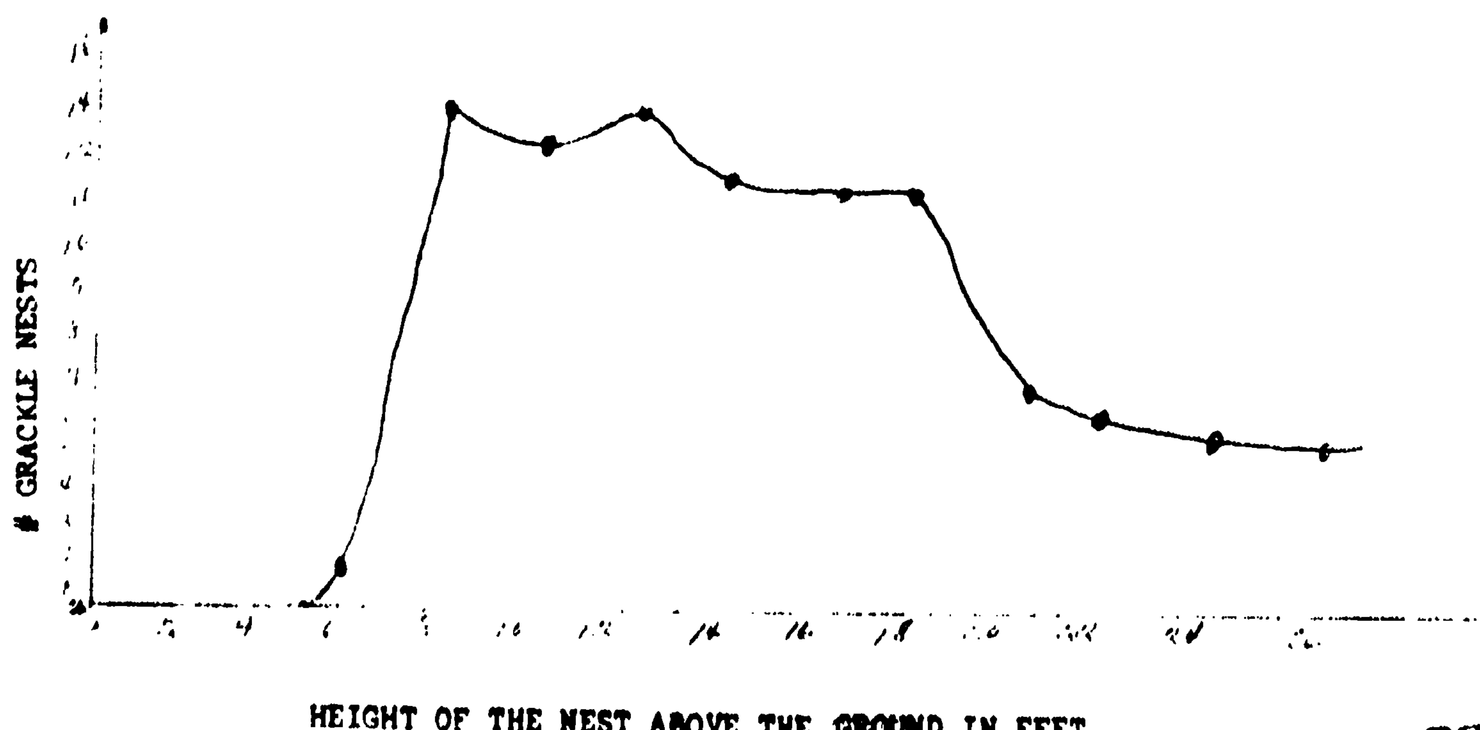
BIRD NEST	TREE	ESTIMATION NEST HEIGHT	BRANCH TYPE	#EGGS OR YOUNG	NESTING MATERIAL	NEST SHAPE
Dove	cedar	6 ft.	flat fork	2 eggs	twigs	saucer shaped
Dove	pine	12 ft.	flat fork	2 young	twigs	saucer shaped
Robin	cedar	4 ft.	flat fork	4 eggs	grass & mud	cup
Dove	cedar	4 ft.	flat fork	3 eggs	twigs	saucer shaped
Purple Grackle	cedar	8 ft.	triangular fork	4 young	grass	cup
Wren	elm	4 ft.	hole in trunk	6 eggs	twigs & grass	cup
Robin	honey-suckle	8 ft.	upright fork	?	mud & grass	cup

YOU MAY WISH TO MODIFY THIS DATA SHEET TO YOU CLASS LEVEL OR PERHAPS YOU MAY CHOOSE NOT TO USE ONE.

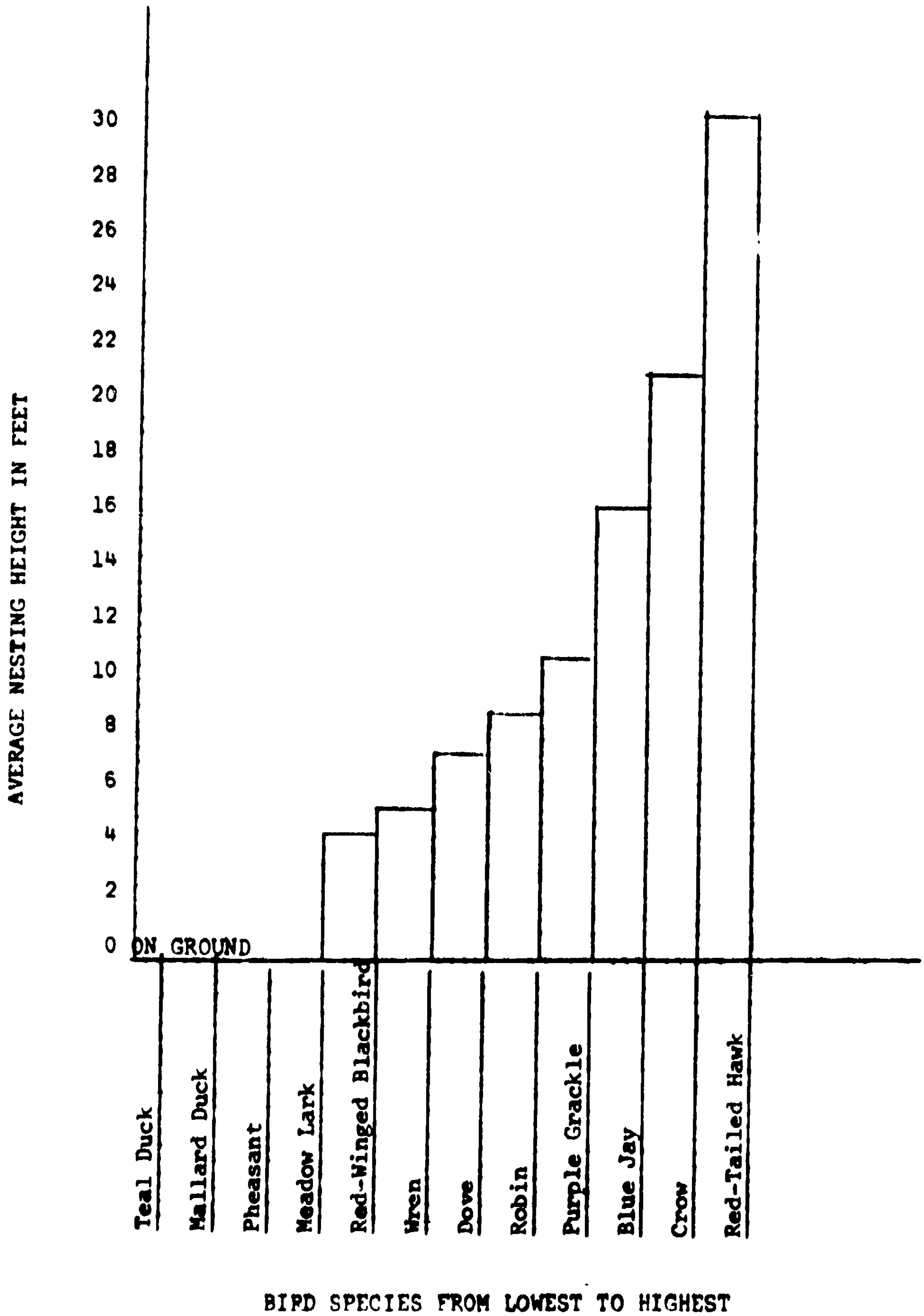
NOTE: This is for demonstration only. The results you get will vary considerably from these.







Using the students' data sheets and information have the students calculate the average height each type of bird nested at. Then plot the average height on a graph as shown below:



DISTRIBUTION OF NESTS IN PLANT SPECIES

	CEDAR	PINE	HONEYSUCKLE	RUSSIAN OLIVE	ELM	GREEN ASH	APPLE	BROME GRASS	BLUE STEM
ROBIN	10	4	1	1	7	1	3	0	0
PURPLE GRACKLE	15	10	5	0	2	2	10	0	0
DOVE	20	15	1	2	2	3	2	0	0
WREN	0	0	0	0	1	0	3	0	0
PHEASANT	0	0	0	0	0	0	0	2	7
TEAL	0	0	0	0	0	0	0	1	8
MALLARD	0	0	0	0	0	0	0	4	7
WOOD DUCK	0	0	0	0	1	0	3	0	0
BLUE JAY	0	0	0	0	2	0	1	0	0

NOTE THE PATTERNS OF PREFERENCE TO NESTING SIGHTS. NOTE ALSO THE WIDE VARIETY OF NESTING SITES WHICH SOME BIRDS WILL SELECT VERSES THE NARROW SELECTION OF OTHERS.

LET'S MAKE BIRD HOMES

Best time of year - anytime, but this makes a good winter project with a spring follow up

Material - lumber, hammers, and nails

Area - a shelter belt or along a country road

OBJECTIVE:

1. This project is a good art project and provides practice in measurement and construction.

2. This project is intended to introduce the idea that man can help wildlife and encourage bird and animal useage of areas where they are not presently found.

3. The project can be used for studies of bird species, bird nests and nesting habits.

BACKGROUND:

Woodland birds which nest in holes are not very abundant here in South Dakota prairies. Why? There is a lack of suitable nesting places. How can you change that? Provide nesting boxes.

PRE-ACTIVITY:

Questions about birds-

Nesting habits - robins vs. chickadees
grackles vs. blue birds
wrens vs. doves

Which are most common? Why?
Which do you see the most? Why?
How could you change that?
Do wrens peck holes in wood?
Do blue birds peck holes in wood? No. They depend on wood peckers.
Flickers - old trees. If no place to nest, no birds.
Provide houses. The more they resemble natural holes, the better luck.

Provide lumber and nails for students to build a bird house. The materials cost about 22¢ per house. The students can bring hammers from homw. A simple plan can be made for building bird houses through work with the shop teacher or let the students design their own.

Suggestion: In grades 1 - 3 it has worked best for students to work in groups of two in order to cut down the time involved.

FIELD TRIP:

Take the bird house out to a shelter belt or part of a fence line and hang one up every 100 feet.

Put some high, some low, some right side up, some hand with entrance toward ground.

Wait until the last week of May and return, everyone check their birdhouse - report the findings.

FOLLOW UP:

Record the results of the experiment.

How many nest boxes were used?
How many sparrows?
How many wrens?
How many mice?

Which locations received the most use? High, low, face down? Small holes, large holes, painted or unpainted.

Do you think you did wildlife a favor?

Let's go back one year from now and see what has happened, and save your report and information.

WHICH IS COLDER, ICE OR SNOW?

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016.
(Revised 3-27-72)

Grade Level - 3-8

Best time of year - Winter

OBJECTIVES:

1. To introduce the students to a scientific, problem-solving method.
2. To demonstrate setting up a research problem which will result in a reliable conclusion based on controlled variables.
3. To demonstrate a scientific test which illustrates the measuring of the one variable.
4. To emphasize the ability of snow to insulate and introduce some important properties of ice and snow.
5. To introduce the concept of temperature affecting the speed of chemical reactions.
6. To introduce the concept of transfer of heat energy by conduction without changing phase.
7. To introduce the concept of liquids changing phase and density.
8. Homemade ice cream is great!

BACKGROUND:

Don't let the objectives listed above throw you. All of these things can be done without much preparation or prior knowledge. These concepts are done using two hand crank (or electric) ice cream freezers. As long as the freezers contain the same capacity and both are hand crank, or both electric, they will work. Borrow them from parents and/or anyone in the community. Set up an experiment like one of those suggested. Put the ingredients together, put the kids to cranking and counting the number of cranks it takes until ice cream is finished. A scientific experiment will have taken place and will be ready to discuss.

MATERIALS:

A hammer or hatchet for chipping ice
Two ice cream freezers - hand crank or electric - both of one type
Ice chips - enough to make one gallon of ice cream
Snow - enough to make one gallon of ice cream
Ice cream salt, livestock salt, or canning and pickling salt (be sure to have enough for both freezers out of the same salt source)
Two plastic or paper cups to measure the amount of salt
Spoons and dishes enough for the class and teacher
Two thermometers
Recipe for one gallon of ice cream (you will need to double the recipe on the next page)

ICE CREAM

4 eggs
$2\frac{1}{2}$ cups sugar
6 cups milk
4 cups cream or half and half
2 tablespoons vanilla
$\frac{1}{2}$ teaspoon salt

Beat eggs until light. Add sugar gradually. Add remaining ingredients and mix well with beater. Freeze.

Have the mixture put together by the kids or cooks or bring prepared to school by a volunteer mother. Remember to use identical ingredients for both freezers.

PRE-ACTIVITY: $\frac{1}{2}$ hour

Introduce this project as one in which the children conduct a real, genuine experiment to answer the following question: Which is colder, ice or snow? Record the students' responses on the board. Then, ask them how they would conduct an experiment which would enable them to find out. Explore why they think ice is colder than snow or snow colder than ice. Or, why they are the same. Help them to suggest ways they might test snow and ice to answer their questions. If no one comes up with it, suggest using ice cream freezers to freeze ice cream to determine which freezes ice cream the fastest. Ask them how they would put the test together to insure that it would be valid.

You set the experiment so that everything is the same, but the variable you wish to measure. In this case, do the following:

Have two ice cream freezers of the same type and capacity. Use exactly the same ingredients for each freezer. When you pour the ice cream mixture into the container, note how much room is taken up and how much is left in the container. Put snow in one and chipped ice in the other; use exactly the same number of cups of freezing salt of the same brand in each. Record the time you start turning the handle and the time the ice cream is finished to have a definite record of the time it took. Also, have the kids record the number of times they turned the crank; this will give you another measure of the difference. As the students are turning the crank, carefully take the temperature of the ice-salt mixture and the snow-salt mixture and record them every five minutes. Be sure that the same amount of salt is used and add ice and snow as needed. When the ice cream is finished in the containers, pull out the paddles and scrape them. Note how full the containers are. (Save the questions for later). Pack the ice cream and let it sit, or dish it out and eat it.

FIELD TRIP:

Activities can be done inside or outside. You may want to have the children collect the ice prior to the activity by filling milk cartons with water and setting them outside to freeze. Arrange to give each child a turn at the freezer crank. Have a contest to see which boy or girl can make the most turns in one minute. Assign jobs: turners, snow, ice and salt handlers, temperature takers, paddle cleaners, servers, etc. so that everyone gets into the act. This activity may follow another winter field trip or may be the central theme of one.

FOLLOW-UP: BEST COPY AVAILABLE

List the results of this experiment on the board:

ICE CREAM FREEZER NUMBER ONE	ICE CREAM FREEZER NUMBER TWO
Time Started: ________	Time Started: ________
Time Finished: ________	Time Finished: ________
# of Cranks: ________	# of Cranks: ________
Temp. outside at study site ________	Temp. outside at study site ________
Temp. at Start -- Freezing Fluid ________	Temp. at Start -- Freezing Fluid ________
at 5 min. ________	at 5 min. ________
at 10 min. ________	at 10 min. ________
at 15 min. ________	at 15 min. ________
at Finish ________	at Finish ________
Amount in freezer at start ________	Amount in freezer at start ________
Amount in freezer at end ________	Amount in freezer at end ________

Which mixture froze the ice cream fastest? Why?
Which mixture was the coldest temperature? Why?
How long did it take to freeze each container? How many minutes difference?
How many cranks did it take to freeze each container?
Who could turn the most cranks in one minute? A boy or a girl?
Did the temperature change in the freezing mixtures? Why or why not?
Were the ice cream containers more full at the end than when you started? Why?
Why did you use salt in the freezing mixture?
Do you suppose that ice cream would freeze faster
- -outside than inside?
- -on a warm day than on a cold day?
- -if you didn't use salt with the snow or ice?
- -if you took it out on a very cold day and used no snow or ice?
- -if you used just air?

Would it make a difference in the time it took to freeze it if we used a different recipe or put chocolate or strawberries in the mixture? You may want to set up additional experiments to try to answer the previously asked questions.

Following is some background to assist you in helping the children recognize the meaning of what they have done.

Following is a sample data sheet recording what we found during workshop experiments. Your results may vary from this depending on air temperature and many other factors.

#1 - Snow-Salt Mixture		#2 - Ice-Salt Mixture	
Time Started:	10:50 a.m.	Time Started:	10:50 a.m.
Time Finished:	11:25 a.m.	Time Finished:	11:10 a.m.
Number Cranks:	1300	Number Cranks:	845
Temp. at study site	8°F	Temp. at study site	8°F
Temp. at start:	4°F	Temp. at start:	10°F
at 5 min.	10°F	at 5 min.	10°F
at 10 min.	10°F	at 10 min.	10°F
at 15 min.	11°F	at 15 min.	11°F
Amount in freezer at start:	80% full	Amount in freezer at start:	80% full
Amount in freezer at end:	100% full	Amount in freezer at end:	100% full

The ice-salt mixture won four days in a row and should normally come out in the end on top. You may get different results; sometimes the snow will change form into tiny ice beads which work better than ice chips. Ice-salt is much faster than fresh snow-salt in an ice cream freezer if everything remains equal. Why? There are several possible reasons. See if your students can figure some of them out. Included is our reasoning.

The reason salt is used in the freezing process is that salt when mixed with water causes the water to freeze at a lower temperature than pure water alone. So when you add salt to ice, there is a chemical reaction of the salt and ice in which the salt goes into solution in the ice to cause the ice to change phase from ice to water. Salt in the water lowers the freezing point. The more the salt and ice are in contact, the faster this reaction takes place. The warmer the salt and air temperature, the faster this reaction will occur. This is when the ice cream is made. Before ice will change to water, heat energy must be absorbed, 80 calories per gram of ice, and that heat energy does not change the temperature of the ice. The only way you know that the heat energy is there is when the ice changes into water. Where does the heat energy come from to change the ice into water? The ice cream mixture. Heat comes out of the ice cream mixture through the sides of the container, through the water-salt-ice mixture into the remaining ice. If all of the ice is melted, then this process is finished. That is why you pour out the water-salt and put in more ice and salt when you pack the ice cream. The temperature of this mixture will vary somewhat with the temperature of the snow and ice you put into the container, but it will remain fairly constant. Snow and salt mixtures are slower because the salt is isolated by the large amount of air between the flakes.

The heat energy transfer is slowed down by the air spaces. Heat conduction through air is poorer than through liquid. As the snow warms up it contracts away from the ice cream container, retarding this heat transfer even more. Snow in direct contact with the salt is melted, but the surrounding crystals and large amount of insulating air space retard the process and insulate the heat energy transfers.

The paddle keeps the ice cream ingredients mixed up and also provides an even flow of heat out of the mixture. Otherwise, the sides, top and bottom would freeze leaving the middle as a thick, gooey mixture of eggs, milk solids, sugar and salt.

Water and water mixtures expand when they freeze making them less dense. The fluid in the ice cream when it freezes adds about 11% to the volume, without increasing the weight. The extra 9% increase in the ice cream volume, without increasing weight, is probably air whipped into the ice cream during the process.

We hope this helps you. We know it is fun and truly educational and we hope you try it with your class. If you want help, the Interlakes Staff will especially enjoy helping with this activity.

FAMILY HISTORY AND GHOST TOWNS

Written by Dorothy Grimm, Elementary teacher, Ramona Public Schools No. 33, Ramona, S.D. 57054. Edited and produced by the Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, S.D. 57016.

Grade level: 6

Best time of year: Anytime

OBJECTIVES:

1. To acquaint students with family and community.
2. To introduce students to the impact the environment has had on family history. (Why did the family settle where it did?) (Why did the family move from their other home?)
3. To acquaint the students with how the environment affected the occupation of the family head.
4. To acquaint the students with how their families have changed the environment by their management of it.
5. To relate the problems of history and environment and how the forefathers treated and managed the environment - pollution - etc.

BACKGROUND:

This activity can correlate with South Dakota history, taught in the Sixth grade. There is a chapter on "My Home Town" which starts with family history. During the periods from the late 1870's to 1900 many towns started on the Midwest prairies were abandoned or relocated. It is an interesting study to find information on the family history and what happened to these towns.

PROCEDURE: FAMILY HISTORY

Pre-activity:

Family history: Find as many facts about your family going back as far as you can. Generate interest by asking students the following questions:

Why did they move here?
Where did they move from?
What was their occupation after they came here?
How did they change the community?
How did they help the community?
How did they create problems?

FIELD TRIP:

This would consist of going to the library, courthouse, or any place to find material. This can be done either as a group or individually. Excellent sources of information are older citizens in the community. Interview them about these questions.

POST ACTIVITY:

After finding all the information, bring it to the classroom and discuss it with the class.

Write a short paper on your family history.

Draw a family tree.

PROCEDURE: GHOST TOWNS

Pre-activity:

Ghost Towns: Find as much information as possible about these towns and answer as many of the following questions as possible.

What happened to these towns?

Where were they?

What was their purpose?

How did the town effect the community?

How did the environment effect the town?

FIELD TRIP:

Go to the court house or the city library for information. Ask some of the old timers of the community questions and talk to relatives.

Some of the remains of these towns are still noticeable. A trip could be planned to try to find some of these. Map the town, based on evidence you find. Where were the houses, stores, schools or churches?

POST ACTIVITY:

Write a paper on your findings.

Draw a map of the county and locate these towns on it.

Some of the towns in this immediate vicinity are Battle Creek, Prairie Queen, Towles, Russell, Badus Wicklow and Wicklow.

FRACTIONAL PARTS IN OUR ENVIRONMENT

Written by Rosemarie A. Brashier, Washington Elementary School, Grade 6, Madison, South Dakota. Adapted by the Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, South Dakota, 57016.

Grade Level: 5-6

Best time of year: Spring, Summer, Fall

OBJECTIVES:

1. To make the study of fractional numbers more meaningful to the children by giving them concrete items with which to work.
2. To give the children experience in determining which items make up the numerator and which items make up the denominator.
3. To give the children experience in using the metric system.
4. To teach the children to measure the same items by two different methods, by weight and by item count.

MATERIALS:

1. Coffee cans or similar containers for various sized rocks.
2. Plastic or paper bags in which materials will be collected.
3. Hardware cloth or 1/2", 1/4", and 1/8", etc. for sieves; five pieces that are at least 6" X 6".
4. Scale to weigh litter. Gram weight scale (optional).
5. Pint jar or similar container filled with 1/2 beans and 1/2 peas.

BACKGROUND:

These activities will give practice in forming fractions by using objects and will also give a better understanding of what the two parts of a fraction represent.

1. A rational number is any number that can be named by a numeral in the form $\frac{a}{b}$ where a and b stand for whole numbers, and b is not equal to zero.
2. The denominator tells how many parts of the same size something is divided.
3. The numerator tells how many parts of the denominator number that are being considered.

The method of determining the denominator can be handled in one of two ways or both ways. (1). A definite total number can be assigned, thus, giving the denominator automatically. (2). The separate groups of items can be counted or weighed and then added together to get the total of the groups and, therefore, the denominator. This will emphasize the idea that the denominator represents the total amount involved and the numerator represents a part of that total.

Sixth grade teachers may use these ideas with a little modification in the study of ration and proportion.

PRE-ACTIVITY: (15-20 minutes the first day).

1. Introduce students to the idea that parts make up the whole thing.
2. Show a jar containing beans and peas. How many seeds are in here? How many beans? How much corn? Is there some way we could express this information?

$$\frac{\text{total beans}}{\text{total seeds}} + \frac{\text{total corn}}{\text{total seeds}}$$

If we count all of the seeds, we get the total that is in the jar. How else can we get a total? You can add the total beans and total peas?

How many other things can you think of that have parts we can express in $\frac{a}{b}$ form? Record the responses on the board.

Do you suppose we can find the rational numbers in nature?

What can we collect or count to show us rational numbers?

Suggest the students think of things to count that would show rational numbers.

Second Day: (30 minutes)

1. Have the students give their suggestions as the teacher records them on the board. Through class discussion, bring out how these things would show fractional parts; or, if not, why not.

2. Suggest leaves to the class if they do not mention them. How could we use leaves to show fractional parts?

FIELD TRIP:

Go to a wooded area containing various types of trees and collect sizes, shapes and colors of leaves in plastic bags.

FOLLOW UP:

A. 1. Measure the length of all leaves.
   2. Find the range of length of the leaves.
   3. Divide range into categories. If the range were 5-20 mm., dividing it into categories of 2 mm. would give you 8 categories; dividing it into categories of 5 mm. would give you 3 categories, etc.
   4. Name the number of leaves whose length fits each category, expressing it as a rational number.
   5. If 100 leaves are collected and 35 of them fit the first category, this is shown as 35/100. The total of these categories should, of course, equal the total collected. Do they?

B. Using leaves that were collected, sort them into piles according to color. Then have the children express these piles in fractional parts. Do all these fractional parts equal the total collected?

$$\frac{\text{red leaves}}{\text{total leaves}} + \frac{\text{brown}}{\text{T. L.}} + \frac{\text{yellow}}{\text{T. L.}} + \frac{\text{green}}{\text{T. L.}} = \frac{\text{all leaves}}{\text{total collected}}$$

FIELD TRIP:

Pick an area that is safe and contains litter. Collect the litter. This can be on a small scale where boxes are used or on a large scale using a pick-up truck.

FOLLOW UP:

A. Sort the litter into categories and use fractions to express the pieces of litter found.

$$\frac{\text{Number of cans}}{\text{Total collected}} \qquad \frac{\text{Number of bottles}}{\text{T.C.}} \qquad \frac{\text{Number of papers}}{\text{T.C.}}$$

These can be further broken down and expressed as fractions.

$$\frac{\text{new}}{\text{total cans}} \qquad \frac{\text{rusted}}{\text{T.C.}} \qquad \frac{\text{plastic}}{\text{T.C.}} \qquad \frac{\text{glass}}{\text{T.C.}}$$

$$\frac{\text{beverage}}{\text{total cans}} \qquad \frac{\text{food}}{\text{T.C.}} \qquad \frac{\text{other}}{\text{T.C.}}$$

$$\frac{\text{half gallon}}{\text{total plastic bottles}} \qquad \frac{\text{pint}}{\text{TPB}} \qquad \frac{\text{quart}}{\text{TPB}}$$

$$\frac{\text{white}}{\text{total glass bottles}} \qquad \frac{\text{brown}}{\text{TGB}} \qquad \frac{\text{green}}{\text{TGB}}$$

B. Using scales, the litter of a particular category (such as bottles) may be weighed for a total, then the breakdown (green, brown, white) may be weighed separately and the results recorded in fractions.

FIELD TRIP:

Go to a rocky area such as a beach or gravel pile. The playground would also work well. An amount of gravel could be brought to school to use in this activity also.

A. By count:

1. Measure off an area about one foot square (more or less, according to the depth of the gravel) for each group of children, or give them a container of gravel.

2. Distribute a set of sieves with each layer numbered, a container large enough to use the sieve over (plastic gallon ice cream containers, for example) and some newspaper. Newspapers could be used instead of containers, also.

3. Pour gravel on the paper, then pour it over each sieve and shake down the smaller rocks.

4. The students will count the rocks remaining in each sieve to use as a numerator for their fractions:

   Sieve #1 = Sieve #2 = , etc.

5. When each sieve has been used and the rocks on each one have been counted in each case, ask: "How could this information be put in a/b form?" (They need to total all the rocks counted for a denominator).

   For step one, the teacher could ask the students to collect a given number of rocks, 50 for example, choosing various sizes. Then have them sieve their collections and state their findings in a/b form. This way is more controlled. Perhaps a group of above average students could do the first method while those students having difficulties could use the collection method.

B. By Weight

1. Give an amount of gravel to each group, as 100 gm, and a set of sieves.

2. Shake down the smaller rocks and weigh the rocks remaining on the sieves and express each in a/b form.

$$\frac{\text{gram weight of rocks on sieve \#1}}{\text{total weight of rocks}} \qquad \frac{\text{gram weight of rocks on sieve \#2}}{\text{total weight of rocks}}$$

This activity would work well with the rock collecting activity in geology.

POST ACTIVITY:

1. Discuss and summarize the results of each field trip putting the results on the board so that each group can explain what they did, why they made the fractional numbers they did, and what stands for those numbers.

2. Suggest that groups of students think of some activities in the classroom that they can do showing use of fractional parts.

   For example:

3. Have the students place their pencils in a three pound coffee can. What is the total count of the pencils? Express number of red pencils in a/b form, yellow ones, white ones, etc. Check to see that the total of each color adds up to the total number of pencils.

4. The students can then be asked to write a story problem, using fractional numbers. The best ones could be saved with this activity to use as examples another year.

BEST COPY AVAILABLE

JOURNEY THROUGH A FLOWERING PLANT

Written by the Fourth Grade Workshop participants, September, 1972, Workshop, Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, South Dakota. 57016

Grade Level - 4th

Best time of year - Fall, Spring

OBJECTIVES:

1. To introduce the students to a study of plant parts.
2. To show students that plants, just as animals, are structurally different.

MATERIALS:

Paper bags
Hand lens
Dissecting microscopes
Mounting paper
Slides
Glue
Felt pens
Reference books
Hand spades
A large diagram of plant parts

BACKGROUND:

Plants are a very important part of our environment. They provide food for us directly from crops we grow and harvest. They are also a part of the food chain for animals that we use for food.

The Fourth Grade curriculum covers plants and an outdoor activity can be worked very easily into your curriculum.

PRE-ACTIVITY:

1. What are plants?
2. Where do they grow?
3. How do they move around?
4. What different parts do plants have?
5. What good are plants to us?
6. What parts of a plant do we eat?
7. Where do plants get their food?
8. Do plants manufacture food?
9. Any other questions you may care to ask.
10. Let's collect several different types of plants and see how many different parts they have.

FIELD TRIP:

This field trip can usually be accomplished within walking distance of the school yard. An area where there is a good variety of plants is best because the students will soon find that some plants look much different than others. Encourage them to find a different type than the one their neighbor is collecting. It is a good idea to have hand spades available so the students can bring the entire plant back.

POST-ACTIVITY:

Bring the plants back into the classroom. Each child, or possibly each pair, should have access to a hand lens, a scalpel or a single edged razor blade, drawing paper and pencils, and a large diagram of plant parts so the students know what they are looking for. Each student should be able to locate various sections of the plant.

Those students who picked plants with flowers can attempt to locate all the flower parts.

VOCABULARY AND LANGUAGE ARTS FOLLOW UP TO WHAT LIVES IN A SHELTERBELT

Vocabulary to cover:

1. Dependency
2. Shelterbelt
3. Seasonal change
4. Community
5. Ecology
6. Effect
7. Deciduous

After the field trip is over and the lists of plants, mammals, insects, birds, and other animals are given, have the students write a story about their activity from the standpoint of one of the plants or animals. Before this is written, the seven words listed above should be covered. These words should be included in the story which they write. Now that they have some understanding of these words, tell them to pick one of the animals or plants and write a story: e.g., a bee - I am a bee, I live in the shelterbelt at the Wetlands, etc. Tell them that the story should show the relationships between themselves and the rest of the community.

TOMMY TREE

Hi! My name is Tommy Tree. I live in the shelterbelt at the Madison Wetlands. Last week the 6th grade class from Washington Grade School took a trip to the shelterbelt I live in to study the ecology of the shelterbelt. They found many different plant and animal communities living in the shelterbelt.

I like living in the shelterbelt. Some trees are not so lucky. They live all alone, or else they are planted in rows where they all look alike. I happen to be a box elder tree. My neighbor is an elm tree. There are cedar trees and cottonwood trees living in this shelterbelt. I am happy about this because this brings different types of animals to our shelterbelt. You see, some animals and plants have a dependency on each other. If you have a large variety of plants, you will probably have a large variety of animals and insects, also. This makes things very interesting for me, and for boys and girls who come to visit us.

I guess I'll tell you more about myself now. As I said, I am a box elder tree. I have many interesting visitors each year. I have a family of squirrels living in my branches. I also have a family of robins and blackbirds each year. Sometimes insects visit me also. I don't always enjoy this. Some insects just visit me while others live with me. I have a spider living on me. He feeds on some of the insects which visit me. Some insects bore holes in my bark and then lay eggs. When the baby insects hatch out, they crawl under the bark. This causes some damage to me. I enjoy having the woodpecker come and drill holes in my bark to get the insects. Although it looks like he harms me, most of the time he helps me.

I have lichens living on my bark. They don't seem to have any effect on me. I also have some shelf fungus growing on me. They don't seem to live very long though.

I provide a lot of shade in the summertime. This helps out a lot of plants and animals. I also provide wind protection for many plants and animals, including man. When fall comes, there is a seasonal change in our shelterbelt. Trees like me lose all our leaves. Scientists have a term for us - it is called deciduous. Other trees, such as cedar trees stay green all year 'round.

Some classes are lucky and they get to see me in the fall, winter, and spring. I change a lot from season to season. So do the plants and animals. Almost all the plants and animals are here all year 'round, but sometimes they are easier to find than at other times. I hope your class gets to visit me several times so you can see what I'm talking about.

FELIX THE FOX

Hi! My name is Felix the Fox. I live in the Madison Wetlands area. This is a very good place to live. Lots of other animals live here. The reason they live here is that there are lots of different kinds of plants around for them to eat on and to hide in. Winter has come to my home. Now I have to be very careful because it is easier for people to see me. All the fresh snow around makes it easy to find my tracks. Last week a group of students from Lincoln came out to visit the Wetland area. They went into the shelterbelt at the Wetlands. I saw them coming so I ran and hid. They found my tracks but they didn't see me. The shelterbelt is a very good place for me to hunt. There are lots of mice, rabbits and squirrels there for me to eat. If I didn't help control their population, they would become too thick and they would damage the shelterbelt. They might also starve to death because there wouldn't be enough to eat. That shows you that I am an important part of the ecology of the shelterbelt community. All plants and animals have a dependency on each other. If you were lucky enough to visit the shelterbelt earlier in the fall and again when the snow comes, you would notice a big change in the Wetlands area and in the shelterbelt. The big box elder tree with the squirrel nest in it has lost all its leaves. I overheard one of the Wetlands Managers saying that trees that lose all their leaves like that are called deciduous trees. They said that there is a seasonal change in all of the plants and animals in the Wetlands area. Some of the animals I used to hunt are not around now. They must be hibernating. Next spring they will come out again. The cold weather has had a effect on me, also. My fur is a lot thicker and longer now so I won't freeze in the cold weather. Well, I guess I'd better start hunting again. I have to hold up my part of the community by controlling some of the small mammal populations. If you come to visit, I'll probably see you, but you may not see me.

OSCAR THE OWL

Hi! I'm Oscar the Owl. I live in the shelterbelt at the Madison Wetlands area. I have a mate that lives here, also. Her name is Othellia. We like living in the shelterbelt because there is lots of cover there. There are also lots of small mammals for us to hunt. We play almost the same part as the fox in the ecology of the Wetlands community. We catch mainly the old or sick creatures. That way we help the small mammal population, also. They may not think so but we really do. We nested in a big cottonwood tree last summer. That was a good place to nest because it was high off the ground and there were a lot of leaves for cover. When winter came, there was a big seasonal change in the Wetlands area. Now the leaves are gone from the deciduous trees. This is very important to the shelterbelt community because the leaves provide organic material for the soil. They also provide food for the microorganisms in the soil. The microorganisms provide organic material for the plants that are growing in the shelterbelt. The plants provide food for the small mammals and they provide food for us. Well, I guess I'd better start hunting again.

As you can see, there is a dependency among all the plants and animals in the shelterbelt. When we die, our bodies will decompose and we will become organic material for the soil. Our effect on the community is really very good, but some people don't understand that and they don't like us. That's why we fly away whenever you come to see us. If you are very quiet, you may get a chance to see us when you come to visit.

BILLY THE BEETLE

Hi! I'm Billy the Beetle. I live in the rubble and leaves on the floor of the shelterbelt at the Madison Wetlands area. You probably think I don't have much effect on the ecology of the shelterbelt community. However, I'm really very important, also. I feed on some of the micro-organisms in the soil. If I weren't there, these organisms would become too abundant and they would cause themselves and the community a lot of damage. Some of my cousins are important because they help break down organic matter such as dead animals and plants. We also provide food for small mammals. You see, we would become too abundant if something didn't control our population. We are dependent on mice and shrews to control our population size. We also depend on seasonal changes in the shelterbelt. The deciduous trees lose their leaves. These leaves form a blanket over the forest floor. This helps us because we can work under the blanket. It gives us protection from the weather and from the animals which hunt us. It is important that some of us survive to build up the population again next spring. You won't see me much this winter because of the leaf and snow cover on the ground. However, when you come to visit us next spring, I'll be around if you know where to look.

BEST COPY AVAILABLE

The following are word games to be used as pre-activities for plant and animal communities or "What Lives In a Shelterbelt?" It is suggested that they work on these at their leisure and with reference books available.

They are to make words from the letters. The letter can be used if they are in the proper order and each consecutive letter touches the preceding letter, either on the sides or the corners.

e.g.

WATER ANIMALS

A	L	S	N	H
C	N	I	C	P
Y	A	E	U	A
C	E	S	D	B
L	O	P	G	U

ANSWERS:

DAPHNIA

			N	H
		I		P
	A			A
			D	

SCUD

		S		
			C	
			U	
			D	

CYCLOPS

C				
Y				
C		S		
L	O	P		

SNAIL

	L	S		
	N	I		
	A			

BUGS

		S		B
			G	U

LEECH

				H
			C	
		E		
	E			
L				

FIND 10 OR MORE HIDDEN TREES:

A	K	O	D	E
E	P	A	L	C
C	P	P	I	A
U	A	S	L	U
M	L	H	M	E

Maple
Apple
Elm
Ash
Cedar
Palm
Plum
Lilac
Spruce
Oak

FIND 10 OR MORE HIDDEN MAMMALS THAT ARE CONSIDERED WILD. HOW MANY ARE FROM SOUTH DAKOTA NOW? HOW MANY LIVED IN SOUTH DAKOTA?

M	X	K	O	W
V	O	L	E	D
O	F	U	E	L
S	E	P	S	A
L	A	B	W	E

Mouse
Moose
Mole
Vole
Seal
Wolf
Deer
Bear
Elk
Fox
Weasel
Ox

FIND 10 OR MORE HIDDEN BIRDS:

D	E	R	S	N
N	I	F	I	C
C	E	B	H	P
R	O	A	G	E
K	W	L	L	U

Owl
Hawk
Crow
Robin
Wren
Finch
Eagle
Gull
Ibis
Snipe
Eider

FIND 10 OR MORE HIDDEN INSECTS:

G	R	I	H	E
U	B	D	S	P
A	E	U	W	A
L	O	E	N	Z
F	Y	T	L	E

Flea
Fly
Bee
Bug
Grub
Louse
Ant
Beetle
Wasp
Aphid

A WILD ALGEBRA PROBLEM

Counting Rabbit Potty Piles

Written by Major L. Boddicker, Ph.D., Director, Interlakes Environmental and Outdoor Education Program, Chester Area Schools No. 34, Chester, South Dakota 57016. Phone: 489-2416.

GRADE LEVEL: 6-8

BEST TIME OF YEAR: Winter with heavy snow cover. Can be adapted for use at other times of the year.

EQUIPMENT:

4 to 8 cans of spray paint
(yellow, orange or red would be best.)

OBJECTIVES:

1. To demonstrate that the concepts of algebretic manipulations are relevant tools for life.
2. To introduce and demonstrate the concepts of sampling for determining wildlife populations.

BACKGROUND:

This technique is modified from a deer population estimate procedure used in many western states to find out how many deer are present on a given area of land. It is algebra in the real sense as a functional field tool to give you an answer to use in resource management. It's crazy, people may think you are nuts. But it is the kind of activity that helps motivate kids and make math mean more to them.

PRE-ACTIVITY:

Introduce algebretic formula $X = \frac{y}{a \cdot b}$ use it in the normal classroom procedure.
Practice it with word problems.
Discuss the formula:
- What is it?
- What is it for?
- What do the letters stand for?
- Do you ever use it? How? When? Where?
- Why study it?
- Suggest a field trip to use it. Where? How? To do what? Count rabbit potty piles to find out how many rabbits are on a given plot of land.

FIELD TRIP:

1. Locate a large wildlife area with lots of cottontail rabbit signs. After a snow when tracks and pellets are highly visible, take a field trip to the area. Have the students comb the cover area. Two jobs; first, locate and spray paint all the potty piles; second, count all the rabbits they see.

Then wait 2-3-4 days, return to the area. Two jobs: first, count all the unsprayed piles; second, count all the rabbits the kids see.

FOLLOW UP:

Develop the formula.
How many rabbits? What letter in the formula represents the rabbits? X. O.K. What letter does y represent? Why? Y represents the new potty piles, the unsprayed ones.

Do you think X = y? Rabbits = new potty piles? Why not?
I'll tell you why. Do you think rabbits just go every other day?
We have 2 days of potty piles. Y has to be made smaller doesn't it?
What do you do with the 2 days? Subtract? X = y - 2 days? No.

Divide - $X = \frac{y}{2}$ = Try it?

$$X = \# \text{ rabbits} = \frac{\# \text{ potty piles}}{2 \text{ days} \cdot 3 \text{ times/day}} = \text{answer.}$$

Is this right? How many rabbits did you see? Check the data. Do we have a close estimate? No, still too many rabbits? Why? Suppose they potty more than once a day? How many times? 3 times, some wildlife student watched several rabbits and took an average. Where does the 3 go? Right.

$$\# \text{ rabbits} = \frac{\# \text{ new piles}}{2 \text{ days} \cdot 3 \text{ times/day}}$$

$$X = \frac{y}{a \cdot b}$$

O.K., calculate X = # rabbits

y =
a = 2 days
b = 3 times/day

O.K., now solve for y using # rabbits seen as X.

O.K., now solve for b using # rabbits seen and # new piles to see if the wildlife student was right.

Review algebra and its purpose. Tool to solve problems. This was just a fun problem. Real ones are plugged in just as easily.

ROLLIN' YER OWN

Writing a Teaching Unit in Outdoor Education

Written by Major L. Boddicker, Ph.D., Director, Interlakes Environmental and Outdoor Education Program, Chester Area Schools No. 34, Chester, South Dakota 57016.

The process of environmental education and outdoor studies in not a difficult one to master. In fact, it is easier and less complicated than some of the classroom procedures you are using. The difficult part of environmental education is confronting unknowns while directing 15-30 children. This unit is written to help you write outdoor-environmental education study units around your specific needs and interests. Writing these is the tough part; doing them is also tough but is more enjoyable. If you have planned what to do, where to go, who you need to help you, these trips will succeed. You and your students win.

TITLE: Make it short, simple and catchy.

CREDITS: Write your name on this unit; it's yours to trade, sell or use. It may not be better than anyone else's, but if you are using it, it is just as good.

GRADE LEVEL: Your grade level is fine. Perhaps your friends teaching K-8 would enjoy using it. If the unit is suitable for use by other grades, list them.

BEST TIME OF YEAR: Recommend when the best time of year is for completing the outdoor activity. This seems obvious, but, we have found teachers studying bird migrations in January. That's not the time to do it. Try October or April. It is difficult to study insects in February, it's easy in September and May. Some units and activities can be done anytime. But it's not practical to study snow in June.

OBJECTIVES: Objectives - plain or behavioral are fine if used as a guide and held in perspective. They are poor if they become lids or limits to growth. We have seen them abused, we have also seen excellent results with them. We leave them as general statements for maximum flexibility. If these are written too stringently they tend to discourage, if too liberal they become a poor motivating factor. They change with the class you have and the level you teach. If you write them, write them so you can use them to measure progress in the kids. Example: Given the completion of the outdoor study unit, "Bird Nests and Plants", 90% of the students will demonstrate the correct identification of doves, grackles, and robins by their songs, flight, shape, color, egg shape and color, and nests on written and oral examinations.

MATERIALS: These are the tools you need to complete the project. Some trips you need no tools. The fewer tools you need, the better. Some of the tools are obvious, some you will find you need after you go out the first time. Research your project, chances are someone else has tried it, or something similar, and can give you a list of equipment. Trial and error are good teachers. Beg, make or borrow equipment. Most communities have equipment to handle almost anything you need. If not, try the junior high or high school. If they won't loan it to you, call the superintendent or a school board member. A lot of equipment in high and junior high science classes sits idle about 80+% of the time and the parents of your 4th grade kids helped pay for it, they should be able to use it.

INTRODUCTION: This section may not be useful for you, but may be useful to someone else who would try your method. We also call this the background section. Its purpose is to clue people in on what you are doing; where, when and why you are doing it. It serves as a review section should you wish to do this again the next year. In it we try to include a discussion of what to do, where to go and how to find things when you get there. We often include notes of interest and tips for success.

PRE-ACTIVITY: An environmental education-outdoor study unit should contain a pre-activity in which you introduce the study, explain the project, who does what. Plan for weather, use of equipment, determine when and where the kids will go. Include the children in the planning. It helps to bolster their egos and gives them some practice at making decisions. It is a time for you to humanize and individualize the work. Jobs should be identified and either assigned by you or the students. Students frequently assign jobs initially according to personality and physical ability, but, ultimately, end up involved in each job before the activity is over.

The pre-activity is the time to motivate the kids. Be excited about what will be done. Ask them questions to pretest them and to stimulate their interest.

We like to write a pre-test into the pre-activity so we can measure what the students learn. This comes in handy if administrators and parents give you static about the effectiveness of outdoor studies. Showing cognitive, affective and psychomotor growth using the outdoor studies is a cinch.

This is the time to determine what the kids should bring and wear. It is also the time to set the limits on the behavior. Explain to the kids clearly what you expect of them and what you expect them to perform. Pass out and practice with equipment and provide data sheets if they are necessary. This part of the project need not be long or complicated.

BEST COPY AVAILABLE

FIELD TRIP: Perhaps the most difficult part of the environmental education process is the field trip. It is also the most essential part of it. To take a successful field trip we have found that the following steps are essential

a. Planning - Be sure transportation has been arranged.
- Be sure the site you have selected contains the things you wish to study. Check it out first.
- Make an equipment checklist, don't leave essential equipment behind.
- Be sure that resource people, mothers, bus drivers, and anyone else who is going along to assist you is aware of the project and activities; include them.
- Be sure the kids have jobs to do to make every minute useful; don't just have them stand and watch.

b. The trip - It helps to have checked the area and dry run the project before you try it with the kids.
- It helps to have other adults along if they have been properly instructed.
- Kids will be a little unruly the first time or two, but don't let it discourage you. Don't mistake discipline problems with enthusiasm.

These are the types of things that can be written into the field trip section. We also like to include tips on where to go and how to find things when you get there. For example: in a unit with water biology, we list places where trips can be taken which are safe and alive with water creatures. Study site for Madison schools: Silver Creek, 2 miles south, 2 miles east, 1/2 mile south of Madison on the Madison Wetlands Area. Any place along the creek contains a vast supply of insects, water life and minnows. Look under and on rocks, vegetation along the edge and bottom for snails, scuds, leeches and insects. Protozoa, rotifers, etc., are abundant in and on the vegetation bottom samples. It is helpful to note in this section the successes and failures after the trip is taken and ways to improve it for next year or the next trip.

POST ACTIVITY (FOLLOW-UP):

This part of an activity is the frosting on the cake. This is where the information collected on the trip is recorded and analyzed. We don't mean with a computer; we mean with reports, posters, bulletin boards, games, art work, etc. This is where the questions asked in the pre-activity are repeated and the answers discussed. This is where the rewards are distributed.

Each student should be praised for his contribution to the project. If he has loused up, his peers will usually let him know that he has failed them. This is the time for a post test to close the chapter. This is where old bird nests are carefully taken apart, the construction and materials described and listed; the insects studied and dissected; the microscopes used to identify pollen and protozoa; the arrowheads and pottery chips identified and mounted. It is where reports are written which include the information collected.

The follow-ups - post activities vary in length of time with the objectives you have determined to be important. It may consist of decorating a tumbleweed Christmas tree with milkweed pods and cocklebur dolls as an art project; or graphing the number of fairy shrimp in your aquarium against time. This part of any outdoor study is exceptionally important, it is necessary that kids be brought to realize the importance of analyzing the results of what they have done, comparing techniques and results and reflecting on ways to do it more effectively. This is the problem solving process, hands on sensory experience; humanized, individualized instruction all tied up in one program. You write it, you organize and do it. Be proud of it. If you use this approach, we are convinced you will improve your teaching program and enrich education for yourself and your students. Don't get upset about not knowing all the answers, or being wrong. I learn something new on each trip out with teachers and kids.

It takes commitment and resolve to tackle an environmental outdoor education program. It takes sacrifice. Heaven is full of those types of teachers.

ALGAE: GOOD AND BAD

Written by Ruby Kuchenbecker, Madison, South Dakota. July, 1971. Revised by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Edcuation Program, Chester Area Schools, Chester, South Dakota 57016. Phone:489-2416. Revised September, 1972.

Grade Level - 4

Best time of year - Spring, Summer, Fall

OBJECTIVES:

1. To learn what algae is.
2. To find out what makes algae grow.
3. To learn in what ways algae is harmful.
4. To learn in what ways algae can be useful.

BACKGROUND:

Algae is a very important part of the ecology of any aquatic habitat. It is extremely important for oxygen production, utilization of carbon dioxide, and as a link in the food chain.

Algae can also become a nuisance in areas where its abundance is not enjoyed. We are all familiar with lakes which have had extreme algae bloom. The results of a bloom of this type is a water source which is offensive to the eyes, ears, taste and touch.

Students need to learn about what algae is, where it grows, and what it needs to grow, and the fact that there are quite a number of different forms of algae.

All lakes have a natural algae bloom when the water reaches 4° C in the spring and fall. When we increase the amount of nutrients available, algae blooms may last all summer. Most of our water samples contain algae, They are very small and a microscope is essential to study the various types.

MATERIALS:

Jars with lids
Microscopes with 10X and 43X objectives

PRE-ACTIVITY:

The following questions could be asked prior to the field trip:

1. What is algae? What does it look like?
2. Who or what uses algae?
3. Is algae important to us? How does algae affect our lives?
4. What is an algae bloom?
5. When do algae blooms occur naturally?
6. How do we affect algae blooms?
7. How can we regulate algae growth?

FIELD TRIP:

The field trip should be taken to an area where several water sources can be sampled. Streams, lakes, rivers, or sloughs may contain different types of algae. The class should attempt to collect as many different algae types as possible. The class can be broken down into groups or pairs depending on how many areas you wish to sample. When the samples are brought back to the classroom, they should be stored in a cool, sunny place but not in the direct sunlight.

POST-ACTIVITY:

Microscopes should be available in the classroom for this post-activity. A good reference book for this is Algae in Water Supplies. There are several types of algae in aquatic habitats. The majority that you will find will be green algae but there are also blue green algae and diatoms present.

A data sheet should be kept. The following is an example of how to set up the sheet. You should adapt this to whatever your needs are.

SOURCE	COLOR OF WATER	SMELL	TYPE OF ALGAE	ANIMALS PRESENT
TAP				
SLOUGH				
LAGOON				
SILVER CREEK				
LAKE MADISON				

If the students aren't already aware of the life contained in a drop of water, this activity should soon enlighten them. If you wish to experiment further, add nutrients to some of the samples and see what develops in the jars. Check the odor periodically to see if it changes. The odor may become unbearable in some of the jars and they may have to be removed from the classroom. It may also be interesting to compare the color of the water as well as the effect that the nutrients have on the animal life.

WRITING SCIENTIFIC REPORTS

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. Phone: 489-2416

Grade Level - 3-8

Best time of year - anytime - this makes a good follow-up acitvity for many of the other science oriented units.

OBJECTIVES:

1. To introduce or expand on the ideas of writing clear, concise reports of data, observations and experiences collected on outdoor trips.
2. To provide some concepts of process and continuity to their studies.
3. To practice in paragraph and sentence construction, vocabulary and spelling, practice in using resource books and communicating facts and ideas.

BACKGROUND:

We communicate in a large variety of ways depending on the message that we hope to get across and the audience we are addressing. Shakespeare used a set of writing and verbal communications best suited to his message. Comic books and the Weekly Reader do the same thing. Scientific writing has some special characteristics and a widely accepted form which centers on identifying a problem, the procedure used in solving it, the collection of information, a discussion and a presentation of the information gathered, and conclusions drawn about the problem based on the information collected. You have been using this format modified more or less with these outdoor studies. It is a very efficient way of approaching problem solving and teaching.

The format of a scientific paper is generally as follows:

Title
Abstract - short review of the results and conclusions
Introduction - state the problem and what is known and unknown about it
Materials and Methods- list of equipment and how to use it. Where you went and when. Exactly how you did the experiment and used the equipment to get your results.
Results and discussion - Put in the information you gathered; charts, tables, pictures, math calculations and discuss them and what you found.
Conclusions and Summary - Summarize your findings and state in a few words the conclusions you made about the problem you set out to solve.

PRE-ACTIVITY:

Let's write a scientific paper to publish in a science magazine. Let's pick out an outdoor study activity and conduct it very carefully and then write up the results and make a science magazine for our class.

Select an outdoor study activity. Any one of them will work.

FIELD TRIP:

Proceed with the study activity as you usually do with the class. Encourage them to make very careful records and observations.

FOLLOW-UP:

Encourage each student to write up a scientific report using the information collected on the field trip or during the normal follow-up activity. Make up a science notebook, or an environmental education notebbok to add to after each experiment or environmental education activity. If the students master this writing format and study procedure, it is very helpful in many things they will do later in school and as adults.

If you need assistance with the activity, call us.

MATHEMATICAL MEASUREMENTS AND CALCULATIONS

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416.
(Revised 2-3-72)

Grade Level - 4-6

Best time of year - anytime

OBJECTIVES:

1. To give the students the opportunity to use mathematical formulas in a practical, problem solving situation.
2. To provide students with problem solving experiences using equipment, materials and places with which the students are familiar.
3. To provide students with a dimension and perspective in using math -- using real things to match the numbers and formulas they are already using.

BACKGROUND:

These exercises have been developed as practice units for math concepts normally covered during grades 4-6. They are designed to provide students with a practical, problem solving format to help them fix the math concepts in their minds. (putting the abstract knowledge into concrete practices)

Sheets are attached indicating or suggesting things to count, weigh and measure. Use whatever items are the most easily available and fit them into your present program. Students will provide the numbers from data they have collected.

PRE-ACTIVITY:

This part of the project is the normal math routine. Review the formulas with the students for such things as finding an area of a square, or the volume of a cube, addition, subtraction, division, multiplication, averaging, calculating, and volume of a rectangle, triangle, etc., percentages, area of a rectangle, rhombus, circle, box, cylinder, cone and triangle.

Let's find various shapes and/or structures; measure them, return to the classroom and calculate volumes and areas by using the measurements we take on the field trip.

MATERIALS:

- paper sacks
- 15 foot bamboo pole
- yardsticks
- 100 foot twine with markings at every foot or a ruler and a string
- a scale that measures in grams

FIELD TRIP SUGGESTIONS:

Fourth Grade

Take the students out for a short trip and pick up as many leaves as they can find in 1-5 minutes. Return to the classroom.

Materials needed are paper bags for each student and an accurate scale.

Have each student first weigh their bag and then the leaves they collected. They will need to subtract the weight of the paper bag to get the amount of weight for the leaves.

Next, sort the leaves into live and dead, yellow and green, insect holes or not, etc., and record your findings on the attached data sheet. Do the same for the opposite category of leaves. Have the students post their weights on the board and calculate their answers in order to fill in the data sheets attached.

DATA SHEET - FOURTH GRADE

NAME ____________________

WEIGHT OF BAG AND LEAVES ________

WEIGHT OF BAG ________

WEIGHT OF LEAVES
(obtained by subtraction) ________

WEIGHT OF DEAD LEAVES ________

WEIGHT OF LIVE LEAVES
(obtained by subtraction
from total leaf weight) ________

WEIGHT OF GREEN LEAVES ________

WEIGHT OF BROWN LEAVES ________

WEIGHT OF YELLOW LEAVES ________

WEIGHT OF RED LEAVES ________

TOTAL NUMBER OF LIVE LEAVES ________

TOTAL NUMBER OF DEAD LEAVES ________

TOTAL NUMBER OF GREEN LEAVES ________

TOTAL NUMBER OF BROWN LEAVES ________

TOTAL NUMBER OF YELLOW LEAVES ________

TOTAL NUMBER OF RED LEAVES ________

TOTAL NUMBER OF LEAVES ________

TOTAL WEIGHT OF LEAVES ________

TOTAL WEIGHT OF LEAVES IN YOUR ROW ________

TOTAL WEIGHT OF LEAVES IN YOUR CLASS ________

TOTAL GRAMS (28.35 grams = 1 oz.) ________

TOTAL POUNDS ________

CHECK LIST OF SHAPES FOUND IN LEAVES

_____CIRCLES

_____TRIANGLES

_____SQUARES

_____RECTANGLES

_____STRAIGHT LINES

_____OVALS

_____PENTAGONS

_____HEXAGONS

_____OCTAGONS

Fifth Grade

Each child should bring two ears of corn picked at random from a crib or field. Have the children close their eyes and pick up the first two ears they touch. Return to the classroom. If possible, have the students find out from their fathers what brand and variety the corn is.

MATHEMATICAL CALCULATIONS

1. Count the number of rows of kernels around the cob.

	Cob #1	Cob #2	Average
Rows	16	15	16

2. Count the kernels per row in five rows on each cob.

	Cob #1	Cob #2
Row 1	35 kernels	27 kernels
Row 2	34 kernels	22 kernels
Row 3	37 kernels	27 kernels
Row 4	34 kernels	29 kernels
Row 5	36 kernels	28 kernels
	176 total kernels	133 total kernels

3. Find the average.

$5\overline{)176}$ = 35 average kernels/row (cob #1)

$5\overline{)133}$ = 26 average kernels/row (cob #2)

4. Calculate the number of kernels per cob by multiplying the average number of rows X the average number of kernels which equals the number of kernels per cob.

(Average rows/cob) 16 X (Average kernels/row) 30 = 480 kernels/cob

5. Determine the number of ears per bushel by estimating, guessing or fill a bushel basket and count them. (approximately 50)

6. How many kernels per bushel. (The number of kernels per cob X the number of ears per bushel).

480 (Av. no. kernels/cob) X 50 (approx. no. cob/bushel = 24,000 kernels

7. How many bushels/acre? (Guess or estimate; approximately 55)

8. How many kernels/acre = kernels/bushel X bushel/acre.

24,000 X 55 = 1,320,000 kernels per acre

In this activity, it is a good place to break the activity off after the counting and calculating kernel and row numbers.

Send the kids home with their own corn and have them shell the ears at home and bring them (the cobs and kernels)back in separate containers; ear number 1 kernels and cob being separate from ear number 2 kernels and cob. Then, go into the weighing experiment.

	Cob #1	Cob #2	Difference	Average
1. Weight of ears	124.0 grams	83.0 grams	41.0 grams	103.5 grams
2. Weight of kernels	96.0 grams	63.0 grams	33.0 grams	79.5 grams
3. Weight of cob	28.0 grams	19.5 grams	8.5 grams	23.7 grams

4. What percentage of ear number 1 is cob? (Divide the weight of the cob by the weight of the ear).

```
                      .225 or 22.5% of ear no. 1 is cob
124 (wt. of ear) / 28.000 weight of cob
                   24 8XX
                    3 20
                    2 48
                      720
                      720
                        0
```

5. What percentage of ear number 2 is cob?

```
                    12349 or 23.5% of ear no. 2 is cob
83 (wt. of ear) / 19.500 weight of cob
                  16 6XX
                   2 90
                   2 49
                     410
                     332
                      780
                      747
```

6. How many ears in the classroom? (44)

7. How many kernels in the classroom? 480 X 44 = 21,120

8. How many bushels in the classroom?

   If there are 44 ears in the classroom and it takes 55 ears to make a bushel; what part of 55 is 44?

9. How many grams of corn in the classroom?

   44 (no. of ears in the classroom) X 103.5 (average wt. of ears = 4,554

10. Now have the rows add the total corn ears weight:

Row 1-----------------------------------Total ____________________

Row 2-----------------------------------Total ____________________

Row 3-----------------------------------Total ____________________

Row 4-----------------------------------Total ____________________

Row 5-----------------------------------Total ____________________

11. Figure the total weight of all of the ears in the classroom by adding the previously figured totals per row.

12. How many grams of cob?

Row 1-----------------------------------Total ____________________

Row 2-----------------------------------Total ____________________

Row 3-----------------------------------Total ____________________

TOTAL WEIGHT IN CLASSROOM ____________________________

13. How many grams of kernels? (Repeat the above procedure). Figure the total for the entire class, also.

14. What is the average weight of cobs in each row?

15. What is the average weight of the kernels in all of the rows?

16. What is the average weight of the ears of corn in each row?

MAKING COMPARISONS

1. Which kind of corn variety is best?

2. Which kind had the highest percentage of kernels?

3. Which kind had the heaviest ears?

An ear of corn can be used to calculate the area of a rectangle, a circle, a triangle, the volume of a cone, cylinder, etc. It has width, heighth and weight.

Measure these characteristics and calculate the characteristics of an ear of corn.

DATA SHEET - FIFTH GRADE

COUNTING AND ESTIMATING

NAME ________________

	EAR #1	EAR #2
1. NUMBER OF ROWS OF KERNELS	____	____
2. NUMBER OF KERNELS PER ROW		
ROW 1--	____	____
ROW 2--	____	____
ROW 3--	____	____
ROW 4--	____	____
ROW 5--	____	____
3. TOTAL KERNELS IN ALL FIVE ROWS	____	____
4. AVERAGE NUMBER OF KERNELS/ROW	____	____
5. NUMBER OF KERNELS PER EAR	____	____
6. AVERAGE NUMBER OF KERNELS PER EAR PER BOTH EARS	____	____

WEIGHING

1. WEIGHT OF PLASTIC CUP ______

	EAR #1	EAR #2	DIFFERENCE	AVERAGE
2. WEIGHT OF EARS	____	____	______	______
3. WEIGHT OF KERNELS	____	____	______	______
4. WEIGHT OF COBS	____	____	______	______
5. TOTAL COB & KERNEL WEIGHT	____	____	______	______
6. TOTAL EAR WEIGHT	____	____	______	______
7. PERCENTAGE OF EAR THAT IS COB	____	____	______	______
8. PERCENTAGE OF EAR THAT IS KERNEL	____	____	______	______
9. HOW MANY GRAMS OF KERNELS IN THE CLASSROOM?	__________		X 22 =	______

DATA SHEET
SIXTH GRADE

NAME ____________________

	EAR #1	EAR #2
1. NUMBER OF ROWS OF KERNELS	______	______
2. NUMBER OF KERNELS PER ROW	______	______
ROW 1--	______	______
ROW 2--	______	______
ROW 3--	______	______
ROW 4--	______	______
ROW 5--	______	______
3. TOTAL KERNELS IN ALL FIVE ROWS	______	______
4. AVERAGE NUMBER OF KERNESL/ROW	______	______
5. NUMBER OF KERNELS PER EAR	______	______
6. AVERAGE NUMBER OF KERNELS PER EAR FOR BOTH EARS	______	______
7. NUMBER OF EARS/BUSHEL (ESTIMATE)	______	______
8. NUMBER OF KERNELS PER BUSHEL	______	______

9. NUMBER OF BUSHELS PER ACRE YOUR DAD PICKED ____________

10. NUMBER OF KERNELS PER ACRE ____________

WEIGHING

WEIGHT OF PLASTIC CUP __________

	EAR #1	EAR #2	DIFFERENCE	AVERAGE
WEIGHT OF KERNELS	______	______	______	______
WEIGHT OF EARS	______	______	______	______
WEIGHT OF COBS	______	______	______	______
PERCENTAGE OF EAR THAT IS KERNEL	______	______	______	______
PERCENTAGE OF EAR THAT IS COB	______	______	______	______

HOW MANY GRAMS OF KERNELS IN THE CLASSROOM ______________ X 22 = ________________

MATHEMATICAL CALCULATIONS

Sixth Grade

1. If one chicken eats ¼ ear of corn/day, how many chickens can you feed in a year if you have 100 acres of corn that yeilds 75 bushels an acre?

2. How many bushels were harvested? 75 bu./acre X 100 acres = 7,500 bu.

3. How many ears/bushel? (Approximately 50)

4. How many ears in 7,500 bushels? 7,500 X 50 = 375,000 ears

5. How many ¼ ears in 7,500 bushels? 375,000 X 4 = 1,500,000

6. If a chicken eats ¼ ear per day, how many chickens can be fed on that corn?

   365 days a ¼ ear/day/chicken. (Divide the no. of days into the number of ¼ ears)

   4,109.5 chickens
   365/ 1,500,000

7. How many ears/chicken? (One chicken eats 1 ear every four days, how many does it eat per year?

   91.25 ears per year
   4/ 365.000

****

1. If a steer converts six lbs. of corn into one lb. of meat, and the steer is gaining three lbs. a day, how many lbs. of corn are you feeding it?

   3 lb. X 6 lb. = 18 lb.

2. If you buy 200 steers which weigh 500 lbs. each, how much corn will you need to feed them until they weigh 1,000 lbs. each?

   167 days
   3 lbs. per day/ 500 lbs.

   167 days
   x18 lbs. of corn
   3,006 lb. of corn/steer will put 500 lbs. of weight on

   3,006 lbs of corn
   x200 steers
   621,200 lb. of corn for all 200 steers

3. How many bushels do you need to feed each steer?

   corn = 50 lb. per bushel

   60 bushels are needed for each steer
   50/ 3,006 no. of lbs. needed to put 500 lbs. of meat on each steer

4. How many bushels will it take to feed all 200 steers?

```
    200 steers
    x60 bushels
 12,000 total bushels of corn needed to put 500lbs. of meat on
        all two hundred steers.
```

5. How many acres of 75 bu. per acre corn is that?

```
        160 acres of corn
 75/ 12,000 total bushels needed
```

6. How much would it cost to feed those cattle if corn was 90¢/bushel?

```
 12,000 number of bushels needed
    x90cost per bushel (boughten or produced)
 10,800
```

7. How much is that per steer?

```
            54.00 cost per steer
 200/ 10,800.00
```

8. If your dad paid 30¢/lb. for the 200 steers @500 lb. per head, how much did they cost?

500 X 30 = $150.00 per steer

9. If he sells them for 35¢ per pound, how much will he make?

```
 $30,000 original cost for steers
 +10,800 cost of feed (corn only)
 $40,800 total expense

        1,000 lb. per head
          x35
      $350.00 per head

     $350.00 received/head
        x2 00 no. of head
    70,000.00 total amt. rec'd
```

10. If he borrowed the money at 8% interest, how much will he pay the bank?

```
 $40,800.00 amount borrowed
      x .08 interest rate
 $ 3,264.00 interest paid on amt. borrowed
```

11. How much money will he have left?

```
 $70,000.00 selling price        $29,200.00
 -40,800.00 expenses              -3,264.00 interest
 $29,200.00                      $25,936.00 profit
```

1. How many acres did your dad pick?

2. How many bushel of corn did he harvest?

3. How many cattle, hogs, sheep, chickens, etc. can be fed with that amount of corn for one year?

Take a trip to an operating farm in the neighborhood. Assign the students a check list of all data to collect. The measurements taken will be used later for calculations using formulas for determing area, volumes and percentages.

AREA CHECK LIST

		LENGTH	WIDTH	SHAPE
1. Feedlot		100 yd.	40 yd.	triangle
2. Feedbunk floor		20 ft.	3 ft.	rectangle
3. Barn floor		80 ft.	50 ft.	rectangle
4. Haymow floor		80 ft.	40 ft.	rectangle
5. Yard		120 yd.	60 yd.	rectangle
6. Yard		50 yd.	50 yd.	square
7. Garden		20 yd.	40 yd.	rectangle
8. Silo floor	radius	16 ft.		circle
9. Corn crib floor	radius	10 ft.		circle

VOLUME CHECK LIST

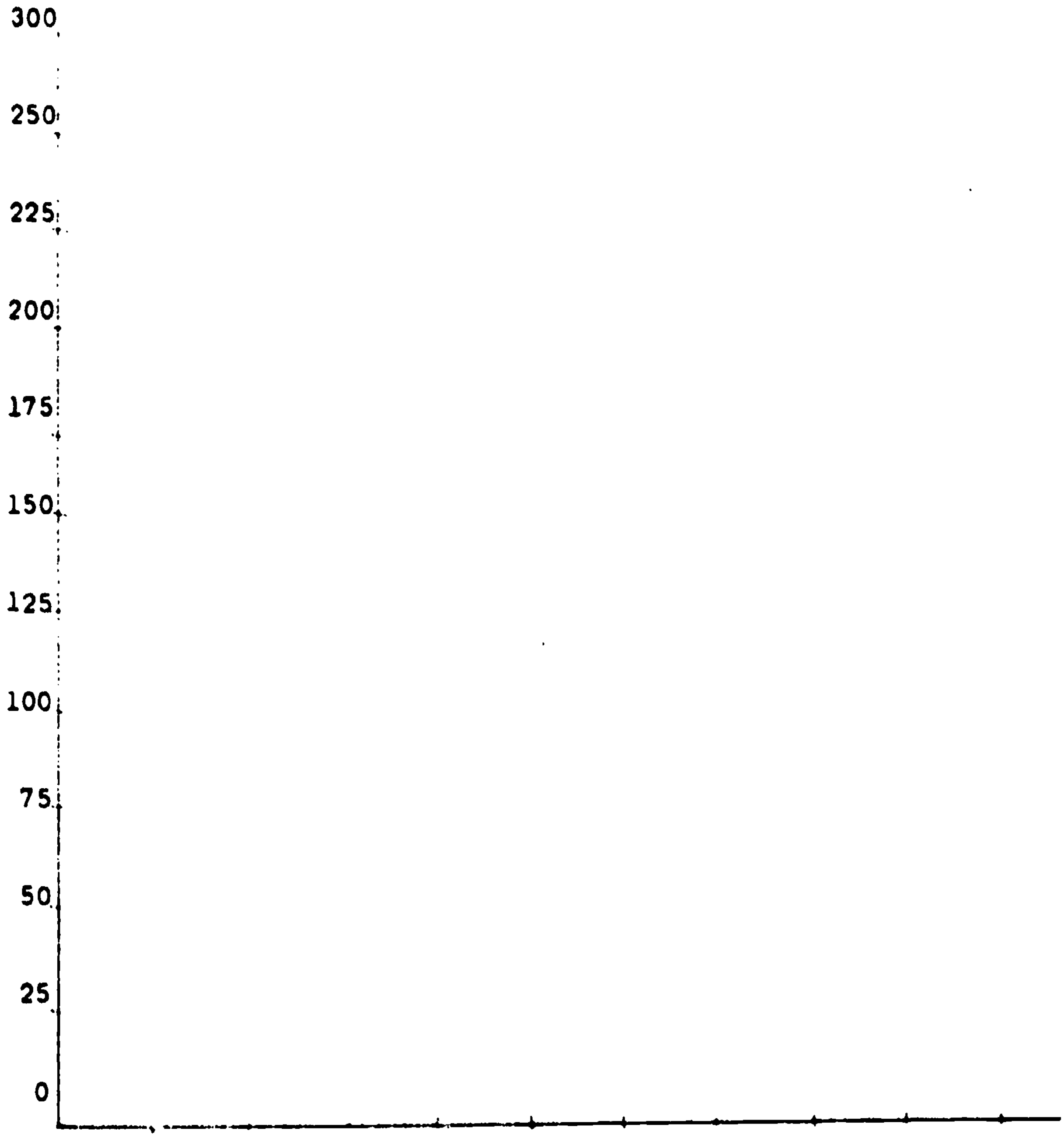
	LENGTH	WIDTH	HEIGHT	SHAPE
1. Feedbunk	20 ft.	4 ft.	6 in.	box
2. Wagon box				rectangle
3. Corn crib			radius 20 ft.	cylinder
4. Silo			radius 16 ft.	cylinder
5. Gas tank			radius 3 ft.	ylinder
6. Hayloft				rectangle
7. Cattle shed				rectangle
8. Water tank				
9. Dugout				
10. Barn				
11. Corn or sileage pile				

PERIMETER-CIRCUMFERENCE CHECK LIST

1. Tractor tires
2. Car tires
3. Axle
4. Measure perimeters of items previously listed

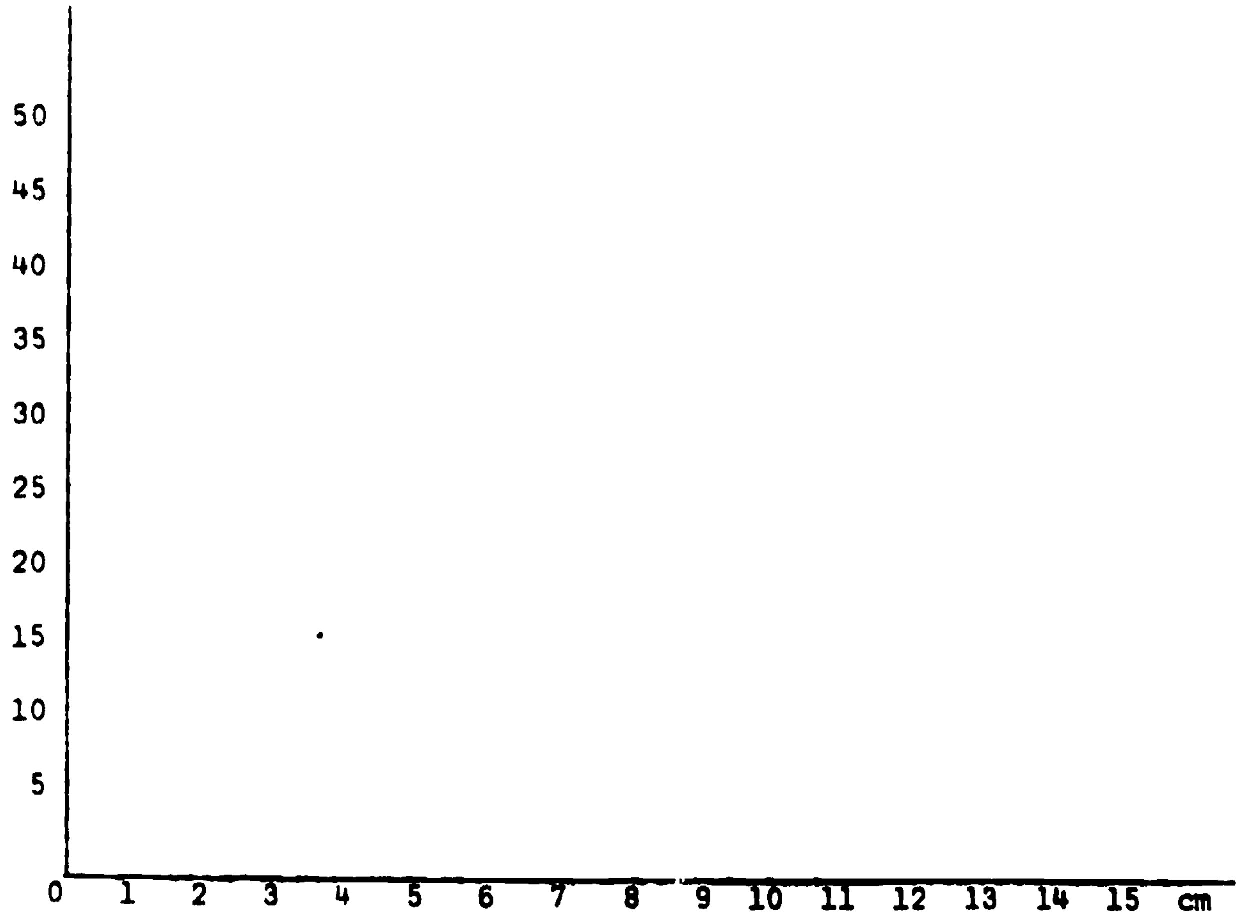
Make a scale drawing for items measured. Calculate hypotenuse to determine the amount of fencing needed to cut a square field diagonally in half.

DISTRIBUTION OF CORN EAR WEIGHT

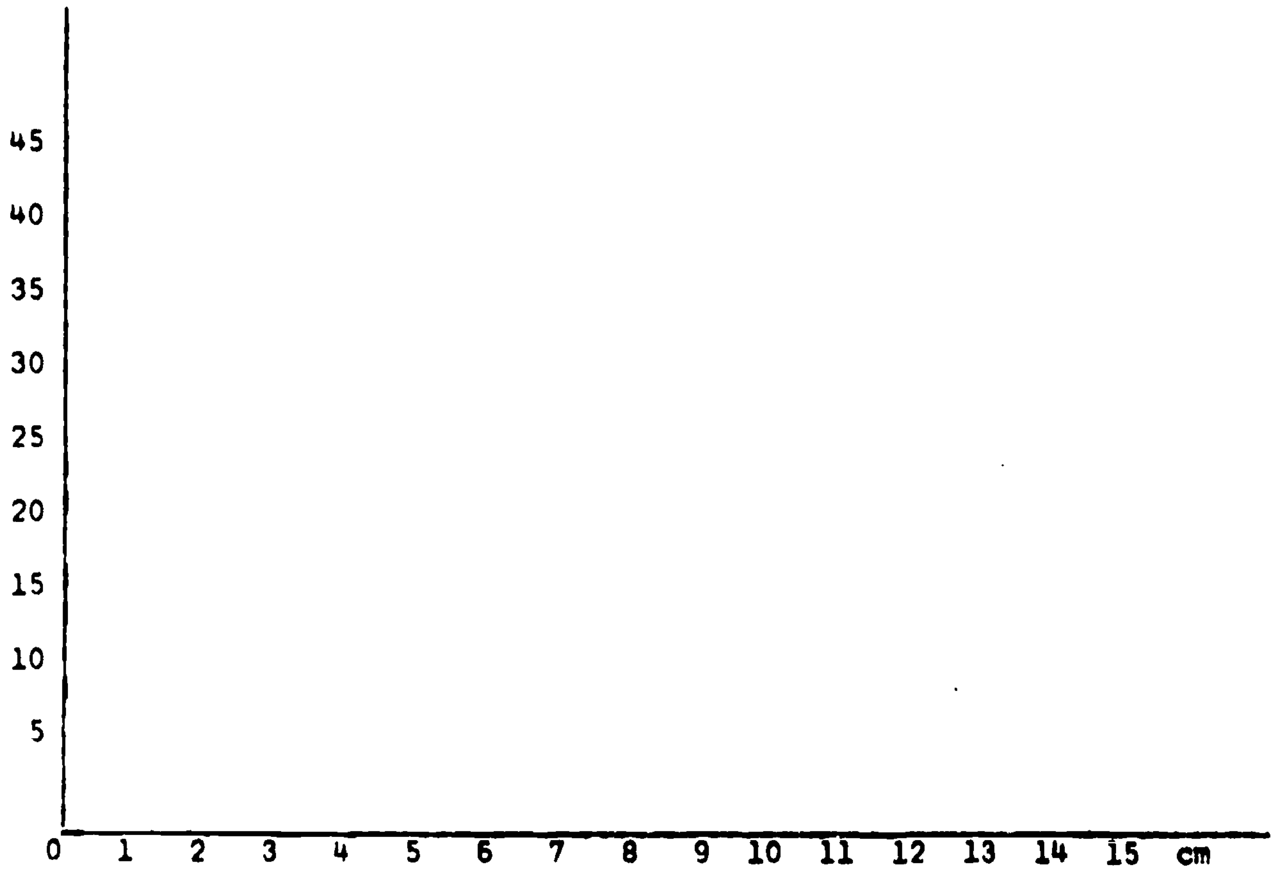


EARS FROM A SAMPLE OF 30-50 EARS

DISTRIBUTION OF COTTONWOOD LEAF WIDTHS



WIDTH OF LEAF IN CENTIMETERS



WIDTHS OF LEAF IN CENTIMETERS

MAPPING A CITY BLOCK

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. (Adapted from the Environmental Science Center, Golden Valley, Minnesota) Revised edition of MAPPING AND GRIDS. (6-22-72)

Grade Level - 6-8

Best time of year - Anytime

OBJECTIVES:

1. To acquaint students with the basic skills and concepts of drawing to scale.
2. To introduce the procedure of grid making and the use of these grids to draw pictures or objects.
3. To acquaint students with methods of surveying and mapping.

BACKGROUND:

Many times you or your students may see a picture or a model of something that you may want a duplicate of. However, it is not likely that the object you wish to duplicate will be exactly paper size. Therefore, you will need to introduce drawing by scale. After learning a few simple skills, the students will be ready to get the project under way.

PRE-ACTIVITY:

The pre-activity for this project is very important. Some students will take much longer to develop these skills than others, but it is important that each student be given the opportunity to experiment with them. A small area indoors should be demonstrated with. Once the class has developed the skills necessary to do this project on a small scale indoors, they are ready to do this same thing out-of-doors.

The first activity in the pre-activity is designed to show the students that an exact reproduction of a picture is hard to accomplish. The procedure I have designed will produce this result. You may want to vary it according to the class you are working with. The procedure I have designed is as follows:

1. Give all of the students a piece of poster paper 18" by 12". This paper will be blank on one side and have a grid on the opposite side. The grid will be composed of squares 1" by 1". Lay the paper on the desk (shown on Data Sheet #1), with the blank side up and instruct the students to draw on that side first.
2. Show the students a picture such as Data Sheet #2 attached to this activity. Give them the dimensions of all the objects shown and tell them to draw them as accurately as possible and in the proper position. Use of rulers to make accurately as possible and in the proper dimensions is permissible and encouraged. Obviously, this will be hard for them. The scissors will be extremely hard.

3. When they have finished this project, observe and compare the drawings with the original copy that you have made. Discuss some of the problems with placement and how they could be eliminated.

4. Ask the students to return to their desks and turn their paper over. What are those lines called? (grid lines) What are they there for? Show them a copy of the original picture you designed, with the addition of the grid lines. This will be similar to Data Sheet #3. Give them the squares the objects are in and here the objects touch the grid lines. Let them draw the objects again. This time, they will be relatively accurate. The scissors will still give them some trouble. Ask them why the scissors are so much more difficult to draw than the pencil or note card. They should decide that the lines aren't all straight on the scissors. (By now they should have realized the advantage of using grids.)

5. Ask the students what a scale model is. If they are having trouble defining it, mention model airplanes, model cars, electric trains, etc. as examples. Show them a picture such as Data Sheet #4. Ask them to produce a scale model of the picture they have already drawn. Tell them to use the scale 1/2" = 1". This may cause some problems since it is the students' first experience with this procedure. However, with a little discussion, they should be ready to begin. The first step should be to establish a grid system with the same number of squares as the original picture. They will be 1/2" square instead of 1" square. Once they have this scale established, they will have little difficulty placing the objects on the picture.

FIELD TRIP:

Now the students are ready for the field trip which may be taken on the school grounds or a nearby area. If you decide to map a block which has private property on it, you should ask permission to do the measuring first. If you explain what you are doing, there should be no problem getting permission. The equipment for this measuring, (gathering of data) is not too sophisticated. We use a coffee can for a spool and twine string for a measuring device. Remember to take a yardstick along on the field trip also. The twine string is marked every ten feet so the measuring is easier. The best method is to drive a long nail into the ground at the corner of the sidewalk and tie the end of the twine string. Next, you are ready to start unrolling the twine. Masking tape can be placed every 10 feet so the measuring device can be used on the rest of the block. The above procedure is shown on Data Sheet #5.

Data Sheet #6 will be used to record the data and is relatively self explanatory. One of these sheets should be used for each side of the block. Once the masking tape is placed at ten foot intervals, the actual measuring can begin.

Data Sheet #7 shows the measurements of the houses on all four sides of the block. Your measurements will probably be quite different from this, but the procedure will remain the same. To do this field trip in the most effective and efficient way, one person should be assigned to driving in the nail and attaching the twine. This person can also put the masking tape at the 10 foot intervals. One student should be assigned to rolling out the twine. If you have enough time and a small group, these two can do the same thing on all sides of the block. One student should be assigned to the job of determing where each house starts and another where each house ends. Another student should be assigned the job of determining how far in from the sidewalk each house is.

BEST COPY AVAILABLE

Some houses are constructed so that they have different distances from the sidewalk. These will have to be measured in at least two different places depending on the construction of the house. You also need a recorder on each side of the block.

This arrangement will call for at least six students in each group. Your class may be large enough to have a group working on each side of the block. This will enable you to gather the data more quickly. It will also give each student something to do. The student who puts down the tape and the one who rolls out the twine will finish first and may be assigned to help the measurers.

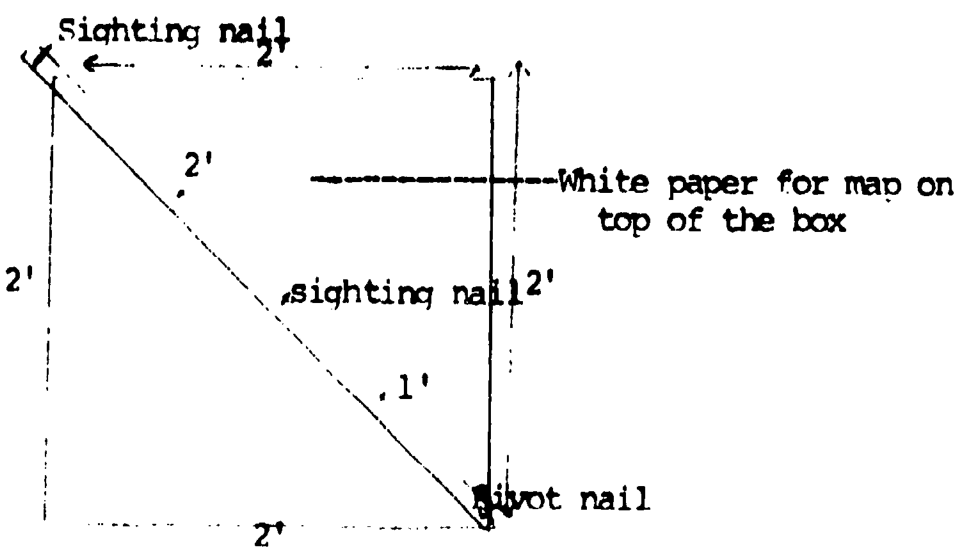
FOLLOW-UP:

Data Sheet #8 shows the finished product of a hypothetical block. This just shows one side of the house or two sides on those buildings on the corners. You may want to stop here or you may continue. You may decide to include all of the dimensions of the houses. You might also draw in driveways, yards, and any biological features. As an art follow-up, the buildings and the biological features could be constructed to scale and put on the block.

SURVEYING TECHNIQUES

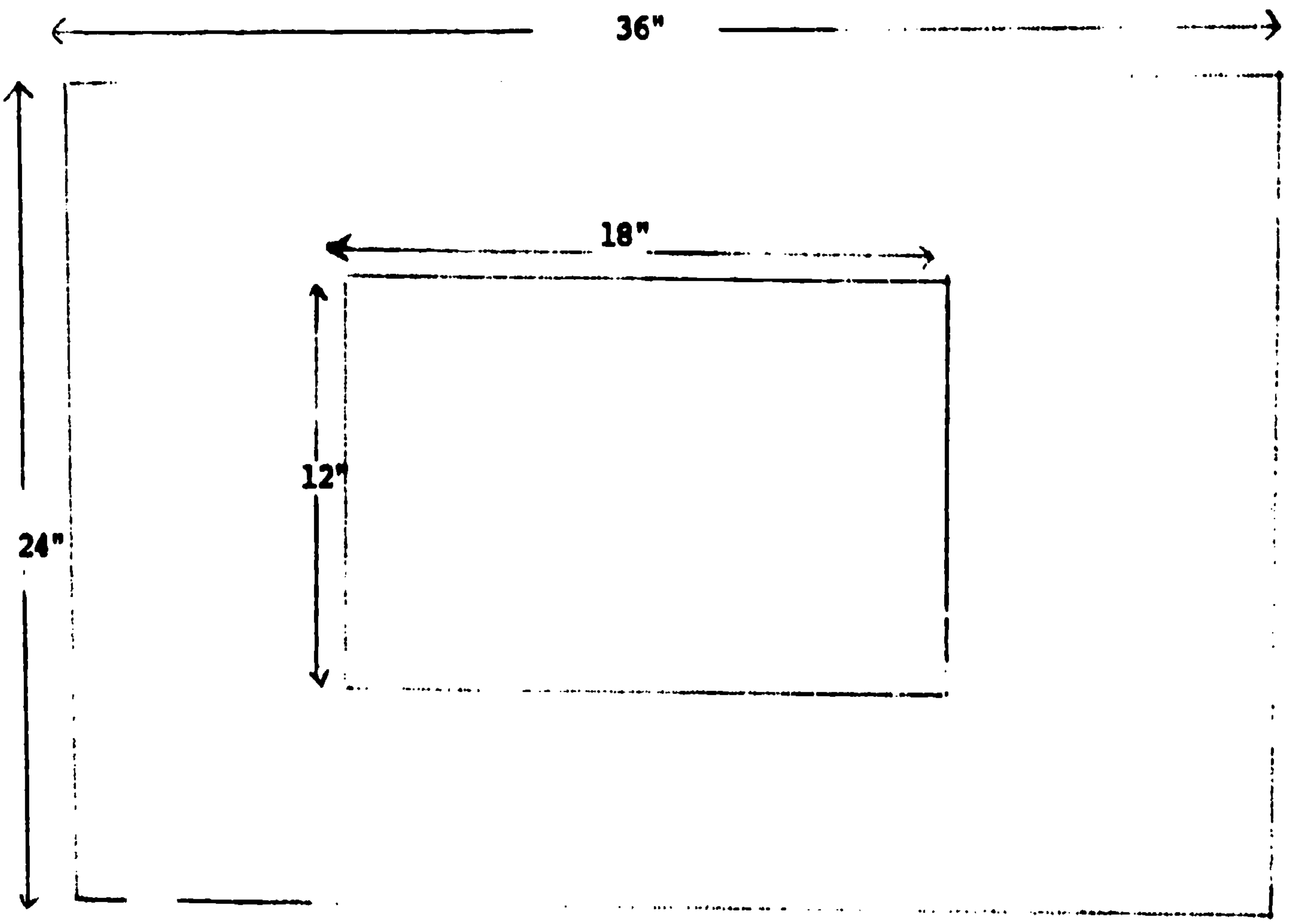
A simple surveying technique can be used to place biological features on a map. Some of the tools which can be used are easy to construct. A large cardboard box is needed for a table, two yardsticks are needed, one for sighting and one for measuring, several nails 3/4" and 3-5", a large piece of white paper, 200 feet of twine and some tape. The twine should be knotted every 10 feet for easier measurement. Possibly, every third knot can be accompanied by a piece of colored yarn to enable easier counting. The extra yardsticks are for measuring between the 10 foot intervals.

The white paper should be taped on the box. It will be used as the surface for the map. The nails can be used for a pivot and sighting device. The box can be located any place on the area that you are surveying as long as the location is accurately marked on the white paper. The box should be secured tightly to one place so that the map will be accurate. One inch can be equal to each 10 foot section of the twine so the objects can be accurately placed on the map. If the object is 40 feet away, you would place it on the map at the 4" mark.



View from top of box - Scale drawing 1" = 1'

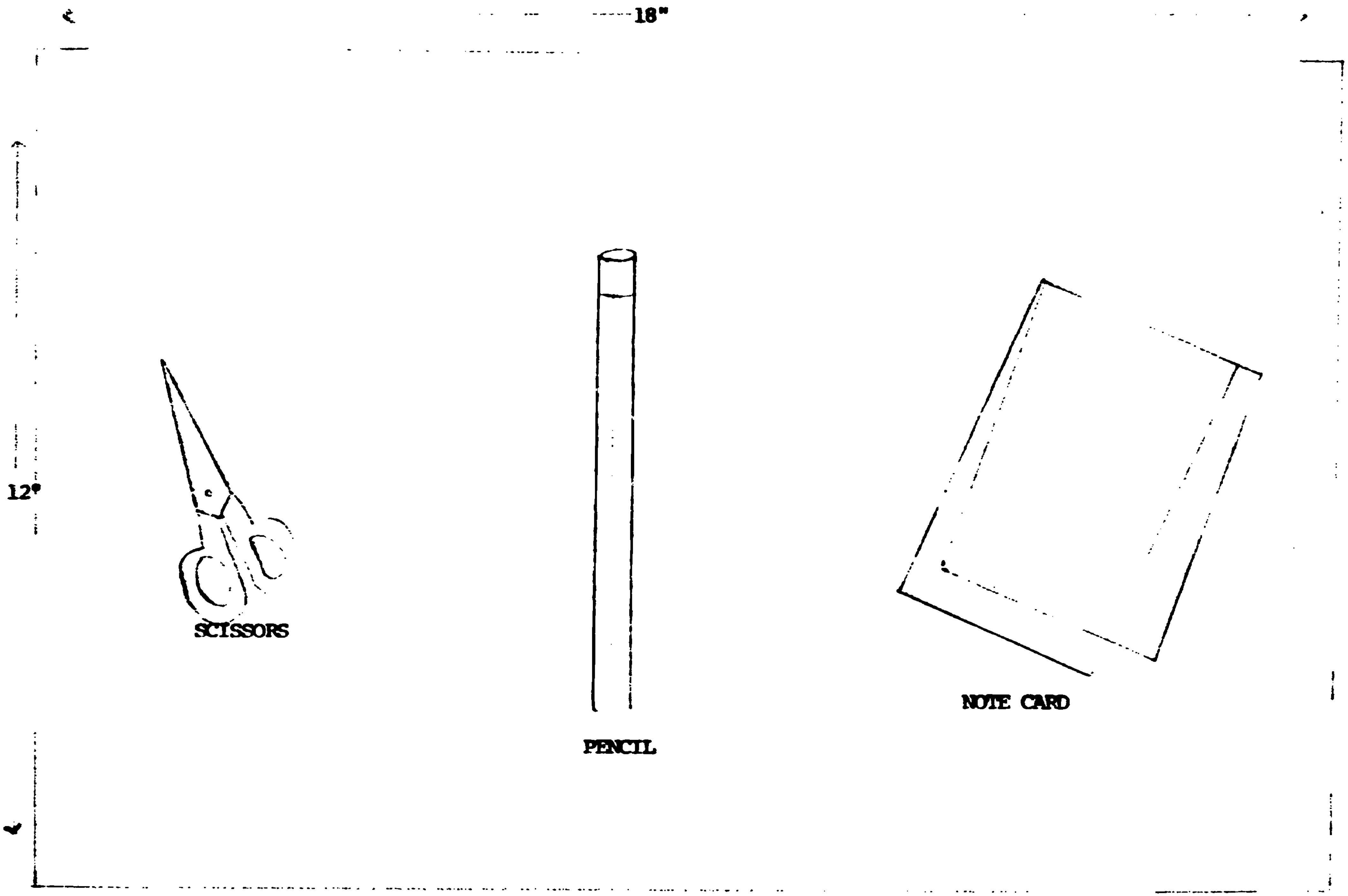
DATA SHEET #1



SCALE: 1" = 6"

Poster paper on desk top

DATA SHEET #2



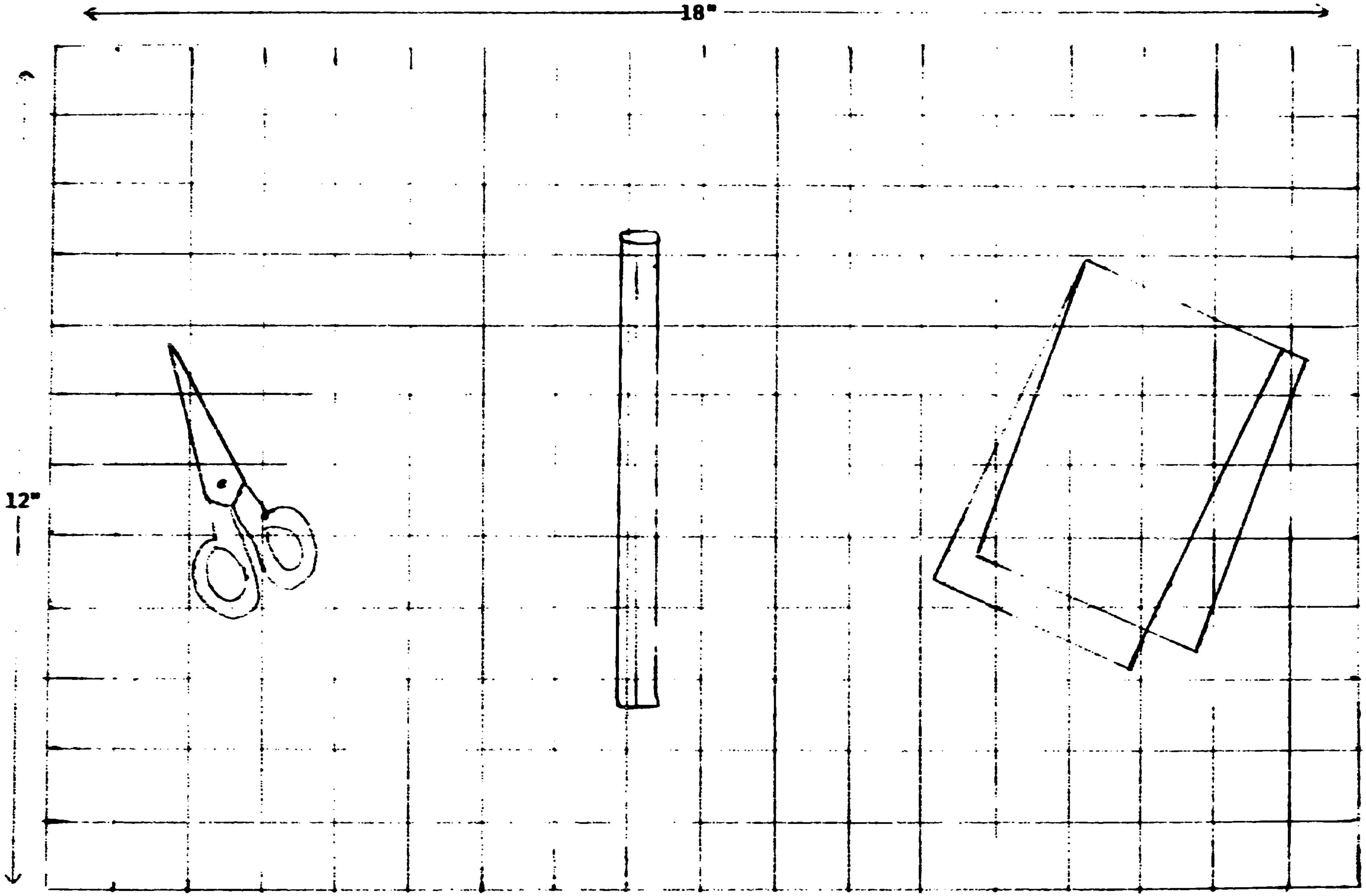
Scissors - 4" long, 1 3/4 " wide

SCALE: 1/2" = 1"

Pencil - 8" long, 1/4" wide

Note card - 5" long, 3" wide

DATA SHEET #3



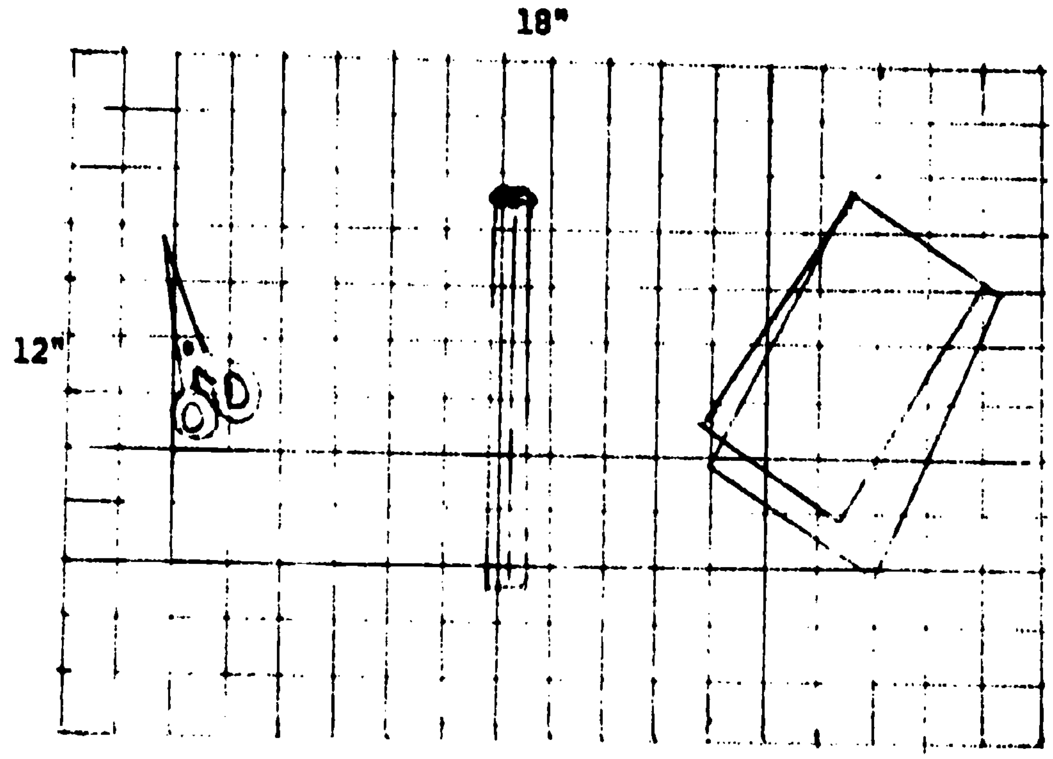
Scissors - 4" long, 1 3/4 " wide

SCALE: 1/2 " = 1"

Pencil - 8" long, 1/4 " wide

Note card - 5" long, 3" wide

DATA SHEET #4



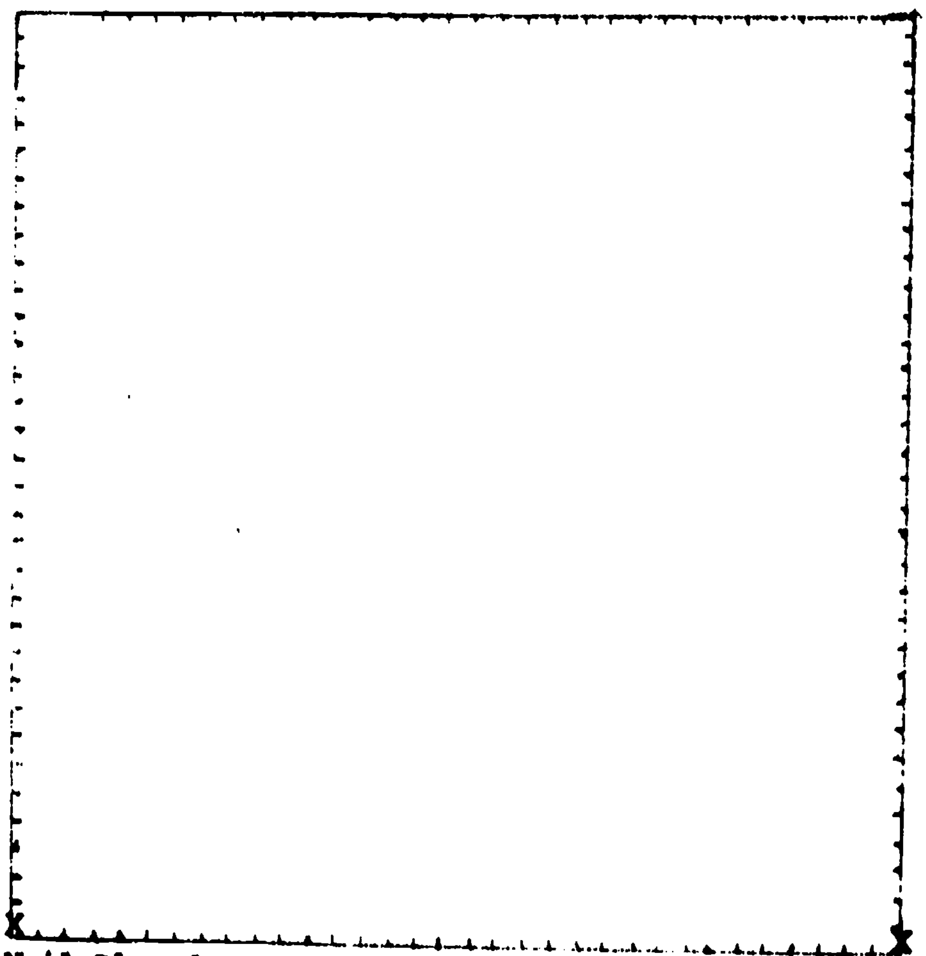
Scissors - 4" long, 1 3/4 " wide

Pencil - 8" long, 1/4" wide

Note Card - 5" long, 3" wide

SCALE: 1/4" = 1"

DATA SHEET #5



Nail Placed Here Nail Placed Here

SCALE: 1/8" = 10'

DATA SHEET #6

house number	side of block	measurement at start of house	measurement at end of house	distance from sidewalk
#1				
#2				
#3				
#4				
#5				
#6				
#7				

DATA SHEET #7

SIDEWALK = 3 feet/300 feet

SOUTH SIDE

HOUSE #1: Starts at 15 ft. and ends at 45 ft., it is 15 ft. from the sidewalk, 12 feet from west sidewalk

HOUSE #2: Starts at 80 feet and ends at 125 feet, 25 feet from sidewalk

Alley starts at 355 feet, is 15 feet wide

HOUSE #3: Starts at 160 feet, and ends at 190 feet, is 10 feet from the sidewalk

HOUSE #4: Starts at 200 feet, ends at 240 feet, is 20 feet from the sidewalk

HOUSE #5: Starts at 260, ends at 280 feet, is 10 feet from the south sidewalk, 17 feet from east sidewalk

EAST SIDE:

HOUSE #1: Starts at 13 feet, ends at 55 feet, is 17 feet from east sidewalk

HOUSE #2: Starts at 65 feet, ends at 110 feet, is 25 feet from east sidewalk

HOUSE #3: Starts at 125 feet, ends at 180 feet, is 25 ft. from east sidewalk

HOUSE #4: Starts at 200 feet, ends at 285 feet, is 20 feet from east sidewalk

HOUSE #5: Starts at 255 feet, ends at 285 feet, is 20 feet from east sidewalk, 12 feet from north sidewalk

WEST SIDE:

HOUSE #1: Starts at 18 feet, ends at 75 feet is 12 feet from west sidewalk

HOUSE #2: Starts at 95 feet, ends at 140 feet is 35 feet from west sidewalk

HOUSE #3: Starts at 160 feet, ends at 205 feet, is 25 feet from west sidewalk

HOUSE #4: Starts at 225 feet, ends at 285 feet, is 20 feet from the west sidewalk, 12 feet from the north sidewalk

DATA SHEET #7 cont.

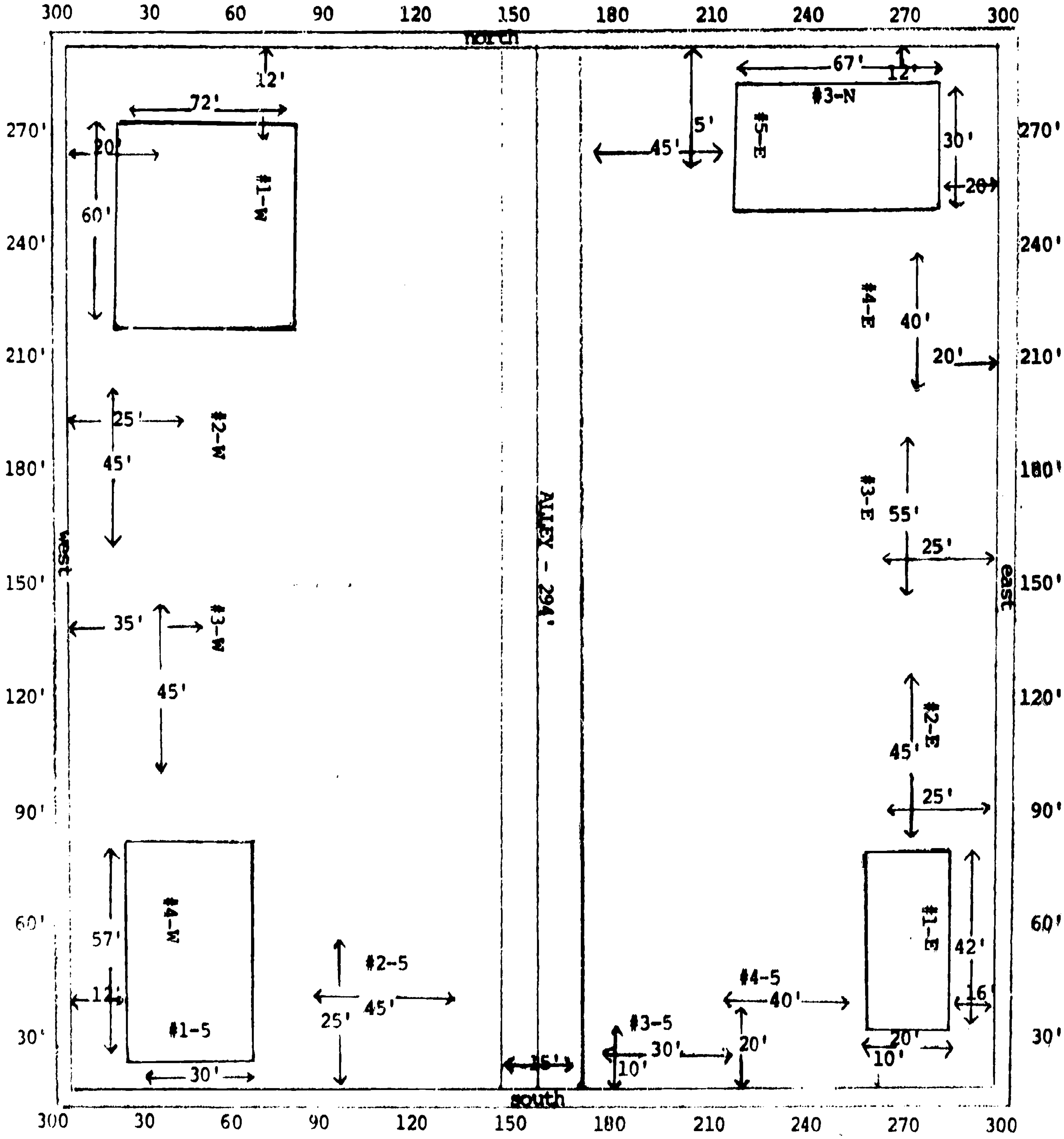
NORTH SIDE:

HOUSE #1: Starts at 23 feet, ends at 95 feet from north sidewalk

HOUSE #2: Starts at 155 feet, ends at 200 feet, is 20 feet from sidewalk

HOUSE #3: Starts at 210 feet, ends at 277 feet, is 12 feet from the north sidewalk, 20 feet from north sidewalk

DATA SHEET #8



SCALE: 3/4'' = 30 feet

STEPPING INTO THE WORLD OF THE WILY WHITETAIL

Written by Arlo L. Levisen, Elementary Principal, Deubrook Elementary School, Toronto, South Dakota 57268. Revised by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, South Dakota. Phone 489:2416.

Grade Level - 4-6

Best Time of Year - October, November and December

Best Area for Field Trip - Shelterbelts, cornfields, tree claims or sloughs

OBJECTIVES:

1. To introduce students to habits and habitats of animals by studying the whitetailed deer.
2. To study physical characteristics of animals by use of the whitetailed deer.

BACKGROUND:

The whitetail deer is the number one big game animal in the United States. It's economic and aesthetic value is extremely high. It's beauty and natural instinct are greatly appreciated by hunters, photographers, conservationists and preservationists alike. It is a very common mammal in most parts of the United States and for the inquisitive student, becomes a very good study animal.

Although the whitetail deer is extremely wary, it is too large a mammal to live in any area and not leave its calling cards. A systematic study of the habits and habitats of the whitetail deer can give the student insight into the behavior of many wild mammals and birds.

We can observe some of the physical features of the deer by use of binoculars. If we want to do an anatomy study of the whitetail, we will have to rely on contributions from hunters.

MATERIALS:

1. proper clothing
2. binoculars
3. plaster of paris
4. cameras
5. knives
6. microscope or magnifying glass
7. paper bags

PRE-ACTIVITY:

1. What is a deer?
2. What do deer eat?
3. Where do deer stay?
4. Do deer do any harm?
5. Do deer do any good?
6. What do deer hoofs look like?
7. How can we tell how old a deer is?
8. What is velvet on deer horns?
9. How does the deer get rid of the velvet?
10. What is a deer scrape?
11. What is the "rut" season in deer and when is it?

If available, introduce different anatomical features contributed by some local deer hunter. Include jawbones, antlers, a piece of hide with the hair attached, hoofs, scent glands, tail, etc.

FIELD TRIP:

The field trip should be taken to an area which has a fairly high concentration of deer. This will insure a successful field trip, and will increase the chances of actually seeing a deer. Shelterbelts, sloughs, tree claims and cornfields are good choices, especially if several of these are in close proximity. Deer signs to be observed and charted include: tracks, beds, scrapes, damaged trees, browsing signs and actual sightings.

All signs should be charted. If cameras are available, pictures of deer signs can be taken and included in a scrapbook on deer habits and habitats. Plaster casts of deer prints can be taken. Signs of browsing can be collected to determine if they are made by deer or other mammals.

Warm clothes are a necessity during these field trips because of possible extended periods of time in the field.

POST ACTIVITY:

The post activity should cover all aspects of the field trip. A large chart should be devised on the blackboard to cover deer signs. An example of such a chart is as follows:

SAMPLE CHART

TYPE OF SIGN	SLOUGH	CORNFIELD	TREE CLAIM	SHELTERBELT
Browsing			X	X
Scrape			X	X
Damaged Trees			X	X
Tracks	X	X	X	X
Beds	X		X	X
Sighting	X	X	X	--
Droppings	X	X	X	X

Additional information which may be included would be number of beds, size of beds, largest concentration of tracks and droppings, etc.

Photographs of deer signs should be studied. Browsing signs should be examined with a hand lens. Deer will tear off branches and the edges will not be smooth. Animals such as rabbits nip off branches and the edge will be even.

If deer parts are available, these should be re-examined by the students. If plaster casts of deer prints were made, these can be examined and compared with the real thing.

A vocabulary and language arts follow up can be included here also.

PRAIRIE PLANTS AND FIRE

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. Phone: 498-2416. (Revised 2-7-72)

Grade Level - 4-6

Best time of year - April-May, September-October

OBJECTIVES:

1. To assist the students in finding, recognizing and identifying prairie plants.
2. To introduce the students to the concept of population sampling and estimations.
3. To introduce the methods and concepts of transect construction.
4. To introduce the idea of fire as a positive natural force in maintaining nature.
5. Introduce the concept of succession.

BACKGROUND:

In a prairie area which is in a relatively native state, there is a large variety of grasses and forbs, many of which most people have never noticed or identified. It is interesting for children to go into a field and look for these different kinds of plants and to identify them. The first part of this activity is centered around just finding and identifying various types of prairie plants from a given area of the Wetlands or another natural area close to your school.

The second part of this activity will involve returning to the area, measuring out a study plot, and then sampling the vegetation. The plants will be identified, counted and population estimates made of the study area. A similar study will be done on that area as on the unburned study area. Plants will be collected, identified and population estimates calculated. This data is then compared and considered.

A very noticeable change in grass and forb species will take place. Usually the grasses will consist of more native grasses than those which we have introduced. Often a very rich growth comes up through the ashes which is much more diverse and luxuriant than the vegetation prior to the burn. Fire is not always a bad thing in a natural situation. Fires were a common occurring phenomenon before man stepped in and stopped them. Lack of fires in our environment is often a handicap to natural areas. The process of a new and different group of plant species invading and taking over an area following a burn or plowing is called succession. Gradually, the new plants will give way and be crowded out by other species. To get the prairie plants to grow again, the area may have to be burned again.

This activity is really three units which depend on each other. Any of them can be done by themselves, but maximum benefit of the units will occur if the three activity series is used.

The first two units of this activity can be done in any yard, ditch, railroad right of way, hay meadow or place where there is a great variety of plants growing.

PRE-ACTIVITY:

Introduce the activity series as a study of plants. Talk about plants, ask questions:

1. How many kinds of plants can you think of? List them.
2. Are they grasses, trees, bushes, or weeds (herbacious or forbs)?
3. Are they native prairie grasses or plants? Were they always there?
4. Which kinds of plants grow best in low wet places?
5. Which kinds of plants grow best in high and dry places?
6. Which kinds of plants grow best in the shade?
7. Do grasses have flowers?
8. How can you tell how many plants there are in a field?
9. How would you count all the grass plants in your yard?
10. Could you make a guess as to how many plants there are?
11. What happens when forest fires burn up forest areas?
12. Does anything ever grow on those places again?
13. Are the plants the same as those that grew before? Why or why not?
14. What happens when road ditches burn off?
15. Is it good when a forest or a grassy area burns off? Why or why not?

MATERIALS:

1. Three or four paper bags per student
2. Six to ten pairs of scissors
3. Copies of South Dakota Weeds or Plants of South Dakota Grasslands will be helpful in plant identification.

FIELD TRIP:

Areas in the Madison Wetlands area are being set up presently to facilitate these activities. Please use these areas if possible to sample for vegetation. There are a lot of very good places on the Wetlands area where native plants grow in abundance. Please select an unburned area for the first two activities. If you have questions about where to take the class, contact the Madison Wetlands Office or the Interlakes Office. Take the students out into the area and have them collect plants, as many different kinds as possible. Put them in a paper bag and return to the classroom.

POST-ACTIVITY:

1. Identify each kind of plant - provide books for student references
2. List the kinds of plants which were found. Make a large poster with plants attached and labeled.
3. List the kind of land the plants came from (wet, dry, high, hill, low, flat land, sand, etc.).
4. Which was the most common plant? grass? forb or weed?

TIPS: Do not be alarmed if some plants are not identified or mistakes in identification are made. You will very likely not have enough time to completely finish this unit in a week. Send some of the unknown plants home with the students to see if their parents can help.

Second Week

MATERIALS:

1. 100 foot tape or twine with knots one foot apart
2. Large paper bags - 2 to 3 per student
3. Baby scale or an accurate scale which weighs in grams
4. Scissors - optional
5. South Dakota Weeds or Plants of South Dakota Grasslands for reference
6. A wire coat hanger for each student

PRE-ACTIVITY:

Introduce this field trip as the second trip of the series, only this time they will attack the problem of finding out how many plants are in a given area and how much vegetable matter is present on that area. Since they have already identified the plants in the earlier activity, they should be acquainted with most of them.

Explain what a transect is. Draw and illustrate one. Explain what a sample plot is and how it becomes a study area which represents a much larger area.

The study area will be an island in the Wetlands area. The island has a good uniform group of plant communities. Since it would be impossible to count and identify every plant on the island, we will select a 100 foot portion of the island as a representative sample of the plants of the whole island. We know how many feet there are on the whole island, therefore if we can find out how many plants and how much vegetation is on the 100 foot plot, we will be able to calculate the amount for the whole island by dividing the total number of feet on the island by 100 and then multiplying the result by the figures we discover in our sampling.

It is also obvious that counting every plant on 100 square feet would be impossible. So we need to select a method of sampling the 100 foot plot. That is what a transect is for. A transect is a random sampling along a line. Measure out a 100 foot line, or ten, ten foot lines and randomly pick a point along that line for each student to work at. The student will make a 1 foot round or square hoop out of his coat hanger and place it down over the vegetation with the coat hanger touching the string or tape. Each growing (green) plant within the coat hanger is to be identified and counted. (Identification may be in terms of grass #1, tree #1, bush, weeds, etc. if the true identity cannot be determined). Each green plant is to be cut off at ground level and placed in a paper bag and labeled as to who picked it and the transect number. Then all of the dead vegetable matter is to be picked and placed in another bag and labeled. If the day is nice, when everyone finishes their plots, repeat the procedure.

Set up weighing stations with two to five scales to weigh the green samples and the dead matter samples from each plot. Record carefully each weight, student's name and plot number. The many square foot transects, when averaged together, will give a very sound representative population estimate.

FIELD TRIP: 1 hour +

Conduct the activity as explained above. When the students return to the classroom, they should have the following data collected: (See sample data sheet for second week).

On each student's one foot square plot, you should know:

1. How many kinds of plants were present.
2. How many of each kind of plant was present.
3. How many kinds of green plants were present.
4. How many kinds of dead plants were present.
5. How much the green, growing plants weighed.
6. How much the dead plants weighed.
7. Total number of growing plants per foot.
8. Total number of dead plants per foot.
9. Total weight of living and dead vegetable matter per square foot.

POST-ACTIVITY: 1 hour plus several hours of math work

Finish up weighing and calculating weights and numbers. Determine the total amounts of these plant species, weights, etc. for all of the square foot samples. Then, calculate the estimates of these figures for the total study plot and then the island. See sample chart and formulas.

Answer the following questions:

1. How many growing plants are there on the island?
2. How many dead plants are there on the same island?
3. How much do the growing plants on the island weigh?
4. How much do the dead plants on the island weigh?
5. How many living goldenrod plants are growing on the island?
6. How many living big blue stem plants are growing on the island?

If a deer eats 10,000 grams per day of live Kentucky Blue Grass plants, how many days could he live on the island and eat only Kentucky Blue Grass?

Calculate the total number of Plants of each type on the island. Calculate the total live and dead weights of each plant type on the island.

You can make many more calculations also, i.e., percentages of each plant in the island vegetation and percentages of each plant weight in the total island vegetation weight.

Third Week

PRE-ACTIVITY: 15 minutes to ½ hour

Answer questions, talk about and clarify what you did during the last two trips.

Ask the students what effect firewould have on the island. How would it affect the amount and kinds of plant materials on the area?

Suggest a field trip to find out. The west half of the island you have visited during the first two weeks was burned off in late May, 1971 by the Madison Waterfowl Production Area Staff. It is the best area available for this type of study in the area. Lake Herman State Park also is conducting some burning experiments and will produce the same type of results.

If you have any questions about this activity, call the INTERLAKES OFFICE at 489-2416.

MATERIALS:

Same as for the second week activity.

POST-ACTIVITY: 1 hour +

Conduct a transect experiment as you did during the second week only on the burned over area.

Calculate values for data collected. Compare the results with the preceeding week. How has fire affected the number of plants, kinds of plants, amount of vegetation covering the soil? Is that good or bad?

List reasons it could be good and reasons it could be bad. List plants from the burned area and compare with a list from the unburned area. Which has the greatest variety?

GOOD ASPECTS:

1. Releases nutrients tied up in dead grass.
2. Kills out undesirable plants and allows desirable plants to grow.
3. Changes the sun energy penetration relationships.
4. Some birds and animals like the open spaces fire creates.

BAD ASPECTS:

1. May result in soil erosion (very rarely).
2. May burn out nests and kill animals.
3. May burn out of control and burn up things we want to save.

SUGGESTIONS: A good follow-up activity to this series is entitled, Bird Nests and Bird Populations on a Prairie Slough Area, which can be obtained from the Interlakes Office, Chester, South Dakota 57016.

SAMPLE DATA SHEET FOR SECOND WEEK

STUDENT'S NAME ____________

TRANSECT #1

PLOT #1

Plant Name	No. Growing Plants	Live Plant Weight	No. Dead Plants	Dead Plant Weight
Kentucky Blue Grass	17	29 grams	13	8 grams
Yarrow	2	13 grams	0	0 grams
Sunflower	2	15 grams	1	177 grams
Big Blue Stem	27	358 grams	28	73 grams
Total	48	415 grams	42	258 grams

TOTAL LIVE AND DEAD PLANTS - 90

TOTAL PLANT WEIGHT (LIVE AND DEAD) - 673 grams

SAMPLE DATA SHEET

IF THERE ARE 25 STUDENT PLOTS WHICH HAVE ESSENTIALLY THE SAME RESULTS, THEN YOU HAVE 1/4 OF THE PLOT SAMPLE. AVERAGE THE STUDENT' RESULTS.

Average of students' plot survey

TOTAL GROWING PLANTS - 48 X 25 = 1200 PLANTS PER 25 SQUARE FEET

GROWING PLANTS PER 100 SQUARE FEET = $(\frac{25 \text{ ft.}}{100 \text{ ft.}} = \frac{1200}{X} = 1/4 \text{ X } 1200/X = X = $ [illegible] X 12 --

871,200 sq. ft. X 48 plants = 41,815,600 plants on the island =

4800 growing plants/ 100 sq. ft.

LIVE PLANT WEIGHT = 415 grams X 25 = 10,375 grams

LIVE PLANT WEIGHT/100 square ft. $= \frac{25 \text{ ft.}}{100 \text{ ft.}} = \frac{10{,}375 \text{ grams}}{X \text{ grams}} = \frac{1}{4} \text{ X } \frac{10{,}375 \text{ grams}}{X}$ --

X = 4 x 10,375 grams

LIVE PLANTS WEIGHT/ 100 square ft. = 41,500 grams

REPEAT THESE CALCULATIONS FOR DEAD PLANTS AND PLANT WEIGHTS. THEN CALCULATE THESE NUMBERS FOR THE WHOLE ISLAND WITH TWENTY ACRES OR 871,000 SQUARE FEET.

4 15 GRAMS PER SQUARE FOOT X 871,000 SQUARE FOOT = 361,548,000 grams or

361,548 kilo grams or 802.370 pounds or 401 tons

110 Copies

WINTER TEMPERATURES

Adapted from Snow and Ice Activities Booklet of the Environmental Science Foundation, Golden Valley, Minnesota by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416 (Revised 2-2-72)

Grade Level - 4-6

Best time of year - Winter (it would be an interesting activity to do during the Fall and Spring also to make comparisons)

OBJECTIVES:

1. To acquaint the students with the use of a thermometer and both Centigrade and Fahrenheit scales.
2. To demonstrate the insulating capacity of snow and ice.
3. To demonstrate the different temperature zones present in ice and snow compared to the air temperatures.
4. To show the importance of snow and ice to living organisms.

BACKGROUND:

Snow and ice are very important in this region as insulators against temperature extremes. Children and many adults have the conc ption that all temperatures outside are the same as air temperatures. This is definitely not the case. It is interesting for children to go outside and measure temperatures at different levels in snow and ice an in different areas of the air.

Snow is a good insulator. It prevents heat from moving through it because of all of the air spaces between the crystals. A blanket of snow is a warm blanket - relatively. A layer of snow covering the ground will keep the soil temperature fairly constant during the winter, even if the air temperature seems to change a great deal. Consider these measurements taken in a school yard with a snow cover of about 18 inches. (Zero degrees Celsius is the freezing point of water).

SNOW DEPTH OF 18 INCHES

Air Temperature Above the Snow		Soil Temperature in feet away from the building			
		2	8	10	25
		Centigrade Degrees			
First Day	$-5^{o}C$	$+3^{o}$	$+2^{o}$	-1^{o}	-2^{o}
Second Day	$-21^{o}C$	$+2^{o}$	0^{o}	-2^{o}	-4^{o}

This data shows that the heat from the foundation of the building is able to keep the soil from freezing under a cover of snow in very cold weather. This is not likely without snow.

Also, the snow creates a 17 degree C difference between air and soil on the coldest day. This means that the soil is only slightly below freezing when the air is -21^{o}c or -5^{o}F. If the air temperature should rise above freezing, say to 5 degrees or 6 degrees C, (41 degrees to 43 degrees F), then the snow would keep the soil cooler than the air. On warm thawing days in winter, temperature readings show a reversal of the temperature difference shown in the previous chart.

These temperature differences under snow have a marked effect on the survival and behavior of animals and plants. Obviously, organisms will be kept warmer, on the average, and will not be subjected to extreme fluctuations of temperature when they are covered with a layer of snow. Also, organisms are protected from wind chill and wind drying when covered with snow.

MATERIALS:

thermometers which register well below freezing

PRE-ACTIVITY:

Discuss snow and ice and temperature. Time 15-20 minutes. Posing a problem or question which considers snow affecting our behavior in the winter:

1. What is snow? What is it made of?
2. What is ice? Why is it different from snow?
3. What temperature is snow?
4. At what temperature does water freeze? F^{o} or C^{o}?
5. What makes a thermometer work?
6. If the air is -20^{o}F, what is snow temperature at surface?
7. If the air is -20^{o}F, what is snow temperature at ground?
8. If the air is $+40^{o}$F, what is snow temperature at the surface?
9. If the air is $+40^{o}$F, what is snow temperature at the ground?
10. What is temperature of ice?
11. What is the temperature of water below the ice?
12. Do you know how to take temperatures?
13. What do we do when it snows? Is snow a nuisance to us? Would you like it if it would never snow and be cold?
14. Does snow ever make money for us? Do we use snow for anything?

Next, pass out mercury thermometers scaled in F^{o} or C^{o} or both, (one per every two students is about right). Discuss the difference of the Fahrenheit and Centigrade scales.

Have the students take the room temperature.
Help them to find the mercury bead.
Have them take their own temperature.
Stick the bulb of the thermometer into ice water, ice or snow and determine the temperature.
Have the students play with the thermometers for 10 minutes or until they are familiar with reading them.

Then, turn in the thermometers. Select teams to get temperature measurements at specific places outside. List the places that children would like to take temperatures of. Arrange for several students to write down the information. Following are some suggested temperatures which might be taken: Then have the children take temperatures of their own special places.

1. Air in shade
2. Air in sunlight
3. Top of snow
4. Middle of snow
5. Buttom of snow
6. Snow-ice interface
7. Snow-ice surface
8. In ice
9. Water under ice
10. In soil next to building
11. Blacktop highway
12. In tree bark
13. In grass not covered by snow
14. In grass covered by snow
15. Rabbit hole
16. Birds' nests
17. Muskrat house, etc.

FIELD TRIP:

Place - anywhere near the school or in the Wetlands Area. This exercise can be done anywhere there is access. Temperatures will vary in animal nests and dens from air temperatures. Temperatures will vary at different levels of snow and ice and in different bodies of air.

Take the students out and let them go to work. Mingle and suggest. Help those who are having trouble reading the thermometers. Suggest new places to take temperatures if some students begin to lag. If very cold temperatures or wind chill exists, cut down time in field and number of measurements each child takes. Very cold air temperatures give good breaks in temperature ranges in snow.

OTHER ACTIVITIES SUGGESTED:

Children can test the snow cover outside to see whether there is a difference in conditions above and below the snow.

1. Burrowing in just to test the feel of it. It will seem more sheltered under the snow. There will be less biting chill on noses and cheeks as long as the snow does not touch the skin, thus drawing off skin heat by melting and making it seem colder than it is. It may seem damper, which it is, under the snow.

2. Digging down to note the condition of the soil. Is it frozen or not? Is the grass still green?

3. Studying temperature differences:

   a. Children can take random measurements at first or perhaps have a game to see who can find the warmest or coldest spot. A discussion of what was discovered can lead to a desire for more organized collection of the data so that some conclusion can be reached about snow temperatures.

   b. Preparation for thermometer:

      1. Pre-select a number of stations. Mark them with a stick or with dry tempera color sprinkled on the snow. Select stations which will provide the widest possible divergence of results such as: (continued on the next page)

--near the school building
--away from the school building
--in deep snow
--under bushes

2. Put long, colored cords on thermometers to prevent them from being lost in the snow.

3. The children can work in pairs or in any combination the teacher wishes. For fast work in cold weather, each pair of children can be responsible for only one reading.

Measurements with a thermometer:

1. Measure air temperature in at least three locations. (Shade the thermometers)

2. Measure the temperature half way down in the snow.

3. Measure temperature at soil surface.

4. Collect data on a tag picture chart.

5. Can any conclusions be formed? Can any of the anecdote problems be solved?

POST-ACTIVITY:

Make a chart listing the place and temperature.
Compare between the places and temperatures.
Try to determine why the temperatures vary in these places.
Why is it warmer under the snow? or colder?
Why is it warmer in the ice? or colder?
Where would you want to be if you were a mouse?
Should you be happy when it snows?

Read the anecdotes below and ask the children to answer the problems and questions.

-- Mr. Novak's car was snowed in completely during a big snow storm. But Mr. Novak was sick when this happened, and he didn't get his car shoveled out until a week later. One day Mr. Novak shoveled out his car; it was very cold. All the people down the street were having trouble starting their cars because of the cold. Mr. Novak's car was a similar kind as the people's cars, but Mr. Novak's car started right away.

Does this story give any clues as to why Mr. Novak's car started easily?

-- Every winter Mrs. Wellington hires a boy to shovel a big pile of snow up against the north wall of her house. Why do you suppose she would do this?

-- It is -15° C (or 5°F) out today. That is pretty cold -- way below freezing. There is snow covering the ground all over. But, do you know that there is wet mud out there right in the school yard? Do you know where?

-- Do you know how that can be in such cold weather? (you'd better check first, but most likely the soil within one or two feet of the school building foundation will not be frozen if there is a cover of snow of at least four to six inches).

-- In many places areound here, where there are wild plants growing, there are also some kinds of spring flowers which will send up leaves or blossoms even before the snow is gone from the ground. If the snow is frozen, and if plants cannot grow when they are frozen, how can the spring flowers grow through the snow? (The soil is not frozen)

-- Old Mr. Jasper waits for the bus every morning. On the corner where he waits, Mr. Simonton always shovels away the snow very carefully so that bus riders will have a place to stand. But old Mr. Jasper will never stand and wait in the shoveled place. He always goes and stands, up to the tops of his overshoes, in a pile of snow. Why do you suppose old Mr. Jasper stands in the snow pile to wait for the bus?

CONVERSION OF CENTIGRADE TO FAHRENHEIT

CENTIGRADE	FAHRENHEIT	CENTIGRADE	FAHRENHEIT
-29°	-20°	-3°	+27°
-28°	-18°	-2°	+28°
-27°	-17°	-1°	+30°
-26°	-15°	0°	+32°
-25°	-13°	+1°	+34°
-24°	-11°	+2°	+36°
-23°	-9°	+3°	+37°
-22°	-7°	+4°	+39°
-21°	-6°	+5°	+41°
-20°	-4°	+6°	+43°
-19°	-2°	+7°	+45°
-18°	-0°	+8°	+46°
-17°	+1°	+9°	+48°
-16°	+3°	+10°	+50°
-15°	+5°	+11°	+52°
-14°	+7°	+12°	+54°
-13°	+8°	+13°	+55°
-12°	+10°	+14°	+57°
-11°	+12°	+15°	+59°
-10°	+14°	+16°	+61°
- 9°	+16°	+17°	+63°
- 8°	+18°	+18°	+64°
- 7°	+19°	+19°	+66°
- 6°	+21°	+20	+68°
- 5	+23°	+21	+70
- 4	+25°	+22	+72

CENTIGRADE	-	FAHRENHEIT
+23°	-	+73°
+24°	-	+75°
+25°		+77°
+26°	-	+79°
+27°	-	+81°
+28°	-	+82°
+29°	-	+84°
+30°	-	+86°
+31°	-	+88°
+ 32°	-	+90°
+33°	-	+91°
+34°	-	+93°
+35°	-	+95°
+36°	-	+97°
+ 37°	-	+99°
+ 38°	-	+100°
+39°	-	+102°
+40°	-	+104°
+41°	-	+106°
+42°	-	+108°
+43°	-	+109°
+44°	-	+111°
+45°	-	+113°
+ 46°	-	+115°
+47°	-	+117°

CENTIGRADE	-	FAHRENHEIT
+48°	-	+118°
+49°	-	+120°
+50°	-	+122°
+51°	-	+124°
+52°	-	+126°
+53°	-	+127°
+54°	-	+129°
+55°	-	+131°
+56°	-	+133°
+57°	-	+135°
+58°	-	+136°
+59°	-	+138°
+60°	-	+140°

MATH FORMULA FOR FIGURING

TEMPERATURE CONVERSIONS:

$°C \times 9/5 + 32 = F°$

$°F \times 5/9 - 18° = C°$

WIND CHILL CHART

Estimated wind speed in m.p.h.	Actual Thermometer Reading (F)										
	50	40	30	20	10	0	-10	-20	-30	-40	
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50
5 mph	48	37	27	16	6	-5	-15	-26	-36	-47	-57
10 mph	40	28	16	4	-9	-21	-33	-46	-58	-70	-83
15 mph	36	22	9	-5	-18	-36	-45	-58	-72	-85	-99
20 mph	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110
25 mph	30	16	0	-15	-29	-44	-57	-74	-88	-104	-118
30 mph	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125
35 mph	27	11	-4	-20	-35	-47	-67	-82	-98	-113	-129
40 mph	26	10	-5	-21	-37	-53	-69	-85	-100	-116	-132
Wind speeds greater than 40 mph have little additional effect	LITTLE DANGER (for properly clothed persons)				INCREASED DANGER			GREAT DANGER			

WINTER FOODS AND MOVEMENTS OF SMALL MAMMALS

Written by Major L. Boddicker, Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416 (Revised 2-2-72)
(Sections of this activity are modified from or are materials of the Environmental Science Foundation, Golden Valley, Minnesota).

Grade Level - 4-6 (Adaptable to other grades)

Best time of year - late Fall, Winter and early Spring

OBJECTIVES:

1. To acquaint students with the variety of small mammals living around them and methods of scientific identification of mammals.
2. To acquaint students with the techniques and difficulties of finding and capturing these creatures.
3. To acquaint students with the delicateness and beauty of animal life and the hazards these animals face.
4. To acquaint students with the concept of habitat and that different mammals require different living places.
5. To acquaint students with the concept of food, habits and that each animal has certain preferences and requirements.
6. To acquaint students with proper methods of handling mammals.
7. To introduce the concept of "home ranges".

MATERIALS:

1. Havahart live traps - available from the Interlakes Office as well as the following items
2. Sherman live traps
3. snap traps (optional)
4. home-made live traps (see directions attached to this unit)
5. Various food items
   a. peanut butter
   b. pecans, walnuts
   c. pieces of liver
   d. rancid hamburger
   e. sardines, smoked herring
   f. carrots, etc.
6. 3-4 gallon jars, cages
7. strips of red cloth
8. scale that weighs in grams
9. F° thermometer and medical thermometer with range from 85-113°F
10. 100 ft. measuring tape
11. pair of long jawed scissors (for clipping fur)
12. pair of fingernail or toenail clippers

BACKGROUND:

Within walking distance of each elementary school in Lake County there is a wealth of small and medium sized mammals. Most of these animals live and die by the thousands without us being aware that they even exist. In a book entitled, A Field Guide to the Mammals, by Burt and Grossenheider (available from the Interlakes Office) are listed medium and small mammals which occur in Eastern South Dakota and which may be present in Lake County. (see attached list)

Each of these animals is found in a different place, has different food and cover requirements. Most of them are not common and you would be exceptionally lucky if you caught one. Some are very common. This activity is an attempt to familiarize students with as many of these creatures as possible. Students will enjoy this activity tremendously and will learn a great deal about life and what environment and habitat means.

Generally, the plan is this. Live traps of three different sizes are to be set using different baits and placed in different habitats. Different baits and habitats should attract different mammals to the traps. These animals can be captured alive and placed in gallon jars for studying in the classroom and/or they may be marked with clippers by clipping a toe and released. Larger mammals will be marked and released after study in the classroom without removing them from the traps. Live traps are safe, easy to use, and animals are not harmed by them. A line of snap traps may also be set for a few small mammals when the teacher does not desire to have the live animals. Sacrificing a few small mammals will not hurt the breeding population and will reap many benefits for the students. Marked animals may be caught again in an adjacent trap thus recording its movements.

If the large Havahart traps are used, possibility exists that larger and undesirable animals may be caught, like skunks or badgers. Please call the Interlakes Office or the nearest Wildlife Conservation Officer if that occurs. The Interlakes Staff will assist you in handling the problem.

If you are interested in catching only mice, shrews and smaller animals, use only the small traps.

This activity is an extensive one and will take a good deal of time and preparation. The Interlakes Office will assist you whenever you have need of their help.

PRE-ACTIVITY: 15 minutes to one hour on the first day

1. Introduce students to the idea of studying mammals.
2. Discuss mammals by questioning students.
   a. What are mammals?
   b. How are they different from birds?
   c. How are they different from frogs and fish?
   d. How are they like birds? frogs and fish?
   e. How many kinds of wild medium sized and small sized animals have you seen? List them for the class.

1.	6.
2.	7.
3.	8.
4.	9.
5.	10.

   f. Where do they live? List the places the mammals in question live.

1.	4.
2.	5.
3.	6.

   g. What do they eat? List what students think they eat.

1.	5.
2.	6.
3.	7.
4.	8.

   h. How do they know that is what the animals eat?
      1. Did they watch them eating?
      2. Did someone tell them?
      3. Did they use clues?

   i. Do they bite? Are they dangerous?

   j. Are they helpful to people or harmful?

   k. Are they good to eat? What kinds of things eat these small animals?

   l. How long are these animals? How much do they weigh? How can you find out what these animals are?

   m. How far do these animals move?

Suggest doing a scientific study to find out for sure what the answers to these questions are. Terminate the discussion, but remind them to think about the scientific experiment. How would they do one?

Second Day - 1 hour

Plan the design and carry through of the experiment in terms of when, where and who will bring what and do what. Assign specific duties to students so they all get into the act.

1. Decide where you will set the traps. What types of habitats?
2. Decide where you will find such a place within daily traveling distance of school for 5-6 children who will check the traps daily.
3. Set up a schedule of who checks traps on what days.
4. Set up a system of transportation: they must set all traps within a reasonable distance from the school or perhaps parents may be willing to transport them to the Wetlands or other area.
5. Give a list to the students of baits, flagging material, jars, etc. that they should arrange to bring from home.
6. Arrange to get the traps and show the children how to set them, bait them, etc.
7. Discuss a trap line design and set up one. Example attached.
8. Decide what measurements you want to take and record.
9. Construct a data sheet with students help. Example attached.
10. Assign one or two traps to each student. Show them how to bait the traps.

SUGGESTED HABITAT TYPES:

1. Garden
2. Creek bottom
3. Bushes and trees
4. Railroad right of way
5. Overgrown fence row
6. Road ditch
7. Abandoned house and yard
8. Corn field
9. Slough edge
10. Slough out on ice
11. Woods
12. Weed patch
13. Soil bank
14. Shelterbelt of evergreen trees

FIELD TRIP: 1½ hours plus ½ - 1 hour per day for two weeks (or one week) plus a 1½-2 hour length of time at the end of the experiment.

1. Review instructions, pass out flagging materials at school.
2. Check equipment list before you leave.
3. Take the entire class out for setting up the trapline.
4. Set up transects and flag trap sights, set up a numbering system for traps.
5. Distribute, bait and set traps; students should do as much of this as possible.
6. Take temperatures and weather data.
7. Return to the classroom.

FOLLOW-UP:

Traps should be checked, reset and baited each morning. Select teams of 4-5 to check traps each day. Arrange for transportation to trapping sites each day for each group.

Instruct the students to carefully set traps and rebait traps when needed. Captured animals in their traps should be returned to the classroom for study. These animals can be returned and released by the next group the next morning. After release, the trap should be reset and baited and placed in the same location. You may want to mark the animals in the field without the classroom study and release them immediately. Careful records should be kept on each trap. A sample record sheet is attached.

The animals in the classroom can be handled in the following ways. Mice and shrews will make up the majority of catches. These can be handled by fifth graders wearing leather gloves. Shake the animals from the trap into a gallon jar with a wide mouth. Observe the animal. Record its size, color, behavior (scared, runs about, eating, licking itself, sleeping, dead, etc.) If the animal is dead, allow the children to hold it, pet it, examine it. Measure the length of the animal, length of the head, ears, tail, feet, etc. Weigh it. Identify animals using A Field Guide to the Mammals. (Available at the Interlakes Office)

Mice and short-tailed shrews may be kept for some time in gallon jars. Provide a house or nest material. Experiment with feeding it. What does it eat? Does it need water?

Mark the animal by clipping the end toe digit from one foot. Toe clipping is the most effective and humane way of marking a small animal. Release it. You may catch it again in a different trap. Larger animals should not be handled but can be left in the trap and studied there. Collect the same data as with smaller animals. Mark them by clipping hair from the animal. Just a small clip is necessary for marking the animals. Release the animal the next day at the same trap location as caught, then reset the trap.

Have each team checking traps and record the weather data each morning in the trapping location. Also, have them record the new tracks or birds and animals they see each day.

The 14th trapping day or last day, take another field trip, pick up all of the traps, clean off baits and discard them. Collect the flagging materials.

FOLLOW-UP:

Gather up the data sheets and analyze the data. Answer the following questions, including those posed earlier:

1. How many kinds of mammals were captured?
2. Which kind was caught most often?
3. Which kind of habitat had the most animals?
4. Which kind of habitat had the least animals?
5. Which bait was most successful?
6. What kind of weather did the animals get caught most in?
7. What kind of animals like meat?
8. Which animals are toughest? Which dies in the traps? Why did they die?
9. Did you catch some animals more than once? In the same trap? How far apart were the traps in which the animal was caught? Which animal traveled the furthest?
10. How big do mice get?
11. Which kind of mouse is the heaviest?
12. How do you tell the different kinds of mice apart?
13. What were the weather conditions on the day you caught the most animals?
14. Who caught the most animals?
15. Who caught the most kinds of animals?

Which habitat had the most kinds of animals?
What kinds of birds did you catch?
Did mice eat meat? Did shrews eat oatmeal?
Did raccoons eat peanut butter?

You might award prizes for the best trappers. Suggestions are as follows:

1. Most kinds of animals
2. Most animals
3. Most unusual animals
4. Biggest animals
5. Smallest animals, etc.

Personnel from the Interlakes Office will be available for planning and executing this activity.

What problems can you expect?

A. Disappointment! You may have days where you catch nothing.
B. Animals in the classroom are a threat! They might get out. Handle them carefully. It really isn't a serious problem to have a mouse or shrew loose in your room. Chances are that they are in there any way whether you know it or not.
C. Handle these critters with gloves, they bite.
D. Toe clipping is the most humane way to mark small mammals. Clip the last digit of the toe of the animal, a different foot and toe of each animal and record the foot and toe. Use a sharp, clean clipper. The toes heal in a day, they don't bleed. Dying and painting or tagging leads to infection, tags pull out, etc.
E. Kids get excited about this project! What may appear to be a control problem of the kids is really enthusiasm. So don't get alarmed. A little extra noise has never handicapped learning.
F. It is essential that this activity is well planned and job assignments are made with responsibilities spelled out clearly.
G. Skunks do! In case some child decides he wants to test that theory, he will definitely learn a lesson. If you wish to include larger mammals in your study, it does not hurt to carry a .22 rifle or pistol to insure against the possibility of a rabid animal or ask the resource person to provide that service to you.
H. There will be a lot of loose ends in this unit that are difficult to cover. That is great!
I. Some animals will die in the traps from freezing.

Some suggestions for other activities follow:

TIPS

Peanut butter and oatmeal are great for mice and shrews. Bacon and liver are great for shrews and weasels. Corn is great for squirrels and rabbits; also gophers. Sardines are great for raccoons, cats and skunks. Carrots and lettuce are good for muskrats and rabbits.

Be sure kids practice setting the traps and baiting them properly prior to setting them. Too much bait plugs up the trigger. Triggers may need adjustments.

Draw maps of the trap locations and flag the trap locations.

Trappers should camouflage traps and be careful not to disturb the area.

Traps should be set from 5-10 yards apart.

Let the kids make lots of mistakes. Let them do the work -- make suggestions, but let the kids do the adjusting.

Kids really enjoy making their own traps, directions for cheap, efficient live traps are attached to this unit.

Kids enjoy skinning, stuffing trap casualties and studying the anatomy of them.

Children enjoy weighing, measuring and even taking the temperature of the animals they capture. Measuring and weighing may be restricted to trap casualties. Temperature taking requires special thermometers and careful handling of live critters, but it can be done and is very interesting.

Other activities and techniques. Adapted from Vertebrate Studies section of Transect Activities II written by the Environmental Science Foundation, Golden Valley, Minnesota.

Mammals and other vertebrates can be directly observed and collected, or indirectly assumed because of their tracks, traces, remains, sounds or homes. It is more difficult to determine frequency, abundance and cover for animals because they move about.

Abundance refers to the number of individuals present. For moving animals, sample plots can be used to determine abundance indirectly by counting the traces, tracks or homes of the various animals in the sample plot (or along a transect). Live trapping and marking animal individuals so that the same one will not be counted twice is another method of obtaining abundance data. Observation of unmarked animals is of some value for rough estimates only.

Frequency refers to the distribution of the individuals of a species. In a study area you might find ten rabbits and thus assign an abundance of ten to the rabbits. These ten rabbits could be confined to a relatively small part of the total area and thus have a low frequency. However, if these ten rabbits or their tracks or traces were found throughout the whole area, rabbits then would have a high frequency.

Generally speaking, a species is considered to have more influence and to be of more importance when it has a higher abundance and a higher frequency than other species.

Cover can be represented by the size of the animal although the concept of plant cover is one that includes its space demands. Therefore, the cover concept for animals would include not only animal size, but also to some extent, its range. Average sizes can be estimated for each of the animals collected. To supplement observations of the mammals, some of the following methods may be used.*

See next page----

*Field Ecology - A Laboratory Block by the Biological Sciences Curriculum Study and Edwin A Phillips, D.C. Health and Company, Boston, 1965.

MATERIALS:

1/4 inch mesh hardware cloth
shovel

PROCEDURE:

Drift fence: Another trapping development that works well in open country and to some extent in forests is the drift fence. A temporary fence of 1/4 inch mesh hardware cloth is set up. Typically, it is made approximately 30 cm high and 10 to 12 m long. A shallow ditch approximately 2 cm deep is made by dragging a shovel through the soil. The fence is then buried 2 cm deep. The fence material is stiff enough to need very little support, but wooden stakes or coat hangers bent in a "U" form may be used from place to place. Live traps or sunken pits are placed at intervals along the fence. The fence is out so as to fit into the funnel of a funnel trap. The trap is placed in the center of the fence so that animals drifting along either side of the fence are directed into the trap. Pits are usually placed on both sides of the fence and may consist of cans from one to five gallons depending on the size of the animals expected. Short fences can be arranged in the form of a cross with live traps or pits in the corners. Then the directions of animal movement can be determined by the particular traps in which the animals land.

If the night is expected to be cold, a little cotton in the live traps will enable the animals to keep warm. Loose, dry oatmeal or oatmeal mixed with peanut butter is put in the can for bait. If there are many small animals in your area, it might be fun to try different baits and see which bait attracts the most animals. Artificial scents could be used also and perhaps different vegetable dyes to give different colors to the bait. Many investigators use plain peanut butter. The crunchy type is better if ants are expected because they have more trouble carrying away this type. If three or four teaspoons of bacon grease are added per pound of peanut butter, more shrews seem to be caught. Other investigators have used raisins, apples, berries, bananas and nuts as bait. Another investigator has used, with great success, dry soup mix (split pea, bean and noodle fragments, etc.) plus a small piece of fresh apple. The traps should be set out of direct sunlight where possible and set firmly with a slight tilt so water will drain out of the can. In the woods, the traps should be placed near a tree trunk or log and in the field at right angles to animal runways, if they can be found. For an estimate of the population, a straight line with twenty stations has been suggested at 15 m intervals. At each station three types are set within a radius of 2 m, perhaps with different baits.

Pitfalls *

MATERIALS:

two pound coffee can

PROCEDURE:

Sink cans in the ground so that the rim is even with the ground. When set along small animal trails, these collect shrews, for example, which are attracted by a little meat (or see suggestions on bait for live traps). Two pound coffee cans are a good size for many mammals.

Scat Board *

MATERIALS:

four inch plywood squares or wall tiles

PROCEDURE:

The droppings (scats) of animals will often appear on squares of tile distributed throughout a community. Four-inch plywood squares have been used but are heavier and more expensive than equally usable tan-colored plastic wall tiles 4¼ inches square. The use of different kinds and colors would provide a good experiment. If these droppings are identified they provide good supplemental information as to range and occurrence. Scats seem elsewhere should also be identified where possible.

Tracks *

MATERIALS:

white sand (optional)

PROCEDURE:

White sand or a substitute can be sprinkled along an animal trail so that the tracks show up better. Also wetting the dirt in certain area where animals are expected will make tracks more visible. Studies of tracks in mud. A good slippery, gooey clay mud is spread evenly and trowelled smoothly on pieces of polyethylene just before nightfall so that evaporation is low. The area can be baited with a piece of food in the middle. Night animals such as raccoons, skunks, and house cats are especially susceptible to this system. To preserve the tracks for more detailed study and identification, the tracks can poured with plaster the next day.

*Field Ecology, A Laboratory Block by the Biological Sciences Curriculum Study and Edwin A. Phillips, D. C. Heath and b ompany, Boston, 1965.

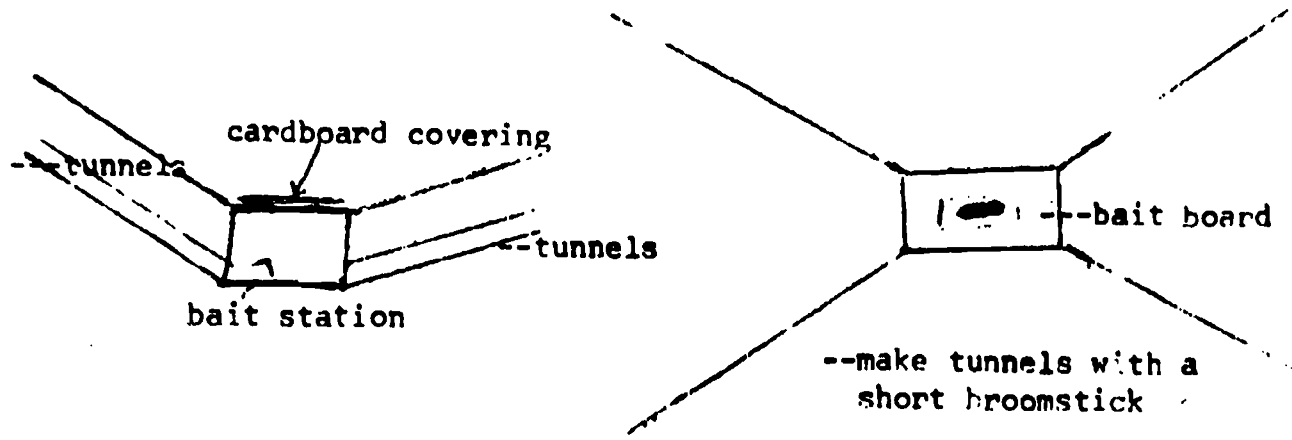
ACTIVITY ORIENTATION FOR LOWER GRADES:

The teacher can assist in setting up experiments which introduce the same kinds of concepts without the trapping experiment.

STUDY OF FOOD HABITS:

Take a two foot by two foot piece of cardboard and attach four or five types of food to it. Have teams of four kids make one. Put these bait stations in different habitat types. Check occasionally to see which food is eaten fastest. Try to determine what is eating it by the tracks and droppings around the station. To protect the station from dogs and cats, pile sticks or boards over the station.

Or, if the snow is too deep, dig out a three foot square hole down to the grass or soil. Pile snow on top of the cardboard covering as shown below:



Record the signs of use, the favorite bait or foods. Try to determine what type of animal is using the station.

This is a good activity to incorporate report writing, story writing and telling, outlining, etc. as part of the follow-up activity. Use experiences learned to construct communication presentations.

1. Story writing, from the animals' point of view about its capture and release, etc.

2. Write a play about it (perhaps with interaction of animals around the bait station.

EVALUATION OF LEARNING:

Why not have the kids make up tests for each other based on what they have learned. Attached are some matching test suggestions which you may use.

Have the kids draw a map and detailed plan of the area they think their animal lives in.

A LIST OF SOUTH DAKOTA MAMMALS

There are many others in South Dakota, but they are not to be expected in Lake County.

Oppossum
Arctic shrew
Masked shrew
water shrew
Least shrew
Short-tail shrew
Dwarf shrew
Raccoon
Least weasel
Short-tailed weasel
Long-tailed weasel
Mink
Badger
Spotted skunk
Skunk
Red fox
Gray fox
Richardson ground squirrel
13-lined ground squirrel
Franklin ground squirrel
Fox squirrel
Northern pocket gopher
Plains pocket gopher
Wyoming pocket mouse
Olive backed pocket mouse
Western harvester mouse
Plains pocket mouse
White-footed mouse
Deer mouse
Northern grasshopper mouse
Southern bog lemming
Boreal red-backed vole
Meadow vole
Prairie vole
Muskrat
Norway rat
House mouse
Western jumping mouse
Meadow jumping mouse
White-tailed jackrabbit
Eastern cottontail rabbit

SAMPLE DATA SHEET

Trapper's Name	3-1-71	3-2-71	3-3-71
Date 2-27-71			
Transect No. 1			
Trap No. 1			
Trap size & type H - large			
Bait or baits corn & sardines	same	same	same
Animal caught raccoon	raccoon	cat	none
Animal weight 12 lbs.	same	8 lbs.	----
Animal length 3 feet	same	2 feet	----
Animal sex male	same	female	----
Marked hair clipped on tail	same	same	same
Temperature 20°F	10°F	32°F	10°F
Sky cover clear	clear	cloudy	cloudy
Precipitation none	none	snow	snow
REMARKS:			
Raccoon - hair clipped on tail released	raccoon released	cat hair on tail clipped	trap undisturbed

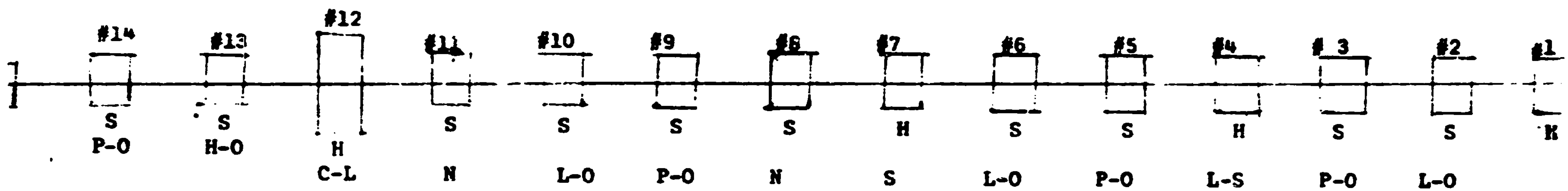
DATA SHEETS SHOULD BE MAKE FOR EACH TRAPPER FOR EACH TRAP.

DATA SHOULD BE COMPLETED EACH DAY WHETHER THE TRAP IS SUCCESSFUL OR NOT.

SAMPLE TRANSECT
CORNFIELD - TRANSECT #1

REPEAT THE ACTIVITY IN WOODLAND, SLOUGH AND DRY LAND PRAIRIE

(KEEP TRAPS 15 FEET APART)



H - indicates Harahart Trap

S - indicates Sherman Trap

L - liver
O - oatmeal
P - peanut butter
N - pecans
S - sardines
C - corn

BEST COPY AVAILABLE

DIRECTIONS FOR MAKING A LIVE ANIMAL TRAP

MATERIALS:	COST
1. Empty coffee can - any size	--
2. Small screws and bolts - two per trap	.02 each
3. Metal or wire cutter	--
4. Mouse trap	.15 each
5. Wire screen	.25
6. Very fine wire	.20 per roll

PROCEDURE:

Cut two slits one inch long and one half inch apart in the open end of an empty coffee can. Drill two holes the size of the two screws on opposite sides of the pad of the mouse trap. Bend the cut piece of the coffee can back into the coffee can, and slide the pad of the trap into the opening formed. Drill two holes in the coffee can to match the holes in the trap.

Cut the wire screen so that there will be about one half of an inch overlap around the can. Cut off a half inch on one side of the wire circle. Attach the wire screw to the wire of the trap using the fine wire. Attach it in eight places at least. Make sure to attach the screen so that is is on top of the trap wire when the trap is set. This is done so that when the trap is sprung the screen will fit flat against the can opening. Using the screws and bolts secure the trap to the can. The wood base of the trap should be outside of the can.

Set the trap in the usual manner pulling the trip wire through one of the holes in the screen.

SAMPLE DATA SHEET

MAMMAL FOOD PREFERENCES

MAMMAL	BAITS USED
Raccoon	Corn
House Cat	Peanut Butter
Deer Mouse	Oatmeal
Meadow Vole	Carrots
Masked Shrew	Bacon
Short-tailed shrew	Liver
Jumping Mouse	Lettuce
Muskrat	Sardines
Weasel	Oats
Skunk	

PLANT ONLY BAITS WHICH CAPTURED THESE ANIMALS.

NOTE: Some animals perfer meat. Some animals perfer vegetables and others eat nearly anything.

ANIMAL AND BIRD SIGN PUZZLES
MATCHING AND/OR SETS

PICTURE OF THE ANIMAL	CLUES
rabbit	fox fur
fox	tail feather
pheasant	duck's foot
duck	rabbit's foot
mouse	droppings
jackrabbit	corn with embryo eaten out
mouse	corn cob
squirrel	rabbit pellet

ANIMAL HABITAT

(Place animals like to live - use pictures or drawings for younger children)

ANIMAL SIGNS, TRACKS OR CAPTURE	HABITAT TYPE
DEER	CORNFIELD
PHEASANT	ALFALFA FIELD
MUSKRAT	PASTURE
MINK	PLOWED FIELD
SQUIRREL	SHELTERBELT (EVERGREEN AND CEDAR)
COTTONTAIL RABBIT	SHELTERBELT
JACKRABBIT	SLOUGH
SKUNK	CREEK
RACCOON	UNGRAZED PASTURE - PRAIRIE
MEADOW VOLE	WOODS OR FOREST
DEER MOUSE	WEEDY PATCH
WHITE-FOOTED MOUSE	DUMP GROUND
MASKED SHREW	
SHORT-TAILED SHREW	
FLICKERTAIL	
13-LINED GOPHER	

NOTE: Arrows drawn to these habitat types will result in definite preference patterns. This shows a need by creatures for a definite type of home or place to live.

ANIMAL ACTIVITY

(Match weather to the day the animal was caught or new tracks seen)

ANIMAL	WEATHER
RABBIT	WARM, CLEAR, STILL
SKUNK	WARM, CLOUDY, STILL
RACCOON	WARM, CLEAR, WINDY
PHEASANT	WARM, CLOUDY, WINDY
MEADOW VOLE	WARM, CLOUDY, STILL
DEER MOUSE	COLD, CLEAR, STILL
WHITE-FOOTED MOUSE	COLD, CLOUDY, STILL
MASKED SHREW	COLD, CLEAR, WINDY
SHORT-TAILED SHREW	COLD, CLOUDY, WINDY
SQUIRREL	SNOWING

NOTE: Animals will show definite activity patterns which vary with weather conditions.

ADAPTATIONS OF PLANTS TO THEIR ENVIRONMENT

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016 Phone: 489-2416
(Revised 3-15-72)

Grade Level - 4-8

Best time of year - Late Spring, Early Fall

OBJECTIVES:

1. To introduce the concept of adaptation of living organisms to their environment.
2. To show how one specimen can adapt to specific environmental influences.
3. To introduce and reinforce the techniques of problem solving by which the student can solve other problems that he may encounter.

BACKGROUND:

The plants and animals that we have on earth today are much different than the plants and animals which were present centuries ago. Very few organisms that we are familiar with have retained their appearance over the many centuries of change. The environment has been constantly changing and the animals and plants have adapted to the change. Those that retained their original form had qualities that allowed them to change physiologically to the environment without changing physically. The majority of our plants and animals have developed the ability to change the environment to better suit them but very few species can claim this feat. The rest of the species had to rely on changes in themselves or they disappeared from the face of the earth.

It is very easy for us to see the various adaptations that plants and animals have. These adaptations have allowed the organisms involved to survive or more easily survive the rigors of daily life in their environment. We can observe different organisms and determine what characteristics these organisms have that help them survive. We can also observe one individual specimen to determine if it has any special techniques that show a tendency towards adaptation. This may be more impressive than observations of an entire group of organisms. We will use a tree for our study speciman and the tree leaves as a source of information.

PRE-ACTIVITY:

1. What is meant by evolution?
2. What is meant by adaptation?
3. What types of adaptations do fish have for living in the water?
4. What kinds of adaptations do certain mammals have for life in the water?
5. How do animals get their food?
6. How do plants get their food?
7. What adaptations do aquatic plants have for living in their environment?
8. What adaptations do terrestrial plants have for living in their environment?

9. Do all plants secure food by photosynthesis?
10. What is essential for photosynthesis to occur?
11. Why do some plants have larger leaves than others?
12. Are all the leaves on a tree the same size?
13. If the leaves aren't all the same size, which ones are larger?
14. Let's take a field trip, collect some leaves, measure them, and determine if there is a difference and if there is, which ones are larger.

FIELD TRIP:

Equipment needed: paper bags and felt-tipped pens

The field trip can be taken to any shelterbelt that has deciduous trees in the belt. The groups should split up and each group should try to find a different kind of tree. Each group should collect leaves from only one tree. They should collect about 20 leaves from the shaded portion of the tree and label the bag that they collected them in. Next, they should pick about 20 leaves from the exposed portion of the tree and label these. This collection may be done while on another field trip or you may want to have a separate activity for the collection.

POST-ACTIVITY:

The leaves collected can be measured in two ways. One method is to use a ruler and find the number of cm^2 or the number of in^2 in each sample. To get an accurate figure, you should average the twenty leaves in each pile and compare the numbers. An alternate method to this would be to weigh the two piles and compare these numbers.

Ideally, the results you get will show that the leaves taken from the shaded portion of the tree will have a larger area and a greater weight than the leaves from the exposed portion of the tree.

Why should you get these results? The leaves that are in the shaded portion of the tree should be larger because they need more area exposed to the sun or to the light. They won't get the direct rays of the sun. Therefore, they won't be as efficient at photosynthesis. This will cause the plant to increase the surface area of the shaded leaves to compensate for the decreased efficiency.

As stated previously, this is an ideal situation. You may find that some of the species of trees won't show this tendency while others will. This may be a topic for a little research on the students part to try to determine the reason behind this.

GRASSES

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. 57016 Phone: 489-2416

Grade Level - 4-8

Best time of year - Early Fall or Late Spring

OBJECTIVES:

Many textbooks and science curriculums contain a unit on grasses. It is often a tough unit to study for lack of student interest and an inability of the teacher to find and provide interesting auxillary learning materials to supplement this unit. The objective of this unit is to translate the excellent vocabulary and concepts taught in the classroom grasses study units into reality in the field.

1. To find and identify different species of grasses.
2. To study the soil and water requirements of different grass species.
3. To study the parts of grasses and reproductive structures.
4. To emphasize the differences between grasses and weeds, shrubs and trees.

BACKGROUND:

There are at least 45 kinds of grasses in Lake County, seventeen to 24 of these species are common and can be picked up in a few minutes on the Madison Waterfowl Production Area. Grasses like other plants have rather specific needs. In wet areas several species will thrive, in very dry areas a different series of species will be found. Some grasses do best in undisturbed soil, others need cultivated and disturbed soil. If you want a variety of grasses, look in different soil and moisture zones. The best characters for separating species of grasses is the seed heads. These are usually very common in the Fall, but rather difficult to find by Spring. The color, growing patterns, leaf and stem shape, and general conformation of the plant or plant colony are also good distinguishing characteristics. Several excellent books are available to help you identify grasses; South Dakota Weeds available from the South Dakota Extension Service, South Dakota State University, Brookings, South Dakota free of charge and Plants of South Dakota Grasslands, Bulletin 566, availabl at the same address for about $3.00 a copy. This publication has excellent color pictures and discussions of the importance of South Dakota Grasses.

MATERIALS:

1. Large paper bags
2. Several hand spades
3. Hunting knives
4. Poster paper and masking tape
5. Books - South Dakota Weeds and Plants of South Dakota Grasslands

PRE-ACTIVITY:

This activity is most effective when it follows a normal classroom unit on grasses. However, here are some questions which may help you increase student enthusiasm and prepare them for a successful outing.

1. List some grasses that are important to us.
2. Which ones provide food for us?
3. Which ones provide food for our livestock?
4. Which ones are weeds?
5. How do you tell a grass from a "weedy forb"?
6. What are different about the leaves and stems of grasses compared with other plants?
7. List some ways grasses reproduce.
8. Have you ever seen stolons or rhizomes?

Let's go on a field trip and make c collection of grasses and see if we can find some answers to our questions.

Remember some tips for separating kinds of grasses:

1. Different water and soil requirements
2. different seed heads
3. shape and color of the leaves
4. shape and grow patterns.

FIELD TRIP:

The field trip can be taken to any farm, park, railroad grade, abandoned field or pasture, slough or native prairie area. Instruct kids to collect one stem, with leaves and seed head of each type of grass they find and put it in a paper sack. Also, ask the children to note how the grasses grow in groups according to the moisture or soil type and condition.

Stolons and rhizomes can be found by digging up plants and noting the growth structures growing out away from the roots. The best example of rhizomes we have found in thes area are those of the large slough grass or cord grass. This is the very large coarse grass found on slough edges. It's seed heads are large and compact. It is very common around the Madison Waterfowl Production Area and other sloughs in Lake County. The rhizomes shoot out from the root system with large shoots which grow out and poke up through the soil from six inches to six feet away. The runner is about the thickness of your little finger. Take one home and put it in very wet mud in a large planter to see if it will grow.

This trip should take about thirty minutes, but can be adjusted to fit weather conditions and class needs.

POST-ACTIVITY:

Have each student make a poster of the grasses they collect. Make a class poster and identify the grasses as best you can. Plant some of the seeds to see what the shoots look like. Plant the rhizomes and stolons to see if you can get them to produce a plant. Plant some of the seeds on the school grounds to see if they will grow there.

Write scientific reports about the results of this experiment and your field trip.

Make a poster which illustrates the differences between a grass like cordgrass and forb like sunflowers. There are many other follow up activities you can do with grasses in math and art. Some grasses come apart in neat sections which can be measured and used in studying fractions and decimels, averaging and calculating percentages.

If you need assistance with this activity, please contact the Madison Waterfowl Production Area Office or the Interlakes Office.

HOW MANY CARRION BEETLES?

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota, 57016. Phone 489-2416. (Revised 2-7-72)

Grade Level - 4-8

Best time of year - After May 1st and before the first frost.

OBJECTIVES:

1. To introduce students to the concept of beneficial insects and scavengers.
2. To acquaint the students with visual and sensory recognition of death and decay.
3. To introduce the students to designing experiments.
4. To introduce the students to the idea of making population estimates (numbers of animals in a given area).
5. To acquaint the students with the concept of home range and animal movement to a new food supply.
6. To acquaint the students with the concept of succession, or that the kinds of animals in a given place will change the conditions in that place to a point that they can no longer live there. Then other kinds of animals will move in after the first group leaves.
7. Acquaint the students with methods of handling and marking animals.

MATERIALS:

1. Colored fingernail polish with application brush - 3-4 colors
2. Flat, shallow cans or pans - one per dead critter or different kind of bait.
3. Five to ten pounds of sand - optional
4. Fresh, dead material (mice, rats, ground squirrels, chickens, sparrows, scraps of meat or almost any dead meat source).
5. 100 foot tape - optional
6. Several hand spades.
7. An accurate scale - weighs in grams - optional

BACKGROUND:

Don't shy away from this activity; it can be one of the most interesting and exciting of them all.

When a bird or animal dies or is killed, a string of events occur which, during a short period of time result in the creature being eaten, decomposed and eventually disappearing back into the soil. Almost immediately after death, flies and large carrion beetles gather. They chew holes in the carcass or lay eggs on it. The eggs hatch and larvae feed on the dead tissues. Beetles feed on the fly eggs and juices of the dead creature. Beetles will dig holes in the soil and lay their eggs. These eggs hatch and beetle larvae eat fly larvae. Eventually, the adult flies and beetles leave the carcass because it no longer has the food it needs. But, other kinds of flies and beetles move in because the carcass is conditioned to just the way they like it. This is called succession. It is very interesting to watch.

There are two very large beetles which are part of the decomposition cycle. One is black and orange and may be one and one half inches long. It is very pretty and easy to catch and handle. The other is gray and black, smaller but still large enough to handle easily. Both insects can be captured and numbers painted on their backs. They can be recaptured and that distance they moved recorded.

PRE-ACTIVITY:

Ask the students the following questions to introduce the activity;

1. What happens when an animal dies? Make a list of the answers.
2. Where does it go?
3. What is the difference between dead and living animals?
4. What causes things to die? List reasons.
5. Do they smell? Why? Does it smell good or bad? Why?
6. Does it smell bad to everything? What do the dead things smell good to?
7. What eats these dead things?
8. Where do these insects go when all the dead thing is gone?
9. How far do you suppose they are able to fly? or crawl?

Let's set up an experiment to find answers to these questions. Set up an experimental design like suggested in the attached sheet to be used for the experiment.

Ask the kids to bring a dead creature. (8-10 will be plenty, four will suffice). A road killed pheasant, pigeon, gopher, or scraps of raw meats will work.

FIELD TRIP:

Check the equipment and baits before leaving.

Travel to study area (Wetlands or any open pasture, ditch or grain field and perhaps the school yard).

Set out a series of four bait stations, 100 feet apart in the form of a square or long line or several squares depending on the number of dead animals or other baits present.

Dig shallow pits and sink shallow pans into the ground with lips of the pans at ground level. Place sand in the pan bottom about one inch deep and then place the animal on the sand. Number each station and assign it a color of fingernail polish. Leave the area undisturbed and return to the classroom.

Return to the field the next day or within two days. Assign students a data collectors and distribute data sheets. Check each bait station to see what has happened. List the number and kinds of bugs you find at each station.

Catch each large carrion beetle, weigh it, paint the number of the station it was caught at on its back with fingernail polish. Also, give it a special mark (attached is a sheet which will give examples). After all baits are checked and beetles are marked and returned to the baits from which they were collected, return to the classroom. (Be sure the fingernail polish has dried before releasing the beetles).

Repeat the activity each day for two or three more days. Put out new bait stations with a new bait during each trip. Place 100 feet from the others.

When baits have been abandoned by marked beetles, dump out the pans, fill up the holes and return to the classroom.

FOLLOW-UP:

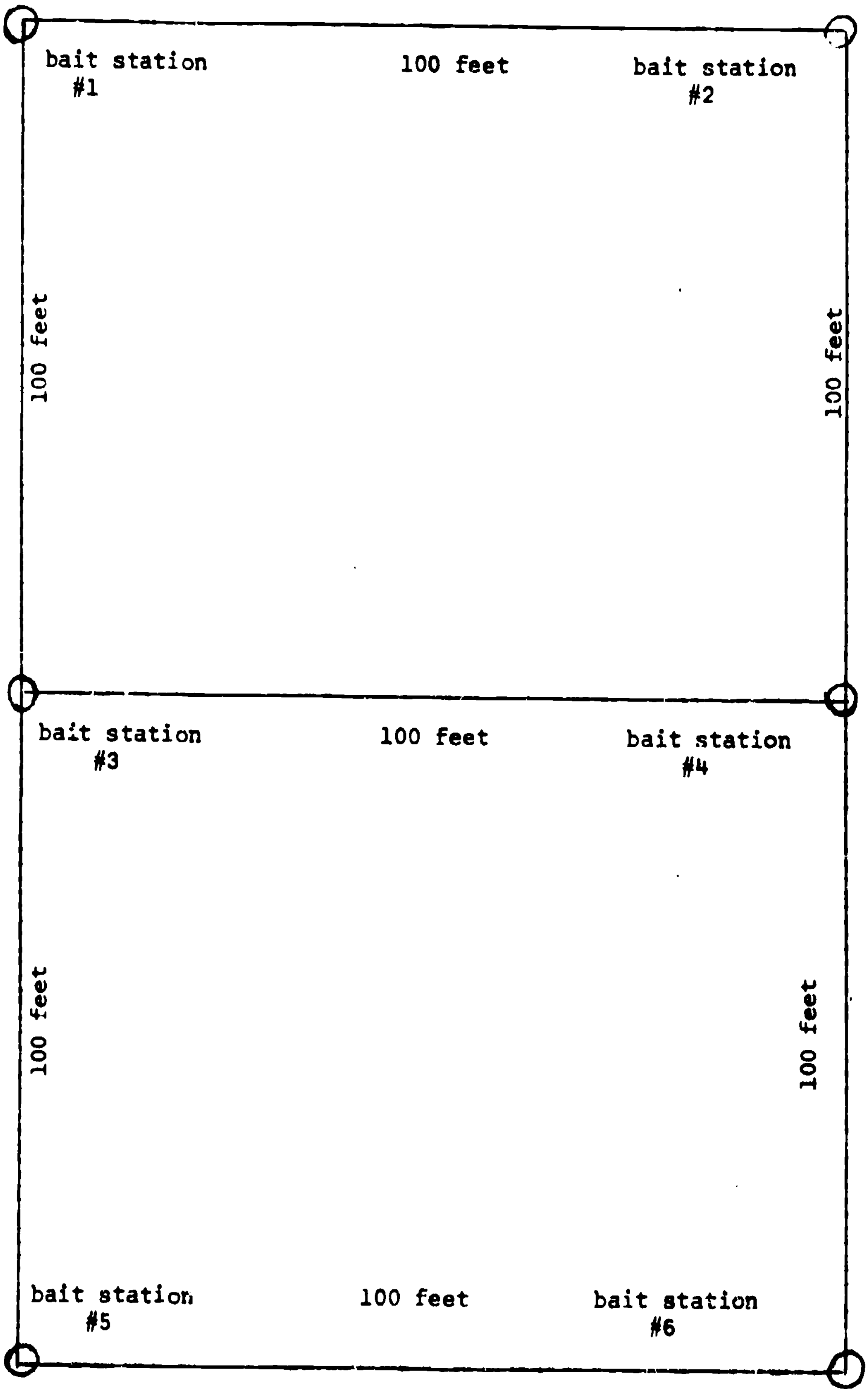
Examine the data collected and answer the following questions:

1. What kind of bugs did you collect?
2. How many different kinds did you collect?
3. Which dead animal or bait attracted the most insects?
4. Which dead animal or bait attracted the most beetles? Orange and black? Gray and black?
5. How many beetles were marked?
6. How many were collected in different places than first marked?
7. How far did they move? Why did they move?
8. How many beetles would you estimate there are in that area?
9. How could you find out?
10. Did beetles all weigh the same? Did the marked ones change weights? Why?
11. What happened to the dead animals? What changed them?

You may want to try to keep some of the beetles to observe in the classroom.

Hopefully, you will arrive at the conclusions that insects are a fast and efficient waste disposal system and that they travel a long distance to get from one animal to another or from one type of bait to another. Also, hopefully the insects will move about from one animal to another related to the changes in smell and appearance observations the class made.

If you have further questions about this activity, please call the Interlakes Office at 489-2416.


bait station
#1
100 feet
bait station
#2
100 feet
100 feet
bait station
#3
100 feet
bait station
#4
100 feet
100 feet
bait station
#5
100 feet
bait station
#6

SAMPLE DATA SHEET

STATION NUMBER: 1

STATION COLOR: Red

DATE PLACED OUT: April 18, 1971

KIND OF BAIT: Dead Rabbit

APPEARANCE: Freshly Dead

SMELL: No Smell

DATE: April 19, 1971

APPEARANCE: Bloated

SMELL: Stinks a Little

DATE: April 20, 1971

APPEARANCE: Full of Holes, Maggots

SMELL: Putrid

DATE: April 21, 1971

APPEARANCE: A Messy Blob

SMELL: Putrid

DATE: April 25, 1971

APPEARANCE: Dried Up, Brown

SMELL: Mild Stink

SAMPLE DATA SHEET
HOW MANY CARRION BEETLES?

STATION NUMBER 1 - RED

BAIT - DEAD RABBIT

DATE PLACED OUT: April 18, 1971

DATE CHECKED FIRST TIME: April 19, 1971

KINDS AND NUMBERS OF INSECTS:

DATE: April 19, 1971

1. 20 blue flies
2. 10 brown flies
3. 50 green flies
4. 3 large orange and black beetles
5. 1 large gray and black beetle
6. Many kinds of small beetles
7. Fly eggs

DATE: April 21, 1971

1.
2.
3.
4.
5.
6.

DATE: April 20, 1971

1.
2.
3.
4.
5.
6.
7.
8.

DATE: April 22, 1971

1.
2.
3.
4.
5.
6.
7.
8.

SAMPLE DATA SHEET

BEETLE DATA STATION NUMBER ONE - RED

ORANGE AND BLACK BEETLES

DATE: April 19, 1971

NUMBER PRESENT: Three

GRAY AND BLACK BEETLES

NUMBER PRESENT: One

DATE: April 20, 1971

ORANGE AND BLACK BEETLES

NUMBER PRESENT: Five

BEETLE MARKING CHARACTERISTICS

BEETLE No. 1 - Station 1 Red + Red

BEETLE No. 2 - Station 2 Red + Blue

BEETLE No. 3 - Station 3 Red + Green

BEETLE No. 1 - Station 1 Red + Red

BEETLE No. 1 - Red + Red, Station 1

BEETLE No. 2 - Red + Green, Station 3

BEETLE No. 3 - New,-Red + White, Station 4

BEETLE No. 4 - Blue + Red(Marked at Station No. 2 on April 19, 1971) Station No. 1

BEETLE No. 5 - Red + Black (New) Station 5

LICHENS

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416.
(Revised 2-8-72)

Grade Level - 4-8

Best time of year - Anytime

OBJECTIVES:

1. To introduce students to the importance of plants to the development of soil and ultimate benefit of man.
2. To introduce students to the scientific identification of organisms.
3. To study lichens and the ecology of an organism association which enables two plants to live where neither could live alone.

BACKGROUND:

Lichens are included in science studies of plants in most elementary and middle school curricula. They are used as prime examples of an association called symbiotic relationship. This means that two organisms grow in an essential and close association, both benefit the other and need each other. They are discussed and treated as single organisms in the naming processes. Soil building from rocks and tough organic materials is the primary function of these organisms. They are important in other respects also. In the cold taiga and artic zone of the northern hemisphere lichens are important food materials for caribou, musk oxen, and even man. Forest fires are fought in Alaska to save the slow growing lichens as much as to save the trees. In parts of Alaska the lichens are more important as caribou food than any other food source.

In eastern South Dakota, lichens are very common and several colors and species are present. But only a few people are aware of them, what they do and why they are important.

Lichens are among the toughest, most resistant of living groups. You can find them where nothing else will grow. On rocks, old dry wood posts, and tree bark, these little cheezy looking, algae-fungi conglomerations stick tightly and etch out a living. They are unprotected from temperature changes and live in some of the driest micro climates available.

Lichens have an interesting ecology which can be studied very easily with a minimum of equipment.

The Interlakes Office has a pictorial key of the common lichen of this area with pointers on where to find them.

MATERIALS:

hunting knife or screw driver
centimeter ruler
dissecting scope or 10X magnifiers
paper, pencils, clipboards, etc. for mapping purposes
paper bags for collecting different lichens

PRE-ACTIVITY:

The normal curriculum experiences on lichens can serve to introduce lichens. Ask the following questions about lichens:

1. What are they?
2. What do they do for man?
3. How are they valuable?
4. If they break up rocks, how do they do it?
5. Where do they get their water?
6. If they grow slowly, how do you know and how could you measure growth?
7. Why do they tend to grow slowly?

Ask the students who have seen lichens and know what they are to raise their hands.

Suggest a field trip to find lichens and study them.

FIELD TRIP:

Take the class to the nearest tree stand, old rock pile, or rocky pasture. In this area lichens on rocks are not plentiful, but every tree will have lichens on the bark.

Have students find all different types they can and collect the various colors and shapes to bring back to class for identification.

Then have students pair into groups and map the distributions of lichens on a tree. Wrap a piece of poster paper around the tree being careful to orient the map to North-South and East-West sides of the tree. Map a belt about one foot high around the tree at chest height. Record the distribution of the colors and lichen types. Record the exposure of the sides of the tree as to being in the sunlight or shade, exposed to prevailing winds or protected, and what type of tree it was found on. Count the lichen plants on each map. Measure their size and average them. See the attached data sheets and simulated experiment.

POST-ACTIVITY:

Compare the maps and data and question the results. Following are some questions you may want to ask:

1. Which side of the tree had the most lichens?
2. Which kind of tree had the most lichens?
3. Which kind of tree had the biggest lichens?
4. Which kind of tree had the most kinds of lichens?
5. What other plants were associated with the lichens?
6. Which lichens were most abundant on the sunny side?
7. Which lichens were most abundant on the dark side?
8. Which lichens were most abundant at the base of the tree?
9. Which lichens were most abundant on the dead branches?
10. How could you estimate the age of a lichen?
11. How big did each lichen species average?
12. How many lichens are there on the study tree? How could you find out?

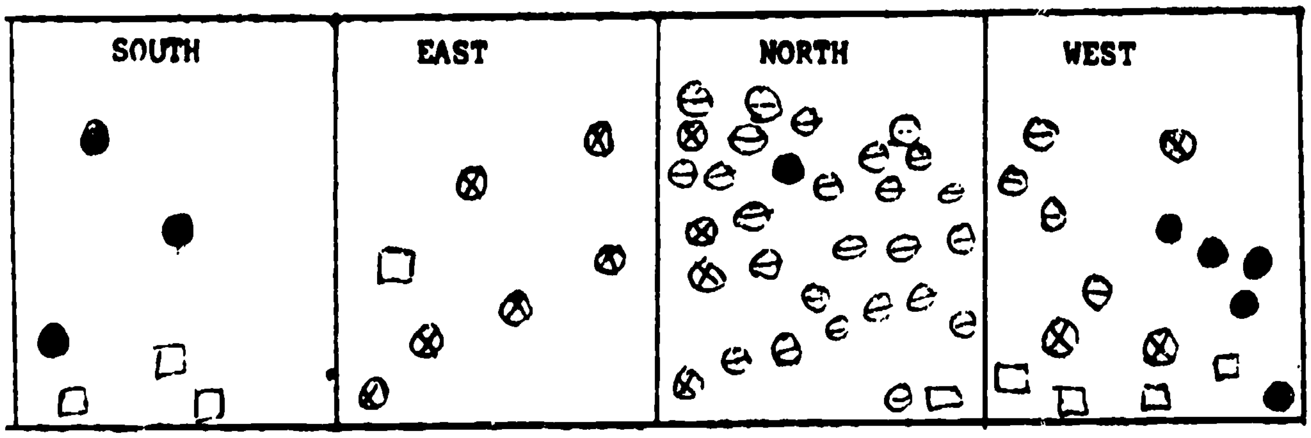
Identify the lichens to genus or species. Which species probably needs the most moisture?

Make a poster of the lichen types and write a short report on each of them from the information you collected on the field trip.

Try growing them in the classroom using techniques developed by the students. Chip off bark or break dead branches and experiment with these plants by giving various amounts of water to them, varying amounts of sunlight, etc. Measure the growth with a centimeter ruler over a month period of time. Expect it to be minute. Why?

Sample map of lichen distribution. One foot high at chest height above the ground.

Elm tree shaded from the other trees.



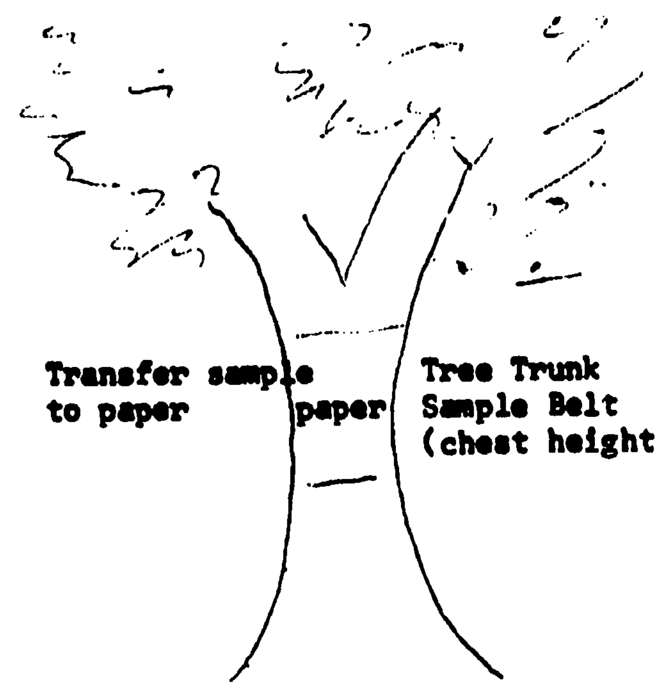
Type 1 ⊗

Type 2 ⊖

Type 3 ●

Type 4 □

Average size - Type 1 - 4 cm^3
Type 2 - 7 cm^3
Type 3 - 3 cm^3
Type 4 - 1 cm^3



Type	1	2	3	4
South	0	1	3	3
East	5	1	0	2
North	5	35	0	2
West	3	4	5	9

Why so much variation?

Estimate of area-size of the lichen

Draw an estimated circumference, determine the radius and treat as the area of a circle

$A = \pi r^2$

$A - 12\ cm^2 \times 3.14$

$A = 452.2\ cm^2$ or $45.2\ cm^2$

or it may be rectangular or square shaped.

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LICHEN DISTRIBUTION ON TREE SPECIES AND ROCKS

TYPE	1	2	3	4	5
ELM	8	10	7	8	0
MAPLE	3	15	1	0	0
WILLOW	0	9	27	0	0
BOX ELDER	25	2	8	3	0
GREEN ASH	23	2	8	2	0
ROCKS	1	0	0	0	10

LEAF STUDY

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. Phone: 489-2416. (2-30-72)

Grade Level - 4-8

Best time of year - Late Spring or Early Fall

OBJECTIVES:

1. To promote student appreciation of the vast variety of leaves found in this area.
2. To enable students to learn different parts of a leaf.
3. To show students that different plants have different leaf arrangements.
4. To demonstrate to the students that there are different leaf types.
5. To assist students in studying leaves and discovering that they have different forms and shapes.

MATERIALS:

1. Paper bags
2. Tag board - cardboard
3. Masking or scotch tape
4. Reference books on leaves
5. A guide to Field Identification of Trees of North America
6. A Field Guide to Trees and Shrubs

BACKGROUND:

South Dakota has an abundance of different types of trees. We all can appreciate their beauty, their usefulness for wildlife and their economic value. We can identify almost all of the basic species -- cottonwood, box elder, willow, evergreen, apple trees, plum trees and lilacs. However, we may have a tough time with some of these if blossoms or the fruits aren't there for us to see. It is difficult to identify deciduous trees in the winter when the leaves are gone.

Very few of us will ever take courses on tree identification, but that doesn't mean that we can't learn about them or our own. While it is not imperative that we learn the names of trees, it is nice to be able to tell what types of trees are in a particular shelterbelt, which types of trees are used most for nesting, which cause the biggest snowdrifts, which ones produce the fruit we like to eat, and which ones need to be protected from disease.

We can introduce a study of tree species in grade school by studying and identifying different parts, types, shapes and arrangements of leaves. After the students have collected examples of the different categories, the leaves can be compared with pictures of various trees or with displays and posters of the actual leaves that have been previously identified and labeled. After this has been completed, some attention can be given to the leaves on subsequent field trips. The more students work with the leaves, the better they will do later on their farm or when they are just enjoying nature.

Note: If trees are not abundant or the variety is small, the same activity can be done with weed leaves.

PRE-ACTIVITY:

Begin by asking questions similar to the following:

1. What are leaves?
2. What do they do?
3. What color are they?
4. Are all leaves the same color?
5. Why do some leaves change color?
6. Why do some leaves stay green?
7. Why do some trees lose their leaves?
8. What shape are leaves?
9. Do leaves have different parts?
10. What happens to the leaves that fall?
11. Do evergreen trees lose their leaves?
12. How do you know whether evergreen lose their leaves?
13. Are all evergreen trees alike?
14. How do you tell the difference between evergreens?
15. What are deciduous trees?
16. How can you tell deciduous trees apart?

Let's examine these diagrams and try to get a working knowledge of the different examples. When we become reasonably proficient, we will go out and try to collect examples of the different leaves.

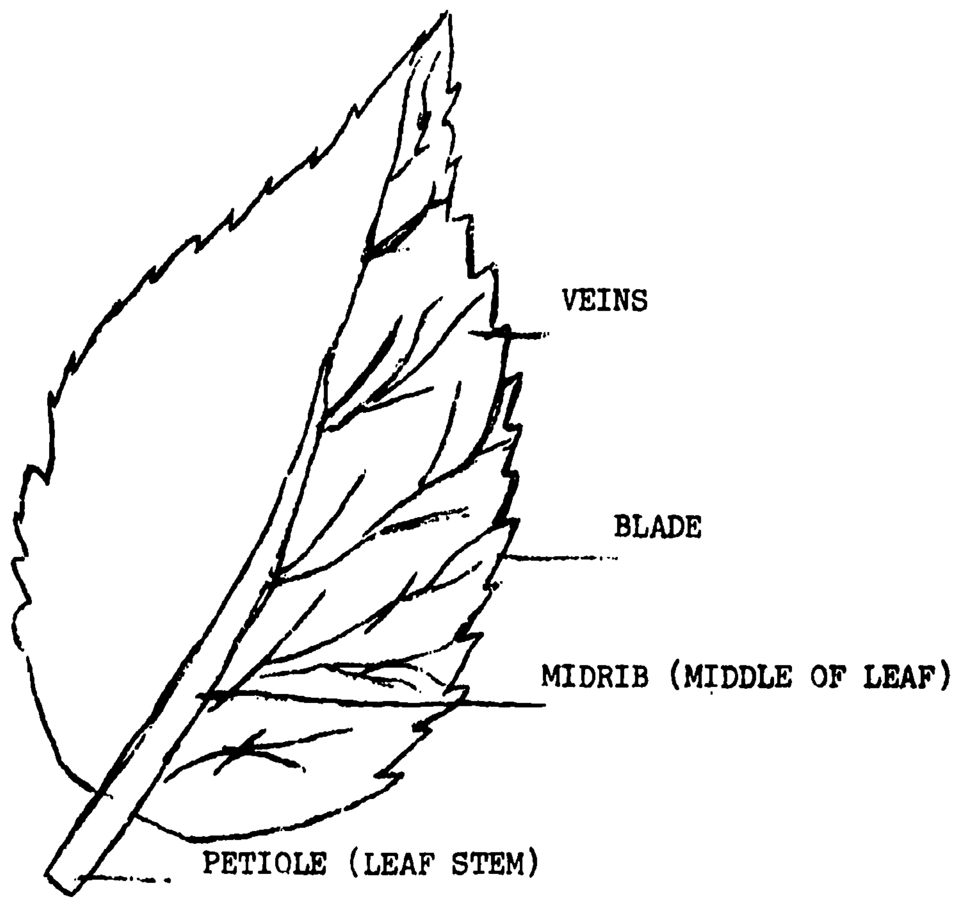
FIELD TRIP:

Each student should have a paper bag for collecting leaves. Some masking tape would be a good idea if they know the names of the leaves they have collected. This will keep them from getting the leaves mixed up. Turn them loose in a shelterbelt (Lake Herman State Park or the Wetlands are excellent areas for this trip) or a wooded area of some type. Inform the students that they should be careful when collecting leaves from trees. If possible, they should pick up some leaves that have already fallen. (This will be easier in the fall of the year, but may still be possible in the spring). Each student should have a copy of the examples they are trying to collect. Encourage them to get as many different examples as they can in the time allotted. This time period could be from 30-60 minutes in length or whatever time you have available. The different examples don't have to be limited to trees; shrubs and bushes are also good examples.

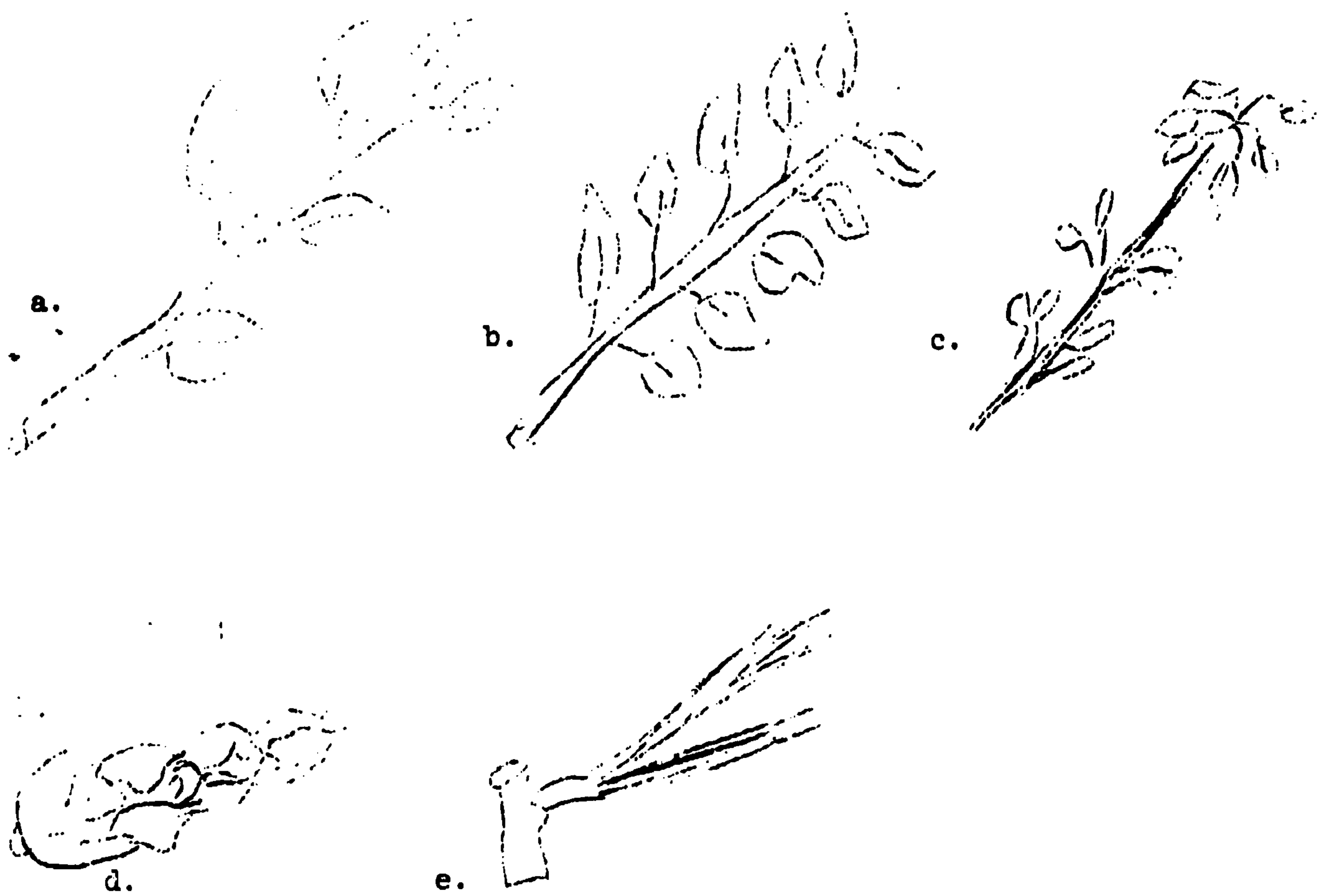
FOLLOW-UP:

The students should use a cheet of tagboard or several sheets if necessary and make a class display showing the various types of leaves. The board can be broken down into ine general leaf showing the parts of a leaf, one with leaf arrangements, one showing leaf forms, and one showing leaf types. If they have examples other than what is on the diagram, they should attach them to the board also and try to determine what they are. After the leaves have been arranged on paper, the students should label them. You should have several reference books available for their use.

PARTS OF A LEAF



LEAF ARRANGEMENTS



a. ALTERNATE

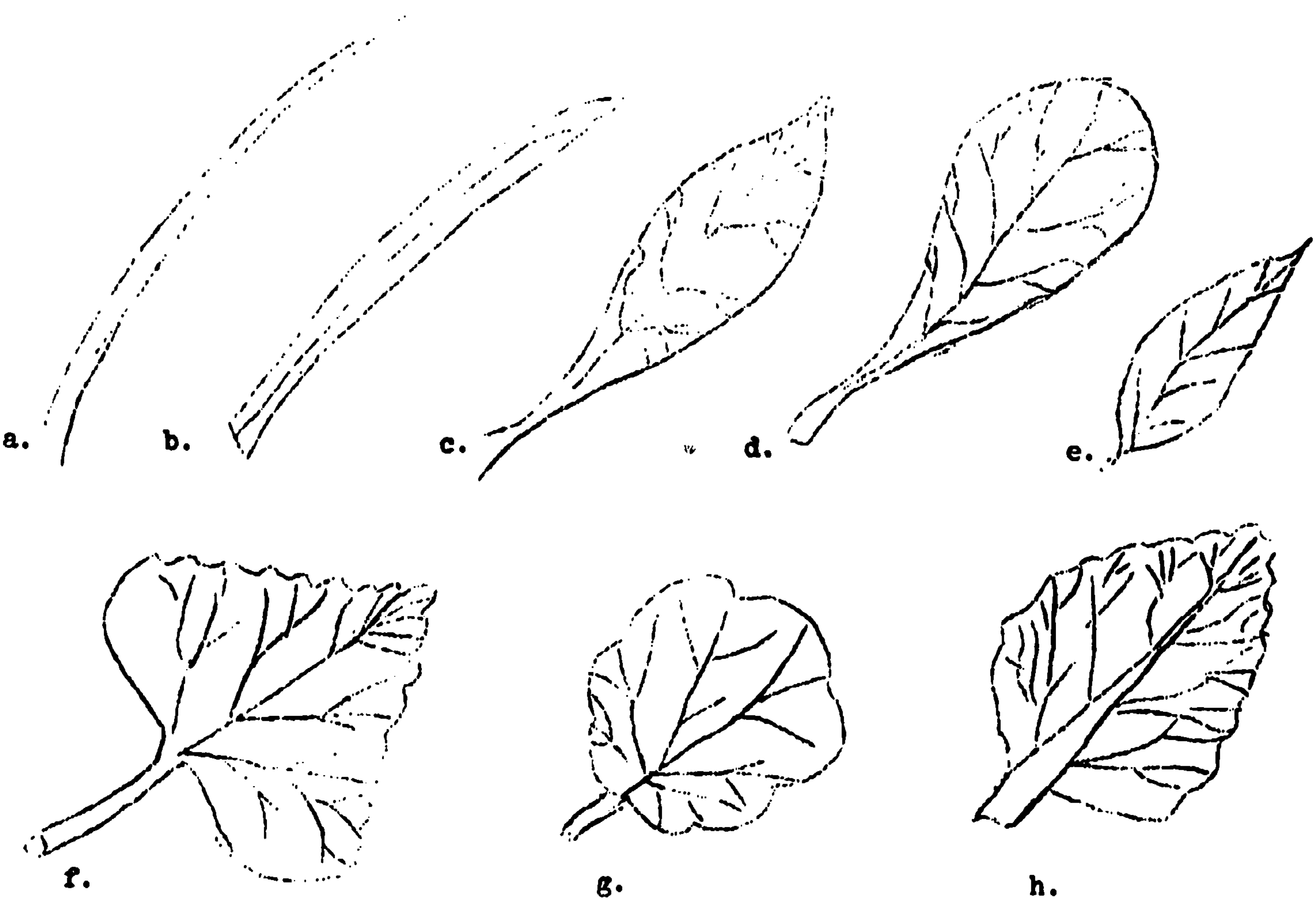
b. OPPOSITE

c. WHORLED

d. IMBRICATED

e. FASCICLED

TYPES OF LEAF FORMS



a. FILAFORM

b. LINEAR

c. OBLANCEOLATE

d. SPATULATE

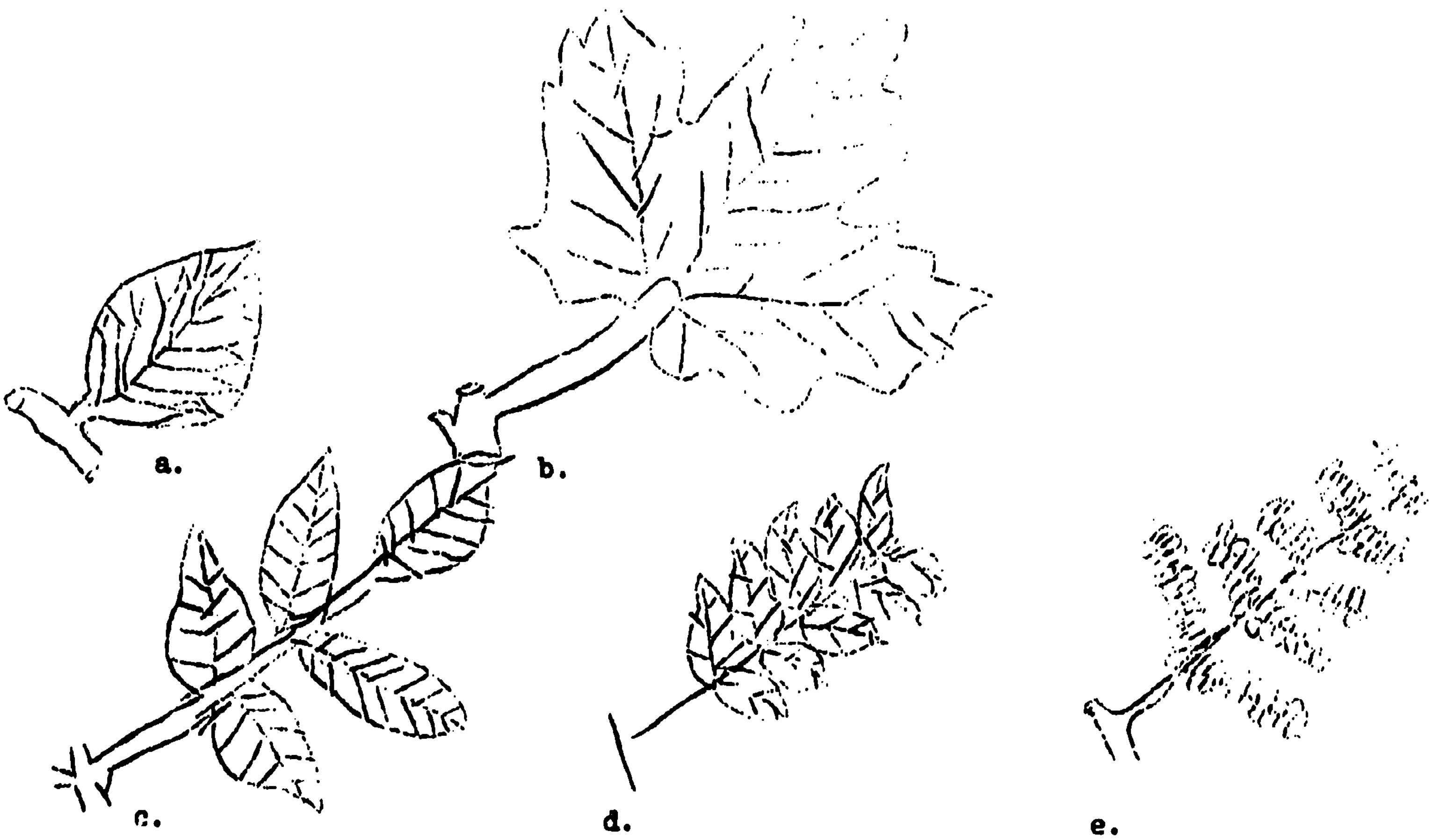
e. LANCEOLATE

f. DELTOID

g. ORBICULAR

h. OVATE

LEAF TYPES



a. SIMPLE ALTERNATE PINNATE

b. SIMPLE OPPOSITE PALMATE

c. COMPOUND OPPOSITE ODD PINNATE

c. COMPOUND ALTERNATE EVEN PINNATE

e. COMPOUND ALTERNATE TWICE PINNATE

1-20-72

WINTER TEMPERATURES AND CHEMISTRY STUDIES OF LAKES AND RIVERS

Written by the Staff of the Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. (February, 1972)

Grade Level - Adaptable from 4-8

Best time of year - Winter

OBJECTIVES:

1. To introduce methods of studying the temperature and chemical characteristics of lakes and rivers.
2. To emphasize the continuous process of change in nature and the need for serial measurements and multiple samples.
3. To explore the effects of changes in air temperature on temperatures in snow, ice and water of South Dakota lakes and streams.

BACKGROUND:

The interaction of temperature and water is a fascinating one to study and is very important to understanding of our environment and the effect we have on it. We believe winter is an absolutely necessary period for survival for life in this area, and that when and if weather modification is ever perfected, that it be carefully implemented. There are many delicate balances in nature keyed to the presence of winter. We believe it better to accept and learn to live in and enjoy wintertime in South Dakota than to try to turn it into an area like Southern Arizona. This set of studies expands on earlier chemistry and temperature studies which are included with the Environmental Science Foundation and the Interlakes Environmental and Outdoor Education Program materials. A discussion of the possible results and suggested questions is attached.

MATERIALS:

Hach water chemistry kits for salt, oxygen, carbon dioxide and pH
10-20 thermometers
four pieces of twine with knots tied every one foot, 12 feet long
two ice augers
paper and pencils, data sheets
a 100 foot tape measure or you may also pace off distance

PRE-ACTIVITY:

Introduce this activity with the suggestion that you study in depth a nearby lake in the winter. Ask the students what you could study. Discuss winter temperatures. Are they the same everywhere? Why doesn't a lake freeze from the bottom up? Why doesn't a lake freeze from the middle to the shore? Where will the warmest temperature be in nature on a -30°F day? (Not measuring living things, of course, or artificial or fire heat).

Ask questions about how to determine these things. Pass out thermometers and chemistry kits and practice reading and using them.

Design a data sheet to run off to record their results. Assign responsibility. Deportment problems do well on the ice augers. Attached is a data sheet you can use for a model. You may wish to compare temperatures over land the same way.

FIELD TRIP:

Go out to a local lake or river. Check prior to the trip to insure that the ice is a safe thickness for movement on top of it. Conduct the measurements and collections. Double check that samples have been taken and labeled and that data sheets are complete.

FOLLOW-UP:

This will take more than one period and should be completed over several days. The water chemistry should be completed first. Then, put the data on the board or in a chart. Compare the data from different children and explain differences (experimental error, inaccurate equipment, etc.). Compare temperatures.

Where is it the warmest?
Where is it the coldest?
Where does the greatest temperature change take place?
Why is the coldest water nearest the ice on top? Isn't the coldest water in the lake during the summer on the bottom?
Why does ice float?
Why is the ice warmest nearest the water?
What would happen if it got much colder than today?
What would happen if it got much warmer than today?
Why isn't the snow the same temperature as the air?
Why isn't the ice the same temperature as the air?
Where is the ice the thickest on the lake?
Why there? Why doesn't the water freeze to the bottom of the lake?

Draw a cross section of the lake and map the temperatures and ice distribution.

Complete the water and snow chemistry. Discuss the differences and discuss why they vary. Where is the highest quality of water? The lowest? Why do you suppose the differences between the water and ice? Discuss why this chemistry is important to the fish life under the ice. Discuss how man effects this chemistry by the addition of organic and mineral materials. Salts and organic materials cause water to freeze at a lower temperature than pure water. Would this have any relationship to the lake freezing to the bottom?

If you repeat this experiment or parts of it on a warmer or colder day, you will find some very interesting changes have taken place. It would be beneficial to repeat this procedure at least once on the same lake or river.

The temperature distribution in and on a lake in the winter is a very interesting concept. Every change in air temperature results in a change in the lake. Some of the changes are predictable, others result in changes which are just the opposite of the expected.

Generally, this is what you can expect. When the temperature at shoulder height is below 10 degrees, the temperature will warm up as you get closer to the snow and into the snow, ice and water. The colder the air temperature at shoulder height, the wider the variation. At -29°F shoulder height temperature, the bottom of the lake may be 36-39° or a difference of 68°F. There are areas of 1-3 inches in height or less where great temperature differences take place, maybe 20°F in the space of ½ inch.

When the air temperature at shoulder height is above 32°, you can expect temperatures to drop as you get closer to the snow, the lowest temperature will be in the snow or ice, but temperatures will again climb as you move into the water.

Why? Snow soaks up heat energy when it is warm and insulates the ice beneath from the heat. Snow releases heat energy when it is cold (below 32°F) and insulates the ice from the cold. This heat transfer shows up in the warmer temperatures in the air just above the snow.

Why is the cold water on top, the warmest on the bottom? In the summer the warm water is on top.

As water goes from 100°F to 39°F, it contracts and gets heavier. At 39°F, water is the heaviest and it sinks in big blobs to the bottom. At 39°F, water starts to form a structure where the water particles begin to spread out or expand. Water then gets lighter and floats on the warmer water. Therefore, water at 32°F is found just under the ice, it is lighter, weighs less than 39° water and floats. When this 32° water has 80 calories of heat energy pulled out of it, it changes to ice at 32°F. These water particles are locked into a network which pulls them far apart. This is what makes ice lighter than water and causes it to float. This is why the lake freezes from the top to the bottom and from the outside in.

Ice nearest the water is warmed by conduction from the water. If the air gets colder, so will the snow and ice, but snow and ice get colder more slowly. If the air warms, snow will soak up heat energy and the temperature will rise to 32°F, then it will stay at 32° until all of the snow soaks up 80 calories per gram and changes to water. Only then will it warm up further.

Ice is thickest on the lake near the edge rather than the middle, depending on the water currents under the ice. This varies a great deal with the place you take the depth readings. Generally, the middle freezes last, it also thaws last. Why? Let's save that question until April.

The water chemistry of the layers of snow and ice of the lake varies. Generally, the snow on the lake is high in oxygen, low in carbon dioxide and salt, nearly neutral pH (6.5-7.5). Surface ice has tested higher in salt than snow above it or the ice layers below it, (150-200 ppm). The oxygen readings have ranged from 5 to 7 ppm, carbon dioxide measured 30-50 ppm and pH readings of 8.00 (7.5-9.00) were found this January. Middle layers of ice show a very low salt content (12.5-50 ppm), low carbon dioxide (5-10 ppm), 5 to 7 ppm oxygen and pH of 7.00-8.00. The water beneath the ice is highest in salt content (250-750 ppm), carbon dioxide content (50-100 ppm), pH of 8.00-9.00 and lowest oxygen content (2-5 ppm). Your results will undoubtedly vary from these readings, and should. The point is that water under the ice is usually poorer in quality in many respects other than just oxygen. As ice freezes, ionic content of water stays dissolved in the free water Ice forms relatively pure water. Organic and ionic stuff dissolved in the water concentrates under the ice.

What effect does sewage have on this situation? It aggrevates it. What effect does it have on fish? The more salt, ionic and organic matter concentrated in the water, the greater the hazard for a winter kill.

How does snow affect winter kill of fish? Snow on the ice shades out the sun energy and soaks it up before it penetrates the ice and is available for the photosynthesis process in plants and production of oxygen in the water. Plants then require oxygen to live just like the animals. This results in too much of a demand for oxygen and the oxygen level drops to 1-0 ppm and the fish die.

What effect does man have on this? We dump sewage and agriculture runoff into the lake under the ice raising the amount of plants and animals needing oxygen. We drive snowmobiles on the lakes and pack down the snow to cause an even greater shadowing affect of the snow. Compacting the snow also destroys much of its insulating capacity, so the ice beneath the snow freezes deeper concentrating the ionic and other dissolved materials.

RECOMMENDATIONS:

Limit the use of snowmobiles on the lakes to very restricted areas in terms of the surface area they drive on.

Don't dump sewage or any other organic materials into lakes and streams.

When **taking temperatures** outside, remember the following tips:

1. Be sure sufficient time is taken for the thermometers to cool down to air temperature. Correct air temperature is the standard by which you measure every other temperature. Take the thermometer out and hold it in the air at least 4-5 minutes.

2. Allow two minutes for thermometers at each measurement station.

3. When measuring temperature in ice, be sure to put the bulb of the thermometer next to the ice and leave two inches of ice chips over it. Otherwise you are measuring the air temperature.

4. Caution kids to not touch the bulb of the thermometer when reading it, otherwise you will be measuring the holders' temperature.

5. Practice using thermometers before the field trip so that fast readings can be taken before the air temperature affects the reading.

6. Thermometers are delicate; be careful with them!

DATA SHEET NUMBER 1

TEMPERATURE DISTRIBUTION
(Verticle)

TEMPERATURE AT SHOULDER HEIGHT	______
TEMPERATURE AT 2" ABOVE SNOW	______
TEMPERATURE AT SNOW-AIR INTERFACE	______
TEMPERATURE AT 1" INTO SNOW	______
TEMPERATURE AT 3" INTO SNOW	______
TEMPERATURE AT 6" INTO SNOW	______
SNOW-ICE INTERFACE	______
TEMPERATURE AT 1" INTO ICE	______
TEMPERATURE AT 3" INTO ICE	______
TEMPERATURE AT 5" INTO ICE	______
TEMPERATURE AT 8" INTO ICE	______
TEMPERATURE AT 11" INTO ICE	______
TEMPERATURE AT 13" INTO ICE, ETC.	______
TEMPERATURE AT ICE-WATER INTERFACE	______
TEMPERATURE AT 1' INTO WATER	______
TEMPERATURE AT 2' INTO WATER	______
TEMPERATURE AT 3' INTO WATER	______
TEMPERATURE AT 4' INTO WATER	______
TEMPERATURE AT 6' INTO WATER	______
TEMPERATURE AT 8' INTO WATER	______
TEMPERATURE AT 10' INTO WATER	______
TEMPERATURE AT THE BOTTOM OF THE LAKE	______

DATA SHEET NUMBER 3

ICE THICKNESS

Measure the thickness of the ice at each hole:

YARDS	INCHES IN DEPTH
10	____________
50	____________
100	____________
150	____________

Use a bent coat hanger or piece of wire to mark ice depth, pull it out and measure it. (Insert the bent hanger into the hole and hook the underside of the ice. Mark the depth, pull it out and measure it.

Take snow and ice and water samples as follows:

SURFACE SNOW

SNOW LAYER JUST ABOVE THE ICE

SURFACE ICE

ICE FOUR INCHES DOWN

ICE SIX INCHES DOWN

ICE TEN INCHES DOWN

WATER BENEATH THE ICE

Following is a data chart for recording the water chemistry results:

	pH	CO_2	O_2	NaCl
Surface Snow				
Snow Above Ice				
Surface Ice				
Ice Four Inches Down				
Ice Ten Inches Down				

DATA SHEET NUMBER 2

HORIZONTAL TEMPERATURE DISTRIBUTION

Take temperatures at the same intervals to the bottom under the ice at four stations as shown below:

150 yards		100 yards		50 yards		10 yards	
Ice-Water Interface	____	Ice-Water Interface	____	Ice-Water Interface	____	Ice-Water Interface	____
1 foot	____	1 foot	____	1 foot	____	1 foot	____
2 feet	____	2 feet	____	2 feet	____	2 feet	____
4 feet	____	4 feet	____	4 feet	____	4 feet	____
6 feet	____	6 feet	____	6 feet	____	6 feet	____
8 feet	____	8 feet	____	8 feet	____	8 feet	____
10 feet	____	10 feet	____	10 feet	____	10 feet	____
12 feet	____	12 feet	____	12 feet	____	12 feet	____
bottom	____	bottom	____	bottom	____	bottom	____

DATA SHEET NUMBER 4

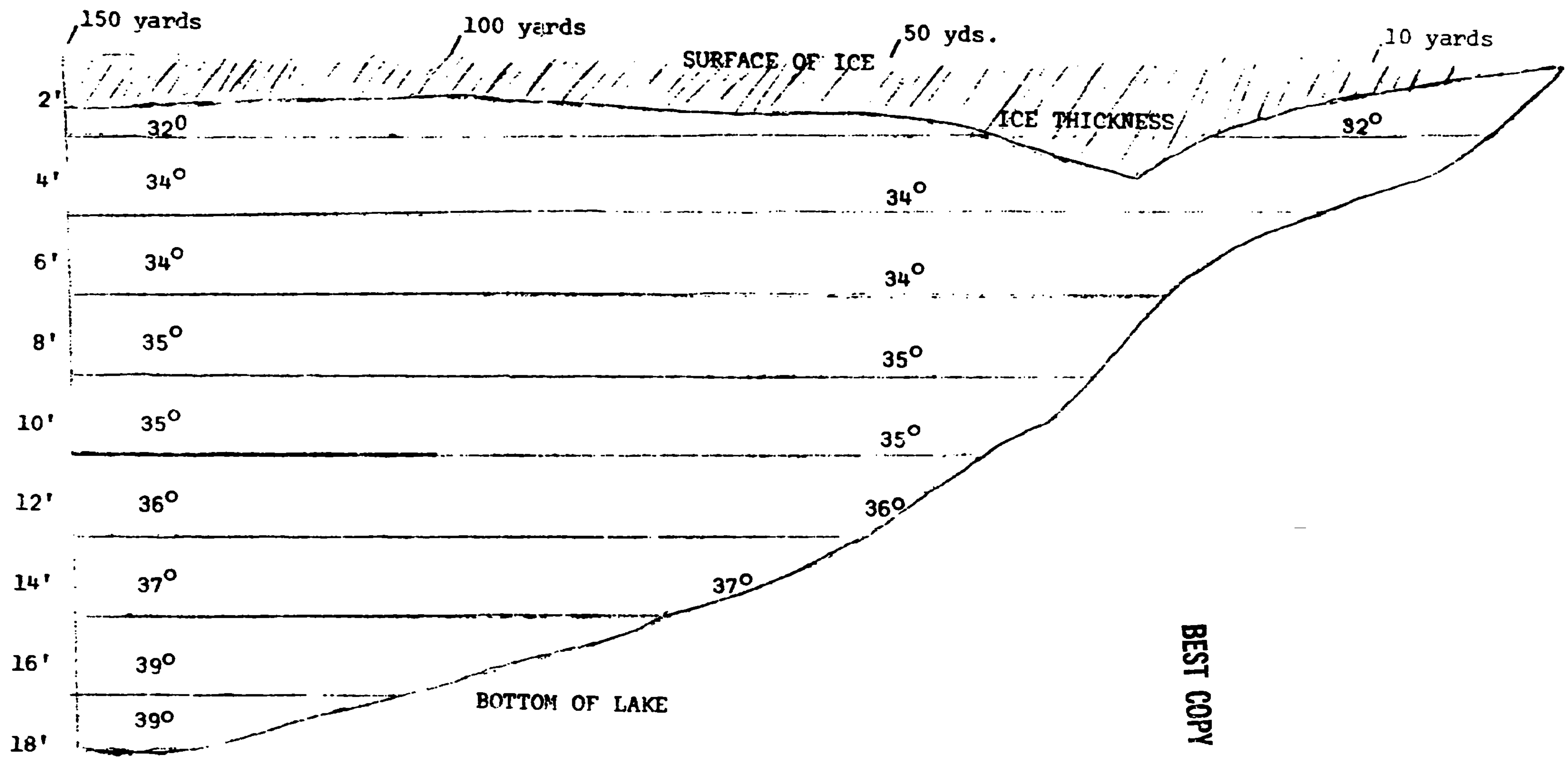
LAND TEMPERATURES

AIR TEMPERATURE AT SHOULDER HEIGHT	________
AIR TEMPERATURE TWO INCHES ABOVE THE SNOW	________
SNOW-AIR INTERFACE TEMPERATURE	________
TEMPERATURE ONE INCH INTO THE SNOW	________
TEMPERATURE THREE INCHES INTO THE SNOW	________
TEMPERATURE SIX INCHES INTO THE SNOW	________
TEMPERATURE NINE INCHES INTO THE SNOW	________
TEMPERATURE TWELVE INCHES INTO THE SNOW	________
GROUND-SNOW INTERFACE	________

IF YOU CAN OBTAIN AN OLD ICE AUGER, YOU CAN DRILL A HOLE IN THE SOIL AND CONTINUE DOWN THROUGH THE FROST LINE. BE SURE THAT THE AUGER IS NOT WANTED FOR ICE DRILLING, AND IT IS UNDERSTOOD THAT YOU WILL BE DRILLING INTO THE SOIL BEFORE YOU USE IT THAT WAY.

COMPARE THESE TEMPERATURES WITH ONES COLLECTED ON THE LAKE.

DATA SHEET NUMBER 5



NOTE: YOUR RESULTS MAY VARY CONSIDERABLY FROM THESE.

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SOIL BEST COPY AVAILABLE

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, S.D. 57016

Grade Level - 4-8

Best time of year - Fall, Spring

OBJECTIVES:

1. To study the physical and biological characteristics of the soil.
2. To acquaint the students with various factors that determine the many kinds of soil.
3. To emphasize the importance of soils and the effect soils have on people.
4. To introduce a study of soil profiles.
5. To introduce the concepts of soil as a dynamic system of living and non-living components which can be damaged.

EQUIPMENT:

hand spades
quart jars

BACKGROUND:

Soils vary in kind almost as much as the plants that live on them.
Many factors influence the characteristics of the soil. Some of the factors involved are climate, plant and animal life in the soil, type of parent material the soil came from as well as man's relationship with the soil.
We can study the physical aspects of the soil as well as the biological.
Some of the physical characteristics are soil texture, water holding capacity, amount of air, structure and type and amount of alkalinity of the soil.
Biological features which are important in the soil are the amount and type of plant and animal life as well as the relationships between plants and animals. It is very important to learn as much as possible about soil and its capabilities so that it can be protected. A lot of discoveries have been made concerning soil since the dust bowl days, but these have not always been applied. With progress and prosperity, the past errors in farming techniques are often forgotten.
Testing physical features of the soil can be very interesting to the students if they are able to get involved in the process themselves. This activity will introduce ways for the students to study soil on their own farm, lawn etc.

Soil texture is determined by the percentage of the following particles:

Gravel - 3.0 - 0.08 inches
Sand - 0.08 - 0.0002 inches
Silt - 0.0002 - 0.0008 inches
Clay - less than 0.0008 inches

The combination of these gives the following group of soils: sand, loams, silts, clays. Loam is about 40% clay. Sands would have a predominance of sand particles while silt would have a larger percentage of particles in the silt range. These are tested by so: fractioning kits which are available from the Interlakes Office. NOTE: The soil must be dry and broken down into particle size before the kit is completely accurate.
Water holding capacity is very important to consider when deciding what crops to plant on a farm. This becomes very evident when you consider extremes such as a swamp or a desert. Bull rushes and cattails are very common in a slough area, but are not to be found in a dry desert area, while the reverse is true with plants such as yucca and cactus.

FIELD TRIP:

Direct the students to areas which have as many different soil types as possible. Try to arrange for a place where a large soil profile is exposed, like at a gravel pit or a deep cut road bank, creek bank or dug-out.
Have students collect soil samples from various locations and soil profile levels.

POST-ACTIVITY:

Return to the classroom, weigh the soil samples, then spread the soil samples out on paper towels to dry. Again let the students examine their samples and make observations as to color, texture, life, smell, etc. Leave the students' samples for several days until completely dry. Now, have them weigh their samples again. Record the weights. If the students are using frozen orange juice cans, have them cut the bottom out of them so that both ends are open. Now, tie a piece of cloth or filter paper around the end. Weigh the can with the cloth or paper on it, fill the container about half full of the sample and weigh it again. Now, place the container (with soil samples in them) into a shallow pan of water and allow them to stand overnight. On the following day, they should observe the container and record what they see. Next, remove the cans from the tray and allow them to drain for 1/2 hour. This may be accomplished by laying a couple of rulers in a dry pan and setting the samples on them. Now, have the class weigh the container with the samples and record the new weight. This will give them the data they need to determine the water holding capacity.

$$\text{percent/moisture holding capacity} = \frac{\text{gain in weight due to immersion} \times 100}{\text{weight of dry soil}}$$

All of the results should be placed on a data sheet or in a tabular form and then discussed by the students. The follow-up should contain a discussion of what crops or plants may be suited to the soil types because of the water holding capacities and the annual rainfall for the area.

While this experiment is taking place, (while the students are waiting for the soil samples to dry), other post activities can be done. Soil chemistry can be determined by kits available from the Interlakes Office. Tests which can be done include pH, potassium range, nitrogen range and phosporous range. The results of these tests should also be tabulated and discussion should follow with a determination of what type of plants are best suited for the existing chemistry of the soil as well as what could be done to alter the soil chemistry.

Another aspect which can be studied is the amount of life in the soil and the relationship of the plants and animals there.

For larger soil animals, such as mice, ground squirrels, and pocket gophers, burrows will suffice as evidence of their presence. For medium size animals, the soil sample can be examined for life such as beetles, spiders, some centipedes and multipedes, etc. Smaller microscopic animals can be discovered by use of a modified berlese funnel to drive them into a collecting jar.

Once you have collected them, they can be examined and identified by use of a microscope. Once they are identified by use of a microscope, their function in the soil should be determined by resource books and a discussion of their relationship to each other and the soil should be developed.

To determine the identity of plants which are present, collect the plants which grow in the topsoil. Trace the roots up to the plant. Microscopic plants can be examined by use of a microscope. The soil sample can be placed in water, shaken up, and then the water sample can be examined for various algae, fungi, actinomycetes, and bacteria. These life forms should also be recorded on data sheets and tabulated on the board. Their function should be determined and a discussion of their needs should be developed by the class.

An interesting activity can be completed using the soil samples as the source of a fishless aquarium. After all tests and studies are completed on the soil, put the remaining soil samples in jars, (1 inch of soil in the bottom), fill with rain water, snow melt water, or distilled water, and wait and record what happens.

SAMPLE DATE SHEETS FOR RECORDING ALL INFORMATION ARE ATTACHED.

SOIL CHEMISTRY

SAMPLE	NITROGEN	PHOSPHOROUS	POTASSIUM	pH	AREA SOIL CAME FROM
A	LOW	MEDIUM	LOW	HIGHLY ACID	SLOUGH
B	LOW	LOW	LOW	MODERATELY ALKALINE	CORNFIELD
C	HIGH	MEDIUM	MEDIUM	SLIGHTLY ACID	SOYBEAN FIELD
D	HIGH	MEDIUM	HIGH	HIGHLY ALKALINE	ALFALFA
E	MEDIUM	HIGH	MEDIUM	SLIGHTLY ALKALINE	OAT FIELD
F	HIGH	HIGH	HIGH	NEUTRAL	FOREST FLOOR

STUDENT'S NAME ______________

CLASS ______________

DATE ______________

WATER HOLDING CAPACITY

SAMPLE	ORIGINAL WT.	DRY WT.	DIFFERENCE	CONTAIN WT.	SAMPLE & CONT. WT.	WET SOIL & CONT. WT.	DIFFERENCE	WATER HOLDING CAPACITY	AMT. WATER HELD	DIFF.
A	100g	90g	10g	5g	55g	100g	45g	82%	11%	71%
B	100g	75g	25g	5g	55g	125g	70g	127%	33%	94%
C	100g	60g	40g	5g	55g	75g	20g	30%	67%	-37%*
D	100g	100g	0g	5g	55g	60g	5g	9%	0%	9%
E	100G	80g	20G	5g	55g	85g	30g	55%	25%	30%

*ERROR IN SAMPLING OR WEIGHING

NAME ____________________

CLASS ____________________

DATE ____________________

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TEXTURE AND COLOR OF SOIL

SAMPLE	WEIGHT	WT. OF PARTICLES IN TRAY A	WT. OF PARTICLES IN TRAY B	WT. OF PARTICLES IN TRAY C	WT. OF PARTICLES IN TRAY D	COLOR	TYPE
A	100g	15g	65g	15g	5g	brown	sand
B	100g	3g	37g	42g	18g	black	loam
C	100g	0g	23g	12g	65g	gray	clay
D	100g	7g	13g	58g	22g	black	silt
E, etc.	100g	25g	25g	25g	25g	brown	——

NAME ____________________

CLASS ____________________

DATE ____________________

ANIMAL LIFE IN SOIL

SAMPLE	EARTHWORM	INSECT	CENTIPEDES	SPIDERS	MITES	NEMATODES	PROTOZOA	ROTIFERS	AREA
A	X	X			X	X	X	X	Slough bottom
B		X	X	X	X				Sand Dune
C	X	X	X	X	X	X	X	X	Alfalfa field
D	X	X	X	X	X	X	X	X	Forest floor

CLASS ____________________

NAME ____________________

DATE ____________________

BEST COPY AVAILABLE

PLANT LIFE IN SOIL

SAMPLE	ALGAE	FUNGI	ACTINOMYCETES	BACTERIA	ROOTS &PLANTS	AREA
A	X		X	X	X	Slough border
B	X	X	X	X	X	Cornfield
C	X	X	X	X	X	Lawn
D	X			X		Lake Bottom
E	X	X	X	X	X	Forest Floor

NAME ______________________

CLASS ______________________

DATE ______________________

ECOLOGY OF A PRAIRIE STREAM

Written by the staff of the Interlakes Environmental and Outdoor Education Program, Chester, South Dakota, 57016. Phone: 489-2416. (Revised 6-30-72). Modification of activities of the Environmental Science Foundation and the Outdoor Activities Booklet.

Grade Level - 5-6

Best time of year - April and May

OBJECTIVES :

1. To familiarize teachers and students with the methods of studying the ecology of a body of water using the following techniques.

   a. measuring water speed
   b. measuring water depth
   c. measuring stream width
   d. measuring water chemistry
   e. determining bottom characteristics
   f. studying plant life
   g. studying animal life
   h. measuring animal populations
   i. measuring water temperatures

BACKGROUND :

Water pollution is a major environmental problem. Water pollution is a term which refers to a condition in our waters that makes them unsafe, unsightly and unhealthy for creatures dependent on them. That includes us! Answers for solving water pollution need to come from all levels of society.

HOW SHOULD THIS PROBLEM BE APPROACHED ?

The easiest way is to break the study down into physical, biological, and chemical characteristics of the stream.

PART I

OBJECTIVES :

1. To introduce a method of studying water speed.
2. To introduce a technique to determine water depth.
3. To introduce a method of determining steam width.
4. To discover and investigate the bottom type of the body of water.

BACKGROUND :

Physical characteristics of a stream are important in determining the type of biological features of the stream. Many aspects are involved in this unit -- most can be determined by the students. This should be an enjoyable study for the students and gives them a chance to use math in a practical way when they determine water volume.

PRE-ACTIVITY:

1. How is water speed determined? BEST COPY AVAILABLE

   a. Measure off a 100 foot length using heavy fish line or twine with markings every ten feet.
   b. Drop a lemon into the water at the start of the 100 foot length and record the time it takes it to go 100 feet.
   c. Repeat the above process four more times and average the five recordings.
   d. Divide the average speed into 100 feet to get the number of feet per second.

2. How is the depth of the stream determined?

   a. Use a yardstick. Take the depth at ten or more places and average the results.
   b. If the stream is more than three feet deep, tie a lead weight onto a stick with fish line and measure the depth in that manner. Colored markers may be tied to the string.

3. Ways of determing stream width:

   a. Use a tape measure. Take the stream widths at ten spots to get an average width. Take a measurement every ten feet. Heavy fish line with colored markers every five feet will work very well for a tape measure and may be made by the students.

4. How is the bottom type determined?

   a. Using hands, feet, sticks or anything available, have the students completely cover the stream to determine where the mud, gravel, rock and plants are. While this is being done, someone should be drawing a map of the area.

5. How to take water temperatures:

   a. Take water temperatures in ten spots again. This time however, don't average the temperatures. Have someone record them and where they were taken. Be sure that the discription of where they were taken is included on the data sheet. For example: #1, middle of the stream; #2, two feet below the surface of the water, etc.

MATERIALS NEEDED:

two measuring tapes made of heavy fish line
colored markers
lemons
yardsticks
one six to eight foot pole for measuring water depth over three feet
clipboards or notebooks for recording data gathered
boots, old sneakers, old clothes, extra change of clothes

FIELD TRIP:

This field trip should be taken to the Madison Wetlands or a similar place. The outdoor activity will probably take at least an hour and will be in preparation for an all day study later in the Spring.

Divide the class into four working groups. Group one will set up the 100 foot area and measure the stream speed. Group two will take the average depth of the stream. Group three will have the responsibility for the average width of the stream. Group four will map the bottom of the stream. For all practical purposes, group four should be the largest. Each group is responsible for recording their own data.

POST-ACTIVITY:

Group one: Figure water speed. If the average of the five recorded speeds is 40 seconds, the lemons are traveling at a rate of 2.5 feet per second. This number is arrived at by dividing the number of feet (100) by the number of seconds (40).

Group two: figure the average width of the stream by adding the number of feet together and dividing by the number of samples (10).

Group three: figure the average depth of the stream by adding the number of feet and inches together, converting this number into feet and then dividing by the number of samples (10).

Group four: draw a map of the stream and record all of the physical characteristics of the stream on it.

Using the figures derived from the first three groups, the volume of water moving through a stream can be figured. If group one arrives at a water speed of 2.5 feet per second, group two comes up with an average depth of 2.3 feet and group three an average width of 27 feet, these figures can be used to compute the volume of water in $ft.^3$. One cubic foot of water contains 7.48 gallons of water. This means that in the 100 foot stretch of water, there are 46,450 gallons of water. In an average one foot stretch of water, there are 464.5 gallons of water. With a water speed of 2.5 feet per second, 1161.25 gallons of water pass by in one second. If this number of gallons is assumed to be accurate, compute the number of gallons per minute, hour, day and year.

number of gallons per minute: 69,675.0
number of gallons per hour: 4,180,500.0
number of gallons per day: 100,332,000.0
number of gallons per year: 36,621,180,000.0

These figures become significant when combined with the water chemistry studies.

PART II

OBJECTIVES:

1. To determine what plant life is associated with the stream.
2. To determine what animal life is associated with the stream.
3. To examine microhabitats in 100 feet of the stream to compare plant and animal populations in the different habitats.
4. To introduce a method of sampling animal populations which is commonly used by wildlife biologists and game management officials.

BACKGROUND:

Water quality has an effect on the type of plant and animal life found in a stream. Why is this important? When materials are added to the stream that allow too many of one population to live or destroys some of another, we are disturbing the food chain and ecological balance of the stream. This may have a disasterous effect on the life in the stream with which we are more familiar. For example, game fish. If one associates the disturbance of the food chain in the small critters with the loss of walleye, northern, croppies, perch, bass or bluegill for Sunday dinner, the kids can start to develop an awareness of the influence of pollution on our lakes and streams.

PRE-ACTIVITY:

1. What is a biological characteristic?
2. How do we determine what types of plants are living in a stream?
3. Do plants live everywhere in the stream?
4. Why do some plants live one place and some another?
5. What animals live in a stream?
6. Where do they live in the stream?
7. Why do some animals live one place and some another?
8. What does the term habitat mean?
9. What does microhabitat mean?
10. Name some microhabitats in the stream.
11. How do you find out what types of plants and animals are present in a stream?
12. How can we find out how many plants or animals there are all together in a stream?
13. What is a Lincoln Index?
14. Lincoln Index formula is as follows:

$$\frac{\text{number captured 2nd time}}{X} = \frac{\text{number recaptured}}{\text{no. captured first time (and marked)}}$$

MATERIALS NEEDED:

boots, old sneakers, old clothes, extra change of clothes
sampling nets for bottom samples and other microhabitats
30 foot seine
minnow buckets or ice chests
one fingernail clippers or toenail clippers for every two students
quart jar, one per study group

FIELD TRIP:

This field trip may be taken at the Madison Wetlands or any other area where a small, flowing stream is located. By using the bottom map which has been developed during the first part of this activity, a study of the different microhabitats can be investigated. Samples of the plants and animals should be collected from all kinds of microhabitats to identify and compare them. Students should be divided into several groups to speed up the collection process and to make sure all habitats are sampled. It is important that these samples be labeled so that comparisons can be made later.

When all samples have been collected, the large seine should be used to collect some of the more elusive water animals. This is also the time to familiarize the students not only with the use of the seine, but also with the use of the fingernail clippers as marking devices. Each student should have an opportunity to mark some of the critters that are found. Many animals can be marked in other ways, but use of the clippers seems to give the best results.

POST-ACTIVITY:

Plant and animal identification is good for a follow-up activity. Compare the different microhabitats to see if some animals are more prevalent in one area than another. A wall chart may be devised to separate the different habitats. When a certain type of plant or animal is discovered, it can be placed on the chart in the proper habitat. Hypothetical numbers can be used to give the students practice in using the Lincoln Index.

PART III

OBJECTIVES:

1. To introduce students to the study of the chemical properties of a stream.
2. To show man's effect on the chemistry of a stream.

BACKGROUND:

Man invariably has an effect on the land and the water that he uses. Man can control the quality of water he uses with the proper equipment and knowledge. However, first he must realize what effect he is having on the water supply. One good technique for student use is water chemistry. The students can sample water at several places along the stream, compare the results and raise questions as to why differences occur and how they can be controlled.

PRE-ACTIVITY:

Begin the study with questions similar to the following:

1. Can man have an effect on the quality of the water in a stream or a lake?
2. How does man effect the quality of Silver Creek?
3. Does he improve the quality of the creek or does he help to deteriorate it?
4. How can we test the quality of the water?

5. Where would we have to get samples from to see what man's effect is on the stream?
6. Where does Silver Creek empty its water?
7. Do you suppose this has an effect on the quality of Lake Madison?
8. How can we determine the effect that Silver Creek has on the quality of the water in Lake Madison?
9. What do we test for when we study water chemistry?
10. What is water pollution?
11. Does water pollution mean the same thing to everyone?
12. In what do we base our understanding of water pollution?

MATERIAL NEEDED:

quart jars
water chemistry kits

FIELD TRIP:

This field trip should be conducted in the same area as the physical and biological phases of the activity were. There are a number of avenues of approach to this study and you may want to try more than one. One of the popular methods has been to collect samples on Silver Creek in these places:

1. above the outlet of the city treatment plant
2. from the outlet pipe of the treatment plant where it enters Silver Creek
3. fifty yards below the outlet of the treatment plant
4. from the same study area as the previous two phases of the study were taken

This gives four samples and a good chance for the students to discover man's effect on Silver Creek and the ability of nature to cleanse the water to some extent. Another approach is to use smaller sampling bottles and try to sample the microhabitats. This should give students different results right in the study area. If you use smaller sampling bottles and open them under water exactly where you want the sample from, you may -- and should get different results. You will probably have enough time to try both techniques.

POST-ACTIVITY:

If the samples are correctly analyzed, you may come up with some interesting results. These should be charted and compared to show the differences between these samples. The comparisons between the samples taken from around the treatment plant will be very vivid and the students should be able to come up with the reasons for the differences. Those samples collected from the microhabitats will be more subtle and will be harder to explain. They may be more challenging to the students, however.

You may also decide to pick the samples which are more representative of the water which is dumped into Lake Madison and figure out what Silver Creek is dumping into the lake each year. For example, if we use the figure that was derived in the physical properties portion of this activity, 36,621,180,000 gallons per year of water passing through and 250 ppm of salt, you will be able to compute the amount of salt dumped into Lake Madison each year.

(250 ppm can mean 250 pts, qts., etc. per gallon of water)

$$\frac{36{,}621{,}180{,}000 \text{ gal/water}}{X} = \frac{1{,}000{,}000 \text{ gal/water}}{250 \text{ gal/salt}}$$

While this may not be extremely accurate, it is an excellent math activity and it does get the point across that we are determining the quality of water.

This concludes the introductory phases of the Fcology of a Prairie Stream study. You may want to stop here or combine all of these activities. However, the results may be more satisfying with a wrap-up, all day activity in which all phases of the activity are done together. This seems to help the students tie everything all together.

The agenda for the all day field trip would be: water chemistry, sample collection, physical characteristics and animal marking in the morning. After a noon hour, the classes will again go out and do water chemistry and the last half of the Lincoln Index. There should be some changes in the water chemistry, to show the students that changes take place even during the day. The Lincoln Index will give the students an idea of what wildlife management is all about. (Other possible adaptions to this activity are fish anatomy, frog and toad anatomy).

BIRD NESTS AND BIRD POPULATIONS ON A PRAIRIE SLOUGH AREA

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016.
Phone: 489-2416 (Revised 2-20-72)

Grade Level - 5-6

Best time of year - May

OBJECTIVES:

1. To acquaint the student with prairie inhabiting birds.
2. To acquaint the student with the different types of nests and nesting habitats (sites) birds select.
3. To introduce the students to the concepts of nest counts and population estimates.
4. To introduce the students to the study of bird behavior as it relates to nesting (protective actions, feigning broken wings, etc.)

MATERIALS:

1. notebook and pencils
2. camera with colored film (optional)
3. 100 foot tape
4. 4-12 markers

BACKGROUND:

Birds and bird nests have a fascinating quality that children are very enthusiastic about. A good spring exercise is to take children on a bird nest hunting trip. While on the trip, there are a lot of things about the out-of-doors that the students can learn as spin-off from their nest hunting activities.

There are many types of birds which nest in our Wetlands areas and the land around them. The red-winged blackbird, purple grackle, robins, meadow lark, pheasant and many different ducks are just a few of the most common types. Each of these birds require just a little bit different type of place to nest even though they may be nesting in the same tree. Each bird builds its nest of a different material, lays different sizes and colors of eggs, etc. Each type of bird will react differently when disturbed from the nest.

Students can learn to identify a nest without seeing the nesting birds by evidence around and in the nest.

The kind or type of habitat (vegetation, water, elevation, etc.) will determine the kinds and how many birds will nest in any given place. Different kinds and numbers of birds will nest in a woodlot or shelterbelt than on a grass covered island. In the Madison Wetlands area, both types of habitat are found in close proximity, this activity exploits both. The activity is essentially this: a class will select an area on a grass and weed covered island, measure it and mark it. Then they will walk through the same area and find, count and identify birds and bird nests found in the area. The same will be done in the woodlot. The areas will then be compared as to kinds of nests and numbers of nests.

PRE-ACTIVITY:

Introduce the study of birds. Use library books to make a list of birds that are found in a South Dakota slough and woodlot area in the spring. Find pictures of each kind. (Several field guides to birds are available from the Interlakes Office). Ask the students questions about birds:

1. Describe a bird.
2. How is it different from a mouse?
3. Where do birds live? Ask the students to list places birds live.
4. What do birds eat?
5. Where do these birds build their nests? What do they make their nests from?
6. How many eggs do they lay?
7. How many times have you seen these birds?
8. Which birds do you see in the winter? Which migrate south?
9. What do birds do when you disturb their nests?
10. Do all birds act alike?
11. If you wanted to have a lot of birds around, what could you do to help them?

Propose a field trip to study birds and birds' nests. Stress that you will experiment to find some answers to the questions which they could not answer.

FIELD TRIP:

The Madison Wetlands area is perhaps the best and most convenient area to hold this activity. However, any nearby slough with a woodlot nearby will work. Contact Dave Gilbert, Gene Hocutt or the Interlakes Office for advice as to a specific location for the field trip.

Start the project by having the students mark off a 1,000 foot square in the woodland or grass area and stake the corners. Then line the kids up, arms length apart and walk across the plot, back and forth until the entire plot has been covered; as the students walk, they are to look for birds and bird nests. When a nest is found, the line should stop and the teacher or assistant notified The teacher should then look at the nests and drive a stake nearby to mark its location. Then the line should move on. When the area has been surveyed, carefully take the children to see each nest. Without touching it, view the structure of the nest; what is the nest attached to? Look at the eggs, try to determine what kind of nest it is. Be careful to watch that the students don't trample the vegetation around the nest too seriously. Repeat the procedure in the area not yet visited. Stress the importance of recording data.

FOLLOW-UP: Time - 1 hour

Discuss the field trip.

Review the data you collected.

Make a comparative chart on the blackboard.

Answer the following questions in the pre-activity and some suggested questions as follows:

1. List the number and kinds of nests found in the grasslands.
2. List the number and kinds of nests found in the woodlot.
3. List the number and kinds of nests found in the trees.
4. List the number and kinds of nests found on the ground.
5. List the number and kinds of nests found in plants over water.
6. Which area contained the most nests?
7. Which area contained the most different kinds of nests?
8. Why didn't you find pheasant nests in trees?
9. How can you tell a dove nest from a red-winged blackbird's nest?
10. If you wanted lots of doves to nest in your yard, what kind of trees would you plant? If you wanted lots of red-winged blackbirds, what kind of area would you make available?

This activity can be continued and expanded.

Have the children draw and paint the birds they saw and nests they found. Draw maps of the area and locate the bird nests. Do you see any patterns in the locations of the nests?

GRASSLAND AREA

SAMPLE DATA SHEET

TYPE OF BIRD	HABITAT	NUMBER OF EGGS	ADULT BIRD PRESENT (yes or no)	NEST MATERIALS
Red-winged blackbird	cattails	4	yes - hen	grass
Red-winged blackbird	willow	4	yes - hen	grass
Mallard duck	grass on hill	13	yes - hen	grass & feathers
		WOODLAND AREA		
Mourning dove	tree	2	yes - female	twigs
Mourning dove	tree	2	yes - female	twigs
Mourning dove	tree	2 chicks	yes	twigs
Robin	bush	4 chicks	yes	mud & grass
Hawk	high tree	?	yes	sticks
Wren	post	6	no	twigs

SAMPLE MAP

The activity, Mapping and Grids can be used with this activity.

LEGEND OF NESTS

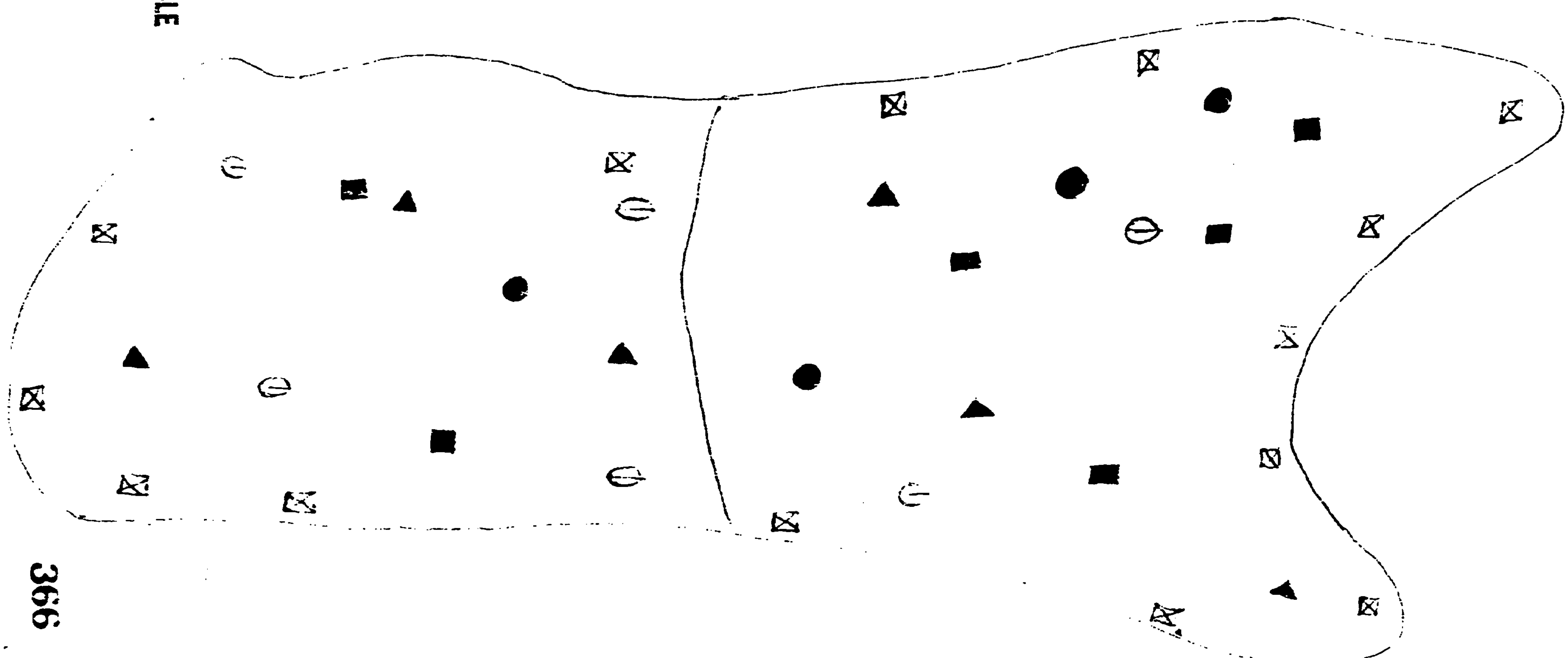
Red-winged blackbird - ☒

Blue-winged teal - ⊖

Mallard duck - ▲

Pheasant - ■

Meadow lark - ●



NOTE: The results of your survey will vary considerably from this. You may find ve'y few nests. The above area represents an area of 20 acres.

ADVENTURES IN WEATHER

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416
(Revised 2-8-72)

Grade Level - 5-6

Best time of year - Autumn, Winter, Spring

RED SKY IN THE MORNING,

SAILORS TAKE WARNING.

RED SKY AT NIGHT,

SAILORS' DELIGHT.

OBJECTIVES:

1. To promote student understanding concerning the causes for certain weather conditions.
2. To assist students in making short range weather predictions.
3. To learn the basic terminology used in forcasting weather.
4. To let the students set up an amateur weather station.

BACKGROUND:

Every year we read in the newspapers about sudden storms that arise and catch people unprepared. Hardship or death is usually the result. However, this is not necessary. We all have the ability to make short range forecasts which will usually give us time to prepare for the upcoming danger. All we need is a few simple skills and a basic knowledge. If we are near a radio, we can always rely on the radio announcer to warn us of impending peril. However, it is not practical for us to carry a radio with us at all times. Therefore, we need to be able to stand on our own. Although storms come up fast, Mother Nature has many ways of informing us that she is about to unleash one of her fantastic displays of force.

PRE-ACTIVITY:

1. How does the wind tell us that a storm is coming?
2. What do clouds tell us about the weather?
3. Does animal activity tell us anything about the weather?
4. Can you tell the difference between storm clouds and fair weather clouds?
5. Does temperature change tell us anything about future weather?
6. Does wind shift indicate a change in weather?
7. What does air pressure tell us about future weather conditions?
8. What does relative humidity tell us about future weather conditions?
9. What do warm and cold fronts tell us about future weather conditions?
10. What other weather signs can you think of?

Let's take a trip to study different types of clouds and to practice reading signs of weather changes.

FIELD TRIP:

The main source of information used in weather forecasting are temperature, air pressure, wind, humidity, precipitation, fronts, clouds, and weather signs. While professional weather forecasters use sophisticated equipment for that purpose, we can make fairly accurate forecasts with limited equipment. We will deal with all the sources of information used by official weather men.

Temperature: This can be taken with a simple fahrenheit thermometer. Temperatures determine the forms of precipitation. The higher the temperature, the greater the chance of a heavy precipitation. A change in temperature usually occurs after a front has passed.

Air Pressure: Someone in the class will have a barometer at home that could be used for this part of the activity. If the air pressure is high or rising, you can expect cool, dry air and generally favorable weather conditions. If the barometer is low or falling, you can expect relatively warm, moist air and generally poor weather conditions. To find the direction of the nearest low pressure center, face the wind and point your right hand straight out from your side and slightly back. You should be pointing toward the nearest low pressure system. To find the direction of the nearest high pressure system, face the wind and point your left hand straight out from the side and slightly forward. You should be pointing to the center of the nearest high pressure system.

Wind: Generally in this area, a westerly wind or a southerly wind brings poor weather while northerly or easterly winds mean fair weather. Most weather systems move from west to east so we can determine what type of weather system will result by our method of locating fronts and watching wind directions. We have wind gauges to tell an approximate wind speed, but wind direction seems to be a more important factor. An abrupt change in wind direction from any direction generally means something is brewing.

Humidity: The higher the relative humidity, the greater the likelihood of precipitation. The lower the relative humidity, the less the chance of precipitation. 70% and above constitutes a good chance of precipitation.

Precipitation: Rain changing to sleet or snow generally means colder temperatures. Snow changing to sleet, glaze or rain normally means warmer temperatures. Hail usually means violent, but short lived storms followed by cooler temperatures.

Fronts: A cold front generally brings heavy, but short lived precipitation followed by rapidly clearing skies and cool, pleasant weather. A warm front generally brings light but long lasting precipitation followed by slowly clearing skies and warmer temperatures.

Clouds: Cirrus Clouds (high, curly, icy, hazy clouds) generally bring precipitation within 24-36 hours, followed by a temperature change. Cumulus Clouds (fluffy, vertical, cottonball clouds) mean relatively cool, pleasant weather when small, but showers when large. Stratus Clouds (low, long, layered, flat, horizontal clouds) normally mean the approach of a warm front with accompanying light and rather long lasting precipitation within 12 hours. Nimbus Clouds (dark, heavy, moisture-laden, threatening "rain clouds") usually bring precipitation within a few hours.

Generally speaking, vertical clouds (cumulus, cumulo-nimbus or thunderhead clouds) are associated with cold air masses while horizontal clouds (stratus, cirrus clouds) are associated with warm air masses.

Mainly watch for building clouds or lowering cloud masses. These usually are the masses which cause the precipitation and violent storms.

WEATHER SIGNS:

The following weather signs are fairly accurate:

1. A halo or corona about the sun or the moon means precipitation within 12-36 hours.

2. Large flocks of birds fly low before a storm.

3. Some injuries and arthritic joints ache before precipitation.

4. Smog usually indicates poor weather conditions approaching.

5. When far away sounds are heard unusually clearly, poor weather may be near at hand.

POST-ACTIVITY:

After practicing the techniques used in weather forecasting, establish a weather station at your school. All of the equipment that was mentioned can be brought from home or can be constructed by the children. It should be housed outside the school in a ventilated box. Have the students construct the weather station themselves. Students can give a weather forecast each day. Assign regular duties on a rotating basis.

GRASSHOPPER POPULATIONS

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota, 57016. Phone: 489-2416.
(Revised 2-27-72)

Grade Level - 5-6

Best time of year - Summer, Fall

OBJECTIVES:

1. To acquaint students with a method of estimating animal populations.
2. To acquaint the students with natural increases and decreases in population levels.
3. To determine movement in populations.

MATERIALS:

insect nets
glass jars
fingernail polish (different color for each group)
stakes and string or twine
tape measure (Optional)

BACKGROUND:

Insect populations naturally will increase in an area as long as a good supply of food is present and there are no predators to curb the rising populations. If the food supply drops, insects have two alternatives: (1) to remain and some insects will starve; (2) to move to another area where there is a more abundant food s ply. There will be some movement back and forth from one area to another when there is an adequate food supply.

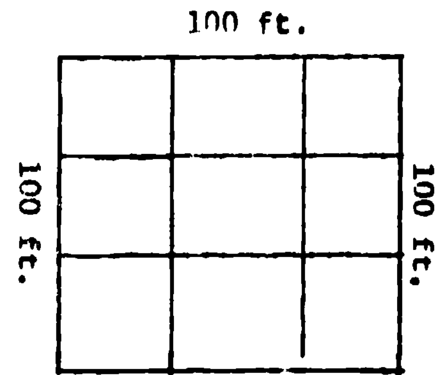
PRE-ACTIVITY:

Introduce the activity with questions similar to the following:

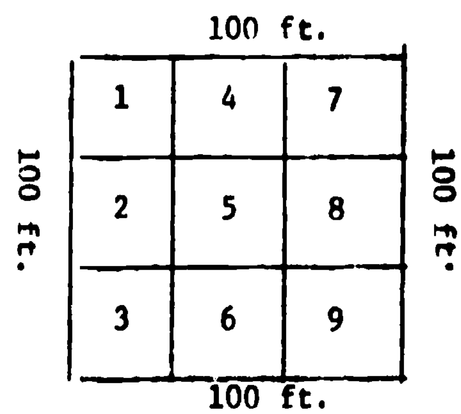
1. What do grasshoppers eat?
2. How much do they eat?
3. Can they eat themselves out of house and home?
4. When do you see grasshoppers?
5. Are there more in the spring or in the fall?
6. What eats grasshoppers?
7. Do grasshoppers do any harm?
8. Do grasshoppers do any good?
9. How do grasshoppers move from one area to another?
10. How would you find out how many grasshoppers live in a particular area?

FIELD TRIP:

First day - set out stakes 100 feet apart with a twine string between the stakes to separate areas as shown below:



Stake out areas side by side, one area for each group of two or three people. If you don't have a tape measure, step off about forty steps between the stakes. The area should resemble the following:



Have each group collect as many grasshoppers as possible in 15 minutes and put them into jars.

Take the grasshoppers to the center of the area, paint the upper part of the thorax with fingernail polish or cut a notch in the tough upper wing and release them. (Use a different color of polish for each area).

Record the number of grasshopppers marked and released.

Second day - have each group collect as many grasshoppers as possible in 15 minutes. Put them into the jars.

Count the total number of grasshoppers, the number of marked grasshoppers and the color of the mark.

Third day - optional. This can be continued to determine a rise or drop in population and movement of grasshoppers back and forth to the other areas.

POST-ACTIVITY:

Set up a Lincoln Index formula for each area and determine population levels.

Ask the students about movement of grasshoppers from one area to another.

Ask the students about the difference in populations and why there is such a difference.

If the study is continued, ask them why there is a change in population levels.

LINCOLN INDEX FORMULA:

$$\frac{\text{NUMBER CAPTURED SECOND DAY}}{X} = \frac{\text{NO. MARKED RECAPTURES}}{\text{TOTAL NUMBER MARKED}}$$

BEST COPY AVAILABLE

SAMPLE DATA SHEET

NAME ______________

DATE ______________

UNIT # ______________

NUMBER OF GRASSHOPPERS CAPTURED AND MARKED ON THE FIRST DAY ______________

NUMBER OF GRASSHOPPERS CAPTURED AND MARKED ON THE SECOND DAY ______________

NUMBER OF MARKED RECAPTURES ______________

USE THE FOLLOWING FORMULA TO FIGURE THE ABOVE DATA:

$$\frac{\text{Number captured second day}}{X} = \frac{\text{Total recaptures}}{\text{Total number marked}}$$

THINGS IN ICE AND SNOW

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. Phone: 489-2416 (Revised 2-2-72)

Grade Level - 5-6 (Adaptable from 5-12)

Best time of year - Winter

OBJECTIVES:

1. To acquaint the student with a basic chemical knowledge of snow, ice and the melted waters of snow and ice.
2. To enable the students to discover and compare the differences of chemical content of waters in winter time as related to human activity.
3. To introduce the students to the principles and techniques of chemistry.
4. To introduce the students to concepts of tiny amounts of matter. (Chemical measurements in parts per million).
5. To introduce the student to the concept that man can upset the balance of a freshwater community without being aware of it.
6. To introduce the concept that snow carries into the ecosystem some valuable chemical items and helps distribute chemical items in the ecosystem.

BACKGROUND:

Snow is important to man in a number of ways. Snow brings and stores up much needed water for replenishing soil moisture which is lost over the warmer seasons. Snow when it melts becomes important to us as a source for refilling our rivers, ponds, sloughs and lakes. Snow melt also serves to bring nutriants into our inland waters. It is important that we do not harm the ecology of our waters. Melted snow, if running off of mismanaged land, will carry as much silt and dissolved nutriants as heavy rains. The result will be silted in lakes and sloughs and an inbalance of nutriants in the living systems of the waters. Over fertilizing results in masses of stinking algae growth, winter and summer fish kills from oxygen starvation, a change of the fish and animal life in the water and a general decline of the water quality.

It is a valuable experience for students to run water chemistry tests on snow and snow melt to determine the chemical content of it. It is also valuable that students have a basis for comparing the high quality snow melt water with poor quality water. Poor quality water is very easy to collect; most sloughs and dugouts located in farm yards have waters which are heavily fertilized and are consequently low in dissolved oxygen, high in dissolved CO_2 (carbon dioxide), have a pH range of 7.5-8.5 and contain relatively large amounts of salt (NaCl) compared with snow. The following is a table recording the chemical analysis results of various waters tested by 5-8 grade students in Lake County during the winter of 1970-71. These will serve as a reference to you.

WATER SOURCE	pH	SALT	O_2	CO_2
Franklin Sewage	8.5	525 ppm	0 ppm	560 ppm
Madison Sewage Effluent	8.0	826 ppm	1 ppm	440 ppm
Redfield Slough	8.0	265 ppm	1 ppm	320 ppm
Buffalo Slough	8.0	150 ppm	1 ppm	250 ppm
Fresh Clean Snow	6.5	12.5 ppm	8-14 ppm	5 ppm
Old Clean Snow	7.0-7.5	25-50 ppm	8-14 ppm	5-15 ppm
Madison Street Snow	7.5	250-635 ppm	7-12 ppm	5-15 ppm
Dirty Snow	7.5-8.0	250 ppm	5-8 ppm	50 ppm

Generally, in this area waters are alkaline, the pH will range from 7.5-9.00. This is a result of the elements the water picks up by percolating over and through the soil. Sewage will show the effects of what man deposits in it. The salt concentration is a good indicator in this regard. Franklin sewage shows high salt content, but Madison sewage shows an even higher salt content. The salt content in sewage will vary considerably with man's changing uses of salt. Madison sewage probably reflects the run-off of salt from salting streets and water softeners. These high salt contents of sewage are in direct contrasts with the salt content of fresh snow melt. pH of fresh snow and clean snow will vary from 6.5-7.5; this is the desirable high water quality range. Fish and water life can tolerate more acid and alkaline waters, however, more extreme ranges are not desirable.

Dissolved gasses tell a very important story in our waters. Oxygen content of water dictates the type and numbers of fish and other animals, which will live in it. Different fish have different tolerances to oxygen content. When the O_2 content of water drops to or below two parts per million, most of our desirable fish die, even some of our rough fish die. Bullheads will live at or less than ½ part per million O_2. Often with a low oxygen reading a high CO_2 reading will occur. High CO_2 readings are an indication of decay and have occurred in sewage samples and waters from under the ice in Redfield and Buffalo Sloughs. The low CO_2 and high O_2 content of the snow is a reflection of its high quality and give the student an insight into snow run-off importance on our lakes and streams. Snow run-off is like a transfusion of fresh oxygenated blood to O_2 starved winter and lake water.

Generally, high salt content will mean a pH rating of 7.5 or above, low salt content may mean 6.5-7.00 pH readings. When high O_2 content is present, CO_2 content will be generally low. When high CO_2 content is present, it may mean bacterial decay is taking place in the water, O_2 content may then be low. High CO_2 content and high pH readings may be experienced in areas where the water source is in or near artesian areas.

The concept of pH is confusing for lower level students. It is perhaps expressed by comparing pH readings of samples with acid and bases students have had experience with. pH of 1.0-7.0 are acid and more like 7-Up or Coke than Alkaseltzer or soap which have pH in ranges from 7.0-14.0.

MATERIALS:

1. Hach water testing kits for pH, CO_2, O_2 and NaCl
2. Quart jars
3. Access to a sink and running water - optional
4. Sponges
5. Ice auger for boring hole through ice (available from the Interlakes Office)

PRE-ACTIVITY:

Discuss snow and ice and the importance of both to man. Discuss what happens to it when it melts. Ask questions like the following:

1. What is snow made of?
2. What does snow contain?
3. List reasons why snow is important to us.
4. List chemicals you would expect in melted snow and ice. How would we find out if they are present or not?
5. What chemical do you smell in the sewage?
6. What does fresh, melted snow smell like?
7. What is a part per million? How much is that?

One part per million can be explained by the following anecdote. Take one penny and paint it bright orange. Then mix that penny into a pile of pennies that is so big that the top is on the ceiling and the bottom covers the whole floor of the classroom. That is around a million pennies. The orange penny is one part per million, or one penny is one million pennies.

How can the chemistry test find one, two or even three parts per million?

Then, introduce the chemistry kits and tell students that they will test melted snow and ice to find answers to their questions.

List different kinds of snow and ice they might test. Any combination of four or five of these will suffice.

1. new clean snow
2. old clean snow
3. snow from trampled playground
4. old dirty snow
5. snow from street side
6. ice chips from lake
7. sewage water
8. slough water from under the ice

Select four teams from the students and assign a test kit to teach group. Get several samples of school water or have several students bring water samples from home. Review the chemical techniques used in the water tests. Directions are on the inside cover of the testing kits. Let the students practice on the water samples. Save the results for comparisons with water collected from the snow and ice samples. Caution the students to label the water samples collected carefully.

FIELD TRIP:

Students can be bussed to the Wetlands or may collect samples from near school. Stress that they collect the samples carefully and not contaminate samples with salt from their hands. Some of the larger boys will be good on the ice auger. The field trip need not be long. After samples are collected, if the weather is agreeable, allow them 10 minutes for play time.

Madison sewage effluent can be collected throughout the winter by the lagoon outlet on the creek on Highway 19 south of Madison. The bus can pull off onto the shoulder to allow for a quick trip by several students to the outlet for sample collection.

Return to the classroom, allow the snow and ice samples to melt. Keep the sample jar lids tightly secured. Allow samples to stand overnight. Keep them as cool and shake them as little as possible.

POST-ACTIVITY:

Have the student groups use the same kits they practiced with earlier. (You may wish to switch them around, that is fine but figure on running through the explanatory phase of the pre-activity with each group). Have each group test each sample (4 or 5 tests, more if time allows). Recordthe results on a table on the board. See sample attached. When the students have completed all of the tests have them rinse the equipment and put it away.

Discuss and compare the chemical characteristics of samples tested. Ask the students questions about the consequences of those results. You needn't have all of the answers, leave some of the questions unanswered. A lot of answers for questions of environmental interactions are not known. Your results may vary considerably from those discussed in this unit.

Suggested questions:

1. Why is the O_2 content so high in snow?
2. Why is the O_2 content so low in sewage?
3. Why is the O_2 content so low in slough water?
4. Why is the CO_2 content in snow so low compared with sewage and slough water?
5. What effect does low O_2 have on fish and aquatic animals?
6. What effect does low O_2 have on water plants?
7. Discuss again questions asked in the pre-activity.
8. What effect do we have on the chemistry of lakes and streams?
9. Where does the salt come from?
10. Why are the pH values so much different between fresh snow and sewage? What do you suppose causes the difference?
11. Which water is most like 7-Up or acid?
12. Which water is most like Alkaseltzer or alkaline?
13. Which water is the saltiest?
14. How did it get that way?
15. Which water would be the best for fish to live in?
16. Which water would you rather drink or swim in?
17. Which water would you think would be best for lakes and streams?

DATA TABLE FOR WATER OR SNOW MELT CHEMISTRY

NAME ______________________

DATE ______________________

WATER OR SNOW SAMPLE	pH	SALT (NaCl)	O_2	CO_2
Old clean snow	7.0	25 ppm	12 ppm	10 ppm
Fresh melted snow run-off	7.5	150 ppm	12 ppm	15 ppm
Dirty snow from plowed field	7.5	150 ppm	10 ppm	100 ppm
Madison street snow	7.5	650 ppm	8 ppm	50 ppm
Madison sewage	8.5	825 ppm	1 ppm	440 ppm

PHOTOGRAPHING THE ENVIRONMENT

Written by Mrs. Rosemarie Brashier and Mrs. Arlis Hanson, Sixth Grade teachers, Washington Elementary School, Madison, South Dakota. Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, South Dakota. 57016

Grade Level - 6-12

Best time of year - Anytime. Because some of these activities are extensive, they may cross over from season to season.

OBJECTIVES:

1. To encourage students to observe and record environmental issues through the media of photography.
2. To encourage students to compare those activities of man that exhibit environmental concerns with those that do not.
3. To develop in the student an appreciation for the beauties of a quality environment.
4. To help the student develop a concern for the future of the environment.
5. To record sequential events that lead to either the improvement or deterioration of the environment.
6. To increase the creative thinking and action of the students.

MATERIALS:

Polaroid Swinger Cameras - 1 for each 5 students
Polaroid color film or Polaroid black and white film
and/or
Personal camera with film

BACKGROUND:

Students should know how to operate a camera before launching forth with this activity. Most school libraries have books on photography. Students who are enrolled in the 4-H photography project have several booklets that teach the use of the camera. Some of the operations are basic to all cameras, but specific types of cameras will need to be studied. Background information on the properties of light could also be studied in order to better understand how a picture results.

There are many ways to use a camera. It can be used to help develop in students a desire to be more creative in the photography and to be more observant and appreciative of their environment. The following special techniques can be used effectively:

a. Interesting effects can be produced by using cellophane paper or a nylon hose over the camera lens.
b. Double exposures might be suggested for some of the activities calling for contrasting.
c. Half-frame pictures might also be tried for pictures calling for contrasting. Take the subject of one picture to the left of the

frame. Then take a second picture so the subject is to the right half of the frame. Cut the finished picture in half and mount them together as though taken as one.

d. Superimposing can be suggested, but a superimposed "effect" can be achieved by cutting a part or parts of one or more pictures and pasting it on another.

Students should be made aware of the fact that their first efforts may not be successful. Technical problems will then need to be solved. The students should be encouraged to invent their own ideas and solutions.

Start by giving the assignment. After that, assist your students only when they seek help, but let them make their own decisions. You may decide to allow the students to choose their own assignments from those available or even let them develop their own. All of the students could be given the same assignment or different assignments might be given to different groups. Let each student select his own method of completing the assignment. Encourage them to do as much of the work after school as possible.

They may share their results in a post-activity if they wish to, but don't insist on it. Whenever possible help the students to develop the ability and desire to express their own feelings.

An alternative method to do these assignments would be as follows:

1. Divide the class into groups or allow the students to group themselves. There should be as many students in each group as there are cameras.
2. Set up a time schedule for the groups to carry out the activities- the first group will be given a certain length of time to complete their assignment, then the second group will begin theirs, etc. These should be spread over the academic year.
3. Each group will be given a different type of photography assignment. The pre-activity will be given to each group just prior to the beginning of their particular assignment. If at that time any student in that group prefers not to do that activity, he should be allowed to select some alternative activity.
4. Although all members of a particular group will be involved in the same activity, each member will perform it individually. Each student should be allowed to make as many of his own decisions as possible, during the course of the activity.
5. A post-activity can be carried out for each group. At the completion of the assignment of the final group, a post-activity of all those involved could be held.

I LIKE IT - I DISLIKE IT

PRE-ACTIVITY:

This may consist of discussion only. First ask the students to think of things in their environment that they like. Make a list of things on the board. Some of their first thoughts may be that they like flowers, birds, trees, etc. Next have a list of things put on the board that they dislike. Perhaps such things as dump-grounds, litter on the streets, algae growing on lakes, etc. will come to mind. Suggest that such things are the usual ones that persons seem to like or dislike. Suggest to the students before they go on the field trip that they try to clear their minds of the more obvious and universal likes and dislikes. Much time should be taken to observe before they begin taking pictures. Hand-and-knee examinations will perhaps prpduce some different thoughts.

The students may be divided into groups of four. Select an area for each of the groups. The areas for each group may be similar. For instance, a city block for each group may be assigned. Or, the groups may be sent to areas which are much different. For instance, one group may go to a city park, one to a farm yard, one to an affluent residential area, and one to a poorer residential area. Depending on the grade level, an adult should accompany each group.

FIELD TRIP:

Allow at least half a day. The children should go to their designated area. The groups should spend at least an hour just walking the area. Notes should be taken of the things they see that they like first. Be sure to put into notes some way of being able to find the chosen "like" when they wish to return to it.

Then the area should be re-walked and notes taken on dislikes. Remember to make notes to identify the spot in which the dislike was found.

When observations are complete the group should sit down and confer about their findings. Those most liked and disliked by the group should then be photographed.

POST-ACTIVITY:

After the film has been developed, each group should show their pictures to the rest of the group. Show likes first. As each picture is shown, students should tell why they liked the particular thing. Questions should be asked. Did they take pictures of things they should like, or that they really liked.

Proceed in the same way with pictures of dislikes. Ask if anything could be done to change the things they found which they disliked. Ask for reactions to dislikes. Make a list of changes that could change dislikes to likes. Ask what might happen in the future that could change likes to dislikes.

Ask others if they like or dislike what others have photographed. Encourage active discussion.

To finalize this activity, those pictures which produced the most reaction from the majority of the class could be mounted and posted. Each group could also produce a mounted arrangement of their picture.

MYSTERIES

PRE-ACTIVITY:

It is suggested that teams as small as possible be set up for this activity. Each team should be given one of the following assignments:

1. Take pictures that contain a clue as to the time of day it was when the picture was taken. Members of the team should be instructed to take pictures representative of each of the daylight hours. Depending on the time of year, suggestions such as the following can be given:

   a. Photograph a milk truck with lights on which would be representative of the 6:00 a.m. hour.
   b. A picture of a building showing very little (if any) shadow could represent 12:00 noon.
   c. A picture of a house with lights on could be representative of the 6:00 p.m. hour.

   Encourage use of shadows.

2. Take a series of pictures that tell a natural or scientific mystery story. Be certain that each picture contains enough clues so that when put together the series can be a whole story retold. Examples: a series of pictures that tell how an animal died, or how a lake became polluted, or what's in a goldenrod gall.

3. Take a series of pictures that will lead others to a specific treasure which you have found in nature. Take photos along the route you want someone else to be able to follow. Each picture must contain clues as to where it was taken along the route. Photograph the natural treasure you have found also. Suggest such a natural treasure as a patch of pasque flowers, a tree growing out of a rock, or a set of tracks made by an animal in the snow.

FIELD TRIP:

Time can be set aside for a field trip, but it is more conceivable to have this performed as an extra-curricular activity. Allow a period of several days for the team to do their studying and photographing. Since the element of suspense is present in this activity, be sure each team remains as reclusive as possible.

POST-ACTIVITY:

Allow ample time for the post activity. It would be best to set aside a half day and arrange a field trip. After the pictures are developed each team should present their photos in the following manner:

1. Those with assignment No. 1 should show their pictures to members of another team. That team must then arrange the pictures in chronological order. They will probably need to go to observe some of the places where pictures were taken to get direction, especially if shadow was used. Those who took pictures will need to tell location of where picture was taken.

2. Those with assignment No. 2 should give their pictures to members of another team. That team must then see if they can figure out what the mystery is and what caused it. If the team can figure out what caused the mystery they should write about it, or be ready to retell it to the rest of the class.

3. Those with assignment No. 3 should give their pictures to members of another team. The pictures of the route taken to the natural treasure should then be followed. It will be necessary that they are told which picture is the first in the sequence, but then they should be able to follow the path and decide what the natural treasure is.

After the field trip the class members should return to the classroom to see if they have solved the various mysteries they have been assigned. Encourage discussion.

This activity will make students aware of things that often go unnoticed. It can be a very rewarding study and will require dogged-stick-to-it-iveness!

MAKE-A-SOMETHING

PRE-ACTIVITY:

Ask students if they are aware that there is unnecessary waste in the world. Have them discuss some of the things that are wasted that they can think of right in their own home. Suggest that many of the throw away items from home could be used in some other way. Ask students to make a list of throw away items, (not food). Have students think about what could have been done with some of these throw away items. If they can't get started in this thinking, ask what they think might have been done with a plastic bag that was thrown away. Suggest such things as having used it for stuffing a stuffed toy or a decorative pillow. Proceed by suggesting that boxes could have been decorated and made into storage boxes for such things as mittens or scarves. Plastic bottles that held bleach could have been turned into clothes pin holders. Waste paper could have been recycled and made into paper bricks for building.

The word recycled must be defined, but after it is, the reasons for recycling must be discussed.

Tell the students that "on-their-own" they are to take pictures of throw away items. Then they are to take the throw away items and make something useful out of it. The "Pack of Fun" magazine suggests many toys and useful articles that can be made from recycled materials. Many magazines also offer articles on what to do with such items.

After they have made something from throw away items they should take pictures of the new article. (Suggest half-frame pictures as told about in background information.)

ON THEIR OWN:

No field trip is suggested for this activity since each student will be working on his own and the project can be very long term. However, it might be an eye-opener to take a field trip to the local dump ground. As an added incentive the activity "Studying South Dakota Refuse Gardens" from the Interlakes Environmental and Outdoor Education Program, Chester, South Dakota might be done before starting this activity.

POST-ACTIVITY:

After pictures are developed show the picture and the recycled article. Have the article explained and the use of the article explained. Have a name invented for the new article.

Discuss whether there are larger things that could be recycled. Have the students research used car body recycling and water recycling.

Hopefully this activity will make students aware of the tremendous waste in our world and will make them want to be more conservative.

ADJECTIVES

PRE-ACTIVITY:

The students should be asked to list adjectives. Put them on the board as they are listed. Be sure the list is long - perhaps as many as fifty. Have students make a copy of the list.

Tell the students that there is not a single thing in nature that cannot be described in some way by the use of an adjective. Ask for words to describe a flower. Probably such adjectives as lovely, delicate, pretty, etc. will be given. Then name a specific flower such as a tiger lily. Ask for adjectives to describe it. Responses will undoubtedly change.

Have students select at least ten of the adjectives from the list. More can be selected if there will be extensive time for the field trip, but each person should pick the same number of adjectives. Once their selection is made, they cannot change it.

Depending on the number of cameras available the class should be divided so that each group has a camera. It would be ideal if each person had one.

FIELD TRIP:

Allow at least a half a day. Bus students to different areas large enough so that they can spread out and not be close to one another. Suggested areas are the Wetlands area, a farm, a set of city blocks, or a park. Each one will then find one thing to photograph that will fit the suggested adjective. If a group is working together, the group must select the adjectives first and then find something that it will describe.

REMEMBER: Each group or each individual must photograph the same number of adjectives, and they cannot change adjectives once selected. This will make the students more observant. Otherwise they will find something and photograph it and be able to fit an adjective to it.

POST-ACTIVITY:

After the film is developed the pictures should be shown. Have each person tell why he feels as he does about the picture he took. Ask other class members if they think the picture best portrays the adjective that was chosen. Encourage discussion. Discuss moods. Ask how something might be changed so that the adjective describing it could be changed. Ask what environmental change might take place so the chosen adjective could no longer apply.

This activity will be an eye-opener for all and will cause students to find that they have a feeling for the things around them.

"FOOTPRINTS"

PRE-ACTIVITY:

Present these ideas to your class with as much discussion as possible. Some of the terms that are used by archeologists should be defined and discussed also.

When archeologists find evidence or "footprints" of some past culture, they try to piece together the information about how these people lived. Pieces of baked clay may tell that they made their own dishes, simple tools would aid us in knowing their technical advancement, bones found in the known garbage area would tell us something of their food habits. Discuss with the children other "footprints" of past cultures.

FIELD TRIP:

Plan a trip to a local refuse garden. Give this assignment to the group:

> If archeologists of the future made a "dig" over our city dump, what would they think of our "footprints"? Take pictures of some of their possible "finds" and be prepared to tell how they may interpret the "footprints".

POST-ACTIVITY:

Post the resulting photographs of the field trip on a bulletin board and ask the students to be the archeologist of the future. Write how they might interpret each particular "footprint".

Discuss with the students this supposition:

> If man could find a way to recycle all wastes and garbage so that there would be no further build up of dumps, how might archeologists interpret this?

This assignment could be used in connection with the activity, STUDYING SOUTH DAKOTA REFUSE GARDENS from the Interlakes Environmental and Outdoor Education Program.

"MUST WE HAVE THE BAD TO ENJOY THE GOOD?"

PRE-ACTIVITY:

Discuss litter and pollution; their causes, reasons for their existence, and if they are really "necessary evils" of the good things. Some that could be discussed are:

1. Air and water pollution from factories in order to have manufactured products.

2. Littered beaches in order for a fisherman to enjoy fishing.

3. Foamy streams and algae in lakes in order to have clean clothes.

Continue the discussion with these questions:

1. When are some times that people litter?
2. Does this littering help them have a better time?
3. What is causing our streams, lakes and rivers to become polluted? Include the ideas of (a.) raw sewage, (b.) phosphates in detergents, (c.) poor treatment of sewage, (d.) poor farming practices causing erosion.
4. Does this have to happen when we wash clothes? Because we farm?
5. Could we present these ideas so other people can be aware of our findings? How might we do this? Could a camera help us?

FIELD TRIP:

Let's take a week to look for and photograph the good and the bad side of our environment. Try to take the photos in pairs as discussed in the pre-activity.

POST ACTIVITY:

For those photos that show good things, ask if there is any bad that results and what we can do to eliminate the bad things that associate themselves with the good. Arrange an attractive display of the series of photographs.

A variation of this assignment is one of "Opposites".

A. Find and photograph things that represent opposite ideas.

B. Make a list of opposite word pairs and then go outside and photograph objects in the environment that represent the word pairs.

An example of this assignment would be one photo of a boy in the woods alone enjoying the environment; the second photo would be that of city traffic only, no nature.

FOR EVERY ACTION, THERE IS A REACTION

(Cause and Effect)

PRE-ACTIVITY:

Cause and effect should be discussed here. There are two types of cause and effect relationships you could use.

1. That showing present or past
2. That showing supposition

The students could be asked to use their reading books to find cause and effect relationships of both types. These should be read orally and discussed.

FIELD TRIP:

The time involved for this activity is difficult to determine. Like many others in this unit, it would be best to extend the assignment over a week or two. The students would need to complete it on their own time.

They should be encouraged to think through the particular assignment quite thoroughly and observe their environment carefully before taking their photos.

Assignment 1: Go outside and find two things - one of which is responsible for the other.

Assignment 2: Go outside and find a series of events relating to the environment so that the first is related to the second, the second to the third and so on. Do it in such a way that the last event appears to have no casual relationship to the first.

Assignment 3: Photograph the series of a food chain, that is, the dependency of one on another, either man or creature.

POST ACTIVITY:

The photographs should be arranged in logical order and mounted attractively. Those students wishing to discuss their assignments should be given that opportunity.

power, Power, POWER

PRE-ACTIVITY:

To get the students to think about power, ask such motivating questions as:

a. What is power?
b. How do you get it?
c. How do you keep it?
d. How do you lose it?
e. How do you use it?
f. Who has it?
g. How can power be measured?
h. Compare different kinds of power.
i. Which power is the most powerful? Why?
j. Which power is the least powerful? Why?

FIELD TRIP:

Instruct the students to find things that represent power to you, photograph these things. If a group has only one camera, they should each find at least one thing to photograph.

This activity would work well as an extra-curricular assignment. Students could be asked to look for things that represent power to them. They could check out a camera with which to photograph them.

POST-ACTIVITY:

Exchange power pictures and discuss what kind of power you see in each other's pictures. Tell what the power does, how it affects your environment - good or bad way.

NOW TRY THIS

Considering the fact
that energy is necessary
for power,
now go back
and do the pre-activity,
field trip,
and post-activity
in terms of energy.

PLANNING A CITY

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota 57016. Phone: 489-2416.
(Revised 6-26-72)

Grade Level - 6-8

Best time of year - Any time

OBJECTIVES:

1. To encourage student participation and cooperation on a class project, emphasizing the democratic process and decision sharing and making.
2. To develop a social studies project which relates to modern day problems.
3. To develop a problem which is interdisciplinary in nature.
4. To introduce students into the process of planning human living environments.

MATERIALS:

South Dakota map
copy of city government structure
bulletin board space
work table
large sheets of tagboard

BACKGROUND:

This is an excellent unit for the students. It will give them a lot of insight into some of the problems that we have in our modern cities. They will be able to better understand why we have the problems we do and why some of them are difficult to remedy. Students should learn to work together on this project because they will have to form committees to solve their problems and get the information in order. They may even form a city government for an added attraction. Council meetings might be held on all issues which come up. The teacher and students' imagination will be the controlling factor on the value of this particular activity.

PRE-ACTIVITY:

Introduce the activity with questions similar to the following:

1. Why do you live where you do?
2. Why do you suppose this city was started here?
3. What are the advantages of living in the city?
4. What are the advantages of living in the country?
5. Would you rather live in a big or small city? Why or why not?
6. What type of city would you construct if you could build your own?
7. Where would you construct it?
8. Let's construct our own city. We can put it anywhere we wish in South Dakota as long as there isn't a city there already.

FIELD TRIP:

The first item on the agenda is the site selection. This should be selected after some research is done on the various sections of the state. Information that is pertinent to their choice may be type of recreation available in that area, type of industry available, modes of transportation, etc. The class could be broken down into groups and each group assigned to an area of the state for research purposes. When this research is finished, (maybe a week or so will be enough time) they should have a meeting and discuss the various points they have researched. Now that the general area is designated, they can pick a specific site for the town. Now, a name should be assigned to the site. This may be a good time to elect a mayor for the city. A general meeting should be held to determine the size of the city. Now, depending on the class size, committees should be established to furnish ideas for the rest of the class to vote on. Committees needed include housing, shopping centers, restaurants, service stations, park department, transportation facilities, recreational facilities, motel or hotel facilities, schools, zoning committee, churches, water and sanitation, health services and any other committees that are needed at the time. Obviously, unless you have an extremely large class, the students will have to be on several committees. Each committee should be from three to five students in number. They should present a main proposal and also one or two alternatives for the class to vote on. Each committee should have a chairman who votes only in case of ties. He should be chairman of only one committee at a time. They may want to use their city government system as a guide to follow so they won't be leaving any vital services out. Field trips to the various departments in the city could be arranged for.

POST-ACTIVITY:

As the different committees come to discuss the decisions and the decisions are voted on by the class, they will want to have a progress report and keep track of this on the bulletin board. You can build a model table top city on a workbench in your room. Everything can be done to scale. This becomes an excellent math activity or one which is very practical in the minds of the student. The buildings can be constructed as art activities. The students can even go as far as to landscape the city. The finished product will be one of which the students and the instructor will be proud. It may also be of the quality to win a prize at a science fair.

FARM PLANNING FOR PROFIT AND RECREATION

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, South Dakota. 57016
Phone: 489-2416

Grade Level - 6-8

Best time of year - Anytime. Well suited for winter weather for most of it is completed in the classroom.

OBJECTIVES:

1. To plan a farmstead in which all of the acreage is put to the use for which it is best suited and compatible with the environment.
2. To plan areas on the farmstead that will produce wildlife, and enable the farmer to derive income and recreation for himself and his family.

MATERIALS:

A large square board or box
Soil
Materials to simulate farm buildings, livestock and natural features

BACKGROUND:

Much of our topsoil and in some cases subsoil is gradually being taken from us because of poor farming practices. This doesn't have to happen. If our farmsteads were planned so that the acres are being used in proper ways, this would not be a problem. Some of our land could be converted into shelterbelts for wind protection. Waterways can be grassed for prevention of water erosion. Contour farming and terraces retard water erosion. With the establishment of this type of farmstead program comes another benefit --wildlife production. Shelterbelts and grassed waterways are important habitat areas for wildlife. There are many cost sharing programs that take a lot of the burden off of the farmer.

PRE-ACTIVITY:

Begin with questions similar to the following, depending on student answers:

1. List types of soil conservation practices which farmers use to stop water erosion of the soil.
2. Ask types of conservation practices which protect the soil from wind erosion.
3. Do these practices benefit anything besides the soil?
4. Do these practices provide recreation in the area?
5. Do you think that a farmer can really farm for a profit and still have wildlife around? How?
6. Can farmers collect any money from the wildlife they produce? List the ways. (a.) trapping furs; (b.) charging for hunting; (c.) eating the wildlife themselves.
7. Are people willing to pay to hunt or fish?

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FIELD TRIP:

Let's get some soil, pile it on a large square board and design a farm that would make maximum use of the land for both crops and wildlife. We will need to do research on a lot of things. We need to know how much land costs an acre. We need to find out how many bushels per acre of corn, wheat or oats we usually raise. It will be valuable to know who will help establish the various conservation techniques and what financial assistance we get. We need to know how much wildlife we can raise on an acre of land managed for wildlife. We need to know the annual rainfall and when in normally comes. We need to know which way the winds will come from so we know where to put our shelterbelts. We need to know how much we can charge to hunt or fish and how much it will cost us to advertise. We need to know what kind of machinery we need, [illegible] it will cost us a year for depreciation and repairs.

Where can we get this information? You can contact the Soil Conservation Service for information on soil practices. We can contact the Game, Fish and Parks for information on wildlife management. Contact the County Agent for yield per acre, average price per bushel, cost per bushel, cost per acre of preparation of land a year, etc. You can contact the weather bureau for rainfall and wind information. You will need to contact the bank or Farmer's Home Administration for land values and interest rates.

This type of research should be organized into committees and reports given to the class. When all the information is gathered, you are ready to design your farm. Design the farm on paper first with everything to scale. Just for convenience, we will make the farm 640 acres = 1 square meter. Design everything to scale including the mile roads, access roads, fields, etc. Figure out how much money you should be able to make an acre for each crop on an average year. This includes livestock and wildlife crops.

POST-ACTIVITY:

With all of your information gathered and your scale model drawn, you can start landscaping the pile of dirt you have. You can make all the different terrain features and constuct the shelterbelts, waterways, terraces, etc. just as they would be on the land. You may want to copy an actual section of land that is located near your town. After you have finished designing it the way you think it should be designed, compare it to the actual section of land and see how they compare. Discuss the differences and come to a decision as to who has the better plan.

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STUDYING SOUTH DAKOTA REFUSE GARDENS

Written by Major L. Boddicker, Environmental Education Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota. (2-4-72)

Grade Level - 6-8

Best time of year - Anytime, however, snow covers some of the trash and lessens the visual and olfactory impact. (Doesn't look or smell as bad).

OBJECTIVES:

1. To acquaint students with the ways we manage litter and refuse.
2. To show the students ways of recognizing and studying waste management.
3. To acquaint them with natural cycling processes.
4. To introduce and develop in students the concept of recycling and implementation of proper waste management.

MATERIALS:

pencil
data sheets

BACKGROUND:

The history of man is read in his garbage piles. History of man is being made presently in an unprecedented quantity. The real tragedy of the management of our wastes is not that they are there, but that we do not provide for their reuse. We are, in effect, taking minerals (iron, aluminum, sand for glass) from areas of high concentrations where they can be obtained cheaply and spreading them out. When the concentrated resources run out we will have an expensive process of collecting these minerals for reuse from our scattered dumps and refuse piles. Our dumps may be the mines of the future. It would seem to me that the greatest pollution problems could be solved by several steps which might cost the consumer more initially, but would benefit him in the long run by eliminating hidden costs. Why not manufacture cars, applicances, furniture, machinery and clothing with lives measured in 30 year periods rather than five years? Why not establish an ethic which sacrifices fashion and style for utility and service? This activity is centered around a mathematical determination of the amount of garbage generated, the composition of that garbage and what is happening to it. (This activity is intended to follow-up Let's Study Litter).

PRE-ACTIVITY:

Discuss garbage and solid wastes. Ask questions relative to where do all of the metals, plastics, glass and wastes generated end up, what happens to it, where is it in Lake County? How do we handle wastes? How much does it cost to manage garbage dumps, old car bodies, litter pickup and disposal, etc.

What is our most common waste item? What is our biggest litter problem? What happens to litter? paper? plastics? tin cans? aluminum cans? glass? rubber? metal? toxic chemicals? wood? What are the best ways for disposing of these wastes? How do we dispose of them here? Propose that the class study this and prepare a report on it.

FIELD TRIP:

Plan and take a field trip to a local city dump and/or a farm dump. Study its location in relation ot the environment around it. Ask the following questions:

1. Is it an eyesore? Does it affect the value of the land around it?
2. Does it contribute pollution to a lake, slough or creek in the area?
3. Does the smoke and smell of the garbage blow over the city or anyone's house?
4. Is the refuse treated or burned to insure that there are no disease breeding rats and mice infesting the dump?
5. Is the dump far enough from houses and town to insure that rats and mice won't infest them from the dump?
5. Is the dump fairly well organized where types of garbage and waste materials are separated for efficient treatment or possible recycling?

Pass out data sheets (examples are attached) and have the children fill them out by assigning each student or pair of students a representative sector of the dump. Step off to measure the sector and determine the depth of the garbage. Calculate the volume of the sector, later add the volume of all sectors to get an idea of the volume of waste in the dump. Students count the different types of refuse and record them. They can then return to the classroom for a follow-up. NOTE: The suggested size for the study sector should be at least 20' by 20' surface area.

FOLLOW-UP:

Calculate from student data sheets the volume of garbage, the most common type, least common and specifically itemize the waste content. Discuss the questions asked in the pre-activity. Try to formulate alternate methods of treating the wastes itemized and calculate the costs or managing those wastes. Write a report on the dump.

HISTORY: When was it started? What was the land before the dump was placed there? How much did the land cost? Who manages it? How much is he paid? Where does the water running off of the dump end up? Who can dump there? What would it cost to replace it? Could it be moved to a better location to minimize damage? Could it be beautified? What is being done to improve the situation, or are people satisfied with it?

Formulate reasonable alternatives.

TIPS: Instruct the kids to wear proper foot wear; old boots or high top shoes.

DATA SHEET NUMBER 1

SECTOR ________

AREA: Calculate volume of trash and count or estimate numbers of ...

BOTTLES	CANS	METALS	
____beer	____beer	____car bodies and pieces	
____catsup	____oil	____junked appliances	
____pop	____food	____bed frames	
____juice	____paint	____misc.	
____misc.	____misc.	____TOTAL	
____TOTAL	____TOTAL		

PAPER	PLASTIC	WOOD	MISC.
____books & magazines	____buckets	____boards	____old tires
____sacks	____sacks	____furniture	____mattresses
____cartons & boxes	____sheets	____misc.	____clothes
____misc.	____food containers	____TOTAL	____TOTAL
____TOTAL	____soap containers		
	____misc.		
	____Total		

TOTAL PIECES OF GARBAGE AND JUNK COLLECTED OR TALLIED ________

DATA SHEET NUMBER 2

SECTOR ______

ROTTING ITEMS (LIST)

1. Melons_____
2. Banana _____
3. Meat leftovers _____
4. Corn _____
5. Cereals _____
6. Paper _____
7. Cloth _____
8. Wood _____

TOTAL ______

CORRODING ITEMS (LIST)

1. Tin cans_____
2. Car Bodies_____
3. Iron scraps_____
4. Steel drums_____

TOTAL ______

NON-CORRODING ITEMS (LIST)

1. Rubber tires _____
2. Glass_____
3. Aluminum cans _____
4. Plastics (some)_____

TOTAL ______

% of materials present which should be recycled ______

RECYCLEABLE ITEMS (LIST)

1. Rubber _____
2. Plastics _____
3. Glass _____
4. Iron _____
5. Aluminum _____
6. Paper _____

TOTAL ______

SIGNS OF MANAGEMENT FOR WASTE

1. Dirt cover
2. Burning
3. Breaking into smaller pieces
4. Decaying -- insects, rats & mice

DATA SHEET NUMBER 3

SECTOR ______

COST TO THE ENVIRONMENT (LIST)

Negative	Positive
1. Stinks	1. Cheap
2. Ugly	2. Better ideas?
3. Runs off into slough	
4. Poisonous materials into the water supply	

DEVELOP HISTORY OF THE DUMP --

1. When was it started there?
2. Who owns it?
3. Who can dump there?
4. How long will it last?

DEVELOP ALTERNATIVES --

1. Read about other methods of waste disposal

2. Recycling

COVER MAPPING AND WILDLIFE USFAGE IN A SLOUGH OR SHELTERBELT AREA

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota, 57016. Phone: 489-2416.
(Revised 7-3-72)

Grade Level - 6-8

Best time of year - Winter after a fresh snow

OBJECTIVES:

1. To determine what type of plant community is present in a certain area and how to determine the number of plants in a particular plant community.
2. To acquaint students with methods of establishing a long term study area.
3. To determine what types of animal communities are associated with these plant communities.
4. To introduce students to methods of mapping plant and animal communities.

BACKGROUND:

After a fresh snow, wildlife activity is often at a very high level. Signs are much easier to find after the fresh snow and it is an excellent time to study the winter cover areas. We should be able to establish food, roosting and bedding preferences of different birds and animals during the field trip. What we learn from this type of study will help us to decide what types of cover areas and feeding areas we should make available for wildlife use.

MATERIALS:

measuring wheel constructed from a coffee can and twine with markings every ten yards - holes in top and bottom and an axle are optional

PRE-ACTIVITY:

Start with questions and a short discussion. Following are some examples which might be used:

1. What do deer eat in the winter? Where do they sleep? What type of cover do they prefer if they have several types available to choose from?

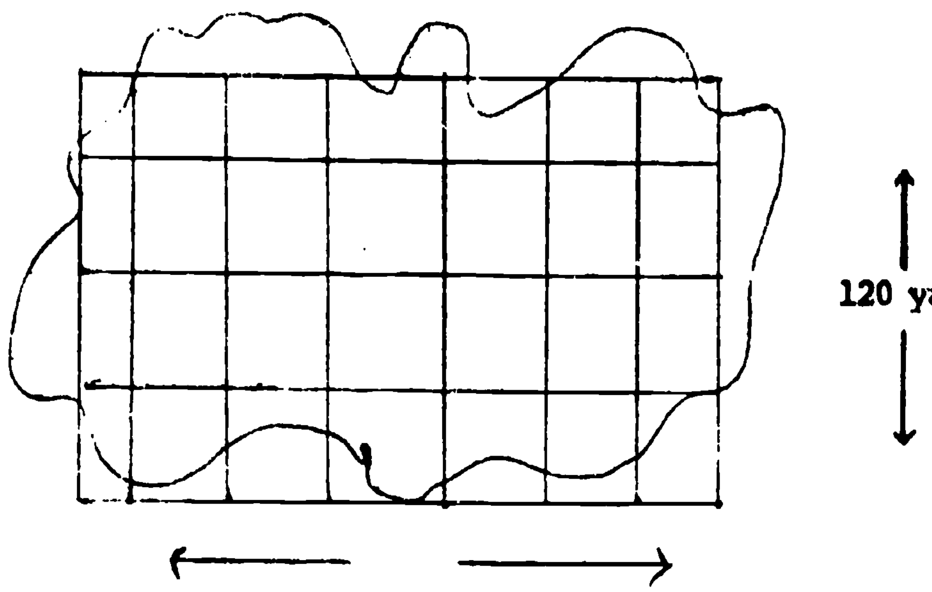
2. What do cottontail rabbits eat in the winter? What type of cover do they prefer if they are given a choice? How would you set up a study to determine what their preferences are?

3. Ask the same type of questions for the following animals: jackrabbits, pheasants, squirrels, fox, small mammals such as mice, shrew, mink, weasels, etc.

Let's devise a method of setting up long term study areas to help us answer these questions. We can use these study areas over a long period of time and in different types of weather.

FIELD TRIP:

To accomplish a study like this, study areas must be set up and a segment of the class assigned to each area. The area to be studied should be divided into thirty yard by thirty yard areas. If you have an ideal area, you should try to establish study areas which are adjacent to each other, but have different types of habitat. This is usually possible if you are studying in a slough area. The plot may look something like the following diagram:



120 yards

120 yards
(each square is 30 X 30 yards)

Areas could be identified by tying a colored piece of yarn to a weed in the approximate area of the corner post. The classes should be broken down into groups of two or three people. Obviously, in a slough as large as the one above, representative areas will have to be picked because there won't be enough groups. The first day may be spent setting up the study areas and generally making observations in the areas. The groups should be assigned to a specific area. If there is still time remaining, a small sample of each of the plant populations should be collected for identification purposes if the species of the plant is not already known.

On the second field trip, the plant communities should be mapped. Each group should establish a scale model of their plots and the cover types indicated.

```
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```


\+ - rushes
0 - grass
* - goldenrod
\# - ragweed

The next item on the agenda is to examine the areas for signs of animal useage. This means any type of useage including feeding, nesting, roosting, bedding, travel and any other significant signs. The exact areas should be pin pointed. Animal and bird signs should be identified and plotted on the map. Very accurate records should be kept in a diary. If possible this activity should be carried on for an extended period. The ideal time for the field trips would be from 24-48 hours after a fresh snow. Weather factors should be considered and this information kept in the diary, also.

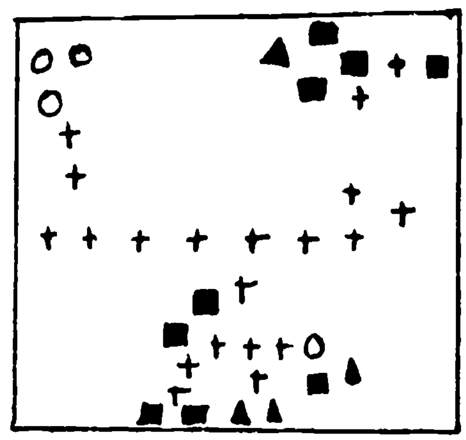
Important factors are barometric pressure, temperature, wind speed and direction, humidity, etc. A model animal sign plot is as follows:

+ rabbit signs (tracks and manure)

0 - rabbit resting holes

■ - pheasant signs (tracks and manure)

▲ - roosting area



POST-ACTIVITY:

After this field trip has been repeated as many times as possible, all of the data should be tabulated in the individual groups. This in turn should be transposed onto a master chart for the entire class to study. See the following example:

Wildlife Species	Type of Sign	Cover Type	Temp.	Barometric Pressure	Wind Direction	Wind Speed	Humidity
White-tailed deer	tracks	rushes	28°	30.4	NW	4 mph	20%
Cottontail rabbit	feeding & tracks	ragweed	28°	30.4	NW	4 mph	20%
Mink	tracks	rushes	28°	30.4	NW	4 mph	20%
Pheasant	tracks	ragweed	28°	30.4	NW	4 mph	20%
Fox	feeding & tracks	ragweed	28°	30.4	NW	4 mph	20%

A master map should also be constructed from all of the individual maps. A comparison of the cover mapping and the master chart should reveal some interesting points as far as wildlife useage of available cover, if there is a large variety of food and cover available.

You may want to do these on transparencies so you can superimpose one on the other to see if any patterns result.

EFFECTS OF SOUND - SOUND POLLUTION

Written by Ruth Von Behren, Elementary teacher, Chester Area Schools, Franklin Middle School, Franklin, S.D. Prepared and edited by the Interlakes Environmental and Outdoor Education Program, Chester Area Schools, Chester, South Dakota 57016.

Grade level: 5 (May be adapted for K-6).

Best time of year: Anytime - Suggest fall or spring when children ask to have a class outside.

OBJECTIVES:

1. To acquaint children with the physiological aspects of sound.

2. To acquaint children with the emotional effects of sound.

3. To introduce aspects of sound pollution and its effects on the environment.

MATERIALS:

Notebook, pen or pencil
Tape recorder (optional)
Camera and film (optional)
Sound meter (optional)

BACKGROUND:

Use this unit after the children have studied the definition, cause and speed of sound in science lessons. Combine this with the mechanics and physiology of hearing.

There can be a correlation with reading stories, current events, or social studies in regular classroom procedure.

PRE-ACTIVITY:

An hour, or two periods preceding a field trip.

Introduce the objectives by use of the following topics - in lower grades the teacher may present as much material as is applicable. Any late encyclopedia year book will have a wealth of material.

1. Kings and Things, (American Book Company, 1968), Page 260

2. My Weekly Reader, (Edition 5, Vol. 50, Issue 20, Feb. 23, 1972.)

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1. Measuring Sound - the sound meter measures the intensity of sound. The basic unit is the decibel (db) which is a tenth of a larger unit, the "bel".

   a. If there is a sound meter available, the child or teacher can demonstrate this portable device to measure degree of sound.

2. Physical effects of sound on the human ear. The ear is comfortable with a 50 db count of a quiet room or office, or it can tolerate a 140 db jet. Most people do not notice discomfort until loudness reaches 115 db, pain at 145 db.

   Causes of noise deafness:

   a. Industrial conditions
   b. Noisy hobbies
      1. shotguns - firearms discharge
      2. rock music
      3. motorcycles
      4. snowmobiles
      5. sports cars

   Effects on the body:

   a. Dilation of the blood vessels in the brain causes headaches
   b. Effect on the heart
   c. Interferes with thought processes
   d. Causes pupils of the eyes to dilate
   e. Increases blood pressure and cholesterol level

3. Noises of modern transportation:

   a. Planes - what was the main reason the government ruled out the supersonic flights over land? (sonic boom)
   b. Cars
   c. Trucks
   d. Buses
   e. Trains

4. Effect on emotions:

   a. Pleasing sounds
   b. Soothing sounds
   c. Loud sounds
   d. Warning sounds
   e. Reaction to sounds - as on those centered on fear and irritation

5. Bring a conch shell and let children listen - or an empty can opened at the top, held approximately 1/4 inch from the child's ear. Or, listen to sound produced by cupping hands over his ear.

   a. What do you hear? (Air whirling)
   b. What makes sound? (Vibration)
   c. What does it sound like? (Waves)
   d. Does imagination help?

FIELD TRIP:

Length of period may vary.

Children may be divided into groups.

Take the children to the school ground. Let one group select a place to hear, perhaps record, bird or animal sounds. Keep a list of sounds.

Another group may listen for busy sounds - perhaps near the highway. List and record sounds.

Let another group listen for playground sounds. List or record happy sounds, scolding, angry sounds, excitement.

Children might contrast and compare town or city sounds by extending the trip. Children from town visit the country. Country children visit a city park, school ground, or airport.

If a sound meter is available measure the degree of noise.

Try to get pictures of sound polluters and non-polluters.

EVALUATION AND FOLLOW UP:

Use any part of the following suggestions:

1. Discuss the field trip.
2. Review notes - listen to recordings.
3. What noises were pleasing to you? Why? Describe how they made you feel.
4. What sounds would you consider to be noise pollution? (Discuss)
5. Would you like to live near a busy highway? Or airport? Or factory area? Why?
6. Would pioneers of our state have had noise pollution? Would it have been the same as we have today?
7. Volunteer groups may wish to find out what is being done to lessen sound pollution.
   a. best to reduce or prevent noise
   b. ear protectors
   c. proper construction techniques
   d. laws providing noise control

8. Reporting on "Noise at Home" interests the group.
   a. What part of the home (house) is usually noisiest? (Kitchen) Why?
   b. What is the most quiet room?
   c. How can you reduce or prevent noise at home?

OTHER ACTIVITIES:

1. Draw or collect cartoons illustrating noise pollution.

2. Make posters or drawings.

3. Math problems: Sound travels through the air at about 1 mile in 5 seconds, which is a little more than 1,000 (1086) feet per second, or 1/5 mile per second.

   a. What length of time would be needed for sound to travel the 100 yard length of a football field? (.28 or a little more than 1/4 second).

   b. How many miles can sound travel in a year? (Use 365 days) (Approximately 6,500,000 (6,486,381) miles per year)

   c. Make a graph comparing intensity of certain sounds.

4. Outside reading (Examples):

   a. Weekly Reader
   b. Sounds After Dark, Copyright 1970
   c. Sounds Around the Clock, Copyright 1966
   d. Sounds I Remember, Copyright 1970

   All by Bill Martin, Jr. and published by Holt, Rinehart, and Winston, Inc.

EXPERIMENTAL UNITS IN MATHEMATICS USING THE

OUTDOOR CLASSROOM

Grades 1-6

Written bv James Simpson, Mathematics and Social Studies Curriculum Constltant to the Interlakes Enviromental and Outdoor Education Program, Chester, South Dakota 57016. Phone: 489-2416. These are experimental units and are intended as idea banks for you to help you make mathematics a little more rewarding and interesting. We would appreciate it if you woulf try these units and would appreciate your help in improving them. Please send us your experiences and suggestions for improving these units.

INTRODUCTION

Every teacher is confronted with the daily task of planning and teaching lessons which are reflective of his knowledge of subject matter and of how children learn. Each day the elementary school teacher prepares to teach in a number of subject areas with definite goals in mind.

What observable pupil behavior might be expected from a given class presentation? On what cognitive functions should he concentrate? What skills? What processes of mathematics? How should the teaching be designed to achieve these aims? The expected outcomes should be defined since they help to determine the instructional procedures. It is not always possible to predict or to observe behavioral changes because the unpredictable and immeasurable so frequently happen. But this is the only way we have at present to measure the learning results of teaching.

In the teaching of mathematics upon which we are focusing, special considerations are added. In order to understand the objects and events of the world in which we live we must include learning experiences which extend outside the classroom, beyond the doorstep as to embrace the total environment. The entire school site, the marsh, the lakes and streams become a laboratory for learning-in, out, all around. There really is not such a thing as "outdoor education" as opposed to "indoor education", Education must include both inside and outside.

The Interlakes Environmental and Outdoor mathematics program is divided into six grade level areas. For each mathematics area, a set of problems to be used by the teacher have been developed. The teacher may develop many more problems. The problems presented should start the teacher thinking along lines of problem solving.

With this as a start the teacher can proceed to develop a series of lesson plans for his class. The grade placement is merely suggestive and is based on guidelines set forth in the curriculum.

A possible outline for a lesson incorporating the recommendations are outlined on the next page.

Mathematics Grade 1
Outdoor Simulation

Information Card

STIMULATION THROUGH OUTDOOR SIMULATION

Name______________________________ Age______________

Birthday____

Mathematics Teacher_________________________________

Grade______________

Favorite Subject____________________________________

Getting ready to go outside

1. Would it make sense for you to write 32 in the blank following "age"? Why? If you wrote 6 in the blank following age, what number would you write in the same place next year? Why?

2. Today we are going outside for our arithmetic lesson. When you get up from your desks to walk outside, I want each of you to count the number of steps you take to get outside the front door. Be sure to remember the number.

3. When outside the building ask each child the number of steps he took to get outside. Compare the largest number given to the smallest. Ask the children why there is a difference in the number of steps.

4. Have the child with the smallest number of steps, take one step. Ask a member of the class to measure the distance between with a tape. Call out the measurement aloud and ask the children to remember the number. Do the same with the child having the largest number of steps.

5. Now take the tape and measure the height of the two students involved. Now ask the class to explain in their own way the reason for the difference in the number of steps.

6. Choose seven other students excluding the two in the first experiment.

7. Pair number of steps to the height of the students. Ask if we can be sure that the taller students will take the fewer steps.

Grade 1
Mathematics

Concept B THINGS MAY BE MEASURED OUTDOORS

Outdoor Activities:

1. Have children measure shadows at different times of day.

2. After the children have become familiar with the terms <u>inch</u> or <u>foot</u> they can go outside and measure some of the following:

   a. length of the shadow of a stick,
   b. width of the sidewalk,
   c. length of the shadow of a building,
   d. length of leaves,
   e. height of various plants,
   f. length of various leaves,
   g. learn personal measurements to use as estimates Examples: hand span, height, pace, width of stretched out arms.

3. Take children for a walk. Let them estimate how long it took to go and return.

4. Take class outside. Let one child take a quart measure and bring it full of dirt and pour in pile. Let another child bring a gallon of dirt and pour in another pile. Discuss which is the larger pile of dirt. Let the first child continue to bring another quart measure of dirt until four measures have been poured in the pile.

BIBLIOGRAPHY:

Books:

E Ko, Kohn, Bernice, <u>Everything Has a Size</u>, Prentice Hall, 1964.

E Sc, Schneider, Herman, <u>How Big is Big</u>, Scott, 1950.

I Content Objectives	II Processes	III Method of Instruction	IV Behavioral Objectives
Outline Content- The points you wish to make	The kinds of thinking you select to stress with proposed content and methods-Math process skills and methods of inquiry are thought to develop certain cognitive skills Example: analyzing, making deductions, recalling, inductive reasoning, comparing, classifying, inferring, predicting, thinking reflectively, thinking critically, generalizing making a value judgement, relating one thing to another, observing.	What do you plan to do to achieve I, II, IV?	What do you want your students to do as a result of your methods, the subject matter, the place where you teach? Indicate behaviors related to mathematics, conservation, outdoors, etc explaining, planning an experiment, controlling variables, measuring, reading, using equipment skills, making new discoveries outdoors, using the school site and the wetlands for investigations.

Note: Outline column I first, then do column II, column IV follows:
Now decide on how to achieve your goals by completing column III.

Grade 1
Mathematics

Comparison

Concept MANY EXAMPLES OF NUMBER AND SIZE CONCEPTS MAY BE FOUND IN NATURE

Outdoor Activities:

1. Children collect sticks or rocks and arrange in order according to size, starting with the shortest and ending with the longest.

2. Children pick up a given number of rocks, leaves, or sticks, such as five or seven - then write the numeral in the dirt or sand with a stick.

3. Combine direction and numbers by having the children take two steps forward, four steps to the right, six steps to the left, and five steps backward.

4. Use the school grounds to explain mathematical word meanings.
   a. Is the bird high in the air?
   b. Are the airplanes higher than the school?
   c. Which is highest - the tree, the car, the school, or clouds?
   d. Is the flower high or low?
   e. Is the grass lower than the tree?
   f. Which is lowest - the grass, the car, the fence, or the airplane?

Devise similar activities for; large, small, heavy, light, near and far.

6. Have children count all the things you can see on the school grounds. Then take a stick and write on the ground the numbers for each set. After counting, classify according to sets; i.e. trees, buildings, cars, etc.

7. Children go outside to compare the size of objects. Use terms such as larger, smaller, shorter, taller, etc. In counting a sampling of the leaves, the terms more than and less than are used.

Concept A MATHEMATICS IS RELATED TO EVERYDAY LIVING

Outdoor Activities:

1. Have children measure various things and distances.

2. Compare temperatures.

3. Discover the growth rate of plants.

4. Go out on the playground. Develop the concept of a line segment by naming points and line segments.

5. Develop the difference in a line segment and ray. (A line segment is from telephone pole to telephone pole; a ray can go on indefinitely.)

6. Develop the concept of a circle by using a large circle of children. Place a child in the circle to show a point inside the circle and a child outside the circle to show points outside a circle. (Do the same with squares and triangles.)

7. Demonstrate the different angles by using a square on the tennis court, corners of buildings, etc. Find right angles.

8. Go for a walk around the school ground. Record the time you left and returned. Figure out how long it took.

Related Activity:

1. Develop the idea of drawing a simple figure by using line segments to make a closed figure. (Triangle, square, rectangle.)

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511 Ca, Corona, Philip, The True Book Numbers. Children's Press, 1964.

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513 Fr, Freeman, Mae & Ira, Fun With Figures, Random House, 1964.

Grade 3
Mathematics

Concept A GEOMETRIC SHAPES CAN BE FOUND IN NATURE

Outdoor Activity:

1. Take a walk with the children. Observe and list all the different geometric shapes you find in nature. (flowers, leaves, stems, trees, shapes, of animals bodies, etc.)

Concept B THE OUTDOORS PROVIDES MANY OPPORTUNITIES TO LEARN AND USE MATHEMATICS

Outdoor Activities:

1. To help with addition and substraction, take the children outside and form sets of nature objects. (Join and petition sets.)

2. Have the children estimate the distance between two trees. Pace the distance off and compare answers.

3. Have the children use a thermometer to check temperature in the shade, sunlight, and soil.

4. Have the children experiment with the use of the compass. Make a compass trail to follow.

5. Have the children tell the time of day by the sun.

6. Divide the class into two groups - Romans and Arabs. Each group will be given a slip of paper with four numerals on it. (Like 8-4-9-1 or 5-3-1-6.) The numbers are different on each slip. Each group is to act out (no speaking) with body positions or postures, their numbers. The other group is to guess what number they are trying to show. The Arabs will be using Arabic numerals, and the Romans will use Roman numerals.

Related Activity:

1. Have the children estimate the cost of the food for a cookout.

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Concept A MEASUREMENT IS EVERYWHERE

Outdoor Activities:

1. Cut and pile a cord of wood -- what is a board foot?

2. Determine the age of a tree by counting its rings.

3. Measure dimensions of buildings. Make scale drawings.

4. Estimate elapsed time periods of half an hour or longer by observing and marking changes in the length of the shadows of trees or other objects, or by constructing a simple sundial.

5. Use the "stick method" to estimate the height of a tree. Have a child of known height stand at the foot of a tree. Then have the other children move back about 100 feet. Each should hold a stick vertically at arm's length, in front of himself, and use his thumb to mark off on the stick what appears to be the height of the child standing at the foot of the tree. Finally, by seeing how many times he can measure this distance on the tree, each child can make a good estimate of the tree's height.

6. Use the "11 to 1 ratio method" of measuring a tree. Starting from base of the tree, walk 11 paces and push a stick into the ground. Continue one pace further and place a mark. At this point have a person lie on the ground and sighting with the eye, project a line past the stick on the top of the tree. The height of stick, where the projected line passed the stick, gives in inches the height of the tree in feet.

7. Place a basin of muddy water on the ground, between you and the tree. Step back from the basin a distance equal to that from your eyes to the ground. You should see the top of the tree reflected in the water. If not, move the basin back until this is possible. The distance from the basin to the foot of the tree is the height. (When AC = HC then BH = AS)

8. Compare shapes of shadows (according to position of the sun).

9. Learn the pacing method of estimating distances of the ground. Measure 100 ft. distance on school yard. Have each child walk this distance several times, counting his paces each time. Then have him find the average number of paces he used in walking 100 ft. By dividing 100 ft. by this average number of paces, each child can find the normal length of his pace.

10. Determine angle of a slope using a simple clinometer (measure angles in a vertical plane). Stand at the base of a hill and sight along the top edge of the clinometer toward a second student who is at the top of the hill. When his line of sight is even with the eyes of the other student, a third person should record the angle indicated on the clinometer side.

Related Activities:

1. During an electrical storm, time the interval between seeing lightning and hearing its thunder. Then estimate how far lightning is from you. (Sound travels at 1,100 feet/sec., light travels at 186,000 miles/sec. If there is an interval of 5 seconds between flash and thunder, then the lightning is 5,500 feet away -- a little more than a mile).

2. Do work with personal measurements:
Use such measurements in judging heights and sizes outdoors.
Length of arm from elbow to end of longest finger.
Height to top of head
Height to shoulder or eye
Height to top of hip
Height to upward reach
Length of pace
A one inch distance on a finger
Length of shoe or foot
Length of arm
Handspan
Length from nose to end of out-stretched arm

Concept B — MANY NATURAL OBJECTS HAVE GEOMETRIC SHAPES

Outdoor Activity:

1. Find and name geometric shapes in an area. Draw pictures using these shapes as a basis.

Concept C — GRAPHS ARE A USEFUL WAY TO RECORD INFORMATION

Outdoor Activities:

1. Graph data collected on projects.

2. Make paper airplane models. Fly them outdoors. Measure distance of each flight and record on bar or line graph.

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513 Fr, Freeman, Mae, Fun With Figures, Random House, 1946.

511.8 Ha, Hatcher, Charles, What Size Is It? Duell, 1966.

512 Ad, Adler, Irving, Numbers Old and New, Day, 1960.

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Unit 1 - Measurement

Concept A MEASUREMENT IS EVERYWHERE

<u>Outdoor Activities</u>:

1. Measure surface areas to make a map to scale.

2. Measure the perimeter of a school site.

3. Measure the circumference and diameter of a tree and compare.

4. Draw a scale plot for a school garden.

5. Pace off an acre.

<u>Related Activity</u>:

1. Find the dimensions of your class room.

Unit 111 - Maps

Concept A MAPS TELL IN PICTURE STORIES THE LOCATION OF PLACES AND THINGS

Outdoor Activities:

1. Use the compass to determine direction.
2. Determine direction of various landmarks from your school yard.
3. Lay a compass trail.
4. Make a map of school site or nearby area.

Related Activity:

1. Construct a map from the school grounds to your home.

Grade 5
Mathematics

Unit 11 - Geometry

Concept A — MANY NATURAL OBJECTS HAVE GEOMETRIC SHAPES

Outdoor Activities:

1. Find and name geometric shapes in given area. Draw pictures using these shapes as a basis.

Concept B RATE AND RATIO ARE METHODS OF COMPARISON

Outdoor Activities:

1. Make a survey of different types of trees and distributions of plants in a field. Make a circle of wire, throw it on a vegetated area, and see how many of a certain type of plants fall within the circle.

2. Fractions and whole numbers: Take a tree census, determining the kinds of trees in a particular area. Determine what fractional part of the total the oaks were.

3. Figure the rate of flow of a river or creek.

4. Count the trees in an acre.

Related Activities:

1. Chart the rainfall for a given period.

2. Chart the average outside temperature and barometric readings for a given period.

Unit 1 - Measurement

Concept A ESTIMATING IS A WAY OF MEASURING

Outdoor Activities:

1. Estimate the height of a tree using the child's own height for comparison.

2. Estimate the area of the tennis court or baseball diamond and compare with accurate measurement.

3. Estimate the width of a creek.

4. Estimate the height of the school building.

5. Estimate the time of day by using the position of the sun. Draw a circle around a tree at 9:00 as large as tip of shadow and label and circle time. Continue for each hour of school day.

6. Estimate the temperature by listening to a cricket chirp for 15 seconds and add 40. Test it by using a thermometer.

7. Estimate the difference between two points by using sound. (Sound travels at the rate of about 1100 feet per second under normal conditions of temperature and pressure.)

8. Make a sundial.

Concept B **MEASUREMENT IS EVERYWHERE**

Outdoor Activities:

1. Measure the perimeter of the school ground.
2. Measure the circumference of a tree. Use formula pi D to prove pi is 3.14.
3. Go outside to look for different angles such as acute, obtuse or right angles.
4. Make personal measurements, such as length of reach, pace, nose, length of outstretched hand, height.
5. Use a compass to walk the perimeter of an equilateral triangle and try to end up at the starting point.
6. Use an astrolabe or clinometer to measure the angle of a slope.
7. Measure the age of a tree by the ring count.
8. Make a scale map of the school ground.

Unit II - Charts and Graphs

Concept A

GRAPHING AND CHARTING ARE USEFUL METHODS OF RECORDING

Outdoor Activities:

1. Chart changing of tree shadow in relation to time of day.
2. Use twine and stakes to lay out geometric figures - measure these and plot them.

Related Activity:

1. Plot readings of temperature and/or barometric pressure for a week.

Unit III - Rate and Ratio

Concept A — COMPARISONS CAN BE MADE BY USING RATE AND RATIO

Outdoor Activities:

1. Figure the height of a tree by using ratio of its shadow to the shadow of a stake of known height.

2. Average the temperature readings for a period of time.

3. Count the number of trees in a specified area. For each kind of tree figure the fractional part of the total number.

Related Activity:

1. Invite a bank employee to come to the classroom and discuss types of interest.

EXPERIMENTAL UNITS IN SOCIAL STUDIES USING THE OUTDOOR CLASSROOM

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Grades 1-4

These are experimental units and are intended as idea banks for you to help you make social studies teaching a little more rewarding and interesting. We would appreciate it if you would try these units and would appreciate your help in improving them. Please send us your experiences and suggestions for improvement of these units.

Unit 1 - Farm

Concept A CHILDREN INCREASE THEIR UNDERSTANDING OF FARM LIFE THROUGH FIRST HAND EXPERIENCE.

Outdoor Activity:

1. Take children to a dairy farm. Let them see how the cows are milked.*

Concept B FARMS PROVIDE MANY THINGS THAT ALL OF US NEED

Outdoor Activity:

1. Have class visit a diversified farm. Observe plants and animals that produce food, shelter, and clothing (cows, hogs, fowls, fish, sheep, grain, fruits, vegetables, trees, and cotton).

Related Activities:

1. Have children cut out pictures of farm-produced products and put in booklets.

2. Have children bring in samples of wool, rocks, cotton, leather, wood, etc. Display in activities center.

3. Let children make a model farm.

*NOTE: THIS ACTIVITY IS DIFFICULT TO ARRANGE DURING SCHOOL HOURS. IT ALSO TAKES CAREFUL PLANNING AND CONSULTATION WITH THE DAIRYMAN PRIOR TO THE TRIP.

Concept C MACHINES MAKE FARM WORK EASIER

Outdoor Activity:

1. Take a field trip to a diversified farm to observe types and uses of farm machinery (tractor, plow, disc, mower, spreader, rake, combine, bailer, grain elevator, cultivator, silage chopper, wagon, bush-hog, fertilizer distributor, hay elevator, silage blower). Discuss uses of each.

Related Activity:

1. Draw or cut out pictures of farm machinery, mount and learn names of each.

Unit 11 - School

Concept A A SCHOOL PLANT IS MADE UP OF BUILDINGS AND GROUNDS

Outdoor Activities:

1. Take the children on a walk to observe the school and school grounds. Then draw a "map" to show this area.

2. Have children observe the school building. Discuss its color, size, structure, etc. Discuss the materials from which it was made. While outside, sketch it.

3. Take class on a walk and observe where the utilities come into the school. Discuss.

Related Activity:

1. Have class draw pictures of what has been observed.

Concept B MANY PEOPLE HELP US AT SCHOOL

Outdoor Activity:

1. Have children visit and interview different people who help us at school (for example, physical education teachers, custodians, and cafeteria personnel).

Related Activities:

1. Return to the classroom and draw pictures of school personnel performing their duties.

2. Let children make up a story about school personnel.

3. Have class visit other school personnel (indoors) and do similar activities as above.

Unit 1 - Community Helpers

Concept A **MANY PEOPLE SERVE OUR COMMUNITY**

Outdoor Activity:

1. Take a walk around the school yard and observe as many helpers as possible.

Related Activities:

1. Take a field trip to the local sheriff's office, post office and fire station. Make a classroom movie about the helpers.

2. Visit a local grocery store.

Unit 11 - Transportation

Concept A MANY KINDS OF TRANSPORTATION ARE NEEDED TO DO THE WORLD'S WORK

Outdoor Activities:

1. Have children make a tally of different types of vehicles on the roads on both sides of our school.

2. Take a field trip to an airport, a bus station, a train station, a boat dock on the river, and a truck transfer company. Discuss the importance of each type and why we need each type.

3. Take a trip to the farm to see what type of transportation is being used.

Related Activity:

1. Make a mural to show the types of transportation on the two roads. Write a number on each vehicle to show how many were seen. Also, include any air transportation that was seen.

Unit 111 - Food

Concept A FOOD AND WATER ARE ESSENTIAL TO GOOD HEALTH AND GROWTH

Outdoor Activities:

1. Visit a garden and observe the different kinds of food growing.

2. Have children observe fruit trees developing fruit.

3. Have children make a small scale water filter. Observe sediment from the water. (Experiment - take a plastic cylinder, put a fine screen over the bottom. Place layers of sand, charcoal and gravel in the cylinder. Pour in muddy water. Observe results).

4. Visit a cattle pasture and a cattle feeder lot. (Follow up with number 3 under related activities).

Related Activities:

1. Visit the East River Electric.

2. Visit a local grocery store.

3. Visit Wenk's Produce

4. Visit a water plant.

Unit 1V - Clothing

Concept A **CLOTHING COMES FROM SEVERAL SOURCES**

Outdoor Activities:

1. Visit a farm at sheep shearing time.
2. Plant cotton

Related Activities:

1. Visit a shoe factory.
2. Weave cloth.
3. Visit clothing manufacturing factory.
4. Make charts from samples of raw and finished materials.
5. Have children observe animal hides while visiting a meat packing plant.

Unit V - Homes

Concept A THERE ARE MANY DIFFERENT TYPES OF HOMES

Outdoor Activity:

1. Visit the community to observe as many different types of homes as possible.

Related Activity:

1. Have children make a model community to show different types of homes.

Concept B THERE ARE MANY KINDS OF MATERIALS USED IN CONSTRUCTING HOMES

Outdoor Activity:

1. Visit the community to observe many different kinds of materials used in constructing homes.

Related Activities:

1. Visit a lumber company to observe building materials.

2. Display samples of building materials.

Unit 1 - Indians and Pioneers

Concept A INDIANS AND PIONEERS LIVED OFF THE LAND AROUND THEM

Outdoor Activities:

1. Have children collect nature materials and make replicas of different Indian and Pioneer homes.

2. Have children make dyes from plant sources.

3. Have children collect nature materials and make replicas of the different transportation vehicles used by the Indians and Pioneers. (Canoes, boats, travois, covered wagons, etc.)

4. Plan an Indian and Pioneer menu with the class. Have a cookout and serve the foods used by each group.

5. Have children collect nature materials such as acorns, nuts, seeds and pebbles to make Indian jewelry.

Related Activities:

1. Have children make Indian pottery from clay. Paint the finished pottery with tempera paints and shellac.

2. Have children make a totem pole like those used by the Northwest Indians. They are easily made by stacking oatmeal boxes that have been decorated with construction paper and Indian designs and faces. (Art)

3. Have children make Indian ceremonial masks from paper bags. (Art)

4. Have children use tin cans and sticks to make Indian Rattles. Fill the cans with pebbles and decorate them. (Art)

5. Have children make Indian head-bands from construction paper. Paint them and use feather for realism. (Art)

6. Have children make a display of arrowheads, Indian crafts, and objects used by the pioneers.

7. Have children make horn books used by the Pioneers. (Art)

8. Distribute small paper tepees to each child for every Indian or Pioneer book he reads. Assemble the smaller tepees to form one large class tepee. (On wall or bulletin board) (Reading)

Concept B INDIANS COMMUNICATED IN MANY DIFFERENT WAYS

Outdoor Activities:

1. Follow a nature trail using Indian signs and symbols to communicate a message.

2. Take the class on an Indian hike. Go in single file, very carefully. Try not to make a sound. Avoid stepping on dry twigs or through dry leaves. Don't talk above a whisper. Stop frequently to listen as well as to look. What sounds can be heard?

3. Have children experiment communicating through sound as the Indians did. One person kneels and puts his ear to the ground. The others tramp in place, some distance away. Try to find out how far away they can be and still be heard.

4. Take the class outside and teach them the step and sequence to an Indian Dance.

Related Activities:

1. Have children make a chart of signs and symbols of language used by the Indians.

2. Let children write stories, using Indian signs and symbols, to share with the class.

3. Have children list Indian names and expressions used today; rivers, lakes, counties, provinces, etc.

Concept C — INDIANS AND PIONEERS FOUND TIME FOR SONG AND RECREATION

Outdoor Activities:

1. Take the class outside and have them form a circle. Sing and dance.

2. Have the Physical Education teachers work with the children on Indian Rhythms during their Gym period.

3. Make some Indian games and let the class play them.

Related Activities:

1. Have children make Indian drums to be used with the Indian dances.

2. Take the class on a trip to the Children's Museum and observe Indian relics, musical instruments, etc.

3. Dramatize some of the Indian beliefs about their Gods, evil spirits, religious ceremonies, etc.

Concept D THROUGH OBSERVATION THE INDIANS WERE ABLE TO LEARN MUCH ABOUT THE NATURAL ORDER OF THE UNIVERSE

Outdoor Activities:

1. Have children measure the shadow of fixed object (such as a post or flag pole) morning, noon, and afternoon for a number of days. Let children draw conclusions as to how the Indians told time by the shadows.

2. Take the children outside and h ve them discuss and explain the changes that they think will take place with the next few days, weeks and months. Discuss whether or not the same occurences would likely take place if we did not know the day, month, or year. Relate this to what the Indians learned through observation and personal experience about the natural order of things.

Unit 11 - Communications

Concept A FROM THE BEGINNING OF TIME MAN HAS COMMUNICATED THROUGH SIGNS AND SIGNALS

Outdoor Activities:

1. Build a fire outdoors and demonstrate how to send smoke signals.

2. Demonstrate how to make charcoal from burnt wood, or coals. Let children draw pictures on rocks or slate as the cavemen did.

3. Let children use mirrors to send messages. Have a code prepared to follow if you wish.

4. Have children send signals with flags. Explain how the flags held at different positions mean different things.

5. Have children use Morse Code to send messages.

6. Have children use drums as the Indians did to send messages.

7. Have the class demonstrate the "pony express" method of sending messages by running with messages from one to the other on the school grounds.

Concept B MODERN MAN HAS CONTRIBUTED MUCH TO IMPROVE COMMUNICATION

Outdoor Activities:

1. Have children use a walkie-talkie outside.

2. Have children observe street signs, policeman's signals, advertisements, etc. Discuss how we can communicate through the "written word".

3. Take a walk around the sc'.ool neighborhood. Spend some time discussing the many things connected with communications (mailboxes, telephone poles and wires, electric wires, airplanes, trains, postman, etc.)

Related Activities:

1. Take a trip to the Telephone Company.

2. Visit a newspaper office and newstand.

3. Visit a radio or T.V. station.

Concept C ANIMALS, INCLUDING MAN, COMMUNICATE IN MANY WAYS

Outdoor Activity:

1. Visit a farm to observe the animals and how they communicate with each other and also how man communicates with them.

Related Activity:

1. Bring a trained dog to class. Demonstrate how man communicates with animals through commands.

Unit 111 - Our City, State and Community

Concept A THERE ARE MANY FACILITIES AND SERVICES IN OUR COMMUNITY

Outdoor Activity:

1. Let children take photographs of important facilities, points of interest, factories, land marks, etc, to be used in making a class album.

Related Activities:

1. Let children use photographs of facilities and points of interest in our community to make individual or class albums.

2. Take the class on a field trip to the water plant.

Concept B THERE ARE MANY HISTORICAL PLACES OF INTEREST IN OUR COUNTY

Outdoor Activity:

1. Take the class on a field trip to Hutterite Colony.

Related Activity:

1. Have a resource person come in and talk about the settling and building of our county.

Unit 1 - Map Skills

Concept A KNOWLEDGE AND USE OF THE COMPASS LAYS A FIRM FOUNDATION FOR BASIC MAP READING SKILLS AND UNDERSTANDINGS

Outdoor Activities:

1. Learn parts of a compass: degrees, magnetic needle, housing, base, direction of travel arrow.

2. Play game to aid in understanding compass points: Participants line up, arm length apart, locate North with a tree or other land mark. On signal "Northeast, Go!" all turn to what they believe to be Northeast; then on command, "Freeze", stand motionless. Those who are facing correctly go out of game to do independent practice. Others continue game to get more training.

3. Use compass. Each team should start at a given point and determine from there the degree readings of school yard landmarks. They may wish to record this on simple map.

4. Orienting map walk. To "orient" a map means to turn it so that North on map fits the actual landmark at which he is standing. He may wish to do this more than once, using more advanced maps each trip.

5. Take a map point walk. On a simple map, lay out an appropriate route leading through easily definable landmarks. Mark the route by crepe paper streamers so each marker can be seen from preceeding one. Place a north pointing arrow marker at each landmark to assist children in orienting their maps. The object is to follow the marked route and indicate on the map, by circling each of the landmarks. A judge at each landmark could help those who need it.

6. Make secret individual compass maps, exchange and follow directions.

Related Activities:

1. Explain sixteen compass directions and degree readings on board. Pass out mimeograph sheet with compass points left blank for children to fill in.

2. Make maps of own neighborhood. Pace off street and make scale, as well as use map symbols for houses, trees, etc.

3. Pace off classroom to learn concepts of scale. (examples: 1 " equals 1 cinder block on wall, 1" equals 1 tile on floor, 1 hand equals 1 foot)

4. To understand use of degrees on maps and globes, note degrees in a circle as marked on compass and observe globes and flat maps. Construct a globe with paper-mache and mark off meridians and parallels by degrees.

5. To relate longitudinal degrees with our time system, have an explanation period followed by game. Pin cut out dolls (representing children) at determined meridians, 15 degrees apart, on a flat map of the world. Designate a time for 0 degrees longitude. Ask each child in turn what time it would be on his meridian. This idea can be used with globe models make in number 2, above.

6. Obtain for bulletin board a flat map of the world or the United States showing gold lines. Find approximate longitude and latitude of important cities.

7. Find map directions with paper circle showing sixteen compass directions and degree readings. Spread map in front of you. Decide on some specific spot on a meridian line as "base of operations" for practice in determining directions. North will be up from that spot, South will be down, East right, West left. Take an imaginary trip from "base of operation" to a given town or landmark. Object: What is the approximate degree reading and direction of travel from base to destination? Or what town lie 180 degrees South, 270 degrees West, etc? (Map may be fictitious. Preliminary to use of protractor in math).

Concept B THE WORLD IS DIVIDED INTO LARGE LAND AND WATER MASSES WITH GREAT VARIATIONS IN ELEVATION AND FORM.

Outdoor Activities:

1. Take a field trip to observe different bodies of water and land forms:

   a. pond
   b. brook
   c. river
   d. canyon
   e. plateau
   f. delta

2. Land mark hunt: Bring group to a high point of good visibility where they can see a number of different landmarks. Provide each child or team with topographic map of the area and a pencil. Directions:

   a. Indicate on your map, by drawing a circle around it, the point where you are now standing.

   b. Circle church approximately Northwest of here.

   c. Circle crossroads approximately South of here. (Set a certain time for finishing the project. Score points for each landmark found correctly).

   Note: Instead of using a list of landmarks, and to add interest, put up a number of markers in a circle, each marker pointing to a different landmark. These markers may be made of strips of wood 1" x 2" x 10", with nails to act as sights at eye level. One end of each marker is pointed. The other carries a strip of cardboard with a description of landmarks such as: "Church". Players move clockwise from marker to marker.

Related Activities:

1. Simple demonstration of contour lines. Dip rock part way in water, draw line, dip one inch deeper, draw another line and so on. View from above.

2. Use land form models, plastic relief models and map reading project maps to teach and reinforce topograpical concepts.

3. Make relief and products map using salt (1 part), flour (2 parts), and food coloring mixed with water to a clay consistency.

4. Invite world travelers and local geographers to speak to students.

Concept C MANY SKILLS ARE INVOLVED IN USING, MAKING AND READING MAPS

Outdoor Activities:

1. To determine distance by measurement and gain some proficiency in judging distances through visual perception, measure off and mark with flags; 100 feet, 200 feet, etc. (Have children recall that a mile is 5,280 feet). After some practice with this, have a contest on "distance judgment" with premeasured stakes or landmarks.

2. Pacing: Determine (by individuals) the length of each child's pace (double step). Mark off a hundred foot distance. Have each child walk this counting his own steps. Then divide number of steps into 100 to determine length of child's step. (example: If he took 50 steps to walk 100 feet, then each step is equal to 2 feet).

    a. Make a simple scale map using paces for measurement.
    b. Estimate a distance by visual perception and then pace it off for more accurate "guess", then measure with tape.

Related Activities:

1. Draw a simple map of the school, or school site following teacher's direction. Teach symbols or have children make their own for whatever they wish to include on map.

2. Find the scale for a map. Get a local map of a small area as possible for each child. (made by teacher possibly) Using a pedometer or tape walk from one landmark shown on map to another. (This should be done in advance by teacher so figure is predetermined.) Using this measurement, make a scale in inches at bottom of given map.

3. Bring out types of map projections and distortions. Use orange peel to illustrate globe shell flattened. (World Book Encyclopedia, Volumn M has good lesson plan on this).

4. Map individual school bus routes being sure to include prominent landmarks. Combine maps to make a large collective map.

Unit 11 - Land of High Mountains

Concept A — IN THE MOUNTAINS, HAY CANNOT BE CURED ON THE GROUND BECAUSE OF HEAVY DEW, BUT MUST BE HUNG ON FENCES, ROCKS, OR SHRUBS TO CURE

Outdoor Activity:

1. Build racks with sticks and twine. Hang cut grass up to dry. Compare length of time it takes grass to dry on racks and on the ground.

Concept B — MOUNTAINOUS COUNTRIES HAVE GREAT VARIATION IN TEMPERATURE, DEPENDING ON ALTITUDE

Outdoor Activity:

1. Experiment with micro-climates: Take temperature at bottom, middle, and top of a hill, and compare findings.

Unit 111 - Lowlands of Holland

Concept A THE LAND IN HOLLAND (NETHERLANDS) IS MOSTLY BELOW SEA LEVEL, AND RECLAIMED LAND MUST BE DESALINATED FOR TWO OR THREE YEARS BEFORE IT BECOMES USEFUL.

Outdoor Activities:

1. On school grounds build an elementary system of dikes and bolders. Make sure land between dikes is lower than water. Place a stick figure on land and a paper ship on water to illustrate how a spectator standing by the Zuider Zee would view ships floating above eye level.

2. Flood a square yard of land at beginning of unit, and salt it. Let set for a week or two. Drain water out (relate to pumping of windmill). Try to grow grass in this area. Plant similar seeds in unsalted area nearby. Compare.

Related Activity:

1. Construct a windmill out of cardboard boxes and poster board.

Unit 1V - Life In The Cold Regions

Concept A — PEOPLE OF COLD REGIONS PROVIDE FOR THEIR BASIC NEEDS FOR FOOD, CLOTHING AND SHELTER BY USING MATERIALS AVAILABLE IN THEIR AREA.

Outdoor Activities:

1. Build an igloo actually using snow, if available.

2. Go on a field trip to a frozen pond to demonstrate climatic conditions in cold lands. Notice state of plant life.

Related Activities:

1. On individual maps of the world, locate and color the cold regions, showing water and land areas. Color appropriately the highlands, mountains, lowlands, etc.

2. Build igloos out of styrofoam, clay or sugar cubes glued together.

3. Use bars of soap and scissors to carve different objects related to the unit (kayaks, walrus heads, igloos, little animals).

4. Make weapons used by Eskimo hunters - harpoons.

5. Play Eskimo games, making materials for playing them. (Refer to Encvclopedia, Volumn E). Learn native songs and dances.

6. Bring in a resource person to talk to the children.

7. Write and produce a simple play about such topics as: "Preparing for and going on an Arctic bear hunt". "Home after a day of fishing".

8. Have panel discussions: (Differences between life in the hot and cold countries).

9. Discuss how long hours of sunlight and rich soil make for a season of very rapid growth during their short summer.

10. Write to Embassies of countries located in polar regions and to Department of Interior, Juneau, Alaska, for information.

Unit V - Hot, Wet Regions

Concept A HOT, WET CLIMATES PRODUCE RAPID GROWTH OF VEGETATION

Outdoor Activity:

1. During a period of warm, wet weather place a ruler by a chosen plant. Visit it periodically and chart growth. Compare with dry season.

Related Activity:

1. Partly fill a gallon jar with soil. Plant seed or set in growing plants. Close jar and notice humidity that develops inside jar.

Concept B PEOPLE IN HOT CLIMATES NEED LITTLE SHELTER OR CLOTHING, AND USE MATERIALS AT HAND FOR CONSTRUCTING HOMES AND MAKING CLOTHING.

Outdoor Activities:

1. Look for material that could be used for making breech cloths.

2. Dye yarn for weaving cloth. Use natural dyes.

3. Weave a mat from straw or strips of bark.

4. Have a ceremony, weave grass skirts and head-dresses out of broomsage and string. Emphasize role of men.

Related Activity:

1. Build a thatched hut, using broomsage and other native materials.

Concept c TOOLS AND WEAPONS ARE SIMPLY CONSTRUCTED OF MATERIALS EASILY FOUND IN THEIR ENVIRONMENTS

Outdoor Activity:

1. Make blow guns, spears, bow and arrows.

Concept D RUBBER IS A NATURAL PRODUCT IN HOT, WET LANDS

Outdoor Activity:

1. Have children examine dandelion, milkweed, or goldenrod for latex. Let drops of the liquid dry on the hand and see the sticky substance produced. When dry, this can be rolled into a tiny ball like rubber.

Related Activities:

1. Use maps and globes to locate hot, wet lands.

2. Make a diorama of jungle life, make animals from clay and use vegetation gathered outdoors.

3. Learn dance rhythms used by natives of equatorial lands.

4. Have resource person speak to class.

5. Collect and display objects from hot, wet lands. (Brazil nuts, tapioca, cocoa, coffee beans, fruit, etc.)

6. Make tapioca pudding and pineapple fruit juice for a class party.

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STUDYING AND ESTIMATING INSECT POPULATIONS - 1 ACRE

Written by Jerry A. Larsen, Assistant Director, Interlakes Environmental and Outdoor Education Program, Chester, South Dakota . Phone: 489-2416
(Revised 2-8-72)

Grade Level - 5-8

Best time of year - late Spring and/or early Fall

OBJECTIVES:

1. To familiarize the students with techniques of collecting insects.
2. To introduce a simple method of estimating insect populations.
3. To introduce students to the concepts of sampling as a means of estimating large numbers.

BACKGROUND:

Estimating insect populations may be an important task to a farmer. While he may be able to have a professional do the job, he can get a fairly accurate estimation by himself. This may be very important information leading to a decision whether or not he should try to control insect populations. The fact that there are crop damaging insects present may not be serious if certain predatory insects are present and populations are not high.

MATERIALS:

insect nets - can be purchased from an equipment supply company (and are available from the Interlakes Office)
bags or jars with covers

PRE-ACTIVITY:

Introduce the activity with questions similar to the following:

1. Why are we interested in the number of insects in a particular area?
2. Why is it important to be able to identify the different types of insects and their feeding habits?
3. What is the advantage of being able to do this technique yourself?
4. Would you expect the insect populations to change in number and type from one week to the next?
5. Let's collect some insects and try to determine how many insects are present on an area and how many kinds are present.

FIELD TRIP:

Take the students out with their insect nets and have each pair or group take ten sweeps with their insect nets along the top of the vegetation. A sweep consists of a 180° swing from one side of the body to the other. Encourage the students to make their swings uniform. Walk forward as the nets are being moved. After the ten swings are completed, put all of the insects in the bags or jars and seal them to prevent the insects from escaping. Now, have the student who collected the insects measure the length of his sweep. For a person with short arms, it may be only 3-4 feet, while one with long arms may have a 6-8 feet swing. The important point is that each individual collector keep his swing uniform. Have the students record the length of their swing. Now, the students are ready to learn how to estimate the populations.

POST-ACTIVITY:

Kill the insects by putting them into extremely hot to boiling water. 2-5 minutes should be sufficient to stop all movement. Now, have each group sort the insects into groups of like insects. When this has been completed, count the number of insects in each group. Now, the math lesson-------

πr^2 X length of swing X number of swings X number of insects gives the number of insects/ft.^{3}

To find the number of insects in 1 cubic foot, divide the number of insects by the number of cubic feet. You can find the number of insects in an area by setting up a proportion. Assuming that the average vegetation is one foot high, you have 43,560 ft.^{3} per acre. Your imagination will be the only limiting factor in this post-activity. Depending on the grade level, you may be able to do averaging, counting, proportions, use of columns, vocabulary, studies in insect anatomy, etc.

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SAMPLE DATA SHEET

KIND OF INSECT	NUMBER OF EACH KIND	LENGTH OF SWING	# SWINGS	π	r^2	#/FT.^{3}
Grasshopper	35	10 ft.	10	3.14	.25 ft.^{2}	35/78.5 ft.^{3}=.44/ft
Nabids	10	10 ft.	10	3.14	.25 ft.^{2}	10/78.5 ft.^{3}=.13/ft
Lady Beetles	32	10 ft.	10	3.14	.25 ft.^{2}	32/78.5 ft.^{3}=.41/ft
Crickets	2	10 ft.	10	3.14	.25 ft.^{2}	2/78.5 ft.^{3}=.03/ft
Honey Bees	6	10 ft.	10	3.14	.25 ft.^{2}	6/78.5 ft.^{3}=.08/ft
Alfalfa Plant Bugs	73	10 ft.	10	3.14	.25 ft.^{2}	73/78.5 ft.^{3}=.93/ft
Lygus Bugs	11	10 ft.	10	3.14	.25 ft.^{2}	11/78.5 ft.^{3}=.14/ft

TOTALS

GRASSHOPPERS - 19,166.4 per acre

NABIDS - 5,662.7 per acre

LADY BEETLES - 17,859.6 per acre

CRICKETS - 1,306.8 per acre

HONEY BEES - 3,484.8 per acre

ALFALFA PLANT BUGS - 40,510.8 per acre

LYGUS BUGS - 6,098.4 per acre