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ABSTRACT

This document provides practical suggestions and meaningful activities for implementing Ohio's model curriculum in science for instruction that emphasizes hands-on experience and diverse learning opportunities. It also includes a variety of nonscience activities that emphasize and utilize the outdoors. This Sampler lists activities by indoor or outdoor settings, group size, and age-appropriate levels from pre-school through grade 12. Related subject areas include art, economics, language arts, mathematics, music, physical education, and social studies, as well as science. More than 20 topic areas range from animals and environmental awareness to food chains and pollution. Processes and skills that are reinforced for students include collecting and recording data, creative writing, estimating, graphing, teamwork, observation skills, and vocabulary building among others. Thirty-six individual activities are offered. Resources including 17 environmental organizations, 6 government agencies, 23 Ohio resident outdoor education centers, 34 organization members of Environmental Education Council of Ohio (EEC), 7 Ohio Coalition of Independent Nature Centers, and 17 other favorite sources are listed. (AIM)

Ohio Sampler: Outdoor and Environmental Education

ENVIRONMENTAL EDUCATION
COUNCIL OF OHIO

SE058154

Developed by:
Environmental Education Council of Ohio

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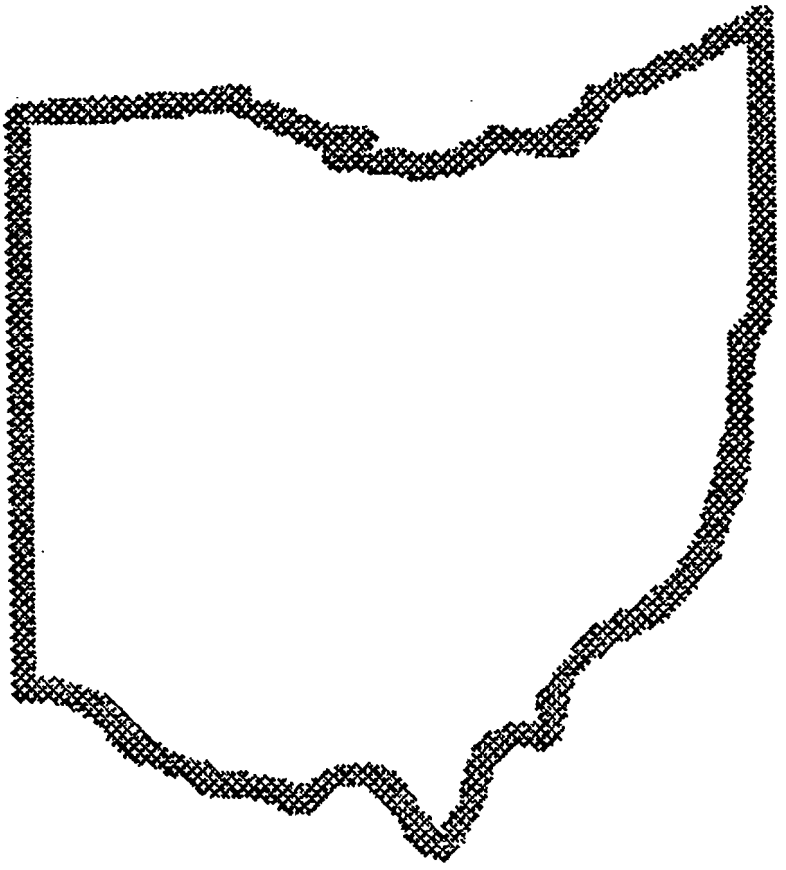
The Program Committee would like to extend a special "thank you" to all the Environmental Education Council of Ohio members who gave their support and expertise to this project.



Ohio Sampler: Outdoor and Environmental Education *is published by the Environmental Education Council of Ohio for outdoor and environmental education professionals—from "seasoned veterans" to those just starting out.*

Published by:

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ENVIRONMENTAL EDUCATION
COUNCIL OF OHIO

Ohio Sampler: Outdoor and Environmental Education is published by the Environmental Education Council of Ohio, a statewide, professional organization dedicated to promoting environmental education which nurtures knowledge, attitudes, and behaviors that foster global stewardship. Teachers, naturalists, camp staff, youth leaders, university students, agency personnel and others join EECO to meet other environmental educators and to share ideas, materials, and teaching techniques. EECO sponsors statewide and regional conferences and workshops, distributes an informative newsletter, provides consulting services, serves as a liaison with other organizations concerned about environmental education, and gives annual awards recognizing outstanding achievements in the field of environmental education. For membership information, contact EECO Membership, 397 West Myrtle Avenue, Newark, Ohio 43055.

The Time Is Ripe!

Sometimes, things fall into place so nicely! The publication of this wonderful resource book, for example, could not have come at a better time.

The recent release of the Ohio model curriculum in science opens the door for instruction that emphasizes hands-on experiences and diverse learning opportunities outside of the regular classroom. This *Sampler* provides practical suggestions and meaningful activities for implementing the philosophy inherent in Ohio's model science course of study. The *Sampler* also includes a variety of nonscience activities that emphasize and utilize the outdoors.

The Environmental Education Council of Ohio (EECO) deserves enthusiastic applause for developing a readable and very useful tool for educators. The activities included represent personal favorites of environmental/outdoor educators who have used and fine-tuned these activities with their own students. The list of contributors to this volume reads like a "Who's Who" of Ohio environmental/ outdoor education.

The time is truly ripe for incorporating outdoor instruction into your teaching. Current trends in education call for integration of curricular areas, compelling content, actively engaged learners, and learning beyond the four walls of the classroom. Wow! Outdoor educators have been using these "current trends" for decades. The activities in this *Sampler* turn the outdoors into a classroom and let you use the best (and biggest!) audiovisual tool available—the natural world.

Of course, any publication is of value only if it is used. Hopefully, you will find at least a few activities that intrigue and entice you. Feel free to modify and adapt the ideas in this *Sampler* to meet your own unique needs.

I challenge you to make the outdoors a regular part of your lesson plans this year. Truly, the time has never been better!

Herbert W. Broda, Ph.D.
Assistant Superintendent—Curriculum & Instruction
Ashland-Wayne County Office of Education

Contents

Section 3: Beyond

Sources and Resources

Appendix

Section 1:

In the Classroom

Shutterbug

Objective: Increasing observation skills; a transition or filler activity.

Materials needed: None

Setting: Indoors or outdoors

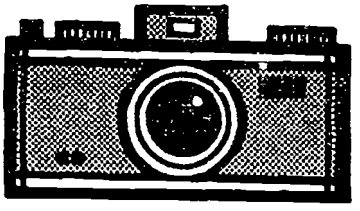
Subject area(s): All subjects where observation is important; science, writing, art...

Grade levels: Any level

Group size: Small group or class

Procedures:
-After choosing a partner, participants decide who will be the camera and who will be the shutter.
-The camera's eyes (shutter) remain closed unless actually taking a picture.
-The photographer guides the camera (careful, it's expensive!) to the subject of the photograph. Depending on the lens being used, the photographer properly positions the camera for a regular, close-up, distant, or panoramic shot.
-To click the shutter, the photographer gently squeezes the camera's shutter release (shoulder). The shutter remains open, photographing the subject, for as long as the photographer continues to squeeze the button.
-Before taking the picture, the photographer needs to inform the camera about the following:

- -film (black & white, color)
- -number of pictures on the roll (5-8)
- -shutter speed (short, medium, or long exposure)
- -lens (regular, macro, telephoto, wide angle)



-To develop the film, the camera describes each photograph in detail.
-Switch roles.

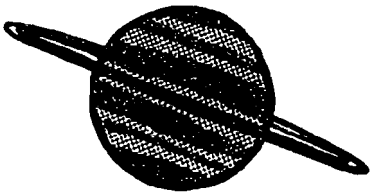
Submitter: Diane Cantrell
If I remember correctly, Donna picked up this idea from Aullwood Audubon Center and Farm. It focuses (yes, pun intended!) attention on visual observation and is an excellent companion to a blindfold walk which uses all senses except vision.

Resource: Adapted by Diane Cantrell and Donna Szuhy.

Whirling and Twirling

Objective: Define rotation, axis, and revolution. Name the planets in our solar system.

Materials needed: None



Setting: Classroom

Subject area(s): Science, music

Grade levels: Preschool–Elem. 2

Group size: Class

Procedures:

Here's a musical way to learn the names of the planets, their order of appearance in the solar system, and the concepts of rotation and revolution. Begin the activity by explaining that there are nine known planets in our solar system, all of which revolve around the sun. As each planet revolves, it rotates (turns) on its axis. (An axis is an imaginary line running through the middle of a planet around which the planet turns.)

Talk briefly about each planet and some of its unusual characteristics (Mars' reddish color, Saturn's rings, Jupiter's red spot, and so on). Also point out where each planet is in relation to the sun. For example, Mercury is closest to the sun, Earth is third in line, and Pluto and Neptune take turns being last.

When you've finished talking about the planets, have the kids form a big circle. Then have them "perform" the following song:

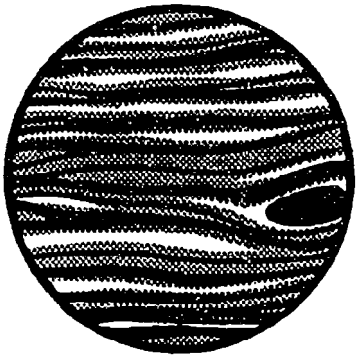
The Planets Go Spinning (sing to the tune of "When Johnny Comes Marching Home")

Words:	Movements:
The planets revolve around the sun, hooray, hooray. The planets revolve around the sun, hooray, hooray. The planets revolve around the sun	Kids form a big circle, join hands, and walk around the circle. (You might want to have a volunteer act as the sun and stand in the middle of the circle.)
And spin on their axes, every one. And they all go spinning, Around and around they go!	Kids drop hands and turn in a small circle.
Mercury, Venus, Earth, and Mars, hooray, hooray. Mercury, Venus, Earth, and Mars, hooray, hooray. Mercury, Venus, Earth, and Mars,	Kids join hands again and continue walking around the circle.

All twirling and whirling among the stars. And they all go spinning, Around and around they go!	Kids drop hands and turn in a small circle.
Jupiter and Saturn are next in line, hooray, hooray. Jupiter and Saturn are next in line, hooray, hooray. Jupiter and Saturn are next in line, Uranus, Neptune, and Pluto make nine.	Kids join hands again and continue walking around the circle.
And they all go spinning, Around and around they go!	Kids drop hands and turn in a small circle.

Submitter: Linda Crispin
I'm a preschool teacher and the Assistant Director at Community Christian Preschool in Akron. I've been the Secretary of OCOEA (now EECO) for many years.

Resource: National Wildlife Federation's *Astronomy Adventures.*



Developing a Sense of Wonder in Children

Objective: Make children aware of the world around them on a day-to-day basis; make note of seasonal changes.

Materials needed:

A diverse school ground
A good library
Teacher interest

Setting: Indoors and outdoors

Subject area(s): Science, math, social studies, creative writing, history

Grade levels: Preschool–Elem. 6

Group size: Small group or class

Procedures:

Make children aware of the world around them on a day-to-day basis: Observe and predict weather by setting up a weather station; make note of seasonal changes on the school ground—dandelion or other wildflowers blooming, birds feeding at bird feeders, grass greening up, unmowed meadow or prairie plants growing, pollinating insects (bees, flies, butterflies) on flowers—anything to make children aware of the real world and that they are part of it. Install an observation beehive in the classroom; keep a box turtle, garter snake, or other small, native wild creature temporarily as a classroom pet to be observed, cared for and loved; plant a garden, plant a prairie, or leave a small section of school ground to grow into a meadow (no mowing); tap maple trees and boil into syrup; erect bluebird boxes; start a compost pile. Being aware of the world around us, and realizing that we, too, are part of it, makes us more human. This is being missed in many schools where sterile buildings and sterile outdoor surroundings create a sense of alienation and of not belonging. Many schools need to be more "naturalized."

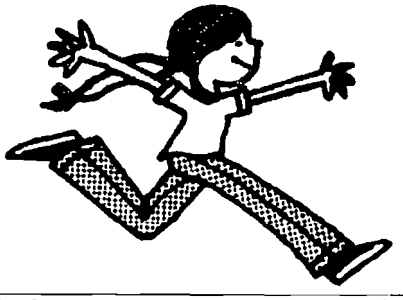
A resource library with lots of good children's books is basic to developing good environmental feelings and understandings in people. Children need to be exposed—on a daily basis—to good literature, imaginative illustrations, and to the many children's plant and animal reference books available today.

Using news clippings about environmental issues, from newspapers and magazines, leads to stimulating daily discussions. News about old-growth forests,

endangered species, destruction of rainforests, human population problems, soil erosion, toxic wastes, etc., can be used daily as a source of learning. Give children the responsibility of bringing news clippings in each day. Use these clippings to create a "world view" bulletin board and post them on a continuing basis. This is an excellent environmental education activity that any teacher can use. Devote five to fifteen minutes per day on this and children will become much more environmentally literate.

Submitter: Paul Knoop
I grew up with an early interest in birds and, later, an interest in insects, mushrooms, mammals, plants—anything natural. I spent much of my early life roaming the woods, fields, and rivers. I have been a teacher/naturalist at the Aullwood Audubon Center and Farm for the past 35 years.
I lecture on natural landscaping, the natural history of Ohio, and ecology. I write a weekly column, "The Naturalist," for the Dayton Daily News. Perhaps my favorite activity is working outdoors with teachers and children. I have been a longtime member of EECO and support efforts to help teachers and others with environmental education.

Resources: The teacher's interest in the environment, the school ground, the outdoors.



Nature's Grab Bag

Objective: Students will describe and identify natural objects while blindfolded to heighten their sense of touch.

Materials needed:

Blindfolds
Paper bag
10–15 natural objects

Setting: Indoors or outdoors

Subject area(s): Sensory awareness

Grade levels: Kindergarten–Middle/Junior High

Group size: Small group

Procedures:

- In a large grocery bag, place several interesting natural objects for students to feel, such as pine cones, stones, feathers, bones, sticks, etc.
- One student at a time reaches into the bag and feels an item.
- Before taking the object out, he/she must guess what he/she thinks it is.
- The student removes the object to check the answer and for all to see.
- Leave the item out of the bag. Go on to another student and repeat.
- As a variation, have the student holding the object (still in the bag) describe it, and let the others guess what it is. The describing words must be limited to the physical characteristics of the item.

Submitter: Sue Cook

I'm currently a sixth-grade science teacher in the Coventry Local Schools. I have a master's degree in Outdoor Education from the University of Akron. I do workshops for Kent State University and University of Akron in Outdoor Education. I'm a current board member and past president of EECO. Activities with blindfolds are my favorites, since they heighten awareness and are lots of fun.

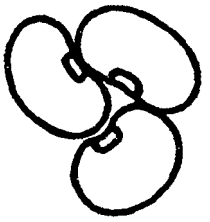
Resource: Outdoor Education: A "Natural" Resource Guide.

Lima Beans and Eggs

Objective: Students wil' compare a chicken egg and a lima bean seed to understand that everything needed to produce growth is contained within the outer coverings.

Materials needed:

Hard-boiled, partly peeled chicken eggs
Raw chicken egg
Large lima bean seeds
Labels
Magnifying glasses
Petri dishes



Setting: Indoors

Subject area(s): Science

Grade levels: Elem. 1–3

Group size: Small group

Procedures:

Lima Bean Discovery

-Soak the lima beans overnight.
-Appoint a "looker," a "drawer," and a "labeler" for each group.
-Show "lookers" how to hold the seed in one hand while splitting the seed coat along the outer curved edge with the other thumbnail. Since we end up with a lot of soaked seeds, I let each child have the fun of examining his/her own—slipping the seed coat off. Many—but not all—will have a seed with a fine example of an embryo in clear view when they part the cotyledons.
-The "drawer" sketches the bean as the "labeler" prepares labels using words (cotyledon, embryo, seed coat) you have written on the blackboard. (The trick is to keep everyone busy and doing some activity besides squishing the beans on the floor!)
-Hang finished drawings at eye level.

Discovering the Egg

-Hold up an egg and have the students compare and contrast the eggshell and the seed coat.
-Introduce the word "membrane" as the scientists' name for the seed coat or skin. Show children the membrane just under the shell of the hard-boiled egg.
-Break the raw egg into the petri dish or other transparent saucer.
-Ask a child to report on the soft membrane just inside the raw eggshell. Have the

class hypothesize why the bean seed has only a seed coat or skin shell but the egg has both a shell and a membrane.
-Ask another child to look at the egg in the saucer and report on its contents (yolk and white, two layers, "string"). Tell the students the ropy white "string" attached to two sides of the yolk is called the chalaza and is like a seat belt, to keep the chick embryo from being tossed around.
-Ask the children what part of the egg does the same job as the bean cotyledons. Ask what part of the egg is like the tiny plant embryo. This is the "big idea." The fertile embryo has everything needed contained within an egg or a bean seed to grow into a hatchling or a bean sprout. The cotyledons supply food; the white (and yolk) supply food.
-Group the children as in the lima bean session and supply each group with a raw and a hard-boiled egg.
-Assign group members to draw and label the egg as in the lima bean activity. The membrane should be felt by all. Remind them to use the soft fleshy part of their index finger so they will not break the membrane. (I remember when the lesson was over and we were talking about what we had learned, some eager fingers had to poke and see the yolk spread.)
-Have the students compare and discuss their bean and their egg drawings. Bring the wrap-up discussion around so the self-containment of seeds and eggs is understood.
Added idea: Use some of the seeds to watch them sprout in see-through jars or in vermiculite, and complete the lesson by watching beans actually develop.

Submitter: Betsy Evans
I worked with Wyoming City Schools to initiate an Outdoor Education Department. Coupled with a small nature center, we planned and taught a curriculum for K–6th grade. The curriculum was interdisciplinary and followed units of study in the grade level. It continues currently in the same manner.

Resource: Science & Children—Early Years, by Dr. Elizabeth Hone.

An Origami Drink

Objective: Students will be able to construct a paper container that will hold water.

Materials needed:
8-1/2" x 8-1/2" piece of paper

Setting: Any

Subject area(s): Geometry, art, math, economics, following directions

Grade levels: Elem. 3–6

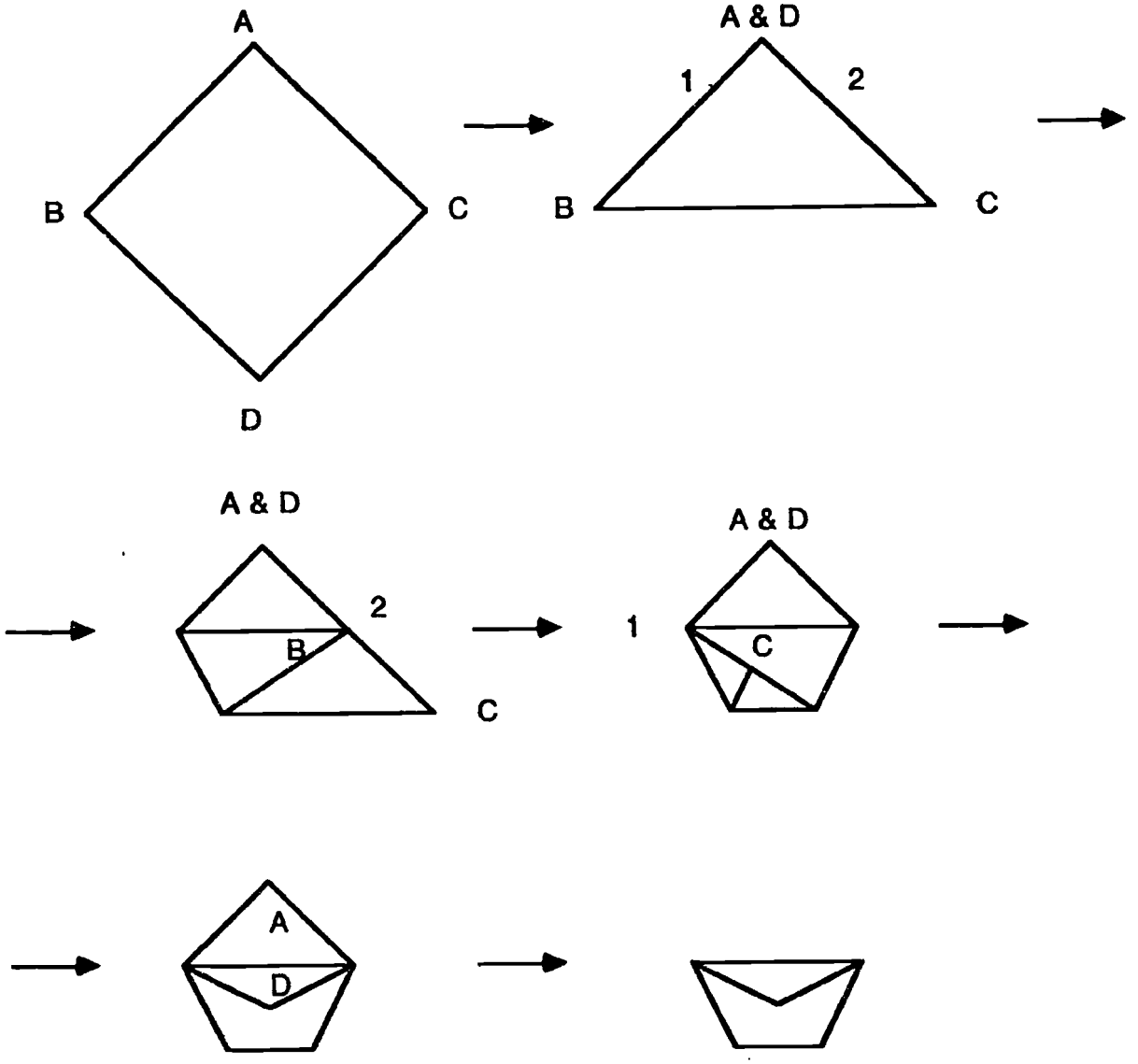
Group size: Class

Procedures:
- Hold paper with one corner up, as a diamond.
- Fold bottom corner D to top corner A.
- Fold corner B to point 2 (middle of opposite edge).
- Fold other corner C to opposite point 1.
- Spread corners A and D at top and fold down.
- Spread apart top edge and the cup is ready to use. (You have an irregular pentagon.)

These cups hold almost 1/2 cup, and are good for at least 2 drinks. They may be carried in a pocket for later use. When through, they may be recycled with office paper.

Submitter: Norm Downing, TAMPEEL
I have been director of TAMPEEL since it began in 1973. It is an environmental education program. The main emphasis is fifth graders studying at the outdoor education center one school day in the fall and again in the spring. I have been active in EECO for many years. It has been valuable to me and I hope I have helped it.
This cup-making fascinates children. I use it as an interesting activity for helping children remember part of a lesson. Children enjoy taking it home and sharing their new "skill." We also avoid the cost and waste of buying cups for classes.

Resources: Water, paper recycling.


A
B
C
D
A & D
1
2
B
C
A & D
2
B
C
1
A & D
C
A
D

Math by Degrees

Objective: Students will record, average, and graph the temperature for a week.

Materials needed:
Thermometer
Graph paper

Setting: Indoors and outdoors

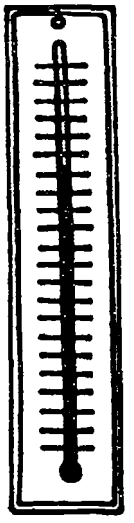
Subject area(s): Math, science

Grade levels: Elem. 3–6

Group size: Small group or class

Procedures:
- Each day, have students check the temperature and record the reading. Readings may be obtained by taking a thermometer outside, by placing one on your windowsill, from the newspaper, or from weather forecasts.
- On the Friday after the last reading or on the following Monday, students take out their data to make a graph.
- After completing their "temperature pictures," students can compare from day-to-day or week-to-week, and even make predictions.

Tip: Only include on the graph a range of temperatures appropriate to the season.



Submitter: Herb Broda

I have been involved with outdoor education for nearly 25 years. I have a special interest in resident outdoor education, but have also developed and encouraged the use of outdoor/environmental education activities at all grade levels, both on and off the school site.

I regularly coteach (with EECO legend Sue Cook) a graduate course in outdoor/environmental education through Kent State University. As often as possible, I teach at outdoor education programs held by our local school districts. My "official" title is Assistant County Superintendent for Curriculum & Instruction, Ashland-Wayne County Office of Education. I'm proud to have been an EECO (OCOEA) member for a L-O-N-G time!

Resource: Outdoor Education: A "Natural" Resource Guide.

Owl Pellets

Objective: Students will be able to construct a simple food chain.

Materials needed:

Owl pellets
Dissecting tools
Poster board
Glue

Setting: Indoors

Subject area(s): Science

Grade levels: Elem. 3–Junior High

Group size: Small group or class (groups of 2-3 work together)

Procedures:

-Locate owl pellets under trees or in abandoned buildings where owls roost. Or, pellets may be purchased from a scientific supply distributor.
-Divide the students into small groups of two to three. Give each group of students an owl pellet and basic dissecting tools.
-Have groups of students separate the bones from the fur in their pellet.
-Determine if there are bones from more than one animal in the pellet.
-Lay out the bones to form as complete a skeleton as possible. Skeletons may be glued onto poster board for display.
-See which group can make the most complete skeleton.

Submitter: Barbara Ray, Outreach Coordinator, Columbus Zoo
Hello, my name is Barb Ray and I "met" EECO at an outreach I conducted in Loudonville. I have enjoyed over ten years of conducting wildlife programs, first for the Ohio Wildlife Center and for the Columbus Zoo since 1988.
As you might guess by the activity, one of my favorite groups of animals are the raptors. One of the most fun aspects about the owl pellet activity is just explaining to people what the pellets are. Almost everyone is astounded by the fact that you can put together nearly whole skeletons of the animals the birds have eaten. They are also surprised to learn that many birds regularly expel pellets, and that the primary reason for the owl's notoriety in the "pellet industry" is that owls' digestion of animal bone is inefficient compared to that of hawks, eagles, and many other bird species. You can dissect hawk pellets all day and all night and you won't find enough bones (if any) to begin to guess what they ate—let alone experience the thrill of finding skulls, ribs, tibulas, entire tail bones, and much more!

Resource: Project WILD (pp. 124-127).

Letter Writing

Objective: To reinforce learning that has taken place, to reinforce learning (including affective developments) at a later time, and to evaluate the effectiveness of the unit.

Materials needed:

Paper
Pencil
Envelope and stamp, optional

Setting: Indoors or outdoors

Subject area(s): Language arts, social studies

Grade levels: Elem. 3–Senior High

Group size: Small group, class, or 2-3 classes

Procedures:
After completing an environmental education unit, have the kids write themselves a letter telling how they felt about the unit and about the things they learned in the unit. Later, send or give them the letter as a culminating activity.

Submitters: Beth Hahn and Vicki Schwartz
Beth Hahn, a teacher and Camp Director, and Vicki Schwartz, a 4-H agent, got together at 4-H Camp about 1987 to design a unique, "fun" environmental education program for campers, ages 9-16. Since then, we've presented some of our ideas to teachers and 4-H leaders. This activity is simple, but just different enough that it gets a "to myself?" from kids and a chuckle from adults—but then both groups "go for it" with enthusiasm.

Resource: A variation of a letter-writing idea from Joseph Cornell.

Fish, Fowl, or Foul Fish

Objective: Students will be able to collect data, calculate percentages, make inferences about sampling techniques based on the data collected, and make estimates about the nature of an occurrence of water pollution.

Materials needed:

Large bowl or other container
Fish crackers or oyster crackers (approx. 1/2 cup per group of students)
Food coloring
Measuring cup
Paper plates
Pencils
Paper
Calculators

Setting: Indoors

Subject area(s): Science, math

Grade levels: Elem. 3–Senior High

Group size: Class

Procedures:

Before class, test the procedure to determine how many "fish" and how much food coloring is required, given the size of the container you will be using. (Use enough "fish" so that approximately 1/3 of the total amount will be left over after all the groups have taken their samples.) One recommendation is to dump a 14-oz. box of oyster crackers in a one-gallon plastic bag and pour one 0.3-oz. bottle of dye down the side of the bag and then shake the bag. Navy beans or butter beans can be used in place of crackers, but will require smaller measures of materials. Also, red, blue, or green food coloring works best; mixing two colors together will produce a substance that will look like a pollutant.

- Discuss surface water pollution and the potential sources of water pollution, including runoff from waste disposal sites and farmland, spills, and improper disposal directly into waterways.
- Explain to students the concepts of simulation (an imitation of a procedure or event) and sampling (taking a small portion for analysis). Explain that the class will simulate a waste spill and determine the results by sampling.
- Organize the students into small groups (cooperative pairs or groups of three).
- Distribute paper plates, one to each student.
- Place crackers (or other item representing fish) in a container which is to represent a body of water. Do not add water. Pour liquid food coloring down the

side of the container, concentrating the coloring in one general area, including direct contact with "fish" in that area. Gently shake the container to simulate motion of the water and movement of the fish. Continue to shake until the "affected" fish are fairly equally distributed.
- One at a time, have each group obtain its sample from the container, using a measuring cup, and pour the "fish" onto the paper plates.
- Have each group count the affected number of fish and the number of those unaffected and calculate the percentages of each. Use the handout, *Data Collection From Samples*. This should inspire discussion on the subjectiveness of some classification schemes.
- Record each group's results on the chalkboard, and have students record the total figures and calculate percentages for all the groups combined on the data collection handout. Discuss results, indicating extreme scores.
- There should be fish in the container. Continue to sample and calculate percentages until all the fish are accounted for.
- Determine the total number of fish that were in the container, total number of affected fish (by additional categories, if so distinguished), and the percentage of affected fish (by additional categories, if so distinguished).
- Compare the actual total results with individual group and total group sampling results. Discuss the accuracy of the estimates.
- Lead students to discuss the advantages and disadvantages of sampling, and what specific types of defects are looked for in fish samples that indicate pollution problems (e.g., fish kills, tumors, lesions, discolorations, etc.).

Evaluation: Have each student write a report about the activity and describe another environmental situation where the sampling technique might be appropriate.

Bring extra "fish" so the class can enjoy a treat when the activity is completed!

Submitter: Caroline Gill
As part of an education class in college, I toured Mohican School in the Out-of-Doors. Inspired by the tour leader, Herb Broda, I've been involved in outdoor education for the past 17 years. I've taught classes at our school's sixth-grade outdoor education camp, The Wilderness Center, a National Wildlife Summit, and at Boy Scout meetings. Five years ago, my principal and friend, Dave Nawyn, encouraged me to join EECO, for which I'm currently serving on the Board.

Resource: Investigating Solid Waste Issues, Ohio Department of Natural Resources. Reprinted by permission.

DATA COLLECTION FROM SAMPLES

INDIVIDUAL GROUP SAMPLE RESULTS

	NUMBER	PERCENT OF TOTAL
UNAFFECTED		
AFFECTED		
AFFECTED CLASSIFICATIONS (OPTIONAL)		
SLIGHTLY		
MODERATELY		
EXTREMELY		
TOTAL NUMBER		

TOTAL RESULTS FROM ALL GROUPS

	NUMBER	PERCENT OF TOTAL
UNAFFECTED		
AFFECTED		
AFFECTED CLASSIFICATIONS (OPTIONAL)		
SLIGHTLY		
MODERATELY		
EXTREMELY		
TOTAL NUMBER		

ACTUAL RESULTS (TOTAL RESULTS FROM ALL GROUPS + REMAINING FISH)

	NUMBER	PERCENT OF TOTAL
UNAFFECTED		
AFFECTED		
AFFECTED CLASSIFICATIONS (OPTIONAL)		
SLIGHTLY		
MODERATELY		
EXTREMELY		
TOTAL NUMBER		

How Wet Is Our Planet?

Objective: Students will be able to describe the amount and distribution of water on earth in oceans, rivers, lakes, groundwater, icecaps, and the atmosphere; and make inferences about the importance of responsible use of water.

Materials needed:

Large display map of the world
5- 10-gallon aquarium
Writing materials
Calculators
Measuring cup
A quart container for every 3 students
One measuring tablespoon for every 3 students

Setting: Indoors

Subject area(s): Math, science

Grade levels: Elem. 4–Senior High

Group size: Small group or class

Procedures:

- Using a map of the earth, begin a discussion of how much water is present. Ask the students to comment on why the earth is called "the water planet." Call the students' attention to the statistic that 2/3 to 3/4 of the surface is covered with water. After discussion, provide the students with the following statistics:

Water on Earth	Percent
Oceans	97.2
All icecaps/glaciers	2.0
Groundwater	0.62
Freshwater lakes	0.009
Inland seas/salt lakes	0.008
Atmosphere	0.001
All rivers	0.0001
Total	99.8381

From *The Cousteau Almanac*, New York: Doubleday/Dolphin, 1981, page 114.

- Discuss the relative percentages. Do the calculations for them, or ask students to calculate the estimated amount of fresh water potentially available for human use:

	Percent
Groundwater	0.62
Freshwater lakes	0.009
Rivers	0.0001
	0.6291
Including icecaps/glaciers	2.0
Total	2.6291

- In discussing these figures, emphasize that the usable percentage of existing water is reduced by pollution and contamination. Also, all the groundwater is not readily available and icecaps are certainly not readily available. Discuss the needs of humans for usable fresh water. Ask the students to consider what other life forms need both fresh and saline (salt) water.
- Show the students five gallons of water in the aquarium. Tell them how much is there. Provide the students with the following: 5 gallons = 1280 tablespoons.
- Have the students assume that the five gallons represent all the water on earth. Do the calculations for them, or ask the students to calculate the volume of all the other quantities on the water percentage list. This will require the use of decimals. Remind the students that for multiplication, all the decimal places must be shifted two places to the left so that 97.2% becomes 0.972 prior to multiplication; e.g., 0.972 x 1280 tablespoons = 1244.16 tablespoons. The following values result:

Oceans	1244.16
All icecaps/glaciers	26.24
Groundwater	7.93
Freshwater lakes	0.11
Inland seas/salt lakes	0.1
Atmosphere	0.0128
All rivers	0.0012
Total	approx. 1280. tablespoons

- Once the values are obtained, ask the students to calculate the volume of the water other than ocean water. (It is approximately 34 tablespoons.) Ask them to divide up in teams of three, put 34 tablespoons of water in a container, and take it to their workplaces.
- At their workplaces, ask the students to remove the amount of water represented by all freshwater lakes and rivers. (It is 0.111 tablespoons, approximately 1/10 of a tablespoon.) Then ask the students to extract the amount represented by rivers. (It is 1/1000 of a tablespoon.) This is less than a drop. Discuss the relative proportions with the students.
- Consider the fragile nature of the freshwaters, wetlands, and oceans of our planet. Discuss how all species depend upon this minute percentage of water for their survival. Summarize by emphasizing the importance of keeping the earth's waters clean and healthy and using them wisely and responsibly.

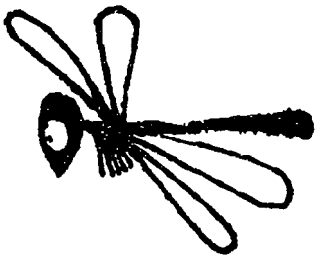
Submitter: Denise Vales
When I started teaching Environmental Studies in the fall of 1980, my first class was "stream study." Now, at the Mohican School in the Out-of-Doors, I still enjoy teaching aquatic studies. The excitement that I see in the children and adults when they find organisms in the pond or stream (even in the "dead" of winter) is very rewarding. As an outdoor educator, I could not ask for a better "classroom"!

Resource: Aquatic Project WILD

Section 2:

Insect Hunt

Objective: To introduce students to the diversity of the insect world.



Materials needed: Bug boxes or jars

Setting: Outdoors

Subject area(s): Science

Grade levels: Preschool–Senior High

Group size: Small group or class

Procedures: Each student should have a bug box or jar. Outside, instruct students to look in different areas for insects to collect. When the students find insects, instruct them to look at the different characteristics (legs, mouth parts, number of body parts, etc.) of the insect. Spread a sheet on the grass. Have the students form a circle around it, about five feet away from the sheet. All the students then shuffle their feet as they walk toward the sheet. The insects will jump onto the sheet. Collect insects and discuss different types. Then take the sheet and place it under a small tree. Shake the tree and then look at the sheet to observe the different types of insects collected.

Submitter: Lynda Anderson
I love the excitement and discovery of environmental education! I feel lucky to promote and to be included in this discovery through my work at The Wilderness Center and Mohican School in the Out-of-Doors. I look for activities that get people actively involved in what they are learning.

Resource: Insect Shakedown. Try the World OUT Creative Skills Card.

Things Out of Nature

Objective: To question our perception of our environment and to heighten our observation skills.

Materials needed:

Green or black olive, pickle, or Ping-Pong ball
Cattail
Seashell
Mustard
Fruit; pancake or sponge
Paper, plastic, or a flower
Cotton ball
String
Pot scrubber

Setting: Outdoors

Subject area(s): Natural sciences

Grade levels: Any age

Group size: Small group or class

Procedures:

-Find a diverse area about 30' x 30' and establish boundaries, either naturally or artificially. Remove obvious litter.
-Strategically place 10 objects within the area that simulate unnatural objects that belong in this area or are real objects that belong in another habitat. Be sure the objects and their placement are geared to the level of the participants.
-Give participants approximately 10 minutes to wander about nonchalantly searching for things out of nature. Encourage passive recognition and recording.
-Share their findings and feelings.

Submitter: Diane Cantrell

I've been an environmental educator for over 20 years, long before I ever heard of environmental education and while I was still teaching middle school French and Language Arts! Since those early years, I learned about EE through graduate degrees and have enjoyed working at ODNR and teaching at Ohio State University. I'm past president of EECO and now serve as an adviser to the Board. This is a favorite activity which I first encountered (1977) at the National Audubon Camp in Maine. After my being fooled by "the mushroom" (a pancake on a stick), I enjoyed listening to the Director's tale. He mailed a photograph of one of these "mushrooms" to an expert friend for identification. It took weeks of research before his friend finally realized that the mushroom was an impostor.

Resource: Adapted by Diane Cantrell and Donna Szuhy.

Shape Hunt

Objective: Develop observation skills, identify common shapes.

Materials needed:

Copy of shape hunt
Pencil

Setting: Outdoors

Subject area(s): Math, science

Grade levels: K–Elem. 4

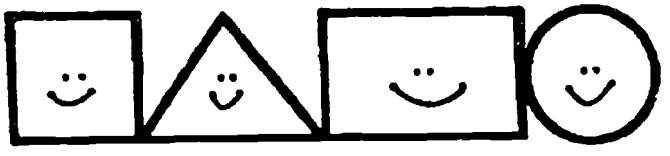
Group size: Small group or class

Procedures:

Directions are listed on the activity page. This paper is given to the students. Each student is to complete the directions as listed on the page: "Make a check mark or X for every shape you find. At the end of the shape hunt, add all of your check marks or Xs. Put the correct number in the boxes at the bottom of the page." After adequate time has elapsed, the check marks are added up. A discussion could then follow, based on the students' findings: What were the most common/ least common shapes; what objects had different shapes, etc.

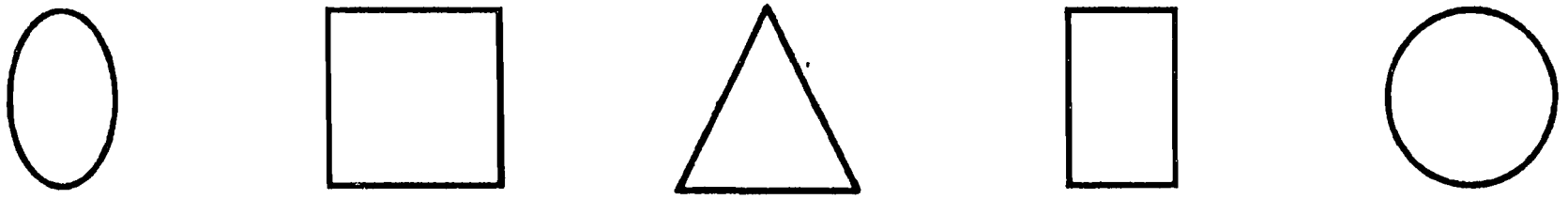
Submitter: Worthington Schools (Christy Ahnmark, Dean Freund, Marty McTigue)

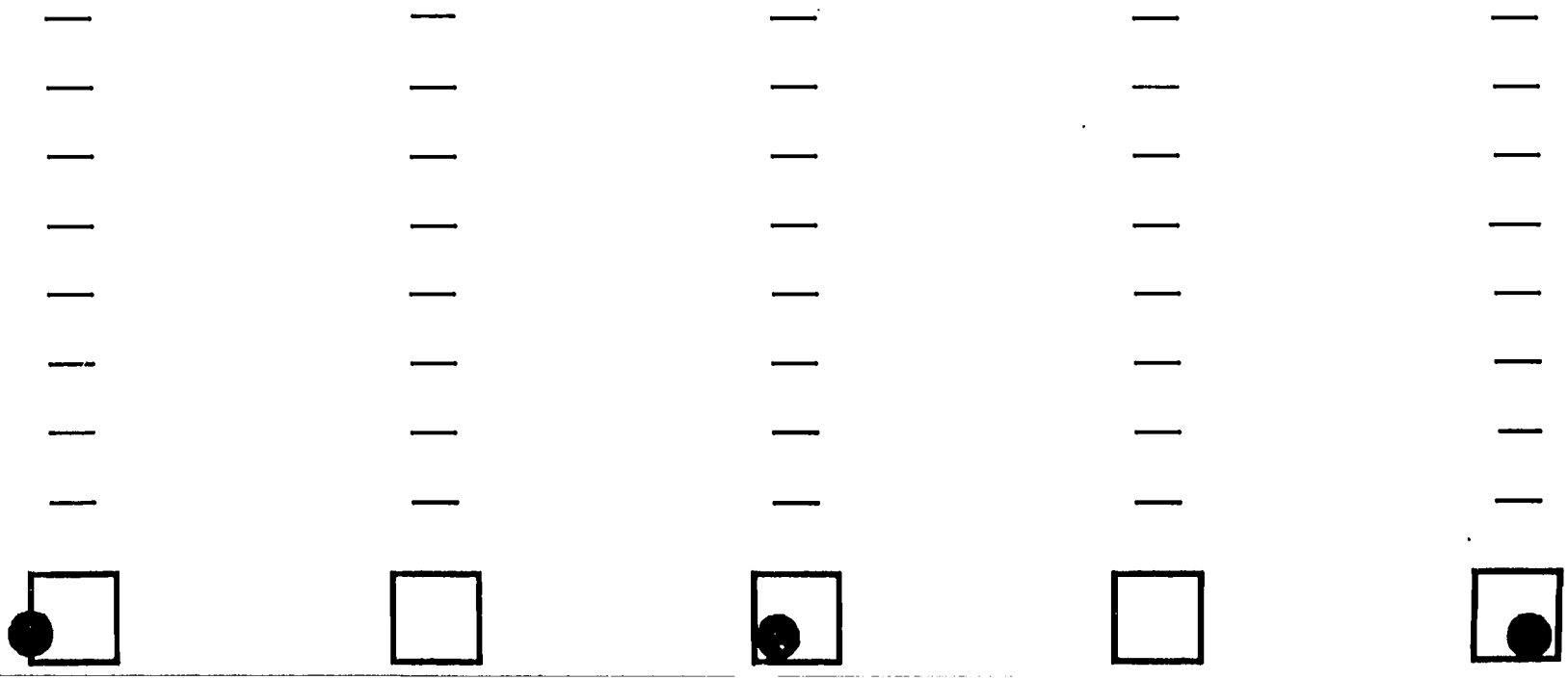
Hi. My name is Dean Freund (pronounced—friend). My career in outdoor education began many, many years ago. I know that, because some of my close associates are now telling me that I'm older than dirt. I have spent over three decades working with kids and adults in the outdoors. It is still the best learning site and laboratory available. These pages were developed to help other teachers in our district see some of the possibilities of relating mathematics and the outdoors. I did this because I hate math! I hope you enjoy these activities. If you have ideas for extensions—and I know you will—please tell me at a conference, or contact me at Worthington Schools Outdoor Education Department.



s·h·a·p·e HUNT

Things in the outdoors have many shapes. How many of these shapes can you find in the outdoors? Make a check mark or X for every shape you find. Make a check mark or X on the lines under the shape. At the end of your *shape hunt*, add all of your check marks or Xs. Put the correct number in the boxes at the bottom of this page.





Natural Art/
Colors From Nature

Objective: Students will be able to list a variety of colors that can be obtained from natural materials.

Materials needed:
Natural materials in a variety of colors

Setting: Indoors and outdoors

Subject area(s): Fine arts, science

Grade levels: It is listed in the original K–Elem. 6 book; however, I have used it at all grade levels and to introduce teachers to another activity.

Group size: Small group or class

Procedures:
Have participants gather just what they can hold in one hand—flowers, leaves, grasses, burnt wood, mud, soft stones, bugs, rotting wood. (If you are not near a woods, a flower or vegetable garden yields some lovely colors.)
Using construction paper or rough-textured paper, draw a picture or make a rainbow of the different colors. Participants can share materials. Participants can also work in small groups to create their drawings.

Submitter: Nancy Speck
Try this! I can promise you that you will be amazed at your creation. I have used this activity with all kinds of groups and it works every time. That is what is so neat abut the Project Learning Tree, Project WILD, and Aquatic WILD materials. The activities that are in these guides really work with groups.
Using the out-of-doors as a classroom has always been a part of my teaching. Taking my group of students outside has always been a reward for me. While I have been retired for almost 5 years, my teaching career spans some 45 years. Wow! That's a long time, but it has been very satisfying!

Resource: Project Learning Tree.

A Look at Leaves

Objective: Students will become familiar with the variety of leaf shapes and colors. Introduction of leaf terms.

Materials needed: None

Setting: Outdoors

Subject area(s): Science, language arts

Grade levels: Elem. 3–6

Group size: Class

Procedures:
Each participant, when on a nature walk, collects five different leaves. When gathered as a group, each participant chooses one leaf. As a group, the participants line themselves up from the person with the smallest leaf to the person with the largest leaf. Then each participant picks another leaf; now they group themselves according to leaf color. Introduce and define the terms margin, serrate, entire, and lobed. After participants pick up another leaf, they group themselves according to leaves with serrate (toothed), entire (smooth), or lobed margins. This type of grouping can be done with any term that describes leaves (e.g., simple vs. compound leaf, pinnate vs. palmate veins, smooth vs. rough). This activity can be an introduction to keying trees or identifying leaves.

Submitter: Lynda Anderson
I love the excitement and discovery of environmental education! I feel lucky to promote and to be included in this discovery through my work at The Wilderness Center and Mohican School in the Out-of-Doors. I look for activities that get people actively involved in what they are learning.

Erosion

Objective: To introduce students to erosion, and begin to explore its effects on the land.

Materials needed:

2 buckets of water

A grassy slope with a path

(There may be additional, student-planned materials for older groups. See Procedures.)

Setting: Outdoors

Subject area(s): Science

Grade levels: Elem. 3–Senior High

Group size: Small group, class, or 2-3 classes

Procedures: Talk about erosion and describe its effects as you walk with the group to the outdoor site. When everyone's ready and watching, quickly empty one of the buckets near the top of the grassy part of the slope. Discuss what they observed. (How much soil was carried away? How far did the water travel down the slope? Where did the water go? Was anything else washed away? What? etc.) Then, quickly empty the other bucket near the top of the slope, on the path. Use the same questions and compare results.

For older students, break out into small groups and have each group come up with a plan to reduce erosion on that slope. Each small group reports back to the larger group, which chooses one plan to put into practice. Do it!

Submitter: Joann Ballbach

I've been an outdoor educator and learner for as long as I can remember. My parents say they took me on my first camping trip when I was three months old—I guess it "stuck." One of my earliest childhood memories is of catching butterflies. Professionally, I was a classroom teacher for about seven years and a professional Girl Scout (Camp Director/Field Adviser) for six years. I've worked at nature centers since 1986, first as a Naturalist, and now as the Education Director at The Wilderness Center.

Resource: I learned this one from Katrina Baltic, then of Tuscarawas Soil & Water Conservation District.

Build a Tree

Setting: Indoors or outdoors

Subject area(s): Tree biology, group cohesiveness

Grade levels: Elem. 3–Senior High

Group size: Class

Procedures:
Players act out the various parts of a tree. In large groups, more than one player can take each role.
The heartwood section pantomimes providing strength and support for the tree. The roots (taproot and lateral) anchor the tree in the ground and draw up water and trace minerals. The sapwood carries water up to the branches and leaves. The cambium is the growing part of the tree. The phloem carries food from the leaves to the rest of the tree, and the bark protects the tree.
Heartwood: To begin play, choose two or three tall, strong-looking people and ask them to play the heartwood. Have them stand with their backs to each other. Tell the rest of the group, "This is the heartwood—the inner core, the strength of the tree. The heartwood's job is to hold the trunk and branches upright so the leaves can get their share of the sun. The heartwood has been around a long time—so long that it's dead; but it's well preserved! The heartwood used to be alive, but its thousands of little tubes that carried the water up and down are now all clogged with resin and pitch." Tell the heartwood players their job is to "stand strong."
Taproot: Next, ask several people to play the taproot. Tell them to sit down at the base of the heartwood, facing outward. Tell them: "You are a very long root, called a taproot. Plant yourself deep in the ground—about thirty feet. The taproot enables the tree to get water from deep in the earth, and also anchors the tree firmly to the ground. When storms come, the taproot keeps the tree from being blown over by high winds." Be sure to say that not all trees have a taproot (e.g., redwoods), but that this one does.
Lateral Roots: Choose people with long hair who look as if they won't mind lying on the ground. Ask the "lateral roots" to lie on their backs with their feet up against the trunk and their bodies extending away from the tree. Tell them: "You are the lateral roots. There are hundreds of you. You grow outward all around the tree, like branches, but underground. At your tips are tiny root hairs."At this point, kneel beside one of the lateral roots and spread his/her hair out around his/her head. Continue your narrative: "Trees have thousands of miles of root hairs that cover every square inch of soil into which they grow. When they sense that there is water nearby, the cells grow toward it and suck it up. The tips of the root hairs have cells as tough as football helmets. I want the lateral roots and taproot to practice slurping up water. When I say 'Let's slurp!' you all go like this (make a loud slurping noise). Okay, let's hear you slurp!"
Sapwood: Now ask a small group to play the sapwood. Choose enough people to form a complete circle around the heartwood, facing inward and holding hands, being careful not to step on any roots! Tell them: "You are part of the tree called the sapwood, or xylem. You draw water up from the roots and lift it to the tree's highest branches. You are the most efficient pump in the world, with no moving parts. You're able to lift hundreds of gallons of water a day, and you do this at speeds of over 100 miles an hour! After the

roots slurp the water from the ground, your job is to bring the water up the tree. When I say 'Bring the water up!', you go like this: 'Wheeee!' (As they do this, they throw their arms up into the air.) Let's practice. First we'll have the roots slurp. Let's slurp." Follow this immediately by commanding the sapwood, "Bring the water up! Wheeee!"

Cambium/Phloem: Select a group to play the cambium/phloem. Have them form a circle around the sapwood, also facing inward and holding hands. Tell them: "Toward the inside of the tree from you is the cambium layer, the growing part of the tree. Every year, it adds a new layer to the sapwood and phloem. A tree grows outward from its trunk and also from the tips of its roots and branches. It doesn't grow like your hair does. (Push the fingers of one hand upward through the horizontal fingers of the other hand.) Behind you, toward the outside of the tree, is the phloem. This is the part of the tree that carries food manufactured by the leaves and distributes it to the rest of the tree. Let's turn our hands into leaves." Have them stretch their arms upward and outward so that they intersect each other's arms at wrists and forearms, leaving their hands free to flutter like leaves. "When I say 'Let's make food!', raise your arms and flutter your leaves and absorb the energy from the sun and make food. And when I say 'Bring the food down', you go 'Whoooo!'" (Make the 'Whoooo!' a long, descending sound while you bend at the knees and drop your arms and body toward the ground.) "Let's practice." Go through all the sounds and motions with all the parts, in this order: "Let's slurp!" "Let's make food!" "Bring the water up!" "Bring the food down!"

Bark: Ask the remaining people to play the bark. Have them circle around the tree, facing outward. Tell them: "You are the bark. What kind of dangers do you protect the tree from?" Suggest fire, insects, extreme temperature changes, and little boys and girls with pocket knives. Tell the bark how they protect the tree: "Raise your arms like a football blocker with both elbows out and both fists close to the chest. (Pause) Do you hear that high-pitched sound? It's a very hungry, long-snouted pine-borer. I'll go and see if I can stop it. If I don't come back, you'll have to stop the pine-borer yourselves. Practice your parts while I'm gone."

Disappear behind a tree or into the hall and come out as the pine-borer. Ham it up by scowling, using branches for your antennae, and turning your head back and forth. Zero in with your antennae and point your long borer-snout toward the tree. Now run or walk quickly around the tree, pretending to penetrate the bark's protective layer. The "bark" people should try to fend you off.

When you finish, have the players give themselves a big hand for being such a wonderful tree. And help the roots off the ground!

Submitter: Donna Szuhy

Teaching in the out-of-doors started early in my career, as my first class and I explored the woodland environment surrounding the elementary school. I continued this interest as I moved throughout my career changes from teaching in public schools, education administrator for the Ohio Department of Natural Resources, and environmental education instructor for Hocking College. Numerous workshops and years of experience have convinced me that "fun and magic" are part of the environment and should always be incorporated into a program. My next career change, into consulting on creativity, puppetry, and storytelling will definitely incorporate these ideas.

Resource: This activity is from *Sharing the Joy of Nature*, by Joseph Cornell, published by Dawn Publications, 14618 Tyler Foot Road, Nevada City, CA 95959, (916) 292-3484. $9.95. Reprinted with permission.

Descriptive Words

Objective: Develop observation skills, increase vocabulary of descriptive words (adjectives), and develop creative thinking.

Materials needed:

Strips of adding tape, or used legal-size envelopes
Wide transparent tape
Pencils
Clipboards or homemade writing boards
An outdoor area with a variety of small objects available, e.g., leaves, rocks, grass

Setting: Outdoors

Subject area(s): Creative writing

Grade levels: Elem. 3–Junior High

Group size: Any size group

Procedures:

- Direct the learners to find a small (1-2") item that interests them from the outdoors.
- Tape the item to the top of the adding tape or to one end of the back of the envelope. I like to use the envelope because I am reusing a waste item. (If Abraham Lincoln could write the Gettysburg Address on the back of an envelope, it is good enough for me!)
- Each person should then make a list of words that describe the object. Write the list down the adding tape/envelope. Some words will come quickly. Encourage the learners not to stop at that point, but to think a little bit more. When they have to really think is when they get the most creative.
- These words can be used later in another creative writing activity, in poetry, or in a story.

Submitter: Vickie Breckenridge

I am employed by Great Trail Girl Scout Council and have been using the outdoors to teach others since I was a student myself. I have been a classroom teacher, outdoor teacher, and camp director. My favorite teaching activities get learners involved in the learning process. All my activities include a bit of "creativity" and challenge the learners to explore their creative side.

Pressed Flower Bookmark

Objective: Create an art object for daily use and appreciate the beauty and variety of flowers.

Materials needed:

An outdoor area with small flowers, weeds, and leaves, where picking is allowed

A flower press or newspaper and heavy books
Two pieces of 2" x 6" clear Contact paper per learner
Glitter (optional)
Scissors
Paper-hole punch
Pinking shears (optional)
8" yarn per learner
2" x 6" piece of scrap paper per learner

Setting: Indoors and outdoors

Subject area(s): Nature craft

Grade levels: Elem. 3–Junior High

Group size: Any size group

Procedures:

Day 1:

- Collect small flowers, weeds, and leaves to use in the bookmark. Be sure learners know what plants they should not pick, e.g., poison ivy, endangered species. Give them a limit of three flowers and a few "greens" per person.
- Arrange the flowers and leaves in the flower press or between layers of newspaper and press under heavy books. Allow to dry for several days, until there is no moisture in them.

Day 2:

- Learners arrange the flowers and leaves in a pleasing pattern on the scrap paper.
- When they are pleased with the pattern, learners *carefully* place the flowers and leaves on the sticky side of one piece of Contact paper. Once they are placed on the Contact paper, they cannot be moved. Leave a margin of "sticky" on all sides of the arrangement. If desired, sprinkle with a little glitter.
- Learners *carefully* place the second piece of Contact paper on the arrangement, sticky sides together, aligning the edges. Press them together completely. Try to get out all the air bubbles. A pin may be used to prick stubborn air bubbles and then the air may be pressed out.

- Learners trim the edges of the bookmark, punch a hole at the top, and tie the piece of yarn through the hole.

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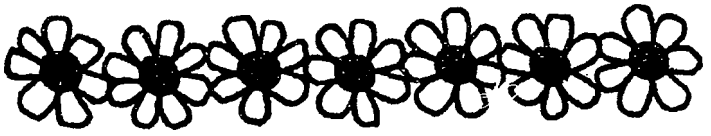


Seton Watching

Objective: A quiet time spent alone with nature; to encourage individual initiative.

Materials needed:

3" x 5" card or small notebook/nature journal
Pencil

Setting: Outdoors

Subject area(s): Art, language arts, science

Grade levels: Elem. 3–Junior High

Group size: Small group or class

Procedures:
Space kids 10-20 feet apart. Have them do an awareness activity, such as sketches of natural objects, a sound map (Joseph Cornell), or observe and list several natural objects. No talking for five minutes. Gather the group and report to each other about what you saw, heard, or drew.

Submitters: Beth Hahn and Vicki Schwartz
Too often, we hurry through life without stopping to look, listen, or reflect. As educators, we often feel that if our students are not "doing something"—often as a group—we have failed them. We have used this activity to help students reflect and realize that it takes their personal initiative to help solve environmental problems. Beth is a teacher and Vicki is a 4-H agent. Beth is Executive Director and Newsletter Editor for EECO and talked so much about the organization that Vicki joined, too!

Resource: Adapted from Ernest Thompson Seton.

Unseen Trees

Objective: Develop the sense of touch as an observation tool, discover the uniqueness of individual trees, and learn to draw realistic trees.

Materials needed:

A trail with a variety of trees along it, easy to walk and free of obstacles
Blindfold for each learner
Rope with knots, long enough for the learners to stand in a line along the length
2 pieces of drawing paper for each learner
Crayons, pencils, or other drawing instruments
Clipboards or other drawing boards

Setting: Outdoors

Subject area(s): Art

Grade levels: Elem. 3–Senior High

Group size: Small group

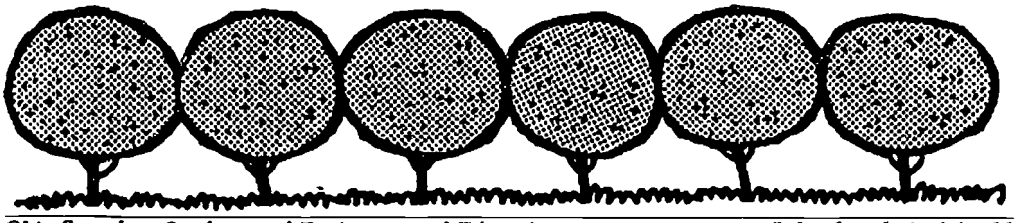
Procedures:

Indoors:

Have each learner draw a tree. Encourage him/her to make the drawing as realistic as possible. Tape the drawings around the room.

Outdoors:

- Take a blind walk along a safe trail to an area with a variety of trees. An excellent resource for setting up the walk is *Sharing Nature With Children*, by Joseph Cornell. Each child is blindfolded and holds on to a knot on the rope. An adult leads the walk without a blindfold and, depending on the size of the group, another adult may walk along for safety purposes.
- Stop at the preselected site with the variety of trees. Have the learners reach out to touch a tree. They may let go of the rope at this point. Instruct them to really get to know their tree well enough to find it again later. You may need to elaborate with detailed instructions on how to explore the tree; e.g., feel its bark; is it rough? Smooth? Where are the branches? Can you touch them? How long are they?



- Once the learners feel they know their tree, resume the walk. Go to a comfortable gathering place nearby where the learners can sit down. They can now take off their blindfolds. Pass out paper and crayons. Each learner should now draw his/her tree. Make it as realistic as possible.
- Go back, unblindfolded, to the trees. Can each learner find his/her own tree? Can other learners find his/her tree from the drawing?
- Go back inside. Each learner tapes this drawing beside his/her original tree drawing. Discuss the two sets of drawings. Are they the same? What is different? Why did the drawings change? Which drawings—the first or second set—are more realistic? What does this tell us about drawing? How can we improve our drawing skills?

Submitter: Vickie Breckenridge

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Oh, Deer!

Objective: Students will be able to: (1) identify and describe food, water, and shelter as three essential components of habitat; (2) describe the importance of good habitat for animals; (3) define "limiting factors" and give examples; and (4) recognize that some fluctuations in wildlife populations are natural as ecological systems undergo a constant change.

Materials needed:

Chalkboard or flip chart
Writing materials

Setting: Indoors or outdoors, in an area large enough for students to run

Subject area(s): Science, math, social studies, physical education

Grade levels: Elem.4–Senior High

Group size: Small group, class, or 2-3 classes

Procedures:

- Begin by telling students that they are about to participate in an activity that emphasizes the most essential things that animals need in order to survive. Review the essential components of habitat with the students: food, water, shelter, and space in a suitable arrangement.
- Mark two parallel lines on the floor or ground, 10–20 yards apart. Divide the students into four groups. One group stands behind one of the lines; the other three groups stand behind the other line.
- The small group becomes the "deer." All deer need good habitat in order to survive. For the purposes of the activity, we will assume that the deer have enough space in which to live. We are emphasizing food, water, and shelter. When a deer is looking for food, it should clamp its hands over its stomach. When it is looking for water, it puts its hands over its mouth. When it is looking for shelter, it holds its hands together over its head. A deer can choose to look for any one of its needs during each round of the activity; the deer cannot, however, change what it is looking for during that round. It can change again what it is looking for in the next round, if it survives.
- The other students become food, water, and shelter—components of habitat. Each student gets to choose at the beginning of each round which component he/she will be during that round. The students depict which component they are in the same way the deer show what they are looking for; that is, hands on stomach for food, etc.
- The game begins with all players lined up on their respective lines (deer on one

side, habitat components on the other side)—and with their backs to the students at the other line.
- The facilitator begins the first round by asking all the students to make their signs—each deer choosing what it is looking for, each habitat component deciding what it is.
- When you can see that all the students are ready, count: "one...two...three." At the count of three, each deer and each habitat component turn to face the opposite group, continuing to hold their signs clearly.
- When the deer see the habitat component they need, they run to it. Each deer must hold the sign of what it is looking for until it gets to a habitat component with the same sign. The first deer to reach each correctly matching habitat component takes the habitat component back to the deer side of the line. This is to represent the deer's successfully meeting its needs, and successfully reproducing as a result. Any deer that fails to find what it was looking for dies and becomes part of the habitat. That is, in the next round, the deer that died is a habitat component, and so is available as food, water, or shelter to the deer that are still alive. If no deer needs a particular habitat component during a round, the habitat component just stays where it is in the habitat. The habitat person can, however, change which component it is from round to round.
- You as the facilitator keep track of how many deer there are at the beginning of the game and at the end of each round. Continue the game for approximately 15 rounds, then gather the students together to discuss the activity. Encourage them to talk about what they experienced and saw.
- Using the chalkboard or flip chart, post and line-graph the data. (Each round is a year.) The students will see a visual reminder of what they experienced during the game—the deer population fluctuated over a period of years. Wildlife populations do tend to peak, decline, and rebuild; peak, decline, and rebuild—as long as there is good habitat and a sufficient number of animals to successfully reproduce.
- In discussion, ask the students to summarize some of the things they have learned from this activity. What do animals need to survive? What are some of the "limiting factors" that affect their survival? Are wildlife populations static, or do they tend to fluctuate? Why? Is nature ever really in "balance," or are ecological systems involved in a process of constant change?

Submitter: Neel Summers
I have been a teacher and director in the Southeast Local School's sixth-grade resident outdoor education program for many years. I have also used the "Oh, Deer!" activity with younger students in ecology classes in Wayne County Schools Enrichment Academy and with Girl Scout groups. I have found that this activity teaches an important ecological concept in a simple activity-oriented session which students greatly enjoy as they learn.

Resource: Project WILD K-12 Activity Guide.

Alphabet Awareness

Objective: To fill in at end of lessons for group participation.

Materials needed: None

Setting: Natural environment

Subject area(s): Science, math

Grade levels: Elem. 5–6

Group size: Any

Procedures:
-Form into even teams.
-Give two—or more—letters of the alphabet (delete Q, X, Y, Z).
-In 5 minutes, in a restricted area, find things (natural or other) beginning with those letters.
-Bring back to group; discuss, line up things.
-If there's time, add an adjective to describe (same or different letter).

Submitter: Kathy Adams
One of my first experiences in teaching at an outdoor school was in over six inches of snow—talk about a change in plans! I have taught classes at an independent outdoor school and at an organized, regular outdoor school. What great natural resources—Ohio woods, ponds, streams, and life!

Resource: Ohio outdoor area.

Micro Hike

Objective: Students will be able to describe a small area of land, using all senses.

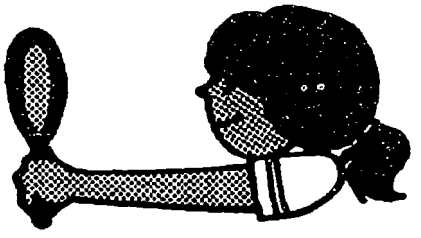
Materials needed:

Magnifying glass
12" piece of string or yarn
Paper
Pencil
Candy (such as Skittles, Nerds)

Setting: Outdoors

Subject area(s): Sensory awareness, science, language arts

Grade levels: Elem. 5–6



Group size: Small group

Procedures:

-Give each student a 12" piece of string.
-Tell students to find an area near where their group is to stretch their string out. They should stay within sight of the instructor.
-Give each student a piece of candy and tell them it is a "magic shrinking pill" that, when they eat it, will shrink them to the size of an ant.
-While students are eating their candy, explain to them that they will "walk" along their string, using their magnifying glass to examine the plants and animals they encounter on the way. Encourage them to not only look but also to feel, smell, and listen for sounds along their hike.
-After students have had enough time to complete their hikes (remember it takes a long time for an ant to climb up and over a plant), instruct them to write about their adventure.
-Gather the group together to share their micro hike stories.

Submitter: Caroline Gill

As part of an education class in college, I toured Mohican School-in-the-Outdoors. Inspired by the tour leader, Herb Broda, I've been involved in outdoor education for the past 17 years. I've taught classes at our school's sixth-grade outdoor education camp, The Wilderness Center, a National Wildlife Summit, and at Boy Scout meetings. Five years ago, my principal and friend, Dave Nawyn, encouraged me to join EECO, for which I'm currently serving on the Board.

Resource: Handed down by outdoor educators and adapted by Caroline Gill.

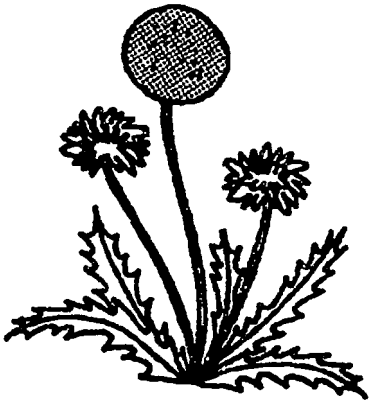
Section 3:

Wildflower Hike— How Many Petals? How Many Colors?

Objective: Develop observation skills, identify colors, reinforce counting skills and graphing skills.

Materials need 1:

Copy of How Many Petals? How Many Colors?
Pencils
Crayons



Setting: Outdoors, in an area with wildflowers

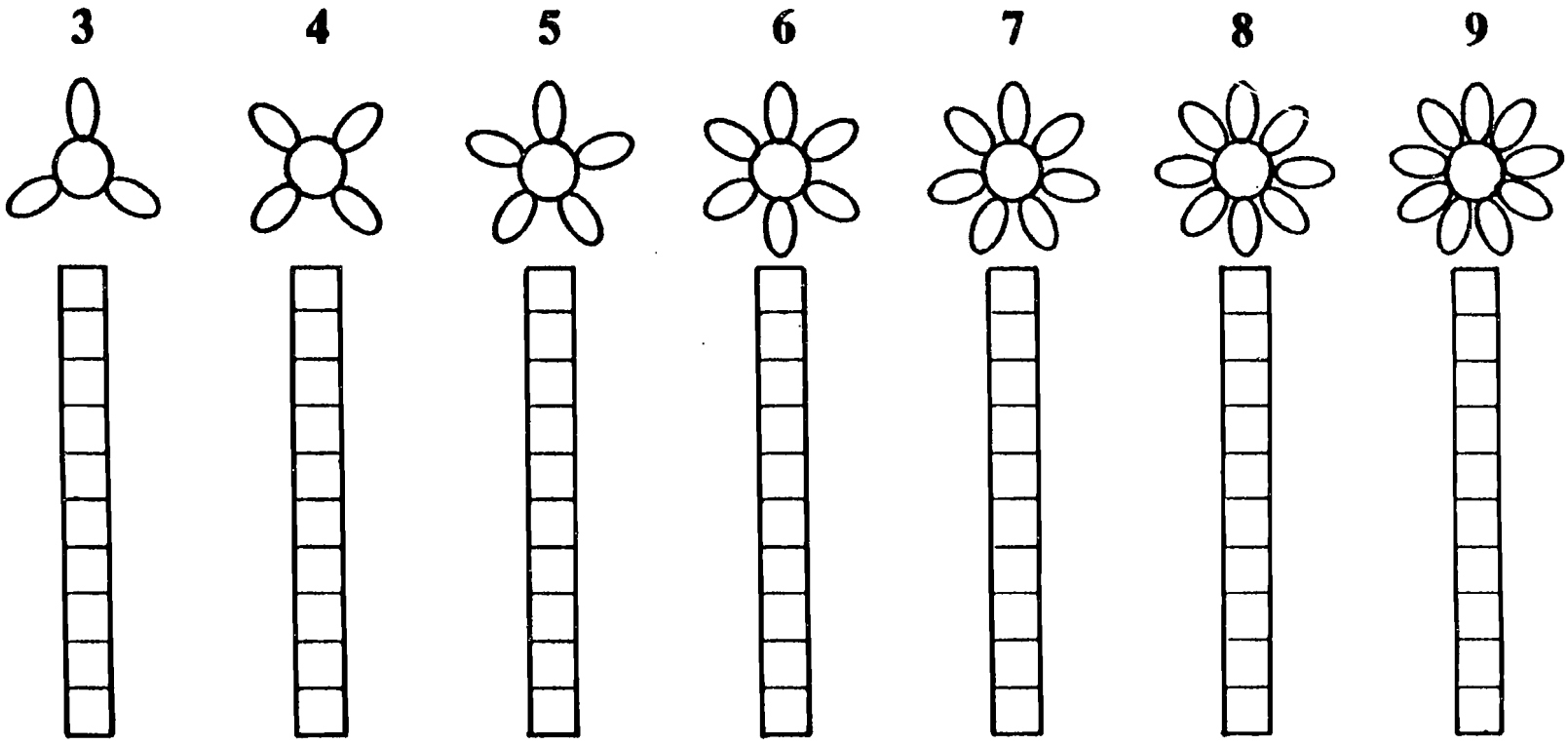
Subject area(s): Math, science, art

Grade levels: Preschool–Elem. 4

Group size: Small group or class

Procedures:
The group goes on a wildflower hike and can complete one or both activities. Directions are listed on the activity pages. How Many Petals: "Fill in one block for each flower with 3, 4, 5, 6, 7, 8, or 9 petals." How Many Colors: "Fill in one block for each flower you see of each color." After the hike, these activities can lead to a discussion about the variety of wildflowers. What was the most common, least common, etc.

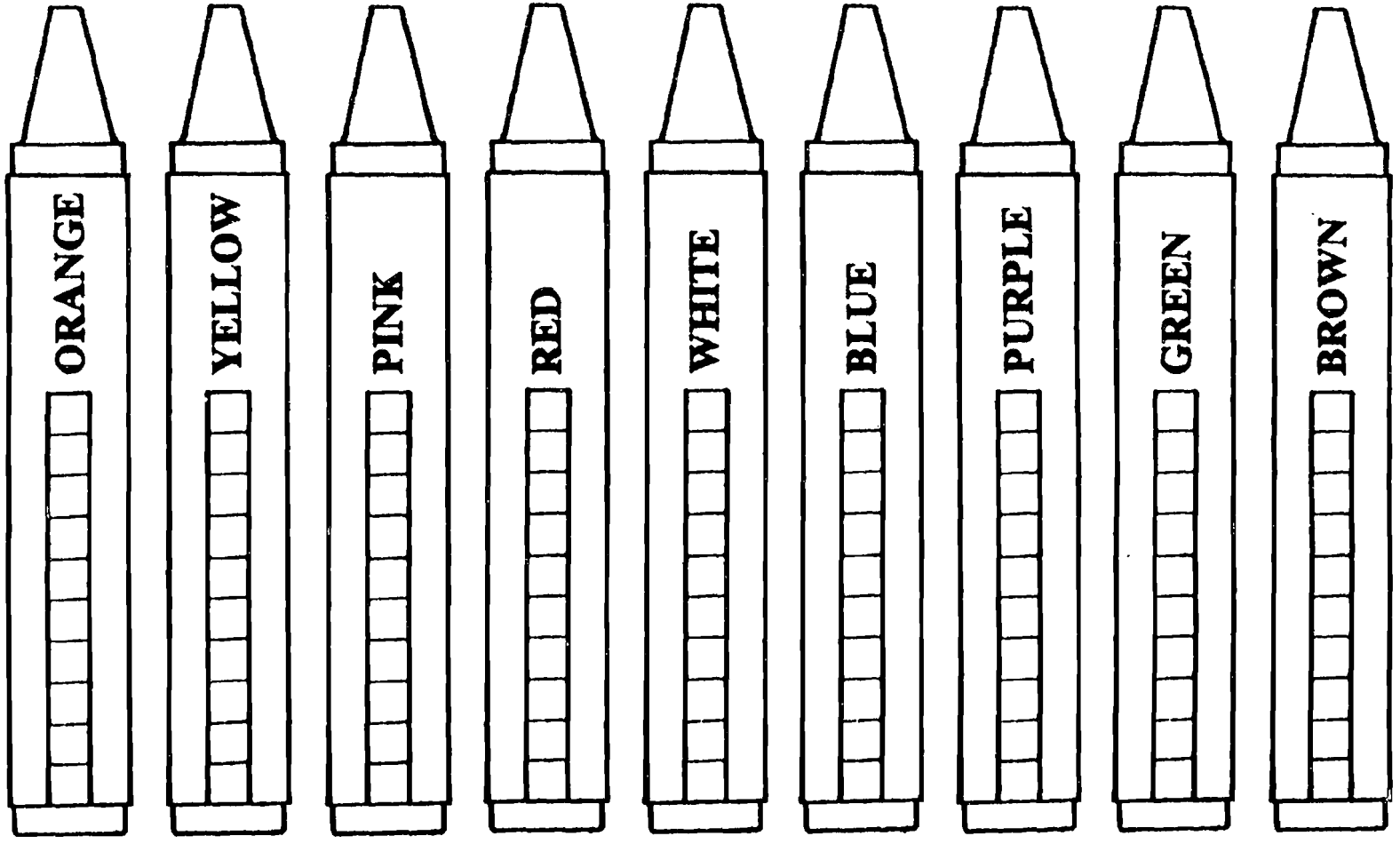
Submitter: Worthington Schools (Christy Ahnmark, Dean Freund, and Marty McTigue)
Hi. My name is Dean Freund (pronounced—friend). My career in outdoor education began many, many years ago. I know that, because some of my close associates are now telling me that I'm older than dirt. I have spent over three decades working with kids and adults in the outdoors. It is still the best learning site and laboratory available. These pages were developed to help other teachers in our district see some of the possibilities of relating mathematics and the outdoors. I did this because I hate math! I hope you enjoy these activities. If you have ideas for extensions—and I know you will have—please tell me at a conference, or contact me at Worthington Schools Outdoor Education Department.



Do all wildflowers have the same number of petals? Use this page to see how many different numbers of petals you can find. Which number of petals did you find most often? Fill in one block every time you see a flower with 3, 4, 5, 6, 7, 8, or 9 petals. When you have finished your hike, you will have a graph which shows the number of petal arrangements you have discovered.

How many petals?

Flowers are very colorful. The colors may be a "signal" to some animals to "visit" the flower. How many different colors did you discover on your wildflower hike? Which color did you find the least? Which color did you find the most?



How many colors?

Stream-Quality Monitoring

Objective: To develop a greater sensitivity to streams and the habitat they provide, as well as the environmental health indicators.

Materials needed:
- Seine
- Containers
- Measuring tape
- Thermometer
- Pencils
- Identification keys

Setting: Stream

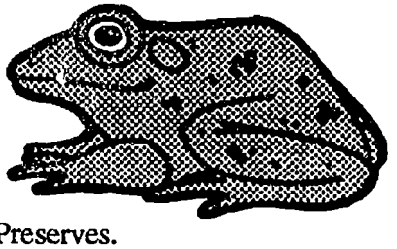
Subject area(s): Biology, water quality

Grade levels: Elem. 3–Senior High

Group size: Small group

Procedures:
-Locate riffle—small rapids (boulders, rocks).
-Choose 3' x 3' area in the riffle.
-Approach sampling area from downstream.
-Place seine at downstream edge of 3' x 3' area.
-Rinse 2" or greater stones and objects in front of seine.
-Step into 3' x 3' area and kick stream bed.
-Remove (scoop) seine.
-Identify and estimate number of nonvertebrate types.
-Determine stream-quality assessment, using cumulative index values provided by assessment form, available from ODNR.

Submitter: Mark Duncan, District Technician, Holmes SWCD
I graduated from Towson State University with a teaching degree in Biology/ General Science. I taught for three years—high school and technical college. I farmed afterward, and am presently employed with Holmes Soil & Water Conservation as a Nutrient Management Specialist. The Holmes SWCD is an affiliate member of EECO.



Resource: ODNR Division of Natural Areas and Preserves.

Habitat

Objective: To compare and contrast habitats and the types and number of plants and animals found there.

Materials needed:

For the class:

- Light meter
- Wind speed indicator
- Large paper for recording the group's results
- Marker

For each small group:

- Clipboard
- Pencil
- Worksheets
- Trowel
- Thermometer
- "Circle" (a hula hoop, a loop of string or wire, etc.)
- Cookie sheet or other large, flat work surface

Setting: Outdoors, in field and forest (or two other—very different—habitats). Choose settings without poison ivy nearby!

Subject area(s): Science

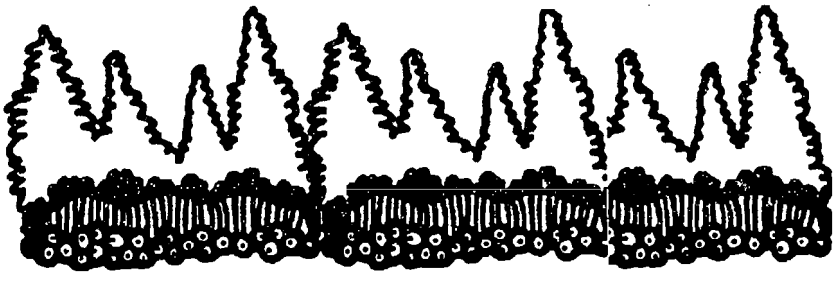
Grade levels: Elem. 4–Senior High

Group size: Class

Procedures:

This is a good culminating activity for habitat study because it makes all the pieces "fall into place." If you are using it as an introduction, be sure to discuss and define the idea of habitat.

Divide the class into teams of 3–4 students. Have each team choose a recorder to write results on the sheet. Pass out materials and explain how to use equipment.



The recorder writes "field" and "forest" in the headings of the worksheets; all the team members sign in. Each team should record at least two predictions about the number or variety of plants or animals they will find in that habitat.
Take the group to the first area to be studied. (I like to do the field first—it seems to "flow" better.) Measure the wind speed and the light as a large group. Have the students take the readings and fill out their first worksheet. The sheet is fairly self-evident, but they may need some guidance using the cookie sheet to look through the dirt they dig up. When everyone is done, emphasize replacing everything so no one can tell you've been there. Repeat the procedure with the other area to be studied.
When all the results are collected from both areas, tabulate them on a large chart. Record each group's results, then average them to get average air temperature, soil temperature, etc. Draw some conclusions: Were their predictions accurate? Which habitat was hotter, drier, etc.? Which had more plants? Animals? Which had a greater diversity of plants? Animals? Did you find any of the same plants in both habitats? Why not? Animals? In ecology, diversity = stability, so which is the more stable community?

Submitter: Joann Ballbach
I've loved the outdoors and loved helping others love the outdoors since I was a child. Born and raised in the city, I feel it's my own special, secret mission to bring "newcomers" from fear of the unknown to joy in nature. Being incredibly "left brained," one of my ways of loving nature is to start understanding how it works. I especially like activities like this one, that help others begin to draw their own hypotheses about the natural world.

Resource: I learned this one from Chuck Barnes of the Lloyd A. Stage Outdoor Education Center in Troy, Michigan, in my first nature center job.

_____Study Sheet
The Wilderness Center

Date:_____Weather:_____
Team members sign in:

Prediction:

Physical:
Wind speed_____

Light meter reading_____

Air temperature_____ (approx. 3' above the surface)

Soil temperature_____ (approx. 5" below the surface)

Soil moisture_____ (approx 5" below the surface)
Dig up a handful of loose soil. Squeeze it in your fist. Does:

water drip out?	wet
soil clump together?	moist
soil not cling, but feel damp?	damp
soil not cling and feel dry?	dry
soil seep out of your hand, like sand?	arid

Plant Index: Toss the circle. Count only the plants touching it.
_____Number of plants
_____Number of different kinds of plants

Critter Index (above ground): Toss the circle. Count the animals inside it.
_____Number of animals
_____Number of different kinds of animals

Critter Index (below ground): Take 2 shovelfuls of dirt. Count the animals in them.
_____Number of animals
_____Number of different kinds of animals

On the back, draw one of the plants or animals you found.

Note any other interesting things on the back of this sheet (smells, general impressions, colors, etc.).

Invented Circumstances

Objective: Develop observation skills, think about a common object from a different point of view, and develop writing skills.

Materials needed:

An outdoor area of interest with trees, birds, tracks, rocks, plants, etc.
Paper
Pencils
Clipboards or homemade writing boards

Setting: Outdoors

Subject area(s): Creative writing

Grade levels: Elem. 3–Senior High

Group size: Any

Procedures:

- This lesson works best if the writing can be done immediately after the observation time. In warm weather, it can be done outdoors at the location of the object. In cold weather, the learners can come inside to write.
- Each learner picks an object of interest. You can have all of the group focus on one type of object—trees, birds, animal tracks, etc.—or they can select different items.
- The learners get to know their items... How it looks, feels, sounds, smells, etc.
- Give the learners the invented circumstances (samples below) and they should use their imagination to write about the circumstance. With learners who have had limited writing experience, you may want to give them the circumstance verbally and elaborate on it to get them started.

Sample Invented Circumstances:

If you observed a tree, pretend you are the tree. How old are you? Tell about important events and the changes that time has brought about.

If you observed an animal, pretend you are the animal. Tell about your home, how you find food, and how you protect yourself.

If you observed an object, pretend you are the object. Tell what it is like being the object. Can you move? Is your "life" pleasant? Do you have any complaints?

Submitter: Vickie Breckenridge

I am employed by Great Trail Girl Scout Council and have been using the outdoors to teach others since I was a student myself. I have been a classroom teacher, outdoor teacher, and camp director. My favorite teaching activities get learners involved in the learning process. All my activities include a bit of "creativity" and challenge the learners to explore their creative side.

Night Hike Favorites

Objective: The goals of a night hike are to encourage participants to use their senses more fully, to help them overcome fear of the dark, and to allow them to experience the fascinating natural world after dark.

Materials needed: (listed with activity descriptions)

Setting: Outdoors, at dusk to dark

Subject area(s): Sensory awareness

Grade levels: Elem. 3–adult

Group size: 8–15 ideal (not more than 20)

Procedures:
Night hikes can be a very enjoyable—or at least favorable—experience for all participants if the leader is totally prepared before the activity begins. Some simple guidelines will help you lead a safe and effective night hike:
- Plan small groups, whenever possible, with one adult at the beginning and one adult at the end. Groups of 8–15 work well, but be cautious of more than 20.
- Begin by greeting the group with "Good morning!" Why? It has been said that 80% of all life wakes up at dusk.
- Select a suitable site ahead of time and walk the path in the daylight, and at night, if possible, before leading a group. Criteria for a good site include: proximity to a central facility, fairly even terrain, trail clear of major obstacles, and a short distance to travel.
- Make your night hikes activity-oriented, especially at the beginning. This helps to displace fear. Talk quietly, and gently transition to total quiet—encouraging participants to become living sponges soaking up the surroundings.
- Leaders may take a flashlight, but use it sparingly or not at all. Discourage participants from using flashlights.
- Process feelings—especially fear—as they arise and always have a sharing circle/session at the end of the experience.

Bat/Moth: Participants stand in a circle, creating the boundaries for a mini habitat. A volunteer becomes the bat by being blindfolded. Three volunteers become moths. The bat and moths enter the circle. Explain how bats use sound echo to feed and get around. To simulate this, the bat says "bat" and the moths must automatically say "moth" as often as the bat desires. The bat attempts to eat the moths by finding and tagging them, but all critters must stay within the circle.

Prickle/Tickle: Participants sit in a circle with eyes closed (or blindfolded, if it is not very dark). Give everyone a natural object to touch, feel, smell, etc. Ask participants to explore the item without saying what it is. Pass the objects, at the leader's cue, until everyone has had every item. Encourage sharing comments about the items after the passing has stopped. Note: Explore, using all stones,

leaves, sticks, or objects that vary a great deal. This will awaken their senses.
The Mating Game: Find a large open area and ask everyone to close his/her eyes or wear a blindfold. Give each person a small, simple noisemaker (be creative). There must be two of every noisemaker. Each participant uses his/her noisemaker and listens to locate his/her mate (matched noise). All participants— at the same time—"make noise" while walking to find their mates. They keep walking around until they find their mates, then stand quietly together until everyone has found a mate. Note: Give one or two participants a predator sound. Challenge participants to find their mates before the predator eats (finds) them.
What's That Sound?: The group stands quietly for 1–2 minutes, soaking in every sound. For every sound heard, a finger can be raised. After listening, share what sounds were heard. Note: Try closing eyes to "hear better."
Night Vision Exam: Place 3–4 participants in the woods just off the trail ahead of the group. Ask the group to walk slowly up the path, looking straight ahead, using their peripheral vision to spot the "hidden" people.
Sit and Sponge: Invite participants to spread out, or drop them off along the path at a modest distance from each other. Instruct them to sit and "sponge"—soaking in the presence of the woods or meadow at night. Encourage silence for a period of time, then slowly round up all the participants and process the experience.
Treetop Designs: Stop and look up through the trees and find designs and shapes in the shadows. Encourage exploring and sharing. Note: This also works well lying down on a bank and watching the clouds on a moonlit night.
Wintergreen Lifesavers: For something on the lighter side, have the group form a circle and give each person a wintergreen Lifesaver. Take time crunching on the Lifesavers with lips open so others can watch. For some reason (it has to do with piezoelectricity), when wintergreen Lifesavers are crunched, spark-like discharges are emitted. This activity works best with fresh wintergreen Lifesavers and in total darkness. It is a great change-of-pace activity, often used to lighten things up after some heavy sponging.
Sharing Candle: End the night hike by finding a quiet place close to the final destination and sit, or stand, in a circle. Light a candle and take turns holding it while sharing thoughts and feelings about the hike or about the broader camp experience. Encourage the sharing of feelings and special insights and/or comments of support for one another.

Submitter: Brian Burkholder
I have loved being outdoors ever since I can remember. I grew up living in a wooded area in the countryside, and I spent many days exploring the woods, stream, pond, and fields. I always treasured the small—yet majestic—treasures offered through nature. I still *need* timely walks through the woods or along a stream to maintain balance and inspiration.
I have been an active outdoor educator for about 15 years, serving as a college student, elementary nature educator, school counselor, nature center summer teacher, and workshop/retreat leader. I especially enjoy facilitating sensory awareness activities in both daylight and nighttime.

Logs Aren't Limited

Objective: To fill in at end of lessons for actual exploration.

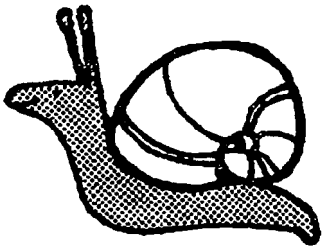
Materials needed: None

Setting: Mature forest

Subject area(s): Science, math

Grade levels: Elem. 5–6

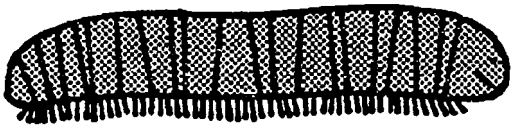
Group size: Any



Procedures:
-Divide into even teams.
-Within area, each team has a dead log.
-Within a 3-minute period, each student must find something live, or evidence of life in the log.
-Go from log to log—discuss.
-On return, may list and discuss ecosystem relationships.

Submitter: Kathy Adams
One of my first experiences in teaching at an outdoor school was in over six inches of snow—talk about a change in plans! I have taught classes at an independent outdoor school and at an organized, regular outdoor school. What great natural resources—Ohio woods, ponds, streams, and life!

Resource: Ohio outdoor area.



Hands Are Measures

Objective: To fill in at end of lessons for team work.

Materials needed: None

Setting: Forest or parkland with trees

Subject area(s): Science, math

Grade levels: Elem. 5–6

Group size: Any

Procedures:
-Form into even teams.
-Assign each team a tree.
-Each team has to "discover" a way to "measure" their tree, using hands and natural objects (no climbing, no rulers).
-Compare trees and measures.

Submitter: Kathy Adams
One of my first experiences in teaching at an outdoor school was in over six inches of snow—talk about a change in plans! I have taught classes at an independent outdoor school and at an organized, regular outdoor school. What great natural resources—Ohio woods, ponds, streams, and life!

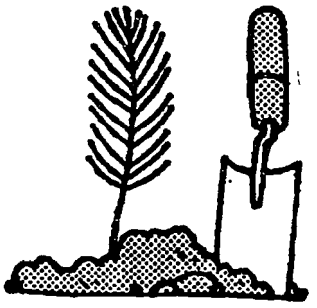
Resource: Ohio outdoor area.

Soil Observation

Objective: Observe and describe different soil types in relation to their origin.

Materials needed:

Per student:	Soil data sheet
Per group:	3 Ziplock sandwich bags
	3 labels for bags
	Trowel
	Pen or pencil
	3 pans
	Tweezers
	Spoons
	Magnifier
For the class:	pH meter
	Moisture meter
	Thermometer



Setting: Field, forest, stream

Subject area(s): Science

Grade levels: Middle/Junior High, adaptable to Elem. 5–6

Group size: Small group

Procedures:

-Before the outdoor session, discuss soil types, how soil is made, what constitutes soil, and what a soil profile is.
-Label the bags.
-Discuss the three areas, predict what you will find.
-As a large group, go to each collecting site—field, stream, woods. Predict the moisture, temperature, and pH of that soil. Read the meters and record results on data sheets.
-Each group collects a soil sample from each area. Keep the bags closed to retain any moisture.
-Each group takes one of their soil samples out of the bag and dumps it into a pan. Describe the color, texture, number of things found in the soil (such as roots, insects, etc.), and complete the soil observation chart.
-Use drawings to show what you have observed about soil makeup and types.

Submitter: Pam Blaha
I've been involved in outdoor education for at least 18 of my 23 years of teaching. I head up our land lab committee and coordinate work and activities at the Highland Land Lab. I've been involved with EECO since the early '80s. The outdoors is as much my home as is the inside of our house.

Resource: Activities for the Land Lab 6-8, Ohio Department of Education.

Soil Observations

Names:

Sample Taken Where	Sample Temperature 1"	3"	Wetness	Color	Texture	Dead Things	Living Things

Ohio Envirothon

Objective: The Envirothon is a competitive outdoor team event for high school students, designed to stimulate, reinforce, and enhance their interest in the environment and in Earth's natural resources.

Materials needed: As many study materials as you can get your hands on!

Setting: Event is outdoors

Subject area(s): Wildlife, forestry, soils, aquatic ecology, current environmental issues

Grade levels: Senior High

Group size: Small group

Procedures:
Two teams of 3-5 high school students per high school compete against other high schools on their knowledge of wildlife, forestry, soils, aquatic ecology, and current environmental issues. The teams rotate to the different testing stations and are instructed by professional resource personnel in the conservation field. The state has five Area Envirothon Competitions. Each area competition sends the top four winning teams to the State Envirothon Competition. The top State winning team then advances to the National Envirothon Competition. For more information and a handbook, contact your SWCD.

Submitter: Darla DiFabio, District Technician, Holmes Soil and Water Conservation District
I graduated from Ohio State University with a degree in Natural Resources, worked one year with the Ohio Division of Wildlife, and have been with Holmes SWCD for two years. I've also been an EECO member for two years. I enjoy teaching conservation to students, and the Envirothon is an excellent way for students to experience the hands-on activities that are so vital to their educational learning process.

Resource: Ohio Envirothon Handbook, by ODNR and OFSWCD.

Sources and Resources

Environmental Organizations

Includes Ohio and national organizations concerned with environmental education, as well as environmental organizations which use education as a main tool. This is an incomplete list; use it as a guide to more information.

Environmental Education Council of Ohio: 397 W. Myrtle, Newark, OH 43055

Ohio Environmental Council: 400 Dublin Ave., Suite 120, Columbus, OH 43215

The Ohio Alliance for the Environment: 445 King Ave., Columbus, OH 43201

Ohio Wildlife Center: 2661 Billingsley Road, Worthington, OH 43235

Ohio Wildlife Federation: 3953 Indianola Ave., Columbus, OH 43214

Alliance for Environmental Education: 51 Main St., P.O. Box 368, The Plains, VA 22171

Coalition for Education in the Outdoors: P.O. Box 2000, Park Center, Cortland, NY 13045

Institute for Earth Education: Cedar Cove, Greenville, WV 24945

North American Association for Environmental Education: P.O. Box 400, Troy, OH 45373

National Audubon Society: 950 Third Ave., New York, NY 10022

National Wildlife Federation: 1412 - 16th St., N.W., Washington, DC 20036

American Forestry Association: 1516 P St., N.W., Washington, DC 20005

Rainforest Alliance: 65 Bleecker St., New York, NY 10012

Clean Water Action Project: 733 - 15th St., N.W., Suite 1110, Washington, DC 20005

Keep America Beautiful, Inc.: 9 West Broad St., Stanford, CT 06902

National Arbor Day Foundation: 100 Arbor Ave., Nebraska City, NE 68410

The International Society for Endangered Cats: 4638 Winterset Dr., Columbus, OH 43220

Government Agencies

Ohio Department of Natural Resources: Fountain Square, Columbus, OH 43224

Division of Wildlife
Division of Litter Prevention and Recycling
Division of Forestry

Ohio Department of Education: Ohio Departments Building, 65 S. Front St., Columbus, OH 43266

Ohio Environmental Protection Agency: 1800 WaterMark Dr., Columbus, OH 43266

U.S Department of Interior: Fish and Wildlife Service, Washington, DC 20240

U.S. Department of Agriculture: Forest Service, P.O. Box 1963, Washington, DC 20013

U.S. Environmental Protection Agency: 401 M St., S.W., Washington, DC 20460

Ohio Resident Outdoor Education Centers

Resident outdoor education is a means to extend and enrich classroom learning. By bringing students to an overnight facility, they can have hands-on experiences not possible at school and, by living in a dormitory with teachers or supervisors, learn to better understand themselves and their peers, while developing greater independence.

Camp America: P.O. Box 47, Oxford, OH 45056, (513) 798-2794, (800) 818-2267

Na[illegible]re's Classroom: FFA Camp Muskingum, 3266 Dyewood Rd., S.W., Carrollton, OH 44615, (216) 627-2208

Girl Scout Camp Libbey: 28325 S.R. 281, Defiance, OH 43512, (419) 784-5888, (800) 356-1447, Fax (419) 782-9408

Glen Helen Outdoor Education Center: 1075 S.R. 343, Yellow Springs, OH 45387, (513) 767-7648

JOY Outdoor Education Center: Box 157, Clarksville, OH 45113, (513) 381-8689 (CINTI)

Kirkmount Center: 6846 C.R. 10, Zanesfield, OH 43360, (513) 593-2141

Lutheran Memorial Camp: Box 8, Fulton, OH 45805, (419) 864-8030

Mohican School in the Out-of-Doors, Inc.:
Camp McPherson, Danville, OH
Camp Otyokwah, Butler, OH
Environmental Learning Center, Butler, OH
Office: 21882 Shadley Valley Rd., Danville, OH 43014, (614) 599-9753

Nature's Classroom: (800) 282-0740
Templed Hills, P.O. Box 578, 5734 Durbin Rd., Bellville, OH 44813, (419) 886-2380
Pilgrim Hills, 33833 T.R. 20, Brinkhaven, OH 43006, (614) 599-6314

Recreation Unlimited: 7700 Piper Rd., Ashley, OH 43003, (614) 548-7006

Woodhaven Program Center: 1870 W. Robb Ave., Lima, OH 45805, (419) 225-1372, Fax (419) 229-7570

Woodland Altars: 33200 S.R. 41, Peebles, OH 45660, (513) 588-2105

YMCA Camp Campbell Guard: 4803 Augspurger Rd., Hamilton, OH 45011, (513) 867-0600

YMCA Camp Fitch: Ables Rd., North Springfield, PA 16430, (814) 922-3219

YMCA Kern Outdoor Center: 5291 S.R. 350, Oregonia, OH 45054, (513) 932-3756

YMCA Storer Camps: 7260 S. Stony Lake Rd., Jackson, MI 49201, (419) 243-1171, (517) 536-8607

YMCA Willson Outdoor Center: 2330 C.R. 11, Bellefontaine, OH 43311, (800) 423-0427

Camp Geneva: 1380 Blue Valley Rd. S.E., Lancaster, OH 43130, (614) 746-9476

Hiram House: 33775 Hiram Trail, Moreland Hills, OH 44022, (216) 831-5045, Fax (216) 831-2477

Northeast Ohio 4-H Camps: 7983 Wiswell Rd., Windsor, OH 44099, (216) 272-5275, (800) 967-2267 (CAMP)

Camp Palmer: 26450 C.R. MN, Fayette, OH 43521, (419) 237-2247

Camp Tippecanoe: 81300 YMCA Rd., Tippecanoe, OH 44699, (614) 922-0679, (800) 922-0679 (for area codes 614, 216 or 304)

Cuyahoga Valley Environmental Education Center: 3675 Oak Hill Rd., Peninsula, OH 44264, (800) 642-3297

Organization Members of EECO

Appleseed Ridge Girl Scout Council:1870 W. Robb Avenue, Lima, OH 45805

Camp America: P.O. Box 47, Oxford, OH 45056

The Columbus Zoo: Education Department, 9990 Riverside Drive, Columbus, OH 43065

Cuyahoga Valley Environmental Education Center: 3675 Oak Hill Road, Peninsula, OH 44264

Cuyahoga Valley National Recreation Area: 15610 Vaughn Road, Brecksville, OH 44141

The Dawes Arboretum: 7770 Jacksontown Road SE, Jacksontown, OH 43055

EE Network: 752 High Street, Worthington, OH 43085

4-H Camp Palmer: 26450 C.R. MN, Fayette, OH 43521

Geneva Hills Center: Presbytery of Scioto Valley, 6641 North High Street, Suite 208, Worthington, OH 43085

Glen Helen Outdoor Education Center: 1075 S.R. 343, Yellow Springs, OH 45387

Greenacres Foundation: 8200 Spooky Hollow, Cincinnati, OH 45242

Hardin Soil & Water Conservation District: P.O. Box 436, Kenton, OH 43326
The Hiram House: 33775 Hiram Trail, Chagrin Falls, OH 44022

John T. Huston—Dr. John D. Brumbaugh Nature Center: Mt. Union College, 1972 Clark Avenue, Alliance, OH 44601

Joy Outdoor Education Center: P.O. Box 157, Clarksville, OH 45113

Kern Outdoor Education Center: 5291 S.R. 350, Oregonia, OH 45054

Kirkmount Center: P.O. Box 128, 6946 C.R. 10, Zanesfield, OH 43360

Lake County Soil & Water Conservation District: 125 E. Erie Street, Painesville, OH 44077

The Lake Erie Nature & Science Center: 28728 Wolf Road, Bay Village, OH 44140

Lucas Elementary School: 84 Lucas North Road, Lucas, OH 44843

Lutheran Memorial Camp: Box 8, Fulton, OH 43321

Maumee Valley Girl Scout Council Camp Libbey: 28325 S.R. 281, Defiance, OH 43512

Mohican School in the Out-of-Doors: 21881 Shadley Valley Road, Danville, OH 43014

Nature's Classroom: 5734 Durbin Road, Bellville, OH 44813

Northeast Ohio 4-H Camps: 7983 Wiswell Road, Windsor, OH 44099

Ohio FFA Camp Muskingum Nature's Classroom: 3266 Dyewood Road SW, Carrollton, OH 44615

Park District of Dayton-Montgomery County: 1375 E. Siebenthaler Avenue, Dayton, OH 45414

PICCA: U.S. Route 22 West, P.O. Box 67, Circleville, OH 43113

Recreation Unlimited: 7920 Piper Road, Ashley, OH 43003

TAMPEEL: 3712 Selkirk-Bush, Warren, OH 44481

The Wilderness Center: P.O. Box 202, Wilmot, OH 44689

YMCA Camp Campbell Gard: 4803 Augspurger Road, Hamilton, OH 45011

YMCA Camp Tippecanoe: 81300 YMCA Road, Tippecanoe, OH 44699

YMCA Camp Willson Outdoor Center: 2330 C.R. 11, Bellfontaine, OH 43311

YMCA Storer Camps: 7260 S. Stony Lake Road, Jacks[illegible], MI 49201

Ohio Coalition of Independent Nature Centers

Aullwood Audubon Center and Farm: 1000 Aullwood Rd., Dayton, OH 45414, (513) 890-7360

Bruckner Nature Center: 5995 Horseshoe Bend Rd., Troy, OH 45373, (513) 698-6493

Cincinnati Nature Center: 4949 Tealtown, Milford, OH 45150, (513) 831-1711

Glen Helen Association: 405 Corry St., Yellow Springs, OH 45387, (513) 767-7375

Lake Erie Nature & Science Center: 28728 Wolf Rd., Bay Village, OH 44140, (216) 871-2900

Shaker Lakes Regional Nature Center: 2600 S. Park Blvd., Cleveland, OH 44120, (216) 321-5935

The Wilderness Center, Inc.: 9877 Alabama Ave., N.W., P.O. Box 202, Wilmot, OH, 44689, (216) 359-5235, Fax: Call first.

(Some of) Our Favorite Sources

Activities in this guide from these sources marked with a •.

Acclimatization, Acclimatizing, Sunship Earth, Earthkeepers, and **Earth Education: A New Beginning,** Steve Van Matre, The Institute for Earth Education, P.O. Box 288, Warrenville, IL 60555

• **Activities for the Land Lab 6-8,** Ohio Department of Education, Ohio Departments Building, 65 South Front St., Columbus, OH 43266

Cows' Tails and Cobras, Karl Rohnhe, Project Adventure, P.O. Box 157, Hamilton, MA 01936, (617) 468-1766

• **NatureScope,** Judy Braus, Ed., National Wildlife Federation, 1412 Sixteenth St., N.W., Washington, DC 20036

The New Games Book and **More New Games,** Andrew Floegelman, Ed., Dolphin Books, Doubleday, Inc., Garden City, NY

Outdoor Biology Instructional Strategies (OBIS), Delta Education, Inc., Box M, Nashua, NH 03061

• **Outdoor Education: A "Natural" Resource Guide,** Herb Broda & Sue Cook

Play Fair, Matt Weinstein & Joel Goodman, Impact Publishers, P.O. Box 1094, San Luis Obispo, CA 93406

• **Project Learning Tree,** American Forest Foundation, 1111 Nineteenth St., N.W., Suite 780, Washington, DC 20036

Project WET (Water Education for Teachers), 201 Culbertson Hall, Montana State University, Bozeman, MT 59717

• **Project WILD** and **Aquatic Project Wild,** Western Regional Environmental Education Council, 5430 Grosvenor Lane, Bethesda, MD 20814

• **Science & Children—Early Years,** Dr. Elizabeth Hone

• **Sharing Nature with Children** and **Sharing the Joy of Nature,** Joseph Bharat Cornell, Dawn Publications, 14618 Tyler Foot Rd., Nevada City, CA 95959, (916) 292-3484

Silver Bullets, Karl Rohnhe, Project Adventure, P.O. Box 157, Hamilton, MA 01936, (617) 468-1766

Super Saver Investigators and **Investigating Solid Waste Issues**, Ohio Department of Natural Resources, Division of Recycling and Litter Prevention, 1889 Fountain Square Court F-2, Columbus, OH 43224

- **Talking to Fireflies, Shrinking the Moon: A Parent's Guide To Nature Activities**, Edward Duensing, Penguin Books USA Inc., 375 Hudson St., New York, NY 10014
- **Try the World OUT Creative Skills Cards**

Appendix

List of Activities

Section 1: In the Classroom

Section 2: In the Schoolyard

Section 3: Beyond

Setting

Outdoor Setting

Activity	*Special Outdoor Setting*	*Activity #*
A Look at Leaves	Area with trees	2-5
Alphabet Awareness	A natural area	2-13
An Origami Drink		1-6
Build a Tree		2-7
Descriptive Words		2-8
Developing a Sense of Wonder in Children		1-3
Erosion	Grassy slope with a path	2-6
Habitat	Field and forest (or two very different habitats)	3-3
Hands Are Measures	Forest, or area with trees	3-7
Insect Hunt		2-1
Letter Writing		1-9
Logs Aren't Limited	Mature forest	3-6
Math by Degrees		1-7
Micro Hike		2-14
Natural Art/Colors From Nature		2-4
Nature's Grab Bag		1-4
Night Hike Favorites	Natural area at dusk to dark	3-5
Oh, Deer!	Large area good for running	2-12
Ohio Envirothon	One of the state's Area Envirothon Competitions	3-9
Pressed Flower Bookmark	Area with small flowers, weeds, leaves	2-9
Seton Watching		2-10
Shape Hunt		2-3
Shutterbug		1-1
Soil Observation	Field, forest, stream	3-8
Stream-Quality Monitoring	A stream	3-2
Things Out of Nature		2-2
Unseen Trees	Area with trees	2-11
Wildflower Hike—How Many Petals? How Many Colors?	Area with wildflowers	3-1

Indoor Setting

Activity	*Activity #*
An Origami Drink	1-6
Developing a Sense of Wonder in Children	1-3
Fish, Fowl, or Foul Fish	1-10
How Wet Is Our Planet?	1-11
Letter Writing	1-9
Lima Beans and Eggs	1-5
Math by Degrees	1-7
Natural Art/ Colors From Nature	2-4
Nature's Grab Bag	1-4
Oh, Deer!	2-12
Owl Pellets	1-8
Shutterbug	1-1
Whirling and Twirling	1-2

Group Size

Small

Activity	*Activity #*
Alphabet Awareness	2-13
Descriptive Words	2-8
Developing a Sense of Wonder in Children	1-3
Erosion	2-6
Hands Are Measures	3-7
How Wet Is Our Planet?	1-11
Insect Hunt	2-1
Invented Circumstances	3-4
Letter Writing	1-9
Lima Beans and Eggs	1-5
Logs Aren't Limited	3-6
Math by Degrees	1-7
Micro Hike	2-14
Natural Art/Colors From Nature	2-4
Nature's Grab Bag	1-4
Night Hike Favorites	3-5
Oh, Deer!	2-12
Ohio Envirothon	3-9
Owl Pellets	1-8
Pressed Flower Bookmark	2-9
Seton Watching	2-10
Shape Hunt	2-3
Shutterbug	1-1
Soil Observation	3-8
Stream-Quality Monitoring	3-2
Things Out of Nature	2-2
Unseen Trees	2-11
Wildflower Hike—How Many Petals? How Many Colors?	3-1

One Class

Activity	*Activity #*
A Look at Leaves	2-5
Alphabet Awareness	2-13
An Origami Drink	1-6
Build a Tree	2-7
Descriptive Words	2-8
Developing a Sense of Wonder in Children	1-3

One Class (continued)

Activity	*Activity #*
Erosion	2-6
Fish, Fowl, or Foul Fish	1-10
Habitat	3-3
Hands Are Measures	3-7
How Wet Is Our Planet?	1-11
Insect Hunt	2-1
Invented Circumstances	3-4
Letter Writing	1-9
Logs Aren't Limited	3-6
Math by Degrees	1-7
Natural Art/Colors From Nature	2-4
Oh, Deer!	2-12
Owl Pellets	1-8
Pressed Flower Bookmark	2-9
Seton Watching	2-10
Shutterbug	1-1
Things Out of Nature	2-2
Whirling and Twirling	1-2

Two–Three Classes

Activity	*Activity #*
Alphabet Awareness	2-13
Descriptive Words	2-8
Erosion	2-6
Hands Are Measures	3-7
Invented Circumstances	3-4
Letter Writing	1-9
Logs Aren't Limited	3-6
Oh, Deer!	2-12
Pressed Flower Bookmark	2-9

Age Levels

Appropriate for Preschool–Kindergarten

Activity	*Activity #*
Developing a Sense of Wonder in Children	1-3
Insect Hunt	2-1
Natural Art/Colors From Nature	2-4
Nature's Grab Bag	1-4
Shape Hunt	2-3
Shutterbug	1-1
Things Out of Nature	2-2
Whirling and Twirling	1-2
Wildflower Hike—How Many Petals? How Many Colors?	3-1

Appropriate for Grades 1–2

Activity	*Activity #*
Developing a Sense of Wonder in Children	1-3
Insect Hunt	2-1
Lima Beans and Eggs	1-5
Math by Degrees	1-7
Natural Art/Colors From Nature	2-4
Nature's Grab Bag	1-4
Shape Hunt	2-3
Shutterbug	1-1
Things Out of Nature	2-2
Whirling and Twirling	1-2

Appropriate for Grades 3–5

Activity	*Activity #*
A Look at Leaves	2-5
Alphabet Awareness	2-13
An Origami Drink	1-6
Build a Tree	2-7
Descriptive Words	2-8
Developing a Sense of Wonder in Children	1-3
Erosion	2-6
Fish, Fowl, or Foul Fish	1-10
Habitat	3-3
Hands Are Measures	3-7
How Wet Is Our Planet?	1-11
Insect Hunt	2-1

Appropriate for Grades 3–5 (continued)

Activity	*Activity #*
Invented Circumstances	3-4
Letter Writing	1-9
Lima Beans and Eggs	1-5
Logs Aren't Limited	3-6
Math by Degrees	1-7
Micro Hike	2-14
Natural Art/Colors From Nature	2-4
Nature's Grab Bag	1-4
Night Hike Favorites	3-5
Oh, Deer!	2-12
Owl Pellets	1-8
Pressed Flower Bookmark	2-9
Seton Watching	2-10
Shape Hunt	2-3
Shutterbug	1-1
Stream-Quality Monitoring	3-2
Things Out of Nature	2-2
Unseen Trees	2-11

Appropriate for Grades 6–8

Activity	*Activity #*
A Look at Leaves	2-5
Alphabet Awareness	2-13
An Origami Drink	1-6
Build a Tree	2-7
Descriptive Words	2-8
Developing a Sense of Wonder in Children	1-3
Erosion	2-6
Fish, Fowl, or Foul Fish	1-10
Habitat	3-3
Hands Are Measures	3-7
How Wet Is Our Planet?	1-11
Insect Hunt	2-1
Invented Circumstances	3-4
Letter Writing	1-9
Logs Aren't Limited	3-6
Micro Hike	2-14
Natural Art/Colors From Nature	2-4
Nature's Grab Bag	1-4
Night Hike Favorites	3-5

Appropriate for Grades 6–8 (continued)

Activity	*Activity #*
Oh, Deer!	2-12
Owl Pellets	1-8
Pressed Flower Bookmark	2-9
Seton Watching	2-10
Shutterbug	1-1
Soil Observation	3-8
Stream-Quality Monitoring	3-2
Things Out of Nature	2-2
Unseen Trees	2-11

Appropriate for Grades 9–12

Activity	*Activity #*
Build a Tree	2-7
Descriptive Words	2-8
Erosion	2-6
Fish, Fowl, or Foul Fish	1-10
Habitat	3-3
How Wet Is Our Planet?	1-11
Insect Hunt	2-1
Invented Circumstances	3-4
Letter Writing	1-9
Natural Art/Colors From Nature	2-4
Night Hike Favorites	3-5
Ohio Envirothon	3-9
Pressed Flower Bookmark	2-9
Shutterbug	1-1
Stream-Quality Monitoring	3-2
Things Out of Nature	2-2
Unseen Trees	2-11

Subjects

Art

Activity	*Activity #*
An Origami Drink	1-6
Natural Art/Colors From Nature	2-4
Pressed Flower Bookmark	2-9
Seton Watching	2-10
Shutterbug	1-1
Unseen Trees	2-11
Wildflower Hike—How Many Petals? How Many Colors?	3-1

Economics

Activity	*Activity #*
An Origami Drink	1-6

Language Arts

Activity	*Activity #*
A Look at Leaves	2-5
An Origami Drink	1-6
Descriptive Words	2-8
Developing a Sense of Wonder in Children	1-3
Invented Circumstances	3-4
Letter Writing	1-9
Micro Hike	2-14
Seton Watching	2-10
Shutterbug	1-1

Mathematics

Activity	*Activity #*
Alphabet Awareness	2-13
An Origami Drink	1-6
Developing a Sense of Wonder in Children	1-3
Fish, Fowl, or Foul Fish	1-10
Hands Are Measures	3-7
How Wet Is Our Planet?	1-11
Logs Aren't Limited	3-6
Math by Degrees	1-7
Oh, Deer!	2-12
Shape Hunt	2-3
Wildflower Hike—How Many Petals? How Many Colors?	3-1

Music

Activity	*Activity #*
Whirling and Twirling	1-2

Physical/Recreation

Activity	*Activity #*
Oh, Deer!	2-12

Science

Activity	*Activity #*
A Look at Leaves	2-5
Alphabet Awareness	2-13
Build a Tree	2-7
Developing a Sense of Wonder in Children	1-3
Erosion	2-6
Fish, Fowl, or Foul Fish	1-10
Habitat	3-3
Hands Are Measures	3-7
How Wet Is Our Planet?	1-11
Insect Hunt	2-1
Lima Beans and Eggs	1-5
Logs Aren't Limited	3-6
Math by Degrees	1-7
Micro Hike	2-14
Natural Art/Colors From Nature	2-4
Oh, Deer!	2-12
Ohio Envirothon	3-9
Owl Pellets	1-8
Seton Watching	2-10
Shape Hunt	2-3
Shutterbug	1-1
Soil Observation	3-8
Stream-Quality Monitoring	3-2
Things Out of Nature	2-2
Whirling and Twirling	1-2
Wildflower Hike—How Many Petals? How Many Colors?	3-1

Social Studies

Activity	*Activity #*
Developing a Sense of Wonder in Children	1-3
Letter Writing	1-9
Oh, Deer!	2-12

Topics

Animals

Activity	*Activity #*
Fish, Fowl, or Foul Fish	1-10
Habitat	3-3
Insect Hunt	2-1
Lima Beans and Eggs	1-5
Oh, Deer!	2-12
Owl Pellets	1-8

Colors

Activity	*Activity #*
A Look at Leaves	2-5
Natural Art/Colors From Nature	2-4
Wildflower Hike—How Many Petals? How Many Colors?	3-1

Diversity

Activity	*Activity #*
Insect Hunt	2-1
Pressed Flower Bookmark	2-9
Habitat	3-3

Eggs

Activity	*Activity #*
Lima Beans and Eggs	1-5

Erosion

Activity	*Activity #*
Erosion	2-6

Environmental Awareness

Activity	*Activity #*
Developing a Sense of Wonder in Children	1-3
Ohio Envirothon	3-9
Seton Watching	2-10
Pressed Flower Bookmark	2-9
Things Out of Nature	2-2
Night Hike Favorites	3-5

Environmental Health

Activity	*Activity #*
Stream-Quality Monitoring	3-2

Food Chains

Activity	*Activity #*
Owl Pellets	1-8

Habitat

Activity	*Activity #*
Habitat	3-3
Oh, Deer!	2-12
Stream-Quality Monitoring	3-2

Insects

Activity	*Activity #*
Insect Hunt	2-1

Natural Resources

Activity	*Activity #*
Natural Art/Colors From Nature	2-4
Ohio Envirothon	3-9

Planets; Rotation and Revolution

Activity	*Activity #*
Whirling and Twirling	1-2

Plants

Activity	*Activity #*
A Look at Leaves	2-5
Build a Tree	2-7
Lima Beans and Eggs	1-5
Logs Aren't Limited	3-6
Natural Art/Colors From Nature	2-4
Pressed Flower Bookmark	2-9
Things Out of Nature	2-2
Unseen Trees	2-11
Wildflower Hike—How Many Petals? How Many Colors?	3-1

Pollution

Activity	*Activity #*
Stream-Quality Monitoring	3-2

Population

Activity	*Activity #*
Oh, Deer!	2-12

Seasons

Activity	*Activity #*
Developing a Sense of Wonder in Children	1-3

Seeds

Activity	*Activity #*
Lima Beans and Eggs	1-5

Shapes

Activity	*Activity #*
A Look at Leaves	2-5
Shape Hunt	2-3

Soil

Activity	*Activity #*
Erosion	2-6
Soil Observation	3-8

Trees

Activity	*Activity #*
A Look at Leaves	2-5
Build a Tree	2-7
Unseen Trees	2-11

Water

Activity	*Activity #*
How Wet Is Our Planet?	1-11
Stream-Quality Monitoring	3-2

Processes and Skills

Averaging

Activity	*Activity #*
Habitat	3-3
Math by Degrees	1-7

Calculating Percentages

Activity	*Activity #*
Fish, Fowl, or Foul Fish	1-10

Collecting and Recording Data

Activity	*Activity #*
Fish, Fowl, or Foul Fish	1-10
Habitat	3-3
Math by Degrees	1-7

Comparing and Contrasting

Activity	*Activity #*
Habitat	3-3

Counting

Activity	*Activity #*
Wildflower Hike—How Many Petals? How Many Colors?	3-1

Creating an Object

Activity	*Activity #*
An Origami Drink	1-6
Pressed Flower Bookmark	2-9

Creative Writing

Activity	*Activity #*
Descriptive Words	2-8
Invented Circumstances	3-4
Letter Writing	1-9

Different Points of View

Activity	*Activity #*
Invented Circumstances	3-4

Drawing (Realistic)

Activity	*Activity #*
Unseen Trees	2-11

Encouraging Initiative

Activity	*Activity #*
Seton Watching	2-10

Estimating

Activity	*Activity #*
Fish, Fowl, or Foul Fish	1-10

Evaluation

Activity	*Activity #*
Letter Writing	1-9

Graphing

Activity	*Activity #*
Math by Degrees	1-7
Wildflower Hike—How Many Petals? How Many Colors?	3-1

Group Building/Teamwork

Activity	*Activity #*
Alphabet Awareness	2-13
Build a Tree	2-7
Hands Are Measures	3-7
Night Hike Favorites	3-5
Ohio Envirothon	3-9

Making Inferences

Activity	*Activity #*
Fish, Fowl, or Foul Fish	1-10
How Wet Is Our Planet?	1-11

Observation Skills

Activity	*Activity #*
Descriptive Words	2-8
Invented Circumstances	3-4
Micro Hike	2-14
Shutterbug	1-1
Things Out of Nature	2-2
Unseen Trees	2-11

Observation Skills (continued)

Activity	*Activity #*
Shape Hunt	2-3
Wildflower Hike—How Many Petals? How Many Colors?	3-1

Overcoming Fear

Activity	*Activity #*
Night Hike Favorites	3-5

Reinforce Learning

Activity	*Activity #*
Letter Writing	1-9

Transition/Filler Activities

Activity	*Activity #*
Alphabet Awareness	2-13
Hands Are Measures	3-7
Logs Aren't Limited	3-5
Shutterbug	1-1

Using All or Specific Senses

Activity	*Activity #*
Micro Hike	2-14
Nature's Grab Bag	1-4
Night Hike Favorites	3-5
Unseen Trees	2-11

Vocabulary Building

Activity	*Activity #*
Descriptive Words	2-8

Writing Skills

Activity	*Activity #*
Invented Circumstances	3-4
Letter Writing	1-9
Micro Hike	2-14

Environmental Education Council of Ohio
397 West Myrtle Avenue
Newark, Ohio 43055

END

U.S. Dept. of Education

Office of Educational
Research and Improvement (OERI)

ERIC

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