

728-73

F. L. Garnsey
Rt. 3, Box 46
Fallbrook, CA 92028

38

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400

450

475

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525

541

x 539.5

DE LUZ SCHOOL

FALLBROOK UNION SCHOOL DISTRICT

TEACHER'S GUIDE

OUTDOOR EDUCATION

DE LUZ ECOLOGY CENTER

450

475

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525

550

x 533.0

x 557.0

575

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Scattered

625

Brush

x 682.0

x 626.0

600

625

65

700

TEACHER'S GUIDE

FOR

OUTDOOR EDUCATION

FOR THE

DE LUZ ECOLOGY CENTER

Prepared by Patricia Rusnell, Patrick Rusnell, and Susan Shimmin

THE FALLBROOK UNION SCHOOL DISTRICT
FALLBROOK, CALIFORNIA 92026

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ACKNOWLEDGEMENTS

In the Fall of 1971 an Area Guide Committee met together to discuss plans for the development of an Outdoor Education Center. The development of the Center was funded through the San Diego County Office of Education Pilot Projects Program. During the school year 1970-71 the Fallbrook Teachers Association Curriculum Committee developed the guidelines and recommended the development of the De Luz School Area.

Patricia Rusnell, Patrick Rusnell, and Susan Shimmin were responsible for screening, organizing and writing this guide. Our gratitude is extended to them for many hours of work.

Members of the area wide committee who contributed their time, shared many ideas which are incorporated in the guide:

Virginia Bach	Catherine Kinsey
Gene Bedley	Frances Knox
Jean Binder	Jane Martinetto
Terry Brann	Emily Nalbach
Jim Branson	Ione Norton
Margaret Brereton	Dorothy Reighley
Bob Culbertson	Patricia Rusnell
Donald Day	Patrick Rusnell
Nancy Delphey	Paul Schaden
Madge Earls	Susan Shimmin
Frank Fairchild	Robert Slater
Mrs. Frank Fairchild	Lewis Toll
Felix Garnsey	Sam Wassner
Theodora Garnsey	Howard Weisbrod
Charlotte Gray	Fallbrook Junior Women's Club
Frank Gray	Fallbrook Boy Scouts
Lou Jones	Sierra Club

To each of these we say thank you. Without your contributions we could not have accomplished the task. We trust we have not omitted any names. This was truly a community wide endeavor for the children of Fallbrook.

GENE BEDLEY, Director
Instructional Services

We would like to add our special thanks to Frances Knox, District Librarian, who devoted her time and resources to our pursuit of knowledge, helping to make the writing of this guide possible.

Many thanks also go to our typist, Michele Bergez, who labored long and diligently for the De Luz Ecology Project.

We wish to express our sincere appreciation and thanks to Mr. and Mrs. Otis Crabtree for their help in the development of De Luz Ecology Center and for their continuing involvement in its operation.

Mr. Crabtree is the caretaker of De Luz Ecology Center. Mrs. Crabtree is your bus driver for each field trip to De Luz Ecology Center. If requested they will point out many places of interest to add to your enjoyment of De Luz.

Patricia Rusnell

Pat Rusnell

Susan Shimmin

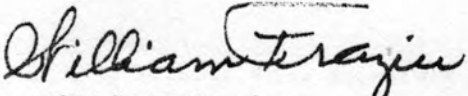
FOREWORD

This guide for teachers has been developed as a result of actively researching known materials on outdoor education. The material has been collected and screened to meet the requirements of the De Luz area. The goals which we have adopted in the use of the De Luz facilities are as follows:



1. To make students aware of the beauty and importance of natural places.
2. To better acquaint children with the wildflowers of De Luz.
3. To make students aware and appreciative of the variety of wildlife in the De Luz area.
4. To help children understand weather.
5. To make students aware of the importance of soil.
6. To enable students to better understand the nature of forest fires.
7. To enable students to understand that the study and grouping of rocks, land forms, and other earth phenomena help us learn more about the history and development of the earth.
8. To enable students to better relate to the natural environment.



This guide has been designed as an integral part of meeting the above goals. Teachers are encouraged to suggest additions and/or changes they feel will improve the quality of the program.


It is our belief that children can benefit from a first-hand experience in the science of the out-of-doors world through visiting the Center. It will hopefully provide the roadmap to a real understanding and appreciation of the world in which we live.



William Frazier
Superintendent of Schools


- LEGEND -



 Horizontal Control Monument
Third Order

 Vertical Control Monument
Second Order or Better



 Horizontal Control Monument
Second Order or Better

 Vertical Control Monument
Third Order



 Horizontal Control Monument
Second Order or Better



 Horizontal Control Monument & Bench Mark
Second Order or Better



 Horizontal Control Monument
Third Order


 Horizontal Control Monument & Bench Mark
Third Order


 Bench Mark
Second Order or Better



 Vertical Control Monument
Third Order



 Photo Identified Section, Grant or
 Subdivision Corner.
*Omit + Where Unidentified
 Where Appropriate*

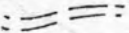

 Photograph, Nadir Point


 Grid Tick

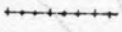

 Building



 Foundation or Ruin


 Surfaced Street, Highway & Road


 Gravel or Dirt Road


 Trail



 Railroad - Single Track



 Railroad - Double Track

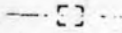

 Bridge



 Culvert


 Fence


 Utility Pole Line - Poles at Ground Spacing


 Pipe Line


 Overhead Trans. Line - Tower Base to Scale


 Tank *Over 10' Diameter*


 Contour Lines


 Spot Elevation

Contour Lines

Spot Elevation

Stream & River

Stream & River *Width Over 10'*

Lake

Marsh or Tidal Area

Dry Riverbed (width over .20")
Shows Thread of Stream

Flood Channel or Wash

Shows Depression or Hollows

Swimming Pool

Settling Pond or Storage Reservoir

Timber or Brush Areas

Free Standing Tree

Orchard, Grove, Etc.

* Labeled ** Numbered

BOUNDARIES IN ORDER OF PRECEDENCE

(Boundary locations are approximate)

.025" National

Name .025" County
Name

.015" City (Use at Border with County)

Name within Bdry .015" Reservation

Name within Bdry .015" National, State or County Park

Name within Bdry .015" Land Grant

T 2 S Township, Range, Section or Subdivision
T 3 S .015" (Name of Subdivision within Bdry.)

PREPARED UNDER THE DIRECTION OF THE COUNTY ENGINEER
 OF THE COUNTY OF SAN DIEGO, CALIFORNIA.
 CONTROL BY U. S. C. & G. S., U. S. G. S. AND THE COUNTY OF SAN DIEGO

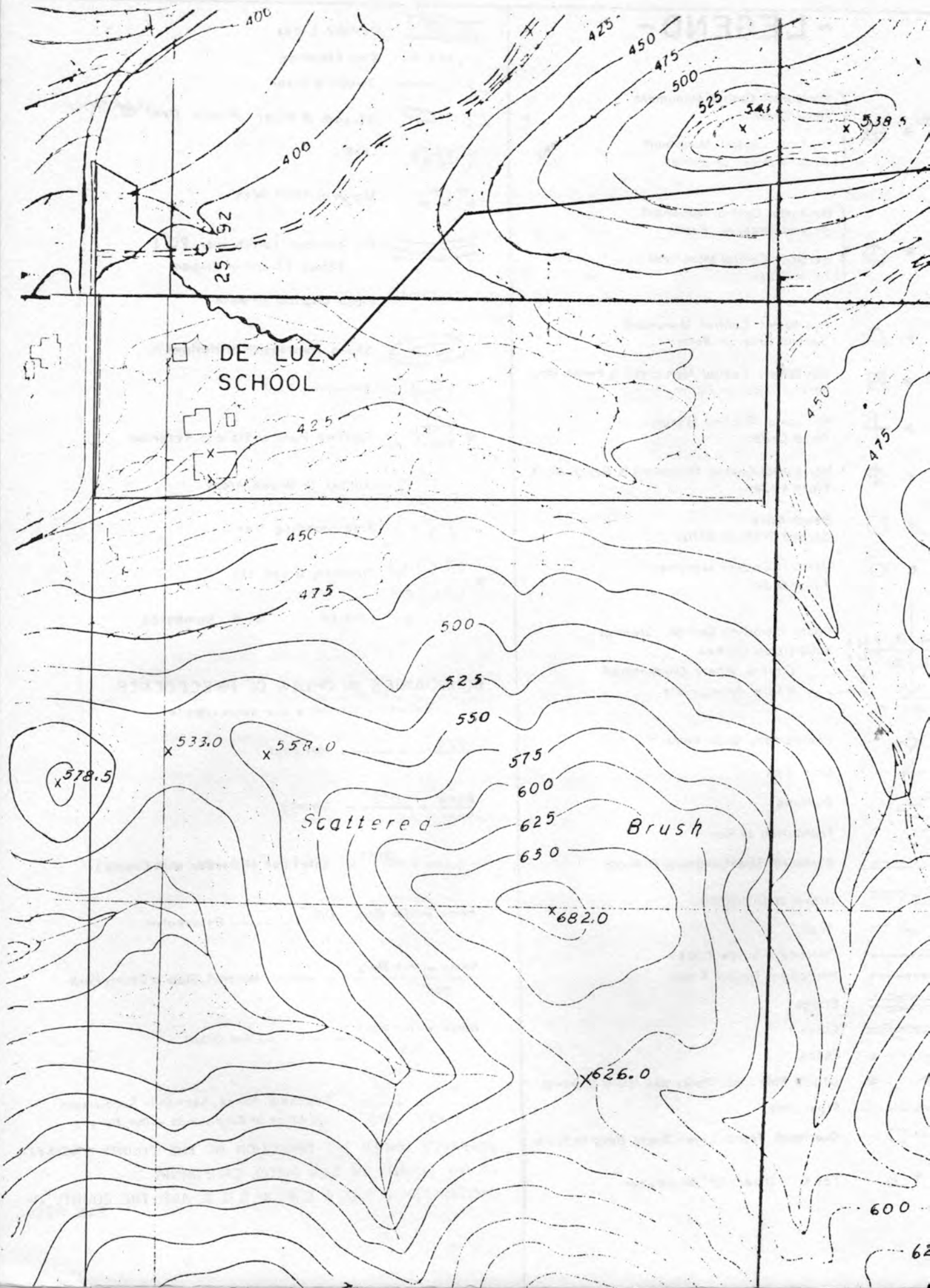


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INTRODUCTION TO THE CENTER

The second best way for children to learn about ecology is from a textbook. The best way is through first-hand, individual experience.

De Luz Ecology Center is an outstanding place for learning about the natural environment. Located in chaparral covered hills, the Center is surrounded by the "elfin forest" that teems with wildlife. There are sunny meadows that are brilliant with spring flowers; oaks and sycamores shade a leafy watercourse. The land is natural and unspoiled, a rare and beautiful place in populous Southern California. We hope to be able to use this natural area as an outdoor learning center, yet leave it as unspoiled as we find it today.

Danny McManus Hall at De Luz Ecology Center is the large central room of the schoolhouse. It is now equipped as a display and testing center, where students can perform experiments and get materials for activities listed in this guide. Equipment for activities is kept in labeled cupboards in the Hall, and is organized in boxes labeled for each activity. When the same equipment is used for more than one activity, it is stored separately. There is a slide projector and table, a bioscope/microscope, and a cassette tape player in the Hall.

There are restrooms and a small kitchen with a stove which can be used for experiments involving heat, at the Center. Outside are tables and playground equipment that may be used during lunchtime. There are also areas set up for following specific activity plans. These will be labeled, such as the Nature Trail. Activity equipment boxes will also contain instructions on areas to use, if applicable.

The Center is keyed for many different activity experiments, but the primary attraction of De Luz is the outdoor environment. We hope that teachers will use the out-of-doors as much as possible for learning situations, and will perform preliminary and follow-up activities in their classrooms when they can, thereby getting the most from each field trip to De Luz Ecology Center.

2

DANIEL BRIAN MCMANUS

1957 - 1972

He loved creation and the God who made it.



Thirteen of "Danny's" fourteen and one half years were lived in De Luz. This was the out-of-doors that he loved.

"Danny" was happiest when he was jumping from rock to rock in De Luz creek, climbing the hills around his home or swinging from near the top of a Sycamore tree on a one-rope swing.

It was natural that this healthy boy saw all this beautiful valley as a sacred creation and he loved it. "Dere's my friend de calipitter" he said to his mother as a tiny boy pointing to a fuzzy caterpillar on their front walk. The harmless snake was more to be held and studied than killed. The spring fed stream behind the McManus house was filled with meaningful life and it was not uncommon to see Danny as a little boy carrying a live crayfish to show his daddy.

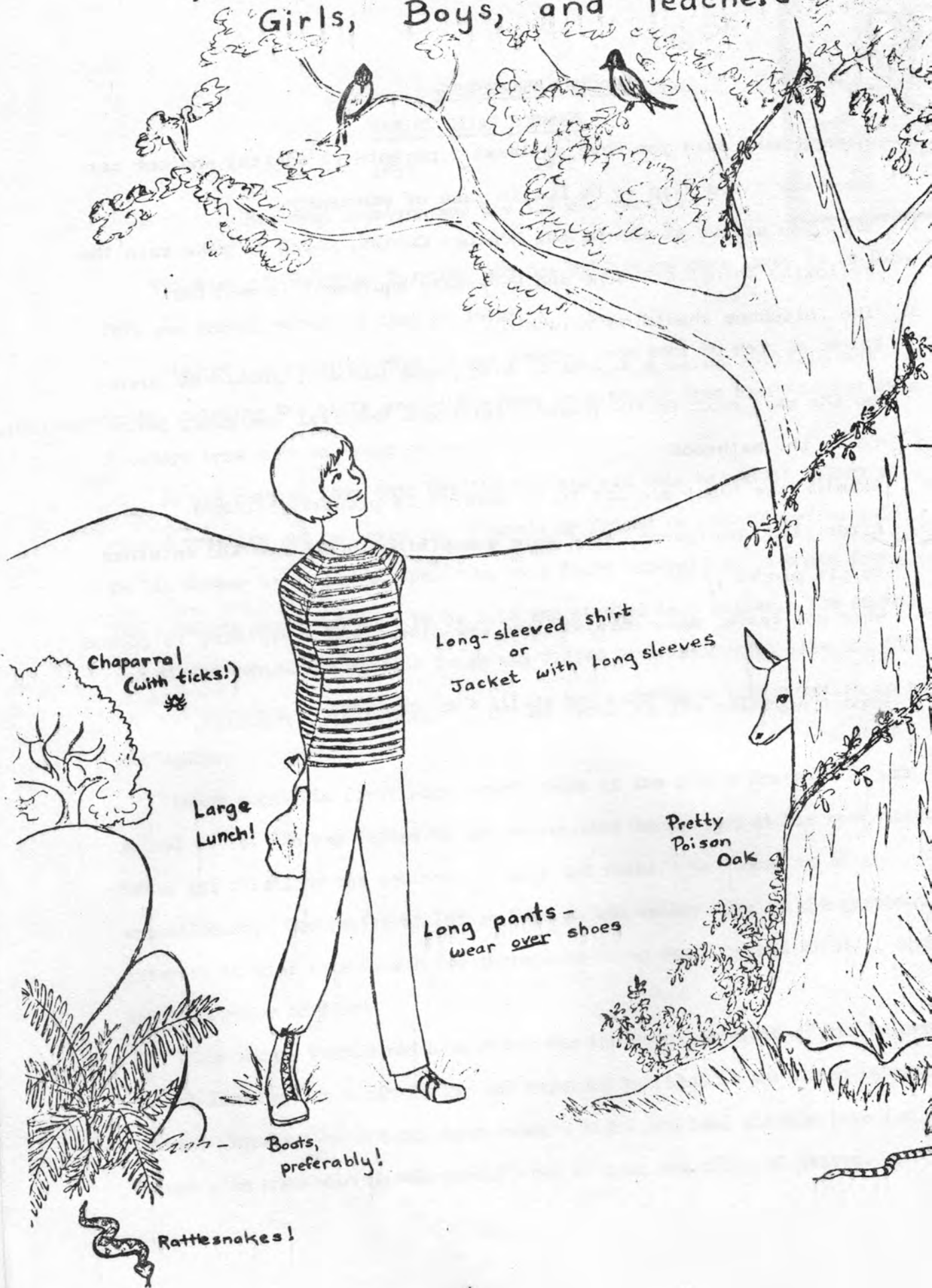
Danny spent his first four school years in the little one-room De Luz school house. He was gifted in art expressions and seemed at his best drawing trees and detailing the textures of bark and rocks. He wanted to be an archeologist. The relics of Indian life in the valley were of the greatest interest to him; in a search for arrowheads Danny would be the first to spot the warm color of flint.

This young, gentle red-headed boy was too soon taken out of his beloved out-of-doors and from his family and friends; but that is our human interpretation. Surely, God who put into Danny's heart and soul all his love for nature also knew when he was best fitted to roam the hills of heaven.

TEACHER PROCEDURE

1. Always make sure you have at least 2 parents (3 adults) and one car on every field trip to De Luz in case of emergency.
2. When you arrive at the De Luz Ecology Center, check to make sure the following things are done and necessary equipment is working:
3. The telephone should be unlocked.
4. The District Nurse's schedule, with phone numbers, should be posted on the wall next to the phone. Fallbrook Hospital Emergency phone 728-11
5. Check the bathrooms.
6. Examine the first aid kit to be sure it is properly stocked.
7. After using equipment, make sure everything is cleaned and returned to its proper place.
8. When you leave, make sure windows are closed and everything is locked up.
9. Report anything out of order to CRC. Gene Bedley 728-1131.

How to Dress for De Luz Girls, Boys, and Teachers



Chaparral
(with ticks!)

Large
Lunch!

Long-sleeved shirt
or
Jacket with long sleeves

Pretty
Poison
Oak

Long pants -
wear over shoes

Boots,
preferably!

Rattlesnakes!

FIRST AID PROCEDURE

Teacher

Responsibility: Your foremost responsibility is to the injured child. If the injury is serious enough that the child must be taken immediately to the hospital, you go with the child and one other adult driver, leaving the rest of the group with at least one adult.

Serious

Injury:

Victim in danger of dying (convulsions, rattlesnake bite, severe allergic reaction to bee sting): Take victim immediately to Emergency Room of Fallbrook Hospital. Adult remaining with children should telephone District Nurse, Physician and/or school.

Other

Injury:

Urgent but victim not in immediate danger of death (broken bones, etc.): Call District Nurse. Remain with victim.

District Nurse

Schedule Should

Be Posted By Tele-

phone:

1. Be familiar with first aid procedures in this guide.
2. Take care of the immediate need.
3. Take the initiative - take charge of the situation.
4. Remain calm.
5. Delegate responsibility.
6. Prevent the emergency from causing other emergencies - guard against panic.
7. Think before acting.
8. In case of snakes, insect, spider, or animal bite, try to determine source of bite, but give first priority to injured student.

Liability for

Treatment:

Section 11709, Education Code, State of California.

Education Code
1969
State of California

Liability for Treatment

Section 11709 Notwithstanding any provision of any law, no school district, officer of any school district, school principal, physician, or hospital treating any child enrolled in any school in any district shall be held liable for the reasonable treatment of a child without the consent of a parent or guardian of the child when the child is ill or injured during regular school hours, requires reasonable medical treatment, and the parent or guardian cannot be reached, unless the parent or guardian has previously filed with the school district a written objection to any medical treatment other than first aid.

SNAKE PROCEDURE

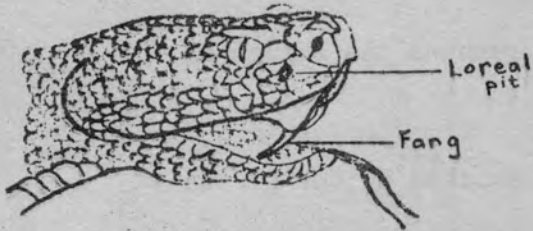
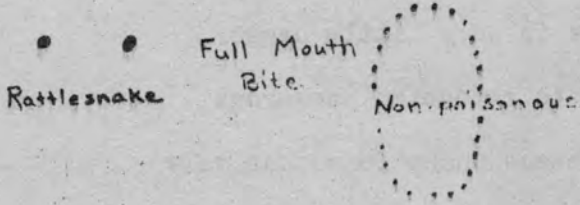
There are some dangerous snakes found in the De Luz area. But with proper preparation and procedures there is very little danger to you or your class. First you must learn to recognize dangerous reptiles. The rattlesnake is the only dangerous snake found natively in our area.

1. Give children instructions before starting your activity.
2. The group should move in single file. This reduces the chance of accidentally stepping on a snake.
3. If a snake is sighted, the word "freeze" is shouted by the person sighting the snake, and everyone within hearing distance should stand absolutely still.
4. The teacher will check the snake to determine if it is a rattlesnake or some other species.
5. A teacher will give the students direction. A rattlesnake can strike $\frac{1}{2}$ to $\frac{1}{3}$ its body length. If the rattlesnake is aroused (head up with neck in a "S" curve and/or tail rattling) and within striking distance (closer than half its body length) stand absolutely still (sudden movement may cause snake to strike). After snake has moved away or relaxed, move slowly and carefully away watching where you step. If the rattlesnake is not aroused or not within striking distance, move carefully and slowly away watching where you step. Remember that some non-dangerous snakes can be rather unfriendly and their bite, though harmless, can be painful.

RATTLESNAKE

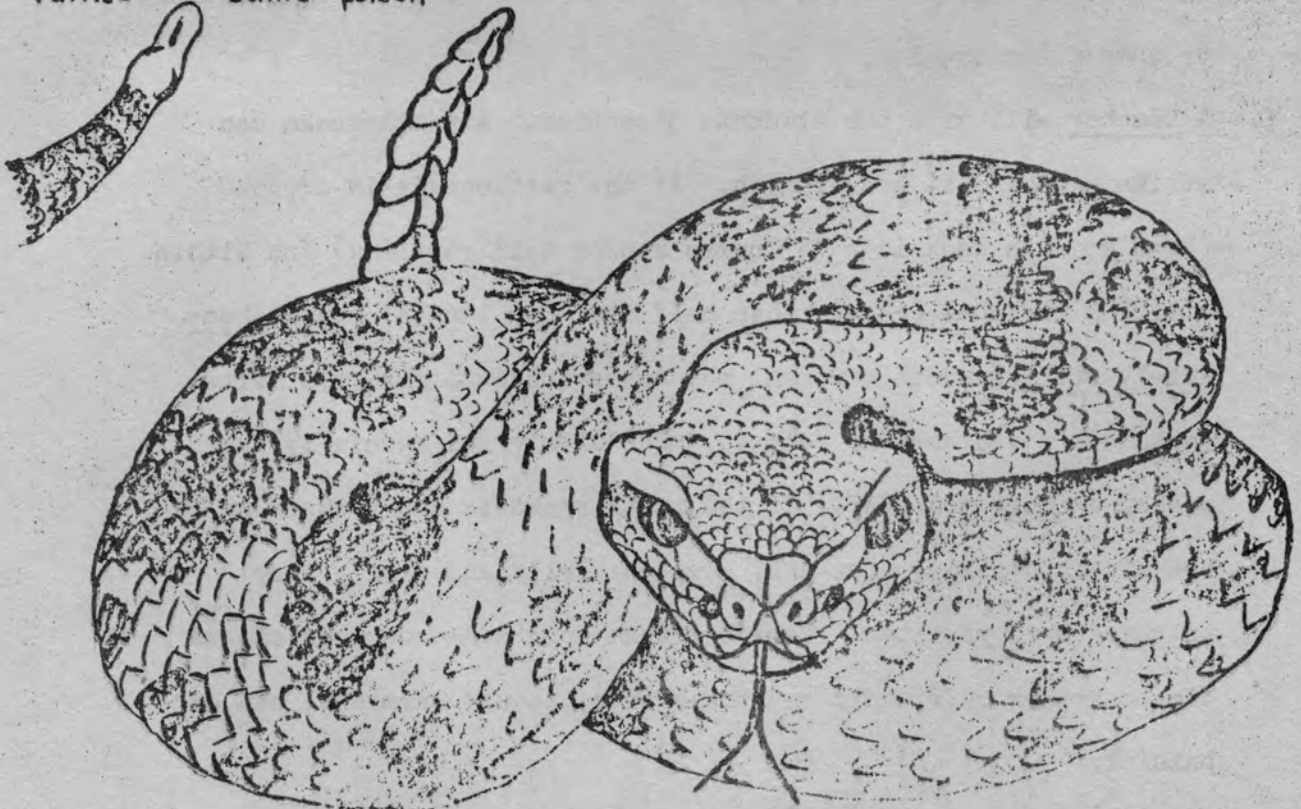
The only naturally occurring dangerous snake in Southern California.

The only positive means of identification is the triangular head shape and definite neck. Baby rattlesnakes have only a button on the tail; adult rattlesnakes may be broken off. Body shape is usually thick in adults. Rattlesnakes do not always rattle. Identify a rattlesnake bite from the fang marks.



Baby Rattlesnake

No rattles - Same poison



SNAKE BITE

The rattlesnake is the only naturally occurring poisonous snake in Southern California. There are about 30 bites from rattlesnakes per year in San Diego County. Rattlesnakes have been found on school property--especially where schools are situated on canyons.

Characteristics of poisonous snake bites are as follows:

- One or two fang or puncture marks. (Bites from nonpoisonous snakes leave a mark resembling a horseshoe.)
- Rapid swelling, discoloration and pain at the site of the bite.
- Sometimes nausea, vomiting, pallor, dizziness and general weakness.
- Tingling of the tongue and mouth and tingling about the wound.
- Perspiration, possible respiratory distress and signs of shock.

FIRST AID FOR POISONOUS SNAKE BITE

1. Put the victim immediately at absolute rest and immobilize the affected part. This is essential in slowing down the circulation of the venom.
2. Immediately apply a constricting band above the bite if the wound is on an extremity. This should not be tight enough to stop circulation. Release for about a minute and a half every 10 minutes. It will have to be moved higher as the swelling increases.
3. Pack the wound in ice or plunge into an ice bath keeping the wound dry. (Waterproof bag could be used.)
4. Get the victim to the nearest hospital as soon as possible in a prone position.

THE SNAKE BITE KIT

Contents:

Rubber tourniquet
Vial of antiseptic
Razor blade

It is unlikely that incision of the wound would be necessary if the bite occurs on the school grounds.

This is a dangerous procedure and should generally be used only by professionals.

If the bite occurs on a hike or camping trip and assistance is far away, follow all of the preceding rules and then read instructions in the snake bite kit very carefully before incising the wound.

Suction, if it is to be used at all, must be started within the first few minutes; it is of no value if delayed for 30 minutes.

HOW TO INCISE A SNAKE BITE

- Cleanse knife or razor with antiseptic or flame from a match.
- Incise with shallow criss-cross cuts $1/8$ to $1/4$ inch long across fang marks avoiding large blood vessels. Go clear through the skin. Where there is swelling, there is little danger of cutting a blood vessel.
- Apply suction either with suction cup or by mouth. (Snake venom in the mouth would be destroyed by the digestive juices.)
- Continue suction for at least an hour unless bleeding is profuse.

OTHER INJURIES

1. **Animal Bites:** The chief danger is from rabies or hydrophobia. Try to identify the animal, but first responsibility is to the student. Wash the wound thoroughly with plenty of soap or detergent. Call District Nurse.
2. **Bee Stings:** Persons who overreact to bee stings may go into anaphylactic shock. **Symptom:** General swelling of the part stung, progressing to adjacent parts, bronchial tubes constrict, vocal cords swell, difficult breathing, eventual death unless immediate help is obtained. Students aware of their sensitivity should have medication with them. If student does not have medication, transport immediately to Emergency room.
3. **Black Widow Spider Bite:** Can cause severe reactions and even death. Watch for symptoms of shock. Call District Nurse. Apply cold compress, and transport as directed.
4. **Cuts or Puncture Wounds:** In case of excessive bleeding, apply pressure until bleeding stops. Call District Nurse. **Minorcuts:** Wash with soap and water. Apply sterile gauze dressing.
5. **Eye Injuries:** Foreign objects - if superficial, remove by brushing lightly with the corner of a facial tissue. Chemicals - wash with water, Call nurse. **Serious injuries:** Cover eye with sterile compress and call the District Nurse.

6. **Fainting:** If person appears about to faint, lower him gently to floor. If seated, have him put head between legs until color returns to face. Provide proper ventilation, apply cold water to face. If aromatic spirits of ammonia are available, break ampul and have student inhale. If he has already fainted, place ampule about 6 inches from nose and gradually bring closer. If student doesn't revive immediately, discontinue use of ammonia and call District Nurse.
7. **Foreign Body:** in throat and air passages, accompanied by violent coughing. Slap student sharply on the back between the shoulders while he is leaning over. If air passages are obstructed it may be necessary to reach down the throat with the fingers to dislodge the object.
8. **Fractures, Dislocations, Sprains:** Stop bleeding if present, immobilize patient - keep him lying down, and treat for shock. Call District Nurse.
9. **Heat Exhaustion:** Symptoms include skin that is cool, sweaty and pale. Person seems to be in shock, pupils are dilated, pulse weak and rapid. Remove victim to a cool place, loosen clothing. If conscious, have person drink lukewarm water with half a teaspoonful of salt per glass and follow with hot tea or coffee.
10. **Mouth and Teeth injuries:** If there is bleeding, rinsing the mouth with cold water may control it. Apply ice to minimize swelling. Save teeth. Call.
11. **Nosebleed:** Tilt head slightly forward, apply pressure with cold compress or towel for 4 to 5 minutes, pressing bleeding nostril against

partition of the nose. If bleeding hasn't stopped after this has been repeated 4 or 5 times, call the District Nurse.

12. Poison Oak: Wash with naptha soap and water 5 or 6 times.
13. Shock: Place victim in prone position, keep warm. Call the District Nurse.
14. Stoppage of Breathing: Requires immediate action. Apply mouth-to-mouth respiration technique. Make sure air passages are not obstructed.
15. Ticks: Chaparral ticks are small, usually $\frac{1}{4}$ " long or less. They usually crawl around on the individual for several hours before biting. Have students check their clothes after being in chaparral. If ticks are found, crush them between fingernails. If a student has been bitten, do not attempt to pull the tick out (the head can break off and remain in the wound to start an infection). Put green soap or oil on the tick and wait until he backs out (a process which may take some time - be patient). Wash wound well, report bite back at school. If tick doesn't come out, leave it and let Nurse remove it at school.
16. Blisters: Clean with soap and water, pad area with sterile dressing.

HOW TO USE ACTIVITIES

The learning activities that can be performed at the De Luz Ecology Center are many and varied. This guide is intended to give teachers some ideas and sample lesson plans for learning situations at De Luz. It is not complete and is not intended to be complete: there are many activities not listed herein that are extremely appropriate and planned for future use at the Center, such as Indian studies, Art, Creative writing, and Plant study, to name just a few. Because of limited time in which to write this guide, we thought it better to give detailed lesson plans for a few units rather than attempt to cover all possible areas and be able to present only an outline. Hopefully, the plans included are detailed enough to give even unexperienced teachers enough specific information for a successful teaching experience at De Luz.

We hope that teachers will also contribute their ideas for activities and successful learning experiences related to ecology and outdoor education. If you have a good teaching idea for one of these subject areas, we hope you will share it by contributing an outline plan to CRC to be included in the De Luz Center resource materials.

The activities in this guide are essentially lesson plans organized in subject units. It is not necessary to attempt to do every activity in a unit; we have tried to offer a variety of activities so each teacher can choose those that will be most appropriate for his particular class. Each activity has a suggested grade level, but all are highly adaptable. They can also be adapted as to the place performed; when materials for performing a designated experiment are available at the Ecology Center, the place stated is "De Luz". Those activities which also say "classroom" or "Schoolyard" are adaptable to those places if the individual teacher can find the proper equipment and materials. Some of these you may also prefer to adapt as preliminary or follow-up activities to an Ecology Center field trip, since field trips will be limited-

ed so that no more than one class visits the Center each day (we wish to have the smallest possible impact upon the area while providing the greatest possible potential for learning).

Equipment needed for each activity is described and should be stored and labeled according to the activity for which it is used, or stored separately if used for more than one activity. If equipment is missing, report the loss to the proper authority at your school or CRC.

Audio-visual materials are also available at De Luz. Besides the wildflower slides described in this guide, we will have slides of native birds, complete with cassette tape and written script, available there in the near future. Bird songs and wildlife sound cassette tapes are also a part of the De Luz resource materials.

Each school should also receive a De Luz Ecology Center Packet, consisting of materials not appropriate for incorporation in this guide, but useful in planning an ecology unit. Many other good resource materials are also available at CRC.

SOIL CONSERVATIONMAJOR GOAL

:To make students aware of the importance of soil.

SUB GOALS

:To make students aware of soil erosion causes and effects.

:To make students aware of the importance of soil composition in plant growth.

:To make students aware of ways to control erosion and properly use soil resources.

MAKING SOIL

Objectives and Evaluations:

Each child will understand and be able to explain, (1) that soil is formed from rocks very, very slowly, (2) that friction between rocks and other things (glaciers) help make soil, and (3) that changes in temperature also help to make soil.

Grade Level: Primary or intermediate.

Place: Classroom or De Luz.

Materials: Limestone and/or sandpaper, hot plate, vinegar.

Activity

Procedures:

1. Have a child rub two pieces of limestone or two pieces of sandpaper together over a piece of white paper.
2. Heat a piece of limestone in a pan on a hot plate, then quickly drop it into a pan of ice water.
3. Put some small pieces of limestone in a little vinegar. Heat the vinegar. The bubbles on the stone are carbon dioxide, caused by acid in the vinegar. If you continued this process, all the limestone would gradually break down.

Questions:

- How long do you think it takes to make soil? Naturally?
- What other things go into making good soil?
- What are some natural ways that cause soil to form the way it did in our experiment?

HOW FAST SOILS TAKE IN WATER

- Objectives and Evaluations:** Each child will understand and be able to explain that soil with grass and organic material soaks up water much faster than soil that is bare and packed down from heavy use.
- Grade Level:** Primary, intermediate, or Jr. High.
- Place:** De Luz
- Materials:** Six large tin cans; board four inch wide, 1" thick, and 12" long; 12" ruler; watch with second hand or timer; pencils and paper; quart measure; and 2 gallons of water.
- Activity Procedure:** Cut the bottom end off each can just below the rim. This leaves a sharp edge that will drive into the ground easily. Cut out the other end, leaving the rim for added strength. Mark the outside of each can 2 inches from the end without the rim. Choose different soil types; woodland (leaves, twigs, etc.) meadow, path that receives heavy foot traffic, and any different and/or interesting area you wish to evaluate. Drive each can into the ground, at selected places, down to the two inch mark (place the board on top of the can and hit it with the hammer so you will not bend the can). Add 1 quart of water and record the following for each location.
1. Place (identify as woodland, meadow, etc.).
 2. Condition of the soil (dry, soft, sandy, etc.).
 3. Presence of leaves or sticks.
 4. Time when quart of water was added.

5. Measure amount of water that has moved downward at the end of each minute for the first 10 minutes. Then measure drop in water level every 10 minutes. Measure from the top of the can to the water with a ruler.

HOW MULCH HELPS PREVENT SOIL LOSSObjectives and
Evaluations:

Each child will understand and be able to explain that mulch (straw, leaves, grass, etc.) prevents puddling or running together of the surface soil under the impact of raindrops, thus allowing more water to be absorbed.

Grade Level:

Primary, intermediate or Jr. High.

Place:

De Luz

Materials:

Two small water proof boxes, 2 flower sprinklers, 2 fruit jars, 2 sticks of wood.

Activity
Procedure:

Fill both boxes with soil. Cover one box with mulch (straw, leaves, grass, etc.). Pour equal amounts of water, slowly and evenly, into each box. Note color and amount of water in each run-off jar.

HOW PLANTS HELP PREVENT SOIL LOSS

Objectives and Evaluations:

Each child will understand and be able to explain that grass breaks the force of raindrops so that the soil is not pounded and broken apart by this impact, and also that grass gives soil protection against running water.

Grade Level:

Primary, intermediate or Jr. High.

Place:

De Luz or classroom.

Materials:

Two small water proof boxes, 2 flower sprinklers, 2 fruit jars, 2 sticks of wood.

Activity Procedure:

Fill one box with a piece of sod cut from the ground. Fill the other with soil of the same type, but without grass. Set the boxes at a slight incline. (Use sticks of wood.) Place jars at notched end to catch run-off. Using sprinkler cans, pour the same amount of water, slowly and evenly, into each box. Observe the color and amount of water in run-off jars. Note erosion in box without grass.

WATER HOLDING POWER OF SOIL

- Objectives and Evaluations: Each child will understand and be able to explain that soils high in organic matter tend to be more crumbly, absorb more water, and absorb water faster than soils with little organic matter.
- Grade Level: Primary, intermediate or Jr. High.
- Place: De Luz
- Materials: Lamp chimneys; small mouth jars; cloth; rubber bands; cans of equal size.
- Activity Procedure: Tie a cloth over the top of each lamp chimney. Turn the chimneys upside down and fill different chimneys with equal parts of different soil samples. (Soil high in organic matter and soil very low in organic matter). Place the lamp chimney in the small mouth jar. Pour a pint of water into each chimney. Note how long it takes the water to begin to drip into the jars, how much water comes from each soil and how long the water continues to drip.
- Questions:
1. Which soil held the most water? Why?
 2. Which soil absorbed the water the fastest? Why?
 3. After a heavy rain, a hillside of which soil will show the most erosion damage? Why? The least damage? Why?

EFFECTS OF CONTOURING

Objectives and Evaluations: Each child will understand and be able to explain that contouring greatly reduces soil erosion. He will also realize, through discussion, that contouring is only one method in farming to reduce soil erosion. (Others are crop rotation, grass covered drainage ways, fertilizers and returning organic matter to the soil, etc.).

Grade Level: Primary, intermediate, or Jr. High.

Place: De Luz

Materials: Two small water proof boxes, 2 flower sprinklers, 2 fruit jars, 2 sticks of wood.

Activity Procedure: Fill both boxes with like samples soil. Using a pencil, make furrows across in one box and up and down in the other box. Pour equal amounts of water slowly and evenly into each box. Observe the rate of flow into the two jars and note the difference in their contents.

GROWING PLANTS IN DIFFERENT KINDS OF SOIL

- Objectives and Evaluations:** Each child will understand and be able to explain that plants grow best in dark rich topsoil (high in organic matter).
- Grade Level:** Primary, intermediate or Jr. High.
- Place:** Classroom.
- Materials:** Containers for collecting soil and for planting, digging tools, seeds, water.
- Activity Procedure:** Sow seeds under similar conditions in rich dark-colored topsoil, in clean sand, in clay subsoil (hardpan) and in a piece of cotton. Label each container, showing type of soil. Place in sunlight, water regularly, and observe results until plants are full grown. Try to have children relate the value of fertility to how it may be lost when topsoil is removed by erosion.

EXAMINING SOIL DEPOSIT SAMPLES

Objectives and Evaluation:

Students will be able to: understand and explain that different kinds of soil have some similar particles and that these particles will settle out of running water in a particular order.

Grade Level:

Primary and intermediate.

Place:

Classroom.

Materials:

Glass jars with lids, and ammonia.

Activity

Procedure:

Ask students to select three contrasting samples of soil - one sandy, one clay, and one dark loam. Put enough of each kind of soil into each jar to the depth of 2 - or 3 - inches (have columns of soil the same length). Add a small amount of ammonia to help break up the soil granules. Put top on jar tightly and shake vigorously for several minutes until the lumps or granules are thoroughly broken up. Some gas may be evolved during the shaking. After shaking, release the top momentarily to let gas escape and then secure top firmly. Quickly invert the jar and set in a rack or other support where it will remain undisturbed. Let settle several days. Examine after soil has settled. Answer these questions:

1. Where is the gravel in each sample?
2. Where is the sand?
3. Where is the fine clay or silt?
4. Do all samples contain some of each kind of soil?
5. If stream water is slowed down so that material settles out, which kind of material will be deposited first?

SPLASH EROSION - WATER POWER!**Objectives and****Evaluations:**

Each child will understand, and be able to explain, (1) that soil particles must be broken apart from one another before they can be moved, and (2) that soil is broken down by the impact of the falling drops of water.

Grade Level:

Primary, intermediate or Jr. High.

Place:

De Luz.

Materials:

Two stakes, 4" x 4"; several coins or bottle caps; sprinkler can.

Activity**Procedure:**

1. Stakes should be sharpened at one end and marked at one foot intervals. Drive the stakes into the ground; one in grass covered soil and one in bare soil. Pour water from as high as possible, one foot in front of each stake. Compare the height of splash erosion on each board.
2. Place several bottle caps on bare soil. Pour water on the caps from as high as possible. Notice how the cap is left on a pedestal.

CAPILLARY ATTRACTION

**Objectives and
Procedures:**

Each child will understand and be able to explain that water moves through soil in all directions, and that how far and how fast capillary water will move depends on the size of the soil particles and the condition of the soil.

Grade Level:

Primary, intermediate or Jr. High.

Place:

De Luz

Materials:

Lamp chimneys; small mouth jars; cloth; rubber bands; grease pencil; ruler.

**Activity
Procedures:**

Tie cloth over the top of each lamp chimney. Turn the chimneys upside down and fill with different soil samples. Fill the small mouth jars with equal amounts of water. Place the chimneys in the jars. Keep a record of how long it takes the water to move up through the soil, 1 inch, 2 inches, 3 inches in each cylinder. Note how long it takes for the water to reach the top or whether it ever reaches the top. The idea is to compare capillary movement of water in coarse, medium and fine soil particles.

Questions:

In which type of soil would you need the least amount of water to wet a given area?

FILTERING WATER

- Objectives and Evaluations:** Each child will understand and be able to explain, (1) that solids can be filtered out of water using natural materials and (2) that this type of filtration does not always make water safe to drink.
- Grade Level:** Primary, intermediate or Jr. High.
- Place:** De Luz
- Materials:** For each team of about 5 students, one quart jar and one plastic funnel, worksheet for recording results of experiments.
- Activity Procedure:** Fill plastic funnel with a layer of clean pebbles, then a layer of coarse gravel, then a layer of fine sand, to make a miniature filter plant. Collect dirty stream water and slowly pour a small amount into funnel to observe filtration effect. With older students, explore variables with relation to filtration agents. Ask students to determine the effect of various filtration agents used. Be sure to point out that this filtration unit and the coagulation process make the water look cleaner but not always safe to drink.

SOIL CONSERVATION BIBLIOGRAPHY

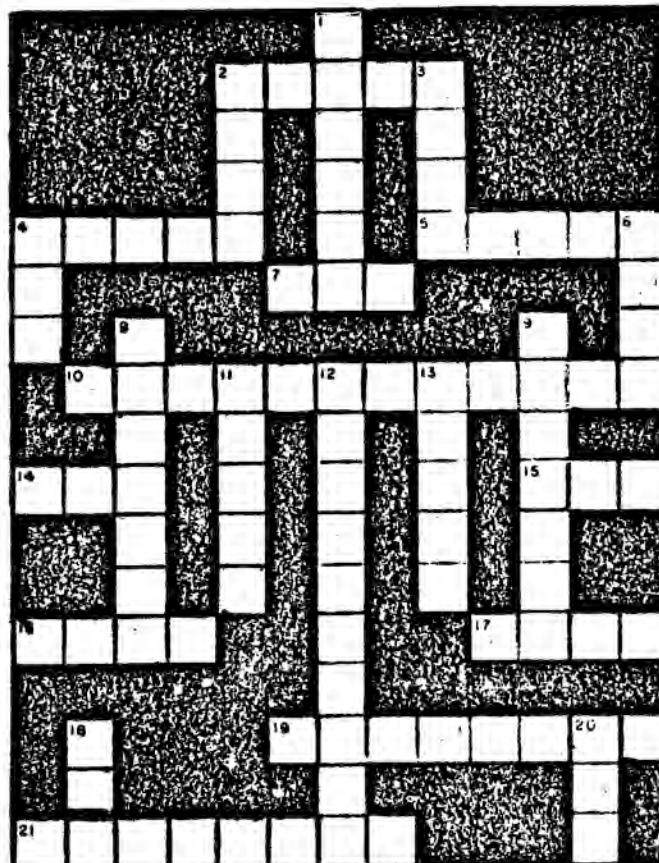
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CONSERVATION CROSSWORD PUZZLEDown

1. Body or group of persons. Conservation is for p _ _ _ _ _.
2. To try out or to examine. . . like to try out certain tree seeds.
3. Basic natural resource in frozen airborne form. Skiers delight when they see it coming.
4. Stone of a fruitlike cherry or peach.
6. Lifeblood of the land. . . (falling from clouds.)
8. Where there are trees, water, wildlife, and places to camp and picnic.
9. Nonrenewable natural resource found in the earth.
11. Conservation resource vital to agriculture. (Pl.)
12. Playing or relaxing outdoors. Picnicking, fishing, hunting, swimming, skiing, and canoeing are often associated with this word.
13. To fish with a hook and line.
18. Large snake which crushes its prey.
20. Type of evergreen tree. Often used as Christmas trees.

Across

2. What forests are mostly made of. . . source of lumber and pulpwood.
4. To put in the ground to grow (v.). Living thing with roots (n.).
5. Most vital conservation resources.
7. Large body of salt water containing many undeveloped natural resources.
10. Wise use of natural resources.
14. Sharp tool used in harvesting trees.
15. Large forest animal belonging to the deer family.
16. Finned creature of the water.
17. Waste material left after refining certain minerals.
19. Living things other than plantlife.
21. Popular form of boating on lakes and rivers.



ANSWERS TO CROSSWORD PUZZLEDown

1. people

2. test

3. snow

4. pit

6. rain

8. forests

9. mineral

11. soils

12. recreation

13. angle

18. boa

20. fir

Across

2. trees

4. plant

5. water

7. sea

10. conservation

14. axe

15. elk

16. fish

17. slag

19. wildlife

21. canoeing

WEATHERGOAL

To help children understand weather,

SUB GOALS

To help children understand the phenomena of weather composition.

To help children understand which phenomena cause different weather conditions.

To help children understand how to measure and interpret weather phenomena and conditions.

AIR**Objectives and**

Evaluation: Each child will understand and be able to demonstrate that air takes up space.

Grade Level: Primary, intermediate or Jr. High.

Place: De Luz or school.

Materials: Marbles (or rocks, marshmallows, etc.), 1 large plastic bag, twist 'em (wire) and water.

Activity**Procedure:**

Press the plastic bag flat. Then have the children fill the bag with marbles. Pass around the bag and let the children feel and poke the bag. They should find that the bag will push back.

Now empty the bag and again press flat. Have a child fill the bag with water. Tie off the end and pass the water filled bag around.

The children may poke the bag and will find that the bag pushes back.

Empty the bag.

Finally, press the bag flat. Now swing the bag quickly through the air.

When the bag is filled with air twist the neck of the bag and seal with a twist 'em. Have the bag passed around. When the children again poke the bag it bounces back. This time the children should conclude that there is air in the bag and that air takes up space.

A LOOK AT AIR

- Objectives and Evaluation:** Each child will understand and illustrate the idea that air can be seen,
- Grade Level:** Primary, intermediate or Jr, High,
- Place:** School or De Luz,
- Materials:** Glass aquarium partially filled with water, empty glass bottle, rubber ear syringe.
- Activity Procedure:** In a aquarium, have a child lower an empty bottle, mouth down, into the water. Tilt the bottle on its side and watch air bubbles escape. The same results can be obtained by squeezing a rubber ear syringe under the water,

AIR CAN BE FOUND IN EVERYTHING

Objectives and

Evaluation: Each child will be aware that air can be found in everything around him. He will be able to explain several ways of finding air.

Grade Level: Intermediate, or Jr. High.

Place: De Luz.

Materials: Pan, water, wide-mouth jar, soil, boiled water.

Activity

- Procedure:
1. Heat cold water and small air bubbles will appear. They surface and disappear. The air has been dissolved in the water and heating releases it. Therefore water contains air.
 2. Take a wide mouth glass jar and fill halfway with soil. Now pour boiled water over soil. Air bubbles should begin to rise to the surface. You may conclude that soil has air.

AIR MOVEMENT

- Objectives and Evaluation;** Each child will understand and demonstrate high pressure and low pressure areas in relationship to weather.
- Grade Level;** Intermediate, Jr. High.
- Place;** School or De Luz.
- Materials;** Fan and paper strips.
- Activity Procedure:** Area of high and low pressure are created by turning on an electric fan. To find the high pressure area, hold the paper strip in front of the moving air. The paper will blow away from the fan. A paper strip held near the back side of the fan shows the low pressure area because the paper is drawn into the fan. The blades push the air away from the fan and create a partial vacuum behind the fan. The air rushes into this vacuum and then is drawn into the blades and then pushed away.

WHAT AIR IS COMPOSED OF**Objective and
Evaluation:**

Each child will understand and demonstrate that one of the components of air is oxygen.

Materials:

Candle, wire, large glass jar, cardboard square large enough to fit over mouth of jar, matches.

**Activity
Procedure:**

Wrap the wire around the candle and bend the free end to make a handle. Now light the candle and insert into the glass jar. Then cover the jar with the cardboard. The flame will go out when the oxygen supply is used up to the point it will no longer support combustion. Remove the candle, light it and lower it into the jar. This time the flame will go out immediately, since there is insufficient oxygen.

Questions:

1. What caused the flame to extinguish? Why did the flame extinguish sooner on the second try?
2. Are there any remaining gases in the jar? If so, what might they be?

AIR PRESSURE**Objectives and****Evaluation:**

Each child will understand and demonstrate pressure is exerted in all directions.

Grade Level:

Primary, intermediate or Jr. High,

Place:

School or De Luz,

Materials:

Bottle of soap bubbles.

Activity**Procedure:**

When a soap bubble is blown you find that the bubble is perfectly round. The pressure is therefore on the inside is the same in every direction. The same pressure is exerted on the outside of the air bubble as well.

AIR HAS WEIGHT**Objectives and
Evaluation:**

Each child will understand that the earth has gravity which pulls everything down including air and that air has weight and weight creates pressure.

Grade Level:

Primary, intermediate, or Jr. High.

Place:

School or De Luz.

Materials:

Books, paperbags.

Activity**Procedure:**

1. A child stands with his arms out-stretched and has books piled on his hands. Air like the books has weight and pressure.
2. Another means of illustrating air pressure is by putting a book on top of an empty paper bag. The book, standing in an upright position will fall when air is blown into the paper bag.

AIR PRESSURE AND CLIMATE**Objections and
Evaluation:**

Each child will understand and explain the use of a barometer in showing changes in air pressure.

Grade Level:

Intermediate, Jr. High.

Place:

Classroom or De Luz.

Materials:

Home made barometer (see "How to Make Your Own Weather Instruments" found in this packet), paper and pencil.

**Activity
Procedure:**

Have the children daily check the barometer and record their findings. Then check the readings with those found in the newspaper, on the radio or on the television.

WATER AND AIR PRESSURE

- Objectives and Evaluation:** To understand and be able to demonstrate that air has pressure.
- Grade Level:** Primary, intermediate, or Jr. High.
- Place:** The first activity can also be used as a preliminary study before using weather instruments at De Luz. The second activity can be done by students at home.
- Materials:** Water, bottle, glass tumblers, square of cardboard.
- Activity Procedure:**
1. Place the square of cardboard over a full glass of water; and with your hand, hold the cardboard as you turn the tumbler upside down. Release your hand. The cardboard will not fall. Do this experiment over the sink or pail. The air pressure pushes on the cardboard harder than the pull of the gravity on the water.
 2. A can of fruit juice can be used to show air pressure's effect on a liquid. Punch one hole in the top of the can. Try to pour out the liquid. The juice will not pour due to pressure outside of the can. Then punch another hole in the top of the can and pour out the juice. The air enters the second hole as the liquid pours out the first due to the pressure created by air entering the second punch hole.

EGG IN THE BOTTLE TRICK

- Objectives and Evaluation;** Each child will be able to demonstrate and explain areas of high and low pressure.
- Grade Level;** Intermediate or Jr. High.
- Place;** School or De Luz.
- Materials;** Old fashioned glass mild bottle, paper, matches, hard boiled egg (peeled).
- Activity Procedure;** Twist the paper, ignite, and drop into the mild bottle, Place the egg in the mouth of the bottle. The small fire uses up the oxygen within the bottle therefore less air and less pressure. The egg is pushed through by the greater air pressure outside of the bottle.
- The egg can be retrieved by blowing into the bottle until the pressure inside of the bottle is greater. The end will pop out of the bottle due to the air pressure inside of the bottle.

SIPHON**Objectives and**

Evaluation: Each child will understand air pressure using a siphon to explain the demonstration.

Grade Level: Intermediate, or Jr. High.

Place: School or De Luz,

Materials: 2 glass containers, rubber tubing (15-20" long), table and chair.

Activity**Procedure:**

Place a jar of water on the table and empty jar on the chair. Fill the tubing with water and pinch the ends. Then place both in the jars. The water from the table jar will flow to the jar on the chair. The force of gravity pulls the water in the long tube and leaving a partial vacuum. The pressure is reduced in the tube and the air pressure on surface of the table jar of water causes water to flow into the tube and the tube to the jar on the chair.

HUMIDITY AND CLIMATE**Objectives and
Evaluation:**

Each child will understand and explain the use of the wet and dry-bulb sling psychrometer.

Grade Level:

Intermediate, or Jr. High.

Place:

Schoolyard or De Luz.

Materials:

Paper, pencil, sling psychrometer (see "How to Make Your Own Weather Instruments" found in this packet).

**Activity
Procedure:**

Have pupils twirl the psychrometer around his head for approximately 2 minutes. Then record the wet-and dry-bulb readings and find the difference between the two readings. Use the table accompanying in the air compared to the maximum amount of moisture that air can hold at that temperature. The higher the temperature the more moisture the air can hold.

TEMPERATURES AND ENVIRONMENTSObjectives
and
Evaluation:

Each child will be aware and be able to explain that air temperature varies depending upon where the readings are taken and that the plant and animal life varies as a result of temperature differentiation.

Grade Level: Primary, intermediate, or Jr. High.

Place: School yard or De Luz.

Materials: 5 thermometers, pencil and paper.

Activity
Procedure:

Have the children list places they would like to take temperature readings from. Try to encourage many types of mini-environments. Place thermometers and then record reading. Make comparisons and discuss why there were variations.

Now take the children to the various locations where readings were taken and list the types of plants and animals found. Have the children try to explain the relationship between the temperature, the flora, and the fauna.

WIND SPEED AND DIRECTION

Objectives and Evaluation:

- 1, Each child will understand the function of the wind vane and the cup anemometer and be able to record the readings off both instruments.
- 2, Each child will be able to relate the importance of the wind on weather and the affect of wind on man.

Grade Level:

Primary, intermediate, or Jr. High.

Place:

Schoolyard or De Luz.

Materials:

Wind vane and cup anemometer (see "How to Make Your Own Weather Instrument" found in this packet), paper, pencil, watch with a sweeping second hand.

Activity

Procedure:

Have the children record wind direction with the wind vane. Also measure and record the speed of the wind using the cup anemometer. The method for wind speed is as follows: count measuring the number or revolutions the anemometer makes in 60 seconds and divide by 10 to find the wind speed. Example - 40 turns divided by 10 = 4 miles per hour.

RAIN**Objectives and
Evaluation:**

1. Each child will understand the use of the rain gauge and be able to read and record precipitation collected.
2. Be able to see seasonal pattern of rainfall as indicated by class records.

Grade Level: Primary, intermediate, or Jr. High.

Place: School or at De Luz.

Materials: Rain gauge (see "How to Make Your Own Weather Instruments") paper and pencil.

**Activity
Procedure:**

Using a homemade rain gauge have the children record the amounts of precipitation daily. If more than one gauge is available, have the children place them under trees, on a roof top if accessible to students, on an open field, on a grass field, etc. Keep the records for many months and note if the precipitation was light or a downpour. Have the children evaluate their records every month or so.

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FOREST FIRE ACTIVITIES

GOAL

To enable students to better understand the nature of forest fires.

SUB GOALS

To enable students to understand the composition of fire.

To create better understanding of how fires can be prevented or stopped by eliminating a necessary element of the fire.

To understand how the Forest Service works to prevent and control fires.

To enable students to make value judgments and hypotheses about fire-created losses for watershed, recreation, wildlife, and aesthetic values.

FOREST FIRE FIELD TRIP ACTIVITY

Resource area: California State Division of Forestry, De Luz Fire Station.

The De Luz fire station, located a short distance from De Luz School, is a resource area that can be utilized as part of forest fire prevention study. If a field trip or stop at the fire station is arranged in advance, State Forestry personnel will give students a tour of the station and fire-fighting materials and will present a fire prevention talk, with hand outs (such as "The True Story of Smokey Bear") when available. Lectures and demonstrations can be adapted to age level, experience and key interest areas of the group, if the teacher making trip arrangements will indicate the type and length of program desired.

To arrange for presentations at the De Luz Station, call:

FIRE CAPTAIN PAUL SCHADEN
DE LUZ FOREST FIRE STATION
728 - 7786

IMPORTANT!!!

Call at least one week prior to visit. Because of the nature of work, personnel can accept students only at their convenience, and field trips may occasionally be cancelled without notice in case a fire erupts, and the station crew is called out to fight it. Thank you.

FOREST FIRE • FIELD TRIP ACTIVITY

Objectives and Evaluations:

- 1. Each student will be able to name at least 3 differences between burned and unburned soil.
- 2. Students will be able to hypothesize about where a fire started or what direction it burned and give reasons for the hypothesis based on observation of the area. Some may be able to hypothesize about how the fire started.
- 3. Each student will be able to list at least 2 losses caused by the fire.
- 4. Each student will be able to name one method of fire prevention.

Grade Level:

Primary, intermediate or Jr. High.

Place:

Visit a burned woodland or pasture.

Activity Procedures:

- 1. What do you think caused the fire? How long do you think it burned? Ask children to explore and analyze what they find. Example: remains of a structure or campfire ring might give a clue to man-caused fire; burned grass and untouched or just scorched trees might indicate a short-burning grass fire; a prevailing wind direction might show the direction the fire moved and point to its possible origin.
- 2. To what area did the soil burn? Take soil samples to see how far fire progressed.
- 3. Compare burned soil sample with a sample taken from an unburned area. Can you see any differences in the soil? List differences seen in burned and unburned soil.

4. What did the fire destroy? Students can determine some losses by observation comparing burned and unburned areas. Ask about other values for wildlife, streamflow, recreation, fertility of topsoil.
5. How would you prevent another fire in this area? Discuss possibilities, and ask students to choose what they think would be the best way.
6. What is the cause of most fires? (9 out of 10 are started by careless people - smokers, campers, burners of brush and debris.)
7. What are good fire prevention rules?

Variation:

A good variation or addition to this activity is to take children on a short walk through a wooded area before visiting the burned place. Stop to listen to the sounds of the forest - wait quietly in one spot for a few minutes, then ask children to list different sounds. Repeat the listening experiment in the burned area.

FOREST FIRES: Nature and Control

Objectives and Evaluations:

1. Students will understand and be able to name the elements in the "fire triangle."
2. Each student will be able to demonstrate that the removal of one part of the triangle eliminates the possibility of fires.
3. Each student will also be able to name at least one method of reducing forest fire hazard.

Grade Level:

Primary, intermediate or Jr. High,

Place:

Classroom or De Luz. This activity would be a good preliminary before visiting the De Luz fire station.

Materials:

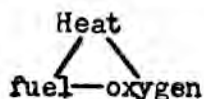
Candle, glass jar (to fit over candle), log or branch section, scissors, bucket full of water to use in case of fire, matches, pie tin, hand lenses, string.

Activity Procedure:

Begin by discussing the nature of fire.

1. What is fire? What are some characteristics of fire?
2. What things are necessary to a fire? (Heat, fuel, oxygen).

Introduce the Fire Triangle: 3 elements form the triangle



3. What happens if we remove one element from the fire triangle?
Can we still have a fire?

Experiment #1: Removing Fuel

Use a candle and a piece of string (wick and string will represent fuel), match (heat), and air (oxygen).

- a. Light a piece of string. Cut the string in two and remove the burning part. When the string (fuel) is consumed and the rest of the fuel is removed, the fire goes out.
- b. Light the candle. Remove the fuel by cutting off the burning wick with scissors.

Experiment #2: Removing Heat

Ask children to hold up one finger and blow gently on it. What sensation do you feel? (Cool breeze). Light the candle and ask a child to cool the heat by blowing.

Experiment #3: Removing Oxygen

Use a candle, pie tin, and jar. Melt some of the wax around the bottom of the candle, so it will stick upright in the pie tin. Light the candle. Place the glass jar over the lighted candle, being careful not to knock the candle over or touch the flame. Watch as the flame dims and goes out. Why did the flame go out? Remove jar and re-light candle. Repeat experiment if necessary.

4. Can we have all the elements in the fire triangle, but still not have a fire?

Experiment #4: Take a match (supplying heat), air (oxygen), and try to light a tree branch or log. Why can't we have a fire - we have all the necessary ingredients? (Ingredients have to be in proportion - we haven't enough heat to light the log.)

5. How can we provide the right amounts of the 3 elements to make fire? (Add more heat to the log, or add less fuel to the heat provided.) Which would be easiest to do when starting a fire?
6. Who has built a campfire? What kind of fuel do you use?
(Children with camping experience will probably mention tinder and kindling.)

Tinder: Fuel sliver-size to finger-size.
Kindling: Finger-size to wrist-size.
Fuel: Wrist-size and larger.

7. How can we prevent a fire? Think of the 3 elements in the fire triangle. (By not having or by removing one or more of the necessary elements.)
8. Can we stop a fire by removing one of the 3 elements? Example:
When water is poured on a fire, what element is removed? When sand is used on a fire, what element is removed? When baking soda is used, what element is removed?

The forest services also uses chemical substances to smother fires. An algae mixture that is jello-like is now used because it doesn't dry out.

9. What are some other ways fires are stopped in the forest?

Backfires: Small, controlled fires set to remove fuel. Backfires are very seldom used in Southern California, according to the State Division of Forestry, because too often more damage is caused by the backfires' getting out of control. Only an expert should attempt to use a backfire in stopping a wild fire.

Firebreaks: Also remove fuel, and provide access routes to fires for fire trucks.

10. In the forest, what would be the most practical way to prevent fires? Which of the necessary elements could we remove?

a. Heat: Remove sources of heat (glass or bottles that might focus sun's rays). Experiment if children have never done so, using hand lenses to focus sun's rays on a piece of paper. Carefully control other sources of heat (matches, cigarettes, campfires).

b. Oxygen: Not practical to remove.

c. Fuel: Also not practical to remove.

11. Is there a way we could control fuel in the forest so as to reduce fire hazard? Think of the kinds of fuel necessary to start a fire (tinder, kindling).

Repeat experiment #4 (trying to light a log with a match).

a. What part of the fuel arrangement does the matchstick represent? (Tinder).

b. What does the log represent? (Fuel).

c. Why won't the match light it? (Not enough heat).

d. What is missing? (Kindling).

e. If we stacked tinder and kindling around the log and lit it with the match, could we get enough heat to light the log? (Hypothesize here - unless you want a full-fledged fire!)

12. In the forest, what would represent the fuel? (Trees, etc.).

a. What would be kindling? (Small branches on ground).

b. Tinder? (Pine needles, leaves).

13. What could most easily be removed? (Discuss possibilities - kindling is probably easiest).

14. But - do we want to completely remove any of these from the forest? Doesn't the kindling need to stay and rot to provide more humus and return nutrients to the soil? Elicit from children any ideas as to how kindling could be left in the forest yet still remove some of the fire danger.
15. Fire hazard reduction, as practiced by the Forest Service and conservationists, involves stacking the kindling in tight piles in clearings.
- Tight woodpiles: generate some heat, which helps the wood decay faster.
 - Stacks are placed in clearings: Ask children to think Why.
- Experiment #5: Light a candle and ask children where the heat goes - test by passing hands over and around candle. If heat rises, then wood is stacked in clearings because there would be no branches overhead to catch if a fire started, in the stack.
16. Now what would happen if a grass fire started, if the kindling were stacked away from the trees? Ask children to hypothesize. Would there be less danger of having a bad fire? Why do they give the answers they do? Point out that in some northern states rangers used to set grass fires yearly, because they do not get hot enough to burn the trees but keep brush (kindling) from forming. We could not attempt this control in our area - chaparral is highly flammable (leaves have high oil content). Chaparral fires are considered the worst kind firefighters face.

17. Who are our forest firefighters? The U.S. Division of Forestry maintains National Forest Land.

California State Division of Forestry: maintains fire lookouts and stations here in the Fallbrook area and throughout the state. Can you name any of our stations or lookouts?

(Red Mountain, De Luz, Tenaja). We can visit some of these fire stations and learn more about the work of the Division of Forestry.

BIBLIOGRAPHY FOR FOREST FIRE

Hone, Elizabeth B. and others. A Sourcebook for Elementary Science, Sacramento: California Department of Education, 1967.

Forestry Activities: A Guide For Youth Group Leaders, Washington, D.C. Department of Agriculture, Forest Service. Pamphlet no. PA-457.

GEOLOGYGOAL

To enable students to understand that the study and grouping of rocks, land forms, and other earth phenomena help us learn more about the history and development of the earth.

SUB GOALS

To help students understand that earth phenomena such as rocks have different properties and can be grouped according to similarities and differences.

To promote the concept that classification of rocks and landforms helps scientists relate apparently dissimilar natural phenomena.

To encourage student observation of land forms and promote the idea that these forms are the result of forces acting on and within the earth.

To encourage student hypotheses about causes of geological phenomena based on observation and testing.

FIELD GEOLOGY**Objectives and
Evaluation:**

Students should be able to explain or hypothesize about the effects of a river or stream on the land, by relating the formation of at least one area to the erosive action of water. They will also be able to perform simple tests to group sample rocks.

Grade Level:

Intermediate, Jr. High.

Place:

De Luz.

Materials:

Geology Test kits, pencil and paper, geologists' hammer.

Activity**Procedure:**

Each of these can be used as a separate activity.

1. Walk around the school yard or the De Luz nature area. Climb to a vista point if possible.
 - a. Describe what you see: flat land, sloping, hills, etc.
 - b. Categorize hills, valleys, delta, creek, etc.
 - c. Develop hypotheses to explain the origin of the formations (try to test later).
 - d. Look for sources of air and water pollution, and try to determine if they relate to mineral resources.
2. Visit a quarry, gravel bed, or road, or a creek bed. Try to find rocks of different texture and sort them into groups, by performing different tests.
 - a. Test for hardness and weight.
 - b. Find out if any rocks can be used to write with.
 - c. Are there any fossils?
 - d. Put a drop of acid on rocks and find out which bubble.
 - e. Which rocks are smooth and which have sharp edges?

- f. How did the rocks get to where you found them?
- g. What might have made them the size they are now?
- h. Find a rock that is changing into clay or sand.

What else will be mixed with it to make it soil?

- 3. Look for places that might show where the earth has moved (fault lines). Examine the rock on both sides of the fault.
- 4. Visit a road cut. How many different kinds of strata can you see? Can you identify any of the rocks?

Related Activities:

Study the geological history of the area. Start a mineral collection and identification study center.

BIBLIOGRAPHY FOR GEOLOGY

Gross, Phyllis and Esther P. Railton. Teaching Science in an Outdoor Environment. University of California Press: Berkely, c1972. pap.

Hone, Elizabeth B. and others. A Sourcebook for Elementary Science. Sacramento: California Department of Education, c1967.

WILDFLOWER SLIDES

Goal: To better acquaint children with the wildflowers of De Luz.

Objectives and Evaluations: Each child will recognize and be able to identify, within his age and ability, some of the wildflowers at De Luz.

Grade Level: Primary, intermediate or Junior High.

Place: De Luz.

Activity Procedure: We have 160 slides of wildflowers found in the De Luz area at different times. They are arranged in order as they bloom. (These slides could be shown in preparation for a flower walk, as an activity during inclement weather, or for identification, etc.) Flowers normally blooming in early spring come at the beginning and those normally blooming in late summer come at the end. There are two shots of each flower, a field shot (distance) and a close up. Each slide is labeled. A tape recording covering each slide in order and a written outline are available.

NATURE TRAIL

- Goal:** To make students aware of the beauty and importance of natural places.
- Objectives and Evaluation:** Each child within his age and ability will understand and be able to explain about some of the flora, fauna, geological phenomena, and interrelationships in the De Luz area.
- Grade Level:** Primary, intermediate or Jr. High.
- Place:** De Luz.
- Materials:** Trail Guide.
- Activity Procedure:** Using the trail guide walk your children to the staging area. There set standards for using the trail..
- Children should:
1. Walk in single file on the trail.
 2. Not handle plants they are unfamiliar with (possibly poison oak).
 3. Listen for directions and follow them immediately.
 4. Leave sticks on the ground.
 5. Follow any other standards you feel are important.
- With the aid of the trail guide, cover the interest area stations.
- PLEASE! RETURN TRAIL GUIDE AT THE END OF YOUR WALK!
- =====
=====

WILDLIFEGOAL

To make students aware and appreciative of the variety of wildlife in the De Luz area.

SUB GOALS

To enable students to identify wildlife by their signs and sounds.

To make students aware of the micro-wildlife world.

To help children understand the importance of the interrelation of wildlife with the environment.

WINDOW ON THE INSECT WORLD**Objectives and
Evaluation:**

1. Each child will understand and be able to describe the activities of various insects.
2. Each child will be able to make general comparisons of the various insects found on a piece of wood.

Grade Level:

Primary and Intermediate.

Place:

Classroom and De Lüz.

Materials:

Piece of decaying wood, shoe box, transparent wrap, and tape.

**Activity
Procedure:**

First, cut a large window in the shoe box (on lid or on side), and tape the transparent wrap over the hole. Next, put the decaying wood inside of the box, and be sure to punch a few small air holes. The insects harbored by the wood can be easily observed.

HATCH A COCOONObjectives and
Evaluation:

1. Each child will understand and be able to describe and illustrate the life cycle of a moth.
2. Each child will be able to relate this cycle to other living forms.

Grade Level:

Primary and Intermediate.

Place:

Classroom.

Materials:

1 large grocery bag, cocoon, tape, transparent wrap, and clay.

Activity
Procedure:

In the early spring collect cocoons off of shrubs and trees. First cut a large window in the paper bage and tape the transparent plastic over the hole. Place the cocoon in the bottom of the bag. Now close the top of the bag and staple. Wait and watch. . .in 2 to 6 weeks a moth will emerge.

SMALL SOIL INSECTSObjectives and
Evaluation:

1. Each child will collect and examine soil bugs and note the types of bugs found in soil.
2. Each child will be able to explain the relationship between soil bugs and sunlight or darkness.
3. Each child will be able to explain the function of soil bugs to their environment.

Grade Level:

Primary, intermediate or Jr. High.

Place:

Schoolyard and De Luz.

Materials:

"Berlese" funnel (glass jar with a tagboard funnel and some window screening attached to the bottom of the funnel), some well-rotted soil and 100 watt light bulb, and 1 bioscope, hand lenses.

Activity
Procedure:

Fill a berlese funnel with some well rotted soil and turn on a 100 watt bulb over the funnel. The light and heat will drive the insects deeper into the soil. They will eventually drop out through the screen and into the jar. The insects can now be studied under the bioscope.

Questions:

How are soil insects all alike? How are they different? How do they react to the light when not in the soil? Are their body structures different from fly insects? If done at your school compare the data with that of De Luz - what are the results?

CREEPY CRAWLERS

- Objectives and Evaluation:** Each child will investigate an open meadow for insects, spiders, leaf-hoppers, etc., and discuss the relationship of animals to their environment.
- Grade Level:** Primary or intermediate.
- Place:** De Luz.
- Materials:** 1 good pair of eyes; 1 hand lense.
- Activity Procedure:** On hands and knees, crawl into an open field. Flap down on your stomach and look for insects, spiders, aphids, worms, sow bugs, leaf-hoppers, etc. Examine some with the hand lense.
- Questions:** What is the relationship between the plants in this field and the animals seen? How many different animals were you able to locate? If you had not seen any little animals, what evidence of animal activity might you have seen? Do you think these animals might be found in a wooded area? Near a stream? How did the animals feed? What did they feed on?

CREEPY CRAWLERS: ACTIVITY 2

- Materials:** Pill jars, hand lenses.
- Activity Procedure:** While crawling in the field collect a few specimens in pill jars. Record data. Then release animals in the field.

TREE INSECT ZOO

- Objective and Evaluation:** Each child will understand and be able to describe their observation of insects' effect on trees, either helpful or destructive.
- Grade Level:** Primary, intermediate and Jr. High.
- Place:** De Luz.
- Materials:** 1 large jar, small jar that will fit inside of large jar, water, a tree branch that's insect infested, cotton balls.
- Activity Procedure:** Put water in a small jar and place the branch in the jar. Seal mouth of the jar with cotton. Now place the large jar over the smaller jar and let children observe insects' effect on tree branch.
- Questions:**
1. What do you think are some effects of insects on trees?
 2. Which do you think kills more trees - forest fires or insect infestation? (Insects: In San Diego County more forest trees are destroyed by the work of harmful beetles than by fire. The destruction of trees increases with long periods of dry, warm weather. The dry weather weakens the trees' resistance while the warm weather increases the number of beetles that attack the trees.)

EXAMINATION OF POND WATER

- Objectives and Evaluations:
1. Each child will collect pond water samples to examine.
 2. Each child will be able to compare the microscopic animals seen and their relationship to other pond animals.
 3. Each child will be able to illustrate microscopic animals seen.
- Grade Level: Primary, Intermediate or Junior High
- Place: De Luz
- Materials: Bioscope and guide, paper, pencils.
- Activity: Have the children collect a sample of pond water from the fish pond at the front of the De Luz School. After carefully setting up the bioscope, examine a droplet of water, which should be teeming with wild-life. Look for paramecium, amoebas, algae, etc.
- Procedure:
- Questions: How are they all alike? How are they all different? Are they plants or animals? How many legs? What are they doing?
- Ask children to sketch what they see.

POND OR STREAM STUDY

Objectives and Evaluation:

Students will be able to:

1. Tell what an insect is (describe determining characteristics).
2. Communicate to others one example of a predator-prey relationship.
3. Demonstrate understanding of conservation practices by limiting collections, and by returning wildlife to its natural environment.

Grade Level:

Intermediate, Jr. High.

Place:

A stream or pond.

There is an occasional seasonal stream on school property at De Luz. There is also a year-round stream that is partially on school property but can only be reached by the road. Remember, most of the stream area is private property. Observe but do not damage.

Activity Procedure:

Don't stay inside and talk on a sunny day! Distribute equipment and head toward observation area. Stop a little distance from the water area and collect equipment into group piles.

Ask:

1. What would you like to find out at the stream? Write down some questions you'd like to answer.
2. If we want to learn about how the stream animals or insects behave, how can we best observe them? (Example - ask a student how we should approach the stream or pond. Elicit - go

quietly so as not to frighten wildlife.)

3. What are different parts (zones) of a pond or stream, where we might find different kinds of life?
 - a. At the water's edge, on the bank (shoreline zone)
 - b. Partially submerged (shallow water)
 - c. In the water (deep water)
 - d. On the water (surface)
 - e. Under the water (bottom-in the mud!)
4. For safety and supervision, set boundaries. Point out interesting biotic areas, like sandbars, plant areas. Go down to the pond or stream (without taking collecting equipment) as quietly as possible. Ask children to observe pond life in its natural habitat, looking for:
 - a. An aquatic insect moving in or on the water.
 - b. Animals feeding on plants.
 - c. Predator-prey relationships (animals catching, feeding on animals)

Return to discussion area and talk about what was observed.

5. What did you see?
6. Do you think you would have seen so much if we had gone down to the water laughing and talking?

Divide into groups. Each group should have: a strainer, a pie tin or two, film cans, a hand lense, a field guide to aquatic insects. Ask children to collect specimens for close-up study.

7. How many specimens should we collect? As many as possible? Elicit - a few specimens of many different species. Children will mention reasons for having more than one of a species - possibility of having a male and female, for example.

Ask each child to become an "expert" on one of this specimens,

by observing the organism's behavior and taking notes. Children are fascinated by names, but ask:

8. What can we find out about the beastie without knowing its name? Give children about 30 minutes (depending on age and attention-span of group) for collecting and observing specimens. Encourage use of the hand lenses to examine body parts, and sketching as a record. Bring pans to one spot to discuss and compare findings. Ask children who wish to tell a little about their specimen. Study the insects outside as much as possible. If desired, a container of stream water and some specimens may be taken inside to study under the microscope or bioscope. Make sure all equipment is clean before returning to storage areas. Culminating discussion: emphasize interrelationships, food chain.

SCAVENGER HUNT

Objectives
and
Evaluation:

1. Each child will be able to discover a wide variety of organisms and share findings.
2. Each child will be able to identify similarity and differences for purposes of grouping.

Grade Level:

Primary, Intermediate and Junior High

Place:

De Luz

Materials:

Paper sack or other container for collecting

Activity
Procedure:

1. Divide the class into teams of 3 to 5 and provide each team with a paper sack. Have the teams go out and find something that begins with each letter of the alphabet. Instruct the children that nothing is to be picked off a living plant and that all animals are to be returned. Set a time limit. Have the teams share their findings and the team having the most complete set wins.
2. Another activity might be to promote interest in an area by listing something for each letter of the alphabet recalled from an excursion. The longest list wins. Have the pupils suggest ways of grouping other than alphabetical.
3. Each child is given a list of identical items to be found in a specific area. The list must be made carefully so as not to destroy an area, and can be keyed to emphasize or test new vocabulary learned. Some examples are:
 1. A plant without chlorophyll. (Witches' Hair or Dodder)
 2. Something that will become soil. (Rock)
 3. "Clothes" thrown away by an animal. (Shed skin)
 4. Duff, mulch, or humus.
 5. **A parasite.**
A discussion of each item found and why it was chosen should follow this activity.

ANIMAL MOVEMENTS

- Objectives and Evaluation:** Each child will be able to discuss one animal's means of locomotion and describe the importance of the form for the animal's survival.
- Grade Level:** Primary, intermediate, or Jr. High.
- Place:** Schoolyard or De Luz.
- Materials:** None.
- Activity Procedure:**
1. Observe the means of movement in animals (snails, birds, ants, squirrels, rabbits, etc.).
 2. Measure animal speed. How long does it take for an ant to travel 5 inches, a snail to travel 10 inches, etc.
 3. How far can a grasshopper hop?
 4. Describe various types of locomotion and categorize the animals using these forms.

MIGRATION OF BIRDS

Objectives and
Evaluation:

1. Each child will log and identify some of the familiar birds of the area.
2. Each child will be able to recognize some of the more familiar bird calls.

Grade Level:

Primary, intermediate or Jr. High.

Place:

Schoolyard and De Luz.

Materials:

Log book, Field Guides for bird identification by Roger Tory Peterson: How to Know the Birds and cassette tape, 'A Field Guide to Western Bird Songs'. Another helpful book is Introducing Our Western Birds by Matthew J. Vessel and Herbert H. Wong.

Activity
Procedure:

In the fall, many birds begin their migration south. A daily activity for the children could be to keep an eye on the sky to watch for migratory birds. The children could keep a log of what is seen. Another activity could be to log the birds of this area - identify by beaks, feet, silhouettes, etc. When at De Luz, the children could identify birds and make comparisons with the birds located around their schools. Keep log with pictures and labels. Go for a walk to look and listen for birds. Look for feathers or tracks, to add to the feather displays at De Luz.

WILDLIFE SOUNDS

- Objectives and Evaluations:** To develop students' listening skills and ability to discern different natural sounds. To encourage children to relate sound and emotion and to evaluate their emotional response to different sounds.
- Grade Level:** Primary, Intermediate
- Place:** This activity can be done at De Luz as preparation for a "Listening Walk" or during inclement weather. It can also be used for classroom preparation before visiting the Ecology Center.
- Materials:** Record or cassette recording: "Sounds of the American Southwest"
- Activity Procedure:** Ask children to listen silently to recording with eyes closed, then answer the following questions:
1. From the sounds you hear, where would you think you are? (What kind of area - city, desert, mountains, for example)
 2. Do you think you can identify any sounds? Which ones?
 3. What happened after the thunderstorm?
 4. How did you feel while you listened to the sounds?
 5. Were there any sounds that gave you special feelings? What were the sounds, and how did you feel?
 6. Were some sounds frightening, even though you didn't know what they were? You could go back and identify these sounds. Do any of them serve as a protective device for the animals? (How might a scary sound help an animal?)
- You may wish to play the recording again after children have answered questions, and discuss different sounds and the responses evoked from students.

WILDLIFE COUNT

- Objectives and Evaluation:** Each child will observe and discuss the many forms of wildlife possibly seen on the trip to and from De Luz.
- Grade Level:** Primary, intermediate and Jr. High.
- Place:** Bus trip to De Luz.
- Materials:** Paper and pencil.
- Activity Procedure:** On your way to De Luz watch for wild life. Log the number and kind of animals seen. Keep a separate log at De Luz of wildlife seen. Compare the two logs. A log of animals near your own school could be brought along for comparison also.

SCATOLOGY - Analyzing Animal Droppings

- Objectives and Evaluations: 1. To enable students to view the study of animal droppings (scat) as another legitimate form of scientific analysis, without placing negative value judgement on the content examined.
- Grade Level: 2. To enable students to identify at least one kind of item (berry, small rodent) in the diet of an animal by examining its scat or droppings.
3. To enable students to hypothesize about the eating habits of the animal whose scat is analyzed: whether it is carnivorous (meat-eating), omnivorous (meat- and plant-eating), or herbivorous (plant-eating), basing the argument on direct evidence from the scat analysis.
- Place: De Luz, and other areas frequented by animals.
- Materials: Hand lens
- Activities: Discuss vocabulary words: carnivorous, omnivorous, herbivorous.
- Procedure: Try to locate a trail used by animals (check for tracks) and look for animal droppings (or regurgitated owl pellets).
- Break scat apart (using a stick if desired) and examine to determine what the animal eats.
- Questions to ask:
1. What do you find in the scat? (berries, seeds, feathers, hair, bones)
 2. From what you found, do you think the animal was carnivorous, omnivorous, or herbivorous (vegetarian)?
 3. Is there any other clue that might tell us what animal left this scat? (shape, size, placement of scat - covered, etc.)
 4. Are there any insects in the scat? What are they doing?
 5. What will finally happen to this scat?
 6. If an owl pellet is found, how can we know it is an owl pellet and not another animal's droppings? (small bones will be clean, unbroken - often the pellet contains an entire rodent skeleton) Why are the bones so clean? What happened to the meat?

ANIMAL TRACKSObjectives and
Evaluation:

1. Each child will be able to identify a few of the common animal tracks of the area.
2. Each child will be able to locate and cast an animal track if available.

Grade Level:

Primary, intermediate or Jr. High.

Place:

De Luz.

Materials:

Cardboard strip, tongue depressors, milk cartons, plaster, water, modeling clay.

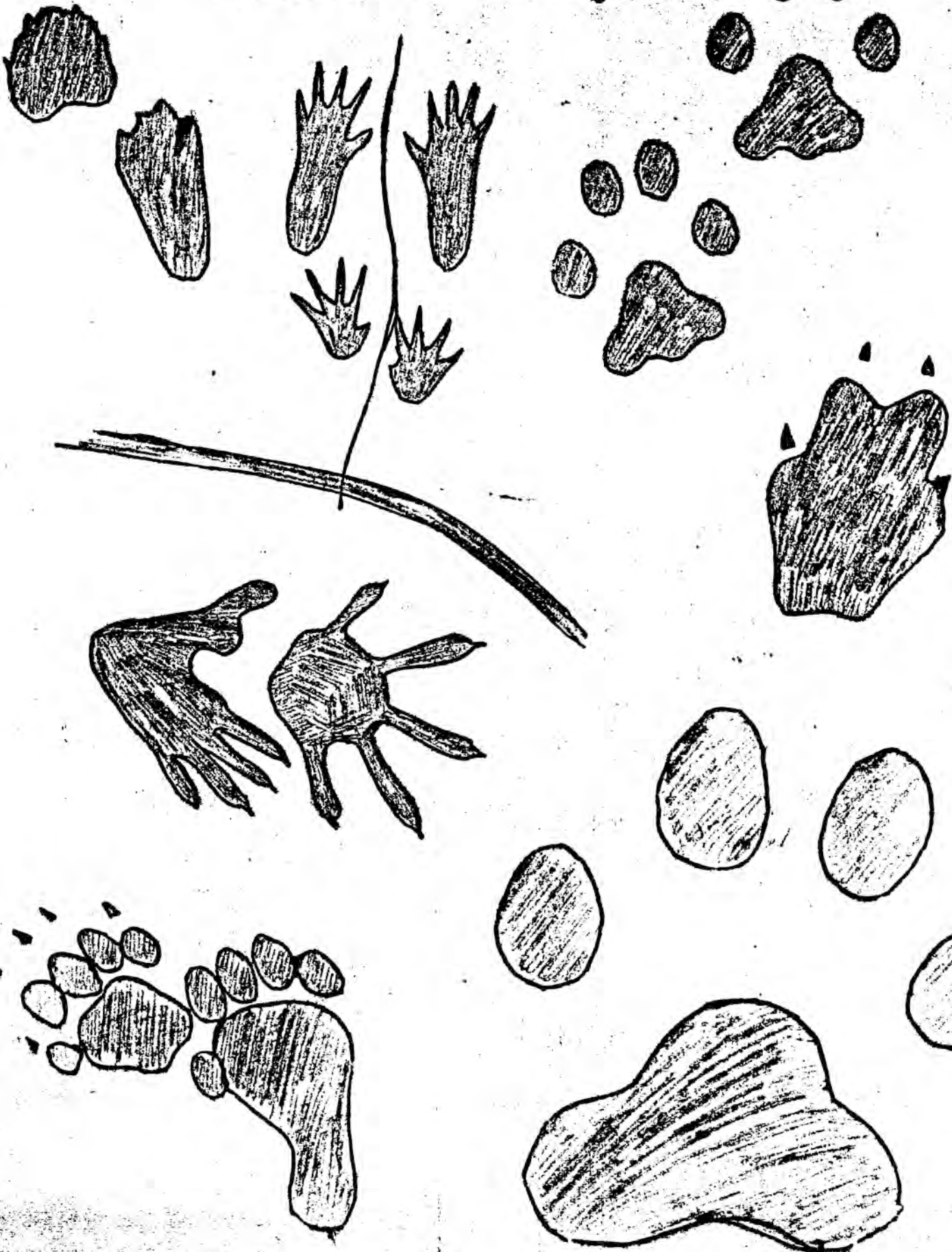
Activity
Procedure:

First a suitable track must be located. The best type is a well-defined track in a moist soil or a track left in a dried area previously damp. Tracks found in sandy or dusty soils will not work very well. Once a track is located each child should form his cardboard strip into a collar to be sunk into the ground around the track. Then mix the water and plaster to a thick pancake-batter consistency and pour into the paper collar. Allow the plaster to set. Then lift the collar and cast from the ground.

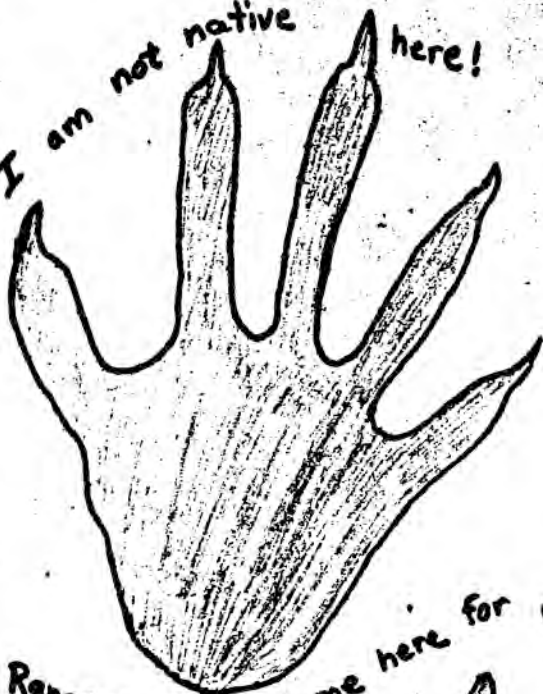
To make a clean cast, the child needs only to brush off dirt, pebbles, etc., and push the original cast into modeling clay. From the modeling clay mold, a clean track can be made by following the above procedure.

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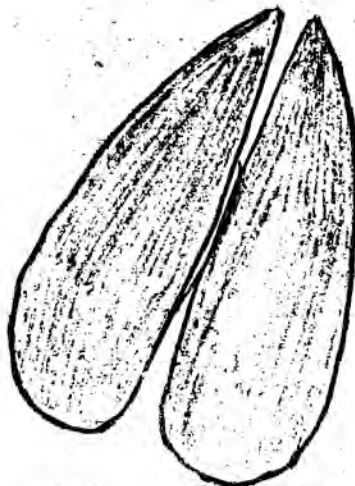
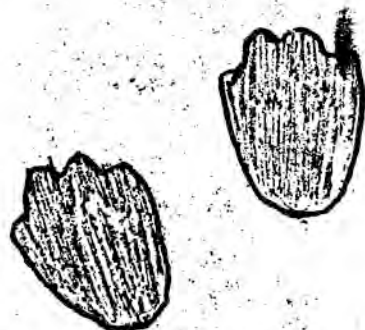
Who am I? Animals of San Diego County

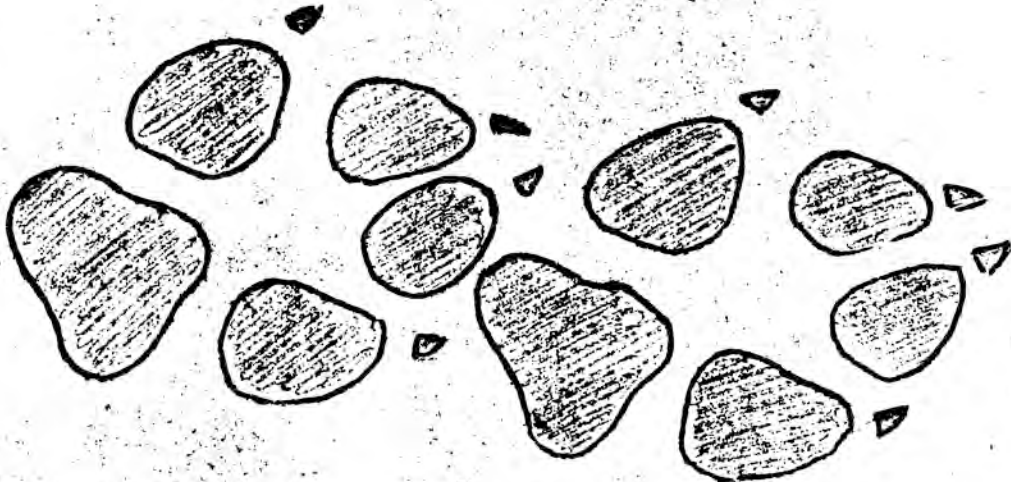
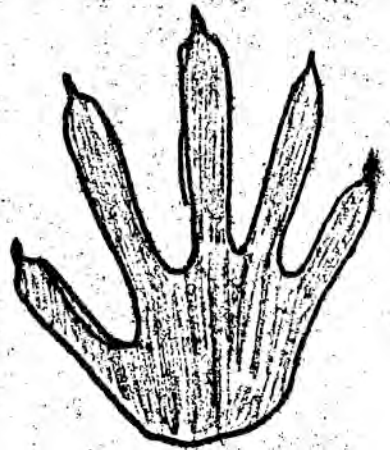
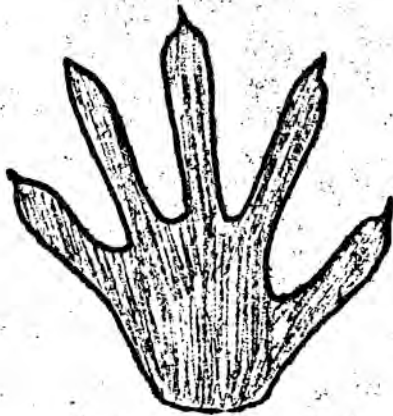


I am not native here!



Rangers brought me here for a purpose!





KEY TO ANIMAL TRACKS

I. Clockwise - upper left to lower left.

Page I.: Weasel, woodrat, bob cat, fox, mountain lion, skunk, and opossum.

Page II.: Beaver (upper and lower track on left - normally these would be obliterated by tail), rabbit, mule deer (walking).

Page III.: Raccoon (prints show all four feet), coyote, mule deer (running - hooves are spread and dewclaws sink into soft ground. Tracks are farther apart.

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SURVIVAL AND LOCATION

GOAL

To enable students to better relate to the natural environment.

SUB GOALS

To encourage the development of self-reliance in the out-of-doors.

To encourage interest and development of survival skills.

To enable students to use scientific tools of location not normally included in classroom programs.

To increase students' awareness of the concept of location and need for being able to find direction.

LEARNING TO USE A DIRECTIONAL COMPASS

Objectives and
Evaluation:

Each student will learn and be able to demonstrate his knowledge of:

1. How to use a compass to find direction.
2. How to render direction into degrees.
3. How to transfer degrees into direction.

Grade Level:

Intermediate, Jr. High.

Place:

De Luz or school.

Materials:

Directional compasses (preferably engineer compasses with degrees and sights), at least 1 for every 2 students; cardboard diagrams showing compass, circle and degrees; portable blackboard and chalk.

Activity
Procedure:

1. Have students assembled outside, in a fairly flat, open area. Ask children to point (without talking) to:
 - a. Where they think Fallbrook is.
 - b. Which direction they think is North.
2. How can we find out which of you is right? Children will mention using a compass.
3. Distribute directional compasses. Who has used a compass before?
4. Who knows what the compass tells us? Answers will vary (direction; how to find your way, etc.). Point out that there is only one thing the compass tells us, and that is which direction is North. (All other information can be figured out after we know that one thing - but the compass doesn't tell us).
5. How does the compass tell us which direction is north? Many children will probably know that the arrow or needle points to north, but

- may not know why. Describe the compass construction and demonstrate that the compass must be held level and horizontal for it to work. Ask children to hold the compass properly and now point to north.
6. Learning about degrees. Children may know that circle is divided into degrees; if not, use diagram to help explain.
 7. Relate degrees on the circle to directions (180° = south, etc.). Have children practice with the compass. Ask them to point to different directions, using degrees rather than names of directions (145° , 270° , etc.). If any have difficulty understanding, ask them to pretend they are standing at the center of the compass, with the degrees marked in a circle all around them. Practice transferring degrees into directions and directions into degrees.

UNDERSTANDING TOPOGRAPHIC MAPS

- Objectives and Evaluations: Each student will be able to:
1. Understand and demonstrate on a model how topographic lines are used to show elevation.
 2. Read and understand a topographic map.
- Grade Level: Primary, Intermediate, Junior High
- Place: De Luz
- Materials: Modeling clay, plastic box with lid, masking tape, grease pencils
- Activity Procedures: Topographic maps are best studied after children have done some preliminary mapping activities.
1. Discuss students' ideas of how elevations could be shown on a map.
 2. Exhibit a topographic map of the area for students to look at. Some may already be familiar with topographic maps.
 3. Using a plastic box, show students how to make contour lines to indicate elevation.
 - a. In the box, build a hill about five inches in diameter out of modeling clay.
 - b. Place a strip of masking tape up and down the outside of the box.
 - c. Mark the tape every $\frac{1}{2}$ inch from the bottom to the top of the box. Let the $\frac{1}{2}$ inch marks represent a certain number of feet of elevation (25 feet or 50 feet are common intervals used on maps).
 - d. Pour water into the box until the level of the water reaches the first mark on the masking tape.
 - e. Use a sharp object (pencil point) to make a groove around the modeling clay where the water's edge hits it.
 - f. Add more water until it reaches the second line on the tape. Make a second line on the model where the water reaches it.

- g. Continue process until water covers the model.
- h. Pour out the water, leaving the model in the box. Place the lid on the box, and put a sheet of clear acetate on top of the lid.
- i. Look at the model from a single point overhead, or keep one eye closed and the other eye right over the pencil.
- j. Trace the grooved contour lines into the acetate with a grease pencil.

How do you tell where the low places are?

Are the smaller rings at the top or bottom of the hill?

How can you tell where the hill is steep?

How can you tell where the slope is gentle?

If you went on a hike on a mountain like the model, how would you travel if you wanted an easy trip? A difficult trip?

A short trip?

4. Have children try making models of some of the following:
 - a. Volcano
 - b. Gravel pit
 - c. Cone
 - d. Hemisphere
 - e. Lake with an island
 - f. Pyramid
 - g. Things they make up.
5. Ask students to make topographic maps from the models.

MAKING MAPS FROM 3-D MODELS

- Objectives and Evaluations: Students will understand and be able to demonstrate that contour lines, as used to show elevation on maps, are a means of representing reality.
- Grade Level: Primary
- Place: De Luz The activity could also be done as a preliminary to visiting De Luz.
- Materials: Sand boxes, water, containers for water, paper, pencils, tongue depressors or popsicle sticks, string.
- Activity Procedures:
1. In pairs or small groups, have children make simple sand models of landscapes. They may need to sprinkle the sand with water until it is wet enough to stick together.
 2. Ask questions of children while they work. Sample questions:
 - a. Where do streams usually get wider?
 - b. Can we tell which bank is which?
 - c. Is there any landmark you could add to the model which would help tell where we are?
 - d. How far away is that cliff? What direction does it face?
 - e. If the tree is that big, how high do you think the hill should be?
 3. Suggest that the children make "mystery" maps of their models. Hang or have children swap maps.
 4. Have others try to find the model from which the map was drawn.
 - a. Do all the maps of the same model look alike?
 - b. If not how and why are the maps different?
 - c. Why is it easier to draw a map from the model on the sand table than it is outside?

"You can see the whole thing at once."

"It's easier to draw things the right size."

"We can look down from the top."

5. Groups of children can work together to make contour lines or sand models using probes marked in inches (made from tongue depressors or popsicle sticks) and cotton string for contour lines, the children can show the different levels on the models.
- a. If you were to walk around the mountain on each piece of string, would you be going up and down or staying level?
 - b. How did you figure out where the 1-inch, 2-inch, and 3-inch lines should be?
 - c. Do the strings always have the same amount of space between them?
 - d. When are they close together? When are they far apart?
 - e. Do any of the string touch?

OUTDOOR MAPPING**Objectives and Evaluation:**

Students will be able to understand and use tools of mapping to show relative location of landmarks in a specific area. They will be able to find the elevation of one area as related to another, and show that elevation on a map.

Grade Level:

Intermediate or Jr. High.

Place:

Schoolyard (for preliminary work) and De Luz.

Materials:

Pencils, paper, measuring equipment (yardsticks, measuring wheels, string), directional compasses, transparent acetate, sighting ruler, levels, markers, range rods.

Activity Procedure:

The outdoor lends itself to many different kinds of mapping projects. Children can map their schoolyard, their neighborhood, or the De Luz Ecology Center. They can map the way the area looked before there were any buildings. They can map seasonal changes at De Luz, the sky at different times of the year, development of a new shopping center. Once they have learned mapping skills, let them use their imaginations!

1. Landmarks and compasses: mapping schoolyard.
 - a. Give every pair of students a large piece of paper cut in a circle. Suggest they stand somewhere in the schoolyard so that they are in the middle of their map and record features they see about them.

Questions to aid students:

1. How far away are the landmarks you want to record?

2. Can you use the compass to tell where on your map to place the flagpole? The corner of the school building? The fire hydrant?
 3. If you measure how far away things are, how do you tell where to put them on the map?
 4. Does it make a difference if you move to another place in the yard while you are making your map?
- b. After children have made their maps, give them time to look at one another's maps and discuss them.
1. Do all these maps look like maps of the same place?
 2. Can you tell where the map makers were standing?
 3. What are the things that make each map different from the rest?
2. Make a map that shows the shape of the schoolyard and its boundaries.
- a. Have one child measure how far away each corner or the property is from where the map maker stands.
 - b. The map maker stands in one place and sights along a ruler to the same corner that is being measured, or he can use compass directions as a guide.
 - c. He converts the measured distance to the scale he has drawn for his paper and draws a light line (one he can erase) to represent the distance to the corner.
 - d. After he has mapped all the corners, he joins them with straight lines. The connected lines show the shape of the property.

3. Mapping a hilly area.

Children will want to know how to convey different elevations. Let them use any methods they think will work for them. Many children will have to try various techniques before they see what kinds of problems are involved in mapping elevations. Others will be able to plan ahead.

a. Questions:

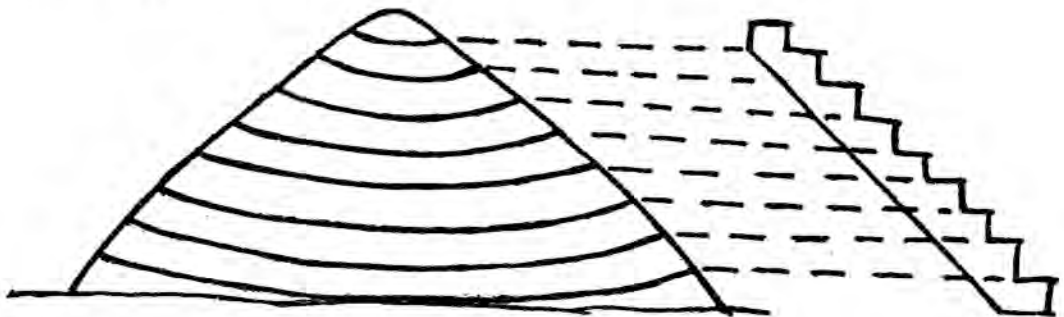
How do you show on your map that the land goes up and down?

When the land goes up, how do you draw it so it doesn't look as if you mean it's far away? It's high, not just out in the distance.

If you changed the hill into something flat, how could you fit it all on the map?

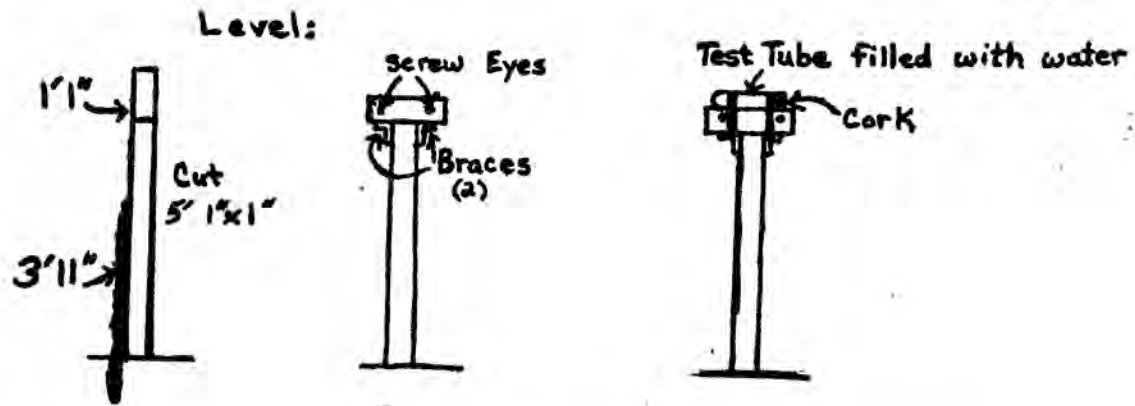
How does the hill compare to a flight of stairs? How would you draw stairs on a map?

How can you figure out how high or low different places are?



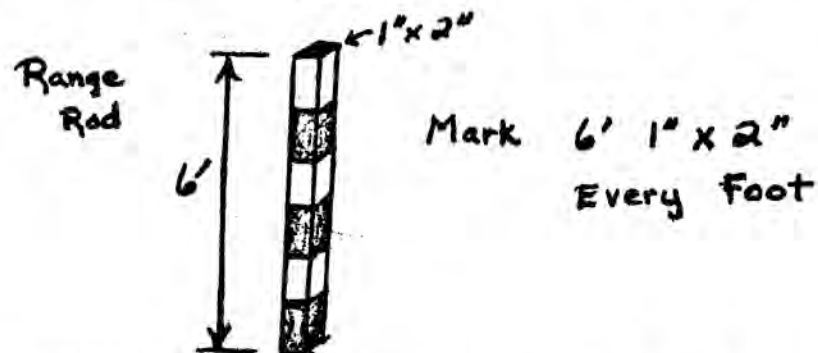
b. Have levels and range rods available to give children ideas.

For levels: 3 5-foot lengths of 1" x 1" soft wood.
 6 Screw eyes.
 3 6" x 7/8" diameter tubes (test tubes) and corks to fit.
 6 rubber bands
 6 large braces with screws screwdriver.



For markers: unbent coat hangers, colored construction paper, tape.

For range rods: 2 6-foot lengths of 1" x 2" soft wood, paint.



- c. Some children will try laying the range rods on the ground. Others will see you have to stand them up. Some will see that their eye must be at the level of the highest they are measuring. These questions may help the children focus on the problems of using a level:
- How can you tell you are really looking straight, not up or down?
- What happens to the bubble when you tip the level?
- How can you tell when the level is horizontal?
- How high is the level from the ground?
- How can you find all the places in the area that are at the same height?
- d. Here is a list of directions one class made for using the level and the range rod.

1. Find the elevation of most of the area (usually a low area).
2. Make this height your common reference point. Measure everything else from it.
3. One person looks through two screw eyes along the level from the common reference height. Others go off with the range rod.
4. Wherever the person who looks through the level can see the 4-foot mark on the rod, the land is at the same height as it is where he stands. (The level itself is 4 feet high.)
5. Wherever the person with the level sees the 3-foot mark on the range rod, the land is 1 foot higher than where he is standing.
6. If the person with the level moves, you have to know how much higher or lower his new location is in comparison with the common reference point.
7. Stick a colored marker in the ground at all places at the same height as the common reference point. . . that are 1 foot above the common reference point. . . 2 feet. . . 3 feet. . .and so on: Use a different color for each new height.

GETTING LOST

- Objectives and Evaluations:** Students will realize the importance of locating oneself in relation to the natural area. Each student will be able to use knowledge of location tools and ingenuity in a problem-solving situation.
- Grade Level:** Intermediate or Jr. High.
- Place:** De Luz. This activity should be done only after students have some experience using directional compasses and topographic maps.
- Materials:** Directional compasses, topographic maps of the De Luz Ecology Center area. Students should be adequately dressed for chaparral hiking. Long sleeves and boots (or sturdy shoes) are definitely recommended.
- Activity Procedure:** One of the most interesting opportunities in which to teach meaningful concepts occurs when students can solve the problem of "becoming lost". Although students may not really be lost, it is often rewarding to simulate the situation enough to bring them an impact of feeling and appreciation of being lost. A good site for simulation might be a valley in which the Ecology Center and familiar landmarks (such as the road) are obscured from view.
1. Location questions:
 - a. Where are we?
 - b. Which direction is the Ecology Center?
 - c. What is the best way back to the Ecology Center?
 2. Remind students that they have maps of the area and compasses that will help them find direction.
 - a. Find a flat, level area where the maps can be spread out so that all campers can see.

- b. Distribute maps and compasses - one of each to every team of partners.
 - c. Check students' ability to read the compass accurately.
 3. Orient the map.
 - a. What do we know from our compass? (Which direction is North - therefore we can find out where the other directions are)
 - b. Look at the map. Point out the orienting "North" and function. Discuss the magnetic North marker. How can we line our map up so that our north (on the compass) will be the same as North on the map?
 - c. Lay the map level on the ground. Lay a compass on the map and turn the map gently until the arrow for magnetic north on the map points in the same direction as the magnetic needle on the compass.
 4. Now the map is oriented, but where are we on the map? Study the contour lines carefully in order to visualize the topography or relief of the land. Search for streams, peaks, ridges, or valleys shown on the map that agree with those observed in the area. If necessary, climb to view point and look for the Ecology Center or a road.
 5. After locating your position on the map, determine what direction the Ecology Center is, and what is the best route back to the Ecology Center.
 - a.. Discuss the information that the map shows that will help in determining routes of travel: valleys, roads, streams, steep cliffs.
 - b. Discuss information not shown on the map: ground cover (talk about traveling through thick chaparral).

6. Draw a pencil line on the map from the known starting point to a place that can be located on the map and can also be seen as a landmark in the immediate surroundings. The landmark should not be so far away that the group's position on the map becomes uncertain.
7. Move along the selected route back to the Center. Coordinate the information on the map with the actual terrain.
8. If desired, have students locate the direction of other landmarks or places easily located on a large topographic map that shows Fallbrook, the Santa Margarita River, Red Mountain, etc.

FOLLOWING A COMPASS TRAIL

- Objectives and Evaluations: Students will understand and be able to demonstrate how to use a directional compass to follow a particular course of travel. Each student will also be able to explain what a chain length is and demonstrate how it can be used in mapping.
- Grade Level: Intermediate, Junior High
- Place: De Luz
- Materials: Directional compasses, clipboards, pencils, paper, 12" rulers
- Activity: To be done after children know how to use directional compasses.
1. Review use of directional compasses and degrees.
 2. Explain importance of using degrees when giving directions. For example, if you know that you want to go in a southwest direction, you could go a short distance and end up in approximately the right place. However, if you had to travel 10 miles to reach your destination, you might end up quite a ways from your target. Using degrees instead of naming a direction is more precise. If you know you have to go in the direction of 200° , you can travel as far as you want on that course, and wind up at the right place.
 3. Ask children to review by naming degrees and asking them to point in the proper direction.
 4. Could we use the compass to make sure we keep following the right course? For example, if we know we want to go in the direction of 200° , how could we use the compass to make sure we keep on that course? Students will probably think of holding the compass and walking with it. Ask one to demonstrate by picking a course and walking while holding the compass. Ask other students to watch and name any problems they think might be encountered (he could run into a tree; he can't walk

very fast; the ground is uneven, etc.).

5. How can we use the compass most easily and efficiently to follow the course?

After the course is chosen, have children hold the compass level and raise the sights on the compass to look through.

6. Carefully turn the compass so that the direction you want to go (the degree course) comes under the compass sight. Wait until the compass needle stops moving, then carefully look through the compass sight, along the degree course, until you see some landmark in the distance that is in line with that compass degree bearing. Now - couldn't you close the compass and walk to the landmark easily, and be sure you have come the right direction?

7. What if the landmark isn't as far as we want to go?

If we want to go further than the landmark we've chosen, then we walk to the first landmark, then sight through the compass again to find another landmark further along.

8. What are good landmarks? Discuss the desirability of using permanent features. Using an automobile, for example, could prove a problem if its owner suddenly drove it away.

9. In order to reach a destination, we need to know two things.

- a. What direction to go.
- b. How far to go.

If we know where we are, we can look on a map and measure the distance to our destination. But if we are making a map for others to follow, we might try a different way.

10. Have you ever seen a "pirate map" in which you are told to walk so many paces in a certain direction? We could mark the distance to go in each direction by using paces.

11. Ask two children (one short and one tall) to walk to a particular

landmark and count their paces silently while their friends watch, ask the other students if they notice anything that might be a problem. Then ask each student how many paces he took to get to the landmark (concept: paces will differ for each child),

12. How can we pace off distance and have the distance come out the same for different people?

CHAIN LENGTH: A chain length is 66 feet. It is a surveying measurement in mapping instead of paces.

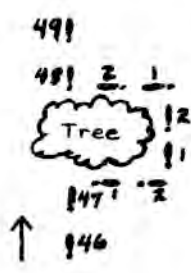
13. How many paces do you take to walk one chain length?

There is a chain length measure marked on the driveway at De Luz. Ask each child to start at one line and walk as straight as possible and as naturally as possible to the other marked line counting the number of paces he takes. For a check, re-count paces on the way back (if there is great disparity between counts, do it again; otherwise take the average if the two differ only slightly). Example: one child might take 30 steps to make one chain length; another child might take 26.

14. Now ask the same two children to walk again to the same landmarks. Ask them how many chain lengths they had to walk,

Example: If the child who takes 30 paces to a chain length has to walk 80 paces to reach the landmark, he will have walked $2 \frac{2}{3}$ chain lengths. The child who takes 26 paces to a chain length will walk $69 \frac{1}{3}$ steps to the landmark, but will still go $2 \frac{2}{3}$ chain lengths.

15. How can you walk around an impediment (such as a tree without changing your pace measurement? Demonstrate, according to diagram.



16. For a culminating activity, have children pick a small area, check it for snakes, and ask them to make an "Invisible Trail" using their compasses. These compass trails are called "Orienteering" courses and are popular forms of recreation in Europe. The "Treasure Island Trail" is an example.

98 TREASURE ISLAND
TRAIL

Orienteering

Name _____

Room _____

Date _____

1. How many feet in a chain length?
2. How many paces do you take to equal one chain length?

	DIRECTION	DISTANCE
START:	1. 120°	3 1/4* chain lengths
	2. 360°	2 c. l.
	3. 300°	1 1/4 c. l.
	4. 240°	2 1/8 c. l.

3. Where did you end up?

*To find a fraction of a chain length:

Multiply the number of your paces by the fraction.

EXAMPLE: You take 28 paces to 1 chain length. To find 3 1/4 chain lengths, first multiply $28 \times 3 = 84$. Then $28 \times 1/4$, which is $\frac{28}{1} \times \frac{1}{4} = 7$. $84 + 7 = 91$. You walk 91 paces. Round off fractions of paces.

MAKING A SOLAR STILL
(obtaining water using sun's energy)

Objectives and
Evaluation:

1. The student should be able to explain phenomena such as fog, clouds and rain in terms of evaporation and condensation.
2. The student should be able to obtain drinking water by using the solar still.
3. The student should be able to observe and explain that air contains some moisture, even in arid regions.

Grade Level:

Intermediate, Jr. High.

Place:

De Luz, schoolyard - a sunny location.

Materials:

Sheet of clear plastic, 1 sq. yd. or larger; spade or shovel; can or clean cup.

Activity
Procedure:

1. In a sunny spot, dig a hole about one yard in diameter.
2. Place a container (cup, pan, or can - clean if water is to be tasted) in the bottom of the hole.
3. Cover the hole with a sheet of smooth, clear plastic. Anchor the sheet with rocks and seal with dirt around the edge of the hole in such a way that the sheet sags into the hole but does not touch the ground except around the perimeter. Put a rock in the center of the plastic, directly over the container.
4. Wait several hours. Look for moisture drops on the underside of the plastic and for water in the container.

Questions for discussion:

- a. Where does the water come from?
- b. Why does it condense on the plastic?

- c. Can you relate what has happened here to fog, clouds, or rainfall? How?

Activity**Variation:**

Set up one still in the sun and another in the shade. Compare the amount of moisture collected in each still.

Related classroom**Activities:**

Study distillation.

Read books on wilderness survival.

Experiment with greenhouses.

EDIBLE WILD PLANTS

Objectives and

- Evaluation:
1. Each student should be able to identify at least 3 edible plants found in the De Luz or Fallbrook area.
 2. The student should be able to explain or describe what part of the plant is edible or how it is prepared.
 3. Each student should be able to give at least 1 good reason why unknown plants should not be eaten.

Grade Level: Intermediate, Jr. high.

Place: De Luz.

Materials: Guides to edible plants (see bibliography for Survival Section). Especially useful are Common Edible and Useful Plants of the West, by Muriel Sweet, and pamphlet, Native Food Plants by the San Diego Society of Natural History. Card guide: Edible and Poisonous Plants of the Western States.

Activity

- Procedure:
1. Take a walk through different natural areas, (chaparral, under the oaks, in the meadow) and try to identify edible plants, using the guides. Try to avoid identified plants on the Nature Trail so students can make their own identification.
 2. Stop in an open area for discussion. Try to pick an area that includes representative food plants that you have seen on your walk. Discuss reasons for not sampling any plants until they have been **identified** and their identification is confirmed by the teacher.
 3. While discussion is going on, ask one adult to check area for snakes and poison oak. Point out any dangerous areas to students and set boundaries.

4. Ask students to work in small teams (2-6) within the identified boundaries.
5. Ask each team to explore the area and carefully take tiny samples (1 leaf) of edible foods. Set a time limit for exploring and selecting food plants, and ask children to be ready to identify each specimen collected and tell how it should be prepared for eating.
6. After students have explored and collected, discuss the findings of each team. (You might want to make up a worksheet for identification questions).
 - a. What have you found that could be used as food?
 - b. How would you prepare it?
 - c. Do you think Indians might have used it for food (is it a native or an imported plant)?
 - d. Are there any poisonous plants you might confuse with this plant? If there are any poisonous plants that look like it, how can you tell them apart?
 - e. Have you learned anything new today that might help you survive in the wilderness?

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HEALTH FORM
DE LUZ ECOLOGY CENTER

Student's name _____ School _____
 Address _____ Teacher _____
 Telephone _____ District _____
 Name of Parent or Guardian _____ Business phone _____
 Phone number of family physician _____

It will not be necessary for your child to have a physical examination before going to outdoor school. However, you should be sure that your child is in good health. If there is any question regarding his physical condition, this might be an excellent opportunity to have him examined. In case of any emergency you will be notified.

I hereby authorize _____ School District to provide medical care if necessary for _____ while in attendance at the outdoor school.

Parent Signature _____

1. Does your child have any allergy which might affect him at the outdoor school (poison oak, pollen, food, medicine or inoculation)? Yes _____ No _____
 If so, give details _____
2. Should your child take any medicine regularly? Yes _____ No _____
 If so, give details _____
3. Do you know of any health factor that makes it advisable for your child to follow a limited program of physical activity? Yes _____ No _____
 If so, please explain _____
4. What is the approximate date of your child's last tetanus shot? _____
5. Has your child been exposed to any communicable disease within the past 21 days? If so, what? _____ Yes _____ No _____
6. Please specify any other information that would be helpful to our staff in caring for your child. _____

Is your child allergic to bee stings? Yes _____ No _____. If yes, you as a parent must provide a bee sting kit to be taken on the trip.