KEEP

Kern Environmental Education Program

Pre- and Post Trip Study Units and Teacher Resource Guide

Montaña de Oro Campus

August 2013

Office of John G. Mendiburu, Ed.D.
Kern County Superintendent of Schools
1300 17th Street–CITY CENTRE
Bakersfield, CA 93301-4533

Rev. 7/17 TRG_Ocean.indd

Table of Contents

Foreword

Hello and welcome to the Kern Environmental Education Program Ocean Campus. As you begin to prepare your students for their week at KEEP you may want to glance over the following resource, data and curriculum guides to ease your apprehensions about your visit. If you are a returning teacher, please take a few minutes to flip through the guide to "remind" you of our policies, what your responsibilities are before and after your arrival and what the staff expects of you and your students. If you are a first time teacher coming to KEEP the following information should adequately prepare you and your students for your week's visit.

KEEP is for kids. The curriculum, rules and schedule are based on this philosophy. Please try to keep this in mind as your week progresses. All walks, evening programs, campfire programs, meals and rules are conceived with the students interest, safety and well-being in mind. The more time in preparation that you spend in the classroom before arriving on campus, the richer the experience can be for your students. This resource guide has been developed and designed to enhance the students' week. Your help in implementing the following curriculum would be appreciated by the staff.

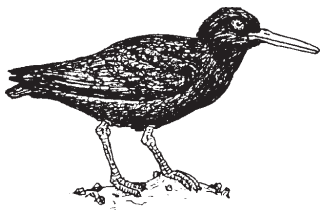
Our goals at the Kern Environmental Education Program are as follows:

1. To foster the understanding that the natural environment functions according to a unique balance among the biological, physical and human realms.

2. To use the natural environment as a living laboratory to teach ecological concepts through experiential learning techniques.

3. To understand the options available to humans so that they may act to shape and control the effect of man's activities on the Earth's ecosystem and its finite resources.

4. To provide a safe and positive social experience for all participants.



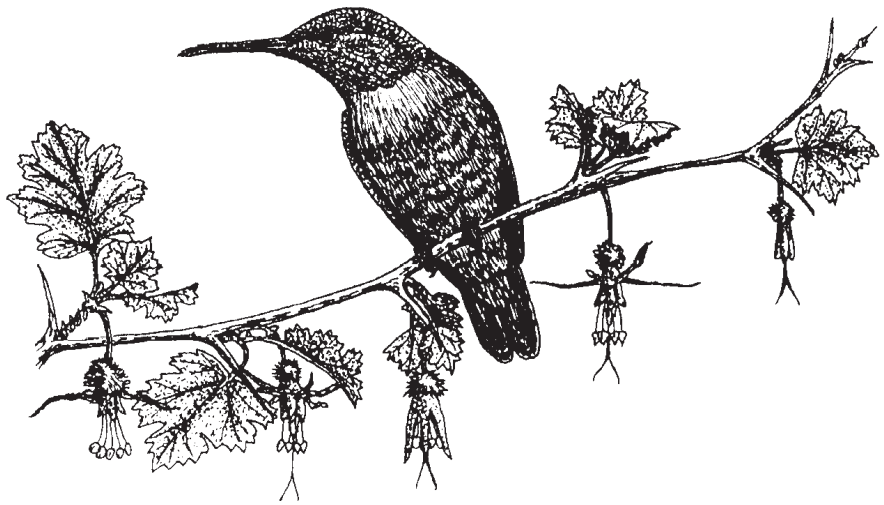
History of KEEP

The Kern Environmental Education Program (KEEP) was developed in 1969, in response to the community's desire for environmental education for the children of Kern County. The Kern County Superintendent of Schools Office, working with representatives from local school districts, developed a five-day environmental education experience.

A novel feature of KEEP is that from the beginning it was designed with mobility in mind. The facility could be moved from one location to another. Initially conducted for only a matter of weeks, the first two years of operation began in 1969, at Tehachapi Mountain Park. In 1971, the campus was moved to Hart Flat in Kern County. Since 1972, the first campus has been at Montaña de Oro State Park, with the exception of the spring of 1974, when heavy rainfall forced relocation to Cambria YMCA Camp. The average yearly attendance is 3500 students at the Ocean campus. In 1987 a second campus was opened in the Sierra foothills. KEEP Sierra now operates 29 weeks per year and serves 2200 students a year. The Spring of 1992 marked the opening of a third program site in Cambria. Approximately 2200 students from Bakersfield City School District and other districts now participate in that program.

The program serves all children. Besides fifth and sixth graders, the program serves visually exceptional, orthopedically exceptional, deaf and hard of hearing and developmentally disabled students. Students of all ages are welcome and have ranged from 6 to 65 years of age.

KEEP is unique in that it provides a preparatory curriculum conducted by the classroom teacher prior to the students' arrival on campus. Once there, students go on a three-hour walk in the morning and afternoon, and attend an informational evening program and campfire each night. After the week on site, students participate in the classroom in a post-trip unit to solidify the attitudes and concepts acquired during their week-long visit.



Facilities

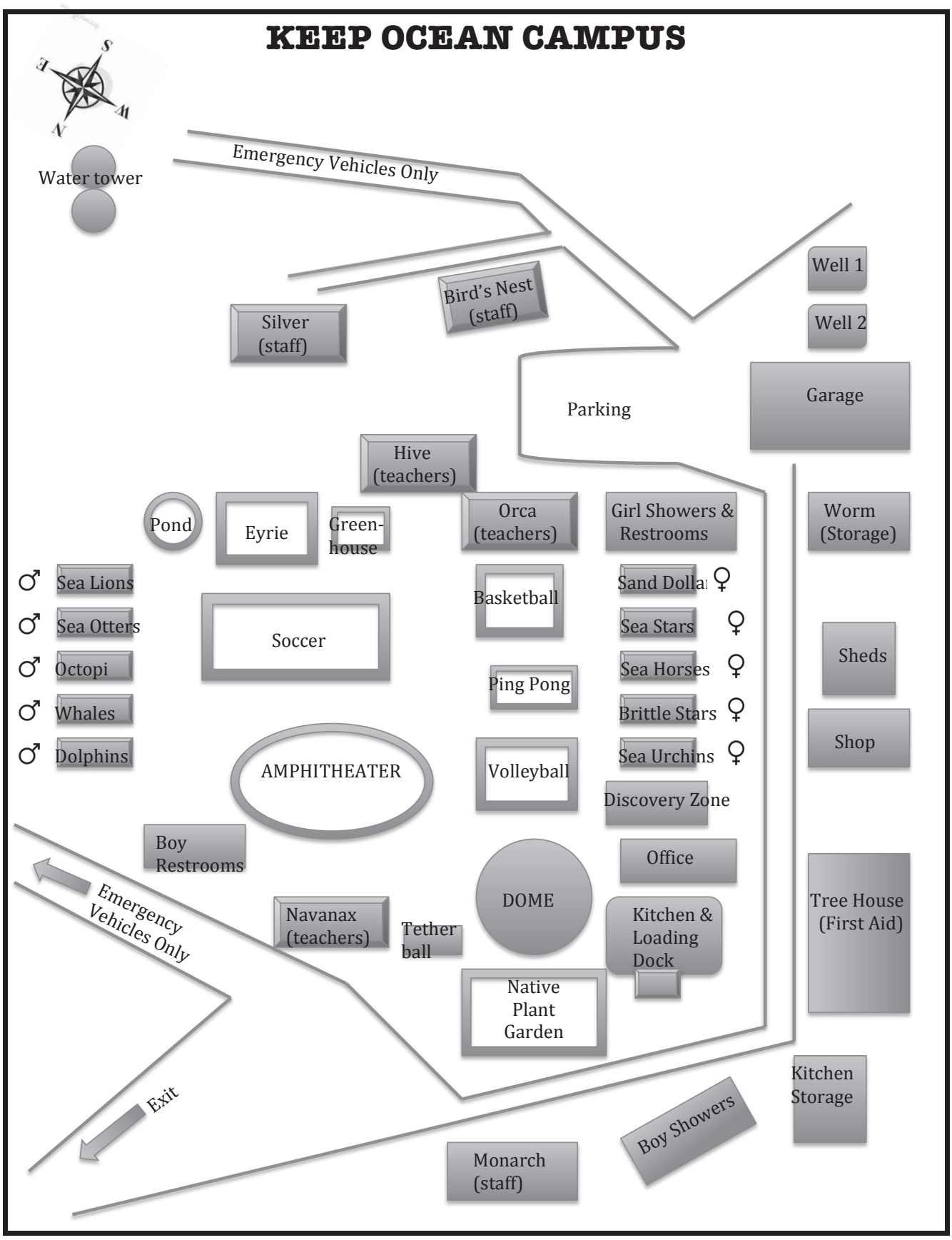
The Ocean Campus is located in Montaña de Oro State Park, approximately 10 miles south of Morro Bay, CA. The campus is located among a grove of Eucalyptus trees about a half of a mile from the ocean. Montaña de Oro State Park offers a wide variety of ecosystems for the students to explore. Students will be introduced to coastal scrub (chaparral), riparian, sand dune, open coast, rocky intertidal and estuary ecosystems. The diversity of habitats offers each student a unique environmental education experience.

The Kern County Superintendent of Schools Office leases 10 acres of land from the State Parks. The yearly permit stipulates that the program be a low impact and temporary facility. This allows for mobile trailers as sleeping quarters and a portable geodesic dome as the dining facility.

The student sleeping trailers are just that, sleeping trailers. Each trailer can accommodate 13 students plus one counselor. The students are only in their trailers to sleep, all other activities are planned outside or in the dome. Therefore, the student trailers do not have any electricity or heat. They are well-insulated from the coastal weather and adequately provide a safe, warm place to sleep. Part of the students' environmental education experience is to recognize and appreciate energy use and conservation. Lack of electrical outlets and light switches seem to help in that effort. The student bathroom and shower facilities do have lights for safety. Each bathroom trailer, one each for the boys and girls, have three lavatory stalls. Each side of the campus also has three outhouses for the students' use as well. Separate shower facilities have several shower stalls which can accommodate 30 students per day for showers. The shortage of water and time allow each student two showers per week, again a reminder that water and energy are precious resources that shouldn't be taken for granted.

The teachers’ sleeping trailers are separate from the students’ but located near their trailers for easy access. Each teacher trailer sleeps three to four adults. Though rustic, the trailers provide electricity, heat and bathroom facilities.

KEEP OCEAN CAMPUS



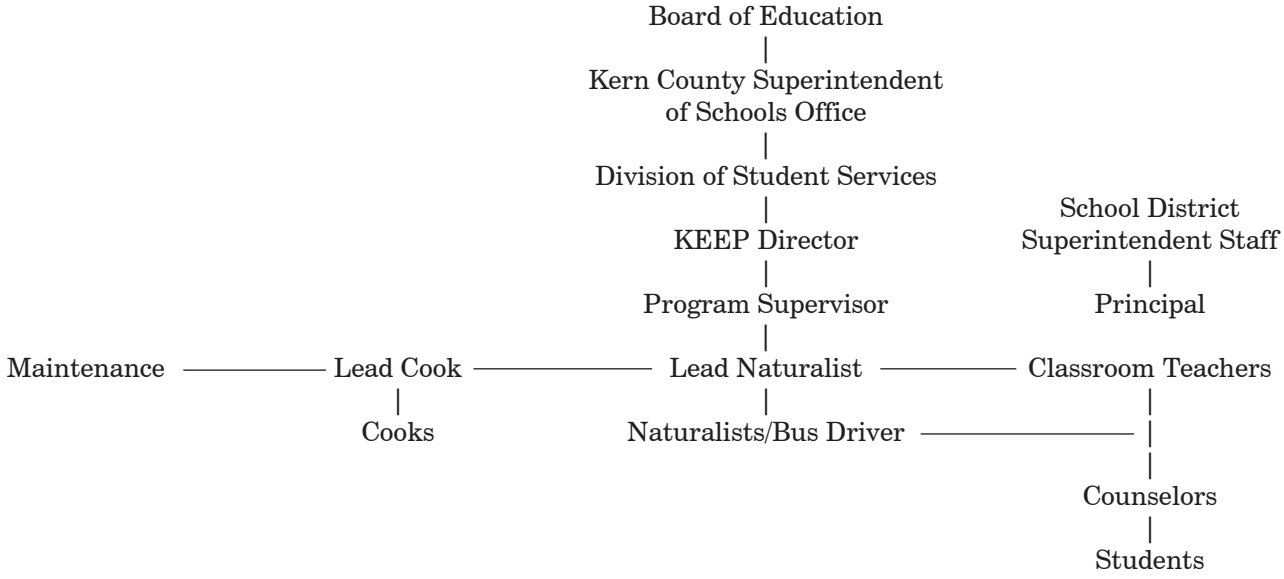
The program staff wants every participating student and counselor to have a successful week. The prospect of a student or counselor going home early is taken seriously. The safety and well-being of all students always comes first, no matter how difficult and discouraging it may be to send someone home.

Staff

The KEEP Staff includes the Director, the Program Supervisor, the Lead Naturalist, 6 to 8 Naturalists, 3 cooks, a maintenance person and a bus driver. The credentialed Program Supervisor is responsible for curriculum implementation, daily planning and emergency situations. The Lead Naturalist is responsible for the counselor orientation, daily counselor meetings and takes over in the absence of the Program Supervisor. The Naturalists are competent college graduates who are experienced in working with children in an outdoor setting. Many of the Naturalists have teaching credentials or have completed graduate course work.

To assist the staff, counselors are selected from "feeder" high schools by high school personnel at the request of your principal. These counselors become part of the staff while on site. They will take their instructions from the visiting classroom teachers and the KEEP Staff.

The organization of the KEEP staff is as follows:



The intent of the staff organization is to take the burden of planning, logistics and teaching off the shoulders of the classroom teacher and leave him/her free to act as a resource person, a facilitator and fellow learner. Your role has simply changed from front line teacher to more of a resource specialist.

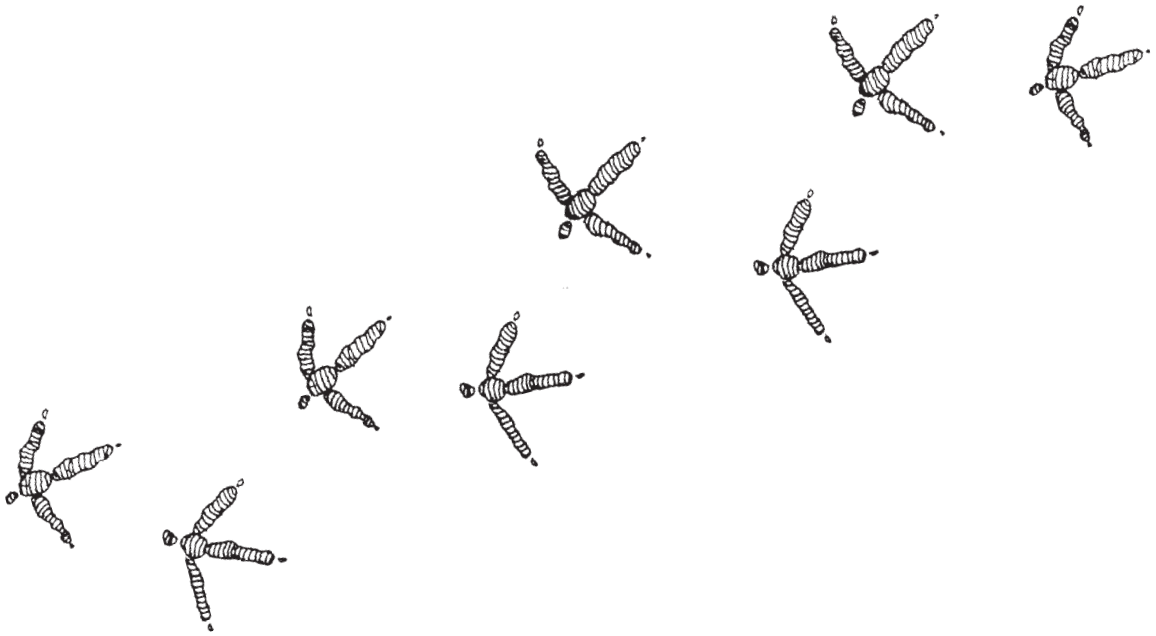
KEEP Schedule

MONDAY	12:00	Arrival/Welcome/Lunch
	1:00-1:30	Orientation
	1:30-4:00	KEEP Tour/Vista Point
	4:00-5:30	Trailer Assignments/Move In/Showers
	5:30-6:30	Dinner
	6:45-8:45	Evening Program/Campfire
	9:00	Lights Out & Quiet
TUESDAY	7:00	Wake Up/Clean Cabins
WEDNESDAY	7:30-8:00	Breakfast
THURSDAY	8:00-8:30	Get Ready for Walks
	8:30-11:30	Nature Walk
	11:30-12:30	Lunch
	12:30-3:30	Nature Walk
	3:30-4:30	Teacher Hour
	4:30-5:30	Showers/Free Time
	5:30-6:30	Dinner
	6:45-8:45	Evening Program/Campfire
	9:00	Bedtime
FRIDAY	7:00	Wake Up/Pack Luggage
	7:30-8:00	Breakfast
	8:00-9:00	Clean Trailers
	9:00-11:00	Nature Walk
	11:00-12:00	Lunch
	12:00	Good-bye!

Your Arrival

When your bus arrives on campus your students will be welcomed by a Naturalist. During this time the Program Supervisor will ask all classroom teachers for their completed registration, medical and attendance forms. The students will then be escorted by the staff to the bathrooms and then to the campfire circle. The Program Supervisor will then explain KEEP's expectations of the students. After lunch the students, counselors and classroom teachers will be given an orientation by the Program Supervisor. Immediately following this session, you will be asked to attend a counselor orientation meeting with the Program Supervisor and the Lead Naturalist. Meanwhile, the students will be on their orientation "walk" around the campus and surrounding area.

After the counselor meeting, the Lead Naturalist will orientate the counselors to the campus and review the week's schedule with them. At this time all classroom teachers will meet with the Program Supervisor to discuss any questions, concerns or problems and to finalize sleeping trailer assignments. The week's schedule will also be discussed as well as emergency procedures.

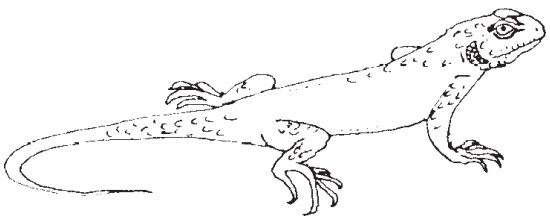


Walks

The students and counselors will be assigned to walk groups by the Program Supervisor. Depending on the size of the group, the students will be divided into four to six walk groups. These walk groups will be rotated through the Naturalists on morning and afternoon walks Tuesday through Thursday. By Thursday afternoon each student will have gone on every walk.

Each walk group, during a five day week, will be taken on five major walks with one or two Naturalists. One full day (two walk periods) will be spent in Morro Bay studying the estuary. The remaining two days will be spent on four separate walks, three hours each, in Montaña de Oro State Park. The walk to Valencia Peak concentrates on geology and the nonliving parts of an ecosystem. The Coves walk concerns itself with the Rocky Intertidal Ecosystem and marine mammals. Hazard Canyon stresses the Open Coast and Coastal Sand Dune Ecosystems and the Rocky Intertidal if the tide is low. Riparian habitat is discussed on the Islay Creek walk as well as the Chumash Indians. The students will also have a short "wrap-up" walk and discussion on Friday morning.

During your meeting with the Program Supervisor on Monday you will be given your own schedule for the week. This schedule will explain what walks will be offered on specific days and what Naturalist(s) will be leading that walk. Classroom teachers are not assigned to a walk group. You are invited and encouraged to join any and all walks. Your post-trip curriculum will be better served and more easily taught if you understand first hand what walks or ecosystems the students have experienced.



Classroom Teacher Responsibilities

KEEP is designed to provide the best learning experiences possible for the students. The opportunities for the classroom teacher to observe, learn and grow are infinite.

Your week at KEEP can give you a chance to observe your students in a new physical as well as social environment. Many teachers are surprised to see certain individuals change in ways they never imagined. This week can give you a chance to interact more freely with the students and observe different ways they learn. This week can also give you a chance to learn about the different ecosystems in the area and how we humans interact with our environment.

Since you know the students better than anyone, your expertise may be called upon to provide insight into student behaviors or illness. You can also provide needed encouragement, support and care both on the trail and on campus.

Classroom teacher responsibilities include all of the following:

1. Remain on campus while the students are there.

2. Work with the counselors on any problems they may be having with one of your students.

3. Remain around the campfire at bedtime to help the staff and counselors get the students quiet.

4. Take care of any student discipline problems or ill students.

5. Conduct Teacher Hour on Tuesday, Wednesday and Thursday afternoons, 3:30 to 4:30.

6. Go on at least one walk with the students sometime during the week.

7. Clean your trailer on Friday.

8. Meet with a staff member on Friday to evaluate your KEEP week.

9. Come to the campus prepared (see Check List for Departure, page 17).

Teacher Hour

One of your main responsibilities during the week is called “teacher hour”. Teacher hour takes place from 3:30 to 4:30 on Tuesday, Wednesday and Thursday afternoons. This is an opportunity to do any number of things, but most important perhaps is a chance for your students to be together with you and get involved as a class unit. It is a chance to pull your class closer together, show them your interest and support and find out how their week is going.

There are as many different activities to do during teacher hour as there are teachers who come to KEEP. If you are at a loss of what to do there is a list of suggestions in the Appendix as well as a list of resources that are in the library and available for your use.

Teacher Hour Ideas

WALKS (may use binoculars)

> Hazard Canyon
> Vista Point
> Environmental Camps/Meadow
> ABC Walk at Camp/Trail (students list natural and/or man-made objects that start with each letter of the alphabet)

WRITING ACTIVITIES

> Write in Student Field Notebook
> Write a letter home
> Write a poem (haiku, environmental, etc.)
> Write your own lyrics to campfire songs
> Write letters to themselves about KEEP; collect and return to students at a later date
> Write questions for an environmental quiz bowl to be held on Thursday
> Make up crossword puzzles/word searches from KEEP vocabulary
> Write about the different ways you had to change your life this week and how you feel about it
> Research a particular topic in the library and write a report, commercial, PSA, etc. (plants, animals, etc.)
> Interview a staff member and write about it
> Create a class newspaper about the week

DISCUSSION/PUBLIC SPEAKING

> Share the days experiences
> Discuss feelings about the week
> Talk about problems and how to safely solve them
> Talk about ideas to promote cooperation
> Orally perform any of the written activities
> Discuss possible conservation projects at school
> Students sit alone for ten minutes and observe then share
> Work on a debate or hearing on an environmental situation - real or imaginary (this could be a good post-activity)

OTHER ACTIVITIES

> Make a class mural to bring to school
> Make leaf print rubbings (teacher must bring variety of leaves)
> Explore the KEEP learning center
> Watch a video (list attached)
> Read or tell a story to your class (list of sources attached)
> Do animal charades with individuals or groups
> Play environmental pictionary
> Perform the environmental quiz bowl with teams
> Try some new games (see attached list)
> Play the 60 second contest (students write as many things as they can to fit into categories given 60 seconds)
> Play the question box game (like a 20 questions game)
> Numerous activities from books here (list following)

Discipline Policy

The KEEP Rules are listed in the Appendix as well as in each Student Field Notebook. During the Monday orientation meeting the Program Supervisor will discuss these rules with the students. In order for the week to go smoothly and safely, the staff expects all rules to be followed.

In the event that a student chooses not to adhere to the rules, fails to cooperate with his/her counselor, peers or staff or jeopardizes the health and safety of fellow students, then that student needs to be sent home. This decision is reached by the Program Supervisor and the appropriate classroom teacher(s). The classroom teacher knows the student(s) behavior patterns and personality traits and therefore is the determining factor in sending a student home. Each school and teacher has their "limits" for behavior at KEEP and those are respected and supported by the staff as long as those "limits" do not exceed the expectations the program has for all participating students.

It is the responsibility of your elementary school to transport disruptive student(s) home. Each school has their own policy in this regard. Some schools have the parents or the principal pick up the student(s). It may be wise to find out what your school's policy is in this regard before arriving on campus. The program does not have the staff or vehicles to transport students home.

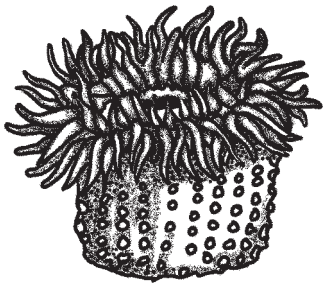
On rare occasions, counselors need to be sent home if it is in the best interest of the students. This decision is also made by the Program Supervisor and classroom teachers. As with students, transportation arrangements need to be made through the visiting elementary school that brought the counselors.

Emergency Situations

Emergency procedures are one of the topics that will be discussed during your Monday afternoon meeting with the Program Supervisor. KEEP has an Emergency Manual on file at the site which will be made available for your information while you are on campus. There will also be an Emergency Manual in each of the teacher trailers. Basically, all emergency situations will be handled by the staff. The classroom teachers will be called upon to help with individual students, contact parents as necessary and provide support.

As detailed in the Emergency Manual, any medical problems are handled by the Emergency Room at Sierra Vista Hospital in San Luis Obispo. A staff member will transport an injured or sick student in a KEEP vehicle. You will be asked to accompany the staff member and your student to provide emotional support.

If an emergency occurs at the students' home and the parents need to contact their child, they must first contact your school principal or the Superintendent's Office. Either one of those sources will put the parent in touch with their child or with his/her classroom teacher. Under no circumstances should the parents be given the KEEP phone number. The campus phone system needs to remain open for on-site emergencies and for business calls only. Some parents expect their child to call home sometime during the week. This is not feasible due to the students' busy schedule.



Forms

(see Appendix for examples of the following forms)

Attendance Form

Six weeks prior to your arrival at KEEP you should receive an information packet from the Kern County Superintendent's Office. Included in this packet are brochures and handouts for each student to take home, including a student registration and medical form. Also in this packet is an attendance form. This form should be filled out and sent to the Program Supervisor before your arrival. This is the billing form that the Superintendent's Office will use. Please make sure that each student, counselor and teacher that is arriving on Monday is represented on that attendance form.

Student , Counselor and Teacher Registration Forms

The purpose of these registration forms is to obtain a brief medical history of each participant and to identify potential problems that may affect their week. Each participating student, counselor and teacher **must** have a completed registration form on site during his/her stay. These forms should be given to the Program Supervisor upon arrival.

Please make sure the entire form is completed and signed by a parent or guardian! Note also that KEEP requires a copy of the parent's insurance card be attached to the form.

Each Registration Form is looked at by the Program Supervisor. Particular attention is paid to asthma, physical limitations, exposure to communicable diseases, sleep walking, bed wetting, parent comments, allergies and a signature for authorization for medical treatment. Any unusual comments or notations are investigated to insure that every student has a healthy week.

It is important that each classroom teacher or school nurse reviews his/her students' forms prior to arrival to prepare for the week. Perhaps the students' parents noted something on the form that bears further investigation before your arrival. Any radical food or insect allergies **must** be communicated to the Director of KEEP in the Superintendent's Office prior to your week at KEEP. Any student with bee sting injection kits, insulin injections, or any other serious medical condition, must have prior approval to participate from the Director as well.

For the safety and well being of each student, please pay careful attention to each of the registration forms as they are turned into you. Don't forget to bring them with you on Monday, along with the counselor and teacher registration forms.

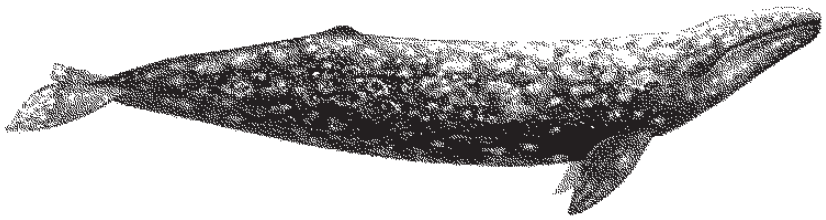
Pupil Medication Form (goldenrod)

The purpose of this form is to insure that each student and counselor under 18 years of age is given the proper medication as deemed necessary by his/her parents and doctor. The KEEP Staff can not dispense medication to a student unless a completed copy of this form accompanies each medication. The program site is a school site and must comply with the same regulations concerning student medication as your school. We do not have a nurse on site. The nearest hospital is 30 minutes away, under the best of circumstances, so we must have clear and complete instructions in regards to a student's medication.

No medication of any kind (aspirin, cough drops, vitamins or prescription drugs) can be dispensed without a completed medication form (one form per medication).

Even though you will be sending a form letter to all parents explaining our medication dispensing policy, not all medication turned in by students is accompanied by this form. Please make sure that each form is completely filled out. The form will be checked for a signature by the parent and doctor. Hand or type written notes signed by the parent are not acceptable. The instructions on the form must be consistent with the instructions on the bottle of the medication. Each medication to be dispensed must be in the original bottle or container.

We will not dispense medicine without this completed and signed form!



Social Issues

Many students are apprehensive about attending the program. For many, this will be the first time away from home or relatives. Some students may be afraid of getting homesick. Some students wet the bed at night and this could be a factor in not wanting to attend the program. Many students have never experienced a cooperative living situation and don't know what to expect. Whatever the reasons, your students need to be assured that their week will be a successful one. Homesickness, bed wetting and group cooperation need to be addressed with your students prior to your week at KEEP.

Homesickness usually strikes on Monday evening. The staff deals with this as delicately as possible. We provide an understanding ear and try to talk the student through the problem. Many times the classroom teacher is called in to help with the problem. You are the closest thing to home that student has and your presence and reassurance usually can solve the problem. Some students can not be "talked out" of their homesickness. These cases are dealt with on an individual basis. The program's policy on homesickness is that it is not an excuse to go home. The staff, with the help of the teachers, do everything possible to get that student through the week.

Bed wetting is a weekly occurrence at KEEP. During the counselor orientation the Lead Naturalist will discuss the mechanics of what to do if the problem occurs. A wet sleeping bag can be discreetly washed with the help of the counselors. It would be wise to know who your potential bed wetters are and to alert the appropriate counselors sometime on Monday.

A group discussion on the above issues may help your week and the students' week go a little smoother.

Clothing List

The importance of proper clothing can not be stressed enough. The students will be spending most of their waking hours outdoors. Remind the students that the weather will be different than they are currently experiencing at home. The weather is unpredictable on the coast. It is important that they follow the clothing list to insure a comfortable week. Please review the clothing and equipment list in detail with the students. Be sure to stress the importance of proper clothing to the parents.

1. Dressing in layers allows for better insulation and comfort.
2. Proper footwear is a must. Each student should bring one pair of comfortable shoes (not new ones that need to be broken in) for hiking and at least one more pair to wear around camp. Students must wear hiking shoes (not sandals) when they arrive on Monday to be ready to hike.
3. A warm sleeping bag is also essential. Do not bring a "slumber party" bag, but a sturdy camping type sleeping bag.
4. Shorts are not worn on walks for safety reasons. There is really no time of the day where shorts are appropriate, so please discourage your students and counselors from bringing them.
5. Encourage the parents to label all clothing and equipment that their child brings to insure that they return with everything they brought.

Essential Items

___1 sleeping bag
___1 pair pajamas or a sweatsuit to sleep in
___2 or 3 pairs of shoes (tennis shoes or hiking boots; no sandals)
___8 pair of socks
___5 pair of pants or sweats
___1 warm jacket
___1 or 2 long-sleeve shirts
___5 t-shirts
___5 pair of underwear
___1 cap or visor for sun protection
___3 handkerchiefs
___1 sweatshirt
___1 flashlight & batteries
___1 bag for dirty clothes
___1 day pack or fanny pack
___1 toilet kit to include:

comb and/or brush	soap
1 bath towel	shampoo
toothbrush	chapstick
toothpaste	

Optional Items

___water bottle
___pillow
___canteen
___rain jacket or poncho
___camera & film
___binoculars
___sunscreen
___sunglasses
___$5.00 for an additional KEEP t-shirt

PLEASE DO NOT BRING: swimsuits, shorts, comic books, knives, money (except for an extra KEEP t-shirt), radio, matches, candy, gum, extra food or any other item that is not allowed at school.

Counselor Selection

Selection of the counselors that will be accompanying you to KEEP is the **most important task** you will have in preparing for your week. Counselors are the determining factor on what kind of week you and your students will experience. Great counselors make for a great week.

Each school or school district recruits counselors differently. Sone schools use high school students, some use parents, some use both. The choice is up to you. Usually a high school administrator, a school district administrator, the school principal or the classroom teachers are responsible for counselor selection. Since you will be dealing with any counselor/student problems, it may be wise to be as involved as possible in the selection process.

Some schools have used the "feeder" high schools that the sixth graders will be attending in three years for counselor recruitment. Some schools take this one step further and request only students that have attended that specific elementary school. Many classroom teachers have personally asked former students to be counselors. This process has an advantage in that the teacher already has an existing rapport with the high school student and a basis for respect has already been established. It is difficult for a classroom teacher to establish this kind of rapport and respect with an unknown high school counselor(s) on the bus ride over or once they arrive at the campus.

If your school feeds into the Kern High School District, please be sure to obtain a copy of the District's "Guidelines for KEEP." In the guidelines, your elementary school has been assigned to a specific high school from which you can draw counselors. Be sure to follow these guidelines and contact the designated person. If you have any questions, be sure to call the KEEP office in Bakersfield at (661) 636-4717.

Many returning teachers have found it valuable to meet with the counselors before their arrival at KEEP. A pre-trip meeting allows the teachers and counselors to introduce themselves and get a "feel" for one another. Many teachers take this opportunity to acquaint the counselors with their responsibilities or duties so the counselors have an idea of what will be expected of them. The Counselor's Handbook that is provided by the program is a good tool to use at this type of meeting. The handbook gives the counselors something tangible to look at and gives the teacher a focus for the pre-trip meeting. Remember, the amount of time and effort put into the counselors before your arrival will pay off during your KEEP week.

All counselors, including parents are required to have a completed **Counselor Registration** form on site. A sample form is included in the Appendix section. Medication forms are also required of counselors under 18 years of age.

In addition, high school counselors are required to complete and sign a **Counselor Contract**. This agreement clearly outlines their duties, expectations and responsibilities. If under the age of 18, the contract needs to also be signed by a parent/guardian. A sample of this form is included in the Appendix.

Check List for Departure

3 months prior to attending KEEP:

___ Contact high school(s) for counselor recruitment (if using high school students.

6 weeks prior to attending KEEP:

___ Will receive curriculum and registration materials from Superintendent's Office.
___ Provide a written estimate of students, counselor and teacher attendance to Superintendent's office.
___ Begin curriculum preparation.

4 weeks prior to attending KEEP:

___ Distribute the KEEP Brochure and clothing list to parents.
___ Contact the KEEP Director with regards to any "special needs" students or students with medical problems that require clearance to attend KEEP.

2 weeks prior to attending KEEP:

___ Make sure you have enough counselors recruited. If appropriate, coordinate with the designated contact person at your assigned high school.
___ Meet with the counselors (high school or adult), distribute Counselor's Handbook, registration and medication forms, and counselor contract.
___ Distribute student registration, medical forms, letter and other forms to parents.
___ Discuss social issues (bedwetting, homesickness, communal living) with the students.

1 week prior to attending KEEP:

___ You will be receiving, via FAX or mail, fan information packet to be completed and returned, via FAX, by the Friday prior to your arrival.
___ Be able to provide a total of students, counselors and teachers that will be attending to the Program Supervisor who will be calling you sometime this week.
___ **Collect all registration and medication forms**.
___ **Review** all registration and medication forms for **completeness and signatures**. All serious medical problems must be reviewed by the KEEP Director prior to the student's arrival. Any noted medical problems such as minor food allergies, bedwetting, sleep walking, etc., should be discussed with the student's parent.
___ Fill in the Attendance Roster and include free and reduced lunch information.
___ Check on counselor attendance. Do you have enough counselors? Arrange for backups. You may bring one extra male and one extra female counselor above your required ration (1:8) at no extra cost.
___ Divide your students into trailer groups. If you will be sharing your KEEP week with another school, please contact that school(s) and discuss trailer and counselor assignments. Mix together students from different schools. Avoid guaranteeing students that they will have certain partners or trailer, since changes can/do occur.
___ Organize and pack any materials or supplies you need for Teacher Hour.

(continued on page 18)

___ Make sure students are checked and treated for any lice problems.
___ Check on transportation arrangements. The KEEP staff will be expecting students to arrive 11:30 a.m.-12 noon on Monday and leave promptly between 11:30 a.m.-12 noon on Friday, unless prior arrangements have been made.

Monday morning of your KEEP week:

___ Make sure you have everyone's (students', counselors' and teachers') registration and medication forms. Do not bring students or counselors who do not have completed registration forms.
___ Collect all contraband and leave it at school.
___ **Take roll of all students and counselors; know how many students (male and female) and how many counselors (male and female) are on the bus.**
___ The teacher(s) who will be arriving **with** the students should have all the required forms and medications.

Upon arrival at KEEP, please give the following to the Program Supervisor:

___ student registration forms, alphabetized
___ student medication forms, alphabetized
___ counselor registration, medication, and contracts, alphabetized
___ teacher registration forms
___ all student medications
___ a completed and accurate Attendance Form with free and reduced lunch information
___ Relax!

Fundraising

Opportunities for your students to participate in the Kern Environmental Education Program can strongly affect their educational experience. Fundraising for KEEP presents exciting opportunities. Students, parents and school staff can join to raise funds for program costs. Fundraising can be quite productive, provided you know where to begin. The following pages provide some basic guidelines, along with some successful ideas on specific projects from a variety of participating schools.

Fundraising events can be an asset to the learning experience. Fundraising events can:

1. Teach students the concept of interdependence; we all need each other to achieve our goal as a team.

2. Be easily incorporated by the teacher into the school curriculum. Skills for fundraising include reading, writing, math and science.

3. Teach important lessons of "real world" finance and business organization.

4. Relieve some of the financial burden that schools and parents have felt in the past.

5. Motivate students and increase their appreciation for reaching a final goal.

Finally, this packet will be updated on a regular basis. We'd love to hear from your school and what project was successful for you. Use the form on the back of this page to submit your idea. **Contact the KEEP program if you'd like more information at (661) 871-1822.**

Thank you and good luck!

Fundraising Ideas

1. KEEP Foundation – The Foundation has some funds for scholarships. Contact the KEEP Office for more information.
2. Candy sales – Undoubtedly one of the best all time fund-raisers.
3. Bake sales – After school or after lunch (work this out with your district food service). One school has raised $100 per week with this activity.
4. School carnivals, book fairs, swap meets, talent shows – a portion of the profits is sometimes available.
5. Car Wash – Obtain pledges before event.
6. "Thons"! Jog-a-thons, spell-a-thons (using 100 KEEP vocabulary words), math-a-thons, trash-a-thons (sponsors agree to pay so much for every mile of roadway or pound of trash picked up) and many others. This also gets the community involved.
7. Endangered species (ecology) T-shirt sales (i.e., "Human-I-tees").
8. Dog Wash – Hold at local feed store. $600 net for one school.
9. Penny Drive – Hardly anyone cares about pennies. Have kids collect and turn in for credit. Most banks will provide paper coin sleeves or will even count them for you.
10. Service Clubs – Kiwanis, Rotary, etc., can be approached to help defray costs or for scholarships. A video or slide presentation from a previous year at KEEP at one of their luncheon meetings is very motivating. A follow-up presentation is very well received.

Clip along line and mail to:
Tom Anspach, KEEP Director, c/o CALM, 10500 Alfred Harrell Hwy., Bakersfield, CA 93306

Tell Us Your Idea!

Name:_____

School: _____

Fundraiser Name: _____

Brief Description: _____

_____

_____

_____

_____

_____

Curriculum Overview

The following lessons have been developed to assist the classroom teacher in preparing his/her students for their week at KEEP. This guide was devised to keep your "prep" time down to a minimum, yet provide an adequate foundation for the students to get the most out of their week. The staff encourages you to prep your students but realizes that your time in the classroom is limited. Many of the lessons can be used as homework assignments if necessary. Your students will have an educational experience whether they have been prepped or not. Their experience will be greatly enhanced and more fulfilling with any prep time you can fit into the classroom curriculum.

The accompanying guide is a resource tool to be used by you at your own discretion. The staff, however, expects that each student will have a basic knowledge in the principles of ecology and an awareness of why they are attending KEEP. These expectations can be met by using our curriculum guide or by devising your own lessons/units to accomplish the same task.

As you flip through the guide, you will notice the first three sections or units include a total of 13 lessons. The staff expects these lessons or the concepts within these lessons to be introduced to the students prior to their arrival at KEEP. Following these "core" lessons are optional lessons for you to use if you have the time and the inclination. Following the pre-trip lessons are four post-trip lessons in Unit 4 that may be valuable in summing up your week. The staff feels that your experience at KEEP can be applied the rest of the school year throughout the classroom curriculum.

Each of the lessons presented in the curriculum guide are referenced to the 1990 Science Framework. All aspects of KEEP neatly tie into this framework. It is appropriate to address energy, evolution, patterns of change, stability, systems and interactions, and scale and structure when discussing ecology. So, enjoy your "prep" time. You will reap your reward when you see your students' eyes light up with understanding as their week progresses.

Student Field Notebook

Each student will receive a field notebook on the day of their arrival. The staff will introduce the students to the notebooks and go over it's role for the week. Each student will be expected to take their field notebook on each of the walks. The staff will not have the time on each walk to allow the students to "fill out" their books. The notebooks will be referred to and will be used on all the walks. You will be given a copy of the Student Field Notebook during your meeting with the Program Supervisor on Monday.

Unit 1: An Environmental Introduction

Lesson 1: An Introduction to KEEP and the Environment

Background

Before you begin to teach this lesson and the rest of the preparatory curriculum, you may want to familiarize yourself with the KEEP Program. The best way to do that if you are a first time teacher to the campus is to read the previous sections in this guide; the Foreword, Your Week At KEEP and Getting Organized. If you are a returning teacher, you may want to flip through the previous sections as a reminder and to inform yourself on our new policies.

Purpose

To introduce KEEP, its location and its purpose to the students.

Objectives

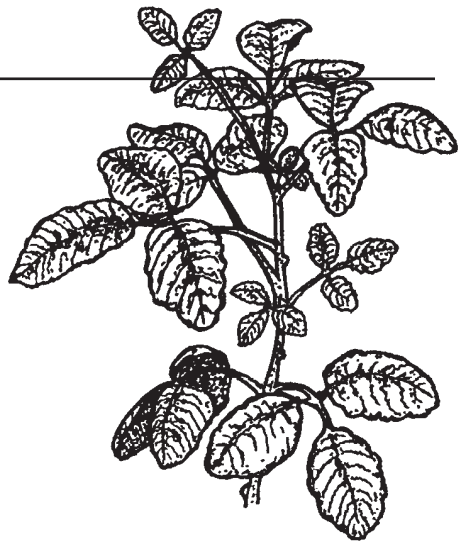
1. The students will be able to define the words, environment and ecology.
2. The students will be able to explain what the Kern Environmental Education Program is, why they are spending a week there and what they will be doing while they are there.

Science Framework Concepts

C-1, pg. 137.

Materials Needed

Large map of California
KEEP Information brochure
Slides, pictures or a video of KEEP (optional)



Activity

Explain to the students that they will soon be going to the Kern Environmental Education Program and it is time to start getting ready. Discuss the meaning of Kern Environmental Education Program. What does it mean to the students? Discuss the meaning of **environment** which refers to everything in your surroundings. Therefore, environmental education is the study of your surroundings.
Talk about the students' immediate surroundings, the classroom environment; the school playground environment; their home environment.

Explain that the study of the environment is a branch of science called ecology. **Ecology** is the study of plants and animals and their relationship with each other and their environment. The best place to study ecology is outdoors. Therefore, at KEEP the classroom will be outside and the subject will be ecology.

Show the students a map of California and point out Bakersfield, KEEP, and any other points of interest that will help orientate the students to the program site. Pass out the brochures and go over the information inside.

If you have slides, pictures or a video of past KEEP trips, show these to the students to give them a feel for the physical appearance of the campus. Explain to the students that the campus is a low impact facility. Discuss what that means and how that will affect their day to day living.
What things will they have to live without?
What experiences might they have that they wouldn't have at home?

Other discussion questions might be:

Why is it important to study ecology?
Why do you want to go to KEEP?
What do you think you will learn at KEEP?
How do you feel about spending a week away from home and the classroom?
Do you think you can learn anything in the outdoors?

Any one of the above questions will generate several more new ones. Perhaps you have specific questions you would like to have the students discuss as well. The previous sections in this guide should help you answer any questions that may come up.

Optional Lesson A: KEEP Pretest

Optional Lesson A: KEEP Pretest

Background

Pretest and post test results can be useful to teachers to measure the entire KEEP experience from curriculum implementation to the campus visit. If you need a yardstick to measure the program, the following test may be helpful.

The list of questions will raise more questions for the students. This may be a good vehicle to open up a discussion about the KEEP experience.

Purpose

To provide the classroom teacher with a tool to measure the effectiveness of the program's curriculum.

Objective

Following the test the student will state relevant questions he/she wishes to have answered concerning the various subjects and topics on the test.

Materials Needed

Pretest (1 per student)

Activity

Pass out the test. Read the instructions. Explain to the students that you are passing out a list of questions which covers much of what will be learned at KEEP. Since they haven't been to the campus, no one expects them to know all the answers. Also, make it clear that this test is not a part of their grades, but a way to see how much they will learn at KEEP.

After the students are done, collect the tests and answer any questions the students have about the test. Save the tests to use in Optional Lesson E.

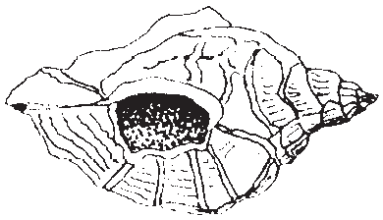
Name:_____

KEEP Questions
Before KEEP

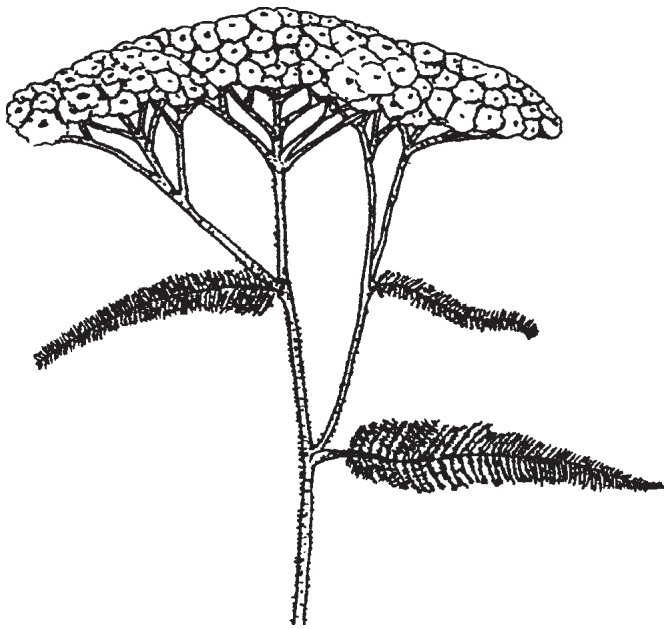
The following questions are to help your teacher and the KEEP Staff find out how much you know. You are not expected to know all the answers. These questions will be used to help get you ready for your week at KEEP. Do your best and please guess the answers if you need to.

If you have guessed, check the "I had to guess" box after each question.

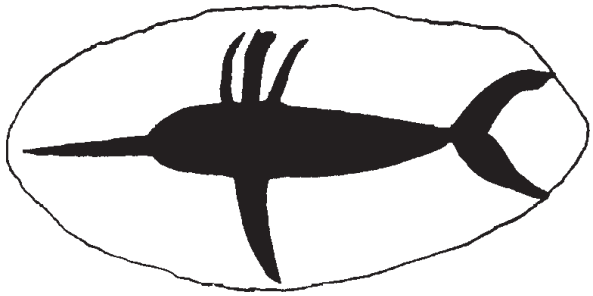
1. What do the letters KEEP represent?
   - ☐ a. Keep Education Exactly Perfect
   - ☐ b. Kern Environmental Education Program
   - ☐ c. Kern Easy Educational Program
   - ☐ d. I had to guess
2. Which of the following is not an ecosystem?
   - ☐ a. A rock
   - ☐ b. The ocean
   - ☐ c. A pond
   - ☐ d. A forest
   - ☐ e. I had to guess
3. How much of the earth is covered by salt water?
   - ☐ a. 1/8
   - ☐ b. 1/4
   - ☐ c. 1/2
   - ☐ d. 3/4
   - ☐ e. I had to guess
4. Where does the energy for all living things come from?
   - ☐ a. Water power
   - ☐ b. Coal
   - ☐ c. Oil
   - ☐ d. Sun
   - ☐ e. I had to guess
5. Which is a producer?
   - ☐ a. Cat
   - ☐ b. Tree
   - ☐ c. Human
   - ☐ d. Ant
   - ☐ e. I had to guess



6. Which is a decomposer?
   - ☐ a. Cat
   - ☐ b. Tree
   - ☐ c. Human
   - ☐ d. Ant
   - ☐ e. I had to guess
7. Which is a consumer?
   - ☐ a. Cat
   - ☐ b. Tree
   - ☐ c. Human
   - ☐ d. Ant
   - ☐ e. I had to guess
8. Which of the following gets energy directly from the sun?
   - ☐ a. A sea anemone
   - ☐ b. A snake
   - ☐ c. An oak tree
   - ☐ d. An ant
   - ☐ e. I had to guess
9. Did Indian life styles use more or less energy than ours?
   - ☐ a. More energy
   - ☐ b. Less energy
   - ☐ c. I had to guess
10. A sea star is a:
    - ☐ a. Omnivore
    - ☐ b. Herbivore
    - ☐ c. Carnivore
    - ☐ d. Decomposer
    - ☐ e. I had to guess
11. A human is a:
    - ☐ a. Omnivore
    - ☐ b. Herbivore
    - ☐ c. Carnivore
    - ☐ d. Decomposer
    - ☐ e. I had to guess
12. Deer are:
    - ☐ a. Omnivores
    - ☐ b. Herbivores
    - ☐ c. Carnivores
    - ☐ d. Decomposers
    - ☐ e. I had to guess
13. Plants make food through the process of:
    - ☐ a. Adaptation
    - ☐ b. Photosynthesis
    - ☐ c. Respiration
    - ☐ d. Chlorophyll
    - ☐ e. I had to guess

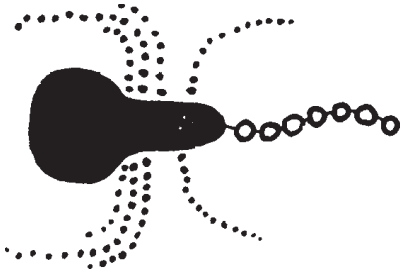


14. What body part do birds have to adapt to life in the sky?
    - ☐ a. Claws on its feet
    - ☐ b. A beak
    - ☐ c. Good eyes
    - ☐ d. Wings
    - ☐ e. I had to guess
15. What adaptation does a sea star have to survive in a tide pool ?
    - ☐ a. Ability to move quickly
    - ☐ b. Tube feet
    - ☐ c. Absence of eyes
    - ☐ d. Ability to jump
    - ☐ e. I had to guess
16. Which is a structural adaptation?
    - ☐ a. A sea anemone's smell
    - ☐ b. A sea anemone's walk
    - ☐ c. A sea anemone's tentacles
    - ☐ d. A sea anemone's food
    - ☐ e. I had to guess
17. Which is a behavioral adaptation?
    - ☐ a. A bird's nest building
    - ☐ b. A bird's smell
    - ☐ c. A bird's feet
    - ☐ d. A bird's eyes
    - ☐ e. I had to guess



True or False?

18. During the process of photosynthesis, plants give off carbon dioxide.
    - ☐ True
    - ☐ False
    - ☐ I had to guess
19. Humans have little effect on the environment.
    - ☐ True
    - ☐ False
    - ☐ I had to guess
20. Indians depended on nature. Today's humans don't have to.
    - ☐ True
    - ☐ False
    - ☐ I had to guess
21. All animals of the same species (deer, for example) are exactly alike.
    - ☐ True
    - ☐ False
    - ☐ I had to guess



22. If a group of foxes dies, it will have no effect on the plants in the area. (Foxes eat mice, rats and rabbits.)
    - ☐ True
    - ☐ False
    - ☐ I had to guess

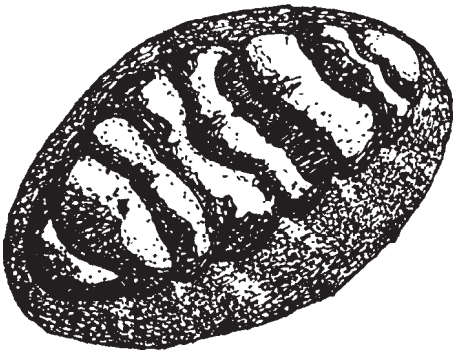
Answer the following questions. If you don't know the answer, write down your best guess and check the box.

23. Why is it important to learn about ecology?

    ☐ I had to guess

24. What are the two major parts of an ecosystem?

    ☐ I had to guess



25. Why is the sun important?

    ☐ I had to guess

26. Draw a simple food chain.

    ☐ I had to guess

27. Why are decomposers important?

    ☐ I had to guess

28. Draw a picture of a cycle in nature. (Examples: air,nutrient or water cycles)

    ☐ I had to guess

Answers to the KEEP Questions

1. What do the letters KEEP represent?
   - ☐ a. Keep Education Exactly Perfect
   - ■ b. Kern Environmental Education Program
   - ☐ c. Kern Easy Educational Program
   - ☐ d. I had to guess
2. Which of the following is not an ecosystem?
   - ■ a. A rock
   - ☐ b. The ocean
   - ☐ c. A pond
   - ☐ d. A forest
   - ☐ e. I had to guess
3. How much of the earth is covered by salt water?
   - ☐ a. 1/8
   - ☐ b. 1/4
   - ☐ c. 1/2
   - ■ d. 3/4
   - ☐ e. I had to guess
4. Where does the energy for all living things come from?
   - ☐ a. Water power
   - ☐ b. Coal
   - ☐ c. Oil
   - ■ d. Sun
   - ☐ e. I had to guess
5. Which is a producer?
   - ☐ a. Cat
   - ■ b. Tree
   - ☐ c. Human
   - ☐ d. Ant
   - ☐ e. I had to guess
6. Which is a decomposer?
   - ☐ a. Cat
   - ☐ b. Tree
   - ☐ c. Human
   - ■ d. Ant
   - ☐ e. I had to guess
7. Which is a consumer?
   - ■ a. Cat
   - ☐ b. Tree
   - ■ c. Human
   - ☐ d. Ant
   - ☐ e. I had to guess

8. Which of the following gets energy directly from the sun?
   - ☐ a. A sea anemone
   - ☐ b. A snake
   - ■ c. An oak tree
   - ☐ d. An ant
   - ☐ e. I had to guess
9. Did Indian life styles use more or less energy than ours?
   - ☐ a. More energy
   - ■ b. Less energy
   - ☐ c. I had to guess
10. A sea star is a:
   - ☐ a. Omnivore
   - ☐ b. Herbivore
   - ■ c. Carnivore
   - ☐ d. Decomposer
   - ☐ e. I had to guess
11. A human is a:
   - ■ a. Omnivore
   - ☐ b. Herbivore
   - ☐ c. Carnivore
   - ☐ d. Decomposer
   - ☐ e. I had to guess
12. Deer are:
   - ☐ a. Omnivores
   - ■ b. Herbivores
   - ☐ c. Carnivores
   - ☐ d. Decomposers
   - ☐ e. I had to guess
13. Plants make food through the process of:
   - ☐ a. Adaptation
   - ■ b. Photosynthesis
   - ☐ c. Respiration
   - ☐ d. Chlorophyll
   - ☐ e. I had to guess
14. What body part do birds have to adapt to life in the sky?
   - ☐ a. Claws on its feet
   - ☐ b. A beak
   - ☐ c. Good eyes
   - ■ d. Wings
   - ☐ e. I had to guess
15. What adaptation does a sea star have to survive in a tide pool ?
   - ☐ a. Ability to move quickly
   - ■ b. Tube feet
   - ☐ c. Absence of eyes
   - ☐ d. Ability to jump
   - ☐ e. I had to guess

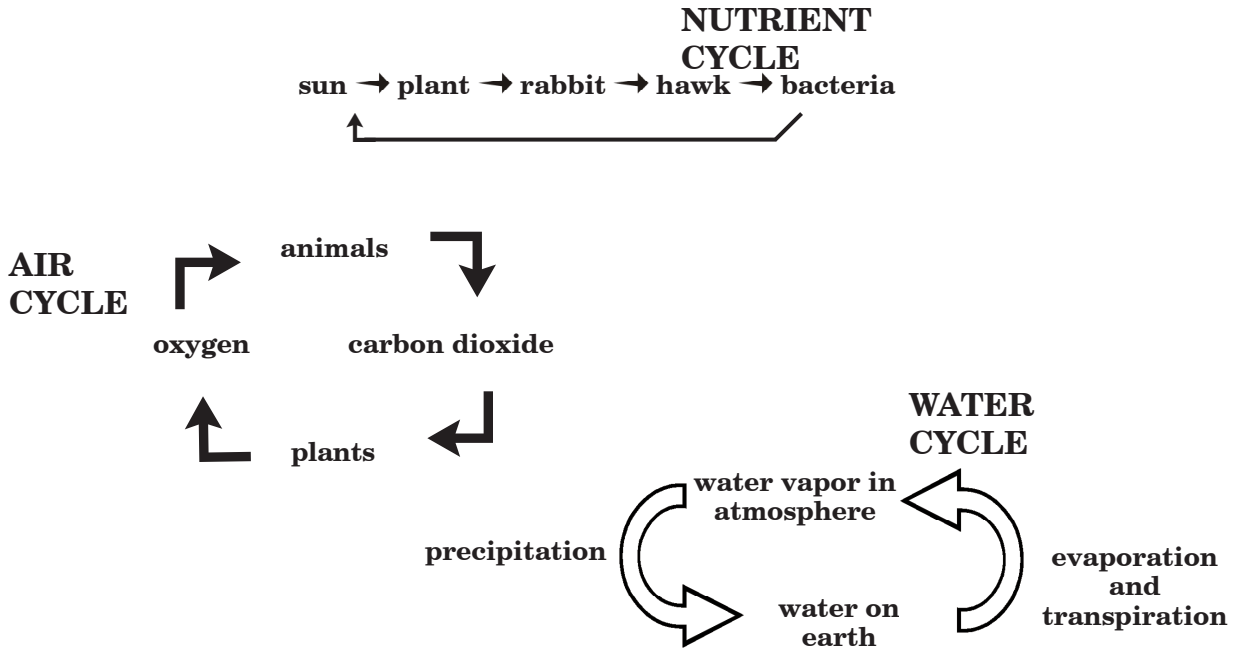
16. Which is a structural adaptation?
    - ☐ a. A sea anemone's smell
    - ☐ b. A sea anemone's walk
    - ■ c. A sea anemone's tentacles
    - ☐ d. A sea anemone's food
    - ☐ e. I had to guess
17. Which is a behavioral adaptation?
    - ■ a. A bird's nest building
    - ☐ b. A bird's smell
    - ☐ c. A bird's feet
    - ☐ d. A bird's eyes
    - ☐ e. I had to guess

True or False?

18. During the process of photosynthesis, plants give off carbon dioxide.
    - ☐ True
    - ■ False
    - ☐ I had to guess
19. Humans have little effect on the environment.
    - ☐ True
    - ■ False
    - ☐ I had to guess
20. Indians depended on nature. Today's humans don't have to.
    - ☐ True
    - ■ False
    - ☐ I had to guess
21. All animals of the same species (deer, for example) are exactly alike.
    - ☐ True
    - ■ False
    - ☐ I had to guess
22. If a group of foxes dies, it will have no effect on the plants in the area. (Foxes eat mice, rats and rabbits.)
    - ☐ True
    - ■ False
    - ☐ I had to guess

Answer the following questions. If you don't know the answer, write down your best guess and check the box. (answers will vary)

23. Why is it important to learn about ecology?
    finite resources on Earth, the more we know, the better we can manage/understand Earth's resources
    humans are a part of the Earth's ecosystem/knowledge is useful to our survival
24. What are the two major parts of an ecosystem?
    living & nonliving things
25. Why is the sun important?
    the energy for all living things
    the beginning of all Earth's food webs
26. Draw a simple food chain.
    sun → grass → deer → mountain lion
    sun → phytoplankton → mussel → gull
27. Why are decomposers important?
    break down dead things into nutrients which return to soil and are used by plants, etc.
28. Draw a picture of a cycle in nature. (Examples: air, nutrient or water cycles)



Lesson 2: Where's KEEP?

Background

Modern transportation tends to distort the environment. A flat road is not much different than an uphill grade to a person traveling in an air conditioned car. Most people who drive Interstate 5, for example, do not know where the road goes uphill and where it goes downhill. Yet, it is really full of a series of short climbs and short coasts up and down hills or ridges as high as 250 feet.

Even in areas where people live and walk on a day to day basis, there is so much man-made material to draw attention away from the land that the land upon which it is all placed is often ignored.

A typical bus trip from Bakersfield to KEEP begins at an altitude of about 400 feet, works its way down to I-5 near Buttonwillow, at 250 feet, then takes State Highway 46 across to Paso Robles. Along Highway 46 the bus reaches a summit of nearly 1100 feet and then works its way down to Highway 101, then down to the KEEP site at about 200 feet above sea level.

Along the way the bus has passed by a minimum of 11 types of ecosystems, driven through miles of some of the most productive agricultural land in the United States, been through three mountain ranges, crossed one of the single most important earthquake faults in the world, been through a national forest, passed one of the last remaining tidal marshes left untouched in California, and arrived at one of the most beautiful stretches of coastline anywhere in California.

One way to get the students interested and aware of their trip to KEEP is to give them the background needed to know where they will be traveling and where all these things are. A map is a good tool for gaining this background. Therefore, an introduction into map use and maps of the San Joaquin Valley and the central coast of California follows.

Purpose

To introduce students to the map reading skills required to use a map for obtaining basic information on location, distance, terrain, etc., of the Southern San Joaquin Valley, the central coast of California and the area between the two.

Objective

1. The student will be able to trace possible routes between KEEP and his/her home in the San Joaquin Valley.

2. The student will be able to use a map to distinguish terrain characteristics such as mountains, lakes, rivers, bays, etc., of a given area and resources such as agriculture, oil and water.

3. Using the "KEEP Country" map, the student will be able to find the resources, population centers and terrain features that they will pass and observe along the way.

Materials Needed

One composite map for each student made of East and West sections of KEEP Country (a copy follows this lesson).
One copy of "The Key" or map legend for each student. (a copy follows this lesson) One set map and legend overhead projector transparencies.
Paste or glue
A compass (optional)

Activity

Pass out the East and West section of the KEEP Country map.

Show the students how to align the map correctly. This involves putting the "A" and "B" arrows together so that they meet. Have them paste these together.

Have the students locate their home town and others nearby and locate Morro Bay. Follow along and point these out on your transparencies.

Point out the various directions on the map; North, South, East and West. Introduce the midway directions by explaining that halfway between North and East is Northeast, etc. Put a compass rose on the blackboard and have the students tell you where to put the correct directions on the rose.

Erase the compass directions on the board. Quiz the students on the directions, have them point to the North, Southwest, etc.

Now ask the students to orient their own maps. It might be easier if the students all face their desks North.

Have the students align the "N" symbol on the map's compass rose with the direction North.

Now ask where various places are and have the student show the true direction using a hand so the whole class can see. Make sure you mention KEEP several times and have them figure out which way the campus is from their school.

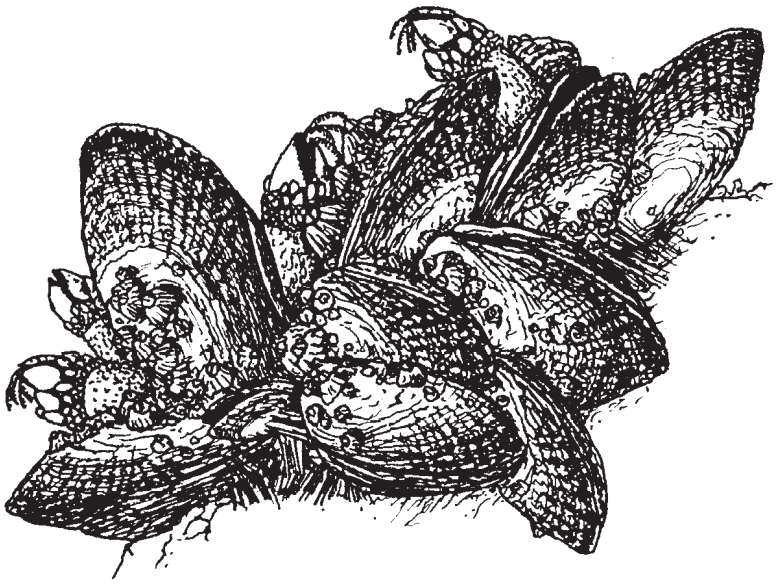
Introduce the Map Key or Legend to the KEEP Country map with the overhead transparen-

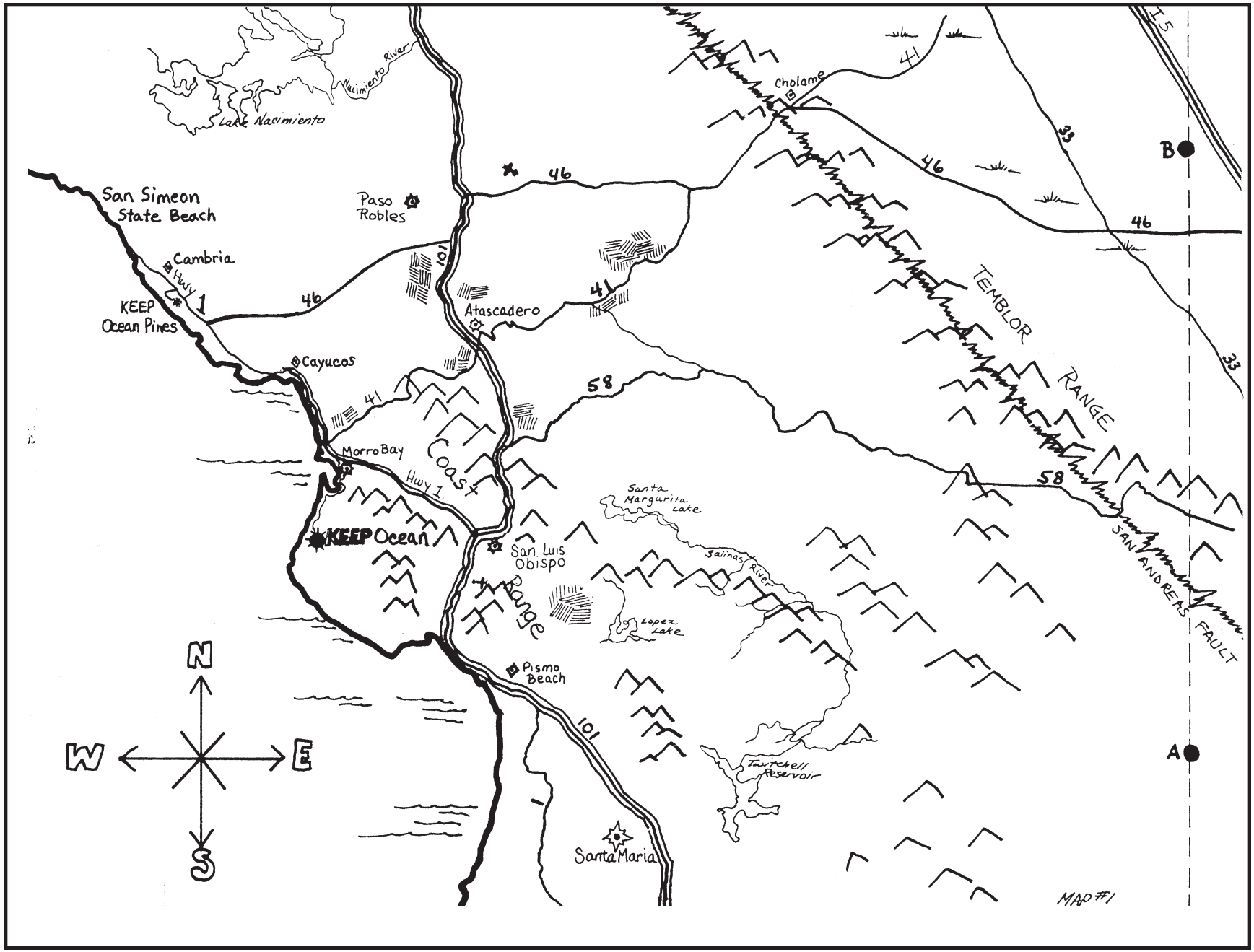
cies. After you have introduced the symbols, have the students find some possible routes to KEEP from their home town.

After several alternatives have been proposed, tell the students that the bus usually takes I-5 and Highway 46 to KEEP. Follow the route on the overhead projector for the students.

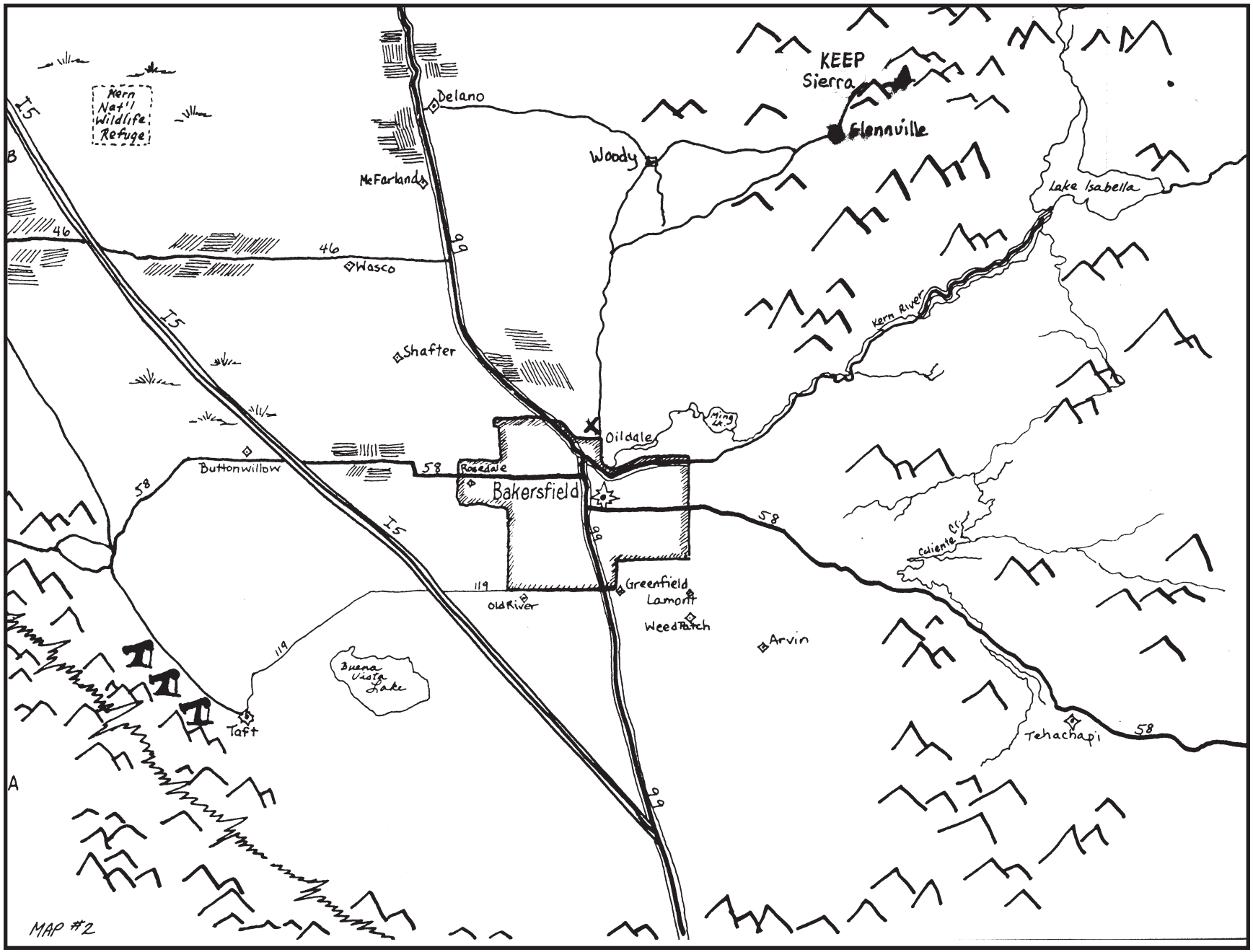
Explain to the students the diversity of ecosystems, terrain and human impact that they will see on their trip to KEEP. Have them point out some of this diversity using their KEEP Country maps.

Optional Lesson B: KEEP Country Quiz





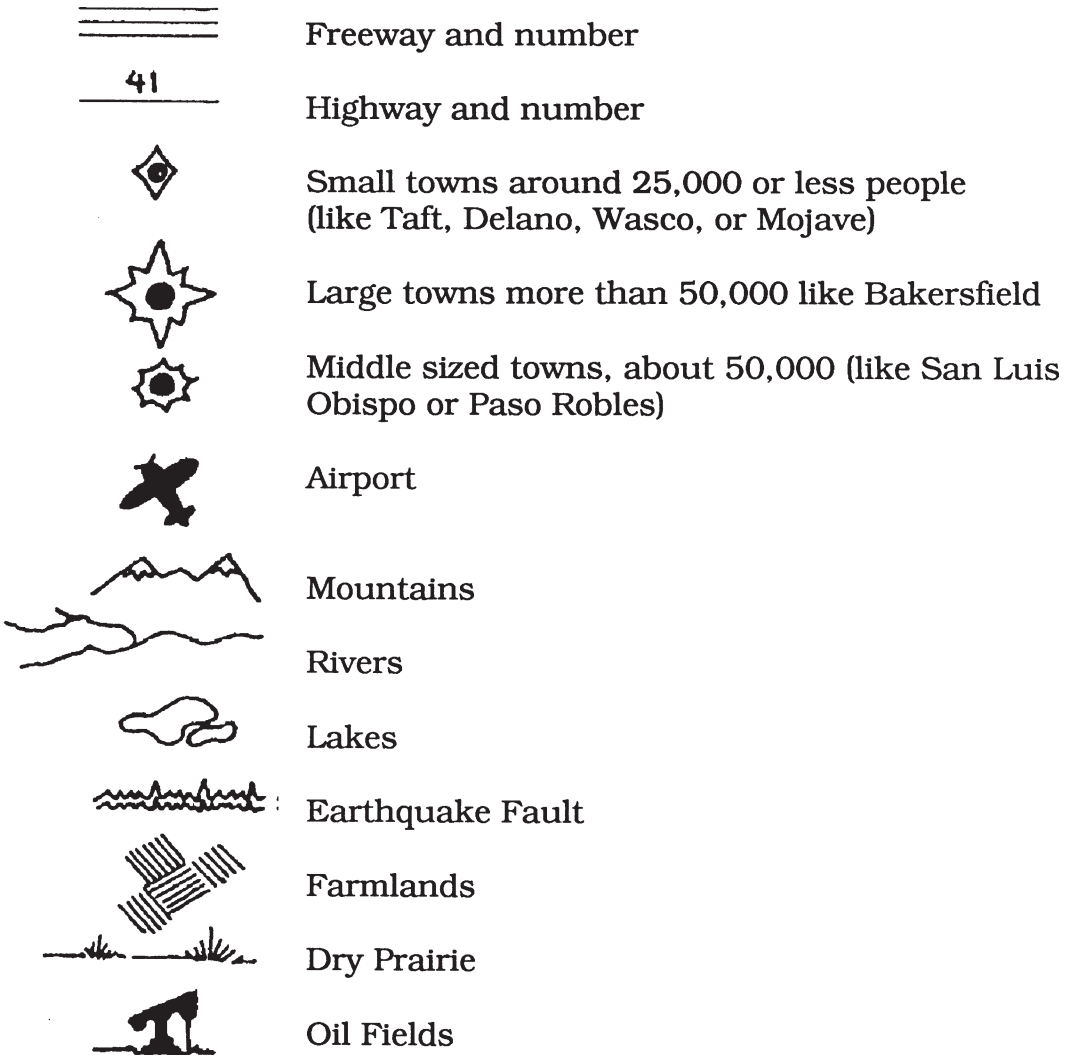
San Luis Obispo County


KEEP
Sierra
Glennville
Woody
Lake Isabella
Kern River
Delano
Kern
Nat'l
Wildlife
Refuge
McFarland
Wasco
Shafter
Buttonwillow
Oildale
Ming Ln
Rosedale
Bakersfield
Greenfield
Lamont
Weedpatch
Old River
Arvin
Caliente Cr
Buena Vista Lake
Taft
Tehachapi
I5
46
58
99
119
A
B
MAP #2

Kern County

The Key

The key to getting the most information from a map is the legend. This tells of the symbols the map uses for the land features it shows. The KEEP Country map symbols are as follows*:



Use this page for the legend transparency.

Name:_____

Optional Lesson B: KEEP Country Quiz

This quiz is designed to see how well you understand where you live and to see if you know how to use a map to find out about an area. Use your KEEP Country map to answer these questions. They are multiple choice. Check the best answer.

1. Which is not a resource of the San Joaquin Valley area?
   - ☐ a. Agriculture
   - ☐ b. Water
   - ☐ c. Sea Foods
   - ☐ d. Oil

2. Which is not a resource of the Morro Bay area?
   - ☐ a. Agriculture
   - ☐ b. Sea Foods
   - ☐ c. Oil
   - ☐ d. Water

3. What does the country look like around Highway 46?
   - ☐ a. Agriculture land
   - ☐ b. Low bushes, dry land
   - ☐ c. Sandy desert areas
   - ☐ d. Grassy hills with oak trees

4. What is the largest town in Kern County?
   - ☐ a. Taft
   - ☐ b. Delano
   - ☐ c. Tehachapi
   - ☐ d. Bakersfield

5. What town is the farthest North on the Kern County map?
   - ☐ a. Bakersfield
   - ☐ b. Delano
   - ☐ c. Tehachapi
   - ☐ d. Buttonwillow

6. What town is West of Bakersfield?
   - ☐ a. Arvin
   - ☐ b. Delano
   - ☐ c. Tehachapi
   - ☐ d. Buttonwillow

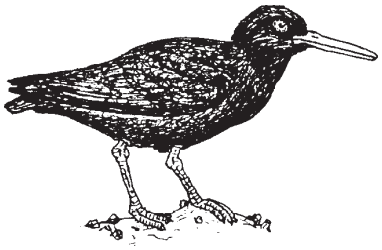
7. In what area are the oil resources found?
   - ☐ a. McKittrick
   - ☐ b. Tehachapi
   - ☐ c. Sierra Nevada
   - ☐ d. Delano

8. The weather in the coastal area near KEEP is:
   - ☐ a. cool in summer, but not cold in winter.
   - ☐ b. cold in winter, very hot in summer.
   - ☐ c. about like Bakersfield.
   - ☐ d. always colder than Bakersfield.

9. What most affects the weather in Morro Bay?
   - ☐ a. the sea
   - ☐ b. the mountains near it
   - ☐ c. the Sierra Nevadas
   - ☐ d. the Los Angeles smog

10. The route the bus will take to the KEEP site is:
    - ☐ a. Highway 99 to Delano, then Highway 155 east.
    - ☐ b. I-5 to Highway 46 west.
    - ☐ c. I-5 to Grapevine, then south.
    - ☐ d. Highway 58 west, then Highway 101 north.

11. What is one mountain range you will cross to get to the KEEP site?
    - ☐ a. Sierra Nevada
    - ☐ b. Tehachapi Mountains
    - ☐ c. Los Padres
    - ☐ d. Temblor Range



FILL IN THE BLANKS:

12. The San Andreas Fault is right next to _____.

13. What are the eight major directions of the compass?

    _____, _____, _____, _____,

    _____, _____, _____, _____,

14. What is the straight line distance from your town to the KEEP site near the ocean?

    _____miles

FILL IN THE BLANKS WITHOUT YOUR MAP:

15. What direction is your classroom's main door?_____

16. What direction is your classroom flag?_____

ANSWER IN SENTENCES:

17. What is a compass rose?

18. Why do you think the weather in Bakersfield is different from the weather at the KEEP site on the coast?

Answers to KEEP Country Quiz

1. Which is not a resource of the San Joaquin Valley area?
   - ☐ a. Agriculture
   - ☐ b. Water
   - ■ c. Sea Foods
   - ☐ d. Oil

2. Which is not a resource of the Morro Bay area?
   - ☐ a. Agriculture
   - ☐ b. Sea Foods
   - ■ c. Oil
   - ☐ d. Water

3. What does the country look like around Highway 46?
   - ■ a. Agriculture land
   - ■ b. Low bushes, dry land
   - ☐ c. Sandy desert areas
   - ☐ d. Grassy hills with oak trees

4. What is the largest town in Kern County?
   - ☐ a. Taft
   - ☐ b. Delano
   - ☐ c. Tehachapi
   - ■ d. Bakersfield

5. What town is the farthest North on the Kern County map?
   - ☐ a. Bakersfield
   - ■ b. Delano
   - ☐ c. Tehachapi
   - ☐ d. Buttonwillow

6. What town is West of Bakersfield?
   - ☐ a. Arvin
   - ☐ b. Delano
   - ☐ c. Tehachapi
   - ■ d. Buttonwillow

7. In what area are the oil resources found?
   - ■ a. McKittrick
   - ☐ b. Tehachapi
   - ☐ c. Sierra Nevada
   - ☐ d. Delano

8. The weather in the coastal area near KEEP is:
   - ☐ a. cool in summer, but not cold in winter.
   - ☐ b. cold in winter, very hot in summer.
   - ☐ c. about like Bakersfield.
   - ■ d. always colder than Bakersfield.

9. What most affects the weather in Morro Bay?
   - ■ a. the sea
   - ☐ b. the mountains near it
   - ☐ c. the Sierra Nevadas
   - ☐ d. the Los Angeles smog

10. The route the bus will take to the KEEP site is:
   - ☐ a. Highway 99 to Delano, then Highway 155 east.
   - ■ b. I-5 to Highway 46 west.
   - ☐ c. I-5 to Grapevine, then south.
   - ☐ d. Highway 58 west, then Highway 101 north.

11. What is one mountain range you will cross to get to the KEEP site?
   - ☐ a. Sierra Nevada
   - ☐ b. Tehachapi Mountains
   - ☐ c. Los Padres
   - ■ d. Temblor Range

FILL IN THE BLANKS:

12. The San Andreas Fault is right next to **Chalome or Temblor Range**.

13. What are the eight major directions of the compass?

    North, Northeast, East, Southeast, South, Southwest, West, Northwest

14. What is the straight line distance from your town to the KEEP site near the ocean?
    answers will vary

FILL IN THE BLANKS WITHOUT YOUR MAP:

15. What direction is your classroom's main door? **answers will vary**

16. What direction is your classroom flag? **answers will vary**

ANSWER IN SENTENCES:

17. What is a compass rose?

    An object on a map that orientates the map as to North, South, East and West.

18. Why do you think the weather in Bakersfield is different from the weather at the KEEP site on the coast?

    KEEP is near the ocean, which has a significant impact on the weather at KEEP.

Lesson 3: Environmental Values

Background

"Environment" is an incredibly complex concept to get across to students. The word itself has been overused, even to the point of being exploited. No one definition can suffice entirely, but it is important that the students themselves define what they mean when they use the term "environment". It is important from the very beginning that children understand that values questions are an integral part of our study of the environment. They determine the direction of the decisions we make concerning the environment and even affect how we see the environment.

Purpose

1. To clarify what values are and how they relate to the study of the environment.
2. To provide data for later evaluation of environmental attitudes/values.

Objective

The students will be able to list several of the environmental values he/she feels to be most important.

Science Framework Concepts

B-4 pg. 97.

Materials Needed

1 Values sheet per student, copy following this lesson.

Activity

Give each student a Values Sheet and explain the directions as necessary.
Have the students fill out the first part of the Values Sheet.

When everyone has done the first five choices, have them select their next five choices at the bottom of the sheet.

When the students are done with the questionnaire, initiate a discussion about their choices to focus on personal and environmental values. A suggested forum is to draw the following grid on the blackboard. Do not put any titles on the grid until after it has been filled in with student comments.

(Environmental Values)	(Personal Values)
clean air (parents, pollution, nature, pleasant friends, planting new trees, nice home)	pleasant friends, feeling of doing good work (happiness, freedom, respect for self and friends, helping, intelligence, athletic)

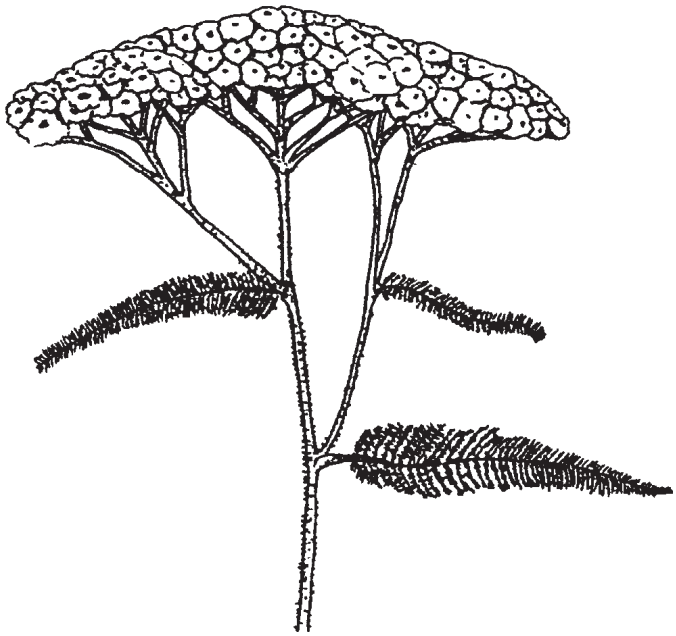
Ask the students to share their important values with the class if they wish. As environmental values are mentioned, write them on the left side of the grid; write personal ones on the right side. Some of the values may go on both sides, in that they are part of the environment and also personal, such as pleasant friends.

Ask the students:

What is a good title for the right side? the left side?
Why would "environmental values" be a good title?
What does the word environment mean?
Why is it important for us to know what our environmental values are?
Do the values you have make any difference in the choices you make?
How many of you had at least one environmental value in your first five choices?
How many in your second five choices?

If time allows you may want to extend the discussion and ask the students for other environmental values.

Collect all Values Sheets and save them for Lesson 14 in Unit 4.



Name:_____

Values Sheet #1

Read the whole list of choices. When you have read the list, put a 1 next to the one you think is most important. Put a 2 next to the second most important, and so on up to 5.

_____nice home, healthy and pleasant place to live

_____pleasant friends

_____feeling of doing good work

_____happiness

_____having freedom

_____clean air

_____respect for others

_____respect for yourself

_____quiet parks

_____planting new trees when you cut trees down for wood

_____parents

_____helping others

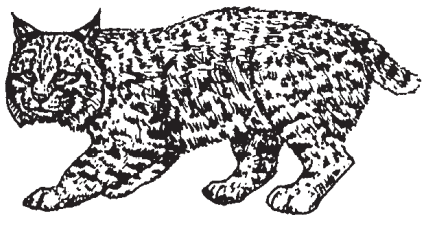
_____being intelligent

_____being athletic

_____pollution

_____natural beauty

Now pick another five you think are important and number them in the same way. But, put a circle around these five numbers.



Unit 2: Ecosystems

Lesson 4: Terrestrial & Aquatic Environments

Background

On the planet Earth, environments can be divided into two groups; terrestrial (land) or aquatic (water). The students will be spending their time at KEEP studying both environments. It is important for the students to understand that the Earth's resources are finite, hence the concept of "Spaceship Earth". Like a spaceship, the Earth is on a course in space with all the resources its passengers need for survival. If the Earth's passengers do not manage their resources properly, then their ability to sustain an acceptable quality of life or life itself may be doomed.

Purpose

To introduce the concept of Spaceship Earth and strengthen the students' concept of ecology and environment.

Objectives

1. The students will be able to distinguish between aquatic and terrestrial environments.
2. The students will be able to explain the concept of "Spaceship Earth".

Science Framework Concepts

B-4 pg.97 & C-2 pg.101.

Materials Needed

1 Apple
1 Knife
Globe (optional)

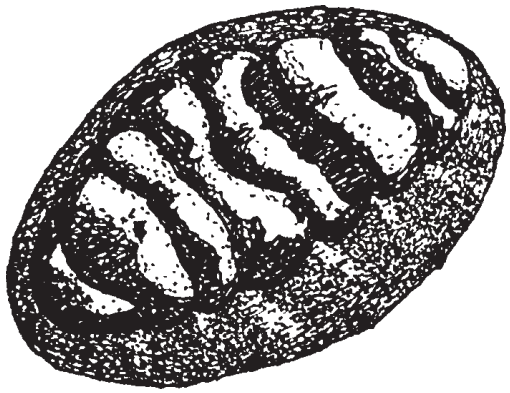
Activity

Using a globe, explain to the students the concept of Spaceship Earth. Review the definition of environment, your surroundings, and explain that you could divide the Earth into two major environments, terrestrial and aquatic. To illustrate this concept use an apple to represent the Earth.

1. Cut your apple into four equal pieces from top to bottom. Three of those pieces represent the aquatic environment. (3/4 of the Earth's surface is covered with water) Set these 3 pieces aside and mark t hese ocean. The remaining one fourth of the Earth's surface is the terrestrial environment. Label this land.
2. Cut your land into 2 equal pieces. One piece represents all the land that is too dry, too wet, too cold or too hot for humans. Label this uninhabitable land. The other piece of land or 1/8 of the Earth's surface is habitable by humans.
3. Cut your habitable land into four pieces. Set aside 3 of these pieces, the remaining piece, 1/32 of the Earth's surface, represents the portion of the habitable land in which humans can grow food.
4. Take this 1/32 piece and cut off a thin slice. This represents 3/100 of 1% of the Earth's surface. All of our drinkable water comes from this area. 99.5% of the fresh water on the Earth is locked up in ice caps and glaciers and is therefore unusable. Compare this piece of the apple with the entire apple to begin a discussion about the Earth's finite resources and the need to protect the environment.
5. Set the terrestrial part of the Earth aside and get the aquatic portion of your apple. Take one of the quarters and cut it in half. This piece, 1/8 of the Earth's surface, represents the productive zones of the ocean. Many regions of the world's oceans are not very productive and support very little life.
6. Cut this 1/8 piece into four equal pieces. One of these pieces, 1/32 of the Earth's surface represents t he productive area along the Pacific coast of North America, one of the richest regions of the oceans.
7. Take another 1/32 piece and cut off a thin slice. This represents the photic zone, the top 100 meters (300') of the ocean through which light can penetrate and support photosynthesis. Almost all of the ocean's life is concentrated in this narrow surface region.

Ask the students how we should treat our earth considering that only a small portion of the terrestrial and aquatic environments are capable of supporting the needs of more than 5 billion humans.

Portions of this activity adapted from "Apple Ocean" in Current/Vol. 8; No. 3; 1988.



Lesson 5: Environmental Necessities

Background

All living things depend directly or indirectly on sunlight, soil, air and water and need food, shelter and a place to live. These needs must be in the quality and quantity required by that particular living thing or **organism**.

Purpose

1. To introduce the students to a more detailed definition of environment and to recognize that all living things depend on the environment for basic needs.
2. To introduce the process called "brainstorming" as a technique to generate ideas within the group.

Objective

Through brainstorming, students will identify and organize the needs of people, other animals and plants.

Science Framework Concepts

A-1 pg. 118.

Materials Needed

Blackboard & chalk

or

Butcher paper & marker (the advantage to using butcher paper is that the lists you develop can be saved and referred to throughout the unit)

Activity

Discuss/review the students' ideas from the previous lesson on environmental values. Tell the students that now they are going to discuss what they and other living things on the planet Earth need for survival.

Explain that to begin the discussion, they will use a technique called brainstorming. One at a time, the students will give their ideas on the topic being brainstormed. The purpose of this technique is to generate as many ideas as possible, no matter how strange some of these ideas may seem at the time. The goal is to list as many ideas related to the topic as possible.

Divide the class into groups of 4 or 5 students. Have these groups brainstorm, one at a time, the basic needs of people, other animals and plants. After their lists are made give them time to go through their lists and cross out the ideas that are not essential needs.

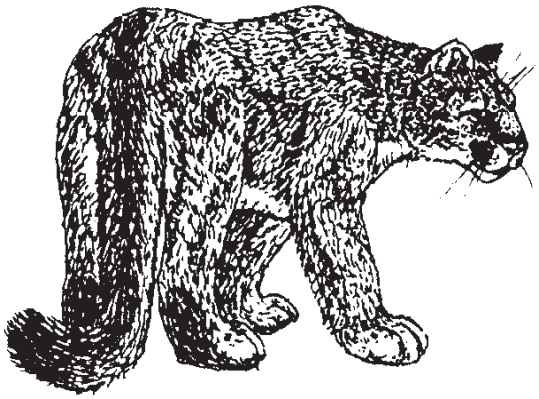
Write the headings "People", "Other Animals" and "Plants" on the board or a piece of butcher paper in a way so that a column of words can be listed under each heading.

Ask each group to read aloud their revised list so you can place them on the board under the appropriate column. After all 3 columns are filled in ask the students if any needs appear on more than one list. Circle the items that appear in all three columns.

Go through the list and reach an agreement with the students that everything on the lists are essential needs. Ask what seems to be the essential needs for people, other animals and plants? The most basic needs for all three groups should be the same.

Review the definition of environment (an organism's surroundings) and add that it is everything around a living thing that determines its survival. Ask the students for some things that would be in an environment. List their responses on the board under a column titled, "What is in the Environment?" Examples might include water, air, rocks, land, rivers, lakes, plants, animals, etc. Discuss the requirements of a healthy environment. Remind the students that they will be studying the environment and its components at KEEP.

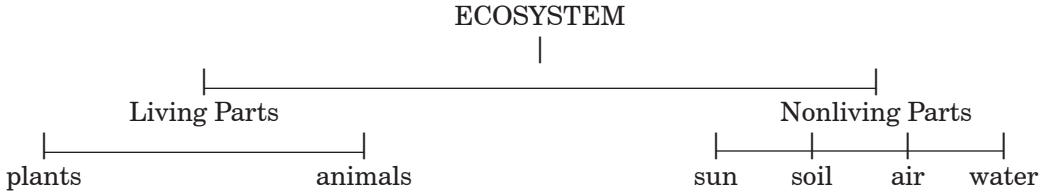
Portions of this activity adapted from: The CA State Environmental Education Guide, page 257.



Lesson 6: Ecosystems

Background

One of the most basic concepts of ecology is the ecosystem. Scientists have divided the places on the earth into smaller units called ecosystems to enable them to study them more efficiently. An **ecosystem** is the total of living parts (producers, consumers, decomposers) and nonliving parts (sun, soil, water, air) that supports life in a unit of nature. The term ecosystem is usually applied to some part of the earth that is relatively self-sufficient. For example, the ocean is a unit that can be studied by itself. The living things within the ocean not only depend on other living things for food but also rely on the nonliving things for shelter, oxygen, energy, etc. Examples of other ecosystems are tide pools, a stream, a desert, sand dunes or a forest. An aquarium or a rotting log in the forest can be considered an ecosystem. The entire surface of the earth makes up a huge ecosystem called the biosphere.



Purpose

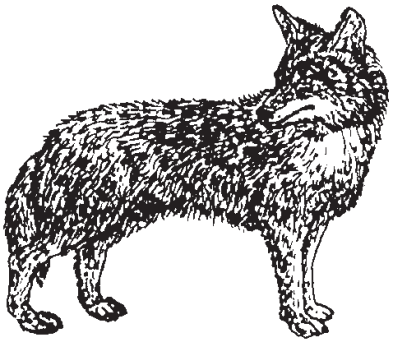
To introduce the student to the concept of an ecosystem and its components.

Objectives

1. The student will be able to give an example of an ecosystem.
2 . The student will be able to identify all components of an ecosystem.

Science Framework Concepts

A -1 pg. 118 & C-1 pg. 137.



Activity

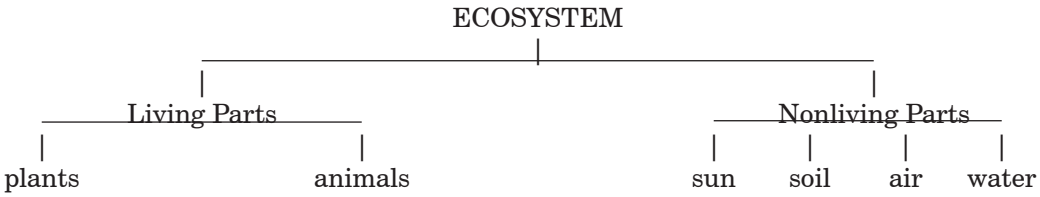
Review the terms environment and ecology.
Introduce the word ecosystem.
Hand out the student worksheets following this lesson.
Discuss the students' answers and observations. Collect the worksheets when the students are done. You will use these again in Lesson 7.

Optional Lesson C: Interrelationships: The Game of Chance

Name_____

Ecosystems Worksheet #1

The study of the environment is a branch of science called **ecology**. Ecology is the study of plants and animals and their relationship with each other and their environment. One of the most basic concepts of ecology is the ecosystem. Scientists have divided the places on the earth into smaller units called ecosystems to enable them to study them more efficiently. An **ecosystem** is the total of living parts (animals and plants) and nonliving parts (sun, soil, water, air) that supports life in a unit of nature.



Look at the attached drawing of an ecosystem biologists call the Rocky Intertidal Ecosystem (the tide pools). Use the drawing to answer the following questions.

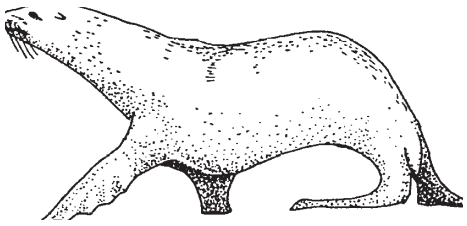
1. List the living and nonliving things in this drawing:

Living	Nonliving
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

The living and nonliving things in an ecosystem are interconnected or dependent on one another. Look at the sea star in the picture. What nonliving things in the picture affect the sea star? Water and air temperature, movement of the water, and the chemicals in the water are all nonliving things that affect that sea star.

2. Name two other nonliving things that have an effect on that sea star.

_____ _____



Living things or organisms also have an affect on other living things within an ecosystem. What living things in the picture could affect the sea star? The amount and kind of food available or parasites are living things that affect other living things in an ecosystem.

3. Name two other living things that have an effect on the sea star in the picture.

_____ _____

Look at the Rocky Intertidal Ecosystem again.

4. What are some of the qualities an environment must provide before life can exist?

   a. Space in which to live
   b. Food
   c. Water
   d. _____
   e. _____

5. Deer live in a forest ecosystem. What five items must the forest provide for the deer?

   a. _____
   b. _____
   c. _____
   d. _____
   e. _____

A forest is what biologists call a terrestrial environment, or land. There are many different types of terrestrial environments.

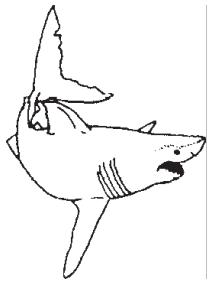
6. Can you name two terrestrial ecosystems?

_____ _____

The opposite of a terrestrial environment is an aquatic environment, or water.

7. Can you name two aquatic ecosystems?

_____ _____



A Rocky Intertidal Ecosystem

Answers to Ecosystems Worksheet #1

1. List the living and nonliving things in this drawing:

Living		Nonliving
plankton	sea anemone	sun
gull	mussels	rocks
Black Oystercatcher		water
human		air
crab		
octopus		

The living and nonliving things in an ecosystem are interconnected or dependent on one another. Look at the sea star in the picture. What nonliving things in the picture affect the sea star? Water and air temperature, movement of the water, and the chemicals in the water are all nonliving things that affect that sea star.

2. Name two other nonliving things that have an effect on that sea star.
   tides, space availability on the rocks, wind, waves

3. Name two other living things that have an effect on the sea star in the picture.
   human, gull or mussels

Look at the Rocky Intertidal Ecosystem again.

4. What are some of the qualities an environment must provide before life can exist?

   a. space in which to live
   b. food
   c. water
   d. **air**
   e. **sun for plants**

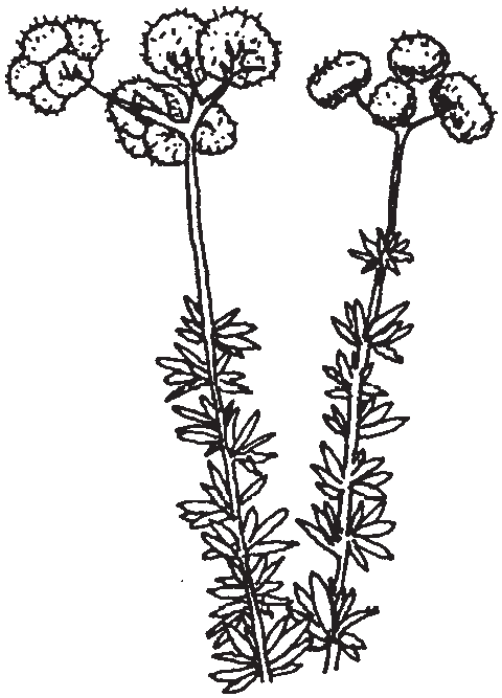
5. Deer live in a forest ecosystem. What five items must the forest provide for the deer?

   a. **space in which to live**
   b. **food**
   c. **water**
   d. **air**
   e. **sun for the plants**

6. Can you name two terrestrial environments?
   grass lands, mountainous, tundra, desert, city, etc.

The opposite of a terrestrial environment is an aquatic environment, or water.

7. Can you name two aquatic environments?
   river, ocean, pond, lake, swamp, etc.



Optional Lesson C: Interrelationships: The Game of Chance

Background

People depend on producers as does any other consumer. In our culture today this is sometimes hard to remember. We are often isolated from the natural environment; the producers are not within our view - they are in parks or on far-away farms. So our feeling of dependence is diminished. Such was not the case for the Indian cultures. The Indians of California lived in constant awareness of their place in nature, and their dependency on other parts of nature.

The Indians of California were a hunting, fishing and gathering people. So when there was a dry summer and not much grew, the people had little to eat. In an effort to explain why some summers were hot and without water and others were productive and moist, one Indian legend states that the Sun and Coyote, two gods, play a game of chance. They play for the whole year. If at the end of the year Coyote wins, there is a fine summer and the people prosper. If the Sun wins, he gets to shine all summer long, and the land dries up, the producers die, and the people suffer.

The weather affected the populations of plants and animals. In ecological terms, a population is the number of plants or animals of the same kind that live in a certain area or habitat. If a population is healthy, it generally never dies out completely, but its numbers may decrease or increase, depending on the environmental conditions.

Purpose

To acquaint the students with an example of the Indian's attempt to explain the world in which he lives. To familiarize the student with the idea that humans are an integral part of the producer-consumer-decomposer cycle.

Objective

The student will demonstrate the effect of a dry or normal summer on members of the producer-consumer-decomposer cycle by stating whether they increase or decrease and why.

Science Framework Addendum Concepts

B-4 pg. 97; A-2 pg. 118; A-4 pg.125

Materials Needed

Five kidney beans for each group of three students (i.e., for a class of thirty, there are ten groups and fifty beans)
Game of Chance sheets, one per group
Game of Chance Score Sheets
Next Year sheets, one per group
Five example beans marked with pencil on one side

Activities

Read the introduction above to the class.

Divide the students into groups of three: one student the Sun, another the Coyote, and the third a Referee.

Pass out the Game of Chance sheets.

Pass out five kidney beans to each group. Carefully read the instructions and answer any questions about how to play the Game of Chance. Then explain that after five quick games they are to pretend the year is up. If the Sun wins the most games, he gets to shine all year long, and the earth will dry up. If Coyote wins, the sun must make way for the rain for part of the year and the earth will be comfortable and moist so that things may grow.

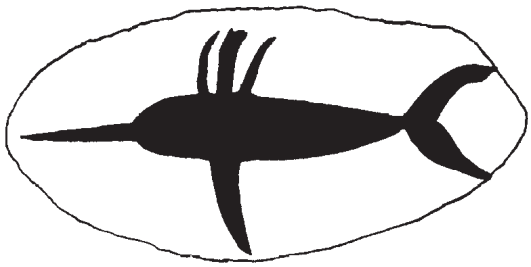
Pass out the Next Year sheets (they include a list of producers, consumers and decomposers) and read the instructions on them and answer any questions as needed. Introduce the concept of population (increase and decrease) to the student, and then explain that favorable conditions increase the numbers in the population while poor conditions cause the numbers to drop. A population of a certain plant or animal adjusts to the conditions in order to avoid dying off completely; it does not necessarily all die off.

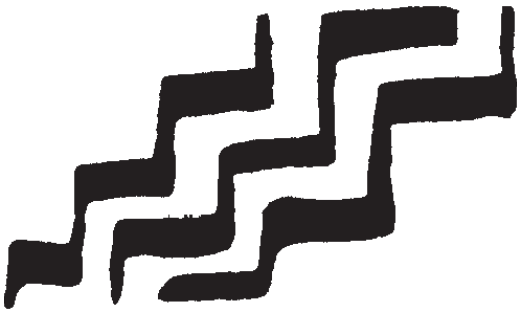
Give the students sufficient time to get through the task.

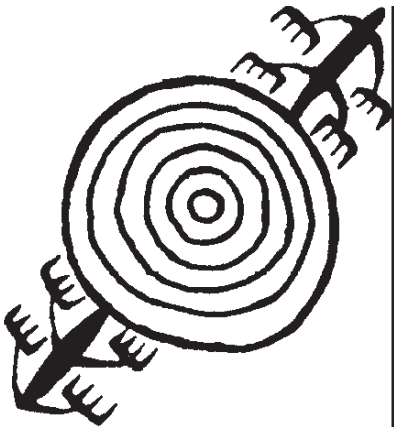
Then ask the groups to share their data and explanations.

The discussion should focus around humans and how other changes affect them, and how they affect the other things; for example, during a dry spell, if the Indians collect all the pine nuts, what would happen to other consumers like the wood rat who also eats the nuts? What would happen to the future growth of new pines?

Prior experience has indicated that intermediate grade students tend to think in terms of either a whole species living, or a whole species dying. Introduce the idea that all the individuals of any one species will not necessarily die, but a certain number of them may (i.e., the populations will decrease, not necessarily die off completely). Also explain that the number of births decrease during hard times, and that the unhealthy plants and animals often die but the healthy ones are often not affected at all. Also bring in the idea that good conditions increase the populations.







Name:_____

*Game of Chance**

You should be in a group of three people. Decide who will be the Sun, who will be the Coyote, and who will be the referee and scorekeeper.

The scorekeeper takes the five beans and with pencil, crayon or marker blackens one whole side of each bean. Now one side should be black and the other clear.

The referee then gives the beans to the Sun who starts out.

TO PLAY

You put all five beans in your cupped hands and shake them well. Then you quickly open up your hands so that all the beans drop together on the desk top. You then count the number of beans with black sides up and the number with clear sides up. Alternate, first the Sun, then the Coyote. When each has had three turns, that game is finished.

TO SCORE

If 1 or 4 black sides are up, then the player gets no points.

If 2 or 3 black sides are up, then the player gets 3 points.

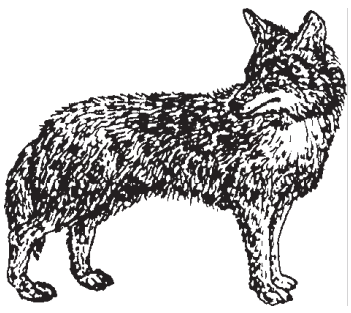
If all 5 black sides are up, the player gets 5 points.

If no black sides are up, the player gets no points.

Add up the scores for each of the three turns. The contestant with the highest score wins the game.

Play five games.

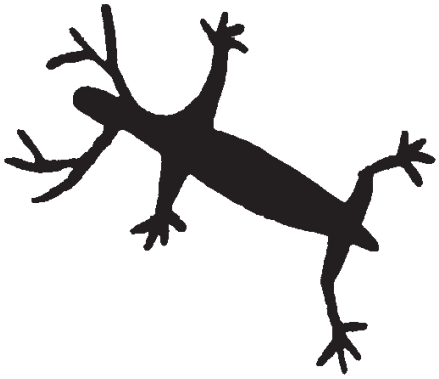
*Adapted from a Chumash dice game played with eight walnut shells and a similar scoring system.



Name:_____

Score Sheet

	Sun	**Coyote**
Game 1 -		
Game 2 -		
Game 3 -		
Game 4 -		
Totals		



Name:_____

The Next Year

Circle one: (Coyote) (Sun) won the most games.

So, next year the weather will be_____.

The streams and rivers will be_____.

Here is a list of some producers, consumers and decomposers with a few facts about them. Tell whether they will do well or poorly next year. Will there be more of them or less of them next year? Explain your answer.

Producers
Bracken Fern - a plant that needs moisture and lots of shade.

Coastal Live Oak - a tree that grows in the coastal areas of California. It produces acorns which the Indians fixed for food.

Pine - can take dry weather. Indians and many animals eat the nuts which are in its pine cones.

Consumers
Humans - the Chumash Indians ate fish and depended on the sea for much of their food. They also needed lots of acorns for their bread. Sometimes they ate pine nuts. They needed water to drink.

Wood Rat - lives in forest areas where there is much brush; makes its nest of dead branches and moss. Eats plants, acorns, pine nuts, berries.

Kangaroo Rat - lives in open, dry areas; makes its water from the food it eats. It doesn't need to drink water.

Decomposers
Bacteria - very tiny living things that break down dead materials. They prefer a warm place that is also damp.

Beetle - an insect that likes to eat dead things (wood, meat). Some beetles eat live plants. Some need very little moisture and can even live in a desert. They also do well when it is wet.

Earthworm - it is the common worm everywhere. It actually eats dirt. It needs water to keep the soil soft. If the soil isn't at least a little wet, the worm can't eat and will dry up. If it is too wet in the soil, the worm will drown.

Lesson 7: How Do Ecosystems Work?

Background

Everything needs **energy** to function. The ultimate source of all the energy on the Earth is the sun. The energy which powers ecosystems is in the form of direct sunlight. Photosynthesis is the process whereby the sun's energy is captured and used by green plants. Not all living things can use the sun's energy directly. Animals and some plants depend on other types of living things to convert the sun's energy into a type of energy they then can use. For example, a mouse depends on grass to convert the sun's energy into grain which it can eat for energy.

Humans depend on the sun for all of their energy needs. Our most obvious dependence is the need for energy to fuel our bodies. Fossil fuels, wind, tides and hydropower all are formed or caused by the sun as well.

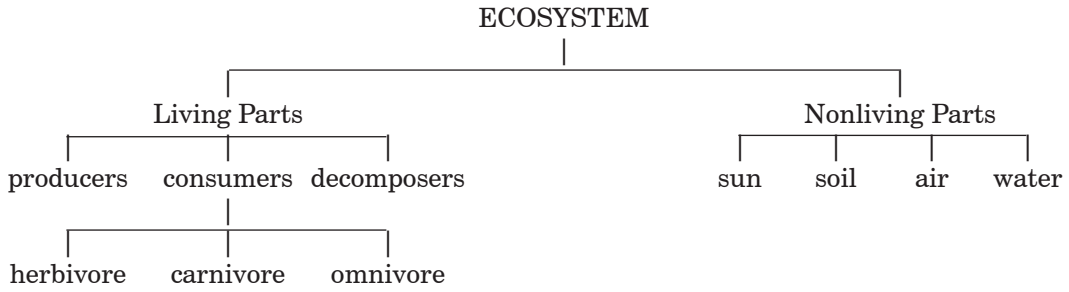
All living things need energy to function. In an ecosystem, the living parts are classified as either producers, consumers or decomposers according to how they get their energy.

Producers are plants. Through the process of photosynthesis they use the sun's energy, which is trapped by chlorophyll, to combine carbon dioxide and water into carbohydrates. Oxygen is given off during this process. All other living things are dependent on producers either directly or indirectly as a source of energy.

Consumers are organisms which get their energy by eating plants or other animals. There are several types of consumers:
herbivore: an animal which eats only plants.
carnivore: an animal which eats only other animals.
omnivore: an animal which eats both plants and animals.

Decomposers or reducers are organisms that get their energy from dead things. Fungi and bacteria are the most important decomposers. In the process of breaking down dead plant and animal material, minerals and other raw materials are returned to the soil. These raw materials or building blocks of life can be reused by plants during the process of photosynthesis.

It is important to recognize that energy cannot be recycled but matter can. Energy is continuously entering ecosystems in its original form as sunlight. As energy flows through an ecosystem it is gradually used up by living things in the course of their daily activities and dissipated as heat. Matter is continually recycled as it passes from producers to consumers to decomposers and ultimately back to the producers.



Purpose

To introduce students to the concept of energy flow in ecosystems involving producers, consumers and decomposers.

Objectives

1. The student will be able to define and identify producers, consumers and decomposers.
2. The student will be able to follow/trace the energy flow through an ecosystem.

Science Framework Concepts

D-1 pg. 61; A-4 pg. 125; C-2 pg. 139.

Materials

Student Worksheets from Lesson 6.
Student Worksheet from Lesson 7 (following this lesson)

Activity

Review the definition of ecosystem.

Pass out the Student Worksheets from Lesson 6.

Explain that the living parts in an ecosystem need energy. Depending on how they get their energy, the living parts are categorized as either producers, consumers or decomposers.

Draw the ecosystem diagram on the blackboard that is on the Student Worksheet. Change the "plants" and "animals" to "producers," "consumers" and "decomposers". Have the students do the same on their worksheet.

Explain that a producer is an organism that can make its own food. Plants are producers.

A consumer is an organism that gets its energy or food by eating producers or other animals. Explain that there are three types of consumers: herbivore, carnivore and omnivore. Add these to your ecosystem diagram and have the students do the same on their worksheet.

Explain that decomposers are a group of organisms that get their energy from the dead bodies of animals or plants and thereby return raw materials and nutrients to the soil for the producers.

Pass out the following student worksheet to be used in conjunction with the illustration of the Rocky Intertidal Worksheet.

Discuss the students' answers on their worksheets.

Optional Lesson D: Habitat Flash Cards

Name:_____

Ecosystems Worksheet #2

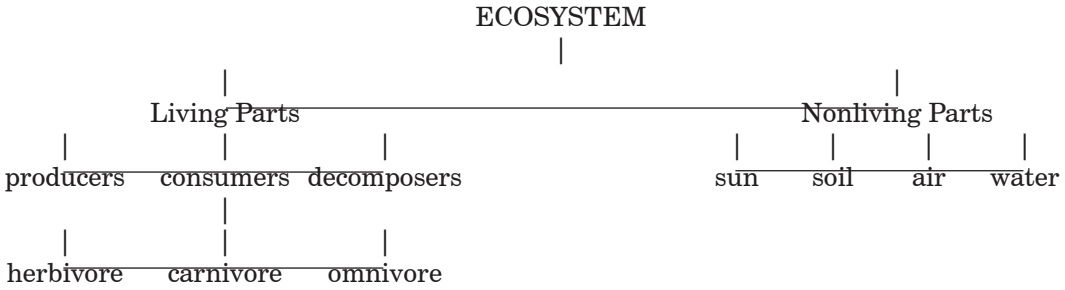
All living things need energy to function. In an ecosystem, the living parts are classified as either producers, consumers or decomposers according to how they get their energy.

Producers are plants. Through the process of photosynthesis they use the sun's energy, which is trapped by chlorophyll, to combine carbon dioxide and water into carbohydrates. Oxygen is given off during this process. All other living things are dependent on producers either directly or indirectly as a source of energy.

Consumers are organisms which get their energy by eating plants or other animals. There are several types of consumers:
herbivore: an animal which eats only plants.
carnivore: an animal which eats only other animals.
omnivore: an animal which eats both plants and animals.

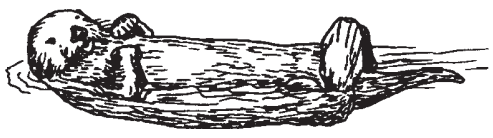
Decomposers or reducers are organisms that get their energy from dead things. Fungi and bacteria are the most important decomposers. In the process of breaking down dead plant and animal material, minerals and other raw materials are returned to the soil. These raw materials or building blocks of life can be reused by plants during the process of photosynthesis.

Here is a chart of an ecosystem:



Look at the illustration of the Rocky Intertidal Ecosystem from your Ecosystem Worksheet #1. Use your worksheet to answer the following questions.

1. Label all the parts of this ecosystem on the illustration. Don't forget the nonliving and living components.
2. Now that you have identified the living and nonliving parts of this ecosystem, can you



identify the producers, consumers and decomposers?

a. phytoplankton
b. sea star
c. crab
d. mussels
e. human
f. gull

3. Choose three consumers and identify them as herbivores, carnivores or omnivores.

   a._____ is a _____

   b._____ is a _____

   c._____ is a _____

4. Add a producer, consumer and decomposer to the illustration.

5. Study the drawing of the Rocky Intertidal Ecosystem and try to figure out how energy flows through this ecosystem. Use arrows to indicate or follow the energy flow.

Answers to Ecosystems Worksheet #2

Look at the illustration of the Rocky Intertidal Ecosystem.

1. Label all the parts of this ecosystem on the illustration. Don't forget the nonliving and living components.
   sun, soil, air, water
   consumers = human, mussel, sea star, sea anemones, American Black Oystercatcher, octopus, zooplankton
   producers = phytoplankton
   decomposers = crab, gull

2. Now that you have identified the living and nonliving parts of this ecosystem, can you identify the producers, consumers and decomposers

a.	phytoplankton	**producer**
b.	sea star	**consumer**
c.	crabde	**composer**
d.	mussels	**consumer**
e.	human	**consumer**
f.	gull	**decomposer**

3. Choose three consumers and identify them as herbivores, carnivores or omnivores.

   a. **sea star is carnivore**
   b. **mussels are omnivores**
   c. **humans are omnivores**
   d. **octopus is a carnivore**
   e. **American Black Oystercatcher is a carnivore**
   f. **sea anemones are carnivores**
   g. **animal plankton (zooplankton) are omnivores**

4. Add a producer, consumer and decomposer to the illustration.
   answers will vary...some examples:
   producers: rock weed, kelp, phytoplankton
   consumers: sea anemones, barnacles, variety of birds
   decomposers: hermit crab, brittle stars

5. Study the drawing of the Rocky Intertidal Ecosystem and try to figure out how energy flows through this ecosystem. Use arrows to indicate or follow the energy flow.
   answers will vary...some examples:
   sun → phytoplankton → mussels → sea star → gull → crab → soil
   sun → phytoplankton → mussels → gull → soil
   sun → phytoplankton → mussels → human → crab → soil
   sun → phytoplankton → zooplankton → mussels → American Black Oystercatcher → crab → soil

Optional Lesson D: Habitat Flash Cards

Background

The material for this lesson focuses on memorization and recall. The lesson merely asks the students to retain and relate a certain body of knowledge, without interpretation, conclusions or any other sort of cognitive processing. The point is to give the students a data base from which they can springboard to the other more elaborate types of learning as they relate to their environment in and around KEEP.

The intent is to give the student a foundation of common species found around KEEP so that when they arrive they will feel familiar with at least some of the things they will encounter. It is hoped that this cursory introduction will allow the students the satisfaction of being able to say to themselves, "Hey, I know that animal - it's a decomposer and I studied it in class." With this in mind, this lesson is oriented toward helping the child to identify these organisms and know some specific facts about them. The students will make 36 flash cards of the plants and animals typically found around KEEP. The flash cards can be used in a "Natural History Showdown" game.

Purpose

To familiarize the student with a small but functional core of knowledge of specific plants and animals around KEEP. This will serve as a data base for further study.

Objective

The student will be able to recall the name and characteristic role (producer, consumer or decomposer) of 36 organisms typically found around the KEEP Campus.

Science Framework Concepts

C-1 pg. 137.

Materials Needed

"Producers, Consumers & Decomposers of CA Central Coast" (2 per student)
"Flash Card Cutouts" and instruction sheet for each student
Scissors
Paste
9 sheets of construction paper for each student

Activity

Review the following information with the students:

Producer-Consumer-Decomposer

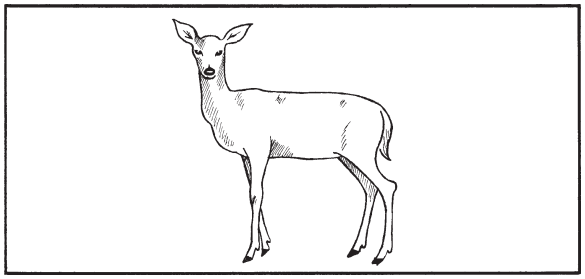
Everything needs energy of one form or another to function. The ultimate source of all the energy on the earth today is the sun. But not all the living things on earth can use the sun's energy directly. Animals and some plants like fungi depend on other types of living things to convert the sun's energy into a type of energy they can use. The field mouse depends on grasses and other plants to convert the sun's rays into grain and the hawk depends on the field mouse to change the energy of the grasses into meat to eat. Every living thing can be classified as either a producer, a consumer or a decomposer (or some combination of the three).

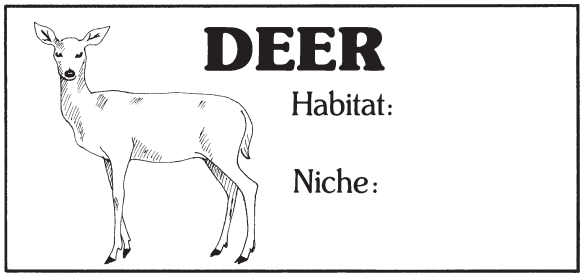
A producer is any plant that can change sunlight, carbon dioxide, water and the nutrients left in the soil into energy (food) that can be used by consumers. Consumers are those living things that eat the producers to get their energy. Nothing is wasted because the decomposers come into the picture. Decomposers take all the dead material on the earth and change it into plant food for the soil, which is again used by other plant producers in the future. If any stage in the cycle is broken, all the living things suffer. They are all interdependent. Humans, too, are consumers, and they are not exempt from the cycle.

Now pass out the "Producers, Consumers & Decomposers of the CA Central Coast" sheets and nine sheets of construction paper to each student.

Have each student fold one sheet of construction paper into fourths so there are four equal sized cards made of the sheet. Then have the student put four sheets behind it and cut. Repeat the process for the last four. Fold one, then cut all four together.

Refer the students to their flash card cutout instructions. Read the instructions to the students and then draw a huge sample card on the board.
Define the concepts of habitat and niche.



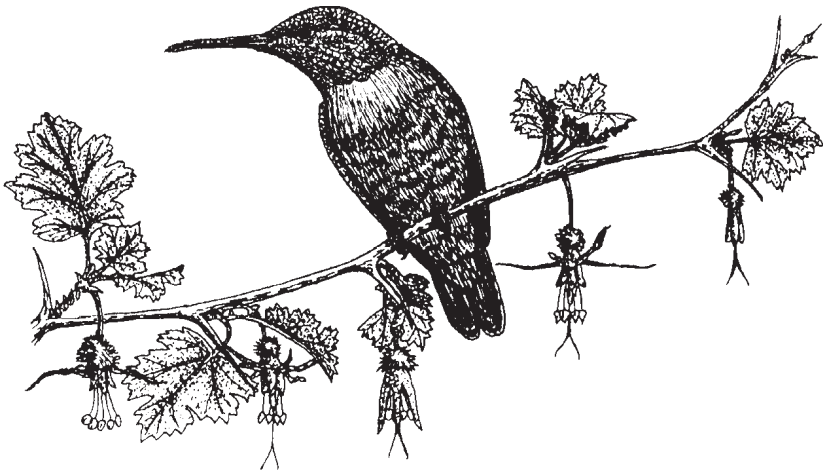


Habitat is the area where the population of a given species is typically found. It is sometimes confused with the word niche. **Niche** is actually the job that the organism does, be it plant or animal. When we speak of producers, consumers and decomposers, we are speaking of, in part, the niche in which the organism fits. A good way to distinguish habitat and niche is to remember that habitat is a place and niche is a job done in that place.

After the class makes their cards, explain how they will be using them. Working in pairs, one student, the answerer, places his/her cards face down on the desk.
The questioner keeps his/her cards, shuffles through them and says a name.
The answerer must: (1) spell the name (2) tell the niche.
The questioner corrects any error and then goes on to the next card.

Variations

1. After studying the flash cards, students can play "Showdown" as described following this lesson.
2. Students can take the flash cards home to study them.



Producers, Consumers & Decomposers of the California Central Coast

1. Habitat: Chaparral

Producers	***Consumers***	***Decomposers***
Poison Oak	Red-Tailed Hawk	Turkey Vulture
Sticky Monkey Flower	Anna's Hummingbird	Bacteria
Coyote Bush	Southern Pacific	Beetle
Rattlesnake		

2. Habitat: Rocky Intertidal

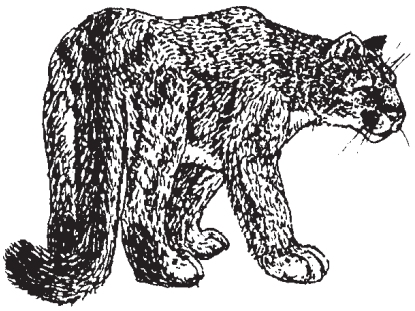
Producers	***Consumers***	***Decomposers***
Bull Kelp	American Black Oystercatcher	Hermit Crab
Rockweed	Mussels	Western Gull
Sea Lettuce	Sea Anemone	Brittle Star

3. Habitat: Estuary

Producers	***Consumers***	***Decomposers***
Pickleweed	Sea Hare	Ghost Shrimp
Eel Grass	Marbled Godwit	Scale Worm
Phytoplankton	Great Blue Heron	California Horn Snail

4. Habitat: Riparian

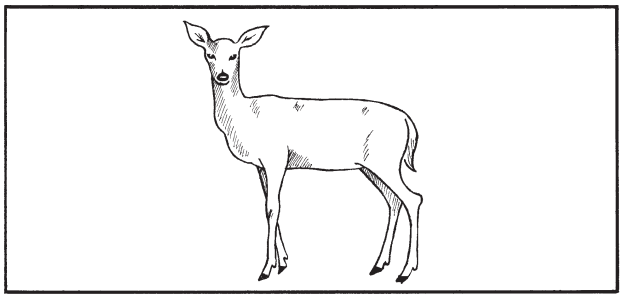
Producers	***Consumers***	***Decomposers***
Willow	Steelhead Trout	Mushrooms
Stinging Nettle	Raccoon	Beetle
Plantago	Dusky-footed Woodrat	Ants



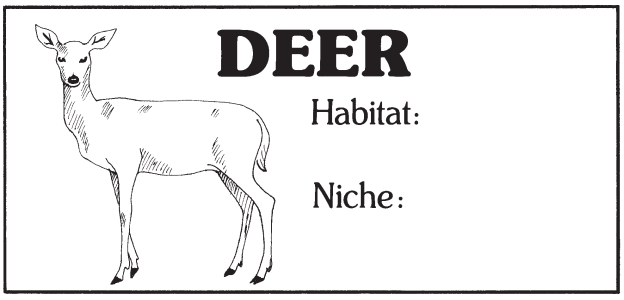
Flash Card Cutouts

On the following pages are two pictures of each kind of plant or animal mentioned in the "Producers, Consumers & Decomposers of the CA Central Coast" sheet. The pictures are for your flash cards.

Cut both pictures out, paste one on the front of the flash card, and the other on the left side of the back (see below).



Then print clearly the name (spelled correctly) and niche (job done) on the back of the card next to the picture. Like this:

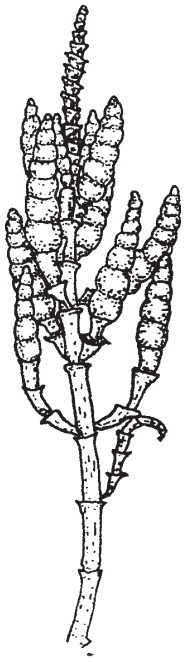


Producers

Poison Oak

Coyote Bush

Stinging Nettle



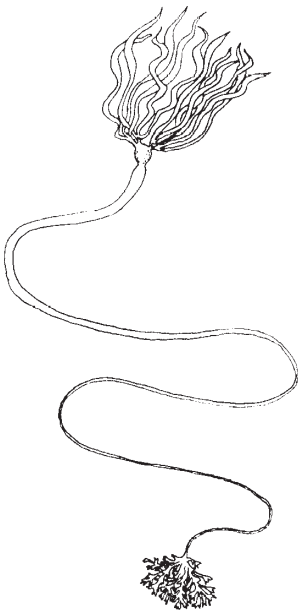
Pickleweed

Sticky Monkey Flower

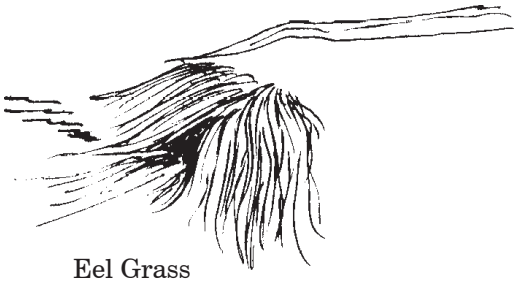
Plantago

Rockweed

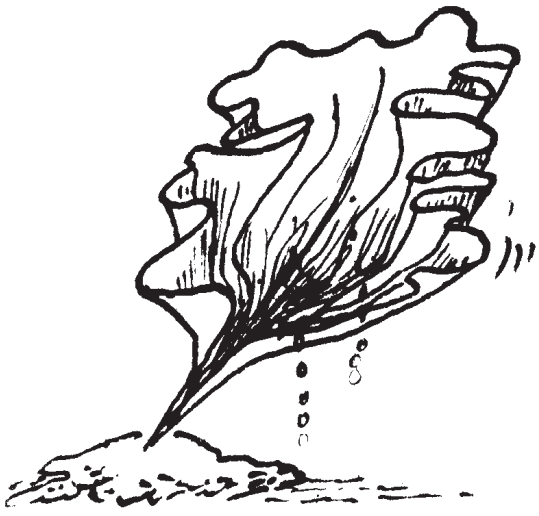
Willow



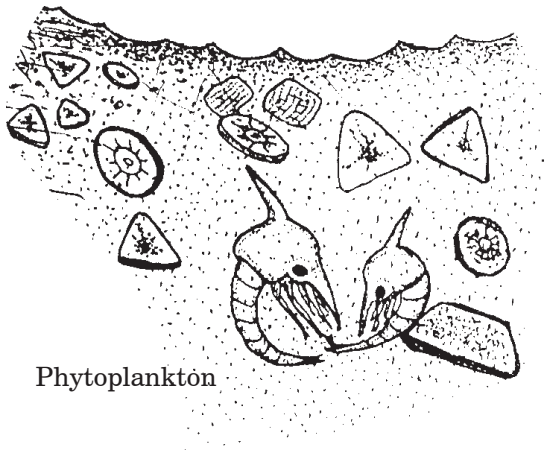
Bull Kelp



Eel Grass

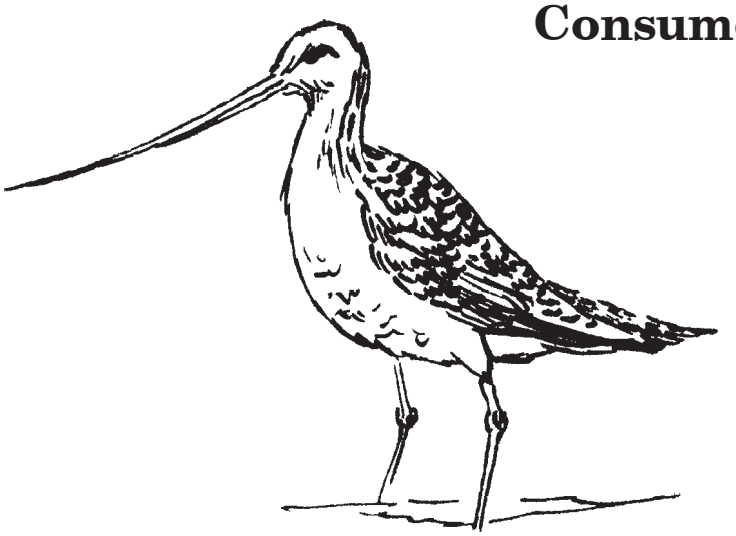


Sea Lettuce

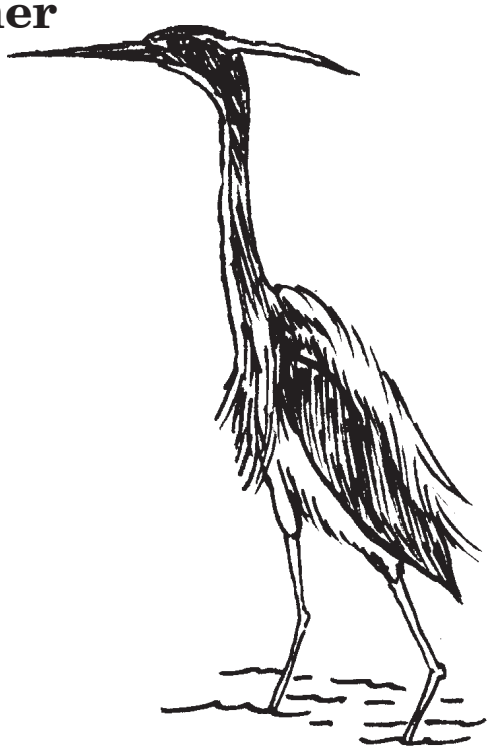


Phytoplankton

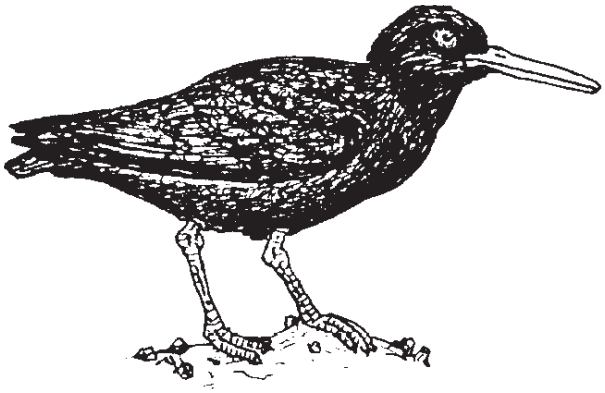
Consumer



Marbled Godwit

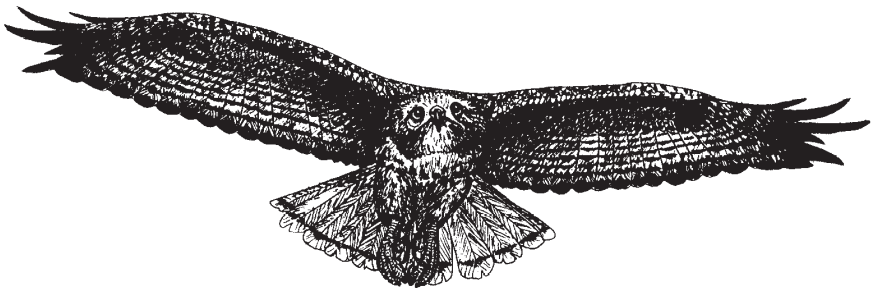


Great Blue Heron

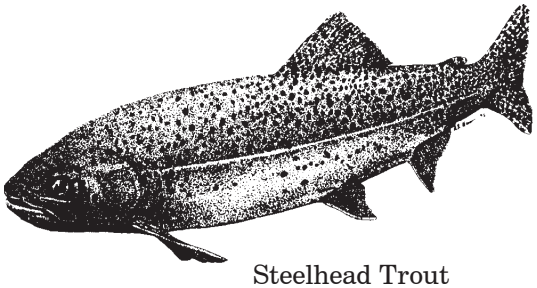


American Black Oystercatcher

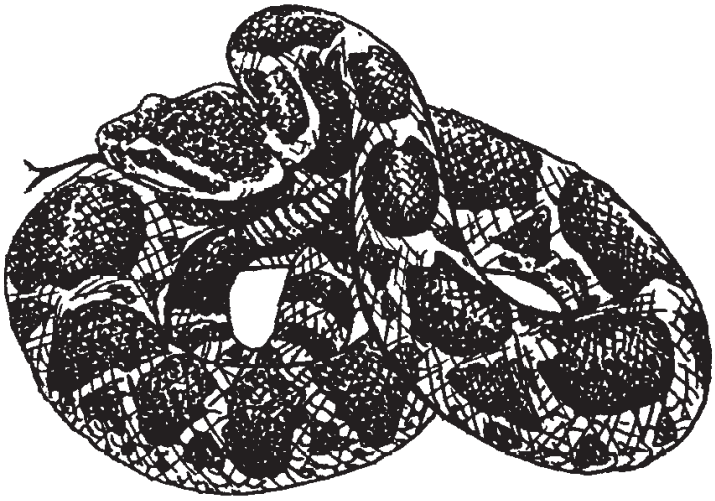
Raccoon



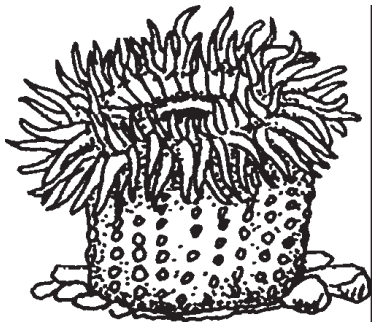
Red-Tailed Hawk



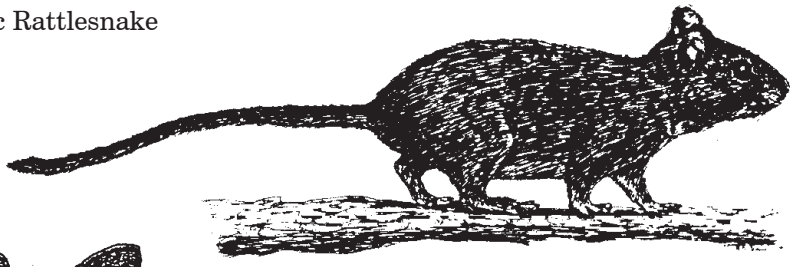
Steelhead Trout



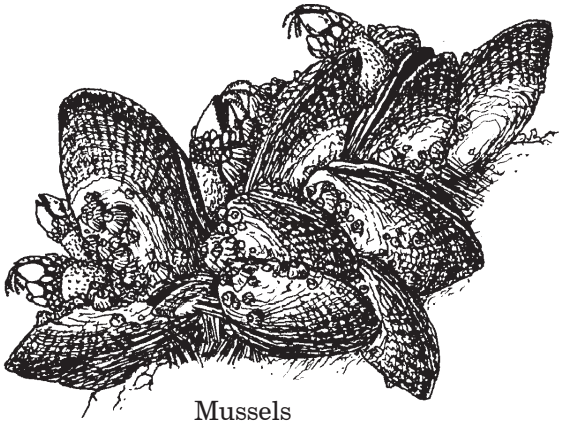
Southern Pacific Rattlesnake



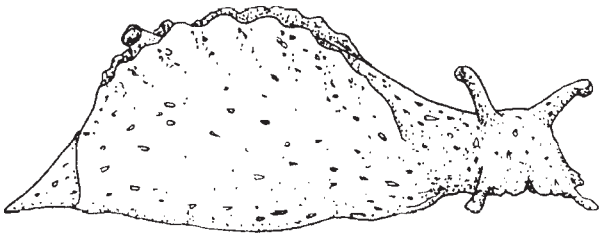
Sea Anemone



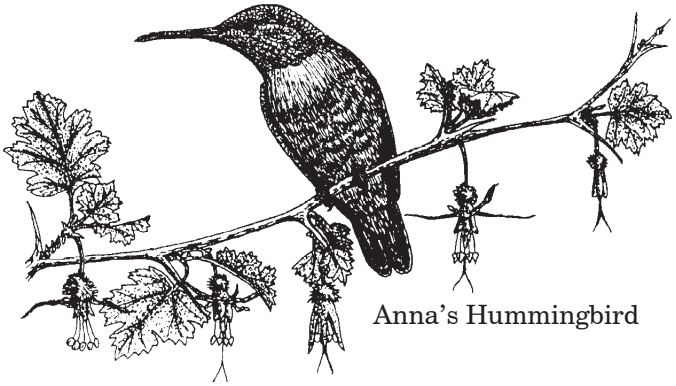
Dusky-footed Woodrat



Mussels

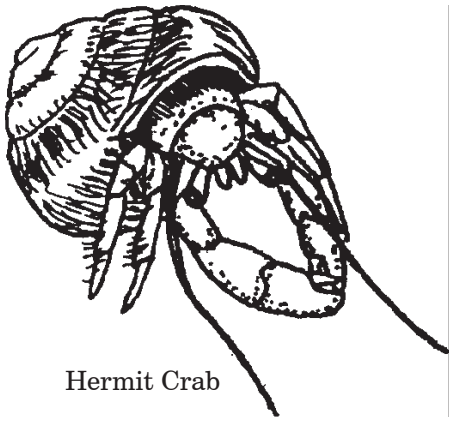


Sea Hare

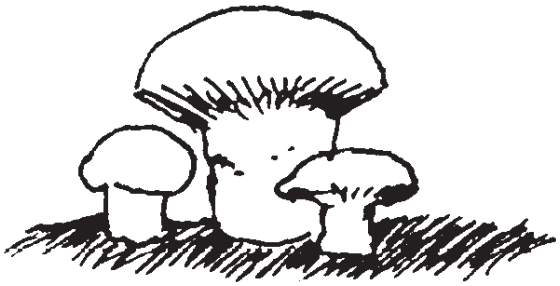


Anna's Hummingbird

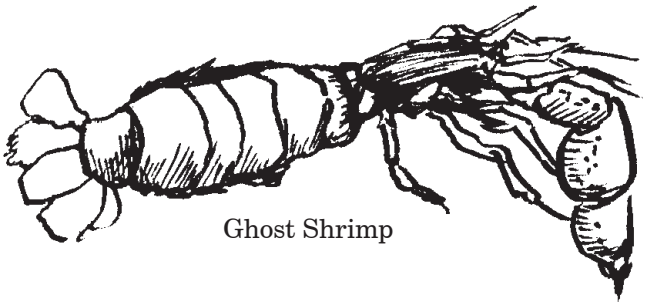
Decomposers



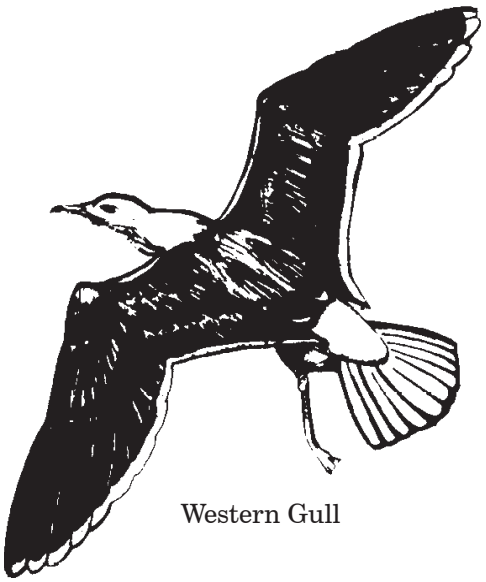
Hermit Crab



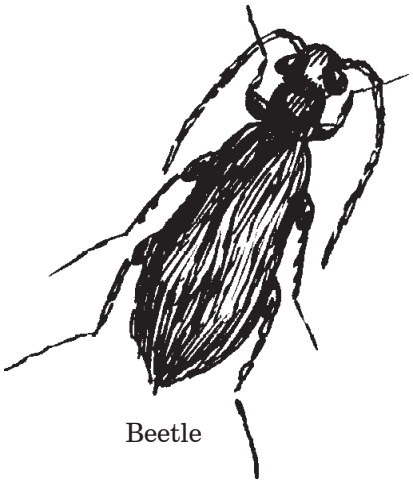
Mushrooms



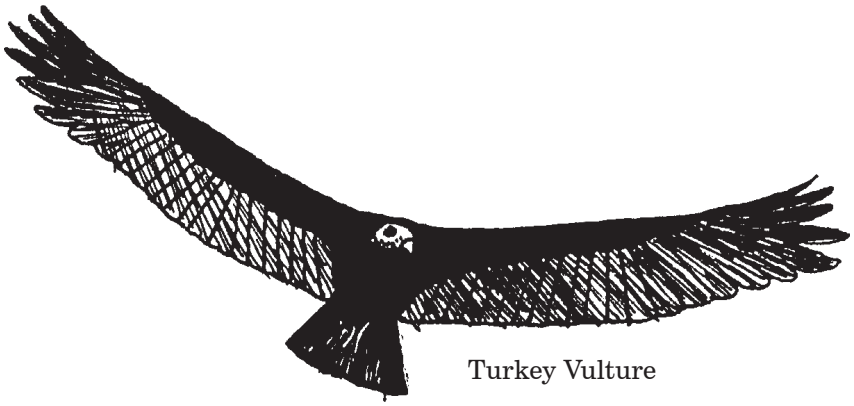
Ghost Shrimp



Western Gull

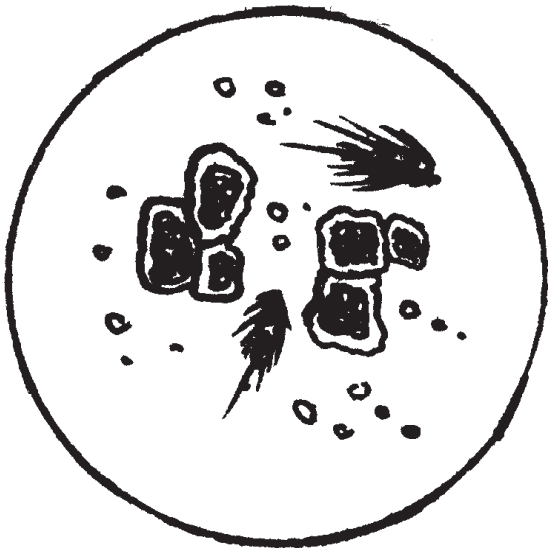


Beetle

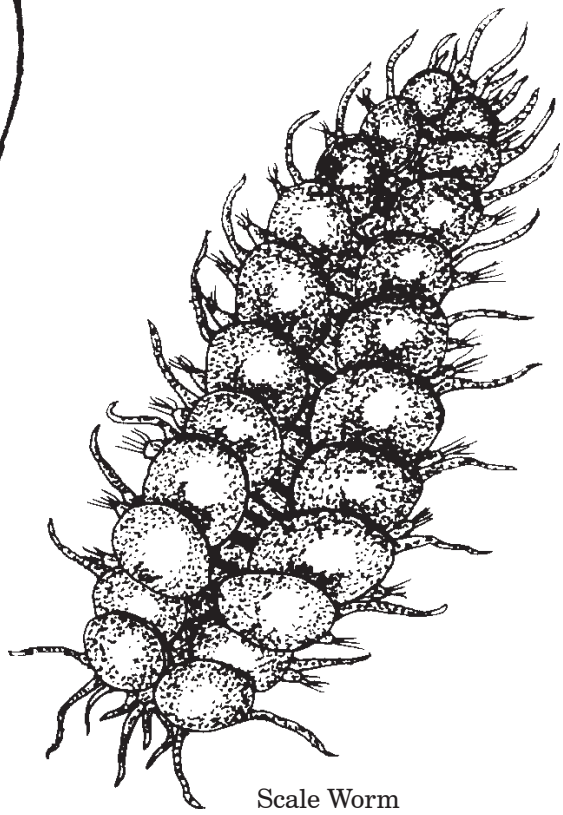


Turkey Vulture

Brittle Star

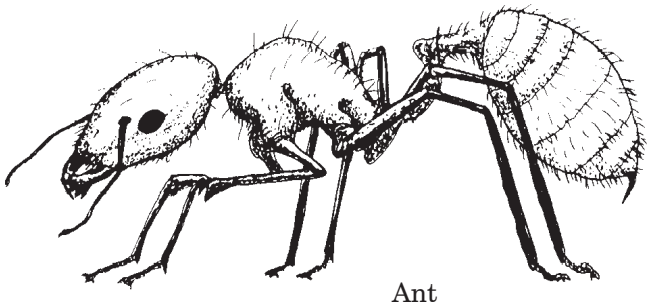


Bacteria



Scale Worm

California Horn Snail



Ant

Showdown Rules

1. The class will be divided in half. The right side goes to the right wall and the left side goes to the left wall.

2. The game will last exactly 30 minutes. The team with the most points at the end of this time wins.

3. The teacher chooses where to start in each line.

4. The teacher (or a scorekeeper) will record the points on the blackboard.

5. A complete set of flash cards is placed in a bag. When the teacher chooses the first student, a flash card is drawn from the bag. The player chosen must:

   a. Spell the plant or animal name correctly.
   b. Identify its niche (producer, consumer or decomposer).

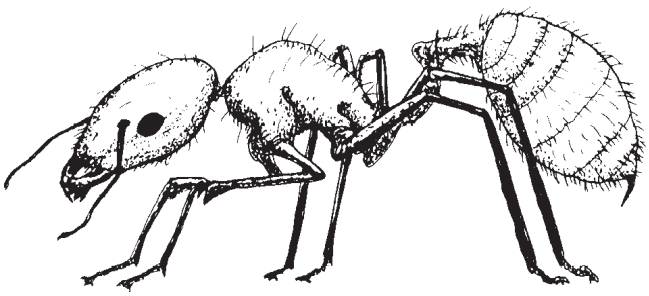
   If this is done, the team gets one point.

6. If the first player on the team answers correctly, the second player on that team gets a chance at another question.

   As long as the answers are correct, or until a team wins five points, that team has a chance to answer questions.

7. If five points are obtained or if a mistake is made, the other team gets its turn. It also has a chance to answer questions until five points are obtained or a mistake is made.

Remember: The game only lasts 30 minutes and only one point is given if both the spelling and all the answers are correct.

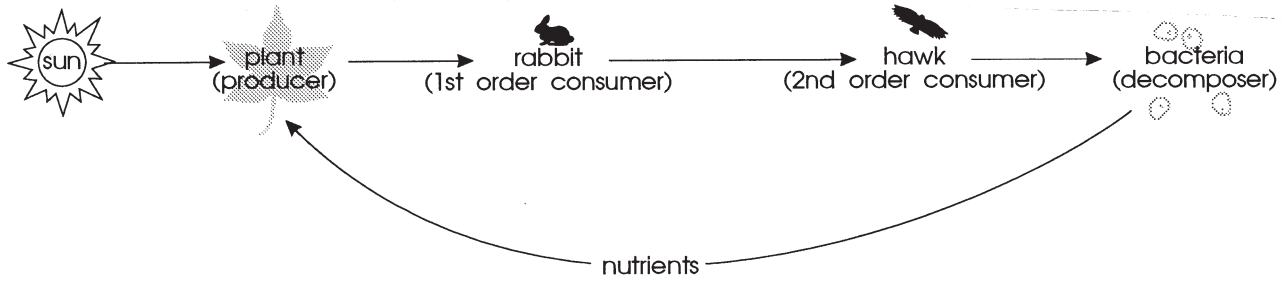


Lesson 8: Food Chains

Background

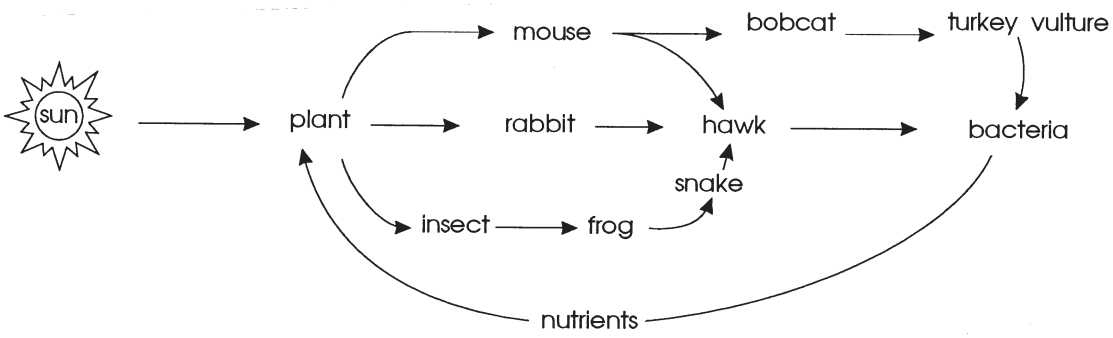
The transfer of energy from one organism to another, with its sequence of eating and being eaten, is called a food chain. Producers form the first link in a food chain. Producers store solar energy in the chemical bonds within the carbohydrates created during photosynthesis. Herbivores, first level consumers, depend directly on producers. Carnivores, second level consumers, eat herbivores or other carnivores. There may be several levels of consumers within a food chain. In order to distinguish among consumers, they are numbered depending on what they eat. A consumer that eats producers is called a 1st order consumer. The consumer that eats the 1st order consumer is called a 2nd order consumer and so on.

As energy passes through each level of a food chain, large amounts are lost, such as heat. Decomposers utilize the last bits of energy from dead plants and animals. They also have the important job of recycling nutrients back into the soil for reuse by producers. It is important to note that decomposers are recycling nutrients, not energy. In the following food chain, all the arrows , except the one between the decomposer and producer, show how energy is passed from one organism to another.



A food chain is relatively simple in its organization. Most ecosystems contain far more complex relationships. Individual food chains combine to form a food web. Few consumers restrict their feeding habits to one type of food; omnivores are good examples. Plants provide a supply of food to a variety of animal life and animals are normally consu predators.

Here is an example of a food web:



As you discuss the following activity with your students, it may be important to note the amount of producers needed to "feed" the first order consumers, second order consumers, etc. As a general rule, it takes 10 pounds of producer for the first order consumer to gain one pound. As you go up the food chain, divide by 10 to establish how much energy is converted into body mass at each level of the chain. For example:

3rd order consumer	WHALE	1 pound
2nd order consumer	SQUID	10 pounds
1st order consumer	ZOOPLANKTON	100 pounds
producer	PHYTOPLANKTON	1,000 pounds

Purpose

To introduce students to the concept of food chains and food webs.

Objectives

1. Students will be able to define the terms, food chain and food web.
2. Students will be able to give an example of a food chain.

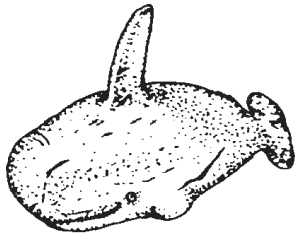
Science Framework Concepts

D-1 pg. 61; C-2 pg. 101; C-s pg. 139.

Materials Needed

organism cards (copied on colored card stock is preferable)
- 12 phytoplankton
- 6 zooplankton
- 1 sablefish
- 1 squid
- 1 gray whale
- 1 sperm whale

scissors
hole punch
string
coathanger for each student

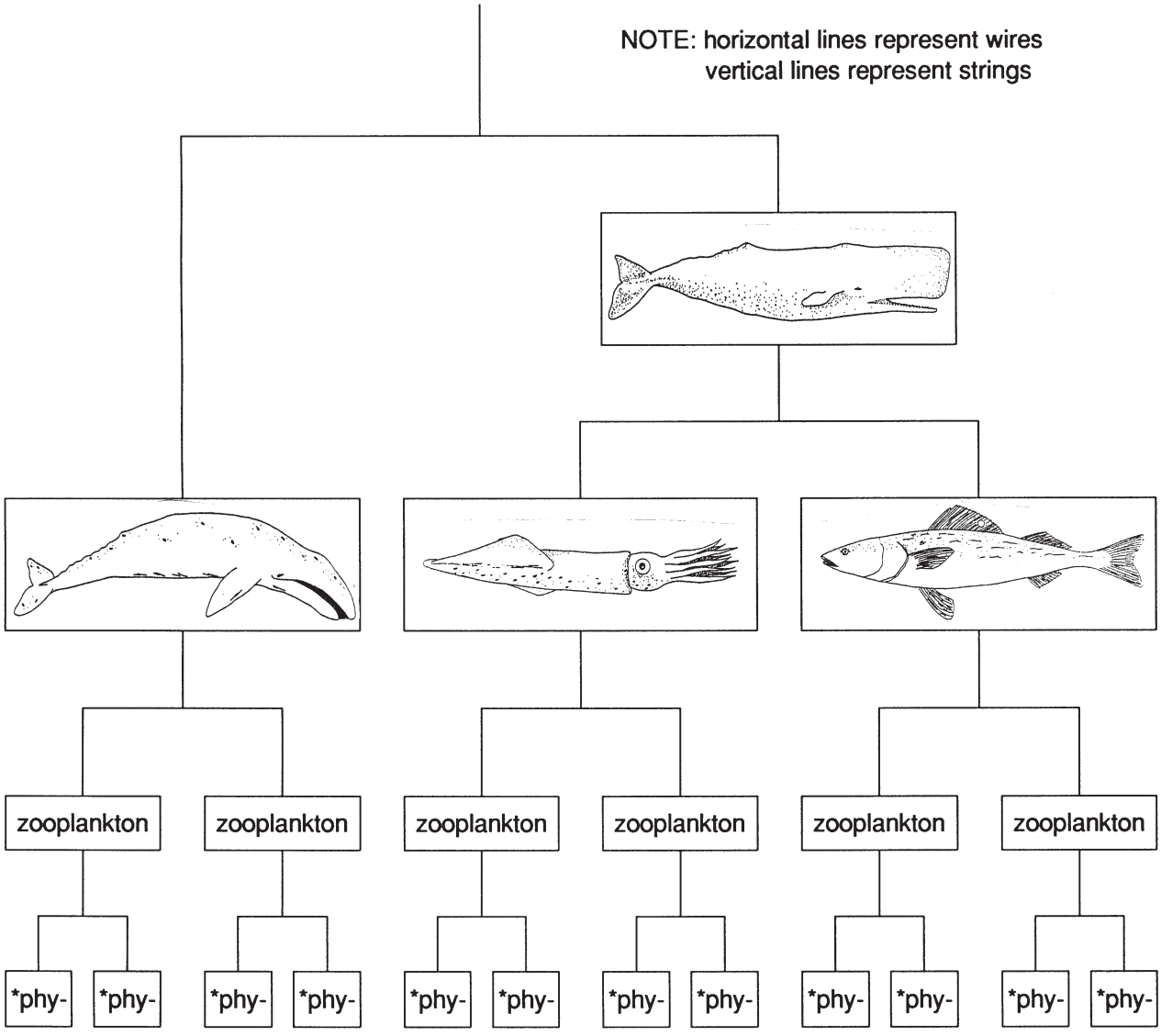


Activity

Review the idea of energy flow among producers, consumers and reducers.

Explain as they follow energy flow, they are identifying a food chain.
Explain that food chains can get complicated and when joined together, form food webs.
Have the students give an example of a food chain.
Ask the students what they had for dinner the night before, and follow the energy through that food chain. In order to understand food chains and webs better, the students will create their own. Divide the class into groups of 2, 3 or 4.
Give each group an activity sheet and organism cards and have them "assemble" an ocean food web. They can actually make a mobile, or if pressed for time, have the students lay out their food webs on the floor.
Once assembled, have the students answer the questions on the activity sheet or discuss with the class the answers to those questions.

adapted from Marine Science Project FOR SEA



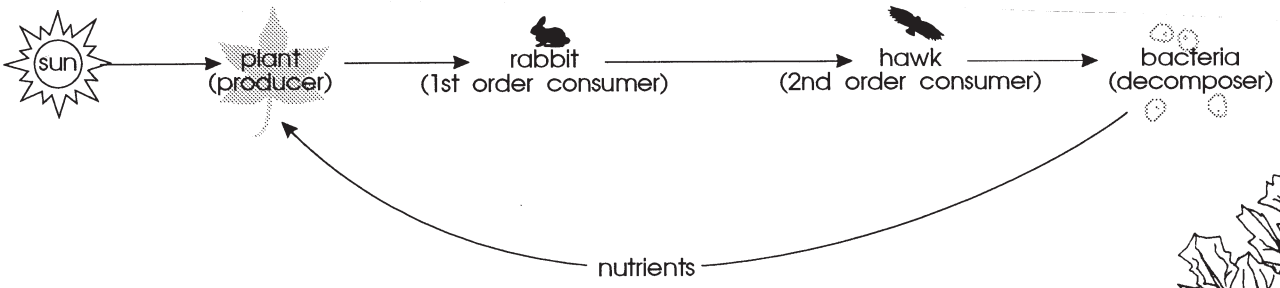
*phytoplankton

Name:_____

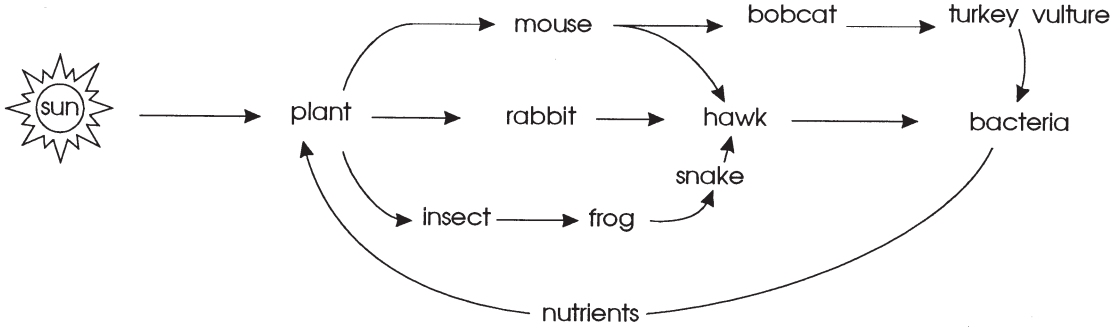
Food Chains Activity Sheet

All producers, consumers and decomposers need energy to survive. When you trace that energy that passes through organisms (who eats what) you follow a food chain. In nature individual food chains can be joined together to form a food web.

Here is an example of a food chain:

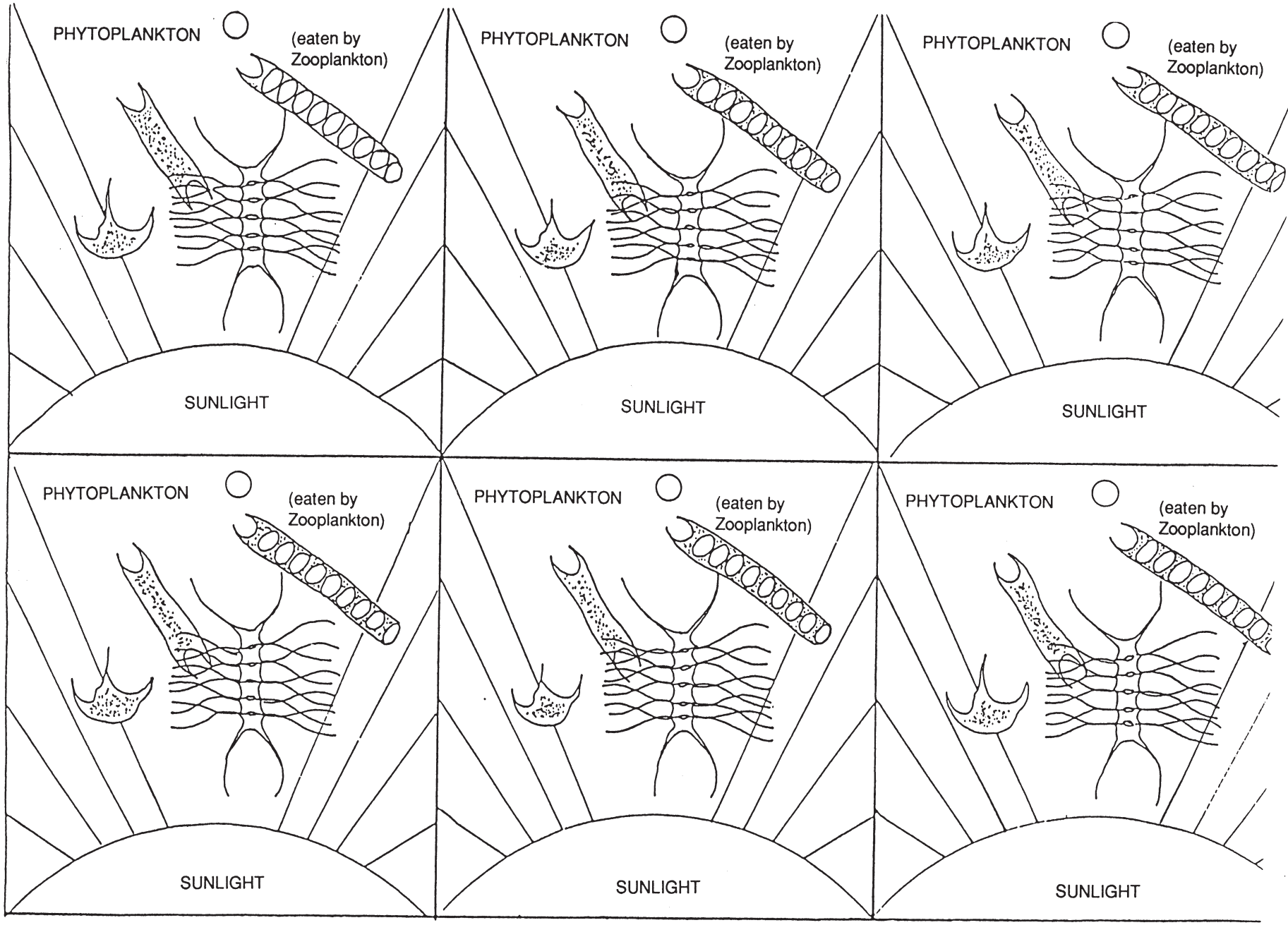


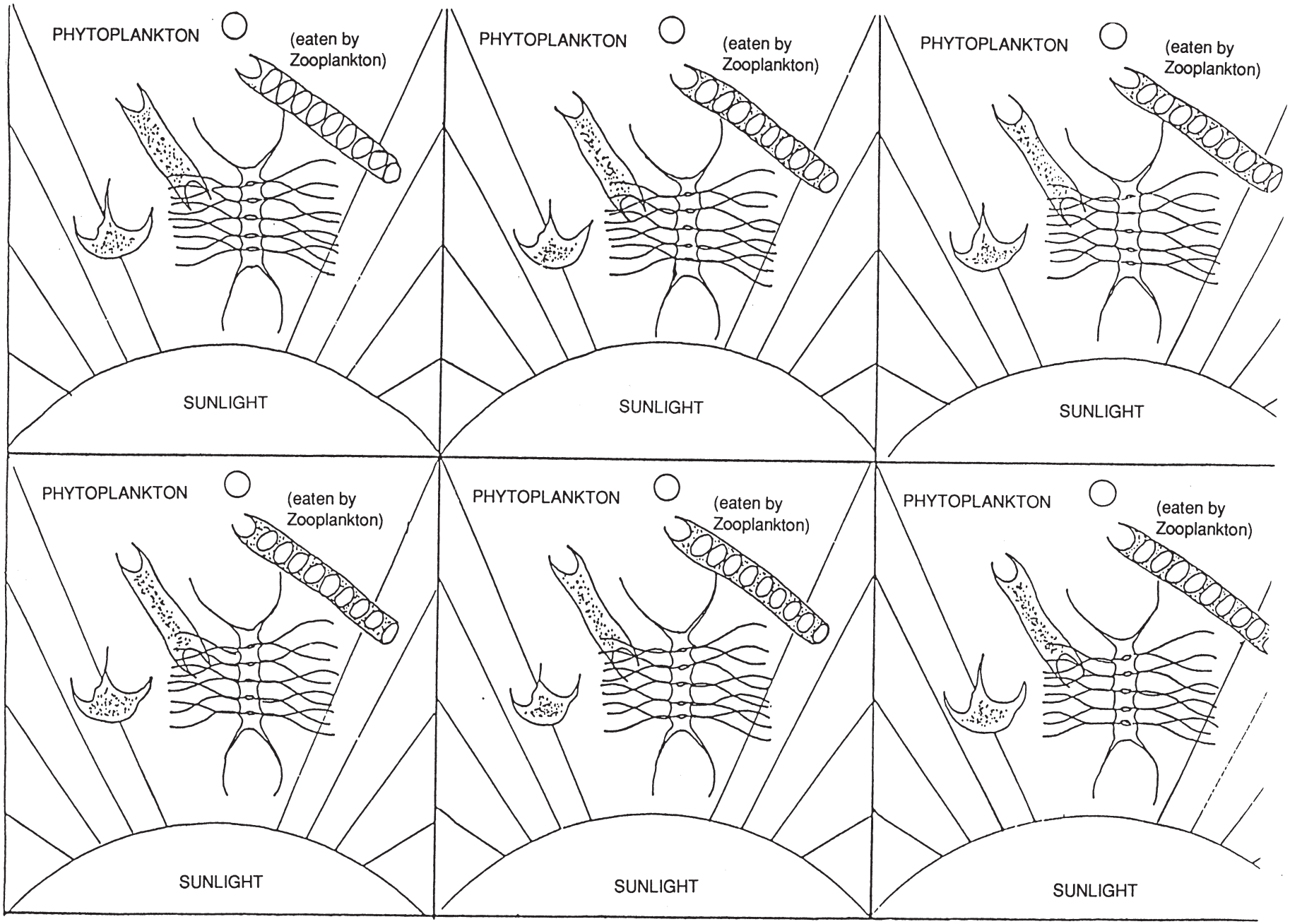
Here is an example of a food web:



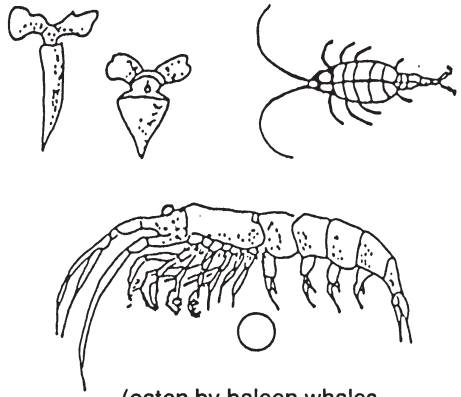
In the ocean, phytoplankton (small microscopic plants) begin the aquatic food web. Phytoplankton, like all producers, use carbon dioxide and water, plus energy from the sun to grow. Zooplankton (microscopic animals) eat phytoplankton and each other. Practically all life in the sea depends directly or indirectly upon plankton. In the following activity you will be able to create your own food web to better understand how food webs work. Here's how:

1. Collect a set of organism cards and cut them out.
2. Make a mobile or lay out the organism cards to illustrate a food web.
   HINT: To line up your food web, start with the producers on the bottom and work up.
   To connect your mobile, start with the top consumers and work down.
3. Use string and wire to connect the producers and consumers to your mobile.


PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT
PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT
PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT
PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT
PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT
PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT

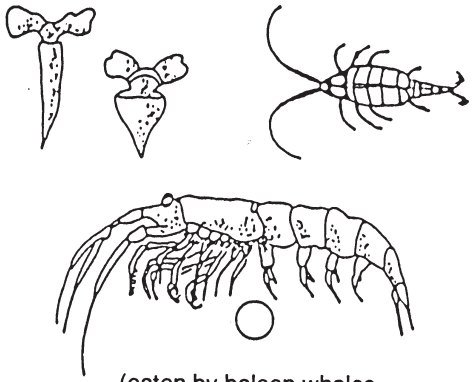

PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT
PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT
PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT
PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT
PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT
PHYTOPLANKTON
(eaten by Zooplankton)
SUNLIGHT

ZOOPLANKTON



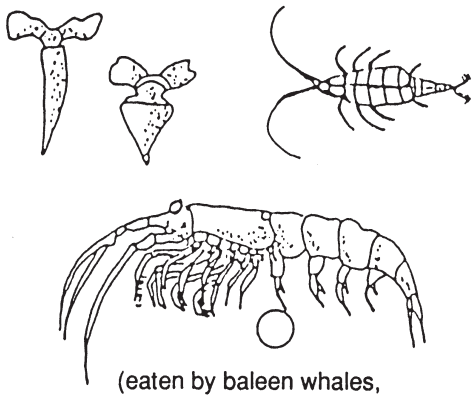
(eaten by baleen whales, sablefish and squid)

ZOOPLANKTON



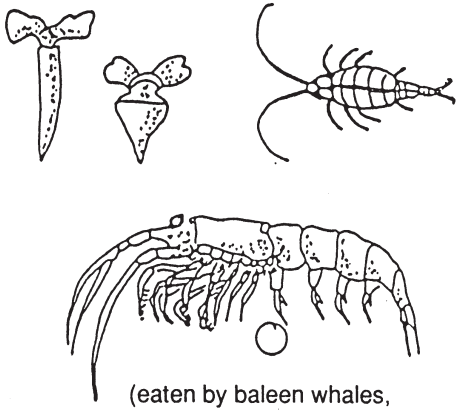
(eaten by baleen whales, sablefish and squid)

ZOOPLANKTON



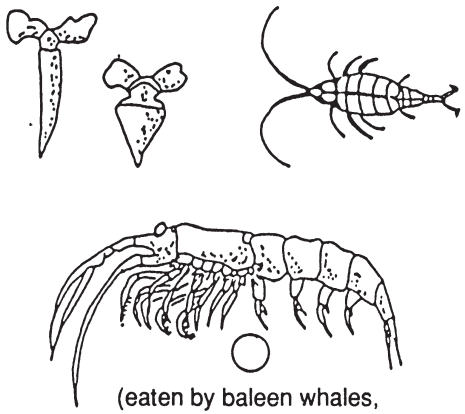
(eaten by baleen whales, sablefish and squid)

ZOOPLANKTON



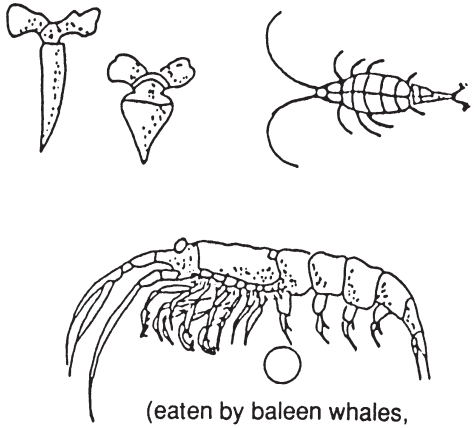
(eaten by baleen whales, sablefish and squid)

ZOOPLANKTON

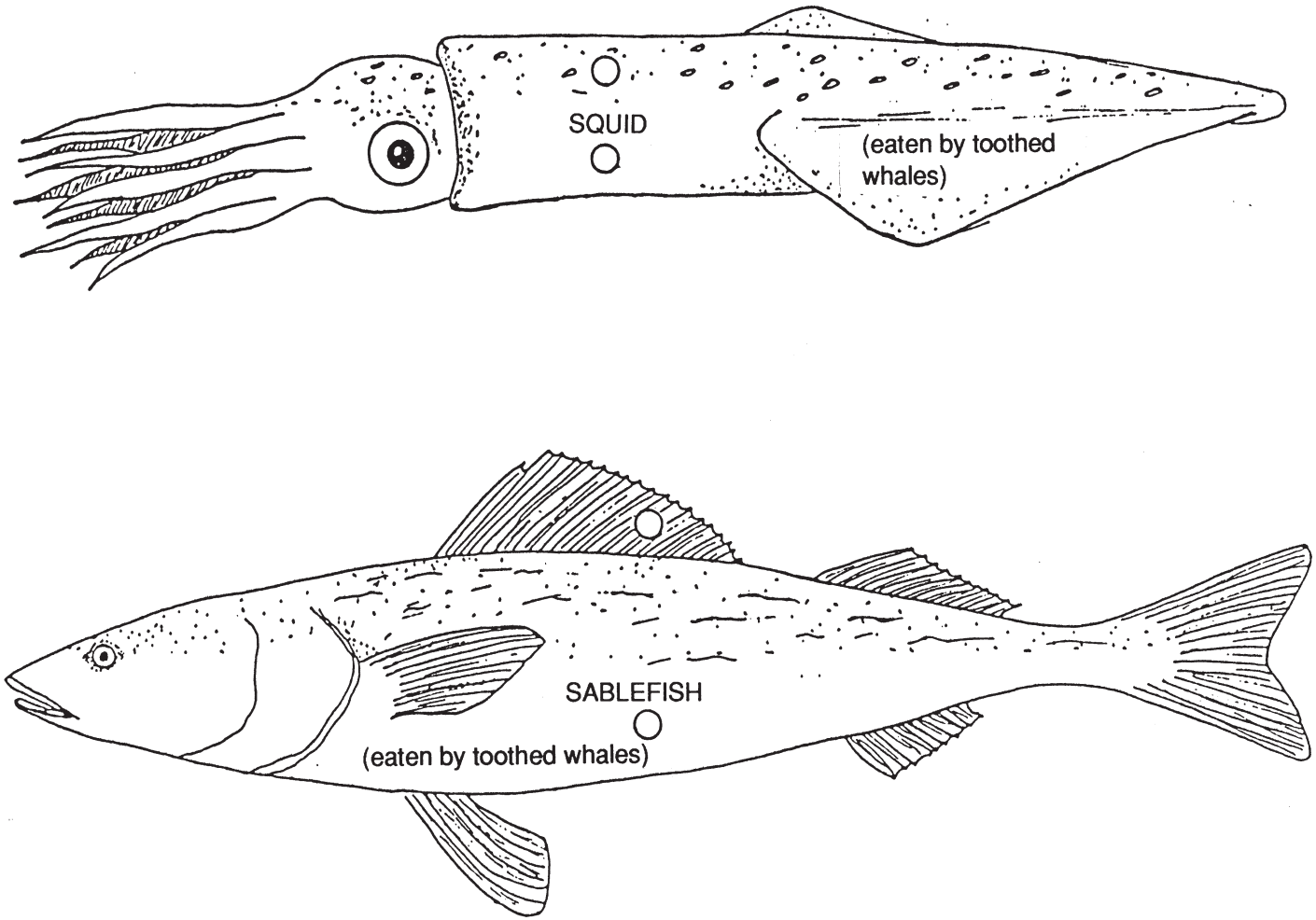


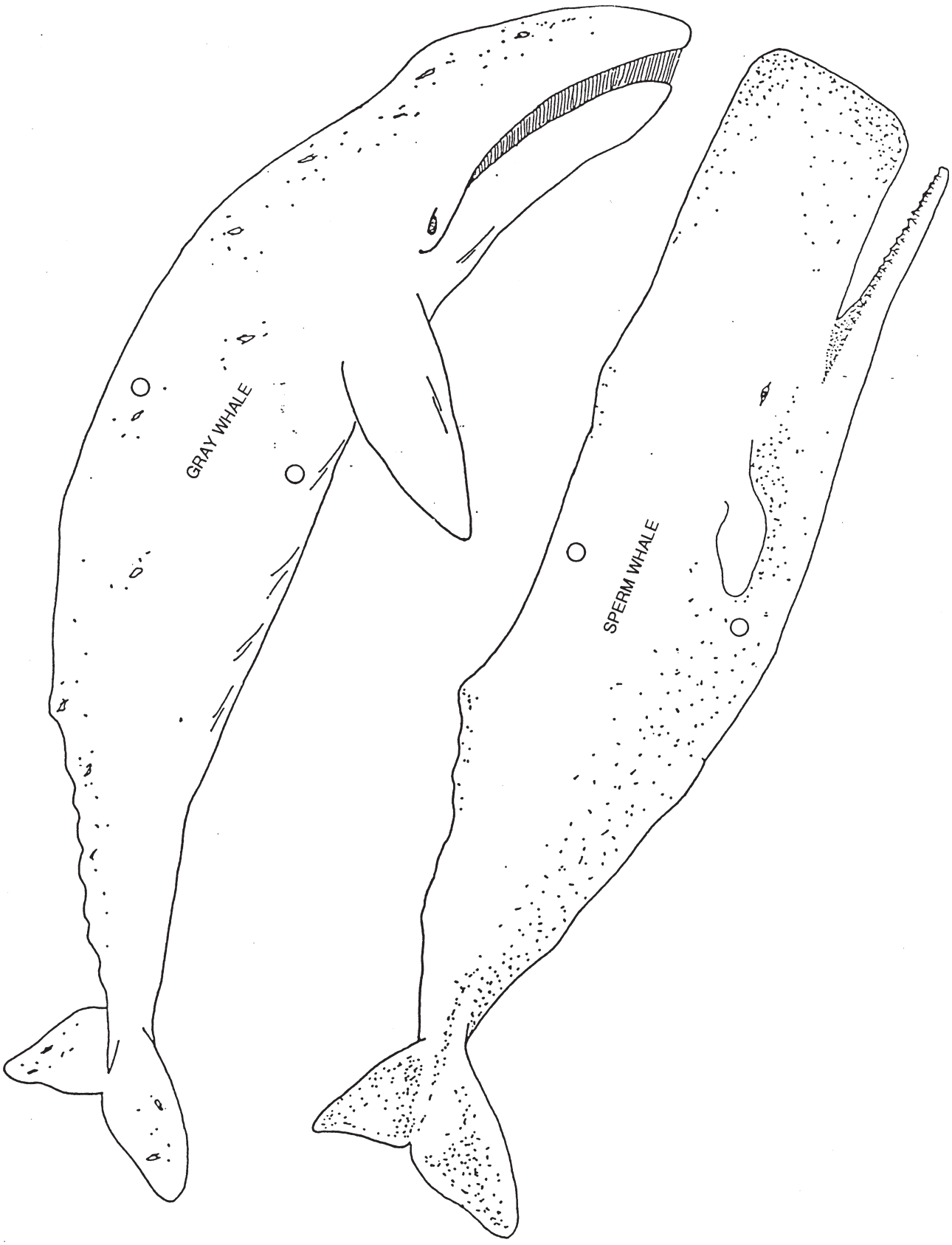
(eaten by baleen whales, sablefish and squid)

ZOOPLANKTON



(eaten by baleen whales, sablefish and squid)


SQUID
(eaten by toothed whales)
SABLEFISH
(eaten by toothed whales)


GRAY WHALE
SPERM WHALE

Name:_____

Food Chains Worksheet

After your food web is connected, use it to answer the following questions.

1. Which level of your food web has the greatest number of individual organisms?

2. Which level has the fewest organisms?

3. In general, what happens to the number of organisms as you move up or to the top of your food web?

4. The producers in your food web are the phytoplankton. What would happen to your web if you removed one phytoplankton card? 2? 3? 4? 5?

5. First order consumers are the first animals to eat the producers. Second order consumers are animals which eat first order consumers.
   a. What do the third order consumers eat?
   b. Identify the first, second and third order consumers in your food web.

6. What would happen to your food web if you removed one first order consumer? 2? 3? 4?

7. Who are the final consumers in your food web?

8. a. What group of living organisms need to be added to your food web to complete it?
   b. Name several organisms from that group that would fit into your food web.

9. Destruction of what level of your food web would have the greatest effect on the other organisms?

Answers to Food Chains Worksheet

After your food web is connected, use it to answer the following questions.

1. Which level of your food web has the greatest number of individual organisms?
   bottom, the phytoplankton

2. Which level has the fewest organisms?
   top, whales

3. In general, what happens to the number of organisms as you move up or to the top of your food web?
   become fewer

4. The primary producers in your food web are the phytoplankton. What would happen to your web if you removed one phytoplankton card? 2? 3? 4? 5?
   the more producers you remove, the more difficult it is for the consumers above to find food; eventually, they may starve.

5. First order consumers are the first animals to eat the producers. Second order consumers are animals which eat first order consumers.
   a. What do the third order consumers eat? second order consumers
   b. Identify the first, second and third order consumers in your food web.
   first order consumer = zooplankton
   second order consumer = squid, sablefish, gray whale
   third order consumer = sperm whale

6. What would happen to your food web if you removed one first order consumer? 2? 3? 4?
   removal of 1 or 2 would allow more producers and fewer second order consumers; when several are removed there would be more producers and the second order consumers may starve.

7. Who are the final consumers in your food web? **Sperm Whale & Gray Whale**

8. a. What group of living organisms need to be added to your food web to complete it?
      decomposers
   b. Name several organisms from that group that would fit into your food web.
      crabs, gulls, bacteria

9. Destruction of what level of your food web would have the greatest effect on the other organisms? **producers**

Lesson 9: Change Through Cycles: Dead Leave Into Milkshakes

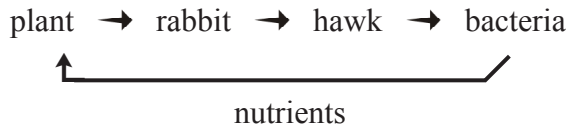
Background

In chemical terms, life can be summed up in six words: carbon, oxygen, hydrogen, nitrogen, phosphorus and sulfur. These six nutrients are called the "building blocks of life" because they make up 95% of the mass of all living organisms. The other 5% is made up of nutrients (such as iron, copper, iodine, etc.) which are needed in very small quantities. We have a fixed supply of nutrients on the earth; thus, they must continuously be recycled through ecosystems. As organisms grow, they use nutrients, taking them from their reservoirs in the air, soil and water. As organisms die, these nutrients, unlike energy, are returned to the earth for reuse. Every organism is thus made from nutrients that were once part of other living things. Through this cycling of nutrients, life is able to continue on the earth.

Three important ways nutrients are cycled through an ecosystem are through the nutrient cycle, air cycle and hydrologic (water) cycle.

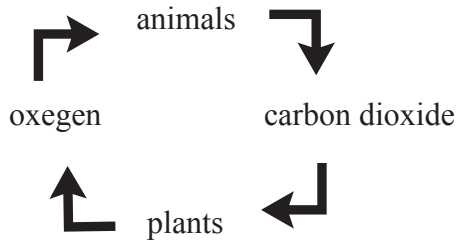
Nutrient Cycle

In this cycle, nutrients contained in the bodies of plants and animals are returned to the soil for reuse. When plants and animals die, the last bits of energy left in their remains are utilized by decomposers (fungus, bacteria, ants, maggots, etc.) Nutrients in the plant and animal remains are returned to the soil to be reused by green plants as they live and grow. This process can be illustrated with a simple food chain.



Air Cycle

The air we breathe in is 20% oxygen with a trace of carbon dioxide. The air we breathe out is 16% oxygen and 4% carbon dioxide. With each breath, we utilize some oxygen and give off additional carbon dioxide. During the process of photosynthesis, plants take in carbon dioxide and give off oxygen. Animals need the oxygen plants produce. Plants need the carbon dioxide which people and other animals produce. This simple, yet very important relationship, can be diagramed as follows:

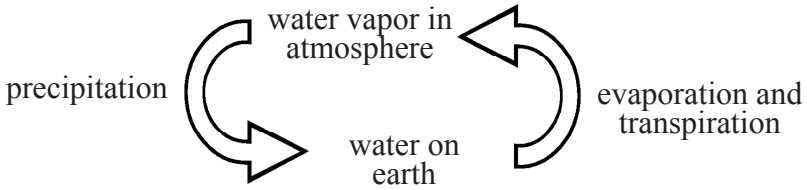


Water Cycle

The earth's supply of water is renewed through the hydrologic or water cycle. There are three main parts of this cycle:

1. Evaporation and transpiration - Solar energy causes water from the surfaces of lakes, streams and oceans to evaporate into the air as water vapor. Plants also release water into the air as water vapor through the process of transpiration.
2. Condensation - As water vapor in the air rises it cools and forms clouds.
3. Precipitation - Clouds release water back to the earth as rain, snow, sleet or hail to begin the cycle again.

A simple diagram of the water cycle is:



Everything on the earth is in the process of changing. Change is an important part of these three cycles. Some changes occur over relatively short periods of time. Examples of this are the changes that occur in the nutrient cycle. The nutrients contained in a plant may end up in a rabbit. The nutrients contained in the rabbit may end up in a fox. Thus, matter in ecosystems is continuously changing forms.

Changes may also occur over long periods of time. Most geologic changes are examples of slow change. Wind, water, fire and ice have drastically changed the face of our planet over a long period of time. Geologic changes are generally very slow with the exception of natural disasters like flooding, volcanos and earthquakes.

Purpose

To introduce the student to the idea that everything on the earth is changing over time.

Objectives

1. The student will be able to describe several changes they have recently observed.
2. The student will be able to trace the nutrient cycle through a simple food chain.

Science Framework Concept

D-2 pg. 63; C-1 pg. 99; A-1 pg. 118; C-2 pg. 139; C-3 pg. 140.

Materials Needed

Blackboard

Activity

Review the concept of food chains and explain how nutrients are recycled through a food chain. On the blackboard, write the words “DEAD LEAVES” on the left side and “MILK SHAKE” on the right side.

Tell the students that they are going to learn how to turn dead leaves into milk shakes. Ask the students to suggest how this can happen. With some help and a reminder of the nutrient cycle, they should be able to come up with the following scenario:

The nutrients in the dead leaves are returned to the soil by decomposers. Nutrients are taken from the soil by grass. Grass makes food using sunlight, water, nutrients and carbon dioxide. A cow eats the grass. The cow makes milk using nutrients it got from the grass. Then people make a milk shake from the milk that came from the cow that ate the grass that contained the nutrients that came from the soil that had dead leaves in it!

Discuss the concept of change. Explain that everything on the earth is in the process of changing. Some changes happen quickly and are easy to observe. Other changes happen slowly and are hard to observe.

Make a list on the board of changes the students have recently observed. Some examples might be:

Ice melts when it is in the sun.
I lost a tooth last week.
My cat had kittens.
It was cloudy this morning, now it's sunny.

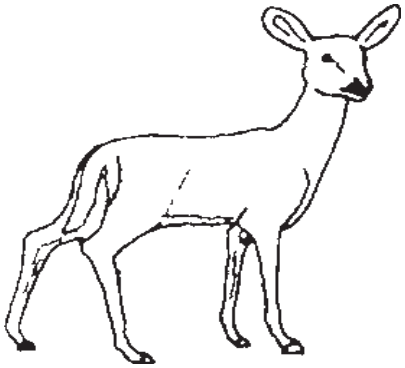
Ask "Is there is anything in nature which does not change?" (**NO!**)
Explain that most of the changes the students listed were probably changes which occur over relatively short periods of time. We notice the changes because we can observe them. However, there are some changes that take thousands of years to occur. Geologic changes such as mountain building (the Sierra Nevada) or land erosion caused by rivers (the Kern River Canyon) occur over very long periods of time. These kinds of changes are not easily observed during a person's lifetime.

Tell the students that they have shown how dead leaves can change into a milk shake.
Ask the students to come up with two items that they can connect through the nutrient cycle. Some examples are:

dead leaves into an apple
sunshine into a Big Mac
sunshine into a person
worms into peaches

Have the class, small groups or individuals take one example and connect it. This can be done orally, on paper or in picture form.

Adapted from: Manure to Meadow to Milkshake
Hidden Villa Environmental Education



Lesson 10: Adapting to Change

Background

Change is a never-ending part of life and the environment. Change in the environment may occur slowly or rapidly. Long term changes in climate and land forms are generally very slow, with the exception of natural disasters like hurricanes and earthquakes. Most of the dramatic and rapid changes have been brought about by humans. Life in the environment must adjust to these changes. This adjustment is referred to as adaptation.

Adaptation can take two forms: structural or behavioral. A structural adaptation occurs when an actual part of the body of the living thing changes to suit the needs of the new environmental conditions. A behavioral adaptation occurs when an animal or plant starts doing different things to adjust to an environmental change. An animal might change its drinking habits in response to a change in rainfall. It might hunt different game, or in different places. Structural adaptations take time to develop for they depend on the genetic process of mutation and evolution and so occur only after many generations. For structural adaptations to take place successfully, the changes in the environment must be slow ones, or minor ones that don't threaten the organism's existence. Quick and major changes require animals to adapt their behavior. The ability to adapt behavior has determined the survival or extinction of many animal species in the face of rapid and major changes. One reason humans have been so successful to date and are able to survive in so many environments is due to their ability to adapt their behavior. The use of tools, fire and shelter are all behavioral adaptations.

Purpose

To acquaint the students with the concepts of structural and behavioral adaptation and how they relate to species survival.

Objectives

The student will be able to identify from a list of adaptations those which are structural and those which are behavioral.

Science Framework Concepts

A-2 pg. 118 & B-3 pg. 132.

Materials Needed

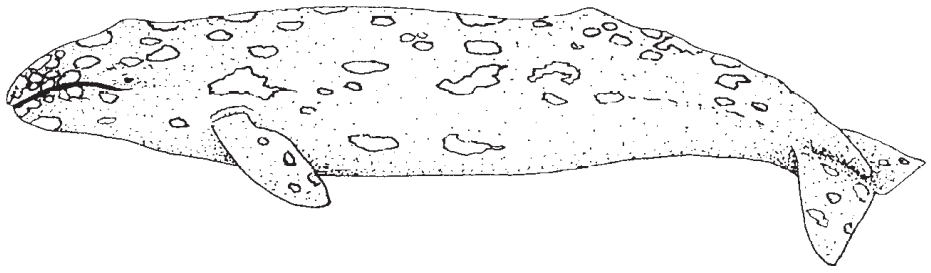
Adaptation student worksheets, one per student.

Activity

Review the concept that everything in nature is in a constant state of change. Ecosystems change as well as the producers, consumers and reducers in them. The adjustment to these changes are referred to as adaptations.

Explain the difference between structural and behavioral adaptations.

Hand out the student worksheet and discuss the answers with the students after they have completed it.



Name:_____

Adapting to Change Worksheet

The world is always changing. Living things have to adjust (adapt) to the changes or they don't survive. They must adapt. There are two types of adaptations: structural and behavioral.

A **structural adaptation** is a change to a part of the animal or plant, like a muscle or a leaf. A bobcat's sharp claws are a structural adaptation which help the animal to survive. How does it help him to survive? _____

A wing is a structural adaptation to the bird's need to escape enemies and hunt. A leaf is a plant's structural adaptation to the need for sun.

A **behavioral adaptation** is a change in an action or a way of doing things that an animal or plant uses to survive. How does diving for food in the ocean help a sea otter to survive?

_____

_____

The sandpiper uses its long beak to probe in the mud for small snails, insects and worms. The action of probing the mud is its behavioral adaptation to get food.

People build shelter for protection. This is a behavioral adaptation. Why is it a behavioral adaptation and not a structural one? _____

_____

_____

Most human adaptations are behavioral. When people must adapt, we change how we act. Our physical features don't change.

Which do you think can happen faster - behavioral or structural change?

_____

Below is a list of adaptations. After each one, put B if it is a behavioral adaptation or S if it is a structural adaptation. Also tell what the adaptation is for.

Example: The wing of a bird S to fly in the air

1. Teeth of a shark ____ _____
2. Sea otter using a stone to break open an abalone shell ____ _____
3. Webbed foot of a duck ____ _____
4. Fins on a whale ____ _____
5. A person's thumb ____ _____
6. A sunflower pointing towards the sun all day long ____ _____
7. Birds migrating south for the winter ____ _____
8. Tree's leaves falling off during winter ____ _____
9. People using tools like bows and arrows ____ _____
10. People changing the things they eat during different times of the year

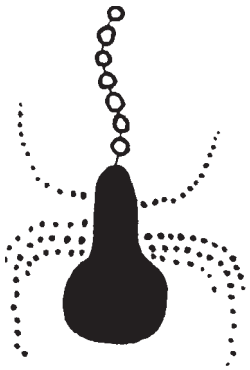
    ____ _____

11. Now think up 3 examples of your own:

    1.

    2.

    3.



Answers to Adapting to Change Worksheet

The world is always changing. Living things have to adjust (adapt) to the changes or they don't survive. They must adapt. There are two types of adaptations: structural and behavioral.

A **structural adaptation** is a change to a part of the animal or plant, like a muscle or a leaf. A bobcat's sharp claws are a structural adaptation which help the animal to survive. How does it help him to survive? **easier to hunt/catch prey/eat**

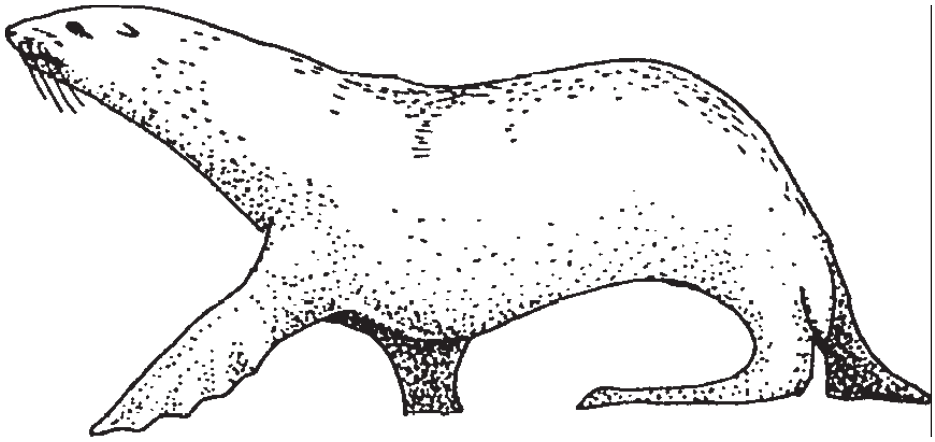
A wing is a structural adaptation to the bird's need to escape enemies and hunt.
A leaf is a plant's structural adaptation to the need for sun.

A **behavioral adaptation** is a change in an action or a way of doing things that an animal or plant uses to survive. How does diving for food in the ocean help a sea otter to survive? **better availability of prey items/access to a variety of food**

The sandpiper uses its long beak to probe in the mud for small snails, insects and worms. The action of probing the mud is its behavioral adaptation to get food.

People build shelter for protection. This is a behavioral adaptation. Why is it a behavioral adaptation and not a structural one? **Shelter building is a way of doing things, not a change to a part of a person.**
Most human adaptations are behavioral. When people must adapt, we change how we act. Our physical features don't change.

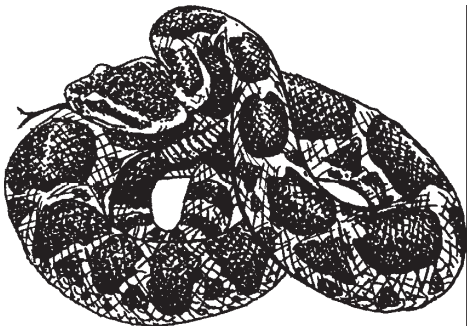
Which do you think can happen faster - behavioral or structural change?
behavioral



Below is a list of adaptations. After each one, put B if it is a behavioral adaptation or S if it is a structural adaptation. Also tell what the adaptation is for.

Example: The wing of a bird S to fly in the air

1. Teeth of a shark **S to cut/bite prey**
2. Sea otter using a stone to break open an abalone shell **B increases the amount of available food items**
3. Webbed foot of a duck **S better movement through water/mud**
4. Fins on a whale **S more powerful swimmer**
5. A person's thumb **S ability to grasp**
6. A sunflower pointing towards the sun all day long **B make food**
7. Birds migrating south for the winter **B move to warmer climates and more food availability**
8. Tree's leaves falling off during winter **S water conservation**
9. People using tools like bows and arrows **B increases hunting capabilities**
10. People changing the things they eat during different times of the year **B availability of food items is seasonal**
11. Now think up 3 examples of your own:
    1. **answers will vary**
    2.
    3.



Unit 3: Getting Ready

Lesson 11: Vocabulary Crossword Puzzle

Background

This is a review of the vocabulary words that were introduced in the previous lessons. If you feel your students know all the words and their definitions, then skip this lesson. This may be a good opportunity to review the material you have covered for your KEEP week.

Purpose

To confirm understanding of previously taught concepts relating to ecosystems.

Objective

Students will be able to spell and define words associated with the study of ecosystems.

Science Framework Concepts

C-1 pg. 137.

Materials Needed

1 Vocabulary Crossword Puzzle per student

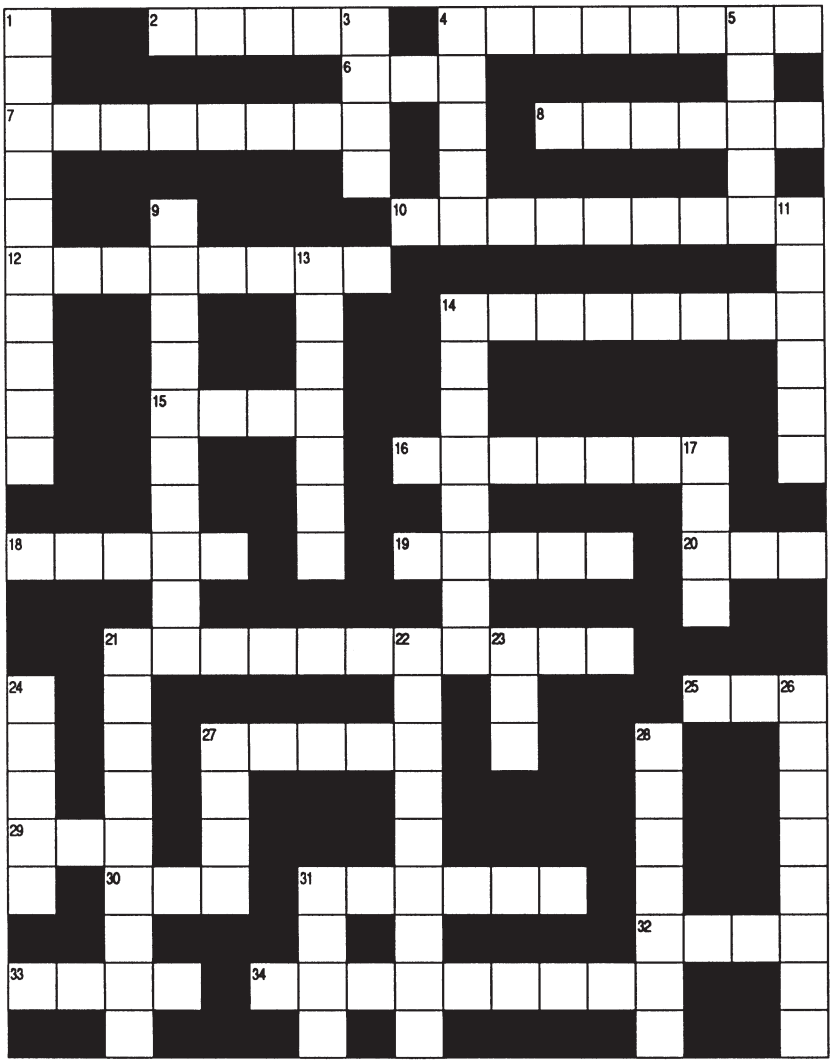
Activity

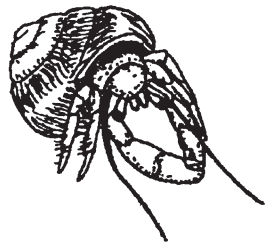
Hand out the puzzles to the students and have them complete them in class or as homework. As you discuss the correct answers, review the concepts that the words describe.

The following are the vocabulary words and the lesson in which each was introduced:

adaptation - 10
carnivore - 7
consumer - 6,7
decomposer - 6,7
ecology - 1
ecosystem - 6
energy - 7
environment - 1, 3
food chain - 8
food web - 8
habitat - 7
herbivore - 7
living - 6
niche - 7D
nonliving - 6
omnivore - 7
organism - 5
producer - 6, 7

Vocabulary Crossword Puzzle





DOWN:

1 Reducer
3 Your muscles may feel this
4 _____ tectonics
5 Sea _____
9 A strategy that helps a plant or animal survive
11 The ultimate source of this is the sun
13 The study of the environment
14 A living thing
17 The rising and lowering of the ocean level
21 A place where living and nonliving things support life in a unit of nature
22 Sun, soil, air and water
23 An outgoing tide
24 Hermit _____
26 A component of a food chain
27 A small bay
28 A complicated food chain
31 What a frog does

ACROSS:

2 What you must follow while at K.E.E.P.
4 Microscopic plants and animals
6 A nocturnal consumer
7 An organism that gets its energy from eating plants or other animals
8 Another word for producers
10 A plant eater
12 A plant
14 An animal that eats plants and animals
15 A structural adaptation that helps birds fly
16 The place where an animal or plant lives
18 An animal found in the tidepools
19 The job an animal has in its habitat
20 A 24-hour period
21 Your surroundings
25 Something you can't do at K.E.E.P.
27 Food _____
29 Morro _____
30 Another word for observe
31 The opposite of nonliving
32 Something you always see at the beach
33 Kern Environmental Education Program
34 Meat eater

Answers to Vocabulary Crossword Puzzle

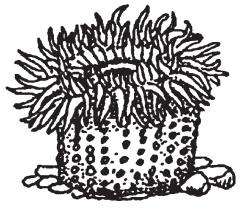
1 D		2 R	U	L	E	3 S		4 P	L	A	N	K	T	5 O	N
E						6 O	W	L						T	
7 C	O	N	S	U	M	E	R		A		8 P	L	A	N	T	S
O							E		T					E	
M		9 A					10 H	E	R	B	I	V	O	R	11 E
12 P	R	O	D	U	C	13 E	R								N
O			A			C		14 O	M	N	I	V	O	R	E
S			P			O		R							R
E			15 T	A	I	L		G							G
R			A			O		16 H	A	B	I	T	A	17 T	Y
			T			G			N					I	
18 S	N	A	I	L		Y		19 N	I	C	H	E		20 D	A	Y
			O						S					E		
		21 E	N	V	I	R	O	22 N	M	23 E	N	T				
24 C		C						O		B				25 R	U	26 N
R		O		27 C	H	A	I	N		B			28 F			U
A		S		O				L					O			T
29 B	A	Y		V				I					O			R
S		30 S	E	E		31 L	I	V	I	N	G		D			I
		T				E		I					32 W	A	V	E
33 K	E	E	P		34 C	A	R	N	I	V	O	R	E			N
		M				P		G					B			T

DOWN:

1 Reducer
3 Your muscles may feel this
4 _____ tectonics
5 Sea _____
9 A strategy that helps a plant or animal survive
11 The ultimate source of this is the sun
13 The study of the environment
14 A living thing
17 The rising and lowering of the ocean level
21 A place where living and nonliving things support life in a unit of nature
22 Sun, soil, air and water
23 An outgoing tide
24 Hermit _____
26 A component of a food chain
27 A small bay
28 A complicated food chain
31 What a frog does

ACROSS:

2 What you must follow while at K.E.E.P.
4 Microscopic plants and animals
6 A nocturnal consumer
7 An organism that gets its energy from eating plants or other animals
8 Another word for producers
10 A plant eater
12 A plant
14 An animal that eats plants and animals
15 A structural adaptation that helps birds fly
16 The place where an animal or plant lives
18 An animal found in the tidepools
19 The job an animal has in its habitat
20 A 24-hour period
21 Your surroundings
25 Something you can't do at K.E.E.P.
27 Food _____
29 Morro _____
30 Another word for observe
31 The opposite of nonliving
32 Something you always see at the beach
33 Kern Environmental Education Program
34 Meat eater

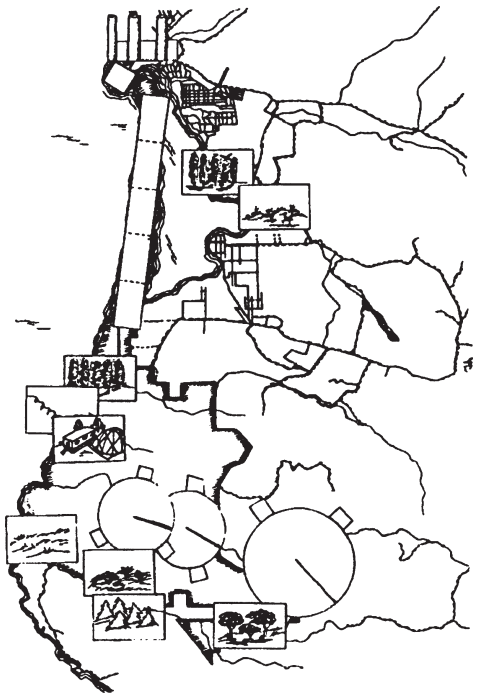


Lesson 12: Introduction to Montaña de Oro & Morro Bay State Parks

Background

The KEEP Ocean Campus is located in Montaña de Oro State Park. All the walks that the students will be participating on are also within the state park. Park rules stipulate that everything is protected within its boundaries. Staff, classroom teachers, counselors and students are visitors in the state park and must act accordingly. Rules covering conduct on walks will be discussed in detail with the students during their orientation meeting on campus.

The map that the students assembled in Lesson 2 was an introduction to the environment of the Morro Bay and Montaña de Oro areas. It included references to the population centers of Los Osos, Baywood and Morro Bay and it also showed some of the roads that connect those population centers. During this lesson the students will be learning the locations of some of the ecosystems they will be visiting and studying while at KEEP. The students will learn the locations of Morro Rock, the tidal marsh (estuary), the eucalyptus groves, the mountains and some of the human-made creations like the power plant. The map itself includes references to the locations of these ecosystems. All the students need to do is find the location of the items, cut out the proper symbols and put them onto the map. The end result is a map with the symbols that stand out on it so that when the student views the map from the south side, looking north, it looks almost as if he is looking over the landscape. The intent is to familiarize the student with the Montaña de Oro and Morro Bay areas even though he/she may never have been there before.



Purpose

To familiarize the students with the geographical and landform features found in Montaña de Oro and Morro Bay areas.

Objective

The student will be able to assemble, orient and identify key locations, places and terrain on his/her Montaña de Oro and Morro Bay area map.

Materials Needed

Montaña de Oro/Morro Bay area map sheets (3) for each student
Paste, glue or tape
Crayons

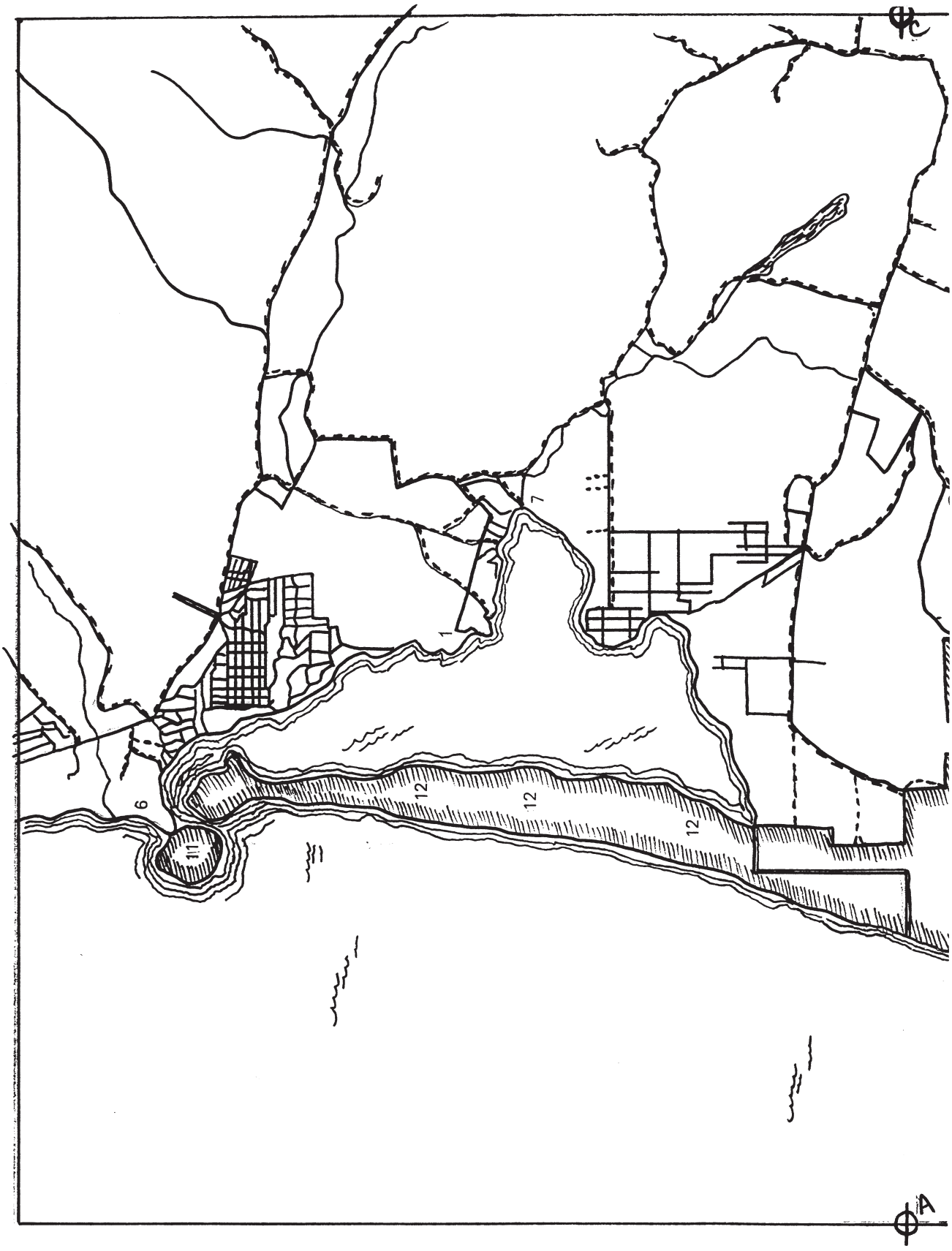
Activity

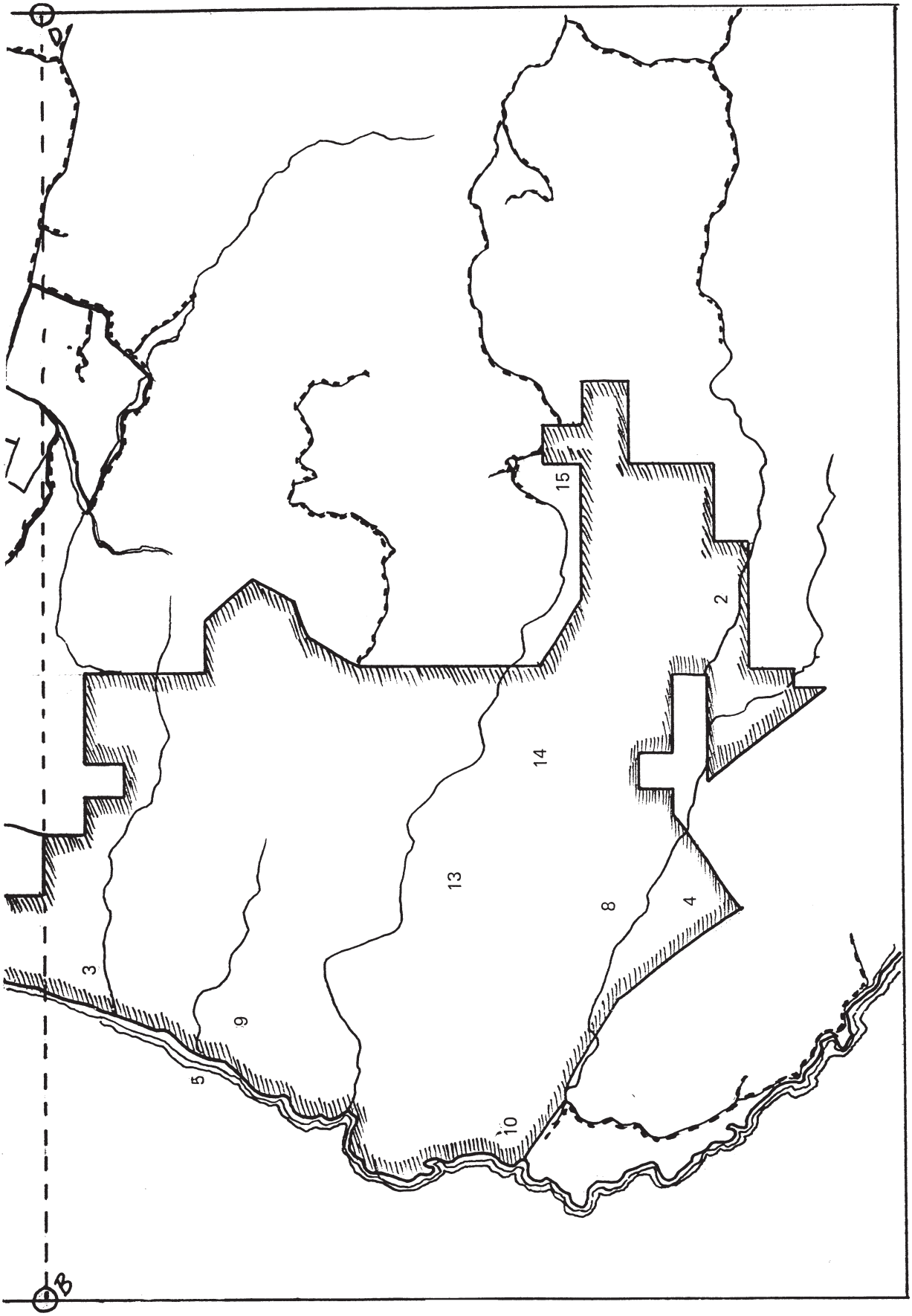
Explain to the students that before they leave for KEEP they need to learn more about the area surrounding the campus where they will be hiking and exploring. This area, called Montaña de Oro State Park and Morro Bay is part of the California coastline and lies about halfway between San Francisco and Los Angeles.

Pass out the three sheets to be used to make the map. Explain to the students that sheets 1 and 2 go together the same way the KEEP Country Map did. By connecting these maps together at the arrows and gluing them they will have a detailed map of the area surrounding the KEEP Campus. When they have properly glued the map sections together, have them paste the 2 sheets firmly onto an 18" x 11" piece of construction paper. They should draw a compass rose showing the directions N, S, E, and W. (The top of the map, towards Morro Rock is North.) The ocean and bay areas should be colored a light blue color, not heavily crayoned.

Pass out sheet 3 to each student, the Geography Worksheet. Read the instructions to the students and have them complete their maps.

Orientate the students with the map and discuss the walks they could be going on. For example, Valencia Peak, the sand dunes, Morro Bay, etc.


C
A
7
1
6
12
12
12
111
111

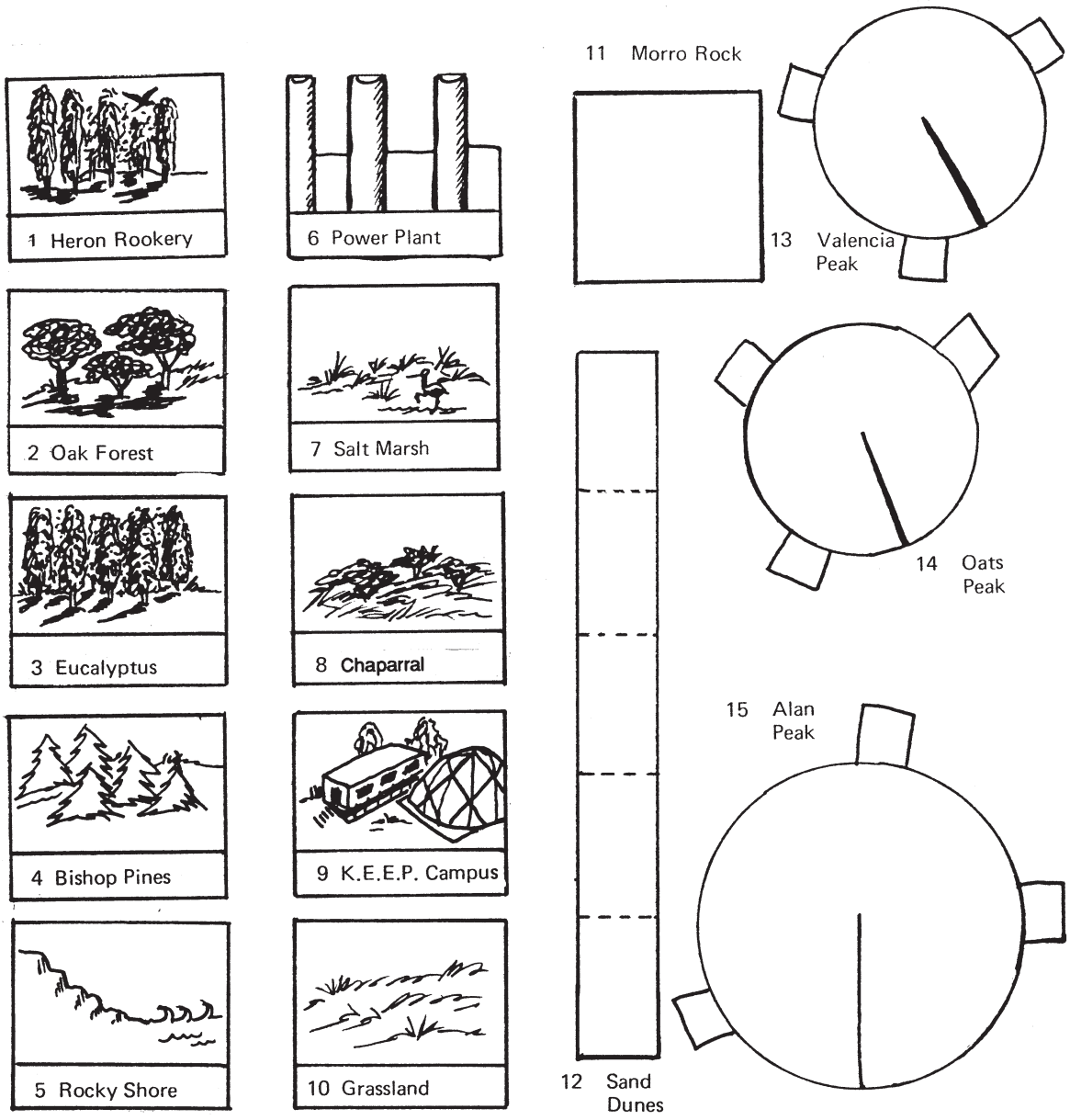

D
B
15
2
14
13
8
4
3
9
5
10

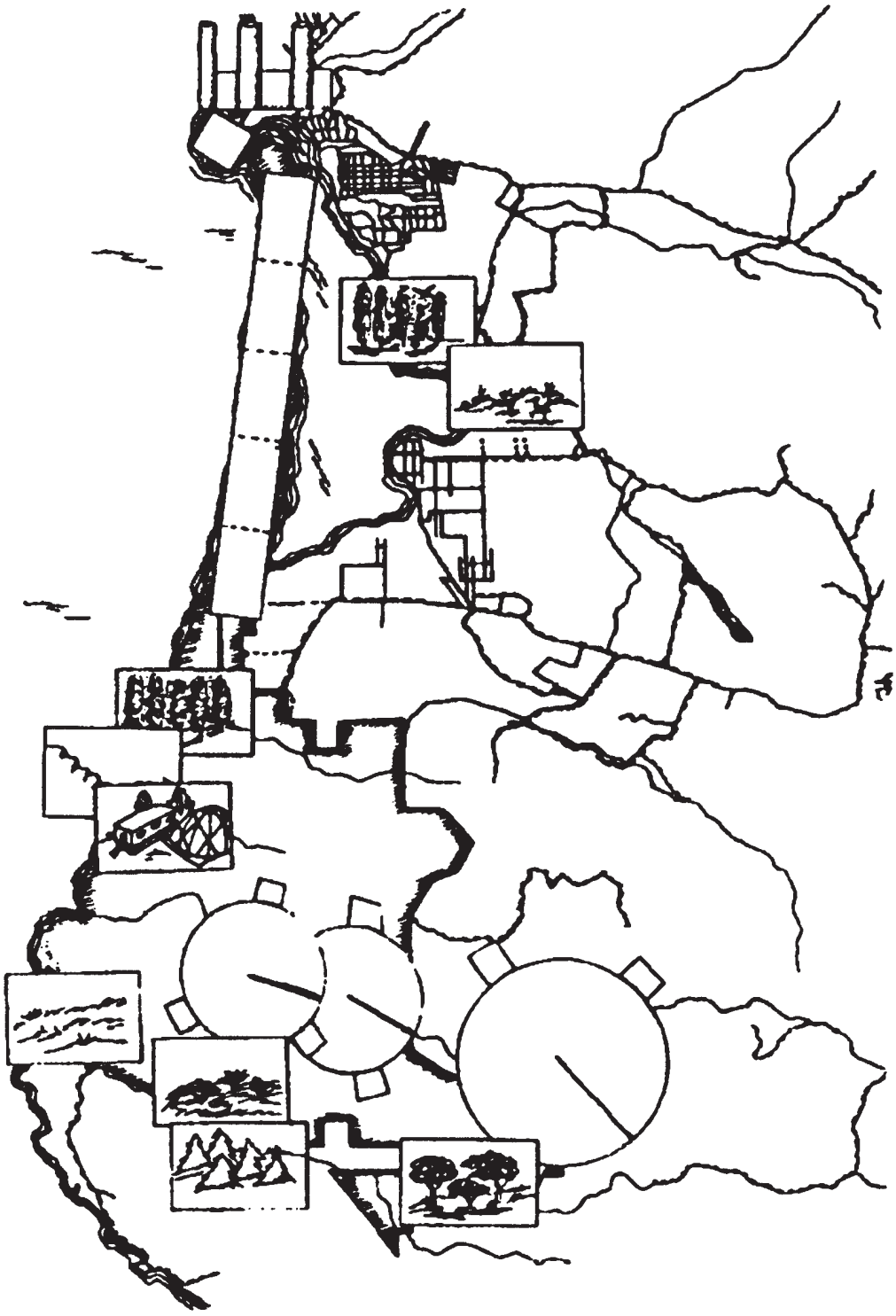
Geography Worksheets

Carefully cut the 15 symbols out and glue them to the map, matching numbers to find the proper location for each one. Fold the picture symbols so that the part with the name on it forms the base and the picture stands up. Glue the base to the map.

The square should be wadded up and glued into place to make Morro Rock. The sand dunes should be folded accordian style on the dotted lines. Then the folds should be rolled around a pencil to make wavy dunes. Then the ends can be glued on the map.

The mountain peaks should be overlapped on the cut and taped in place to make cones, then glued to the map by their tabs.





Lesson 13: KEEP Rules

Background

In preparation for the your trip, it is important to familiarize the students with the KEEP rules.

Purpose

To explain the rules which the students must follow while they are visiting KEEP.

Objective

The student will be aware of the KEEP rules and be able to explain how his/her behavior should reflect those rules.

Materials Needed

copy of KEEP Rules handout, one per student

Activity

Explain that KEEP is an outdoor school. Just like the school they normally attend, KEEP has rules which must be followed.

Explain that all of the rules were made with everyone's safety in mind. Keeping the environment and visiting humans safe is a priority for all who attend the program. All the rules were made to insure that everyone has a good, safe experience.

Tell students the key to their week is cooperation. Spend a few minutes discussing cooperation and how it may have an affect on their week.

Pass out the KEEP Rules handout and go over each rule. You might want to have a different student read each rule. After each rule, ask the class what the rule means, and if they can give an example of how to follow that rule easily. Then ask what might happen if the rule is ignored. All of the rules are written in a positive manner, so try to keep your discussion of the rules focused on the positive side as much as possible.

(You may want to discuss social issues such as bed wetting & homesickness after discussing the rules.)

KEEP Rules

For any system to work well, its parts must work together. In nature there are natural rules of operation; human systems have human rules. These are the rules that help the KEEP system work well.

While at KEEP students will:

1. Stay on the KEEP grounds unless you're with a naturalist or teacher. Boundaries are explained at the orientation meeting with the Head Teacher when everyone arrives on campus.

2. Keep dry by staying out of creeks, bays and the ocean. Students must not go wading or swimming.

3. Respect the environment around you. Avoid throwing rocks, cutting or damaging plants. Use trails.

4. Walk, don't run.

5. Stay in your trailer after lights out and maintain quiet.

6. You may only go into your trailer, not any other sleeping trailer.

7. Protect all living things in and around the campus. Don't remove, injure or destroy any human-made or natural objects. Collecting souvenirs or any natural object is against the law in California State Parks.

8. Report all injuries or problems to your counselor, teacher or naturalist immediately, day or night.

9. Follow the KEEP Schedule. It makes sure everyone works well together and can make theprogram a better experience.

10. Take care of KEEP. Keep it clean and healthy for you and the next group of students.

Remember, you and everyone else are guests at the KEEP Campus. Even the program itself is a guest of the State Parks. Littering, destroying property or acting in an unsafe or offensive manner are not good habits for guests to follow. They soon are no longer guests.

The fire signal is a loud bell. Continuous sounding of the bell means there is a fire. When the bell rings, everyone should go to the campfire circle, and assemble according to your trailer groups. Instructions will be given to you as a group. Calm, orderly action can save lives.

Unit 4: After KEEP

Lesson 14: Rethinking Environmental Values

Background

One of the major functions of an environmental unit like this is to provide students with enough background and experiences so they can understand the workings of our world and develop attitudes that will promote its preservation. To gauge how much the unit has succeeded requires on-going evaluation of student work and discussions. It also requires some measure of student growth after the unit is over.

To provide at least a tentative measure by which the teacher can gauge the effect, a post-test of the students attitudes is needed. The Values Sheet activity originally done in Lesson 3 provides the means to get a feeling for the program's effectiveness.

The nature of attitudes, their complexity, and the fact that they are very hard to gauge without detailed observation make the Values Sheet only a rough tool to assist the teacher. The teacher's own estimate of attitudes, based upon the knowledge of the student gained while teaching, is at least as valid a measure. The Values Sheet is only a tool to be used as one measure of the student's response to the unit.

Purpose

To clarify values and how they relate to the study of the environment. To provide data for evaluation of environmental values and awareness.

Objective

The student will recognize the extent to which his/her values may have changed in the time that the student has been participating in the environmental units.

Science Framework Concepts

B-4 pg. 97.

Materials Needed

Values Sheet (one per person)
Values Sheet from Lesson 3

Activity

Pass out new Values Sheets. Read the instructions to the students. Explain to the students that they did this before and that they are doing it now so they can compare this one with the other.

Give the students sufficient time to do the sheets and then find out how many students think they ranked the environmental issues higher the second time than the first.

Pass out the sheets they did for Lesson 3.

Ask the students if they remember which of these items were related to the environment. Put the environmental issues on the board:

health & pleasant place to live
clean air
quiet parks
planting new trees when grown ones are cut for wood
pollution
natural beauty

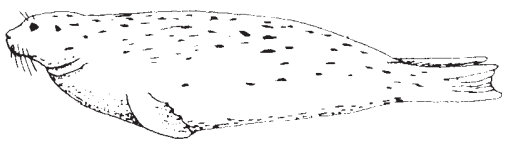
Have each student determine how much his/her position on these issues has changed. Go to the board and take a tally of the changes on these issues. After each item, write down the number of students whose numbers increased on the item. Draw an arrow up for those. Then write the number for items going down and draw an arrow going down.

After the tally is recorded on the board, summarize it for the students. Then have a discussion which focuses on the influences the students think created the changes. Ask the students what they thought caused the changes.

Ask the students how much they feel the facts they learned at KEEP changed their ratings.

Ask the students how much they feel the beauty of the places they experienced during their KEEP week changed their ratings.

Optional Lesson E: Post Test



Name:_____

Values Sheet #2

Read the entire list of choices. When you have read the list, put a 1 next to the one you think is most important. Put a 2 next to the second most important, and so on up to 5.

_____nice home, healthy and pleasant place to live

_____pleasant friends

_____feeling of doing good work

_____happiness

_____having freedom

_____clean air

_____respect for others

_____respect for yourself

_____quiet parks

_____planting new trees when you cut trees down for wood

_____parents

_____helping others

_____being intelligent

_____being athletic

_____pollution

_____natural beauty

Now pick another five you think are important and number them in the same way. Put a circle around these five numbers.

Optional Lesson E: KEEP Post Test

Background

Pretest and post test results can be useful to teachers to measure the entire program, from curriculum implementation to the on-campus visit. If you need a yardstick to measure KEEP, the following test may be helpful.

The list of questions will raise more questions for the students. This may be a good vehicle to open up a discussion about the KEEP experience.

Purpose

To provide the classroom teacher with information on the effectiveness of the program by providing them with data on the students' initial environmental knowledge.

Objective

The student will answer questions which measure the knowledge they have acquired during the environmental education units. Pretest and post test results can be compared to measure the degree of successful learning throughout the KEEP curriculum.

Materials Needed

Post Test (1 per student)
Pretest for each student

Activity

Pass out the test.

Explain to the students that the questions will look familiar because this is the same test they took before beginning the environmental education unit. They are taking the test again to see what they have learned during the past several weeks.

After the students are done, have the students self correct them. Hand out each student's pretest and let them compare the two. Answer any questions the students have about the questions.

Name:_____

KEEP Questions
After KEEP

The following questions should look familiar. This is the same test you took before going to KEEP. Your teacher and the KEEP Staff want to see what you have learned during the past few weeks. Do your best and please guess the answers if you need to.

If you have guessed, check the "I had to guess" box after each question.

1. What do the letters, KEEP, represent?
   - ☐ a. Keep Education Exactly Perfect
   - ☐ b. Kern Environmental Education Program
   - ☐ c. Kern Easy Educational Program
   - ☐ d. I had to guess
2. Which of the following is not an ecosystem?
   - ☐ a. A rock
   - ☐ b. The ocean
   - ☐ c. A pond
   - ☐ d. A forest
   - ☐ e. I had to guess
3. How much of the earth is covered by salt water?
   - ☐ a. 1/8
   - ☐ b. 1/4
   - ☐ c. 1/2
   - ☐ d. 3/4
   - ☐ e. I had to guess
4. Where does the energy for all living things come from?
   - ☐ a. Water power
   - ☐ b. Coal
   - ☐ c. Oil
   - ☐ d. Sun
   - ☐ e. I had to guess
5. Which is a producer?
   - ☐ a. Cat
   - ☐ b. Tree
   - ☐ c. Human
   - ☐ d. Ant
   - ☐ e. I had to guess

6. Which is a decomposer?
   - ☐ a. Cat
   - ☐ b. Tree
   - ☐ c. Human
   - ☐ d. Ant
   - ☐ e. I had to guess
7. Which is a consumer?
   - ☐ a. Cat
   - ☐ b. Tree
   - ☐ c. Human
   - ☐ d. Ant
   - ☐ e. I had to guess
8. Which of the following gets energy directly from the sun?
   - ☐ a. A sea anemone
   - ☐ b. A snake
   - ☐ c. An oak tree
   - ☐ d. An ant
   - ☐ e. I had to guess
9. Did Indian life styles use more or less energy than ours?
   - ☐ a. More energy
   - ☐ b. Less energy
   - ☐ c. I had to guess
10. A sea star is a:
    - ☐ a. Omnivore
    - ☐ b. Herbivore
    - ☐ c. Carnivore
    - ☐ d. Decomposer
    - ☐ e. I had to guess
11. A human is a:
    - ☐ a. Omnivore
    - ☐ b. Herbivore
    - ☐ c. Carnivore
    - ☐ d. Decomposer
    - ☐ e. I had to guess
12. Deer are:
    - ☐ a. Omnivores
    - ☐ b. Herbivores
    - ☐ c. Carnivores
    - ☐ d. Decomposers
    - ☐ e. I had to guess
13. Plants make food through the process of:
    - ☐ a. Adaptation
    - ☐ b. Photosynthesis
    - ☐ c. Respiration
    - ☐ d. Chlorophyll
    - ☐ e. I had to guess

14. What body part do birds have to adapt to life in the sky?
    - ☐ a. Claws on its feet
    - ☐ b. A beak
    - ☐ c. Good eyes
    - ☐ d. Wings
    - ☐ e. I had to guess
15. What adaptation does a sea star have to survive in a tidepool?
    - ☐ a. Ability to move quickly
    - ☐ b. Tube feet
    - ☐ c. Absence of eyes
    - ☐ d. Ability to jump
    - ☐ e. I had to guess
16. Which is structural adaptation?
    - ☐ a. A sea anemone's smell
    - ☐ b. A sea anemone's walk
    - ☐ c. A sea anemone's tentacles
    - ☐ d. A sea anemone's food
    - ☐ e. I had to guess
17. Which is a behavioral adaptation?
    - ☐ a. A bird's nest building
    - ☐ b. A bird's smell
    - ☐ c. A bird's feet
    - ☐ d. A bird's eyes
    - ☐ e. I had to guess

True or False?

18. During the process of photosynthesis, plants give off carbon dioxide.
    - ☐ True
    - ☐ False
    - ☐ I had to guess
19. Humans have little effect on the environment.
    - ☐ True
    - ☐ False
    - ☐ I had to guess
20. Indians depended on nature. Today's humans don't have to.
    - ☐ True
    - ☐ False
    - ☐ I had to guess
21. All animals of the same species (deer, for example) are exactly alike.
    - ☐ True
    - ☐ False
    - ☐ I had to guess

22. If a group of foxes dies, it will have no effect on the plants in the area. (Foxes eat mice, rats and rabbits.)
    - ☐ True
    - ☐ False
    - ☐ I had to guess

Answer the following questions. If you don't know the answer, write down your best guess and check the box.

23. Why is it important to learn about ecology?

    - ☐ I had to guess

24. What are the two major parts of an ecosystem?

    - ☐ I had to guess

25. Why is the sun important?

    - ☐ I had to guess

26. Draw a simple food chain.

    - ☐ I had to guess

27. Why are decomposers important?

    - ☐ I had to guess

28. Draw a picture of a cycle in nature. (Examples: air, nutrient or water cycles)

    - ☐ I had to guess

Lesson 15: Thinking About Our Actions

Background

This activity is designed to give students an opportunity to further examine their environmental values and beliefs. An individual uses his/her personal code of ethics, which is based on values, to decide what seems right or wrong. Each individual develops their own personal code of ethics. This activity is not meant to prescribe right and wrong answers for the students (except where the law is involved). In this activity, students make their own judgements about what they think are responsible and appropriate actions to take in situations affecting the environment.

Purpose

Each student will examine his/her environmental values and beliefs.

Objective

Given a specific situation, the student will use his/her own personal code of ethics to determine the most responsible and appropriate action to take.

Science Framework Concepts

B-4 pg. 97; A-4 pg. 125; C-4 pg. 142.

Materials Needed

Situations sheet (1 per student or group)

Activity

Discuss how our values influence the decisions we make. Stress that everyone has their own unique set of values which they use as a basis for making decisions.

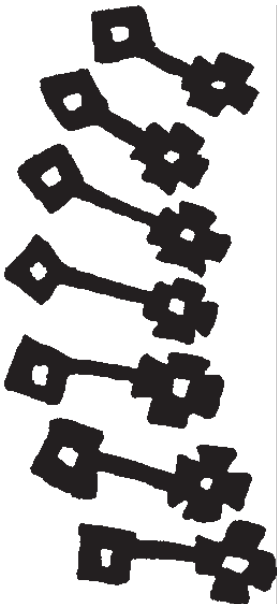
Tell students you will be reading several problem situations out loud to them. There will be several choices regarding what to do. They are to think about the situation and decide which action is the best to take. Stress that there is no one right or wrong answer. The answers will vary, depending on an individual's values.

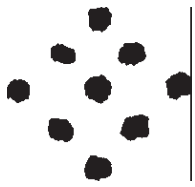
Once you have read a situation and the students have thought about it, have the students express their views on what is the most responsible and appropriate action to take. Let them discuss what they believe to be the positive and negative effects of all the options.

Variations

1. Divide the students into groups of 3, 4 or 5 and give each group a situation to discuss and decided what they would do in that situation.
2. Have students come up with their own situation and solution.
3. Give each student one situation and let them write out their solution. This could be used as a homework assignment.

Adapted from Project Wild





Name:_____

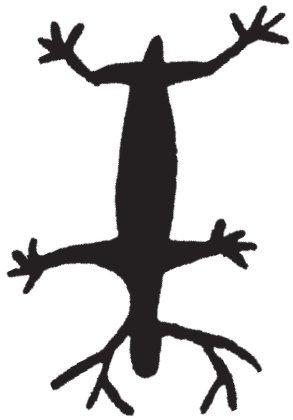
Thinking About Our Actions Worksheet

1. You are having a picnic at the beach. The group of people next to you is about to leave. You notice they are not going to pick up their trash. Should you:
   - ask them to pick up their trash?
   - wait until they leave and pick up the trash for them?
   - do nothing?
   - other

2. You found a baby barn owl and have cared for it for several months. It has become very tame and you like it a lot. You've been told that it is illegal to keep it without proper permits.
   Should you:
   - give it to a zoo?
   - keep it anyway?
   - call the California Department of Fish and Game and ask their advice?
   - try to release it back into the wild?
   - other

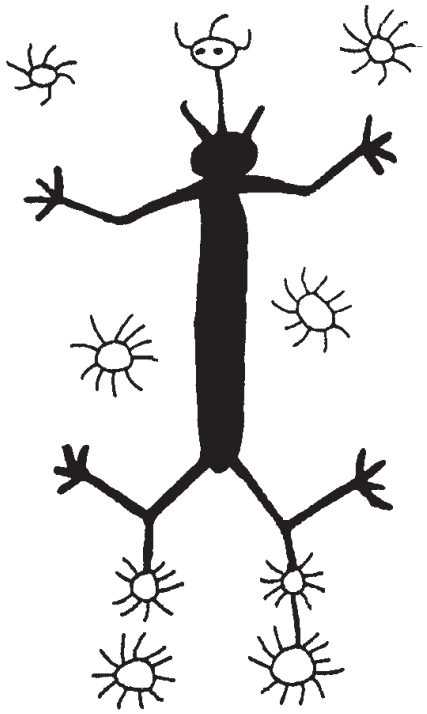
3. You are camping in a state park where there are many raccoons. It is dusk and raccoons are beginning to come into the campground. You notice that the family next to you is feeding the mother raccoon and her babies potato chips. There are signs posted saying, "Please Do Not Feed The Wildlife." Should you:
   - feed the raccoons so you can see them up close?
   - try to explain to the family that it is not a good idea to feed wild animals?
   - tell the park ranger?
   - other

4. You are hiking in a National Park. Along the trail you find a small arrowhead. You have an arrowhead collection. However, it is illegal to take anything from a National Park. Should you:
   - take it anyway (no one will ever know)?
   - leave it where it is?
   - hide it in the bushes off the trail?
   - give it to a park ranger?
   - other



5. It is the day after the deer hunting season has closed. You and your best friend are driving on a dirt road far from the main highway. Neither of you had any luck hunting. You are both very disappointed. All of a sudden you see a huge buck in front of you. Your friend quickly shoots the deer. Later in the day you are approached by a game warden. The warden wants to know when you shot the deer. Should you:
   - tell him it was shot yesterday before the hunting season closed?
   - let your friend do the talking (what if he/she lies?)
   - tell the game warden the truth?
   - other

6. You own a large company. Recently you have been told your plant is polluting the water in a nearby stream. Equipment that would reduce the pollution is very expensive. You would have to fire 20 employees to cover the cost of the new equipment. Should you:
   - not add the equipment?
   - add the equipment and fire the employees?
   - wait a few years to see if the cost of the equipment goes down?
   - other



Lesson 16: Environmental Coat of Arms

Purpose

Each student will design a personal "Environmental Coat of Arms" which reflects their values and opinions.

Objective

The student will create a personal coat of arms which shows their favorite experience at KEEP, the most important thing they learned, a serious environmental problem and how they can help to solve that problem.

Science Framework Concepts

B-4 pg. 97.

Materials Needed

Environmental Coat of Arms pattern, 1 per student
KEEP Student Field Notebook, 1 per student

Activity

Explain to the students that a "Coat of Arms" is used to symbolize things which are important to an individual or a family.

Tell the students they will be creating a personal "Environmental Coat of Arms".

Give each student a coat of arms pattern.

Explain that the coat of arms is divided into five sections, each section representing something different.

Draw an outline of the coat of arms on the board, placing the numbers in the appropriate sections.

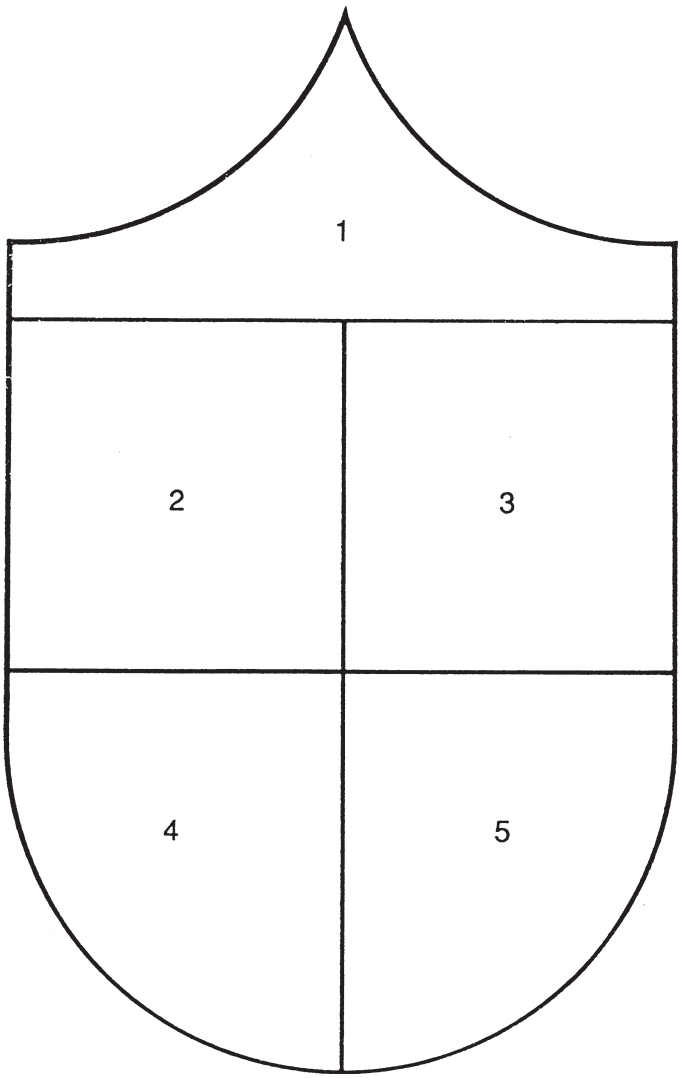
Next to the coat of arms write the following information on the board:
1. Name and totem.
2. What was your favorite experience at KEEP?
3. What is the most important thing you have learned about nature?
4. What is our most serious environmental problem?
5. What is something you can do to help solve the problem shown in section 4?

Stress that everyone's coat of arms will be different.

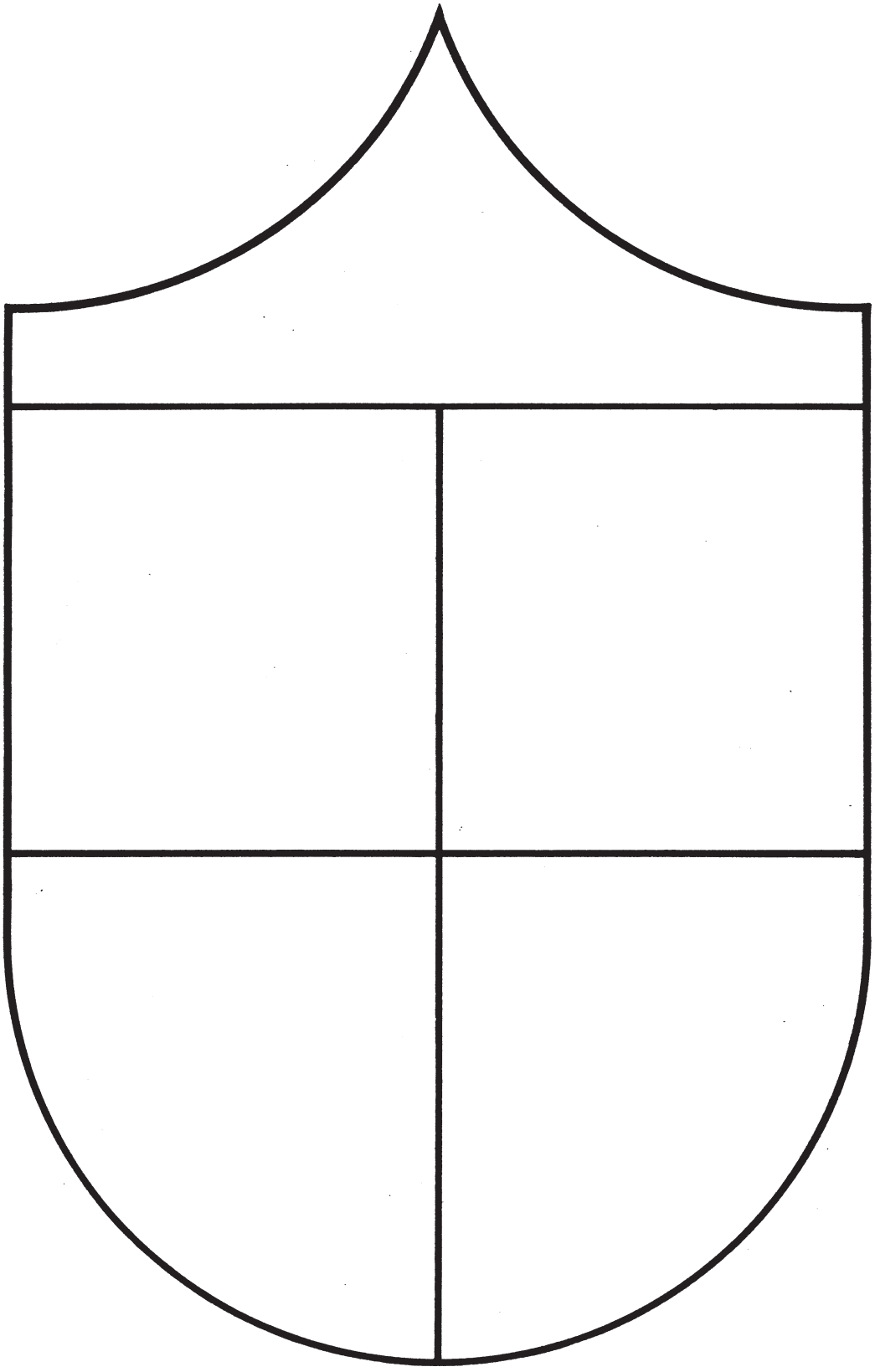
Tell the students that in section 1 they should write their name and draw the picture of their totem. Explain that a totem is anything in the natural world (plant, animal or any other part of the earth) that they want to identify with or want to protect. The American Indians adopted totems. Their totem was a lucky symbol for them throughout their lives. Have the students think about their recent experience at KEEP and try to come up with an appropriate totem.

The students should answer questions two through four by drawing a picture or writing in the appropriate area on their coat of arms. The Student Field Notebooks will help the students with these sections.

When the students have completed their coat of arms, have them share their drawings with each other.



Ecology Coat of Arms



Lesson 17: It Starts With You

Background

There is no definitive lesson to "wrap up" a student's KEEP experience. Hopefully, each student will draw upon his/her experience for a long time. As a teacher, you can use your KEEP week as a reference point and as an experience that can be incorporated into all of your lessons throughout the school year. The following lesson is an attempt to say good-bye to KEEP and move on with ideas learned there.

Purpose

To provide the classroom teacher and the students a way in which to incorporate their KEEP experiences into their lives "back home".

Objective

Each student will be able to identify one environmental problem area and a way he/she can help solve that problem.

Science Framework Concepts

B-4 pg. 97; A-4 pg. 125; C-4 pg. 142.

Materials Needed

Chalkboard
Student's Environmental Values Sheets (optional)
Student's Environmental Coats of Arms (optional)

Activity

Remind students of their work on the Environmental Values Sheets and Environmental Coats of Arms. Each student's coat of arms depicts an environmental problem and a solution. Discuss some of those problems and solutions.

Students may leave KEEP with the feeling that they are too young to help with environmental problems or that the problem is so overwhelming, they can't possibly do anything. Every little bit helps, a small effort is a good starting point.

Ask the students to write down an environmental problem (either one from their coat of arms or a new one) and list possible solutions to that problem. Are one or more of the solutions something that you can incorporate into your daily lives? As an individual or class? What can the students do about an environmental problem today?

The obvious answers may include recycling. What about recycling metal cans, milk cartons, glass, etc. besides the standard newspaper and aluminum cans? How about throwing less garbage away by composting, recycling clothes, and other goods we sometimes throw in the garbage can? What about solutions that require lifestyle changes? Walking or bike riding instead of using a car? Buying products with less packaging than comparable brands? Supporting companies that do not pollute or that recycle, i.e. green companies? Using less styrofoam or none at all? Landscaping around our houses and schools with native vegetation that requires less water? And the list can go on.

Are the students willing to make an individual or classroom commitment towards solving an environmental problem?

Remember: *"No one ever made a greater mistake than he who did nothing because he could only do a little."* Edmund Blake

Resources

Bibliography of Supplemental Environmental Education Materials

ACCLIMATIZING, ACCLIMATIZATION; Van Matre, Steve; American Camping Association, Martinsville, Indiana 46151. Primary sensory awareness activities.

CALIFORNIA ENVIRONMENTAL EDUCATION GUIDE; Alameda County Superintendent of Schools, 244 North Winton Avenue, Hayward, California 94744. A four (4) volume set (K-3, 4-6, 7-9, 10-12) developed for classroom teachers. Includes activities for all subject areas.

GREEN BOX; Humboldt County Office of Education, Environmental Education Program, 901 Myrtle Avenue, Eureka, California 95501. A box full of environmental education activities.

IN FIVE; The Idea Factory, Inc., 1016 Neptune Drive, Ruskin, Florida 33570. Science and environmental awareness activities that can be done in 5-10 minutes.

INVESTIGATING YOUR ENVIRONMENT; U.S. Forest Service, 630 Sansome Street, San Francisco, California 94111. Contains activities in which students investigate various parts of the environment such as soil, water or wildlife.

LIVING LIGHTLY IN THE CITY; Schlitz Audubon Center, 1111 East Brown Derby Road, Milwaukee, Wisconsin 53217. Activities which teach environmental education in an urban setting. A four (4) volume set (K-3, 4-6, 7-9, 10-12).

MANURE TO MEADOW TO MILKSHAKE; Hidden Villa Environmental Project, Drawer A-H, Los Altos, California 94022. Indoor and outdoor environmental education activities.

NEW GAMES BOOK; New Games Foundation, P.O. Box 7901, San Francisco, California 94120. Noncompetitive games which stress cooperation and team building.

OBIS-OUTDOOR BIOLOGICAL INSTRUCTIONAL STRATEGIES; Lawrence Hall of Science, University of California, Berkeley, California 94720. A wide variety of environmental education activities. Many different packets are available.

PROJECT LEARNING TREE; American Forest Institute, 1619 Massachusetts Avenue, Northwest, Washington, D.C. 20036. A two (2) volume set (K-6 and 7-12) designed for classroom teachers. Activities focus on forest resources.

PROJECT WILD; Sponsored by Western Association of Fish and Wildlife Agencies and Western Regional Environmental Education Council; Project Wild, Salina Star Route, Boulder, Colorado 80302. Copyright 1983, Western Environmental Council. Two (2) volumes: Primary/secondary volumes - help develop awareness, knowledge and skills - like OBIS - activities concerning wildlife and environment upon which all life depends.

SHARING NATURE WITH CHILDREN; Joseph Cornell; Ananda Publications, 14618 Tyler Foote Road, Nevada City, California 95959. An excellent book of nature games for all ages.

SUNSHIP EARTH; Van Matre, Steve; American Camping Association, Martinsville, Indiana 46151. This model for a five (5) day residential environmental education program is by the author of Acclimatizing and Acclimatization.

THE GROWING CLASSROOM; Live Oak School District, Santa Cruz, California 95062. This curriculum was developed to teach a garden based science and nutrition program. There are three (3) books. Book two contains the Science Curriculum which has excellent environmental education activities.

TRASH MONSTER; State Solid Waste Management Board, 1020 Ninth Street, Suite 300, Sacramento, California 95814. Interdisciplinary, two week unit for grades 5-7 emphasizing resource conservation.

List of Federal, State and Private Organizations Involved In Conservation Related Activities

FEDERAL

Bureau of Land Management
Federal Office Bldg., Rm. E-2841
2800 Cottage Way
Sacramento, CA 95825

Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105

Forest Service
630 Sansome Street
San Francisco, CA 94111

National Park Service
450 Golden Gate Avenue
P.O. Box 36063
San Francisco, CA 94102

Department of Energy
Forestry Bldg.
Independence Avenue
Washington, DC 20585

Fish and Wildlife Service
Washington, DC 20240

Geological Survey
National Center
Reston, VA 22092

National Science Foundation
Washington, DC 20550

Natural Resource and Conservation Service
P.O. Box 2890
Washington, DC 20013

STATE

California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

Department of Conservation
1416 Ninth Street, Room 1320
Sacramento, CA 95814

Department of Fish and Game
1416 Ninth Street
Sacramento, CA 95814

Department of Parks and Recreation
1416 Ninth Street
Sacramento, CA 95814

California Waste Management Board
1020 9th Street, Suite 300
Sacramento, CA 95814

Department of Education
Conservation Education Service
721 Capitol Mall
Sacramento, CA 95814

Department of Forestry
1416 Ninth Street
Sacramento, CA 95814

Department of Water Resources
1416 Ninth Street
Sacramento, CA 95814

PRIVATE

Cousteau Society
8430 Santa Monica Blvd.
Los Angeles, CA 90069

Ducks Unlimited
One Waterfront Way
Long Grove, IL 60047

Greenpeace
2007 R Street, NW
Washington, DC 20009

National Audubon Society
950 Third Avenue
New York, NY 10022

Nature Conservancy
4245 Fairfax Dr.
Arlington, VA 22203
(703) 841-5300

Wilderness Society
1400 I Street, NW, 10th Floor
Washington, DC 20005

Friends of the River
909 12th Street, Suite 203
Sacramento, CA 95814

California Nature Conservancy
201 Mission Street, 4th Floor
San Francisco, CA 94105
(415) 777-0487

Global Tomorrow Coalition
1325 G Street, NW, Suite 915
Washington, DC 20077-8482

Defenders of Wildlife California Office
5604 Rosedale Way
Sacramento, CA 95822
(916) 442-6386

Facility for Animal Care and Treatment (FACT)
California State University
9001 Stockdale Hwy.
Bakersfield, CA 93311
(661) 664-3167

Defenders of Wildlife
1244 19th Street
Washington, DC 20036

Friends of the Earth
1045 Sansome Street
San Francisco, CA 94111

Humane Society
2100 L Street, NW
Washington, DC 20037

National Wildlife Federation
1412 16th Street, NW
Washington, DC 20036

Sierra Club
530 Bush Street
San Francisco, CA 94108

Zero Population Growth
1400 Sixteenth St., NW, Suite 320
Washington, DC 20036

Californians For Population Stabilization
926 J Street, Suite 915
Sacramento, CA 95814

Rainforest Action Network
301 Broadway, Suite A
San Francisco, CA 94133

California Living Museum (CALM)
10500 Alfred Harrell Highway
Bakersfield, CA 93306
(661) 872-2256

Audubon California
Kern River Preserve
P.O. Box 1662
Weldon, CA 93283
(760) 378-2531

Recycling Locations in Kern County

Bakersfield

American Collection & Recycling
321 Ming Ave. 835-8622

Bakersfield Assoc. for Retarded Citizens
2240 S. Union Ave. 397-3622
1818 Roberts Lane (Varner Bros)

Bakersfield Recycling Co.
6701 Niles 836-1567
661 Roberts Lane
10595 Rosedale Hwy.

Smurfit Recycling Company
2710 "O" St. 327-3841

Coors Recycling Center
1420 "N" St. 325-3508
2101 White Lane 834-9933

Westchester Recycling Center
3001 "F" St. 325-0246

Eastside Recycling Center
Weedpatch Hwy. 366-7633

J & R Recycling, Inc.
2200 S. Union 834-0242

Golden State Metals
2000 E. Brundage 327-3559

Midway Recycling
7200-C Downing 589-5712

Sierra Iron & Metal
1620 E. Brundage Lane 324-4585

Delano

Delano Recycling Center
1029 High St. 725-7643

Lamont

Bakersfield Assoc. for Retarded Citizens
9710 Main St. 397-3622

Mojave/CA City

D & H Recycling
16500 Sierra Hwy (Mojave) 824-2398
21026 Neuralia (CA City) 824-2398

Ridgecrest/Inyokern

Cate Recycling
1416 N. Inyo (760) 466-4441

Pearson Recycling
1536 N. Mahan (760) 446-6106

A.R.C. Recycling (drop off donations)
Richmond Road Gate
Naval Weapons Center (760) 375-9787

Taft

Rose Street Recycling
327 Rose St. 763-1487

Westside Waste Management
310 Commerce Way 763-5135

Tehachapi

Tehachapi Recycling
416 N. Denison 822-5273

Recycling Center
355 Enterprise Way 822-4555

Wasco

Copeland's Recycling
541 Highway 46 758-5061

Frazier Park

Planet Happy Recycling
(Frazier Park Market)
632 Laguna Trail 245-3468

Kern River Valley

Kern River Recycling
6925 Wofford Heights 985-7500

Kernville Landfill (drop off donations)
101 Dump Road (760) 376-3438

Bakersfield Assoc. for Retarded Citizens
2000 Chanin Ave. (760) 379-3177

from "Kern County's Guide to Recycling"
Kern County Public Works Department (661) 861-2481

AV List

ACID RAID - 8643
Surveys mounting damage occurring world-wide by acid precipitation to our lakes, forests and structures. Additionally, it raises serious concerns about its effects on human health.

AGE OF MAMMALS - 3372
Stop action animation and live action take us on a tour of the cenozoic era. Man's appearance is used to raise the question of his ability to adapt and survive without destroying all life on Earth.

AMAZING ANTS - 2812
Close-up photography probes an underground nest and shows how ants store food, care for their young, and protect their nest.

AMERICA'S WONDERLANDS - NATIONAL PARKS - 8939
America's national parks reveal nature at its most beautiful.

AMERICAN LEGACY - THE PROBLEM OF WATER - 735
California's Mojave Desert; explorations by Jedediah Smith; water dependence of the Imperial Valley and Los Angeles.

ANIMAL POPULATION - NATURE'S CHECKS AND BALANCES - 9496
Scientific studies of animal communities reveal how critical environmental factors - food supply, climate, predators and disease - determine the continuing existence of all living things on Earth.

ANIMALS IN SPRING AND SUMMER - 8994
Close-up sequences filmed in natural wilderness settings reveal how animals adapt to yearly cycle of nature which governs their patterns of mating, breeding, and migration.

ANIMALS SEE IN MANY WAYS - 1905
Studying the ways animals see and the structure of the human eye helps students understand the importance of the eye and the significance of the structure and position of the eye.

ANTHROPOLOGY - A STUDY OF PEOPLE - 2078
Shows how anthropologists study groups of people and ancient cultures.

ARK - 1120
Depicts the ecology problem as a human moral problem, as one man attempts to keep alive a community of wild creatures native to a small pond.

AT THE CROSSROADS - THE STORY OF AMERICA'S ENDANGERED SPECIES - 643

Explores the struggle for survival of many species of animal wildlife. Presents mistakes of the past which have resulted in the extinction of some species.

BIOSCOPE - ENDANGERED SPECIES - 2595

Examines the conditions which threaten wildlife worldwide and the efforts being made to protect endangered species.

BIRDS IN WINTER - 4663

A study of birds that are migrants and those that are permanent residents. Shows how and what to feed birds.

BOREAL FOREST (FALL AND WINTER) - 9243

Emphasis is on preparation and adaptations, plants and animals must make to survive the winter. Shows relationship between plants and animals and their environment.

BOREAL FOREST (SPRING AND SUMMER) - 9244

Shows signs of spring and the flurry of activity among the animals. Summer is the time for replenishment of living things, both plant and animal.

BOY AND A CRANE, THE - 5735

Efforts are being made today in Japan to preserve and propagate the Tancho crane, the most beautiful of the crane species. Film is a story of this preservation as seen through the eyes of a boy.

CAMOUFLAGE IN NATURE - FORM, COLOR, PATTERN MATCHING - 9105

Examines protective resemblance, which, in nature, can be a life and death matter for many animals.

CLIMATE - A FIRST FILM - 1135

Climate is first defined and then a number of factors that determine climate are described.

COLOR AND LIGHT, AN INTRO - 6975

A prism spreading white light into a band of colors, leads to an understanding of the relationship between color and light.

COMMUNITY OF LIVING THINGS - BIORHYTHMS - 1156

Investigates seasonal change. Leaf fall, waterfowl and migration.

COMMUNITY OF LIVING THINGS - COMPETITORS AND PREDATORS - 1195

Begins with competition among plants and progresses to competition among animals.

COMMUNITY OF LIVING THINGS - CREEKS AND OCEANS - 1174

Traces marine organisms from brakish tidal creeks and tributaries to the Atlantic Ocean.

COMMUNITY OF LIVING THINGS - DIFFERENT BUT ALIKE - 1180

While emphasizing a diversity of organisms, common functions/responses and basic ingredients of living are defined.

COMMUNITY OF LIVING THINGS - LIVING CYCLES - 1152

Introduces the concept that all organisms are bound to certain events within an established time frame. Insects and amphibians are emphasized.

COMMUNITY OF LIVING THINGS - PARASITES - 1185

Deals with the relationship of parasite and host.

COMMUNITY OF LIVING THINGS - STREAMS AND LAKES - 1176

Compares and contrasts standing and fresh water environments and organism adaptation to the two environments.

COMMUNITY OF LIVING THINGS - SUCCESSION - 1162

Focuses on relatively longer cycles. Examines what will typically happen to a salt marsh, lake and puddle, over thousands of years or only days.

CYCLES IN NATURE - 9263

Film explores effects of cycles outside our bodies such as seasons and day and night as well as the cycles that occur inside us every day.

EAGLE - 9865

As a symbol of power and strength, the eagle has played a role in our nation's art and history down through the ages. Shows the eagle's habits and includes a plea for preservation.

EARTH - ITS ATMOSPHERE - 9210

Examines our layered atmosphere, the protective covering between the blackness of space and the surface of our planet.

EARTH - ITS OCEANS - 9214

Shows how oceans affect weather and climate and contain a wealth of plants and animals useful to man. They are also a vast source of oil and other valuable minerals.

EARTHWORMS - NATURE'S SOIL BUILDERS - 4120

Describes structure of earthworms and explains how earthworms are adapted to living underground.

EROSION AND WEATHERING - LOOKING AT THE LAND - 8878

Documents the effects of physical and chemical weathering on man-made structures and rock. Shows effects of running water, glaciers, wind, oceans and gravity.

FLIGHT FOR SURVIVAL - THE MIGRATION OF BIRDS - 8873

Explores navigational and homing instincts of various migratory bird species. Shows different techniques of mapping bird migration routes. Shows experiments on birds long range navigation.

FLIGHT OF THE MONARCH - 9884

Poetic and informative film about the magic cycle of a butterfly's life. Exceptional photography and flute music intensify the experience of the butterfly's life.

FLOWER TO SEED - 5014

A meticulous and beautiful portrayal of the process of seed production. Time-lapse photography and animation.

FLOWERS AT WORK - 8867

Animation and live action photography illustrate functions of the major parts of flowers. Examines part of wind, insects, and water in pollination.

FOOD CHAINS - A BOND OF LIFE - 9718

Explains the food chain, starting with the energy from the Sun. This energy is converted to food by plants and then through a complex food web to nourish every other living thing on this Earth.

FOREST IN THE CLOUDS - 9259

Travel to Costa Rica and explore a mountaintop cloud forest, study close up the many plants and animals that inhabit the cloud forest and the intricate relationships they have developed.

FUNCTION OF BEAUTY IN NATURE - 9178

Examples of nature's art - a spider's web, a fish's colors, a bird's song - reveal their function beyond beauty.

GENETICS - MUTATION - 5516

Explores the genetic causes of mutation.

GENETICS - THE SAME...BUT DIFFERENT - 5511

Explores the likenesses and differences within a species. How does nature keep variations in check.

GENETICS - VARIATION - 5512

Explores the transfer of genetic information.

GREAT BLUE HERON - 1671

A young biologist takes us to tree-top home of herons. Shows herons in flight, fighting, courting, mating, hatching and learning to fly.

GREAT HORSESHOE CRAB FIELD TRIP - 9902

Paul Weeks, a master science teacher in Harlem, uses the horseshoe crab to illustrate the scientific method and the way we all learn.

GROUNDWATER - 3898

Explores geological features that related to the occurrence of subsurface water and illustrates its importance as an agent in the formation of caves and land contours.

GROUPING LIVING THINGS - 5532

History and hierarchy of classification. Viewers learn the difference between genus and species. Animated.

HAROLD AND HIS AMAZING GREEN PLANTS - 9264

Basic botany lesson follows the life cycle of a green plant from seed to maturity, showing the necessity of water, soil, sunshine, and air for growth.

HONEYBEE, THE - A SOCIAL INSECT - 4977

Honeybees are shown to be an example of social insects that live in a community. There is a division of labor among them and they cooperate with each other.

HOUSEFLY - 8830

Life cycle of the housefly as well as its unique flight and feeding mechanisms.

HOW GREEN PLANTS MAKE AND USE FOOD - 9556

Animation and time-lapse micrography show how materials reach leaves and how sunlight supplies energy for the manufacture of sugar.

HOW WE KNOW THE EARTH MOVES - 4114

Reviews discoveries of early astronomers. Explains the foucalt pendulum, and involves students in a demonstration that illustrates star shift.

HUMAN COMMUNITY, THE - CHEMICAL QUESTION - 580

Explores pesticides, fertilizers, household and other chemicals that frequent our environment. Emphasis is on benefits provided versus risks involved with use of such materials.

HUMAN COMMUNITY, THE - CHOICES - 502

Examines decisions which impact the environment and focuses on the ability of humans to contribute to positive change.

HUMAN COMMUNITY, THE - ENERGY DEMANDS - 535

Examines human lifestyles in relation to energy dependence.

HUMAN COMMUNITY, THE - FUTURE ENERGY SOURCES - 528

Explores a variety of energy sources that may play a more important role in the future, including solar, wind, tidal, and agricultural sources.

HUMAN COMMUNITY, THE - GLOBAL ISSUES - 569
Acid rain, pollution of the oceans, and the "greenhouse effect".

HUMAN COMMUNITY, THE - LIFESTYLE CONFLICTS - 572
Examines the human urban lifestyle as related to an array of potential problems, including noise, visual pollution, drinking water and microwaves.

HUMAN COMMUNITY, THE - SHORTAGES - 582
Due to increased human consumption, shortages are becoming more common. This program examines why and when shortages occur.

HUMAN COMMUNITY, THE - SPECIES MODIFICATION - 524
Explores human manipulation of North American species.

HUMAN COMMUNITY, THE - TOXIC WASTES - 577
Focuses on the considerations surrounding proper and improper disposal of toxic wastes.

HUMAN COMMUNITY, THE - URBAN SPECIES - 503
Investigates the urban environment and the impact on organisms who exist there.

HUMAN COMMUNITY, THE - WASTE DISPOSAL - 581
Examines the problem of waste materials and the recycling of aluminum, glass and paper products.

LAKESIDE HABITAT - 9251
Each year shore and water birds return to the lakeside habitat. Shows courtship rituals, nest building, and territorial establishment.

LAND POLLUTION - A FIRST FILM - 4238
Film describes the uses and misuses of land as well as suggesting methods for protecting it for future generations.

LEARNING ABOUT FLOWERS AND THEIR SEEDS - 8917
Examines parts of a flower and describes how each contributes to the production and dispersal of seeds. Shows seeds as food source.

LEARNING ABOUT REPTILES - 8748
Alligators, crocodiles, turtles, etc. Are examples of adaptations to environments ranging from a desert to the ocean.

LIFE CYCLE OF THE SILK MOTH - 8952
Close-ups and slow motion reveal mating, egg laying, egg hatching and the emergence of the caterpillar. Shows how caterpillars form cocoons and slowly change into the adult moth.

LIFE IN A DROP OF WATER - 9314
Photomicrography reveals the amoeba, spirogyra, paramecium, hydra and other living forms in a tiny drop of water.

MAJESTIC EAGLES OF NORTH AMERICA, THE - 8479

Observing the life cycle and natural habitat of the American Bald Eagle, students learn why this majestic bird has often symbolized strength, loyalty, and courage.

MISS GOODALL AND THE WILD CHIMPANZEES - 6537

The adventure of an English woman in the jungles of East Africa observing the daily lives of wild chimps in an attempt to understand their behavior in relation to human realization.

MONARCH BUTTERFLY STORY - 7585

Portrays in detail the life cycle, minute features, and unique activities of the monarch butterfly in its four stages of development.

NATIONAL PARKS - PROMISE AND CHALLENGE - 9183

Visits Yosemite, Yellowstone, Mount McKinley and the Grand Canyon. Asks question should parks be a playground for everyone to use or should they be preserved for the future.

PHOTOSYNTHESIS - 8820

Examines chemical changes and structures involved and investigates how modern science is being used to develop that process to produce food and provide energy alternatives.

PLANTS MAKE FOOD - 4049

Elementary photosynthesis. Describes the materials, the machinery and the role of sunlight.

PLANTS THAT GROW FROM LEAVES, STEMS AND ROOTS - 3751

Examines vegetative reproduction in seed bearing plants. Compares seed growth with vegetative reproduction. Shows experiments with plant cloning.

POISON PLANTS - 5004

This film aids children in identifying many poisonous plants that irritate the skin or cause illness or death if eaten.

PREDATORS OF THE DESERT - 9283

Dramatic view of the continual struggle for survival in the desert. Depicts nature's forces with total candor and uncompromising realism.

PROJECT PUFFIN - 4150

Filmed on location in Newfoundland and Maine, this is an account of efforts made by the National Audubon Society biologist Dr. Stephen Krees to save the puffin.

PROTECTING ENDANGERED ANIMALS - 5914

Examines extinction, from the dinosaur and passenger pigeon of the past to some of today's endangered animals. Also examines success stories as well - such as the whopping crane and bison.

PROTISTS - THRESHOLD OF LIFE - 9187

Tells how thousands of tiny organisms called protists may be found in a single drop of stagnant water. Examines euglena and amoeba.

RACCOON - 9558

Visits the world of the raccoon and shows how they find food, make their homes, raise their young, and sometimes become pests.

RAPTORS - BIRDS OF PREY - 3065

Gives close views of flying, nesting, and feeding habits of eagles, ospreys, falcons, owls, and hawks.

RICHES FROM THE EARTH - 9188

Our society depends on riches from the Earth such as valuable ores, minerals, and water. This is a story of discovery and depletion, and of technology, conservation, and recycling.

RIVERS - THE WORK OF RUNNING WATER - 8819

Introduction to waterway geology focuses on the Colorado and Mississippi rivers. Shows how rivers shape and reshape the land, their importance in irrigation and the benefits and problems of dams.

SEARCH FOR FOSSIL MAN - 8749

Film shows Dr. Phillip Tobias, paleoanthropologist at the Fossil-Hominid site in South Africa.

SEASONS AND DAYS - 5948

Extensive animation shows how changes in seasons and the length of the daylight result from the Earth revolving around the Sun on an inclined axis. Explains polar circles and the tropics.

SECRET LIFE OF A TROUT RIVER - 8763

Students learn how mayflies, brown trout, water ouzel, and pike figure in the life of the trout river. River is shown to be a complex, delicately balanced ecosystem.

SIMPLE LENS - AN INTRODUCTION - 2713

Using the directed light from a laser, this film show how light is organized by the likens of the eye or a camera.

SNAKES - 3340

Focuses on habitats and structural and behavioral adaptations. Shows physical characteristics of snakes and how they move and feed.

SNAKES, SCORPIONS AND SPIDERS - 9428

Shows how these animals live on the shortgrass prairie and special physical features of each.

SOIL AND WATER - A LIVING WORLD - 9709

Children on a nature expedition learn all about the plants and animals that live in soil and water.

SPIDERS - 8975

Depicts different kinds of spiders. Describes where they live, how they grow, and how they get their food.

STORMS - AN INTRODUCTION - 3800

Examples of the effects of thunderstorms, hurricanes, tornadoes, and blizzards on our environment. Weather patterns, how they are predicted, and how storms harm and help us.

SUCCESS STORY - HOW INSECTS SURVIVE - 8452

Through time-lapse photography and fascinating close-up detail, the camera shows viewers how insects have adapted successfully to a variety of environments.

TADPOLES AND FROGS - 8892

A young student keeps a diary of the transformation of a tadpole into a frog.

UNFRIENDLY FLORA AND FAUNA - 9037

Viewers learn to recognize many dangerous species and how to avoid injury or illness from them.

WATER BIRDS - 4007

Gives glimpses into the behavior, nest building, mating and anatomical features of seaside and marshland bird life in many parts of the world.

WATER CYCLE - 6045

Distribution of Earth's water supply, water cycle phenomena, including evaporation, condensation, precipitation, and return flow. Geographic variables influencing the water cycle.

WATER'S WAY - 775

A little boy is introduced to the properties and purposes of water by a friendly little droplet - actually a snowflake that melted in the boy's hand.

WEATHER - COME RAIN, COME SHINE - 9396

Animation and live action show the complex interaction of Sun, air, and water that creates our weather. Shows old and new forecasting tools.

WET TALE - 8800

Animated, nonverbal adventure features a small drop of water. Examines the cycle of water on Earth.

WHAT'S IN AN EGG - 9892

Film uses a chicken egg to observe the development of life. Also shows how fish, amphibians, reptiles and insects produce eggs differently and how they've adapted to different environments.

WISE MASTERS OF WIND AND WATER - 4989

Closeups of windmills and waterwheels built by the simple, ancient-looking people of rural Hungary. Harnessing natures energy.

WIND - THE POWER AND THE PROMISE - 8828

Shows how wind can be a devastating force as seen in hurricanes and tornadoes or a beneficial source of power.

WONDERFUL WEATHER MACHINE - 3052

Animated, narrated by the Sun. Describes how gravity, water, and land and air, and the Sun itself, all act together to create different weather conditions.

WONDERING ABOUT LIGHT - 911

Introduces children to the wonder of light - its behavior and many sources, how it makes shadows, and changes them.

Student Reading List

FICTION

Author	**Title**
Aaron	Moving On, stories of far travelers
Bell	Jenny's Corner
Brenner	A Killing Season
Brown	The Pig and the Pond
Brown	The Tracker
Bond	The Voyage Begun
Burchardt	What Are We Going To Do, Michael
Carter	The Education of Little Tree
Colver	Wayfarer's Tree
Dann	Animals of Farthing Wood
Davis	Fishman and Charly
Dejong	Singing Hill
Dejong	Well on the School
Dixon	Lion on the Mountain
Dr. Seuss	The Lorax
Edmonds	Beaver Valley
Edmonds	Time to go House
Edmonds	Wolf Hunt
Gage	Big Blue Island
George	Bubo, the Great Horned Owl
George	Hook a Fish, Catch a Mountain
George	Julie of the Wolves
George	Masked Prowler
George	My Side of the Mountain
George	The Talking Earth
George	Vulpes, the Red Fox
George	The Wounded Wolf
Goodwin	Alonzo and the Army Ants
Graham	Jacob and the Owl: A Story
Harris	Secret in the Stlalakum Wild
Heide	Wendy Puzzle
Herzig	Shadows on the Pond
Jewett	A White Herron
Johnson	Cedars of Charlo
Johnson	Everglades Adventure
Johnson	The Grizzly
Johnson	The Plant Hunters
Johnson	Utah Lion
Johnson	Wild Venture

Jones	Wild Voyageur
Kirkup	Insect Summer
Kjelgaark	Haunt Fox
Liers	Beavers Story
Liers	A Black Bears Story
Liers	Otter's Story
Lippincott	Coyote, the Wonder Wolf
Lippincott	Little Red the Fox
Lippincott	Long Horn, Leader of the Dears
McCracken	Biggest Bear on Earth
McGregor	Miss Pickerell and the Super Tanker
Miles	Otter in the Cove
Milton	Save the Loomies
Montgomery	Kildee House
Morey	Canyon Winter
Morey	Gentle Ben
Mowat	Never Cry Wolf
North	Little Rascal
North	Wolfing
O'Dell	Island of the Blue Dolphin
Peake	Indian Heart of Carrie Hodges
Ray	Fog Drift Morning
Rolerson	A Boy and a Dear
Ropner	Golden Impala
Ross	Letters from Foxy
Rounds	Wild Orphan
Rumsey	Beaver of Weeping Water
St. George	Do You See What I See?
Saint-John	What I Did Last Summer
Salten	Bambi
Silverstein	The Giving Tree
Snow	By Bird is Romeo
Uttley	From Spring to Spring
Wiseman	Blodwen and the Guardians
Wiseman	Adam's Common

NON-FICTION

W863P	Woods	Pollution
363.7 K542p	Kiefer	Poisoned Land
500.9	Tveten	Exploring the Bayous
507 G262	Geary	Marin Trails
507 H556	Hillcourt	Field Book of Nature Activities and Conservation
507 p329	Peattie	Rainbow Book of Nature

523.7	Adams	Catch a Sunbeam
530 W852w	Woodburn	Whole Earth Energy Crisis
550 B957	Burton	Life Story
550 L199p	Lampton	Planet Earth
551 SCH57	Scheider	Rocks, Rivers and Changing Earth
551.3 F683c	Fodor	Chiseling the Earth
551.4 B789c	Bronin	The Cave: What Lives There
551.4 B789d		The Desert: What Lives There
551.4 F534	Fisher	Wonderful World of the Sea
551.4 G555L	Goetz	Lakes
5514 G76	Graham	Water for America
551.5 K743	Knight	First Book of Air
551.6 Gri	Gribbon	Our Changing Climate
551.6	Weiss	What's Happening to Our Climate
551.6/P936f	Pringle	Frost Hollows and Other Microclimates
552 B344e	Baylor	Everybody Needs a Rock
570 C235	Carrighar	One Day on a Seetle Rock
570 D249	Darling	Science of Life
570 G484	Glemser	All About Biology
570 H368b	Hellman	Biology in the World of the Future
570 S129b	Jacker	The Biological Revolution
572 ST76P	Stoutenberg	People in Twilight
574/926		The Curious Naturalist
574 H615	Arnosky	I Was Born in a Tree and Raised by Bees
574 HGI5	Hirsch	Living Community
574 P758b	Polgreen	Backyard Safari
574.5 AL53b	Allen	Life of Prairies and Plains
574.5 B321t	Batten	Tropical Forest: Ants, Animals and Plants
574.5 B179i	Bakker	Island Called California
574.5	Berger	Coral Reef
574.5 B813L	Brown	Life of the African Plains
574.5 C839	Cowing	Our Wild Wetlands
574.5 C66h	Cohen	How Did Life Get There
574.5 C868i	Cristini	In the Pond
574.5 F891y	Freschet	Year on Muskrat Marsh
574.5 G914h	Grossman	How and Why Wonder Book of Ecology
574.5 GRA	Graham	The Milkweed and its World of Animals
574.5 G914u	Grossman	Understanding Ecology
574.5	Goldstein	How Parasites Live
574.5 H255L	Hartman	Living Together in Nature
574.6 H345h	Heady	High Meadow: The Ecology of a Mountain Meadow
574.5 J152a	Jacobs	Africa's Flamingo Lake
574.5 K131	Kane	Tale of a Pond
574.5 LH52a	Laycock	Animal Movers

574.5 L961	Lubell	In a Running Book
574.5 M132L	McClung	Lost Wild America
574.5	Milne	Mystery of the Bog Forest
574.5 M635	Milne	Phoenix Forest
574.5 M786m	Moore	Man in the Environment
574.5 N533e	Nickelsburg	Ecology
574.5 P773	Pond	Survival in Sun and Sand
574.5 P936c	Pringle	Chains, Webs and Pyramids
574.5 P936e	Pringle	Ecology: Science and Survival
574.5 P936ci	Pringle	City and Suburb Exploring an Ecosystem
574.5 P936es	Pringle	Estuaries: Where Rivers Meet the Sea
574.5 P936fv	Pringle	From Pond to Prairie
574.5	Pringle	Gentle Desert
574.5 P936in	Pringle	Into the Woods
574.5	Pringle	Natural Fire: Its Ecology in Forests
574.5 R913e	Russell	Earth, the Great Recycler
574.5 S913w	Sabin	Wonders of the Pond
574.5 Sa58e	Sanger	Forest in the Sand
574.5 ST43	Stephen	Nature's Way
574.5 W586t	White	The Edge of the Pond
574.5 W433W	Wier	The White Oak
574.92 B912e		Exploring a Coral Reef
574.92	Hamberger	Birth of a Pond
575 F222	Farb	Story of Life
575 W997	Wyler	Life on the Earth
579	Rahn	Seven Ways to Collect Plants
581.5 N484f	Newton	A Forest is Reborn
591 R366a	Rice	As Dead as a Dodo
580	Fenton	Plants that Feed Us
581 H679e	Hogner	Endangered Plants
581 P935s	Prime	Seedlings and Soil
581 W697h	Wilson	How Plants Grow
581.6 B895e	Budlong	Experimenting With Seeds and Plants
581.6 F917	Frisch	Plants that Feed the World
581.6 Se58p	Selsam	Plants that Heal
581.6	Weiner	Mans Useful Plants
582 B176	Baker	The Redwoods
582 EN31e	Engbeck	The Enduring Giants
582	Heady	Trees are Forever
582 L361	Lauber	Seeds, Pop, Stick, Glide
582	Milne	Because of a Tree
585.2 B812m	Brown	Monarches of the Forest
590 C66n	Cohen	Watchers in the Wild
590	Cousteau	Ocean World of Jacques Cousteau
590 H769	Hoover	Gift of the Deer

590 L452a	Laycock	America's Endangered Wildlife
590 L452	Laycock	Never Pet a Porcupine
590 L452n	Laycock	Wild Refuge
590 R621	Roedelberger	Wonderful World of Nature
590 R826N	Rublowsky	Nature in the City
590 SH94w	Shuttlesworth	Wildlife of South America
590 S139	Silverburg	The Auk, the Sodo and the Oryx
591 St9l	Stuart	Wildlife Alert! The Struggle to Survival
591.5 C829	Cosgrove	Animals Alone and Together
591.5 H874S	Hughey	Scavengers and Decomposers
591.5 M451n	May	How the Animals Came to North America
591.5	Pringle	Animals and Their Niches
591.5	Milne	Gadabouts and Stick-at-Home
591.5	Riedman	How Wildlife Survives Natural Disasters
591.5	Selsam	How Animals Live Together
591.9 C239	Carson	The Edge of the Sea
591.9 G689L	Gowett	Life in Ponds
591.9	Mackinnon	Animals of Asia
591.9 L696q	List	Questions and Answers About Seashore Life
595 R345L	Rhime	Life in a Bucket of Soil
595 SI530	Simon	Our Six-Legged Friends and Allies: Ecology in Your Back Yard
595.7	McClung	Gypsy Math: Its History in America
596 B3956B	Gehme	Shasta and Rogue: A Coyote Story
596 B556B	Bjorklund	The Bison: The Great America Buffalo
596	Caras	Mysteries of Nature, Explained and Unexplained
596 C42r	Chen	Run, Zebra Run
596 C824W	Costello	World of the Porcupine
596 D33w	Day	World of the Grizzlies
596 F31	Fisher	Valley of the Smallest
596 F832s	Fox	Sundance Coyote
596 F832W	Fox	Wolf
596 G794	Gray	Children of the Ark
596 K242w	Keefe	World of the Opossums
596 L452	Laycock	White-Tailed: Story of a White-Tailed Deer
596	Mays	A Pilgrims Notebook
596 M8180	Morey	Operation Blue Bear
596 P219	Park	World of the Bison
596 R541r	Roberts	Red Fox
596 R836W	Rue	World of the White-Tailed Deer
596 R913d	Russell	Datra the Muskrat
596 R938W	Rutter	World of the Wolf
596 SE775i	Seton	Biography of Grizzly
596 T834c	Tunis	Chipmunks on the Doorstep
596 V389w	Van Wormen	World of the Bobcat

596 V389c	Van Wormen	World of the Coyote
596 W461a	Wellman	Africa's Animals: Creatures of a Struggling Land
597.8 P833W	Porter	World of the Frog and the Toad
597.8 B221v	Bancroft	Vanishing Wings
598 L967b	Luger	Bird of the Farallons
598.1 M451a	May	Alligator Hole
598.2	Gordon	If An Auk Could Talk
599	Arnosky	Cringlieroots Book of Animal Tracks
599 C772B	Cook	Blue Whale: Vanishing Leviathan
599	Hogner	Sea Mammals
599	Roach	Dune Fox
599 J629S	Johnson	The Story of Sea Otters
599.5	Gordon	Once There Was a Giant Sea Cow
599.7 Eb37m	Eberle	Moose Live Here
599.7	Pringle	Controversial Coyote
599.7 P936f	Pringle	Feral: Tame Animals Gone Wild
599.7	Harris	Endangered Predators
599.7 C268b	Casey	Black-footed Ferret
599.7	Ryden	Little Deer of the Florida Keys
614.8	Hyde	Everyone's Trash Problem
620 H567b	Hilton	Beat It, Burn It, and Drown It
621.47	Millard	Solar Energy for Tomorrow's World
621.47	Spooner	Sunpower Experiments: Solar Energy Explained
628	Chester	Let's Go To A Recycling Center
628 AR25r	Archer	Rain, Rivers and Reservoirs: The Challenge of Running Water
628 H567	Hilton	How Do They Get Rid Of It?
628 BB4a	Bay Area Pollution Control District	Air Pollution and the San Francisco Area, 1976
628 J712a	Jones	Pollution: The Air We Breathe
628 J7]2w	Jones	Pollution: The Waters of the Earth
628	Kavaler	Dangerous Air
628 M137s	McCoy	Shadows Over The Land
628 P936	Pringle	The Only Earth We Have
628 SH94	Shuttlesworth	Clean Air, Sparkling Water
628.1 G827	Green	Water
628.1 M369o	Marx	Oilspill
628.1 ST47T	Stevens	Town That Launders Its Water
628 ASI		As We Live and Breathe
628.5 D961s	Dwiggins	Spaceship Earth
628.5 K124t	Kalina	Three Drops of Water
628.5 J443e	Jennings	The Earth Book
628.5 J712L	Jones	Pollution: The Land We Live On
631.4 K24W	Keen	World Beneath Our Feet
632	Graham	Bug Hunters

634.9	Nagel	Tree Boy
635 H689T	Hoke	Terrariums
636.1	Ford	The Island Pony
636.1 H396M	Henry	Mustang
639 H363b	Heilman	Bluebird Rescue
639	Turner	Serengeti Home
639.9 Sch37p	Sehlein	Project Panda Watch
639	Weber	Wild Orphan Babies
743	Arnosky	Drawing from Nature
790 M975L	Musselman	Learning About Nature Through Games
796 B815F	Brown	Five Days of Living with the Land
796 V733n	Vinal	Nature Recreation: Group Guidance for the Out of Doors
796.51 H245T	Harrison	First Book of Hiking
808.81 L328R	Larrick	Room for Me and a Mountain Lion
808.81 L588	Lewis	The Moment of Wonder
808.81 L588W	Lewis	Wind and the Rain
808.81		To Look at Anything
811 AT95H	Atwood	Haiku: The Mood of Earth
811 R975i	Ryder	Inside Turtle's Shell and Other Poems of the Field
W596	Whitman	Poems of Walt Whitman: Leave of Grass
811.08 B468		Beyond the High Hills
812 B636P	Boiko	Plays and Programs for Boys and Girls
895.6 B268	Baron	Seasons of Time
995.6 B395	Behn	Cricket Songs
895.6 L588	Behn	More Cricket Songs
895.6 L588	Lewis	In A Spring Garden
897 J717t	Jones	Trees Stand Shing: Poetry of the North American Indian
900 B275t	Barrett	Tundra and People
910 M82lj	Morgan	Jungles and People
917 S56	Sanderson	The Continent We Live On
917.59 B613e	Blassingame	The Everglades: From Yesterday to Today
920 AU29K	Kieran	John James Audubon
B Cousteau	Iverson	Jacques Cousteau
920 M89Gdi	Dines	John Muir
920 M896s2	Swift	From the Eagles Wing
970 AM67e	Amon	The Earth is Sane: Native Americans on Nature
976.4 P336	Peacock	Big Thicket of Texas: America's Ecological Wonder

Some of the Resources Available at KEEP

VIDEOCASSETTES

The Voyage of the Mimi
Plight of the Bumblebee
Great Blue Heron
The Rotten World (Fungi)
World of the Sea Otter
Watching the Whales
The Hidden Power of Plants
How Nature Protects Animals
Human Community-Global Issues
Life on Planet Earth - Estuaries
In the Land of the Polar Bear
Portrait of a Whale
Horseshoe Crab Field Trip
Lost World of the Medusae
Life at Salt Point
Cougar & Her Cubs
Snakes
World of Cousteau
Acid Rain
Birds of Paradox
Kinabaleo-Summit of Borneo
Raptors: Birds of Prey
Desert Community
Plankton
Insects
Reptiles
Monarch Butterfly Story
Audubon Specials

LISTENING CENTER CASSETTES

Language & Music of the Wolves
Reptile Learning Module
Whale Learning Module
Underwater Sounds of the Humpback Whale
Ocean Sounds
Sounds of Nature
What Is That Sound?
Campfire Songs

COLLECTIONS

Mammals
Birds
Plants
Ocean Animals
Skulls & Skeletons
Rocks
Scat
Insects

BOOKS

Mammals
Birds
Oceans
Plants
Reptiles/Amphibians
Animal Life
Astronomy
Geology
Weather
Indians
Natural History
Nature Stories

BOOKS FOR TEACHERS

Sharing Nature With Children
Project Wild
Project Learning Tree
Teaching Science in an Outdoor Environment
California State Environmental Education Guides
Story Telling Books
The Green Box
The New Games Book