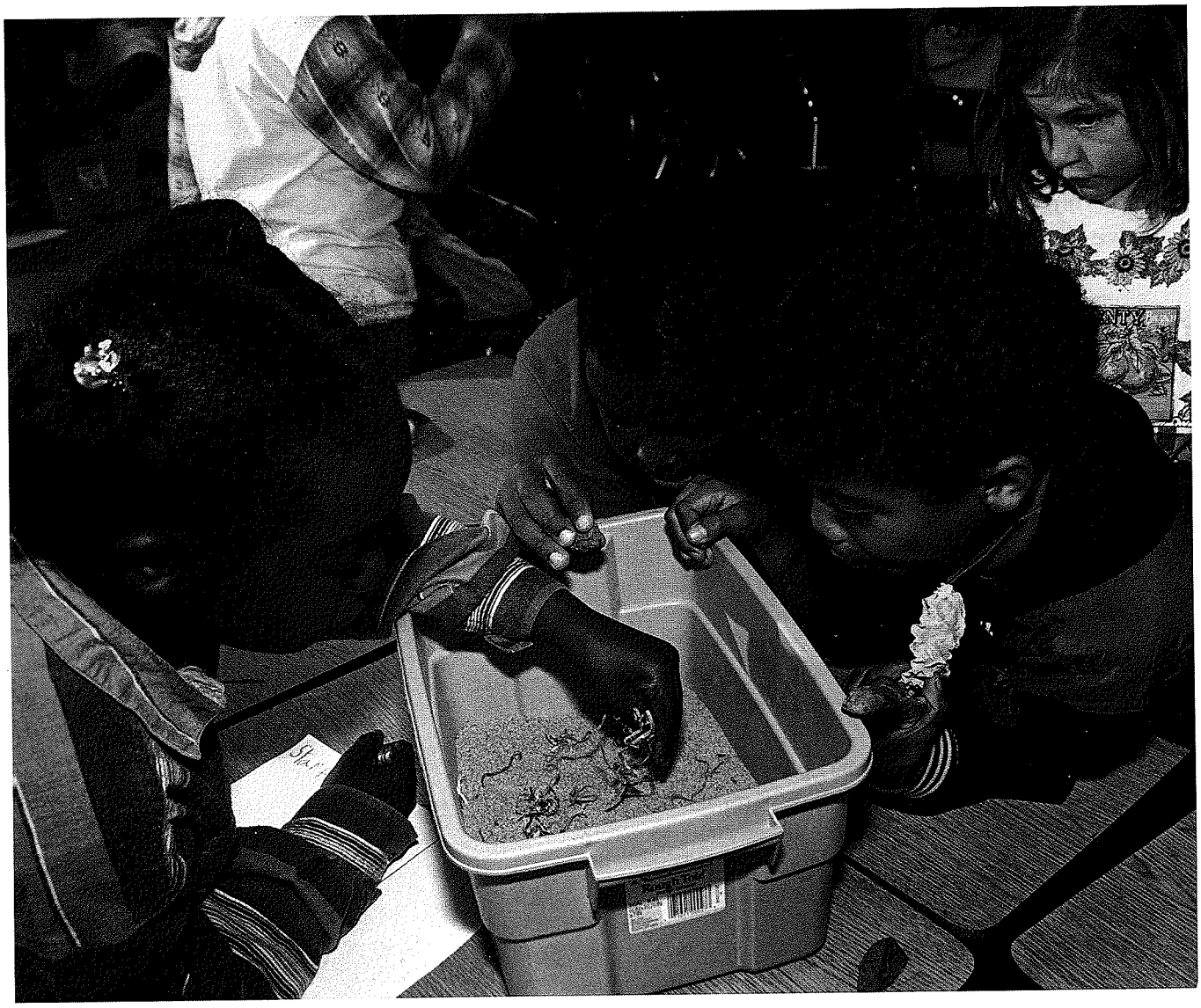


# *Activity 1: Beach Bucket Scavenger Hunt*

## Overview

A sandy shore reveals evidence of nearly everything that has been washed onto it from the land or the adjacent ocean. Rocks and minerals are carried from tall and distant mountains to beaches through streams and rivers. Waves and wind push sediment and "beach drift" from the ocean onto beaches around the world. Marine debris (garbage that ends up in the ocean or at the seashore) is carried from land by the millions of visitors to the world's beaches and dumped from the world's fleet of boats and ships. As waves crash against the shoreline, all these objects are ground into sediments—rough edges are progressively smoothed and rounded into sand grains.

Look closely at sand and you might see pieces of rocks and minerals that have broken free from the rocky seashore, cliffs, ocean floor and even from the distant mountains. There might be shells or shell fragments from animals that once lived on nearby reefs, bones from animals living in the ocean and on land, algae, coral fragments, glass, driftwood, plastics, feathers, and much more.

In this activity, students are introduced to the vastness of our planet's ocean and to the characteristics of one type of shoreline we call a beach. In Session 1, two activity structures, Planet Ocean Brainstorm and My Buddy Says, guide students "**Into** the Activities" by sharing what they already know, value, and enjoy about the sea and beaches.

In Session 2, students go "**Through** the Activities" as they work in small cooperative groups to explore a simulated sandy beach in a plastic tub that is littered with beach drift and debris. Through a sorting activity, they discover that biotic objects found on the sandy beach can be grouped into those that represent: evidence of plant life, evidence of animal life, and evidence of humans. They discover the differences between once-living (biotic) and never-living (abiotic) objects. Also introduced in this activity is the concept that sand is made up of tiny bits of everything that is found on the beach. In Session 3, students go "**Beyond** the Activities" by making mini-books about visiting a beach.

*"Beach drift" is anything that washes up on the beach, whether it came from living or non-living materials. Later in the unit, your students learn about "beach wrack" in great detail. At that time you may want to clarify the distinction between beach drift and beach wrack for them. Beach drift generally refers to the washed up items, not to living organisms. Beach wrack is the line of kelp, other seaweeds, or sea grasses that often forms across an entire beach at high tide. It includes other organisms, shells, beach drift, and debris. Many organisms—such as snails, crabs, and limpets—that live on the kelp stipes and fronds are carried into the beach wrack along with the kelp. Worms, flies, and birds are attracted as the kelp begins to decay. Most of the animals of the beach wrack are hidden underneath the seaweed to avoid bird predators and the hot sun. The beach wrack is a temporary ecosystem on the sandy shore.*

*For more information about the formation of sand, see "Behind the Scenes," page 109, as well as Activities 2 and 3.*

*The Center for Marine Conservation reports that the following twelve types of trash were found most often in the United States during a 1994 clean up: cigarette butts; plastic pieces; foamed plastic pieces; plastic food bags/wrappers; paper pieces; glass pieces; plastic caps/lids; glass beverage bottles; metal beverage cans; plastic straws; plastic beverage bottles; and metal bottle caps.*

*There is a saying, "Take only pictures and leave only footprints." This is a wise practice for learning about and enjoying the outdoors and leaving it unspoiled for those who come later. However, many of our children do not have the opportunity to visit beaches and as teachers we can bring the ocean and an environmental ethic to them. When collecting for the classroom, take only a small amount of beach drift, the dead animals and plants washed up on the shore. On the other hand, collect as much human litter and debris as you can carry. It is important that we tell our students why we collected our beach drift [many, many students will have the opportunity to learn from it], that we only collected drift and debris (no living organisms), and when we are done with it we will return the drift to the beach where we found it and dispose of the litter in the trash. Nothing may be taken or collected from a reserve, preserve, or National Seashore, not even beach drift or sand. We suggest that you do not purchase shells and other dead animals such as sea stars or sea horses because most are collected alive and reefs may have been dynamited to find them.*

*Posters, drawings, photos, and pictures are especially helpful for students who are English language learners.*

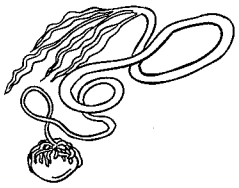
## What You Need

### For the class:

- ❑ 1 classroom globe
- ❑ 4–6 sheets of chart paper (approximately 27" x 34")
- ❑ markers (4–5 colors, wide tip)
- ❑ masking tape
- ❑ (*optional*) miscellaneous posters or calendar pictures of beach scenes and/or beach animals

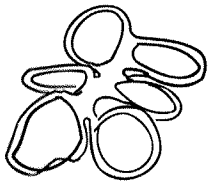
### For each group of 4–6 students:

- ❑ 1 plastic tub or dishpan, 12" x 9" x 4"
- ❑ enough beach sand to fill each tub 2" deep
- ❑ fine-point markers or crayons
- ❑ 4–6 sheets of 11" x 17" or 8 1/2" x 11" construction paper (and copy of template on page 25 for simple version of mini-book)
- ❑ 4–6 photos, pictures, or drawings of beach organisms or sandy shores with and without marine debris
- ❑ pieces of beach drift and marine debris—**at least two from each of the following groups:**



___ evidence of plants: driftwood, twigs, leaves, seaweed, seaweed holdfasts attached to rocks

___ evidence of animals: shells; feathers; bones; dried fish parts; shark, skate, or ray egg cases (often called "mermaids' purses"); crab parts; tracks in the sand



___ evidence of humans: cans, bottles, candy wrappers, six pack rings, plastic straws, bottle caps, juice boxes, fishing line, balloons, plastic toys, coins, chicken bones

___ non-living material: rocks, "beach glass" (broken glass worn smooth), plastic, metal

## Getting Ready

1. Several weeks before beginning this unit, plan your strategy for gathering a large number (at least one for every student in your class) of photographs, pictures, or drawings of sandy beaches and beach organisms (plants and animals). These pictures are used early on in this first activity and again later in the unit. For the second activity, some of these pictures should focus on the sand itself. You can contact parents, ask students to bring several photos or illustrations in, and gather some yourself.

2. Collect items for the beach buckets. If you don't live near a beach, don't worry! See the "Getting Ready Tips" on page 10 for ideas.

3. Assemble the beach buckets by adding two inches of sand to the bottom of each plastic tub, and randomly placing marine debris and beach drift items on top of or in the sand.

4. Have chart paper, markers, and masking tape at the front of the room. Duplicate mini-book template as needed.

5. Divide one piece of chart paper into three columns, each one headed by simple drawings of a plant, an animal, or a human. On another piece of chart paper, draw a large question mark as heading.

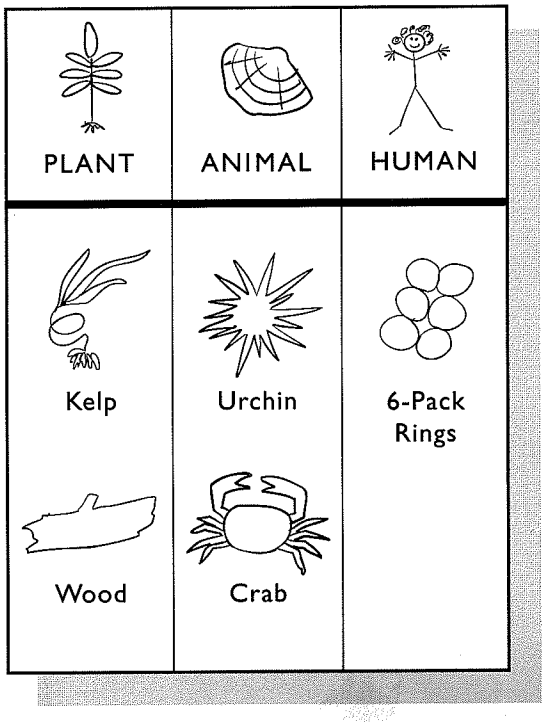
6. *(Optional)* Hang the posters or calendar pictures of beach scenes and/or beach animals.

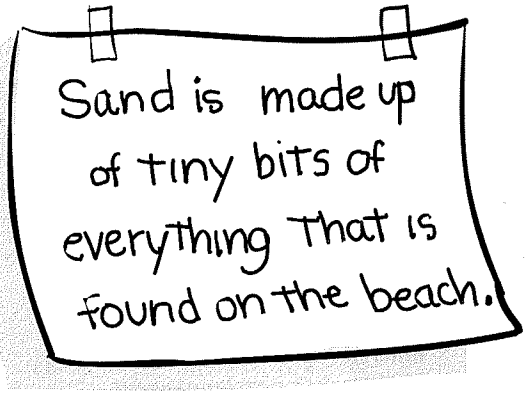
7. Write out each of the Key Concepts for this activity in large, bold letters on separate sheets of chart paper and set aside.

- **Objects found on the sandy beach can be grouped into: evidence of plant life, evidence of animal life, evidence of humans, and non-living material.**

- **Sand is made up of tiny bits of everything that is found on the beach.**

*Later in the unit, in Activity 4: Build a Sandy Beach, additional sandy beach images, including slides and videos, are used for a simulated classroom field trip, so be on the lookout for slides and videos. See "Resources" for suggestions.*




*Some teachers use sentence strips to write out and display the key concepts horizontally. You could also do this by cutting butcher or chart paper in half lengthwise and using these as sentence strips.*

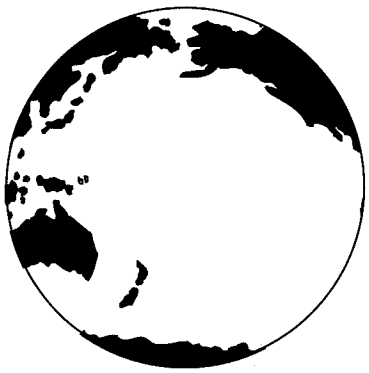
# *Session 1: Planet Ocean Brainstorm*

*The ocean is so vast that it is difficult to study or understand all of its parts at once. Many students will have some prior knowledge of and experience with the sandy shore. Beginning with something familiar, such as a beach, will help students create a context within which they can later place new ideas and concepts about the ocean. This process of identifying prior knowledge and beginning from a point of strength and confidence is especially important for English language learners. It will speed their acquisition of English vocabulary and grammar, as well as their grasp of science concepts.*

1. Ask students to brainstorm all the ways that people use and depend on the ocean. Use a globe to show a "traditional" map view of the world—that is, with the continents in full view with the Americas in the center. Now turn the globe to show the "Pacific Ocean view"— half of the world with almost no land showing. What does this view tell about the world? [Most of the earth is covered by oceans.] Depending on the level of your students, introduce and discuss the following ideas:

- Most of our planet is covered by ocean.
- People get food and water from the ocean.
- Over half of our oxygen comes from plants in the ocean.
- The ocean plays a major role in moderating our climate. Without an ocean the surface of our planet would burn up or melt during the day and freeze at night.

2. Tell students that in the next few weeks they will be learning more about the ocean and in particular, about the place where the water meets the land. Ask if anyone knows what this place is called? [beach, shore, shoreline]



*Listening skills are critical for language development. Students learn to speak a new language by hearing it used correctly. By using a language naturally, even if they make lots of errors, students invite others to speak back to them, and that is when new language is acquired.*

## My Buddy Says

This teaching strategy or activity structure helps students talk about their related prior knowledge. It emphasizes short conversations, cooperation, and good listening skills. It creates opportunities for students to use language in a non-threatening, highly relevant setting where the focus is on the meaning rather than the form of the language. In My Buddy Says, students are introduced to articulating their thoughts and to active listening by responding to questions and prompts about the beach.

1. Quickly introduce the topic of a beach to your class by asking, "Has anyone been to a beach?" "What kinds of things are at a beach?" Remind students that a beach could be next to a river or creek as well as the ocean.

2. Tell them that the first thing they're going to do is an activity called My Buddy Says. They'll be learning more

about beaches from each other. Discuss with students what it means to really listen to a classmate. How does active listening look? [you look directly at the person, nod your head, you don't interrupt]

3. Form student buddy pairs at their seats and assign each student to be either #1 or #2. Pass out a picture of a beach or a beach organism to each student. Have the students look at the pictures closely. The pictures will help them think about beaches and respond to a few questions with their partner.

4. Ask a question from the list below, and give Buddy #1 30–60 seconds to talk about their response to Buddy #2 (who listens only).

5. Ask several Buddy #2's what their Buddy #1 said about the question. They can answer, "My Buddy, DeMarco, says..." Buddy #1 may correct misstatements by the reporting buddy, but cannot add new information. As they share, list their responses in words or pictures on the board.

6. Switch roles and pose a question for Buddy #2 to answer. If time allows, repeat the process so that each buddy gets to respond to at least two questions. Remind the students that only one person in each pair is talking at a time—the other person is actively listening.

**My Buddy Says prompts and questions:**

- Close your eyes and imagine you are sitting on a beach. Look down the beach. Now open your eyes and describe what the beach looked like.
- Where are some beaches you have visited?
- What are some things you like best about beaches?
- If you walked along a sandy beach looking very carefully, what types of things do you think you might find?

7. Spend some time discussing this last question with your students. You may want to write down their responses on chart paper (or the chalkboard), using words and simple drawings. You may also organize the responses into categories, such as: evidence of plants, evidence of animals, evidence of people, and non-living things.

*If you have more than one language spoken in your room, ask students the words for "water," "ocean," "beach," or "shore" in other languages. What other related words do students know in their native language? Write the words down and have everyone practice repeating them. Try to use these words as you teach the rest of the unit. You will not only be showing respect for your students' languages, you will also be reminding students that they each have a wealth of knowledge, although it may not all be in the language of English.*

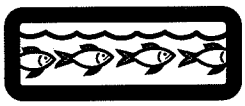
*For younger students, you may want to define evidence or explain it in other words. You could talk about "clues" that we can observe because they've been left behind on the beach. These clues can give us information about the plants, animals, people, and things that live on or visit the sandy beach.*

8. Ask the students to think about two or three of the following questions and then lead a class discussion.

- When you were speaking, how did you know if your buddy was listening?
- Did you learn anything new?
- What did it feel like to talk while your buddy only listened?
- What did it feel like to listen without answering back?
- What helped you to remember what your buddy said? What could help you remember more?
- Did anyone notice that the teacher hasn't taught anything yet? You've been teaching each other!

9. Tell students that this activity will help them be better listeners and teammates when they work together on the next activity about beaches. Collect the pictures or photos of beaches and beach organisms for use later in the unit.

*One teacher told us, "My students really struggled with My Buddy Says. It showed me how much they need to work on listening skills." Another said, "Developing listening skills is the most valuable part of all of these activities. I'll use this over and over again." Like any skills, students will listen better and become more respectful of their buddies with practice. We recommend that you try structures like this several times to give your students a fair chance to succeed.*



# *Session 2: Beach Explorations*

## Explore-a-Beach

1. Tell students that now they will have the chance to explore a "beach" right in their own classroom! Show them the beach buckets you have prepared and ask the students to handle the items carefully.

2. Divide the class into groups of four to six students. Tell them they can feel the sand and pick up pieces of drift and debris to look at more closely. They should keep all the sand in their tub so the classroom will stay clean! Provide each group with a beach bucket and let them begin their observations.

3. Circulate among the groups. Ask focusing questions, such as: "What colors do you see?" "What do the things on the beach feel like?" [fuzzy, rough, prickly, soft, etc.] "What are some of the shapes of objects on the beach?"

"Where do you think the items came from?" "What evidence is there of living things?"

## Sorting and Classifying

1. After they've made some observations, encourage them to sort or group the items into categories, based on any observable characteristic of their choice.

2. Give groups time to share and describe the categories they devised.

3. Explain that often when we go to a sandy shore, we may not see many living plants and animals at first, but if we look closely, we will always find plenty of **evidence** of living things.

4. Next, have students re-sort the items into the following four groups: evidence of plant life, evidence of animal life, evidence of humans, unknown items (or items about which they can't agree).

5. Display the piece of chart paper with three columns headed by simple drawings. Display the second piece of chart paper headed by a large question mark to record unknown items.

6. Have the groups share again. On the chart paper, record, with simple labeled drawings, the items groups share. Explain that everything in the first two categories is evidence of life (or biotic material). Evidence of humans could be biotic (chicken bones or paper) or abiotic (plastic, aluminum). Can anyone identify the unknown items?

7. (*Optional)* Point out any large pictures or posters you may have in the classroom that show examples of the whole, live animals and plants from which the biotic material came.

8. Ask students if there are things left in their beach buckets that were never alive. These things, such as rocks and most of the sand, are called non-living or **abiotic** materials. Ask if there are items that could go in more than one category. In general, things found at the beach are called "beach drift." More specifically things left by humans are referred to as "marine debris."

9. Ask the students what might eventually happen to all of this beach drift and marine debris if it were left on a real beach? If it doesn't come up in the discussion, explain that

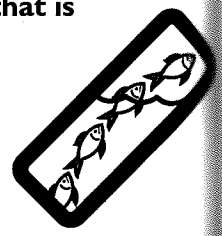
*Recording student ideas on chart paper provides a permanent "group memory" for which the whole class is responsible. If misconceptions arise, they should also be recorded. If they are challenged by another student, add a question mark in another color next to the idea. Make sure that sometime during the unit, all misconceptions are "discovered" and corrected, preferably by students. Go back to your group memory and physically replace the misconceptions with the new information.* ***No individuals need be "wrong." The group's collective knowledge simply changes as it grows.***


many of the items found at the beach will be pounded by wind, waves, tides, and each other, and eventually will be ground into sand. Sand can be either biotic or abiotic, and is usually a combination of both.

10. In closing the activity, hold up the Key Concepts for this activity one at a time, and have one or more students read them aloud. Briefly discuss how these statements review the important ideas from today's activities. Post the concepts on the wall near your chart-paper record of evidence of plants, animals, and humans for students to revisit during the rest of the unit.

- **Objects found on the sandy beach can be grouped into: evidence of plant life, evidence of animal life, evidence of humans, and non-living material.**

- **Sand is made up of tiny bits of everything that is found on the beach.**



## *Session 3: Make a Mini-book*

A mini-book is an activity structure designed to help students organize and reconstruct new information and to guide their creativity. This activity also provides opportunities for students to use written language in meaningful ways and for the teacher to assess the writing skills and science knowledge of individual students.

1. Tell students that they get to become authors of a book about visiting a beach by making a mini-book with pictures and words. First they need to make the blank book. Pass out fine-point markers or crayons and either 11" x 17" paper or 8 $^1/_2$" x 11" paper and lead them through the directions on the appropriate Mini-book instruction sheet. (Please see pages 22 and 24.) There are instructions for simple and more complex versions, depending on your preference and your students' abilities.

2. Encourage students to write their book about what they have learned by creating text and illustrations on alternate pages. They can title their book, "My Beach Book." Chapter titles for each two-page spread can be as follows: Chapter 1: Plants and Animals; Chapter 2: People at the Beach; Chapter 3: The Best Thing About Beaches.

3. Provide students with time to write and draw pictures that are appropriate for each chapter.

*Younger students will need adult help with the 11" x 17" mini-book. The 8 $^1/_2$" x 11" mini-book is much simpler to make.*

4. When completed, give the students time to share their mini-books informally with their cooperative group.

5. After they've completed their mini-books, ask the students to think about two or three of the following questions and then hold a class discussion:

- How did you decide what to include in your book?
- Was there anything special you did to help you remember what you learned in this activity?
- Are you proud of your book? Could you improve it?
- Do you think this book will help you remember what you learned?
- Does your book reflect the most important things you learned?

*Mini-books should be written in whatever language students are most comfortable using, and the focus should be on content and creativity, not grammar and spelling.*

*Mini-books can be introduced and begun as a whole group activity and then completed during subsequent work sessions or whenever students have extra time. Consider letting students finish during your normal writing time. Mini-books are ideal assessment tools. Collect them, develop an evaluation or scoring system, and include them in student portfolios.*

## Going Further

1. Take a field trip to the beach (at a local seashore, stream, river, pond, or lake) and conduct a clean-up project. Have students explore the beach and sort what they find into the same categories used in this activity. Bring enough plastic garbage bags so every pair of students can have one. Divide the pairs into three collection groups: 1) unbroken glass and cans; 2) plastic; 3) paper and other miscellaneous trash. Students should wear gloves and be warned of picking up sharp or toxic items. If you're on an ocean beach, you could have all pairs line up from the water's edge to the dune area and sweep a half-mile section of beach. Remind students that they should collect only evidence of humans. Take all the debris they have collected and organize it into categories. Weigh or measure the volume of each. Discuss the differences between biodegradable and non-biodegradable, and recyclable and non-recyclable objects. Point out any collected items that are natural, rather than human-made, and ask students to return them so your impact on the ecosystem is minimized.

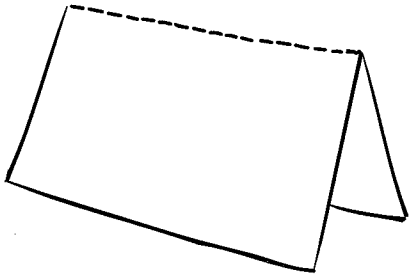
*The* MARE Teacher's Guide to Marine Science Field Trips: Central California *describes dozens of field trip sites and gives you invaluable guidelines on organizing and carrying out a customized field trip experience. Contact MARE at (510) 642-5008.*

2. As appropriate, research nearby beach and shoreline conservation projects, and seek out ways your class can become involved.

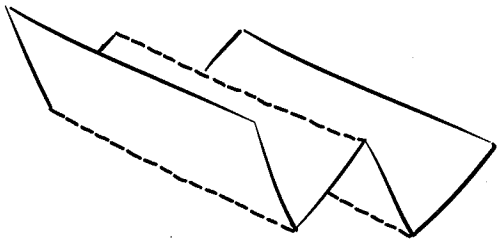
*For more information about the official Adopt-A-Beach program in California, contact the California Coastal Commission (415) 904-5206 or the Center for Marine Conservation (415) 391-6204. Similar programs may be in place in other regions.*

# Mini-book *(11" x 17")*

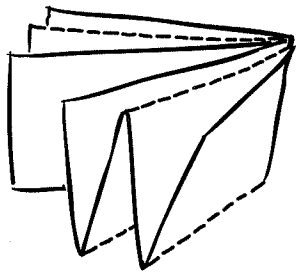
**1.** Fold the sheet in half crosswise.



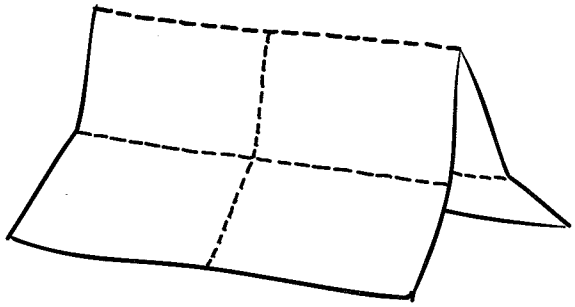
**2.** Fold up ends separately to form a "W" shape.



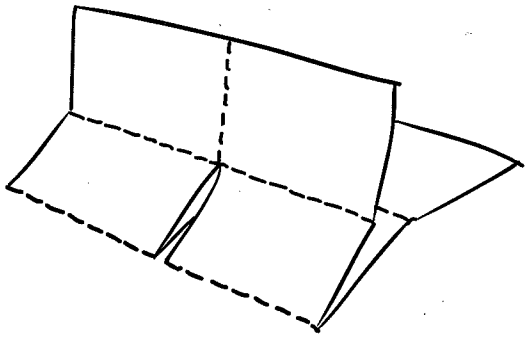
**3.** Fold the paper in half again to form a small rectangle. Then unfold this last fold, and fold it again back the opposite way, making good, hard creases on each side.



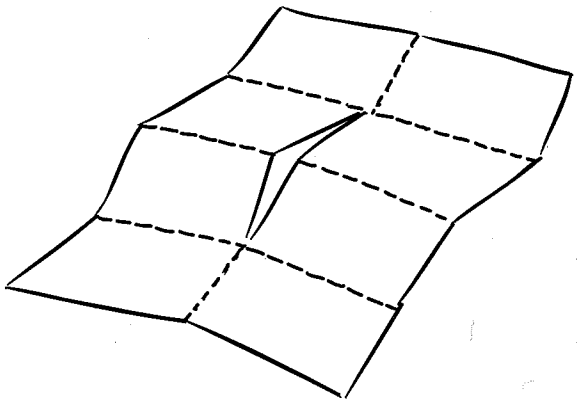
**4.** Unfold back to step #1, where the sheet is only folded in half.



**5.** Face the folded edge closest to you and cut along the middle fold through both sides to the center as seen in the diagram.



**6.** Unfold the sheet entirely.



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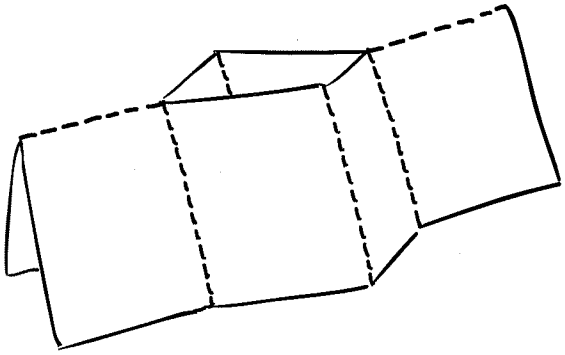
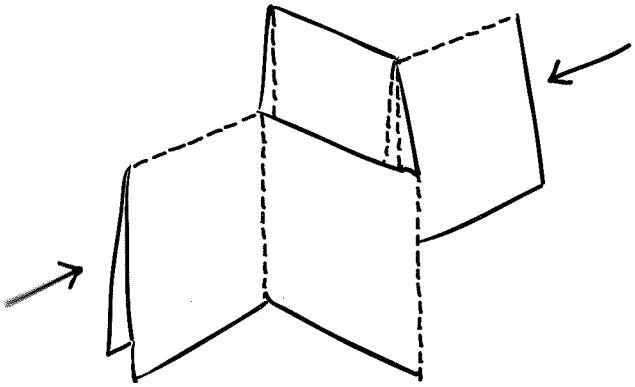
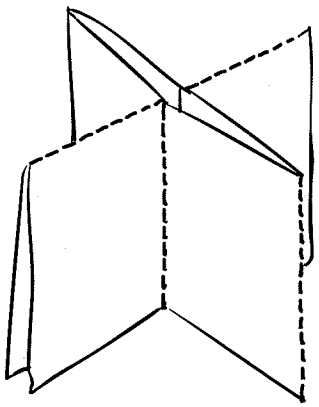
**7.** Refold the sheet in half, this time lengthwise.

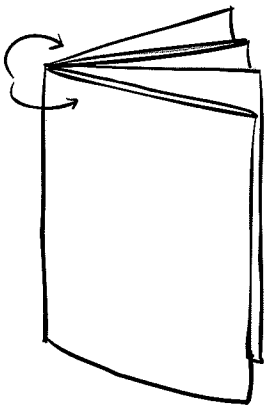


**8.** Grab the two outside panels and push inward. The part you cut with the scissors should open up and form a diamond.





**9.** Finally, fold all the pages together to form a small book. Make good, hard creases on all sides.



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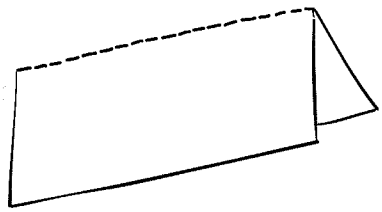
# Mini-book *(8 ½" x 11")*

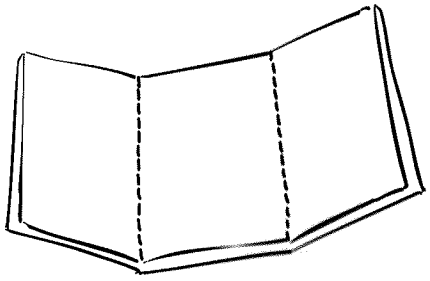
**Note: A simple template for folding and cutting this mini-book is on the next page. On the template, dotted lines show where to cut the paper and other lines show where to fold.**

Fold an 8 $^{1}/_{2}$" x 11" piece of plain paper in half lengthwise and then into thirds. Open it up so it is only folded in half lengthwise—with the fold on top. On the top half only, use scissors to cut along the two small folds, to form three flaps that open vertically. Then fold the right third to the center, and the left third on top of that. With the book folded shut and only the "cover" showing, have students write the title of their mini-book on the cover and illustrate it. Then have them open the cover (from right to left) and write their name as the author. Then turn the title page (from left to right) and label each of the three chapters or sections. As they flip up each of the three chapters they can use one panel inside to draw a picture and the other to write about what they've learned.

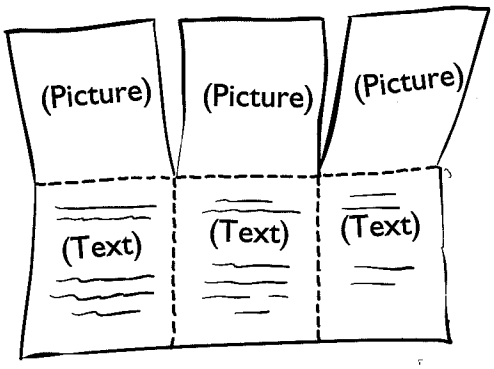
**1.** Fold in half lengthwise.



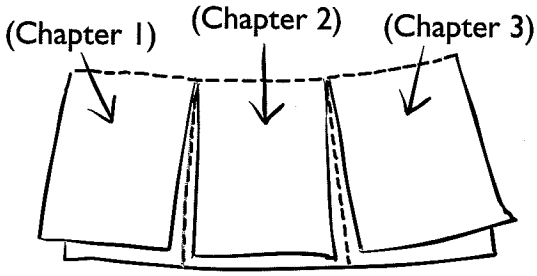
**2.** Then fold into thirds.



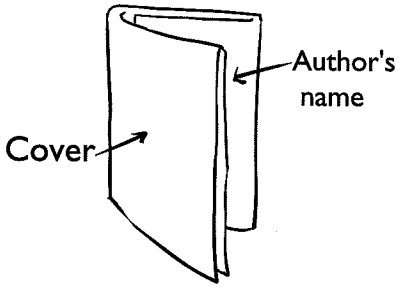
**3.** Cut only the top half into three sections.




**4.** It will now look like this.




**5.** Fold the right third to the center and the left third on top of that.

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# Mini-book (8 ½" x 11") Template