

Notes for Suitcase Oceanography Earth Materials Lesson
Lesson 2

What can we learn from the sediment record?

Note: Because there will be three simultaneous stations at each class, you will need three adults to help. The teacher can help at one station, but at least two people should come with the suitcase.

1. In advance:

Prepare the cups with layered sediments using different colored sand. Add water to 12-oz paper cups, and then carefully add colored sand to form two or three layers at the bottom of the cup. Each layer should be about 2-cm thick. You would need about 6 cups for a class of 30. Cut the straws in half and prepare small cups with playdough at the bottom for the students to set their straws in.

2. Introduction:

A. Hang wall charts in advance, queue films.

B. Set up stations.

Station 1. Booklet (from ooze to marble), hand size samples, tray to organize samples “in time”, magnifying glasses, “work” cards.

Station 2. Rock specimens, magnifying glasses, “work” cards”, booklet

Station 3. Coring with straws – Set up stations for 2-3 kids to work as partners. Each station should have a cafeteria tray, a cup with sediments, straws, small cups with play dough and colored pencils.

C. Review concepts. Ask students to:

1. Name one thing they can find in the bottom of the oceans and how did it get there. If you recovered this material back from the seafloor, how would it look?

2. What is the most common rock one finds in the bottom of the oceans, why?

D. Explain that they will be looking at some rocks, how are they different? What can we tell about their origin? They will also see some samples of rocks that change with time, and they will be doing some coring to learn how oceanographers collect sediments and learn from these the history of the Earth. Remind the students not to start touching the materials until their guide is there to help.

3. Collecting sediment samples

How do oceanographers know what is in the bottom of the ocean? Sometimes they go to the seafloor in submarines, but more commonly they collect samples from ships. Show coring movie. Explain that film shows scientists collecting sediments from a research ship, and explain that this is how oceanographers collect sediment samples.

4. Wall chart discussions

Show them the chart about input and review last week concepts. Show them examples of cores recovered by oceanographers from various parts of the ocean. Ask questions: What do these sediments mean? How are they different. Why are they different?

5. Stations

Explain to the students what will happen when they go to the stations, they will be working in groups of 10 (~1/3 of the class). Ask them to review their hand-outs and to not touch the materials until their teacher is at the table. Each activity should last no more than 15 minutes, and the children should change stations as a group.

Station 1. From ooze to marble: The idea of this activity is to teach the children that substances change through geologic time. The rocks will not be in any order at the beginning of the experiment, and it is the job of the students (with teachers' help) to figure out this progression. Divide the students into groups of two to three children. Each will be the "experts" on a given "material", and students will fill in observations on a work card (three things you can tell about it: color, hard/soft, can you see minerals/shells?) on that particular material. This should last about 5 minutes. Then invite the experts to talk about their materials following the progression in the timeline (see booklet) and put the rock in the tray on the appropriate order, with the complete work card for reference. Then allow the students in the group to fill in their own timeline worksheet. More notes on this station are available in the "hand-out" section of this lesson.

Station 2. Rocks and their origin: The idea of this activity is to teach the children to look for characteristics of different rocks and learn about the different origins. Remind them that they have learned about igneous, sedimentary, and metamorphic rocks. They will now see some examples of rocks that originated in the ocean. Hand out the work cards and each student (or subgroup of students) must fill in as many of the questions in their work cards as possible. Then go over the rocks with the help of the booklet and help answer any questions the students may have. You can point out similarities among igneous (black and hard), metamorphic (shiny and hard), and sedimentary rocks (soft). You can have the students arrange the rocks in groups to see their similarities and differences. More notes on this station are available in the "hand-out" section of this lesson.

Station 3. Coring with straws: The purpose of this study is to reinforce the concept of stratigraphy and sediment source learned in the previous lesson. Each student will collect material from the bottom of the cup and reconstruct the "history of sedimentation in their "model basin". You can ask the children before they begin whether they know what is at the bottom of their ocean, and how are they going to find out. Look at the worksheets, and ask them to "predict" what the sediments would look like. Remind them that because you have given them no information as to the location of this "ocean", it is not possible for them to guess, but they can take a sample to help them answer this question. Remind them that this is a model. Use white sand to represent animal shells, black sand to represent volcanic ash, and brown sand to represent clays delivered from rivers (refer them to the laminated chart on their trays). Tell the children that it is important not to move the cups, because this can disturb the sediments at the bottom. Demonstrate once again how to use the straw to sample, remind them to use their fingers at the top of the straw to avoid the sand spilling out after the sand is cored. Put the straw with the sand in the cups containing play dough, so that the sediments don't come out and they can make their observations. Ask them now to fill in the rest of the worksheet.

6. Recap

Bring the students together once again. Sitting in the floor in front of you would be fine and ask them to name three things they knew about the ocean that they did not know before. Thank them for their attention and ask them to fill in the assessment sheet as part of their homework (the teachers should collect these for you, and can mail them to COAS). Collect the assessment sheets for evaluation.