Sediment Sleuths

Grade Level: 7-8

Purpose: To identify the types of rocks and minerals found in various regions of the state.

Suggested Goals: Students will be able to identify common rocks and minerals that are found in a specific region of the state through the analysis of samples of sediments from local ponds, streams, or rivers.

Objectives: As a result of this lesson, students will be able to:

1. Classify sediments based on their physical characteristics, such as size, shape, and color.
2. Identify and describe rocks and minerals that are common to their region of the state.

Time Required: 2 - 3 class periods
Group Size: Individually or by working in teams of 2-3 students.

Background: The exposure of rocks to the forces of wind, rain, snow, and ice at the earth's surface breaks them down into smaller particles. The particles are transported by wind, water, and gravity and eventually deposited as sediments in or near streams and rivers. By analyzing the types of rocks found in sediment samples, students can identify the types of rocks and minerals available in their region of the state.

Materials/Preparation:
Samples of conglomerate (or other sedimentary rocks)
Classroom display set of Illinois rocks and minerals [Kit available from the Illinois State Geological Survey.]
Rock and mineral identification books
Access to ISM Geology Online and other geology sites
Copies of Sediment Sleuth worksheets (printed on card stock, if possible)
White glue (Elmer's or similar brand)

For each group:
1 sample of sediment obtained from local streams or rivers (use the small snack-sized Ziploc bags or small plastic cups and label with location)
Egg cartons (or 10-12 small plastic cups) for each group
Toothpicks
Tweezers
Hand lenses
Magnets

NOTE: If the students are familiar with the acid test to identify a carbonate, you may also provide vinegar (or weak HCl acid) and safety goggles.

Skills: Students will need to be able to sort objects by developing a method of classification. Students will also need to be able to use identification guides or online resources.

Procedure:

1. Ask the students to use a hand lens to examine the conglomerate. Create a list of observations on the chalkboard. Students should be able to observe that the sample consists of small pebbles of different sizes, colors, and textures. Point out that the pebbles are sediments that have been cemented together.
2. Ask the question, "Where do sediments come from?" Students should be able to demonstrate a basic understanding of the process of weathering and erosion as outlined in the background section. If your students do not have an understanding of the process, provide additional activities exploring weathering and erosion before attempting this lab.
3. Distribute the samples of sediments (sand, soil, and pebbles) and other materials for the lab. Explain that the sediment samples were obtained from local streams and rivers. If possible, have the students bring in their own samples and use a permanent marker to label the location of each sample.
4. Instruct the students to use the egg carton (or small cups) to sort their sediment samples into categories based on color, shape, and other physical characteristics using the equipment provided. Students should have at least one full class period for sorting the sediment samples.
5. After the students have sorted the samples, challenge them to identify the pebbles by comparing the pieces in each group to the sample rocks available in a classroom display set, the ISM Geology Online collection, or an identification guide.
6. Once all the rocks have been identified, provide glue to adhere the samples to the Sediment Sleuths worksheet. Each type of sediment should be glued in the center of a magnifying glass. The students should also glue a representative sample of the sediment in the *My Sediments* box and indicate the location where the sample was obtained.
7. Allow time for the students to research each type of rock or mineral and complete the name and description sections on the worksheet. Descriptions may include physical characteristics, mineral composition, classification, and common uses.

Extensions:

1. Contact teachers in other regions of the state and ask that they have their students do the Sediment Sleuth investigation. Through the use of e-mail or other communication tools, allow the students to discuss the results of their investigations. If this is not possible, request a sample of sediment from the school and allow time for your students to do the lab again. Mark the locations of the schools on a map and challenge your students to create a summary report of the rocks and minerals for a specific region. Students can also use Excel to create spreadsheets and graphs for the summary report.
2. Have the students research the rock cycle as well as the geologic history of the

state using geologic maps, online resources, and other reference materials. Challenge the students to create a story, cartoon, or poster about the history of the sediments in the sample and their journey through the rock cycle.

3. Create sediment bottles with the leftover sediment samples to explore the *birth* of sedimentary rocks. Have each student bring in one clear plastic bottle (1 liter or smaller) and provide samples of sediments containing pebbles, sand, and soil. Allow the students to choose their own mixture ratio, but caution them not to fill the bottle more than halfway with sediments. You can also add two to three tablespoons of Epsom salt to the mixture to help the sediments cement together. Let the students observe the bottles for 10-15 minutes and make a list of all their observations as they move the bottle around. After time is up, discuss the observations and relate to the process of sedimentary rock formation. Throughout the next few weeks, have students record their observations of the sediments in the bottles. This activity may also be used during a unit on weathering and erosion.

Assessment: Assessment for this activity should be based on the student's ability to sort the sediments into various categories and identify the rocks based on the resources available. The Sediment Sleuths worksheet may be used as a tool to determine if the lesson objectives have been met.

Print Resources:
Educational Series 5: Guide to Rocks and Minerals of Illinois
Published by the Illinois State Geological Survey, 1971

Eyewitness Handbooks: Rocks and Minerals
By Chris Pellant, ISBN# 1-56458-033-4

Golden Guide: Rocks and Minerals
ISBN #0-307-24499-7

Web Resources:
ISM Geology Online GeoGallery
http://geologyonline.museum.state.il.us/geogallery

The Science Spot: Earth Science Links for Kids
http://sciencespot.net/Pages/kdzethsci3.html

Setting: Classroom and computer lab with Internet access

State Science Standards:
12.E.3a : Analyze and explain large-scale dynamic forces, events and processes that affect the Earth's land, water and atmospheric systems.
12.E.3b: Describe interactions between solid earth, oceans, atmosphere and organisms that have resulted in ongoing changes of Earth.

Sediment Sleuths

Name _____

Name _____
Description:

Name _____
Description:

Name _____
Description:

Name _____
Description:

My Sediment

Location: _____

Name _____
Description:

Name _____
Description:

Name _____
Description:

Name _____
Description:

Simply Sediments

Name _____

Part 1: Create a sediment bottle!

1. Use a plastic bottle (1 liter or smaller) and sediments from your community to create a sediment bottle. Don't fill the bottle more than halfway full with sediments. What types of sediments did you find?

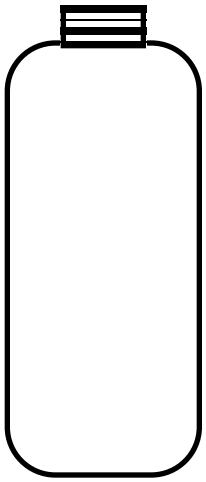
2. Add water to fill up the bottle to within one inch of the cap. Screw on the cap tightly! Use a permanent marker to write your name on the cap.

3. Shake and observe! Describe your observations in the space below.

Part 2: Experiment!

4. After your sediment bottle has been allowed to stand undisturbed overnight, what do you observe?

(a) Draw and label what you see on the diagram of the sediment bottle.



(b) Describe your observations.

(c) Predict what will happen after your sediment bottle is allowed to sit undisturbed for one week.

5. Which types of sediments float? Which ones move along the bottom?

6. If you were to continue moving the bottle for a long time, what would happen to the large sediments?

7. Would you find fossils in sedimentary rocks? Why or why not?