

“SANDS” OF TIME

STANDARDS

See summary of National Science Education Standards.

Original: <http://books.nap.edu/readingroom/books/nses/>

Standard concept	General Standard	Specific Standard	General Standard	Specific Standard	General Standard	Specific Standard
Grade Level		K-4		5-8		9-12
Science as inquiry (A)	Abilities ... to do ... inquiry	A.1.4.1	Abilities ... to do ... inquiry	A.1.8.1	Abilities ... to do ... inquiry	
		A.1.4.2		A.1.8.2		
		A.1.4.3		A.1.8.3		
		A.1.4.4		A.1.8.4		
		A.1.4.5		A.1.8.6		
		A.1.4.6		A.1.8.8		
	Understandings about ... inquiry	A.2.4.2	Understandings about ... inquiry	A.2.8.1	Understandings about ... inquiry	A.2.12.2
				A.2.8.3		A.2.12.5
Earth and Space Science (D)	Properties of Earth materials	D.1.4.1	Structure of Earth system	D.1.8.3		



“SANDS” OF TIME

INTRODUCTION

Sedimentary layers are deposited according to the “Law of Superposition,” with the oldest sediments/rocks on the bottom and the youngest on the top.

OBJECTIVE

Students will model the “Law of Superposition” in which the oldest sediments/rocks are on the bottom, youngest on top. The activity can stand alone as a demonstration for lower primary grades incorporating art, science and math skills. At upper elementary level it can accompany a study unit on rocks and earth science. The model can be made in small groups, each group using and sharing five or six different colors of chalk and salt, but each student should have his/her own vial to take home.

MATERIALS REQUIRED:

- Plastic teaspoons
- Salt (enough to fill all vials)
- Brightly colored chalk
- Small (7-12 dram) clear plastic vials with tightly fitting caps for each student
- 1 Paper plate per student (flexible)
- Paper and Pencils
- Small ruler with metric units

PROCEDURE

- 1) Hand out a plate, spoon, vial, pencil and paper to students as you introduce the activity.
- 2) Describe how the students will “deposit” layers of different colored “sandstone” in a container.
 - a) Show the students a finished one as an example.
- 3) To color a SMALL amount of salt (measure out between 1 and 2 teaspoons at a time) rub a stick of colored chalk around in the salt on the paper plate.
 - a) Pour some of the colored salt carefully into the vial.
 - b) Repeat procedure for each color and pour carefully into the vial.
 - c) Students can make as many different colored layers in their vial as they want, pouring each layer carefully into the vial without mixing it with previous layers.
 - d) Layers do not have to be flat, they may be wider, uneven (hills) or however the students’ imaginations may want.
 - e) Each layer should remain relatively undisturbed and unmixed with other layers once deposited.
- 4) For students who can tell time, the students should write down on their papers the time they deposit each colored layer or they can make a chart of color and time.
 - a) If students cannot tell time you can help them record the time as they color the chart.
 - b) Younger students can number their deposits on the paper (1 - red, etc).



- 5) Remind students that record keeping, no matter how simple, is important and very critical to learning scientific procedures.
- 6) Once the students have completely filled their vials, they should carefully put the caps on, without disrupting the contents.
- 7) If vials are full, the cap will hold contents in place without mixing layers.
- 8) The resulting “3-D sand paintings” are attractive art projects to take home, but continue the activity with a discussion of relative “age” of the sand layers.
 - a) Students can note which is the youngest and which is the oldest in their creation.

EVALUATION FOR UPPER ELEMENTARY ROCK STUDY UNIT:

- Relate the “Sands of Time” to layered rocks or sediments the students might see in the field or if possible dig a small trench in the school yard or visit a road cut to relate the oldest to youngest sedimentary layers of rocks.
- Ask the students when this relationship of the oldest rocks being on the bottom might not be true.
 - (When a disturbance has turned them upside down).
 - Have the students turn their vials upside down.
 - ◆ What type of disturbance could have caused the layers to be inverted?
 - Earthquakes, landslides, caving along riverbanks, man-caused events are some answers but students may know of other causes.
 - Discuss sedimentation rates in nature.
 - ◆ If a particular rate were one hundred years per millimeter, how long would it have taken each layer to form?
 - Make sure these lengths of time are recorded.
 - ◆ What type of situations in nature could cause large amounts of sediment to be deposited at once (over a short period of time)? (Mudslides, floods are two examples).

Teachers Note:

- Clear plastic vials (7-12 dram) can usually be purchased in lots of 100 for less than \$10 from mining supply companies, laboratory suppliers, or chemical supply companies.

OPTIONS

- Have upper elementary students research what minerals are used in chalk, to make colors, or to manufacture paper or plastic. Remind the students that salt is also a mineral that has to be mined.

