Lesley University School of Education
Activity Plan

Activity 1

This unit is taken from FOSS Landforms.

Brief Description of Group to be Taught: This unit will be taught to two classes of about 20 seventh grade students. Each group has a wide range of ability levels and a few children with IEP's.

Relationship of this Lesson to the unit: This unit will transition from the unit on rocks and minerals, where they learned about types of rocks and how they are formed. Then the driving question of how the Grand Canyon formed will introduce the unit on erosion and deposition. This lesson will focus on erosion and will lead into a lesson on deposition.

Massachusetts Frameworks Strand and Learning Standard: Describe and give examples of ways in which the earth's surface is built up and torn down by natural processes, including deposition of sediments, rock formation, erosion, and weathering.

Concepts:
- Particles of soil are carried (away) by a flow of water. (soil erosion)

Processes:
- Building a model.

Science Habit of Mind:
- Be curious.

Other Subject Area Objectives:
- Literature connected by short reading on people in the Grand Canyon. This reading is parallel from the English teacher. It will help her introduce her non-fiction section.

Session Length: This lesson will last for two 50-minute periods.

Materials Needed: (Per group of 4)

- ❑ Tray with a mixture of sand, clay and small pebbles
- ❑ Water source- 3-4 cup plastic cup with small hole cut in the bottom
- ❑ Ruler, 30-cm
- ❑ 1 L container
- ❑ 1 Basin- at least 18 inches by 18 inches
- ❑ 2 Hand lenses
- ❑ 2 rolls of duct tape cut into 5 inch pieces
- ❑ Paper towels
- ❑ Newspaper
- ❑ Dustpan and broom
- ❑ Grand Canyon poster
- ❑ Standard Stream Table Setup Poster
- ❑ Landform Vocabulary poster

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	PROCEDURE	NOTES
25 minutes	●Introduce the Grand Canyon by showing clip National Geographic film. Choose a film that shows many arial shots of the canyon at many angles, without a lot of dialogue over it.	
20 minutes	●Explain that students are going to become earth scientists to study a model of the landform. ●Discuss how they think the Grand Canyon formed. Once some theories have been formed by the students. Ask them how they would test these theories. ●Once they begin talking about models, show them the supplies available for the stream table. Ask them what the sand represents, the liter of water, the set-up of the water source. Ask them how the set-up is like nature. Make sure they understand the connection between the model and nature. ●As a class detail how we will set up our stream table following the instructions on the poster and other suggestions from the class. Write everything down on chart paper, to go over during the next class period. ●Discuss the Colorado Plateau and how the liter of water used represents the Colorado River. Have water worn rocks available if questions arise of how water can wear down rocks. ●Tell students that tomorrow they will investigate their ideas using this set-up. Divide students into groups of 4 and assign roles for the next class.	
	End of 1st class…….Into 2nd class	
25 minutes	● Go over the information for set up on the chart board from yesterday. Have students begin the set-up. Make sure all tables are set-up correctly before they begin. ●Remind students that they will only run 1L of water through the system and they should not touch or shake the tray once they start. ●Have groups begin to run the water through the tables. As groups on working, walk around room and monitor each group's progress. Ask students what they are seeing and what they think is happening. Ask them connections to real phenomenon. Encourage students to take notes and draw diagrams of what they are seeing. ●Have students drain tables and set it up again. Have them make predictions about what will happen this time. Have students run the stream table the same way again. Make sure they note the changes from the first time. ●Have students drain stream tables when done and clean up.	Remind students of roles for groups. Refer to set-up poster if necessary
15 minutes	●Come back together as a class and have reporter's state one or two observation their group made. Write these observations down on chart paper for future reference during the unit. ●After discussing these new concepts with the class and seeing that they grasp the concept of erosion, introduce the term to them. Ask them about the stream table and the Grand canyon. Ask them to discuss the similarities and differences between the model and the real thing. ●Go back to their observations that we have written down. Introduce new terms for the things they are describing: Canyon and Plateau.	Begin vocabulary list on wall for unit.

	Homework: Read science story *Real People in the Grand Canyon?* Have students write in their journal about their experiences during class today.	

	Novice	Competent	Expert
Process Skill	Not making any connection between the set-up and real phenomenon.	Making connections between the set-up and real phenomenon.	Understanding what is realistic about the model and what is not.
Habit of Mind	Not really caring at all about the experiment	Being curious as to how the water flows.	Asking engaging question about why certain things happen.
Concept	Water on the land moves pieces of the soil.	When water flows over land it carries pieces of soil with it. Some areas are moved easier than others and it therefore doesn't go straight.	When water flows over land it carries pieces of soil with it. Smaller pieces are carried longer in the water and smaller particles drop out earlier.

Activity 2

This unit is taken from FOSS Landforms.

Brief Description of Group to be Taught: This unit will be taught to two classes of about 20 seventh grade students. Each group has a wide range of ability levels and a few children with IEP's.

Relationship of this Lesson to the unit: This lesson will build off what the students have learned about erosion. We will cover the concepts of deposition during this activity. The following activity will focus on the concept of slope and how it effects erosion and deposition.

Massachusetts Frameworks Strand and Learning Standard: Describe and give examples of ways in which the earth's surface is built up and torn down by natural processes, including deposition of sediments, rock formation, erosion, and weathering.

Concepts:
- Pieces of soil are carried by water and dropped farther down the stream.

Processes:
- Making observations.

Science Habit of Mind:
- Ask questions.

Other Subject Area Objectives:
- Literature.

Session Length: This lesson will last for two 50-minute class periods.

Materials Needed: (Per group of 4)
- ❑ Tray with a mixture of sand, clay and small pebbles

- ❑ Water source- 3-4 cup plastic cup with small hole cut in the bottom
- ❑ Ruler, 30-cm
- ❑ 1 L container
- ❑ 1 Basin- at least 18 inches by 18 inches
- ❑ 2 Hand lenses
- ❑ 2 rolls of duct tape cut into 5 inch pieces
- ❑ Paper towels
- ❑ Newspaper
- ❑ Dustpan and broom
- ❑ 50 ml vials with cap (1 for each group)
- ❑ Cotton swabs
- ❑ Food coloring
- ❑ Grand Canyon poster
- ❑ Standard Stream Table Setup Poster
- ❑ Landform Vocabulary poster

	PROCEDURE	NOTES
5 minutes	●Ask students if the water on the stream tables flowed the same way each time yesterday. Encourage them to run the stream tables again, but really observe the path of the river and how it changes. Also, encourage them to watch the movement of the earth material.	Changing of observations
15 minutes	●Have the Getters get the materials and make sure the trays are set-up correctly in each group. ●When the groups are set-up, have the Starter's pour the water into the water source and have the group observe what happens observe what happens to the water that flows into the basin in the model. Walk around and ask students what they are seeing. Have them describe the path of the water and why they think it changes. Ask them where the earth material goes. Does it all go to the same place? ●As a class discuss the observations by asking the Reporters to list a few things they saw. Write these observations on a piece of chart paper. ●Remind students that the earth material was a mixture of sand clay. Ask, "Where did most of the eroded earth material end up?" As the concept becomes clear to them introduce the term deposition. ● Introduce vocabulary words as they are introduced as concepts by the students: floodplain, delta, drainage basin, sediment.	Vocabulary table
10 minutes	●Ask students why the sand and clay were deposited in different places. ●Ask students how they could observe how sediments settle out of water at different speeds and show them the vials. Decide on a protocol for this experiment using vials water and earth materials. ●Have the Getters get a vial and let the students conduct their experiment.	Let the students design the experiment
15 minutes	●Have reporters present what their groups observed. Write down observations on chart paper. ●Ask, "Why do you think the sand was deposited on the bottom and the clay on the top?"	

	and "Where does the water slow down first on the stream table? How do you know?" ●Have students consider what would happen if gravel was added to the earth material. ●Discuss the stream table. Ask, "How does the result of the shake test explain why the sand and clay were deposited in different places on the stream table?" Ask, "Where did the material that was once in the Grand Canyon go?" Write down any and all important hypothesis that they have formed for future reference as a class. ●Clean up. Allow students to keep vials if interested to see how the earth material will continue to settle out. ●Use last 5 minutes to have students write in journals about their observations and ideas of erosion and deposition. If not enough time have them do it at home.	
	Homework: Handout from FOSS- asks students to give explanations for how a fan of sand ended up on the sidewalk.	
	End of 1st class…….Into 2nd class	
5 minutes	●Ask, "When the water ran through the stream table yesterday, what did you notice about how the water traveled over the earth material?" ●Ask students if there is some way we can watch the water better. Show them food coloring if they don't think of it.	Focus on the student responses that water didn't always travel in the same course.
25 minutes	●Demonstrate how to add a small amount of food coloring to the water source. ●Distribute food coloring in plastic cups to all groups and instruct them to carefully observe the path the water takes and to come up with some explanations for why its path may have changed. Encourage them to draw diagrams. ●Discuss the observations. Have students describe the water's speed, direction and final destination. ●Introduce vocabulary as these concepts come up and write it on chart paper: Channel and meander. Ask, "Why did the water move back and forth in the channel?" ●Ask, "Do you as earth scientists do you agree with geologists that the Colorado River created the Grand Canyon?"	Vocabulary table Encourage good class discussion
15 minutes	●Clean up. ●Have students record their observations and feelings in their journal and collect to look over tonight. ●Have students bring out their homework from last night and discuss as a class how they all believe the fan of sand ended up on the sidewalk.	Encourage students to use their new vocabulary words
	Homework: Read science story: *Rivers and controlling the flow*	

	Novice	Competent	Expert
Process Skill	Not paying attention to the stream table	Watching the stream table for the entire water flow and taking notes and/or drawing diagrams.	Watching the table for the entire water flow and taking notice of the events that occur with detailed notes and diagrams.
Habit of Mind	Not involved in the experiment.	Involved in the experiment and asking questions to teacher or each other about set-up and what is occurring on the table.	Involved in the experiment and asking and answering questions about what is occurring on the table.
Concept	Soil moves after the water flows.	Pieces of soil are carried by water and dropped farther down the stream	Larger pieces of soil come out of the water earlier than finer pieces.

Activity 3

This unit is taken from FOSS Landforms.

Brief Description of Group to be Taught: This unit will be taught to two classes of about 20 seventh grade students. Each group has a wide range of ability levels and a few children with IEP's.

Relationship of this Lesson to the unit: This lesson will build off what the students have learned about erosion and deposition We will cover the concepts of slope and its effect on erosion during this activity. The following activity will focus on how floods have an effect on erosion as well.

Massachusetts Frameworks Strand and Learning Standard: Describe and give examples of ways in which the earth's surface is built up and torn down by natural processes, including deposition of sediments, rock formation, erosion, and weathering.

Concepts:
- When land is at a slope water will run down it faster and more erosion will occur.

Processes:
- Communicating with their group members.

Science Habit of Mind:
- Keeping records of their observations.

Other Subject Area Objectives:
- Literature.

Session Length: This lesson will last for one 50-minute class period

Materials Needed: (Per group of 4)
- ❑ Tray with a mixture of sand, clay and small pebbles
- ❑ Water source- 3-4 cup plastic cup with small hole cut in the bottom
- ❑ Ruler, 30-cm

- ❑ 1 L container
- ❑ 1 Basin- at least 18 inches by 18 inches
- ❑ 2 Hand lenses
- ❑ 2 rolls of duct tape cut into 5 inch pieces
- ❑ Paper towels
- ❑ Newspaper
- ❑ Dustpan and broom
- ❑ Clock with second hand
- ❑ Grand Canyon poster
- ❑ Standard Stream Table Setup Poster
- ❑ Landform Vocabulary poster

	PROCEDURE	NOTES
10 minutes	●Discuss the Grand Canyon again and look at the poster. Explain that one idea that geologists have for its formation is that the slope of the Colorado Plateau became steeper and caused the canyon to erode faster. ●Ask students how they could use their stream tables to find out if the slope of the land makes a difference in how fast the land erodes. ●As a class make up a protocol for how to investigate this. Discuss the set-up. Students will need to run the stream tables 2 times. Once as before and once at an angle. Students will use a stop watch and record times when specific things happened	If they don't suggest it, recommend using a wood angle to prop up the water-source end of the table.
15 minutes	●Get materials and set-up ●Have all groups start at the same time and walk around as they record their observations. Make sure they are using the stop watches and recording what is happening when.	Make note of how students are observing the tables.
10 minutes	●Ask students to compare their slope and standard results Ask, "What was the first event you observed?" "When did water start flowing through the downstream?" "Did a delta form in the stream table? When?" "What similarities and differences did you notice between the slope and standard stream investigations?" ●Record observations on chart paper. ●Make sure to encourage the students to use the correct vocabulary when discussing these events.	Encourage the students to ask their own questions, but lead with questions if they are struggling.
10 minutes	●Introduce the stream-table map. Explain that students will fill one out, making sure the label the investigation either slope or standard. Maps should have both the drawing of the final results and the written sequence of events. ●Review map making skills: key, measurements, labels. ●Have students work on their maps if time. ●Clean up	Make sure students are understanding what they are doing with the maps. Should be

	●Hand back journals with comments.	reinforcement for the concepts we are learning.
	Homework: Finish maps Journal entry	

	Novice	Competent	Expert
Process Skill	Not speaking with group members at all.	Discussing their observations regularly with their group members.	Discussing and encouraging all group members to engage in the discussion equally.
Habit of Mind	Not recording any observations.	Recording the majority of observations with times.	Recording all their observations and writing detailed records of these.
Concept	The land tilts so that water will run off more.	When the land is at a slope it makes more erosion occur.	The greater the slope of the land the more erosion will occur on the land.

Activity 4

This unit is taken from FOSS Landforms.

Brief Description of Group to be Taught: This unit will be taught to two classes of about 20 seventh grade students. Each group has a wide range of ability levels and a few children with IEP's.

Relationship of this Lesson to the unit: This lesson will show students how erosion is also effected by the amount of water passing over the land (floods). This will build off what the students have learned about slope in the previous lessons. From here we will learn about wind erosion.

Massachusetts Frameworks Strand and Learning Standard: Describe and give examples of ways in which the earth's surface is built up and torn down by natural processes, including deposition of sediments, rock formation, erosion, and weathering.

Concepts:
- When larger amounts of water flow over the earth more erosion will occur.

Processes:
- Identifying and controlling variables.

Science Habit of Mind:
- Asking questions.

Session Length: This lesson will last for one 50-minute class period

Materials Needed: (Per group of 4)
- ❑ Tray with a mixture of sand, clay and small pebbles
- ❑ Water source- 3-4 cup plastic cup with small hole cut in the bottom
- ❑ Ruler, 30-cm
- ❑ 1 L container
- ❑ 1 Basin- at least 18 inches by 18 inches
- ❑ 2 Hand lenses

- ❑ 2 rolls of duct tape cut into 5 inch pieces
- ❑ Paper towels
- ❑ Newspaper
- ❑ Dustpan and broom
- ❑ Grand Canyon poster
- ❑ Standard Stream Table Setup Poster
- ❑ Landform Vocabulary poster

	PROCEDURE	NOTES
10 minutes	●Tell students that sometimes great storms near the Grand Canyon send huge amounts of water down the side canyons. Introduce the concept of flash floods and suggest students investigate them. ●Ask for suggestions on how to investigate them. If necessary bring out the flood water source and show them the larger hole in it. Have the class determine a procedure for conducting the investigation.	Make sure that students design the experiment on their own.
15 minutes	●Get materials, set-up, and begin the investigation ●Have Getters get a stream table map for all group members and have them complete their flood maps.	Ensure students are using their flood maps correctly.
15 minutes	●Share and compare map results as a class. Write observations down on chart paper. Ask, "What might happen in the Grand Canyon when there is a flash flood?" "What might make water flowing through a stream channel slow down?" "What do you think happens to flood waters when they reach another body of water like a lake?" "Where did you see that happen on your stream table?" ●Help students draw conclusions that fast-moving water(slope) erode faster than slower moving water (standard) and large quantities of water(flood) erode more earth than smaller quantities. Ask, "How were the results of the flood and slope investigations similar and how were they different?" "What would you expect to see where the slope changes?" ●Discuss velocity and why slower moving rivers move faster when they near their mouths ●Clean up ●Journaling if time (otherwise send assign it for homework).	
	Homework: Create a concept map about how the flow of water effects the land it is moving over. Remember to go over concept maps with the class. Tell students they will be assessed on the depth and creativity of their concept maps.	

	Novice	Competent	Expert
Process Skill	Not attempting to keep their tables the same with each experiment at all.	Understanding the importance of holding the variables of the table constant in order to	Understanding the importance of holding all variables constant, but also

		observe effects of something.	understanding that there is no way to make the stream table exactly the same each time.
Habit of Mind	Not involved in the experiment.	Involved in the experiment and asking questions to teacher or each other about set-up and what is occurring on the table.	Involved in the experiment and asking and answering questions about what is occurring on the table.
Concept	Not recognizing the increased erosion caused by our flood.	Observing and commenting on the flood causing increased soil erosion.	Understanding the direct relationship between increased water flow and increased erosion.

♦♦♦If I had time I would a use a flow rate sensor probe from PASCO for this activity. This way we could alter the flow rate of the water to see how it effected the amount of erosion in our stream table.