WEEK 3 Lesson 2

Science and Engineering: Earth's Systems

The Forces of Water on Land

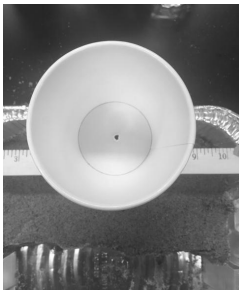
Note: This lesson requires significant set up.

S & E **Big Ideas**	Wind and water can change the shape of the land. Changes happen over time.
S & E **Guiding Question**	What resources can we use to understand changes in the shape of the land?
Content Objectives	I can conduct an investigation to model and observe water's effects on land. (Practice 2, Science 2-ESS2-4(MA)) I can write and draw what I observed during an investigation about the force of water on Earth's materials. (Practice 4, 2-ESS2-2) I can draw and write about the effects of water on land, based on my observations. (W.3.2)
Language Objective	I can discuss my observations with my peers while we conduct an investigation by listening and adding onto what they say. (LS.2.1b)
Vocabulary	**plateau**: a raised landform with a flat surface on top **stream table**: a tray or table use to model the way water flows like a stream
Materials and Preparation	Before the lesson, assign children to groups of four to five. ● stream table, one for each group Prepare one stream table for each group according to the directions below. If the schedule allows, a few children might be asked to help set up before the lesson. For additional help with setup, watch the Stream Table setup video. Stream Table Preparation **Materials:** ● 2 aluminum foil trays

- screwdriver to poke holes
- 3 cups of sand
- spray bottle with water
- plastic spoon to mix the sand
- 12 inch ruler
- duct or packaging tape
- 8 oz paper cup

Steps:

1. Turn one aluminum tray over. Poke a hole where one short side of the tray meets the bottom, in the center.
2. Turn the tray back over.
3. Pour sand into the tray.
4. Spray the sand with water, and mix it until it is evenly moist but not soggy.
5. Pack the sand to cover one third of the tray at the end opposite the hole, forming a plateau about 1½ - 2 inches high. Make sure the sand is well packed and flat on top.
6. Place the ruler across the tray, above the sand, 1½ inches from the edge of the tray.
7. Tape the ruler to the tray on both ends.
8. Use the screwdriver to poke a **small** hole in the bottom of the cup.
9. Place the cup on the ruler so the hole sits between the ruler and the edge of the tray.
10. Place the second tray on a chair or other surface below the hole in the stream table to catch water.



	● 16 oz bottle or other container filled with water, one for each group ● Grand Canyon and Popham Beach slides ● projector and screen ● writing tools ● Science and Engineering packets During this lesson, one child in each group will be the recorder. Identify a recorder for each group and gather those children's packets. This and other stream table investigations may be conducted outdoors to reduce mess.
Opening 10 minutes	Show slide 2: Colorado River. *We have been looking carefully at landforms and bodies of water around the world. When we started this study, we looked at Horseshoe Bend in the Colorado River. Here is the river from a different view. How do you think these shapes were formed?* Harvest several children's ideas. Show slide 3: Popham Beach. *Here is another place we've been discussing: Popham Beach. How do you think this land was formed?* Summarize children's ideas. For example: *Some of you think that water or wind changed and formed these areas. Let's try to understand how that happened. We will do an investigation using sand and water to model in a short time what happens in real life over many, many years.* *Scientists record detailed observations of what happens during their investigations. As you work in your groups today, one person will be the recorder. Recorders, you'll record your group's findings on this page* [show page]. Distribute packets to children who will record the group's investigation. Other children will take roles in conducting the investigation: placing the cup, pouring the water, and narrating the group's observations for the recorder. Identify children for each role, or allow this to happen organically in the groups. *The materials you need are at your tables. When you get to your table, look at the materials, but please wait for directions before touching them so you know exactly what to do. Are we ready?*

	Send children to their tables.
Investigation 20 minutes	Give directions to the whole group simultaneously for preparing and conducting the investigation; use the steps below and pace directions according to children's activity. 1. Set up *Place the stream table (the tray with the hole) on the desk, with the hole hanging over the side of the desk. Set the tray without a hole on a chair underneath the hole in the stream table.* Note: If the side of the stream table with the sand is lower than the other end, prop it up with a book. 2. Record *If you are the recorder, sketch a map of the sand in the stream table. You can pretend that it is a plateau.* 3. Predict *Turn and talk to your group. What might happen when the water falls on the sand? Recorder, write your prediction in your packet.* 4. Investigate *If you are in charge of the cup, place it in the middle of the ruler. Make sure the hole is not blocked.* *If you are in charge of the water, slowly pour it into the cup until it is full. When the cup is empty, fill it again with the remaining water.* 5. Observe and talk *As the water flows, observe and talk with your group about what is happening.* 6. Talk *After all of the water has been poured, talk about your observations.* 7. Record *Record your observations. Sketch a map of the sand now. Label any landforms you recognize.* 8. Clean up *When you finish, label your stream table with your names. Leave the sand in place and put the stream table* [in the designated area]. *Then, clean up the rest of the materials.*

	As the children work and between each step of the investigation, circulate to support them. Direct their attention to the landforms being formed by the water, and encourage them to use specific vocabulary to name what happens.
Discussion	*Discussion about this experience will happen in Week 4.*
Closing	Note: Stream tables should be kept intact for use in the Discovery Studio. They will be used again in Week 4 lessons, with topsoil in place of sand. Cups and lower trays can be put away. *Before you set your trays aside, take a moment to reflect on the investigation. Ask each other the questions on the bottom of the page:* ● *Did we use our five senses to gather information about an object or something that happened?* ● *Did we draw or write what we thought or observed?* *Today you investigated with water and sand to observe how erosion works in real life to shape landforms. You can continue this work in the Discovery Studio!*
Standards and Practices	**W.3.2** Use a combination of drawing and writing to communicate a topic with a beginning, middle (including details) , and an end. **2-ESS2-2.** Map the shapes and types of landforms and bodies of water in an area. Clarification Statements: • Examples of types of landforms can include hills, valleys, riverbanks, and dunes. • Examples of water bodies can include streams, ponds, bays, and rivers. • Quantitative scaling in models or contour mapping is not expected. **2-ESS2-4(MA).** Observe how blowing wind and flowing water can move Earth materials from one place to another and change the shape of a landform. Clarification Statement: • Examples of types of landforms can include hills, valleys, riverbanks, and dunes. **Practice 2.** Developing and using models **Practice 4.** Analyzing Data & Interpreting Data
Ongoing assessment	Observe and take notes as the children conduct the investigation. Do children recognize various landforms as they form in the stream table? Do they sketch their maps with care and accuracy? Do they record their observations? Review the children's packet entries in preparation for upcoming lessons.