

SciTech Activities: Stream Table Challenge

Time: 4 hours (broken down into 4-1 hour classes)

Standards:

4th Grade Science Content Standards:

ES5a. Students know some changes in the earth are due to slow processes, such as erosion, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

ES5c. Students know moving water erodes landforms, reshaping the land by taking it away from some places and depositing it as pebbles, sand, silt, and mud in other places (weathering, transport, and deposition).

I&E6. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

5th Grade Science Content Standards:

ES4c. Students know the causes and effects of different types of severe weather.

I&E6. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

Topical Objectives:

- Students will investigate the process of erosion on various landforms created by floods.
- Students will observe deposition and how particle size affects the distance materials move downstream (sand, gravel, clay, top soil)
- Students will predict what effect the slope and volume of water flowing over the land will have on erosion and deposition.
- Students will know that during a flood, as the volume of water increases, there is an increase in erosion and deposition.
- Students design, construct and test a structure (house) that will withstand a flood by diverting the flow of water, stop the flow of water completely or have the structure withstand a flood.

Safety Rules:

Students should be aware of water spills and clean them up promptly.

Materials:

(per group of 3-4 students):

1 stream table

1 10 gallon bucket

2-10 inch pieces of wood
Roughly 5 lbs of sand, clay, top soil, gravel, cedar chips
Chair
bucket
1 ruler/paint stick
1 clear liter container
Paint scraper
Card stalk
Construction paper
Foam board
Bubble wrap
Low temperature glue gun
Glue sticks
Scissors
Markers
Plastic trees
Making tape
Paper towels

Day one

Preparation:

1. Pre-drill holes in clear liter containers. This is the basis for the volume of floods.
2. Fill one stream table with soil and plant grass seeds, allow enough time before the lesson for the seeds to sprout.
3. Prepare 5 stream tables with a variety of materials. Moist top soil, moist sand, gravel, powdered clay, soil with vegetation
4. Arrange the stream tables at the edge of the table, so the water will land in the bucket
5. Be prepared with paper towels or sponges in case of water spills.
6. Have cedar chips in a separate stream table set up for demonstration, and extra materials for stream bed for students to mix two or more together.

Procedure:

** Don't forget to take pictures of the students in action!**

1. Discuss Erosion, review prior knowledge. What is it? What causes it? How does it shape the landscape?
2. Introduce the activity and the stream tables. Inform the students that they will be exploring how the water moves through different substrates. They will draw each stream table in their notebooks and record any important observations, predication and questions. Stress the generation of questions, and maybe have the students generate three questions for each stream bed.
3. Demonstrate that often cities use cedar chips to help prevent erosion on road embankments, have them predict how they think cedar chips would work in a stream table and test as a group. Record observations.

4. As a group, pinpoint variables that can be changed. Use generated questions that are testable and have the students work out which variables would change and which would be constant.
5. Review generated questions as a group and choose 5 to work on the following class period.
6. If time allows, have the students come up with a procedure and/or materials list for the following meeting.

Notebooks: Should have drawings, observations, predictions and questions from their stream table exploration as well as the 5 selected questions, procedure and materials needed to test the questions.

Day Two

Preparation:

1. Set up student's stream tables from previous class.
2. Provide various materials for the generated questions from the last class session. (including slope materials, substrate samples, buckets for mixing samples, paint sticks for mixing, various clear volume containers, etc...)

Procedure:

1. Using the students generated questions from the previous class session, allow students to set up their test stream table. Remembering to test **only one variable** at a time.
2. Encourage students to generate questions based on their variable. Was their prediction correct? How would their variable help or hinder erosion?
3. Have students observe the other team's stream table. Let each group demonstrate and state the variable they were investigating. What variable did they notice about the other student's stream table? Did they have the same results?
4. Students will clean up stream tables and proceed to write their results in their notebooks.
5. **Challenge:** Students must engineer a method to construct a house to withstand a flood. If time allows--as a group, students will decide on the "RULES" of the flood. (i.e. all stream tables must have the same substrate(s), volume of water for a flood, angle and the definition of what constitutes a structure to "survive" a flood). These materials and procedures will be the basis for the following **Challenge** science session.

Notebooks: During this session of erosion investigation, students will make observations, predictions and record their results on their stream tables and substrate experiments. As a group, a wrap-up on today's activities will be discussed. What worked? What did not work? Are there any other variables the students could have tried? Students should have come to the conclusion that the increase in angle, increase in volume of water, size of the house, single use of substrate (i.e. sand),

placement of their structure or multiple mixtures of substrate (i.e. top soil, clay) all have an impact on the rate of erosion and deposition.

Day Three

Entire period will be building and testing for challenge without stream tables

Preparation:

1. Provide chosen substrate sample voted for the **Challenge**.
2. Provide various construction materials for the houses and dams (card stock, foam board, bubble wrap, construction paper, low temp glue guns, extra glue sticks, tape, etc...)

Procedure:

1. Remind the students of the “RULES” that were established for the **Challenge**. Day 3 should be a planning and constructing phase.
2. In their notebooks, each group of students should record what materials they will need for this challenge and draw what their structure will look like. (They can investigate the types of materials to help complete this segment of the challenge)
3. After students have recorded and predicted if their building will withstand the flood, they will begin constructing and testing their structures.
4. Remind students the glue guns can become **hot** if plugged in too long!
5. Have students put names on their structures.
6. All groups should be close to completion of a solid structure.

Notebooks: Students will record their materials list and a construction plan of their house. They may also have predictions about how their structure will survive.

Day Four

Testing and conclusion

Preparation:

1. Set out stream tables with all controlled variables
2. Construction materials should be out from previous day
3. Camera on hand
4. Find an article on flood prevention to discuss

Procedure:

1. Students will have 15 minutes to complete final construction
2. Testing will begin!
3. Have students record any observations, predictions, results, changes they might want to make in their Notebook.
4. Clean up and discuss successes, and maybe discuss flood prevention techniques.

Notebook: Have students write their favorite part of this activity, if their house survived or if not what would they have changed, what did they learn.

Extensions:

Challenge can be changed to Dams, cleaning water run off, waterwheels and hydro power. Investigating different substrates, or investigating water flow from melting glaciers (large blocks of ice).

Synthesis:

Investigating and testing variables for floods and investigating materials to withstand floods.

Landform vocabulary –see attached note

Research flood prevention:

www.sciencedaily.com

www.fossweb.com

Sources: Debbie DeRoma, RH Fleet.