

## 6. C Formative Assessment #2 Erosion Performance Task

**Name of Task:** Hillside Erosion

**Science Discipline:** Earth Science

**Grade:** 6

**Task Overview:** The slope of a hill impacts the amount of soil that can be eroded and deposited in other areas. This investigation involves building models that represent mountains with different slopes. Students create "rain" on the slopes and compare the amount and type of deposited material for each slope.

**Whole Task Concept:** Water is a force of erosion that moves Earth materials; the greater the slope, the greater the erosion.

**Materials:**

**Per Group of 6 students**

2 shorter 1 by 2 inch sticks of wood for use as risers under paint trays  
2 longer (13 inches long) 1 by 2 inch sticks of wood to rest "rain cup" on above paint trays  
2 one gallon plastic bags of earth materials each containing a mixture of *4 cups ground walnut shells\**, *2 cups sand*, *1 cup gravel*, *2+ cups of water (divide mixture into 6 quart bags)*  
1 16 oz. Styrofoam cup with 11 equal-sized holes drilled or punched in three rows across the bottom or small watering can to simulate rain  
1 plastic containers for mountain molds (approximately 22 oz containers)  
2 8 oz clear plastic cups (1 for pouring water, 1 for holding deposited materials)  
1 Spatula or plastic spoon to collect deposition materials  
1 paint tray drilled with five 1/8 inch drain holes in the center lowest point of the pan  
1 plastic 2.5 quart bucket (only for inside classroom use)  
1 measuring cup with one cup of water  
1 paper plate  
1 towel  
*\* note: ground walnut shells may contain nuts*

**Per Student**

Performance Task Booklet  
Pencil

*Teacher Note: teacher must provide a water supply, newspaper to cover tables and 3 paper towels per group if doing lab inside the classroom. Recommend doing lab outside.*

- ADVANCED PREP:**
1. Gather all materials.
  2. Drill holes in paint trays and water cups.
  3. Prepare earth materials one day prior to the assessment. Use two bags for each class with the mixed sediments described above. Add two (or more if needed) cups of water to each bag of earth materials. Mix in the bag and divide into six-quart bags.
  4. On the day of the assessment, cover the tables with newspaper.
  5. Simulate lab prior to teaching it.

#### Special Directions

1. Explain to the students that they will experiment with a "rainstorm" on the three hillsides with different slopes. The groups will share their data about the hillside slope they tested. Finally, each student will individually analyze the data.
2. Show the students the materials for making one model hillside: paint tray, "soil", one cup of water, rain cup, sticks or blocks for slope, drain bucket, spatula/plastic spoon, and clear collecting cup.
3. Demonstrate how to build the model set up.
  - Place the paint tray so that the drain holes are over the end of a table.
  - Position the drain bucket on the floor directly beneath the drain holes only if you are doing this lab in the classroom.
  - Spread the "soil" mixture across the top half of the paint tray and pat down until firm and level about a half inch below the rim of the container.
  - Demonstrate how to hold the Styrofoam "rain cup" above the top of the hillside slope.
4. Provide each group of 4-6 students with a supply of one cup of water in the measuring cup.
5. Ask each group to make their hillside following your demonstration. Walk around the room and assist as necessary. Each group will need to take their "soil" material from the quart bag.

6. When all of the hillsides have been assembled, distribute H1 (Student Performance Task Booklets) and have students complete the prediction.
7. Assign a slope to each of the groups: Group 1 and 2: low slope (no sticks or blocks under paint tray); Group 3 and 4: 2 inches high (2 1 by 2 sticks or blocks); Group 5 and 6: 4 inches high (4 1 by 2 sticks or blocks). Show students how to stack the 1x2 wooden sticks or blocks for the correct height. Make sure students place the sticks or blocks under the top of the paint tray.
8. At this time take the class outside to a grassy area.
9. Explain that they will slowly pour this water into their rain cup that should be held above their hillside.
10. Ask one partner to hold the rain cup and the other partner to measure the water and begin pouring into the rain cup (Note, for students with the highest slope, make sure that one student holds the rain cup in place!)
11. Once the rain has occurred, ask students to drain the water (cover with hands the non-eroded hillside material to prevent it from sliding down) and use their hands and spoon to collect the eroded deposited earth material. Have the students put this material in a clear plastic cup.
12. Ask groups to place their clear cups on their group's table back in the classroom and record their own group's results on H1 (Student Performance Task Booklets). Then ask students to rotate to the other hillside slope groups and record the other groups' results on **H1 (Student Performance Task Booklets)**. Have them compare the amount and type of sediment in each cup and draw their lines on their data sheet.
13. Ask each group to dump the contents of their cup onto a paper plate. Have them spread the contents around. Ask each group to separate and count the rocks found in their mixture and record on data table on **H1 (Student Performance Task Booklets)**. Have students notice the amount of different types of sediment in each sample and complete the data chart.
14. Ask students to share results with class. Ask students to record results for all groups and slopes on their data table on **H1 (Student Performance Task Booklets)**.
15. When groups have all their data, ask students to analyze their data individually on **H1 (Student Performance Task Booklets)**.

**Note this picture is only approximate. Use the picture that comes with the materials as a guide for making the set up.**



Name \_\_\_\_\_

## Formative Assessment #2 Erosion Task

The 6<sup>th</sup> grade class at Carpinteria Middle School is learning about water erosion and deposition. The students want to build models to test how the slope of the hill changes the amount and type of materials moved in a rainstorm.

For their experiment, they collected the following materials: a mixture of rocks, sand and finely ground walnut shells; paint trays to represent the hillside; wooden blocks to change the slope of the hill; "rain cup;" bucket; and collecting cup to measure the amount of deposited Earth materials.

Help them conduct their experiment.

**Prediction:** Think of a steep hill and a less steep hill you have seen. Which hill do you think will have the most erosion of materials after a rainstorm?

Circle one: Steep Hill                      Less Steep Hill

Explain your prediction:

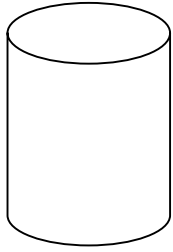
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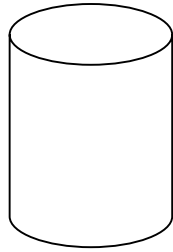
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### Directions:

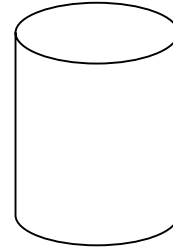
- The teacher will explain the setup of for the activity. You will be an expert on one hillside.
- After the teacher checks your setup, pour the cup of water into the rain-cup. Be careful to hold the rain-cup in position.
- After the "rain" remove the rain cup.
- Carefully tip the paint tray to the left and right to drain extra water into bucket.
- Use a small spoon to collect the material deposited in the lower part of the paint tray. Place collected material in a clear plastic cup
- Share your results with the other members of your group. Chart The Data From the Three Slopes
- **Observe the deposited Earth materials from each of the slopes. Draw a line in each of the three cups (shown on next page) to represent the amount of material in each cup.**



Low Slope



Medium Slope



High Slope

- Use a spoon to completely pour the materials from YOUR cup onto a paper towel. Spread the material on the paper towel. Look at all three paper towels and complete the following observations for slope.

Observation Table of Materials Deposited at Different Slopes

<b>Material From:</b>	Amount of Rocks  Count the number of rocks	Amount of Sand  Mark 1 for least 3 for medium 5 for most	Color of Material  Mark 1 for lightest 3 for medium 5 for darkest
<b>Low Slope</b>			
<b>Medium slope</b>			
<b>High Slope</b>			

**Analysis of Data/Summary Statement:**

Use your data to explain the differences in the amount and type of deposited material for each slope. Circle which slope created the largest amount of deposited material?

Low \_\_\_\_\_

Medium \_\_\_\_\_

High \_\_\_\_\_

Does your data reject or support your prediction. Explain.

**My prediction:**

**Support/ Reject:**

**Explain:**

Conclusion:

Use your data and what you know about water erosion and deposition to answer the following: Predict the amount and type of materials that would be deposited from a slope that increases two inches higher than our steepest model. Explain your answer.

**Predict:**

**Explain:**

Use your data and what you know about water erosion and deposition to explain the following statement: "A mountain road on a steep slope with large boulders next to the road would be a dangerous place to be in a rainstorm. "

Scientists often use models to help them test ideas. Models, however, are not the "real thing." Explain one advantage and one disadvantage of the using the hillside slopes models for your experiment.

**Advantage:**

**Disadvantage**

Name \_\_\_\_\_ Key \_\_\_\_\_

**Formative Assessment #3**  
**Erosion Task – Scoring Guide 30 points**

The 6<sup>th</sup> grade class at Carpinteria Middle School is learning about water erosion and deposition. The students want to build models to test how the slope of the hill changes the amount and type of materials moved in a rainstorm.

For their experiment, they collected the following materials: a mixture of rocks, sand and finely ground walnut shells; paint trays to represent the hillside; wooden blocks to change the slope of the hill; “rain cup;” bucket; and collecting cup to measure the amount of deposited Earth materials.

Help them conduct their experiment.

**Prediction:** Think of a steep hill and a less steep hill you have seen. Which hill do you think will have the most erosion of materials after a rainstorm?

Circle one: Steep Hill                      Less Steep Hill

Explain your prediction: *(2 points)*

I predict that the \_\_\_\_\_ hill will have the most erosion because

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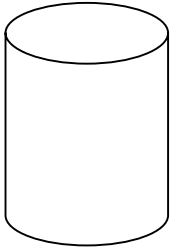
**Directions:**

- The teacher will explain the setup of for the activity. You will be an expert on one hillside.
- After the teacher checks your setup, pour the cup of water into the rain-cup. Be careful to hold the rain-cup in position.
- After the “rain” remove the rain cup.
- Carefully tip the paint tray to the left and right to drain extra water into bucket.
- Use a small spoon to collect the material deposited in the lower part of the paint tray. Place collected material in a clear plastic cup.
- Share your results with the other members of your group.

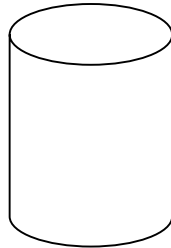


Chart The Data From the Three Slopes

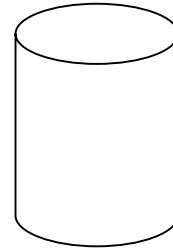
- **Observe the deposited Earth materials from each of the slopes. Draw a line in each of the three cups to represent the amount of material in each cup. (3 points - 1 point each cup)**



Low Slope



Medium Slope



High Slope

- Use a spoon to completely pour the materials from YOUR cup onto a paper towel. Spread the material on the paper towel. Look at all three paper towels and complete the following observations for slope.

Observation Table of Materials Deposited at Different Slopes

<b>Material From:</b> <i>(9 points - 1 per box)</i>	Amount of Rocks  Count the number of rocks	Amount of Sand  Mark 1 for least 3 for medium 5 for most	Color of Material  Mark 1 for lightest 3 for medium 5 for darkest
<b>Low Slope</b>			
<b>Medium slope</b>			
<b>High Slope</b>			

## Analysis of Data/Summary Statement:

Use your data to explain the differences in the amount and type of deposited material for each slope. Circle which slope created the largest amount of deposited material? (4 points)

Low \_\_\_\_\_

Medium \_\_\_\_\_

High \_\_\_\_\_

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Does your data reject or support your prediction. Explain. (3 points)

**My prediction:** *Restate prediction*

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**Support/ Reject:**

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**Explain:** *Uses data to explain the support or rejection of prediction.*

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**Conclusion:**

Use your data and what you know about water erosion and deposition to answer the following: Predict the amount and type of materials that would be deposited from a slope that increases two inches higher than our steepest model. Explain your answer. (3 points)

**Predict:** *(Would be more sediment)*

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**Explain:** *(Steeper slope would increase the pull of gravity, more would fall down)*

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Use your data and what you know about water erosion and deposition to explain the following statement: "A mountain road on a steep slope with large boulders next to the road would be a dangerous place to be in a rainstorm." (3 points)  
*(Rain loosens the soil, steep slope would increase the pull of gravity, boulders*

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*would fall down)*

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Scientists often use models to help them test ideas. Models, however, are not the "real thing." Explain one advantage and one disadvantage of the using the hillside slopes models for your experiment. (3 points)

**Advantage:** *(less dangerous, model in our classroom, try out different scenarios)*

**Disadvantage:** *(not actual thing, can't see full effect, hard to determine)*