

## G3.4 STACK IT UP LAB



### PROBLEM

- How does the slope of a material relate to the angle of repose and mass movement?
- How does gravity affect the erosion of rocks and soil?

### BACKGROUND INFORMATION

The angle of repose or the critical angle of repose of a granular material is the steepest angle of descent or dip of the slope relative to the horizontal plane when material on the slope face is on the verge of sliding. This angle is in the range  $0^{\circ}$ – $90^{\circ}$ . When bulk granular materials are poured onto a horizontal surface, a conical pile will form. The internal angle between the surface of the pile and the horizontal surface is known as the angle of repose and is related to the density, surface area and shapes of the particles, and the coefficient of friction of the material. However, the angle of repose is also gravity-dependent.

### MATERIALS

- Corn Kernels
- Dirt
- Wet Sand
- Dry Sand
- Pebbles
- Protractor
- Ruler

### PROCEDURE

1. You will spend 1.5 minutes at each station building the tallest piles you can.
2. At each station record:
  - a. The type of sediment
  - b. Describe the sediment (small grains, big grains, dry, wet, sorted, unsorted, etc.)
  - c. The height of the pile you were able to make.
  - d. The width of the pile you made.
  - e. The angle of the sides.

### HYPOTHESIS - RE-READ THE PROBLEM!!

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**DATA \*MEASUREMENTS IN CENTIMETERS\***

Station	Sediment Type	Grain Description	Pile Height (cm)	Pile Width (cm)	Angle (°)
1					
2					
3					
4					
5					

**CONCLUSIONS - USE COMPLETE SENTENCES!!**

1. What is the ratio for each sediment pile you made? (height : width)

1. \_\_\_\_\_

4. \_\_\_\_\_

2. \_\_\_\_\_

5. \_\_\_\_\_

3. \_\_\_\_\_

2. What was the most difficult sediment to pile up? Why do you think that was?

\_\_\_\_\_

\_\_\_\_\_

3. What was the easiest? Why?

\_\_\_\_\_

\_\_\_\_\_

4. How does the slope on which a material rests and the angles of repose have an effect on erosion and mass movement?

\_\_\_\_\_

\_\_\_\_\_

Skills Worksheet

**G3.4 The Effect of Gravity on Erosion and Deposition Directed Reading A**

**Section: The Effect of Gravity on Erosion and Deposition**

1. What is mass movement?

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2. What causes ice, rocks, and soil to move down a slope?

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**ANGLE OF REPOSE**

3. What is the “angle of repose”?

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4. What are three of the characteristics of a material that will affect its angle of repose?

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Directed Reading A *continued*

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**RAPID MASS MOVEMENT**

Match the correct definition with the correct term. Write the letter in the space provided. Some terms will not be used.

- |   |              |
|---|--------------|
| _____ 5. a group of loose rocks falling down a steep slope    | a. landslide |
| _____ 6. sudden, rapid movement of rock and soil down a slope | b. slump     |
| _____ 7. mudflows of volcanic origin                          | c. mudflow   |
| _____ 8. rapid movement of a large mass of mud                | d. lahar     |
|   | e. rock fall |
|   | f. monsoon   |

**SLOW MASS MOVEMENT**

- \_\_\_\_\_ 9. Extremely slow movement of material downhill is called
- a. slump.
  - b. rock fall.
  - c. creep.
  - d. mudflow.

10. What are three factors that affect creep?

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