What Moves Earth?

Investigate changes in rock and soil over time

4.ESS2.1 "Plan and conduct an investigation to gather evidence on the effects of water, ice, wind, and vegetation on the rate of weathering and erosion."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline what Maya changed in each test. Circle the observations that show how much rock or soil changed or moved during the test.

Maya's Garden Tests

1. A crack in a garden stone made Maya wonder whether ice could break rock. She found two similar sandstone pieces with small cracks and put them in cups. Each morning for six days, she froze one piece, then let it thaw. She kept the other piece at room temperature. Both got the same amount of water. By day six, the frozen piece's crack had widened, but the other crack had not.

2. Next, Maya tested how water and grass affect moving soil. She filled three trays with the same amount of soil and set them at the same slope. One tray held grass; the others were bare. For five minutes, she poured equal amounts of water on the grass tray and one bare tray. She left the third tray dry. Cups caught soil that moved off each tray: 3 grams from grass, 12 from wet bare soil, and 0 from dry soil.

3. Finally, Maya set two bare trays of dry sand on separate sheets of paper. She tested each tray for five minutes at the same distance from a fan. The fan was on for one test and off for the other. The sheets caught 10 grams of sand when the fan was on and none when it was off. Maya compared how much sand moved in five minutes to study the rate of erosion.

2 ANSWER WITH EVIDENCE

Use the passage

1. What did Maya change in the sandstone test, and what observation showed that ice affected the rock?

2. How did Maya's dry tray help her test the effect of water on bare soil? Compare the amounts of soil that moved in five minutes.

3. What evidence shows how grass affected the rate of soil erosion during Maya's water test?

4. How did Maya test the effect of wind on the rate of erosion? Use the sand amounts and time in your answer.

3 YOUR TURN

Your own words

Plan a new test of how the number of times a rock freezes and thaws affects weathering. In three or four sentences, tell what you would change, what you would keep the same, what you would measure, and how you would compare the rates.

ANSWER KEY

What Moves Earth?

GRADE 4 · 4.ESS2.1

PART 1 · READ AND MARK

Underline what Maya changed in each test. Circle the observations that show how much rock or soil changed or moved during the test. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What did Maya change in the sandstone test, and what observation showed that ice affected the rock?	**She froze and thawed one sandstone piece but kept the other at room temperature. Only the frozen piece's crack widened.**
2	How did Maya's dry tray help her test the effect of water on bare soil? Compare the amounts of soil that moved in five minutes.	**The dry tray gave her a test without added water. In five minutes, 0 grams moved from it, compared with 12 grams from the watered bare tray.**
3	What evidence shows how grass affected the rate of soil erosion during Maya's water test?	**In the same five minutes, 3 grams moved from the grass tray and 12 grams moved from the watered bare tray. Soil moved more slowly from the grass tray.**
4	How did Maya test the effect of wind on the rate of erosion? Use the sand amounts and time in your answer.	**She compared sand moved in five minutes with the fan on and off. The fan moved 10 grams in five minutes, while no sand moved with the fan off.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would freeze and thaw one cracked sandstone piece twice in a week and another five times in a week. I would use pieces with the same starting crack width and add the same amount of water to each. I would measure each crack's width at the start and end of the week. I would compare how much each crack widened per week.

Accept plans that change the number of freeze-thaw cycles while keeping the rocks and other test conditions as similar as possible. Students should measure a change in the rock over the same length of time to compare rates.