Rock to Soil

Test evidence for two kinds of weathering

E.8.9A.6 "Design and conduct investigations to evaluate the chemical and physical processes involved in the formation of soils."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline what changes between the samples in each test, circle one condition kept the same in each test, and write 1 beside each comparison sample.

What Breaks Down a Rock?

1. After a storm, a creek carries cloudy water past a rocky bank. Some grains came from rocks that cracked or scraped against other rocks. This is physical weathering: the material breaks into smaller pieces without changing its makeup. Other grains can form when minerals in rock react with weak acids in rainwater. That is chemical weathering because the minerals change into different substances. Soil forms over long periods as weathered rock mixes with decaying plant and animal matter. Scientists can investigate weathering by comparing treated samples with comparison samples.

2. To investigate physical weathering, place three similar, small limestone chips in each of two clear, sealed bags. Shake one bag 50 times and keep the other still. Compare the amount of new powder and the size of the chips without opening the bags. More powder in the shaken bag would support the idea that collisions broke rock into smaller pieces. The still bag shows what happens without shaking. Keeping the chip type, chip number, and bag type alike makes the effect of shaking easier to judge.

3. To investigate chemical weathering, place one similar limestone chip in each of two clear cups. Cover one with household vinegar and the other with water, using equal amounts of liquid. Watch for two minutes and record any bubbles that continue to form on the chips. Vinegar contains an acid that reacts with a mineral in limestone and releases carbon dioxide gas. Water is the comparison treatment. Bubbles continuing to form in the vinegar cup but not the water cup support a chemical reaction, but they do not tell how much rock became soil.

2 ANSWER WITH EVIDENCE

Use the passage

1. In the bag test, how does the still bag help you judge whether shaking caused the new powder?

2. Name two conditions kept the same in the bag test. Why does keeping them the same improve the investigation?

3. In the cup test, what observation would support a chemical reaction rather than just bubbles trapped when the liquid was poured?

4. Suppose both tests give the results described in the passage. What evidence would support physical weathering, and what evidence would support chemical weathering?

3 YOUR TURN

Your own words

With teacher-provided limestone chips, cups, water, and household vinegar, conduct the two-cup investigation as described in the passage. Record what you observe in each cup after two minutes, then explain what the comparison suggests about chemical weathering and name one condition kept the same.

ANSWER KEY # Rock to Soil

GRADE 8 · E.8.9A.6

PART 1 · READ AND MARK

Underline what changes between the samples in each test, circle one condition kept the same in each test, and write 1 beside each comparison sample. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	In the bag test, how does the still bag help you judge whether shaking caused the new powder?	**The still bag provides a comparison without shaking. More new powder in the shaken bag would support shaking as the cause.**
2	Name two conditions kept the same in the bag test. Why does keeping them the same improve the investigation?	**Accept any two of chip type, chip number, and bag type. Keeping them alike makes it easier to judge the effect of shaking.**
3	In the cup test, what observation would support a chemical reaction rather than just bubbles trapped when the liquid was poured?	**Bubbles continuing to form on the chip in vinegar, but not on the chip in water, would support a chemical reaction.**
4	Suppose both tests give the results described in the passage. What evidence would support physical weathering, and what evidence would support chemical weathering?	**More new powder in the shaken bag would support physical breakdown. Continued bubbling in the vinegar cup but not the water cup would support a chemical reaction.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

After two minutes, I saw bubbles continuing to form on the chip in vinegar. I saw no continuing bubbles on the chip in water. The different bubbling supports the idea that the acid in vinegar reacted with limestone and released gas. Both cups held similar limestone chips.

Accept students' actual recorded observations, even if bubbling is faint. Conclusions should match their observations and should not claim that this short test produced soil.