Water Shapes Rock

Use evidence to distinguish weathering from erosion.

ESS.4 "Obtain, evaluate, and communicate information about the geologic conditions and processes that form different Earth materials. a. Plan and carry out investigations to explore the processes that form plutonic (intrusive) and volcanic..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two pieces of evidence in the passage or table about what water does to rock. Circle the words that name the geologic processes those pieces of evidence support.

From Limestone to Caves

1 Rainwater absorbs carbon dioxide from the air and soil, becoming slightly acidic. In northern Alabama, some groundwater enters cracks in limestone, a rock rich in calcium carbonate. As the water moves underground, it can dissolve the rock and widen cracks into caves over long periods. This is chemical weathering, because minerals change as they dissolve.

2 A class tested whether water type and rock material affect weathering. They placed equal dry masses of limestone chips and quartz pebbles in separate cups for 48 hours. Each cup had the same volume of water at the same temperature. Afterward, they dried and weighed the solids, finding no loose fragments. The table reports one trial per setup.

DRY MASS AFTER 48 HOURS IN WATER

Material	Water	Starting mass (g)	Final mass (g)
Limestone chips	Neutral	10.0	9.9
Limestone chips	Slightly acidic	10.0	9.6
Quartz pebbles	Slightly acidic	10.0	10.0

3 The mass results suggest that slightly acidic water dissolved more limestone than neutral water did, while the quartz resisted measurable mass loss. One trial cannot establish a reliable rate of cave growth. At the surface, flowing water can also move loosened grains downstream. That movement is erosion, not chemical weathering, and it may build sediment layers where the current slows.

2 ANSWER WITH EVIDENCE

Use the passage

1. How much more mass did limestone lose in slightly acidic water than in neutral water? Show how you found the difference.

2. Compare the two materials tested in slightly acidic water. What does their final mass suggest about how each responds?

3. How do the test results help explain cave formation in northern Alabama? Give one reason the test cannot tell us how fast a cave grows.

4. A stream carries loosened grains downstream. Why is this erosion rather than the chemical weathering described in the limestone test?

3 YOUR TURN

Your own words

Design a follow-up test of how water speed affects erosion at the surface. In four sentences, state what you would change, what you would keep the same, what you would measure, and what result you predict with a reason.

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PART 1 · READ AND MARK

Underline two pieces of evidence in the passage or table about what water does to rock. Circle the words that name the geologic processes those pieces of evidence support. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How much more mass did limestone lose in slightly acidic water than in neutral water? Show how you found the difference.	**It lost 0.3 g more: 0.4 g in slightly acidic water minus 0.1 g in neutral water.**
2	Compare the two materials tested in slightly acidic water. What does their final mass suggest about how each responds?	**Limestone lost 0.4 g, while quartz had no measurable mass loss. The results suggest that the acidic water dissolved more limestone than quartz.**
3	How do the test results help explain cave formation in northern Alabama? Give one reason the test cannot tell us how fast a cave grows.	**The limestone lost mass in slightly acidic water, supporting the idea that acidic groundwater dissolves limestone and widens cracks. A single 48-hour trial cannot establish a long-term cave-growth rate.**
4	A stream carries loosened grains downstream. Why is this erosion rather than the chemical weathering described in the limestone test?	**The stream moves grains from one place to another. In the test, limestone minerals dissolved in water.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would send the same volume of water over two trays of sand at different flow speeds. I would keep the sand mass, grain size, tray slope, and water volume the same. I would dry and weigh the sand carried to a catch basin from each tray. Faster water should carry more sand because it can exert greater force on the grains.

Accept answers that use the table as evidence and distinguish dissolving rock from transporting sediment. For the follow-up test, accept other measurable signs of erosion if the student changes water speed while keeping relevant conditions consistent.