Grass Saves the Hill: Weathering and Erosion

Teacher		**Class**	Grade 4
Subject	Science	**Topic**	Weathering and erosion
Date		**Room**	
Lesson length	60 minutes	**Country**	United States

Students learn how weathering breaks rock and erosion moves it. They test two soil hills to measure how grass changes erosion.

Curriculum links

- 4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. [1]

Learning objectives

- Students will explain weathering as breaking apart and erosion as moving away.
- Students will measure how grass changes the rate of erosion by water.
- Students will use observations and measurements as evidence for erosion rate.

Success criteria

- I can say if rock broke apart in place or moved away.
- I can measure in inches how far soil moved with and without grass.
- I can use my numbers to tell which hill eroded faster.

What students already know

Show a cracked sidewalk with soil washed away. Ask: Did the rock break where it sat, or did something carry pieces away?

Key words

weathering	breaking of stone into smaller bits right where it sits [6]
erosion	carrying of broken stone and soil away to a new spot [6]
sediment	tiny bits of broken rock and soil that water or wind can carry [10]
vegetation	plants such as grass that can hold soil in place [14]
glacier	huge slow river of ice that scrapes land and pushes rock along [16]

Materials

- Two foil pans of soil per group, one with grass sod
- Two cups, water, rulers, collection trays
- Paper towels for spills
- Slides 1-5 and 7-12 projected
- Video clip 5 Erosion experiment demo ready to play
- Worksheet Task B (page 2) printed, one per student
- Exit ticket slips or notebooks

Before the lesson

- Print Worksheet Task B (page 2) for each student and exit slips
- Test Video clip 5 (0:00-3:34) and Slides 1-5 and 7-12
- Make two soil hills per group: bare soil and soil with grass sod in foil pans over trays
- Mark collection cups in inches, fill water cups, set rulers and paper towels at tables

Lesson outline

0–8 min **Starter** 8 min · Whole class

To hook interest and set up weathering as breaking and erosion as moving.

YOU DO

1. Show Slide 1 title: Weathering Breaks It, Erosion Takes It Away.
2. Use the hook: Two hills get the same rain. One is bare soil and one is covered in grass. Which hill survives? Take votes.
3. Show Slide 3 and read together: Weathering breaks rock apart right where it is. Erosion carries the broken pieces to somewhere new.
4. Link votes to learning goal: today we will measure how plants change the rate of erosion by water.

STUDENTS DO

1. Vote bare hill or grass hill and give one reason.
2. Repeat the break-or-move words with hand signs: fists breaking, hands carrying.
3. Tell a partner one guess about what water will move.

Say: Two hills get the same rain. One is bare soil and one is covered in grass. Which hill survives? Today we test it. We will break rock ideas apart and track what moves.

Ask: What does weathering do? (It breaks rock apart right where it is.) · What does erosion do? (It carries the broken pieces to somewhere new.) · Which hill do you predict will lose less soil? (The grass hill, because plants help hold soil in place.)

Check understanding: Thumbs up for break means weathering, wave for move means erosion. Reteach Slide 3 lines if mixed.

Support: Show picture cards for break in place and move away while reading Slide 3. **Stretch:** Ask students to predict what a second cup of water would do to each hill.

Use: Slides 1–3

8–20 min **Teaching** 12 min · Whole class

To explain how water, ice, wind and plants break rock and move pieces.

YOU DO

1. Show Slide 4 chain and walk through crack to gravel: rain fills crack, ice grows, crack splits, water washes pieces away.
2. Show Slide 7 steps for ice: water drips, freezes solid, grows bigger and pushes, melts and bits drop.
3. Show Slide 5 question: You see piles of broken rock under a cliff. What broke it? What moved it? Take pair ideas.
4. Summarize: scattered piles of broken rock at cliff bases show weathering [2], and wind and moving water move those particles [2].

STUDENTS DO

1. Copy the four ice steps with quick sketches.
2. With a partner, answer Slide 5: what broke the cliff rock and what moved it.
3. Sort two examples: freeze split is break, river carry is move.

Say: Rain can fill a tiny crack. Cold turns that water to ice and it grows. Ice pushes hard and splits rock. Then melted water washes the loose bits away. That is breaking, then moving.

Worked example: Ice example step by step. 1. Water drips into a small crack. 2. Cold night freezes the water solid. 3. Ice grows bigger and pushes outward, because water expands as ice and splits rock like a wedge [11]. 4. Warm day melts ice, loose bits drop and trickle away with water [11]. Breaking was weathering, washing away was erosion.

Ask: How does ice break rock? (Water in a crack freezes, expands, pushes and splits the rock wider [11].) · After breaking, what moves the pieces? (Melting ice and water wash them away, and wind can carry loose bits [2][16].) · Piles of broken rock sit under a cliff. Is the pile mostly evidence of breaking or moving? (Breaking in place, which is weathering, with later moving by water or wind [2][6].)

Check understanding: Hold up 1 finger for break and 2 for move for: roots split rock, river carries sand, wind lifts dust. Correct together if split.

Support: Give sentence frame: I see ___ so I think ___ happened, with break or move choices. **Stretch:** Ask what they would measure next month to check for more change at the cliff.

Use: Slides 4–5, 7

20–30 min **Video and model** 10 min · Whole class

To show how to pour, watch, and measure erosion rate.

YOU DO

1. Show Slide 8 prompts: watch how much water they pour and how far soil moves.
2. Play Video clip 5 Erosion experiment demo (0:00–3:34).
3. Pause halfway to name breaker and mover: water breaks and carries, using Slide 6 prompt to name water, ice, wind, plants.
4. Model measuring with a ruler in inches from hill edge to farthest sediment in tray.

STUDENTS DO

1. Watch and call out break when rock breaks and move when pieces travel.
2. Name the agent each time: water, ice, wind, or plants.
3. Practice reading a ruler to the nearest inch on a sample tray mark.

Say: Watch how much water they pour. Watch how far the soil moves. We will do the same. We pour the same amount each time, then we measure in inches.

Worked example: Model numbers: After 1 cup poured slowly, tray shows soil reached 2 inches from the hill. After a faster pour, it reached 4 inches. Faster water moved it farther, so rate was greater.

Ask: What must stay the same to test fairly? (Amount of water, height of pour, same hill shape, only grass changes.) · What measurement shows rate of erosion? (How many inches soil and sediment moved and how muddy the runoff is.)

Check understanding: All students show ruler reading with fingers for 1, 2, 3 inches. Reteach lining up zero if off.

Support: Replay last 30 seconds with captions and point to water amount and distance moved. **Stretch:** Ask why pouring faster might move more: more water energy to detach and carry sediment [13].

Use: Video clip 5 (0:00–3:34), Slides 6, 8

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30–50 min **Main activity** 20 min · Groups

To measure and compare erosion rate on bare and grass-covered hills.

YOU DO

1. Hand out pans, cups, rulers, trays and Worksheet Task B. Show Slide 9 task steps.
2. Direct fair test: slowly pour one half cup of water from same height on each hill over its tray.
3. Remind groups to observe color and measure depth and distance of collected sediment in inches.
4. Circulate, help read rulers, and ask which hill eroded faster and why.

STUDENTS DO

1. Pour one half cup of water slowly on bare hill, then same on grass hill.
2. Observe and record on Worksheet Task B: draw hills, label weathering and erosion, write inches moved.
3. Compare, decide which hill survived, and clean spills with towels.

Say: Build test time. Slowly pour one half cup of water on top of each hill. Catch what washes off. Measure with a ruler how many inches moved. Write labels and numbers to show which hill eroded faster.

Worked example: Worked result: Bare hill: water ran brown, sediment spread 3 inches, pile 0.5 inch deep. Grass hill: water ran clearer, sediment spread 1 inch. Claim: bare soil eroded faster. Evidence is 3 inches is more than 1 inch, because erosion moves weathered soil away [6][10].

Ask: What did you observe that shows erosion? (Soil and rock moved from hill to tray and piled in a new place [10].) · Which hill had a greater rate of erosion and what numbers prove it? (Bare hill, it moved more inches and made muddier water than the grass hill.) · How did grass change the result? (Grass held soil in place so less was carried away by water [14].)

Check understanding: Teacher checks each group's Task B numbers and asks to point to moved sediment. Repeat pour if no movement seen.

Support: Use collection cups marked in inches and a simple chart for muddy or clear, since erosion is the wearing away of land by water carrying soil away [16]. **Stretch:** Have students test pouring from higher up and compare the measurements.

Use: Slide 9, Worksheet Task B

50–60 min **Plenary** 10 min · Whole class

To review break versus move and use measurements as evidence.

YOU DO

1. Show Slide 10 Four Big Agents and review water, ice, wind, plants lines with class actions.
2. Show Slide 11 mystery: wind and water broke soft rock, then carried pieces away to make a bridge shape.
3. Show Slide 12 exit and have students write: Weathering is __. Erosion is __. My measurement is __.
4. Collect Task B and exit lines, preview next lesson on deposition.

STUDENTS DO

1. Chant and act water carry, ice scrape, wind lift, roots pry.
2. Share group inches and state which hill eroded faster.
3. Complete exit ticket sentences in notebooks.

Say: Weathering breaks rock apart right where it is. Erosion carries the broken pieces to somewhere new. Tell me your inches. That number is your evidence for how fast erosion happened.

Ask: A tree root splits pavement. Is that mostly weathering or erosion? (Weathering, roots growing into cracks pry rock apart in place [13].) · Wind lifts dust and polishes rock smooth. What is happening? (Wind picks up and carries loose bits away [16], and hitting grains can break off more [15].)

Check understanding: Read three exit tickets aloud. If break and move are swapped, restate Slide 3 definitions and fix together.

Support: Provide word bank with break in place and move away and sentence starters for exit lines. **Stretch:** Ask students to add a fourth comic box predicting what happens after many rains.

Use: Slides 10–12

Common mistakes

Mistake	How to spot it	How to fix it
Mixing up weathering and erosion as the same process.	Labels breaking in place as erosion or carrying away as weathering.	Restate that weathering breaks apart at its location while erosion transports it away [6], sort two photos again.
Thinking grass stops all erosion so no measurement is needed.	Says grass hill had zero change without looking at tray.	Check tray closely; planting grass holds soil in place [14] but some fine grains still move, so measure inches to prove rate.
Measuring from the wrong start point each time.	Inch numbers jump a lot between tries or groups.	Always start ruler zero at hill edge and read to farthest sediment; liquid water is the main mover to watch [4], so keep pour height same.

Support

- Use collection cups marked in inches and a simple chart for muddy or clear.
- Give picture word bank for break in place and move away and sentence frames.
- Pair students so one pours while the other measures and records.

Stretch

- Have students test pouring from higher up and compare the measurements.
- Have students compare slow versus faster pours and explain rate change with numbers.
- Have students draw and add two new break-or-move cards for another team to sort.

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For the LSE or teaching assistant

Stay with target groups during main test. Help line up ruler zero, read inches, and prompt muddy or clear choice. Keep water pouring slow and towels handy.

Safety

- Pour slowly over the tray, wipe up spills right away, and do not drink the water.
- Keep work area dry, handle wet pans with both hands, wash hands after touching soil.

Check for understanding

Question	Answer
Weathering is __.	Breaking rock apart right where it is.
Erosion is __.	Carrying the broken pieces to somewhere new.
Which hill eroded faster and what measurement proves it?	Bare-soil hill; it moved more inches of sediment and made muddier runoff than the grass hill.

Homework

Sketch one spot outside where rain moved soil and label what broke and what moved.

Sources

1. 4-ESS2-1 Earth's Systems | Next Generation Science Standards · nextgenscience.org · https://www.nextgenscience.org/pe/4-ess2-1-earths-systems
2. Weathering and Erosion - U.S. National Park Service · nps.gov · https://www.nps.gov/articles/000/weathering-erosion.htm
3. Chapter 4 Weathering and Erosion – *Introduction to World ... · pressbooks.howardcc.edu · https://pressbooks.howardcc.edu/worldgeography/chapter/chapter-6/
4. Weathering, Erosion, and Sedimentary Rocks – Introduction to ... · pressbooks.lib.vt.edu · https://pressbooks.lib.vt.edu/introearthscience2e/chapter/weathering-erosion-and-sedimentary-rocks/
5. Chapter 9 - Weathering, Erosion, and Mass Wasting · gotbooks.miracosta.edu · https://gotbooks.miracosta.edu/earth_science/chapter9.html
6. weathering and erosion - Students | Britannica Kids ... · kids.britannica.com · https://kids.britannica.com/students/assembly/view/189387
7. Erosion, weathering and mass movement - River processes ... - BBC · bbc.co.uk · https://www.bbc.co.uk/bitesize/guides/zcjprdm/revision/1
8. Flexi answers - How is weathering different from erosion? | CK-12 Foundation · ck12.org · https://www.ck12.org/flexi/earth-science/weathering-and-erosion/how-is-weathering-different-from-erosion/
9. Weathering Facts for Kids · kids.kiddle.co · https://kids.kiddle.co/Weathering
10. Erosion Facts for Kids · kids.kiddle.co · https://kids.kiddle.co/Erosion
11. Weathering and Erosion Information and Effects | National Geogra… · nationalgeographic.com · https://www.nationalgeographic.com/science/article/weathering-erosion
12. weathering - Kids | Britannica Kids | Homework Help · kids.britannica.com · https://kids.britannica.com/kids/article/weathering/601271
13. Erosion and Weathering: Examples & Processes - Geology Science · geologyscience.com · https://geologyscience.com/geology/geology-fundamentals/erosion-and-weathering-examples-processes/
14. Weathering and Erosion Explained: How Rocks Break and Move ... · academickids.com · https://academickids.com/guides/weathering-and-erosion-explained
15. The Difference Between Weathering & Erosion - Sciencing · sciencing.com · https://www.sciencing.com/difference-between-weathering-erosion-8212886/
16. Earth Science for Kids: Erosion - Ducksters · ducksters.com · https://www.ducksters.com/science/earth_science/erosion.php

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