

Lesson 4.2: Weathering and Erosion

Task	Page(s)	Learning Target
1	2-3	I can describe how Earth's surface is affected by weathering and erosion.
2	4-5	I can design and conduct a model experiment for weathering and erosion.
3	6	I can describe an experiment that tests factors that affect soil erosion.

Task 1 Learning Target: I can describe how Earth's surface is affected by weathering and erosion.

1. Answer the pre-reading questions: Agree or Disagree?

- A. Erosion is the break down of rock.
- B. Weathering moves rock and soil from one place to another.
- C. Water can cause erosion but ice cannot.

2. Copy the T-Chart that compares 2 types of weathering:

Chemical	Physical/Mechanical
Rainwater: How does rainwater cause chemical weathering?	Water: How does water cause physical weathering?
Plants/ animals: How do plants and animals cause chemical weathering?	Temperature: How does temperature cause physical weathering?
	Wind: How does wind cause physical weathering?
	Plants and animals: How do plants and animals cause physical weathering?
	Glaciers: How do glaciers cause physical weathering?

3. Read "Weathering and Erosion Article" on the next page of this document and complete the T chart (by answering the questions) using the information from the article.

4. Describe erosion.

- a. How does water cause erosion?
- b. How does wind cause erosion?
- c. How do glaciers cause erosion?

5. Describe the relationship between weathering and erosion.

Additional Links for Exploration:

<https://sites.google.com/a/ps207tigers.org/207sci/weathering>

<https://www.youtube.com/watch?v=exS9gFXgib0>

https://www.youtube.com/watch?time_continue=38&v=LaB3nKxPjiU&feature=emb_title

<https://www.youtube.com/watch?v=loI584OFVpE>

<http://www.kineticcity.com/mindgames/warper/>

Weathering and erosion slowly chisel, polish, and buff Earth's rock into ever evolving works of art—and then wash the remains into the sea.

The processes are definitively independent, but not exclusive. **Weathering** is the mechanical and chemical hammer that breaks down and sculpts the rocks. **Erosion** transports the fragments away.

Working together they create and reveal marvels of nature from tumbling boulders high in the mountains to sandstone arches in the parched desert to polished cliffs braced against violent seas.

Water is nature's most versatile tool. For example, take rain on a frigid day. The water pools in cracks and crevices. Then, at night, the temperature drops and the water expands as it turns to ice, splitting the rock like a sledgehammer to a wedge. The next day, under the beating sun, the ice melts and trickles the cracked fragments away.

Repeated **swings in temperature** can also weaken and eventually fragment rock, which expands when hot and shrinks when cold. Such pulsing slowly turns stones in the arid desert to sand. Likewise, constant cycles from wet to dry will crumble clay.

Bits of sand are picked up and carried off by the **wind**, which can then blast the sides of nearby rocks, buffing and polishing them smooth. On the seashore, the action of waves chips away at cliffs and rakes the fragments back and forth into fine sand.

Plants and animals also take a heavy toll on Earth's hardened minerals. Lichens and mosses can squeeze into cracks and crevices, where they take root. As they grow, so do the cracks, eventually splitting into bits and pieces. Critters big and small trample, crush, and plow rocks as they scurry across the surface and burrow underground. Plants and animals also produce acids that mix with rainwater, a combination that eats away at rocks.

Rainwater also mixes with chemicals as it falls from the sky, forming an acidic concoction that dissolves rock. For example, acid rain dissolves limestone to form karst, a type of terrain filled with fissures, underground streams, and caves like the cenotes of Mexico's Yucatán Peninsula.

Back up on the mountains, snow and ice build up into **glaciers** that weigh on the rocks beneath and slowly push them downhill under the force of gravity. Together with advancing ice, the rocks carve out a path as the glacier slumps down the mountain. When the glacier begins to melt, it deposits its cargo of soil and rock, transporting the rocky debris toward the sea. Every year, rivers deposit millions of tons of sediment into the oceans.

Without the erosive forces of water, wind, and ice, rock debris would simply pile up where it forms and obscure from view nature's weathered sculptures. Although erosion is a natural process, abusive land-use practices such as **deforestation** and **overgrazing** can expedite erosion and strip the land of soils needed for food to grow.

Task 2 Learning Target: I can design and conduct a model experiment for weathering and erosion.

Weathering and Erosion With Skittles

Materials:

- | | | |
|-----------|---------------------------|---------------------|
| ✓ Vinegar | ✓ Pipette (water dropper) | ✓ Shallow container |
| ✓ Water | ✓ pH paper | ✓ Skittles |

Guided Questions:

1. What will the water represent in this lab activity?
2. What will the Skittle represent in this lab activity?
3. What will the color on the Skittle represent in this lab activity?
4. What will the shallow container represent in this lab activity?
5. How will mechanical weathering be modeled in this activity?
6. How will chemical weathering be modeled in this activity?
7. How will erosion be modeled in this activity?
8. How will the pH paper help you to determine how acidic to make your water.
(Remember: you want to model a natural substance.)

Open Inquiry:

Write a procedure explaining how you can use the materials to model weathering and erosion.

Enrichment: Design an experiment that will test how 1 variable will affect the rate of weathering and/or erosion.

Data and Observations: Show and describe your results for different amounts of “acid rain.”

5 drops	10 drops	15 drops	20 drops	25 drops
<u>Visual</u>	<u>Visual</u>	<u>Visual</u>	<u>Visual</u>	<u>Visual</u>
<u>Written Description</u>	<u>Written Description</u>	<u>Written Description</u>	<u>Written Description</u>	<u>Written Description</u>

Task 3 Learning Target: I can describe an experiment that tests factors that affect soil erosion.

Visit the following link: <https://www.almadinah-school.com/apps/video/watch.jsp?v=93146>

Complete the following prompts:

1. What is the independent variable?
2. What is the dependent variable?
3. What are the constants/ controlled variables?
4. Is there a control group? If so, what is it?
5. Write a scientific conclusion (including evidence and reasoning) for the experiment.