

Photo Description



This image shows a house with a beautiful rock garden made of stacked flat stones. The rocks are piled in different heights and shapes, creating a natural-looking landscape. Many green plants grow around the rock piles, and trees hang over the house with their leafy branches.

Scientific Phenomena

The anchoring phenomenon here is weathering and erosion creating the flat, layered rocks we see stacked in this garden. Over millions of years, natural forces like wind, water, ice, and temperature changes broke down larger rock formations into these smaller, flat pieces. The layered appearance suggests these rocks were formed through sedimentary processes, where materials settled in layers over time and were compressed into rock. Humans then collected and arranged these naturally-shaped stones to create this decorative garden feature.

Core Science Concepts

1. Weathering Processes: Physical and chemical weathering break down rocks over long periods of time through forces like freezing water, plant roots, and chemical reactions.
2. Rock Formation: These flat stones likely formed as sedimentary rocks, created when layers of sediment were pressed together over millions of years.
3. Erosion and Transport: Moving water, wind, and ice carried rock fragments from their original locations to new places where humans could collect them.
4. Human Impact on Landscapes: People modify natural environments by moving rocks and planting gardens, showing how humans interact with Earth's materials.

Pedagogical Tip:

Have students bring in small rocks from home or the schoolyard to examine with magnifying glasses. This hands-on observation helps them connect the abstract concept of weathering to real objects they can touch and study.

UDL Suggestions:

Provide multiple ways for students to show their understanding of rock formation - through drawing diagrams, building with clay layers, or acting out the slow process of sediment settling. This supports different learning preferences and abilities.

Zoom In / Zoom Out

1. Zoom In: At the microscopic level, chemical weathering occurs when minerals in rocks react with water and acids, causing the rock's crystal structure to weaken and break apart grain by grain.

2. Zoom Out: This rock garden is part of a larger watershed system where weathered rock materials eventually flow into streams, rivers, and oceans, contributing to the continuous rock cycle that shapes our planet's surface over geological time.

Discussion Questions

1. What clues in these rocks tell us about how they formed long ago? (Bloom's: Analyze | DOK: 3)
2. How do you think these rocks traveled from where they first formed to this garden? (Bloom's: Apply | DOK: 2)
3. What would happen to these rocks if they stayed in this garden for 100 more years? (Bloom's: Evaluate | DOK: 3)
4. Why do you think some rocks in the pile are different colors and textures? (Bloom's: Analyze | DOK: 2)

Potential Student Misconceptions

1. Misconception: Rocks don't change - they stay the same forever.
Reality: Rocks are constantly changing through weathering and erosion, just very slowly over long periods of time.
2. Misconception: These flat rocks were made by people cutting them.
Reality: Natural weathering processes create flat, layered rocks when sedimentary rocks break along their natural layer lines.
3. Misconception: Weathering only happens during bad weather like storms.
Reality: Weathering happens continuously through daily temperature changes, plant growth, and chemical reactions, even on calm days.

Cross-Curricular Ideas

1. Math - Measurement and Patterns: Have students measure the height of different rock stacks in the garden using non-standard units (like hand spans or pencil lengths), then create bar graphs to compare their measurements. They can also count the layers in each stack and look for patterns in the numbers.
2. ELA - Descriptive Writing: Ask students to write a detailed description of the rock garden as if they were writing for a travel brochure or nature guide. Have them use sensory words (rough, smooth, brown, layered) and explain what visitors would learn by studying this landscape.
3. Social Studies - Human-Environment Interaction: Discuss how people use natural materials like rocks to change their living spaces. Students can research how different cultures around the world build with stone (Native American dry-stacked walls, Japanese rock gardens, dry stone walls in England) and compare the different purposes and methods.
4. Art - Sculpture and Design: Invite students to create their own miniature rock stacks using small stones, pebbles, or clay. They can plan their designs on paper first, considering balance, color, and height—just like a landscape architect or garden designer would do.

STEM Career Connection

1. Geologist - Geologists are scientists who study rocks, minerals, and how Earth changes over time. They examine rocks like the ones in this garden to understand Earth's history and find valuable resources like metals and gems. Some geologists even help predict natural disasters like earthquakes and volcanoes. Average Annual Salary: \$92,000 USD

2. Landscape Architect - Landscape architects design outdoor spaces like gardens, parks, and yards. They decide where to place rocks, plants, and water features to make beautiful and useful outdoor areas. They need to understand how nature works and how to arrange materials in appealing ways. Average Annual Salary: \$67,000 USD

3. Environmental Engineer - Environmental engineers study how rocks, soil, and water interact to protect our planet. They help clean up polluted land, design systems to manage water, and understand how weathering and erosion affect the environment. Average Annual Salary: \$88,000 USD

NGSS Connections

- Performance Expectation: 4-ESS1-1 - Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
- Disciplinary Core Ideas: 4-ESS1.C - Local, regional, and global patterns of rock formations reveal changes over time due to earth forces.
- Crosscutting Concepts: Patterns - Patterns can be used as evidence to support an explanation.
- Science Practice: [[NGSS:SEP:Analyzing and Interpreting Data]] - Analyze and interpret data to make sense of phenomena.

Science Vocabulary

- * Weathering: The slow breaking down of rocks by wind, water, ice, and temperature changes.
- * Erosion: The movement of broken rock pieces from one place to another by water, wind, or ice.
- * Sedimentary rock: Rock formed when layers of sand, mud, or other materials get pressed together over time.
- * Minerals: The natural materials that make up rocks, each with their own colors and properties.
- * Landscape: The shape and features of the land in an area, including rocks, hills, and valleys.

External Resources

Children's Books:

- "Rocks and Minerals" by Steve Tomecek
- "The Magic School Bus Inside the Earth" by Joanna Cole
- "National Geographic Readers: Rocks and Minerals" by Kathleen Weidner Zoehfeld