

# Lesson Plan:

# Rocks and Erosion

---

*Subject Areas:* Earth Science, Geology, Social Studies

### Science Connections

- Students will develop arguments and construct explanations for natural processes shaping works of art made of rocks.
- Students will explore how artists use weathering and erosion to create works of art.

### Guiding Questions

- How do weathering and erosion affect art made out of natural materials placed outside?
- How do artists use the natural processes that shape Earth's features to create works of art?

**Grades 3–6**



**The Rebecca Q. and James C. Morgan Garden  
at the Johnson Museum**

## Learning Standards

Next Generation Science Standards:

<https://www.nextgenscience.org/pe/4-ess2-2-earths-systems>

- 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.
- 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.

Common Core ELA Standards (PDF):

[https://learning.ccsso.org/wp-content/uploads/2022/11/ELA\\_Standards1.pdf](https://learning.ccsso.org/wp-content/uploads/2022/11/ELA_Standards1.pdf)

- CCSS.ELA-LITERACY.RI.4.7
  - Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears.

## Vocabulary

Familiarity with the following words will help students get the most out of this lesson:

- |              |                       |
|--------------|-----------------------|
| ▪ Deposition | ▪ Chemical weathering |
| ▪ Erosion    | ▪ Physical weathering |
| ▪ Fossil     | ▪ Metamorphic rock    |
| ▪ Sediment   | ▪ Sedimentary rock    |

## Live Lesson Structure

Warm-Up Discussion [10 minutes]

- Project these three images of the Johnson's Morgan Garden:



- First, ask students to share their observations for each image.
- Then, prompt students with the following questions:
  - Where is this located? How do you know? How did this get here?
  - What is natural here? What is human-made?
  - How will this garden change over time?
- For the final image, ask students to share questions instead of observations. What do they want to know about this work of art?
- Introduce students to the main idea of this lesson: artists can use the unique features of rocks to create works of art.

## Lesson Presentation [30 minutes]

### Looking closer at the garden:

- Introduce students to the style and elements of the garden. Teachers can prepare for this by reading more about the garden here: <https://www.mpkeane.com/tiger-glen-garden>
- Alternate inquiry between asking questions, and sharing background information.
  - The garden is created in the style of *Karesansui*, which means dry-landscape. Ask students: How do you think this word relates to the appearance of the garden?
    - In this style of garden, the image of the landscape and water is created without the use of actual water.
  - How did the garden designer try to create the appearance of water?
    - In the center of the garden, a twisting ravine filled with stones is meant to look like a river of rushing water.
  - What can you observe about the rocks, both big and small?
    - The rocks in the sculpture garden were brought to Ithaca from Connecticut. They are made out of rock called *gneiss*. Gneiss is a metamorphic rock.
  - Do you know what metamorphic rock is? What is a *metamorphosis*?
    - Metamorphic rocks are formed through change. A long, long time ago (likely millions of years!), metamorphic rocks started out as a different type of rock. Due to a factor like high heat, high pressure, or mineral-rich fluids, these other types of rocks were transformed into metamorphic rock.
  - How do you think these rocks have changed since the garden was created, in 2011?
    - Even though 10+ years is a very short time compared to the whole life of a rock, these rocks have changed in small ways. They have become more and more covered in moss and lichen.
  - What do you notice about the moss in this garden?
    - The garden contains twelve different species of moss, which were carefully chosen and planted. Teachers can read background information on the mosses here: [https://www.mpkeane.com/\\_files/ugd/86eb66\\_3bf088e2adec480abf64dd4159625fab.pdf](https://www.mpkeane.com/_files/ugd/86eb66_3bf088e2adec480abf64dd4159625fab.pdf)
  - What else is affecting the rocks?
    - These rocks have also been exposed to weathering, which is a gradual process that breaks down the rocks on Earth's surface. Chemical processes cause the surface of the rocks to be slowly broken down when exposed to water, especially through rain and snow. This usually happens very slowly, especially with rock like gneiss. Over time, the rocks will continue to change.
  - There is one location in this garden where weathering is happening more quickly. Can you find it?
    - Point out the water spout, which creates a fountain and a pool of water. Explain how this pool is slowly, slowly growing.



#### *Weathering and Erosion in Scholar's Rocks:*

- We can find evidence of weathering and erosion in other works of art as well. Let's take a closer look.
- Project this Scholar's Rock image, and lead a short close-looking session, asking students to share what they see:  
[https://www.lookandlearn.com/history-images/preview/YM/YMO/YMO053/YMO053129\\_Scholars-rock.jpg](https://www.lookandlearn.com/history-images/preview/YM/YMO/YMO053/YMO053129_Scholars-rock.jpg)
- Next, prepare students to do a short (5-10 minute) free write by having them get out a pencil and paper. Set a timer for 5 minutes. Ask students to write continuously for all 5 minutes, in response to the prompt:
  - What would you do if you could touch this rock? What would it feel like? What textures would it have?
  - Afterwards, have students share out, comparing their ideas.
- Once the discussion is complete, give students a short description of the process by which Scholar's Rocks like these are formed.
- This rock is made of a type of limestone type called 'ying' stone. It was harvested in southern China. Limestone is a sedimentary rock, which means it was formed by layers and layers of materials, or *sediment*, that becomes compacted and cemented, forming sedimentary rock. Often, once-living creatures are part of the sediment. When they become compressed into sedimentary rock, this sometimes causes the formation of fossils!
- Scholar's Rocks like this started to become popular in China about 1,000 years ago. They were harvested from caves, especially caves filled with water. Over time, water caused weathering to occur on the rock's surface, creating the holes, bumps, and smooth surface on the rock.
- These rocks were prized for looking like mountains and caves, especially the mystical caves and grottos believed to be inhabited by immortal beings.

*Image:* China, Qing dynasty (1644–1911). Scholar's rock, 19th century. Limestone and wooden stand. Collection of the Metropolitan Museum of Art; gift of Richard Rosenblum Family (2008.674a, b)

#### *Wrap-Up*

- As an exit-ticket or final class activity, ask students to compare the two works of art they focused on in this lesson: How do weathering and erosion affect these works of art different?

## Supplementary Activities

#### *Design a Work of Art Meant to Erode*

- Independently, or working in small groups, ask students to design a work of outdoor art designed to change due to weathering and erosion. Students should create a visual sketch of their artwork, and be able to explain the process they would take to create it.
- Encourage students to consider:
  - What will your work of art look like after one year? Five years? Ten years? 100 years?
  - Is it possible to design something that will show visible signs of change in one week, but still be present after one year? What are the challenges?
  - What forms of weathering erosion will take place? How will the artwork change depending on where you put it? How will it change depending on weather and climate?