

## Unit 3: Birth of Rocks

### 4<sup>th</sup> Grade Science

35 Class Meetings

*Written December 2024*

#### Essential Questions

- How do different types of rocks form, and what makes each type unique?
- How do natural forces like heat, pressure, and weathering affect the formation and transformation of rocks?

#### Enduring Understandings with Unit Goals

**EU 1:** Weathering and erosion are natural processes that break down and move rocks, soil, and other materials on Earth's surface.

- Determine the difference between weathering and erosion.
- Identify the causes and effects of weathering and erosion.

Recognize patterns in Earth's surface that have been caused by weathering and erosion.

**EU 2:** Many of Earth's surface features are connected to underlying geological processes, such as earthquakes, volcanoes, and the movement of tectonic plates.

- Identify and describe patterns of the Earth's surface
- Understand that Earth's processes shape its surface.
- Use scientific tools to better interpret Earth's surface.

**EU 3:** Understanding the rock cycle helps explain Earth's history, including how rocks form, change, and provide clues about the past.

- Explain the role that Earth's forces play in the rock cycle.
- Understand that processes of change impact the rock cycle.
- Use scientific tools to identify and classify rocks.

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#### Standards

##### Next Generation Science Standards:

- **NGSS. 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.
- **NGSS.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.
- **NGSS.4-ESS2-2.** Analyze and interpret data from maps to describe patterns of Earth's features.

##### Common Core State Standards:

- **CCSS.ELA-Literacy.RI.4.1:** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **CCSS.ELA-Literacy.RI.4.2:** Determine the main idea of a text and explain how it is supported by key details; summarize the text.
- **CCSS.ELA-Literacy.RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.
- **CCSS.ELA-Literacy.RI.4.9:** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.
- **CCSS.ELA-Literacy.W.4.2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- **CCSS.ELA-Literacy.W.4.2.a:** Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.
- **CCSS.ELA-Literacy.W.4.2.b:** Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
- **CCSS.ELA-Literacy.W.4.2.c:** Link ideas within categories of information using words and phrases (e.g., *another, for example, also, because*).
- **CCSS.ELA-Literacy.W.4.2.d:** Use precise language and domain-specific vocabulary to inform about or explain the topic.
- **CCSS.ELA-Literacy.W.4.2.e:** Provide a concluding statement or section related to the information or explanation presented.
- **CCSS.ELA-Literacy.W.4.4:** Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience
- **CCSS.ELA-Literacy.W.4.5:** With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.
- **CCSS.ELA-Literacy.W.4.6:** With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting.
- **CCSS.ELA-Literacy.W.4.7:** Conduct short research projects that build knowledge through investigation of different aspects of a topic.

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- **CCSS.ELA-Literacy.W.4.8:** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources.
- **CCSS.ELA-Literacy.W.4.9:** Draw evidence from literary or informational texts to support analysis, reflection, and research.
- **CCSS.ELA-Literacy.SL.4.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.
- **CCSS.ELA-Literacy.SL.4.1.a:** Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
- **CCSS.ELA-Literacy.SL.4.1.b:** Follow agreed-upon rules for discussions and carry out assigned roles.
- **CCSS.ELA-Literacy.SL.4.1.c:** Pose and respond to specific questions to clarify or follow up on information and make comments that contribute to the discussion and link to the remarks of others.
- **CCSS.ELA-Literacy.SL.4.1.d:** Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
- **CCSS.ELA-Literacy.SL.4.2:** Paraphrase portions of a text read aloud, or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **CCSS.ELA-Literacy.SL.4.3:** Identify the reasons and evidence a speaker provides to support particular points.
- **CCSS.ELA-Literacy.SL.4.4:** Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

### ISAAC Vision of the Graduate Competencies

**Competency 1:** Write effectively for a variety of purposes.

**Competency 2:** Speak to diverse audiences in an accountable manner.

**Competency 3:** Develop the behaviors needed to interact and contribute with others on a team.

**Competency 4:** Analyze and solve problems independently and collaboratively.

**Competency 5:** Be responsible, creative, and empathetic members of the community.

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#### Unit Content Overview

##### 1. Weathering and Erosion

- Define weathering, erosion, and deposition, and explain how they are related but distinct processes.
- Identify the natural forces that cause weathering and erosion and describe their effects on Earth's surface.
- Observe and analyze patterns in landforms that result from weathering, erosion, and deposition.
- Conduct experiments or simulations to demonstrate the effects of weathering and erosion on different materials.
- Explain how water (e.g., rivers, waves, glaciers) and wind contribute to erosion and deposition.
- Relate weathering and erosion to natural events like landslides, floods, and coastal changes.

##### 2. Earth's Features

- Recognize and describe patterns in Earth's surface features, such as mountain ranges, ocean trenches, and river systems.
- Explain how processes like plate tectonics, erosion, and weathering contribute to the formation and transformation of Earth's features.
- Interpret maps, diagrams, and models to analyze the distribution and patterns of Earth's features.
- Relate the location of geological features, like volcanoes and earthquakes, to the movement of tectonic plates.
- Use knowledge of geological processes to predict how Earth's features might change over time.

##### 3. The Rock Cycle

- Recognize and classify rocks as igneous, sedimentary, or metamorphic based on their characteristics and formation processes.
- Describe the processes involved in the rock cycle, including melting, cooling, weathering, erosion, compaction, cementation, heat, and pressure.
- Explain how geological forces, such as volcanic eruptions, plate movements, and erosion, contribute to the rock cycle.
- Create and interpret diagrams or models that represent the stages and processes of the rock cycle.
- Use evidence from rocks to infer information about Earth's past environments and events.

**Vocabulary and Key Terms:** weathering, erosion, deposition, sediment, rock cycle, igneous rock, sedimentary rock, metamorphic rock, fossil, mineral, magma, lava, crystallization, compaction, cementation, heat, pressure, abrasion, freezing and thawing, chemical weathering, physical weathering, oxidation, glacier, wind erosion, water erosion, gravity, landform, soil, natural forces, geology

**Interdisciplinary Connection:**

- Humanities, ELA

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#### Daily Learning Objectives with TWPS

##### Students will be able to...

- Students will define weathering and erosion and describe how these processes change Earth's surface over time. \*\*
  - *What are some examples of weathering you have seen in your everyday life?*
  - *How do you think erosion can change a river over time?*
- Students will differentiate between physical (mechanical) and chemical weathering and provide examples of each. \*\*
  - *How does physical weathering differ from chemical weathering?*
  - *How does erosion work together with weathering to change landforms?*
- Students will explain how water, wind, ice, and gravity contribute to erosion and observe examples of erosion in real-world scenarios. \*\*
  - *Why do you think weathering is an important process for shaping Earth's surface?*
  - *What natural forces cause erosion, and how do they move materials across Earth's surface?*
- Students will conduct an investigation to demonstrate the effects of weathering and erosion on various materials.
  - *How does erosion work together with weathering to change landforms?*
- Students will analyze how weathering and erosion work together to shape landforms, such as valleys, canyons, and cliffs. \*\*
  - *How do rivers and wind contribute to the formation of landforms like valleys and sand dunes?*
  - *Why are some landforms, like mountains, taller or steeper than others?*
- Students will define deposition and explain how it contributes to the formation of new landforms, such as deltas and sand dunes.
  - *How do changes in Earth's surface features impact the plants, animals, and people living there?*
- Students will use models or maps to identify and describe patterns in Earth's surface features caused by weathering, erosion, and deposition.
  - *What are some different types of landforms, and how do you think they were created?*
- Students will investigate the role of glaciers in shaping Earth's surface, focusing on erosion and deposition.
  - *How do glaciers contribute to the formation of landforms like valleys and sand dunes?*
- Students will summarize how weathering, erosion, and deposition interact to create and reshape landforms over time.
  - *What are some key ideas you would use to teach someone else about the impact of weathering and erosion?*
- Students will identify and classify rocks as igneous, sedimentary, or metamorphic based on their characteristics and formation processes. \*\*\*
  - *How do you think weathering and erosion play a role in the rock cycle?*
  - *What are the three main types of rocks, and how do they form?*
  - *How is the rock cycle like recycling?*

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- Students will describe the stages of the rock cycle and explain how rocks change from one type to another. \*\*
  - *If you could "follow" a rock through the rock cycle, what do you think its journey would look like?*
  - *What clues can rocks and landforms give us about Earth's history?*
- Students will analyze the role of heat, pressure, and time in forming metamorphic rocks.
  - *Why is understanding the processes of weathering and erosion important for protecting Earth's environment?*
- Students will investigate how weathering and erosion play a role in breaking down rocks and contributing to the rock cycle.
  - *How do weathering, erosion, and deposition work together to change Earth's surface over time?*

### **Instructional Strategies/Differentiated Instruction**

- Whole group instruction
- Paragraph frames and sentence starters
- Teacher modeling
- Think-write-pair-share and small-group discussions
- Graphic organizers
- Accountable talk
- Homework
- Word walls with visuals (Venn Diagrams)
- Small group instruction
- Visual exemplars with teacher and student critiques
- Text and video chunking
- Spiraling back to guiding questions
- Multiple CFUs
- Close reading with text-dependent questions

#### **EL Differentiation Strategies**

- Word Banks and Word Walls with visuals
- TWPS (Think, write, pair, share)
- Pre-reading strategies
- Culturally responsive teaching
- Explicit teacher modeling
- Key vocabulary
- Graphic organizers
- Strategic Grouping
- Non-verbal assessments

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#### Assessments

##### **FORMATIVE ASSESSMENTS:**

- Do Now
- Academic Discourse
- Exit Slips
- Accountable Talk Discussions
- Completed notes
- Completed graphic organizers
- Homework
- Performance Task -- “Jack’s Inspiration” Persuasive Stance O Teacher’s rubric/scoring guide

##### **SUMMATIVE ASSESSMENTS:**

- Quiz: Elements of a Story, Story Structure, Text as Evidence (EU1, EU2, and EU3)
- IAB
- Unit Task: Plan a Park (EU1, EU2 and EU3)

#### Unit Task

**Unit Task Name:** Plan a Park

**Description:** Upon completing the unit students will create a model and informational presentation for a fictional national park that showcases examples of weathering, erosion, deposition, and the rock cycle in action. Students will create a 3D model, diorama, or detailed drawing of their national park. The park must include at least three landforms created by weathering, erosion, or deposition (e.g., canyon, sand dune, delta). The model should also include examples of at least two types of rocks (igneous, sedimentary, metamorphic) and labels explaining how they formed within the rock cycle. Students will create an informational brochure or poster to accompany their park model. The brochure must include:

- Descriptions of the park’s landforms and how they were shaped by weathering, erosion, or deposition.
- An explanation of the rock cycle and how the rocks in the park were formed.
- Details about how visitors can see the processes of weathering and erosion in action.
- Suggestions for how humans can help preserve the park's features and prevent excessive erosion or environmental damage.

**Evaluation:** Teacher’s Scoring Guide

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#### **Unit Resources**

- Google Classroom
- NewsEla Articles
- ReadWorks Articles
- Google Slides (Teacher's)
- Student Journals
- Chromebooks
- Graphic Organizers
- Vocabulary Wall
- Science Kits