

## Grade 4 Science - Rocks & Minerals Lesson Plan

**Unit:** Earth and Space Systems

**Time Required:** 6 Days

### Ontario Curriculum Expectations

- A1.1 use a scientific research process and associated skills to conduct investigations
- A1.4 follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials
- A1.5 communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes
- E2.1 explain geological processes that result in the formation of igneous, sedimentary, and metamorphic rocks, using the rock cycle
- E2.2 describe the physical properties of igneous, sedimentary, and metamorphic rocks
- E2.4 describe everyday uses of rocks and minerals

### **Learning Goals**

- Understand the different types of rocks based on their formation.
- Discover and communicate the various everyday uses of rocks and minerals based on their properties.
- Investigate different types of rocks based on their formation and properties while following safety procedures.

### **Cross Curricular Expectations**

## **Language**

D1. Developing Ideas and Organizing Content - plan, develop ideas, gather information, and organize content for creating texts of various forms, including digital and media texts, on a variety of topics

D2. Creating Texts- apply knowledge and understanding of various text forms and genres to create, revise, edit, and proofread their own texts, using a variety of media, tools, and strategies, and reflect critically on created texts

D3. Publishing, Presenting, and Reflecting - select suitable and effective media, techniques, and tools to publish and present final texts, and critically analyze how well the texts address various topics

## **Visual Arts**

D1. Creating and Presenting: apply the creative process to produce a variety of two- and three-dimensional art works, using elements, principles, and techniques of visual arts to communicate feelings, ideas, and understandings

## **VOCABULARY**

- Igneous rock
- Sedimentary rock
- Metamorphic rock
- Magma
- Lava
- Weathering

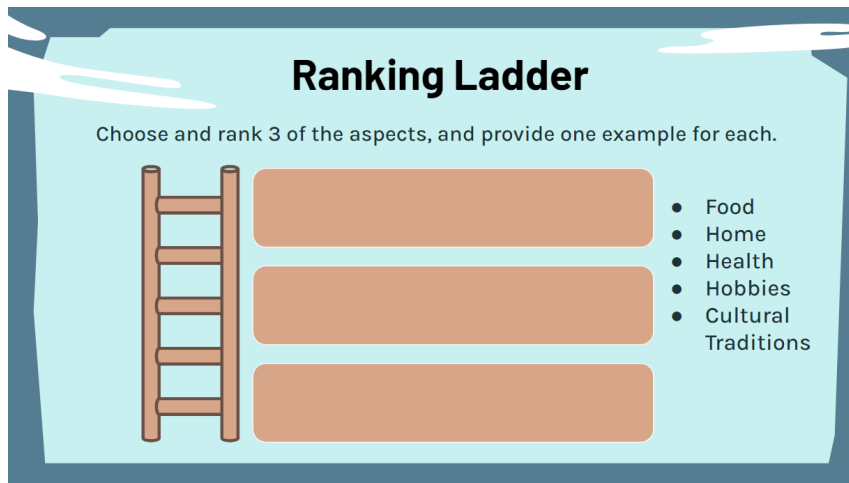
- Erosion
- Deposition
- Compaction
- Cementation
- Sediments
- Metamorphism

### PART 1: MINDS-ON

Imagine there were a shortage of rocks and minerals, which aspect of your life would be affected the most: food, home, health, hobbies, or cultural traditions?

Using a Ranking Ladder, students will choose and rank the three aspects that would be most affected by a shortage of rocks and minerals:

- Food
- Home
- Health
- Hobbies
- Cultural traditions



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Students will also provide a specific example for each of the three choices to demonstrate their knowledge and understanding of rocks and minerals, and their properties. They will write their response in their own science journal.

As students learn more about the types of rocks and their properties, they will be given opportunities to adjust their initial response to the overarching inquiry question in their science journal. Students' reflections in the science journal will be used to create their final task.

## PART 2: ACTION (DAY 1)

*(What is the teacher doing? What are the students doing?)*

### INPUT/MODELLING DEMONSTRATION

#### What is a rock?

- a solid material formed by nature that is made of minerals
- found everywhere, including beneath the earth's surface

#### Types of rocks

- classified based on how they are formed
- 3 types: igneous, sedimentary, metamorphic

#### Igneous Rocks

- rocks that have formed through the cooling and hardening of lava and magma
- upper section of the earth's crust made up of 95% igneous rock
- *Ask students, "If igneous rocks are formed from hardened magma, where do we expect to see them the most?"*
- Example: Basalt
  - most common type of rock in the earth's crust
  - Most of the ocean floor is made up of basalt.
  - In Hawaii, there is a large shield volcano called Mauna Loa. It is made of basalt.  
The lava that comes out of the Mauna Loa volcano is called basaltic lava.
  - Used in roadways, sculptures, and flooring

#### Sedimentary Rocks

- Made when sand, mud and pebbles get compressed in layers

- Can be found all over the earth's surface, but not very common in the earth's crust
- Example: Limestone
  - Made up of bits and pieces from animal shells
  - Over time, shells that collect on the ocean floor are compressed with mud into layers and into limestone.
  - *Ask students, "If limestones are formed from animal shells, what may we find in this type of rock?"* Limestone often contains fossils of plants and animals.
  - Used to make cement, roads, and fertilizer for plants

### **Metamorphic Rocks**

- Formed when igneous and/or sedimentary rocks have been exposed to high temperature and pressure - a process called metamorphism
- Example: Marble
  - Made from the sedimentary rock, limestone
  - Has a unique, swirl pattern due to the clay, silt, and sand that was originally part of the limestone
  - *Ask students, "Where do you commonly see marbles?"* Commonly used in sculptures, countertops, floors because durable (considered an expensive building material)

### **PRACTICE**

#### **Materials:**

- Enough samples of coal, basalt, sandstone, and marble so that each group has one of each

- A small magnifying glass for each group

### **Activity: Coal Formation**

In groups of 3 or 4, investigate how coals are formed by identifying which type of rock it is.

Compare coal to basalt, sandstone, and marble by looking at the observable traits of each  
*(provide students a real sample of each).*

- Which rock is coal closest to? Why?
- Based on your answer to the first question, how do you think coals are formed?

### **Safety Guidelines**

- Handle rock samples and use the magnifying glass carefully. Do not throw, drop or hit the rocks against each other.
- Do not taste or put the samples in your mouth.
- Wash your hands thoroughly after the activity.
- If a rock sample or magnifying glass breaks, do not touch or step on the broken pieces. Inform others in the area about the broken pieces to avoid accidents. Immediately ask your teacher for help in safely cleaning up the broken pieces.

### **Science Journal**

Give students time to review and adjust their initial response to the minds-on inquiry question based on what they've learned from this lesson.

## PART 2: ACTION (DAY 2)

*(What is the teacher doing? What are the students doing?)*

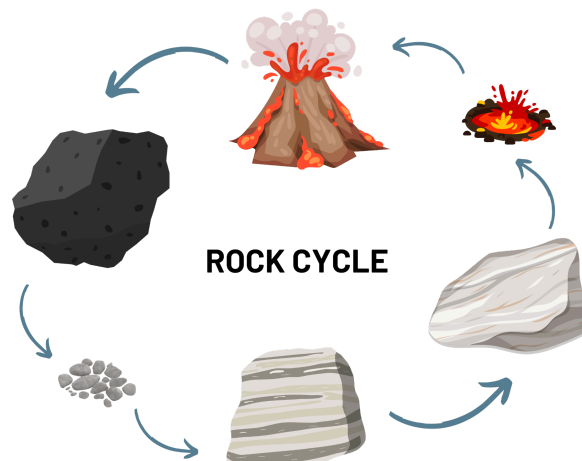
### INPUT/MODELLING DEMONSTRATION

#### The Rock Cycle

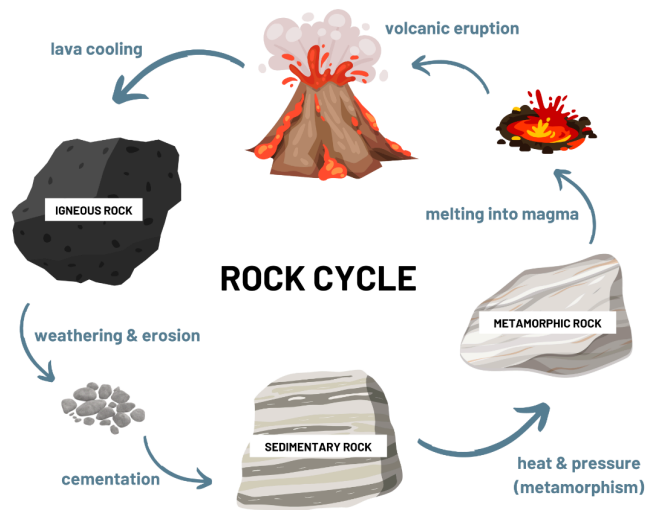
- In groups of 3 or 4, ask students to predict and draw what the rock cycle looks like based on what they've previously learned about the different types of rocks. Include and label the following elements:
  - igneous rocks
  - sedimentary rocks
  - metamorphic rocks
  - volcanic eruption
  - sediments
  - lava cooling
  - weathering & erosion
  - heat & pressure
  - melting into magma
- Review the key components of the rock cycle and complete the diagram below with students
  - Igneous rocks are formed through the cooling and hardening of lava.
  - When rocks are broken into tiny particles by weathering and erosion, they become sediments.



- When sediments are pressed together over time through a process called cementation, they can become sedimentary rocks.
- Due to weathering and erosion, rocks may be buried deep underground, which subjects them to a huge amount of heat and pressure. This process, called metamorphism, transforms igneous and sedimentary rocks into metamorphic rocks.
- If exposed to high heat, metamorphic rocks may melt into magma, which can move to the surface through a volcanic eruption. The magma becomes lava, and the hardened lava becomes igneous rocks again.



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### **PRACTICE (DAY 3)**

#### **Activity: Rock Collection**

- This activity will be done in pairs.
- Visit a nearby park and ask students to collect five different-looking rocks.
  - If you can't go to a park as a class, have students do this as a homework assignment with their guardian. Alternatively, as the teacher, you can bring in rocks from around your community.
- Provide students with three samples from each type of rock. Have them compare their collection to the samples provided and make a prediction about which type of rock their collection belongs to. Ask them to explain their answers.
- Put aside the students' collections for the next lesson, when they will investigate the properties of the rocks they collected.

## **Safety Guidelines**

### Before the Trip

- Obtain permission from the office and let them know the date, time and location.
- Inform parents of the trip and ensure all students have signed permission slips.
- Collect emergency contact information for each student.
- Ask parents if they are able to help supervise students during the trip. Find two or three volunteers depending on the size of your class.
- Prepare to bring a fully stocked first aid kit.
- Remind students to handle rock samples carefully.
  - Do not throw, drop or hit the rocks against each other.
  - Do not taste or put rocks in your mouth.

### During the Trip

- Pair students up to stay with their buddies at all times.
- Set clear boundaries for where students can go.
- Remind students of the proper way to handle and collect rocks.
- If a rock breaks, do not touch or step on the broken pieces. Inform others in the area about the broken pieces to avoid accidents. Immediately ask your teacher for help in safely cleaning up the broken pieces.
- Remind students not to leave any garbage behind and to dispose of it properly.

### After the Trip

- Ask students to wash their hands thoroughly after the activity.
- Inform parents about the success of the trip and any incidents.

## PART 3: CONSOLIDATION (DAYS 4, 5 & 6)

### **Storytelling Rocks!**

Students will independently create a 5-minute short story narrating how their life would change if there were a shortage of rocks, to demonstrate their understanding of the importance of rocks in our daily lives.

- They will need to include at least 3 different rocks from each type of rock (igneous, sedimentary, and metamorphic) and explain their uses based on their properties.
- They will have to include at least three of the following aspects and provide an example for each: home, health, food, hobbies, and cultural traditions.
- They must include a drawing depicting how their lives would be affected by a shortage of rocks. This drawing must be included in their slides or video presentation as one of their visual aids.

There are two options to submit and share their story:

- By reading their story with visual aids or slides
- By creating a video with voice-over narration and images

### **Criteria for the Story**

- Clarity and Accuracy
  - Is the story well organized and easy to understand?
  - Are the facts accurate and well-researched?
- Engagement
  - Is the medium used effectively to catch the audience's attention?
  - Do the visuals and audio used make the message memorable?

- Persuasiveness
  - Are personal examples relevant and meaningful?
  - Is there a call to action?

*Note: Days 4 & 5 are dedicated for students to work on the task. Day 6 is for presentations.*

## References

- *Rocks and Minerals - Geology (U.S. National Park Service)*. (n.d.).  
<https://www.nps.gov/subjects/geology/rocks-and-minerals.htm>
- *National Geographic - Rocks*. (n.d.).  
<https://www.nationalgeographic.com/science/article/rocks>
- *National Geographic - The Rock Cycle*. (n.d.).  
<https://education.nationalgeographic.org/resource/rock-cycle/>

I recommend the following videos as a resource:

- Hopscotch. (2022, November 29). *The Rock Cycle song* [Video]. YouTube.  
<https://www.youtube.com/watch?v=IKXP3vGy0as>
- Learn Bright. (2022, February 9). *Rocks for Kids | Learn all about geology and rocks* [Video]. YouTube. <https://www.youtube.com/watch?v=xsHPA2GNF9Q>
- Miacademy Learning Channel. (2023, July 26). *The Rock Cycle - Elementary Science for Kids!* [Video]. YouTube. <https://www.youtube.com/watch?v=IsoV6KG42fE>