

Earth & Space Science

—— Grade 4 ——

Written by Tracy Bellaire

The activities in this book have two intentions: to teach concepts related to earth and space science and to provide students the opportunity to apply necessary skills needed for mastery of science and technology curriculum objectives.

The experiments in this book fall under thirteen topics that relate to three aspects of earth and space science: **Rocks, Minerals, and Erosion, Weather, and Waste and Our World.** In each section you will find teacher notes designed to provide you guidance with the learning intention, the success criteria, materials needed, a lesson outline, as well as provide some insight on what results to expect when the experiments are conducted. Suggestions for differentiation are also included so that all students can be successful in the learning environment.



Tracy Bellaire is an experienced teacher who continues to be involved in various levels of education in her role as Differentiated Learning Resource Teacher in an elementary school in Ontario. She enjoys creating educational materials for all types of learners, and providing tools for teachers to further develop their skill set in the classroom. She hopes that these lessons help all to discover their love of science!

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Published in Canada by:
On The Mark Press
15 Dairy Avenue, Napanee, Ontario, K7R 1M4
www.onthemarkpress.com



Learning Intentions

	Rock Types	Fossils	Exploring Minerals	Mining	Fun with Rocks	Experimenting with Erosion	Erosion Prevention!	Weather Patterns	Precipitation	Weather Instruments	Waste	Managing Waste	Reduce, Reuse, Recycle!
Knowledge and Understanding Content													
Describe the three different rock types and discover the types that are in the neighborhood	.												
Locate a fossil, describe the fossil formation process, and explain how they help us to understand Earth's history		.											
Identify minerals and describe them according to their properties; conduct a rock study			.										
Identify the uses of a mineral, the methods of extraction, and the societal and environmental impacts of mining it				.									
Determine the presence of carbonates, and the presence of magnetic minerals in rocks					.								
Describe effects of wind, water, and ice on our landscape						.							
Determine the signs of erosion and describe the techniques to prevent it from occurring							.						
Determine different types of weather and describe daily weather patterns								.					
Describe the water cycle and create an instrument to measure weather in terms of precipitation									.				
Create instruments to measure weather in terms of wind speed and direction										.			
Determine the waste that is a result of human activity versus plant and animal waste, and describe how waste is managed in the natural world											.		
Identify types of waste and describe how it is managed												.	
Identify materials that can be reused or recycled, and describe methods of reduction in order to decrease waste													.
Thinking Skills and Investigation Process													
Make predictions, formulate questions, and plan an investigation				
Gather and record observations and findings using drawings, tables, written descriptions
Recognize and apply safety procedures in the classroom
Communication													
Communicate procedures and conclusions of investigations using demonstrations, drawings, and oral or written descriptions, using science and technology vocabulary
Application of Knowledge and Skills to Society and the Environment													
Assess the benefits and drawbacks of using objects that are made from extracted rocks and minerals				.									
Analyze the environmental and societal impact of extracting and refining rocks and minerals				.									
Analyze the natural occurrences and human activity that cause changes to landscape and the methods to control it						.	.						

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FUN WITH ROCKS

LEARNING INTENTION:

Students will learn about the presence of carbonates, and the presence of magnetic minerals in certain rocks.

SUCCESS CRITERIA:

- conduct a test to determine the presence of calcite in a sedimentary rock
- record observations in a chart using pictures
- make a conclusion about the type of sedimentary rock
- conduct a test to determine the presence of magnetic minerals in rocks
- research types of minerals in rocks that are magnetic, record findings in a chart

MATERIALS NEEDED:

- a copy of “Testing for Limestone” Worksheet 1 and 2 for each student
- a copy of “What’s in that Rock?” Worksheet 3 for each student
- 3 different sedimentary rocks, 3 glass jars, 300 mL of white vinegar, 2 magnifying glasses, a measuring cup (for each pair of students)
- a mixture of rocks (varying in type and color), a strong magnet (for each pair of students)
- masking tape, markers, chart paper, pencils

PROCEDURE:

***This lesson can be done as one long lesson, or be divided into two shorter lessons.**

1. Give students Worksheets 1 and 2 and materials to conduct the experiment (ensure that each pair of students has a piece of limestone). Read through the materials needed and what to do section to ensure their understanding of the task. Upon completion of the experiment, students will determine if any of their sedimentary rocks are limestone.

Some interesting facts to know why scientists would want to know determine sedimentary rock as limestone and about the presence of calcite:

- it is used in the construction industry
- calcite is used in antacid tablets to reduce stomach acid
- calcite is used as a whitening agent in paint, and to remove stains in clothing
- ground limestone is sprayed on the walls in coal mines to reduce the dust in the air, it also reflects light in the dark mine

2. Give students Worksheet 3 and the materials to conduct the investigation. Upon completion of the investigation, students will access the internet to research the types of minerals that are present in certain rocks that make them magnetic.

DIFFERENTIATION:

Slower learners may benefit by working as a small group with teacher direction and support in order to provide accurate observations while conducting the experiments. This would result in one record of information, which could be done together, using chart paper and markers. An additional accommodation may be to only have them conduct one of the two experiments.

For enrichment, faster learners could describe some common uses of rocks and minerals, explaining how they are used within the school, at home, or in the community.

Testing for Limestone

You have learned that limestone is a sedimentary rock. Can you tell it apart from other sedimentary rocks? Let's try this simple test to see if a sedimentary rock is limestone!

You'll need:

- 3 different looking sedimentary rocks
- 3 glass jars
- 300 mL of white vinegar
- a magnifying glass
- a measuring cup

What to do:

1. Place a sedimentary rock in each of the glasses.
2. Pour 100 mL of vinegar into the measuring cup.
3. Pour the vinegar over the sedimentary rock in the first glass.
4. Using your magnifying glass, observe what happens in the glass.
5. Record your observations on Worksheet 2.
6. Repeat steps 2 through 5 for each of the remaining rocks.
7. Make a conclusion about which of the rocks may be limestone. Record it on Worksheet 2.



Let's Observe

Rock #1	Rock #2	Rock #3
This is what it looked like when I poured the vinegar over it:	This is what it looked like when I poured the vinegar over it:	This is what it looked like when I poured the vinegar over it:
Did you see any tiny bubbles? _____	Did you see any tiny bubbles? _____	Did you see any tiny bubbles? _____

Bubbling is a sign of a chemical reaction. Vinegar and the mineral **calcite** will create carbon dioxide. If you saw bubbles then the rock is limestone because it contains the mineral calcite.



Let's Conclude

Were any of the rocks you tested limestone? Explain your results. _____
