

Grade 4

Science



Unit: Rocks and Minerals

Activity Outlines

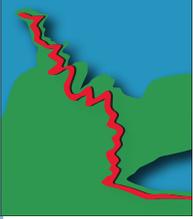
Sponsors

**TD Friends of the Environment
Giant's Rib Discovery Centre**

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Activity Outlines

Activity 1 - A Journey to the Niagara Escarpment and the Muskoka Lakelands

Expectations

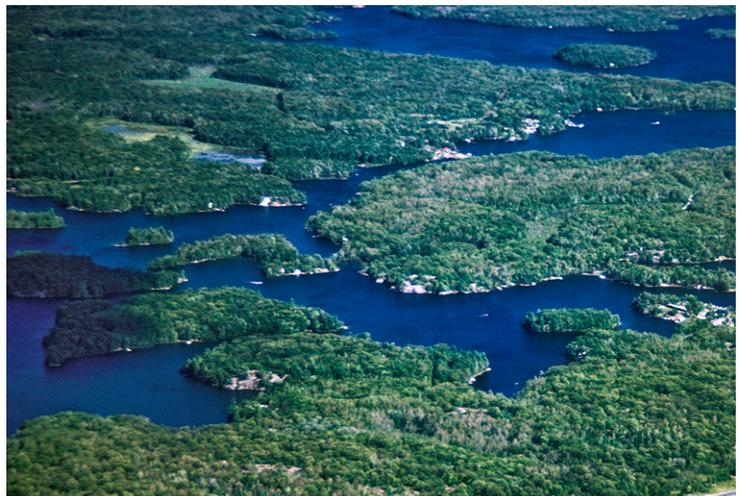
- 2.6 use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes (e.g., use a graphic organizer to show how rocks and minerals are used in daily life)

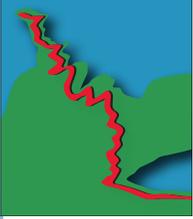
Description

Students are taken on a virtual field trip of two distinct regions of Ontario, the Niagara Escarpment and the Muskoka Lakelands, through the use of a QuickTime movie. The movie will contain aerial and ground level images of the two regions showing how they are different in their appearance, geology, uses, and landscapes.

After viewing the movie, students are asked to write a description (Language & Literacy linkage) and/or draw sketches (Arts linkage) that show how these two regions are different from one another.

Timing: 1 Hour





Activity 2 - Different Places, Different Rocks

Expectations

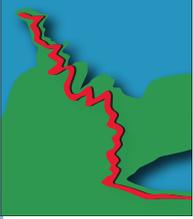
- 2.5 use appropriate science and technology vocabulary, including hardness, colour, lustre, and texture, in oral and written communication
- 3.2 describe the properties (e.g., colour, lustre, streak, transparency, hardness) that are used to identify minerals
- 3.3 describe how igneous, sedimentary, and metamorphic rocks are formed (e.g., igneous rocks form when hot, liquid rock from deep below the earth's surface rises towards the surface, cools, and solidifies; sedimentary rocks form when small pieces of the earth that have been worn away by wind and water accumulate at the bottom of rivers, lakes, and oceans and are eventually compressed into rock; metamorphic rocks form when igneous or sedimentary rocks are changed by heat and pressure)
- 3.4 describe the characteristics of the three classes of rocks (e.g., sedimentary rocks often have flat or curved layers, are composed of pieces that are roughly the same size with pores between the pieces, and often contain fossils; igneous rocks have no layers, are usually made up of two or more minerals whose crystals are different sizes, and normally do not contain fossils; metamorphic rocks may have alternating bands of light and dark minerals, may be composed of only one mineral, such as marble or quartzite, and rarely contain fossils), and explain how their characteristics are related to their origin



Description

Using either actual rock samples or a second QuickTime movie, students identify the major characteristics of rocks found in the Muskoka Lakelands and along the Niagara Escarpment. In sequence, students examine and learn the origins of igneous, metamorphic, and sedimentary rocks. They associate the different rock classes with the two regions - igneous and metamorphic in the Muskoka Lakelands, and sedimentary on the Niagara Escarpment. In the process, they become familiar with, and create a list of, key characteristics that can be used to classify rock samples into the different rock classes.

Timing: 1 Hour



Activity 3 - Rocks - Which Class?

Expectations

- 2.3 use a variety of criteria (e.g., colour, texture, lustre) to classify common rocks and minerals according to their characteristics
- 3.4 describe the characteristics of the three classes of rocks (e.g., sedimentary rocks often have flat or curved layers, are composed of pieces that are roughly the same size with pores between the pieces, and often contain fossils; igneous rocks have no layers, are usually made up of two or more minerals whose crystals are different sizes, and normally do not contain fossils; metamorphic rocks may have alternating bands of light and dark minerals, may be composed of only one mineral, such as marble or quartzite, and rarely contain fossils), and explain how their characteristics are related to their origin



Description

After a quick review of the last activity, students use the list of characteristics of different rock classes to identify/classify additional visual or actual rock samples that they have not seen before and provide reasons for their classification for each of the samples.

Timing: 1/2 Hour

Activity 4 - Minerals: Building Blocks of Rocks

Expectations

- 2.2 use a variety of tests to identify the physical properties of minerals (e.g., hardness [scratch test], colour [streak test], magnetism)
- 3.1 describe the difference between rocks (composed of two or more minerals) and minerals (composed of the same substance throughout), and explain how these differences make them suitable for human use
- 3.2 describe the properties (e.g., colour, lustre, streak, transparency, hardness) that are used to identify minerals



Description

Students view a QuickTime movie, or handle actual samples of granite and sandstone rocks. These samples are examined closely to discover the various minerals that make up these two rock types. For granite, the common minerals would be quartz, feldspar, and mica. For sandstone, it would be small grains of sand cemented together, and largely made up of quartz, but also feldspar. Based on this investigation, students reach the conclusion that rocks are made up of one or more minerals.

Timing: 1/2 Hour



Activity 5 - Quarries, Mines, and Pits: Obtaining Rocks and Minerals

Expectations

- 1.2 analyse the impact on society and the environment of extracting and refining rocks and minerals for human use, taking different perspectives into account

Description

Various aerial and ground level photographs are used to show students how various minerals are obtained from earth's crust. Shaft and open pit mines in the Canadian Shield, quarries in the Niagara Escarpment, and sand and gravel pits are included to show the different ways Ontario's rocks and minerals are obtained for human use and make note of the impact each type of mine has on the natural environment. The types of mines are then related to specific types of minerals and rocks. Students produce a graphic display to illustrate the types of mines and their associated products as well as the comparative environmental impact of each.

Timing: 1-1 1/2 Hours

Activity 6 - Using Rocks and Minerals

Expectations

- 2.4 use scientific inquiry/research skills to investigate how rocks and minerals are used and disposed of in everyday life
- 3.1 describe the difference between rocks (composed of two or more minerals) and minerals (composed of the same substance throughout), and explain how these differences make them suitable for human use

Description

Students view photos of various products and uses made from rocks and minerals from Ontario. These products include those made from rocks (granite kitchen counters) to minerals (nickel coins). As they view the photos, they record the various products in one column of a two column organizer. After viewing the photos, they work in small groups to identify the specific rock or mineral that was used to make the product. A general class discussion is then used to share information to see if all the source rocks or minerals used to produce the products can be correctly identified by students.

Timing: 1 Hour





Activity 7 - Rocks and Minerals in the Classroom, Home, Neighbourhood

Expectations

- 1.1 assess the social and environmental costs and benefits of using objects in the built environment that are made from rocks and minerals
- 2.4 use scientific inquiry/research skills to investigate how rocks and minerals are used and disposed of in everyday life

Description

Students work individually or in pairs to identify various products in their classroom, their home, or their neighbourhood that are made from rocks or minerals. They record their findings in a two column organizer, with column one being the products and column two to indicate, where possible, whether Ontario could be the source of the rocks or minerals used to make these products. As a final reflection, students are asked to identify how important such products are in their lives.

Timing: 1/2 Hour

Activity 8 - The Niagara Escarpment: A World Biosphere Reserve

Expectations

- 1.1 assess the social and environmental costs and benefits of using objects in the built environment that are made from rocks and minerals
- 2.4 use scientific inquiry/research skills to investigate how rocks and minerals are used and disposed of in everyday life

Description

Using the Internet (if available and convenient to use) or the information sheets provided, students answer the questions: “What is a Biosphere Reserve?” and “Why was the Niagara Escarpment made a Biosphere Reserve?” They learn that one of the key reasons for establishing such reserves is to encourage the preservation of natural habitats from threats due to human activities. They also discover that as a result of being declared a biosphere reserve, there are many groups and organizations that have been created in Ontario with the purpose of protecting the physical and biotic features of the Niagara Escarpment.

Timing: 1/2 Hour





Activity 9 - Human Impacts on the Niagara Escarpment

Expectations

- 1.1 assess the social and environmental costs and benefits of using objects in the built environment that are made from rocks and minerals
- 1.2 analyse the impact on society and the environment of extracting and refining rocks and minerals for human use, taking different perspectives into account
- 2.4 use scientific inquiry/research skills to investigate how rocks and minerals are used and disposed of in everyday life



Description

Using a set of aerial and ground level photos and a four column organizer, students identify various human impacts and uses of the Niagara Escarpment. In column one of the organizer, they identify the impact or use as they analyse each photo. When completed viewing the photos, students work in pairs or small groups to assess whether each of the impacts or uses has a positive or negative impact on the natural environment. In the third column, they give a reason for their assessment. As a final step, each group decides how to rank the items on their list from most positive (#1) to most negative (highest number). The groups then share their two most positive and two most negative uses and try to reach a class consensus on which are the most justifiable rankings, positive and negative.

Timing: 1 Hour

Activity 10 - The Health of the Niagara Escarpment in Your Area

Expectations

- 1.1 assess the social and environmental costs and benefits of using objects in the built environment that are made from rocks and minerals
- 1.2 analyse the impact on society and the environment of extracting and refining rocks and minerals for human use, taking different perspectives into account

Description

Students work in small groups to decide how the Niagara Escarpment in their area has been impacted by human activities. Using locally available resources and their own knowledge of the local area in which they live, they assess how much the natural environment has been preserved, or has been disrupted, by human activities. They investigate both the positive and the negative sides of this issue.

The class is then asked to use their assessment to debate the issue by taking one side or the other (either orally or in written form), write a letter to the local MPP expressing their concern about the escarpment, write an opinion column or editorial for a local newspaper, or outlining a plan to use to help preserve or improve the natural environment of the Niagara Escarpment.

This activity could serve as a culminating activity for the unit and would also create links to Language Development and Literacy Skills.

Timing: 1 1/2 - 2 Hours