Earth materials

Duration
60 minutes

Lesson overview
Students are introduced to how materials on Earth are interconnected. They choose a natural object to explore and use that object to draw connections. This lesson provides a foundation for exploring the rock cycle—and the energy related to cycles—in more depth.

Objectives
Students will be able to:

• make and record observations about a chosen object from the Earth
• communicate findings about a chosen object from the Earth
• identify connections between Earth materials
• provide examples of natural cycles and cyclical patterns
• consider what they know about the rock cycle and generate questions for future exploration

What you’ll need
• student-selected materials from the Earth
• Science notebook or Earth Materials Student Handout (see lesson notes)

Preparation
• Have students bring an object connected to the Earth before beginning this lesson (see lesson notes).
• Review the Earth Materials Student Handout
• Consider using the Earth Materials Student Handout to guide and provide structure to students taking their own notes in their Science notebooks, or alternatively, print a class set of the student handout (see lesson notes).
Lesson notes

This module explores Earth materials and cycles—and our interconnectedness with these cycles—through an exploration of the rock cycle and energy. This lesson is a starting point to consider different Earth materials, how these materials connect to each other and how they connect with cycles on Earth. Lesson 2 will provide a more in depth look at the rock cycle.

Student handouts are provided throughout the module where they support the learning. A more student-centered, personalized learning approach may include students representing their learning in forms they choose themselves. Teachers are encouraged to use strategies and methods that will best support their students and classrooms. Notes are provided in each lesson reminding teachers of the option to either print class sets of handouts or use the handout as a guide for students taking their own notes and working with a Science notebook approach.

Earth materials

The Earth's crust is composed of a wide variety of rocks, which, in addition to minerals, soil and water, are referred to as Earth materials. Providing the building blocks for agriculture and industry, these are the raw materials that support life.

These materials are part of Earth's natural cycles. The Earth is a closed material system; while energy (e.g. energy from the sun) can enter and leave, material does not (except for occasional matter from space). There are numerous, interconnected material cycles on Earth and changes within one cycle have an effect on other cycles, along various timelines. From water, weather and seasons, to carbon and fossil fuels, life on Earth depends on the continued cycling of materials and the processes that connect them locally and globally.

Connections to energy

Earth's cycles have a common connection to energy; energy is required, generated and/or transformed at different points in the cycles. The sun, Earth's primary source of energy, drives Earth's cycles. Without the sun, life on Earth, as we know it, wouldn't exist. Earth's cycles provide us with energy and materials we use to generate energy in our everyday lives.

Connecting to Earth

Before starting this lesson, ask students to bring an object from the Earth to share with the rest of the class. The object should have a close link to the Earth (e.g. rock, shell, stick, feather, etc.) and you may want to suggest they choose something meaningful to them. For example, something collected on a special trip as a memento are examples. This object will be used in this and subsequent lessons, so it should be something they can keep at school for the duration of the module. Students will have an opportunity to think about how their chosen Earth objects are connected to Earth's basic materials.

Word list

cycle          Earth materials          minerals          rock          rock cycle          soil           water

Lesson activities

Activity 1: Earth materials – sharing our objects (20 minutes)

- Have students form groups of two or more and have each student share the Earth material object they brought to class and discuss the following:
  - Explain what their object is.
  - Share why they chose to bring it to class.
  - Consider how it is connected to the Earth.
Activity 2: Earth materials – observations and connections (25 minutes)

• Individually, have students make observations about their objects and record these in their Science notebooks or on the Earth Materials Student Handout (Question 1).

• With a partner, have students continue with Question 2, comparing their objects and noting similarities and differences on a Venn diagram. Some suggestions to consider:
  - What do the objects look like (colour, shape, size, etc.)?
  - What do they feel like (texture, weight, etc.)?
  - Were the objects from something that was living?
  - How are the objects connected to the Earth?

• Explain that all of Earth's materials are connected in some way. As a class, discuss some of the possible connections between objects. Listen to a few ideas and then provide the following example:
  - Think about a rock, a snail shell and a piece of bark from a tree. Ask students how they think the items might be connected? Some possible responses are:
    - All the items are hard to the touch. They may have similar textures or colours.
    - One of the items is non-living material (rock) and the other two items were once part of living things (bark and snail shell).
    - Both the snail shell and bark were both used as protection. The bark of a tree provides protection to the softer, inner layers of the tree and the snail shell protected the soft body of the snail.
    - Rocks form over thousands of years and are part of the Earth's surface. Rocks provide hiding places for snails and sometimes minerals that enrich the soil, helping the tree to grow.
    - There are often layers of connections between Earth materials.

• Have pairs of students form a group with another pair so they now have four objects to consider. Have students explore how their items could be connected or sorted into groups, and complete Question 3 in their notebooks or on their Earth Materials Student Handout.

• As a class, have a volunteer from each group explain how they sorted the objects and why.

• Ask students to identify any patterns they’ve observed.
Activity 3: Earth materials and the rock cycle (15 minutes)
• Write the following terms on the board: plants, animals and other. Explain that this could be a simple way of sorting and grouping all the students’ objects.
• Have students consider their object and then form three groups based on the above sorting guidelines.
• Review the three groups as a class, and make any corrections as needed.
• Ask students to look at the objects in the “other” category. Some points of discussion may include:
  - Ask students where they think these objects come from.
  - There are four main types of Earth materials (components of the Earth’s crust): minerals, soil, rock and water. These materials combine to make life on Earth possible, and are the basis of the energy and materials we use in our daily lives.
  - All things on Earth are connected in some way. All of the objects brought to class can be traced back to a connection to Earth’s materials.
  - Earth’s materials are finite and cycle through the environment. Ask students to consider how water cycles through the environment, as an example. Can they think of any other examples of Earth cycles (or things in nature that happen in a cyclical pattern? e.g. seasons, biological life cycles, etc.
• Explain to students they are going to explore the rock cycle in Lesson 2. In preparation, have students complete questions 4 and 5 in their Science notebooks or on their Earth Materials Student Handout.

Assessment
• Assess students’ participation, collaboration, communication and capacity to make observations and find patterns during activities 1 and 2.
• Review students’ Science notebooks or collect the Earth Materials Student Handout and assess for completion, effort and understanding.
• Assess students’ prior knowledge about the rock cycle in Activity 3.

Extensions
• Have students go on an outdoor scavenger hunt for evidence of Earth materials in the school yard or another community space. Have them record their observations and share back in the classroom.
• Have students write a story or poem about their object, describing how it connects to the Earth.
Definitions

cycle: a complete series of events or occurrences that are continuously repeated

Earth materials: the Earth's crust has four main components, which are referred to as Earth’s materials: minerals, rocks, soil and water

minerals: solid substances with a specific chemical structure that occur naturally on Earth, either made up of a single element or from a combination of elements

rock: the solid mineral material forming part of the surface of the Earth and other similar planets, exposed on the surface or underlying the soil or oceans

rock cycle: a continuous process by which rocks are created, changed from one form to another, destroyed, and then formed again

soil: the loose, top layer of the Earth's surface in which plants grow; a black or dark brown material typically consisting of a mixture of organic remains, clay and rock particles

water: the liquid that supports all life on Earth and cycles through the air, rivers, lakes, oceans, land and all living creatures