



## **“That’s the Truth” Episodes #21-25 Backgrounder**

**Episode 21: “Rock On!” (Intro to the Rock Cycle)**

**Episode 22: “Call Me Iggy” (Igneous Rocks)**

**Episode 23: “Sedimental Journey” (Sedimentary Rocks)**

**Episode 24: “Metamorphosis” (Metamorphic Rocks)**

**Episode 25: “That’s a Wrap” (That’s the Truth Series Conclusion)**

**TOPIC:** Rock Cycle/Rock Types

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### **CURRICULUM CONNECTIONS**

Kindergarten: Environment and Community Awareness

Grade 2 Science Topic D: Hot and Cold Temperature

Grade 3 Science Topic A: Rocks and Minerals

Grade 4 Social Studies: Alberta – A Sense of the Land

Grade 5 Social Studies: Physical Geography of Canada

## Quick Facts

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- There are three main types of rocks: sedimentary, igneous, and metamorphic
- Each of these rocks are formed by physical changes—such as melting, cooling, eroding, compacting, or deforming—that are part of the rock cycle.
- The rock cycle is the process by which one type of rock becomes another.
- Plate tectonic movement is responsible for the recycling of rock materials and is the driving force of the rock cycle.
- Each group contains a collection of rock types that differ from each other on the basis of the size, shape, and arrangement of mineral grains.
- **Igneous rocks** come from **magma**, a hot material in the Earth’s crust. When magma reaches the Earth’s surface, usually out of a volcano, it’s called **lava**. When it cools, it becomes igneous rocks.
- Sedimentary rocks are formed from loose sediment over millions of years. Sediment is any solid material that gets moved from one place to another.
- Rocks and minerals can be sediment. Plant and animal remains can be sediment, too. Sediment can be as small as a grain of sand or as large as a boulder. Over time, sediment builds up and becomes sedimentary rock.
- The Earth’s surface is composed of 75% sedimentary rock.
- Badlands, which are found in several parts of Canada, are examples of sedimentary rock formations. They tend to form in areas where rain tends to fall in short bursts, like in a thunderstorm
- Metamorphic rocks are igneous or sedimentary rocks that have been transformed by pressure or heat. The heat and pressure can come from inside the Earth, from the shifting of the Earth’s crust or from radioactive decay. These forces change the rock’s structure.
- Most rocks begin as igneous rocks. Over time, wind and water break them up into sediment. This is called **erosion**. As sediment piles up, it becomes sedimentary rocks. Eventually, these rocks are covered up and become part of the Earth’s crust. There, heat and pressure build up and turn these rocks into—you guessed it!—metamorphic rocks.

## Discussion Questions

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- What are the three main types of rocks?
- How are sedimentary rocks formed?
- What are some examples of sedimentary rock?
- How are metamorphic rocks formed?
- What are some examples of metamorphic rocks?
- How are igneous rocks formed?
- What are some examples of igneous rock?
- What is the most common type of rock on Earth's surface?
- What is the rock cycle?
- Can the rock cycle go in any order? Can one type of rock can change into either of the others?

## Follow-Up Activities/Resources

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Alberta-Specific Rocks/Minerals Resources:

<https://tyrrellmuseum.com/sites/default/files/media/TRG-AncientAlbertaRocks.pdf>

<https://www.alberta.ca/exploring-for-minerals-in-alberta.aspx>

<https://www.ags.aer.ca/activities/minerals-in-alberta.html#:~:text=Alberta's%20geology%20is%20favourable%20for,sandstone%2C%20dolomite%2C%20and%20limestone.>

<http://www.edmontonlapidary.ca/rocks-and-minerals.html>

<http://canadianwildcat.com/properties.html>

<https://sites.google.com/gshare.blackgold.ca/grade3/science-3/rocks-minerals>

<https://learning-center.homesciencetools.com/article/rock-cycle-science-lesson/>

<https://sciencing.com/rock-lessons-activities-first-grade-8701943.html>

<https://www.nasa.gov/sites/default/files/rockingtherockcycle.pdf>

## Source Articles & Links

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### The Rock Cycle – National Geographic Encyclopedia

There are three main types of rocks: sedimentary, igneous, and metamorphic. Each of these rocks are formed by physical changes—such as melting, cooling, eroding, compacting, or deforming—that are part of the rock cycle.

#### Sedimentary Rocks

Sedimentary rocks are formed from pieces of other existing rock or organic material. There are three different types of sedimentary rocks: clastic, organic (biological), and chemical. Clastic sedimentary rocks, like sandstone, form from clasts, or pieces of other rock. Organic sedimentary rocks, like coal, form from hard, biological materials like plants, shells, and bones that are compressed into rock.

The formation of clastic and organic rocks begins with the weathering, or breaking down, of the exposed rock into small fragments. Through the process of erosion, these fragments are removed from their source and transported by wind, water, ice, or biological activity to a new location. Once the sediment settles somewhere, and enough of it collects, the lowest layers become compacted so tightly that they form solid rock.

Chemical sedimentary rocks, like limestone, halite, and flint, form from chemical precipitation. A chemical precipitate is a chemical compound—for instance, calcium carbonate, salt, and silica—that forms when the solution it is dissolved in, usually water, evaporates and leaves the compound behind. This occurs as water travels through Earth's crust, weathering the rock and dissolving some of its minerals, transporting it elsewhere. These dissolved minerals are precipitated when the water evaporates.

## Metamorphic Rocks

Metamorphic rocks are rocks that have been changed from their original form by immense heat or pressure. Metamorphic rocks have two classes: foliated and nonfoliated. When a rock with flat or elongated minerals is put under immense pressure, the minerals line up in layers, creating foliation. Foliation is the aligning of elongated or platy minerals, like hornblende or mica, perpendicular to the direction of pressure that is applied. An example of this transformation can be seen with granite, an igneous rock. Granite contains long and platy minerals that are not initially aligned, but when enough pressure is added, those minerals shift to all point in the same direction while getting squeezed into flat sheets. When granite undergoes this process, like at a tectonic plate boundary, it turns into gneiss (pronounced “nice”).

Nonfoliated rocks are formed the same way, but they do not contain the minerals that tend to line up under pressure and thus do not have the layered appearance of foliated rocks. Sedimentary rocks like bituminous coal, limestone, and sandstone, given enough heat and pressure, can turn into nonfoliated metamorphic rocks like anthracite coal, marble, and quartzite. Nonfoliated rocks can also form by metamorphism, which happens when magma comes in contact with the surrounding rock.

## Igneous Rocks

Igneous rocks (derived from the Latin word for fire) are formed when molten hot material cools and solidifies. Igneous rocks can also be made a couple of different ways. When they are formed inside of the earth, they are called intrusive, or plutonic, igneous rocks. If they are formed outside or on top of Earth’s crust, they are called extrusive, or volcanic, igneous rocks.

Granite and diorite are examples of common intrusive rocks. They have a coarse texture with large mineral grains, indicating that they spent thousands or millions of years cooling down inside the earth, a time course that allowed large mineral crystals to grow.

Alternatively, rocks like basalt and obsidian have very small grains and a relatively fine texture. This happens because when magma erupts into lava, it cools more quickly than it would if it stayed inside the earth, giving crystals less time to form. Obsidian cools into volcanic glass so quickly when ejected that the grains are impossible to see with the naked eye.

Extrusive igneous rocks can also have a vesicular, or “holey” texture. This happens when the ejected magma still has gases inside of it so when it cools, the gas bubbles are trapped and end up giving the rock a bubbly texture. An example of this would be pumice.

<https://www.nationalgeographic.org/encyclopedia/rock-cycle/>

## The Rock Cycle in Canada – Let’s Talk Science

What do a computer, a stove and a sidewalk have in common? OK, maybe you use them all every day, but there’s more. All three of these items contain rocks! In fact, if you look carefully, you’ll find that many other objects you use every day also have rocks in them.

Of course, some rocks are more obvious than others. Depending on where you live, you might be surrounded by rocks. But do you know what kind of rocks they are?

### What Are the Different Types of Rocks?

There are three types of rocks:

- Igneous rocks
- Metamorphic rocks
- Sedimentary rocks

#### Igneous Rocks

**Igneous rocks** come from **magma**, a hot material in the Earth’s crust. When magma reaches the Earth’s surface, usually out of a volcano, it’s called **lava**. When it cools, it becomes igneous rocks.

Igneous rocks that form beneath the Earth’s surface are called **intrusive igneous rocks**.

Igneous rocks that form above the Earth’s surface are called **extrusive igneous rocks**.

Balancing Rock in Nova Scotia is made of an igneous rock called **basalt**.

#### Sedimentary Rocks

Sedimentary rocks are formed from loose sediment over millions of years. Sediment is any solid material that gets moved from one place to another. Rocks and minerals can be sediment. Plant and animal remains can be sediment, too. Sediment can be as small as a grain of sand or as large as a boulder. Over time, sediment builds up and becomes sedimentary rock.

The Earth’s surface is composed of 75% sedimentary rock. Let’s look at some examples here in Canada.

Cape Spear, Newfoundland and Labrador, is the most easterly point in North America. Its cliffs are made up of sedimentary rock.

Percé Rock is a natural arch off the coast of the Gaspé Peninsula in Quebec. It is made of limestone, another type of sedimentary rock.

Badlands, which are found in several parts of Canada, are examples of sedimentary rock formations. They tend to form in areas where rain tends to fall in short bursts, like in a thunderstorm. You may have seen badlands in Alberta's Dinosaur Provincial Park or in Cheltenham, Ontario.

## Metamorphic Rocks

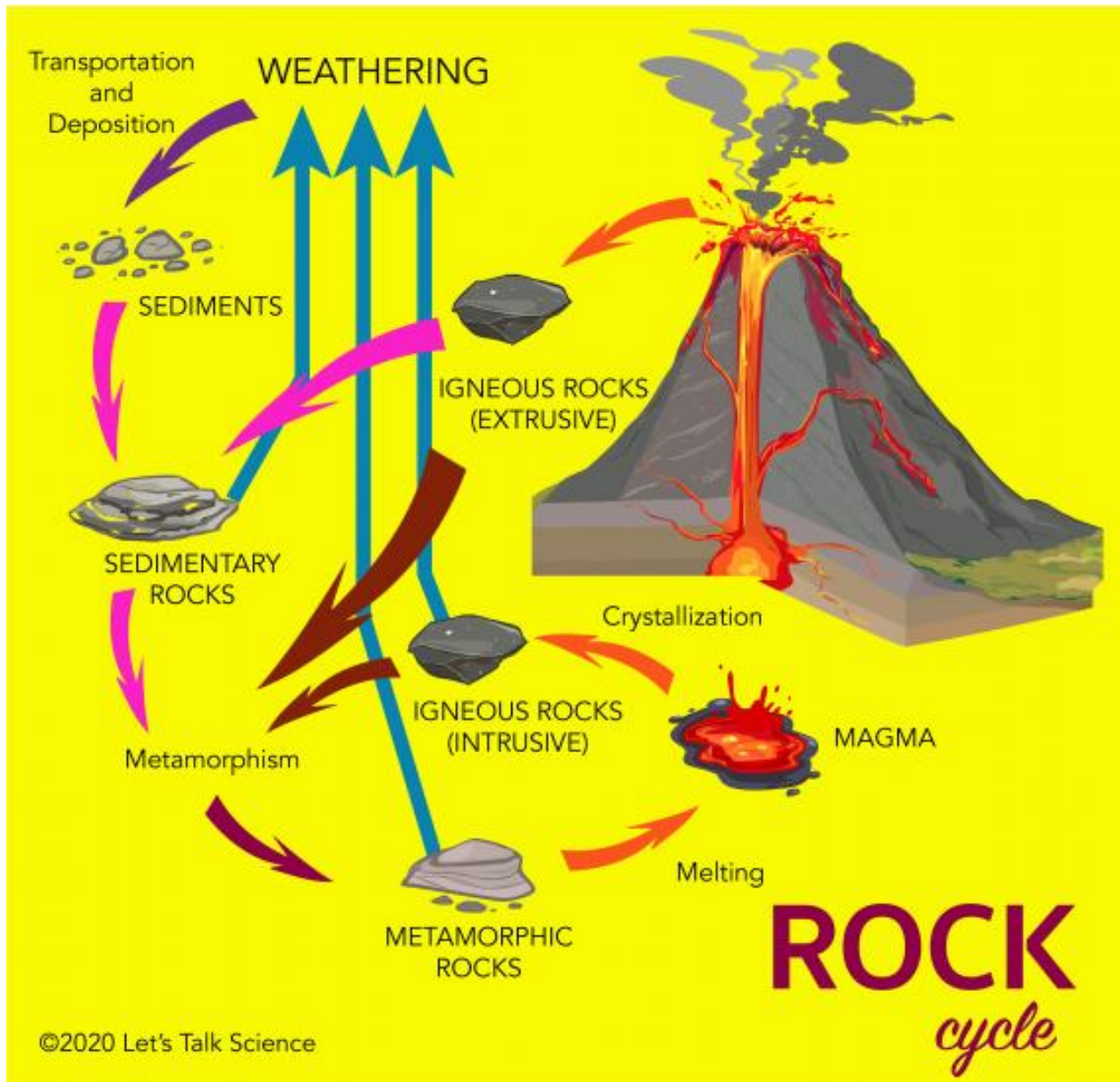
Metamorphic rocks are igneous or sedimentary rocks that have been transformed by pressure or heat. The heat and pressure can come from inside the Earth, from the shifting of the Earth's crust or from radioactive decay. These forces change the rock's structure.

## What Is the Rock Cycle?

The rock cycle is the process by which one type of rock becomes another.

Most rocks begin as igneous rocks. Over time, wind and water break them up into sediment. This is called **erosion**. As sediment piles up, it becomes sedimentary rocks. Eventually, these rocks are covered up and become part of the Earth's crust. There, heat and pressure build up and turn these rocks into—you guessed it!—metamorphic rocks.

See Diagram on next page...



The different types of rocks can change into each other over millions of years. This cycle is especially cool because it can go in any order. One type of rock can change into either of the others!

You can see evidence of the rock cycle all around you! For example, when pieces of cliffs or large rocks are **eroded** (worn down), they create sediment. Water is often responsible for eroding rocks. The next time you're walking by a stream or river, look for smaller pieces of rock that have been eroded. After millions of years, they may become a different kind of rock!

<https://letstalkscience.ca/educational-resources/stem-in-context/rock-cycle-in-canada>