

Student Exploration: Rock Cycle

Vocabulary: deposition, erosion, extrusive igneous rock, intrusive igneous rock, lava, lithification, magma, metamorphic rock, rock cycle, sediment, sedimentary rock, soil, weathering

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. What happens to hot **lava** after it erupts from a volcano?

Volcanic eruptions produce molten lava that cools and solidifies into rock. Cooling time varies, influenced by factors such as flow thickness, air temperature, and water availability.

Solidified lava contains valuable minerals like calcium, magnesium, sodium, and potassium. Witnessing the power and beauty of volcanoes and the geological formations they create is truly remarkable.

2. How does rock turn into **soil**?

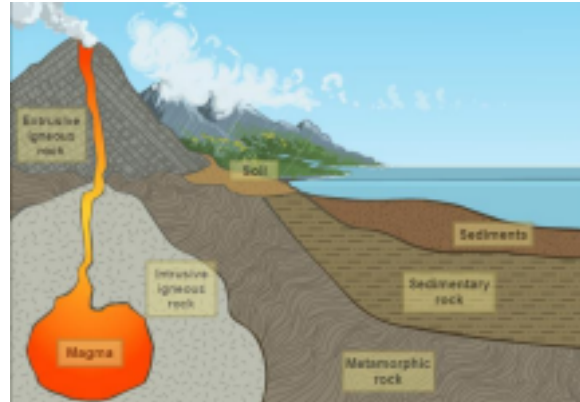
Soil forms through the physical and chemical weathering of rocks. Natural forces like water, wind, ice, and plant growth cause physical weathering, while environmental chemicals cause chemical weathering. Over time, these processes break rocks into tiny pieces, creating nutrient-rich soil that sustains life.

3. The Mississippi River carries tons of tiny rock fragments called **sediments** into the Gulf of Mexico. What do you think will happen to these sediments after a few million years?

The Mississippi River's sediments are essential building blocks for the Gulf of Mexico's future. Over time, they undergo diagenesis, turning into sedimentary rock that forms the foundation of diverse ecosystems. Sandstone and shale are just two examples of the many rock types that can form from sediment.

Gizmo Warm-up

Over millions of years, rocks are broken down and transformed into other rocks. The *Rock Cycle* Gizmo illustrates the different transformations that make up the **rock cycle**. Before exploring the Gizmo, take a look at the image.



1. What types of rocks are shown?


Sedimentary rock, metamorphic rock, and igneous rock

2. **Magma** is molten (liquid) rock under Earth's surface. Based on the image, how do you think magma turns into **extrusive igneous rock**?

Magma is molten rock that is found beneath the Earth's surface.

3. Click **Extrusive igneous rock** button to the right of the image. Were you correct? _____

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Activity: The rock cycle	<u>Get the Gizmo ready:</u> • Click Start again .	
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Question: What is the rock cycle?

1. Observe: A cycle is a path with the same start and end. Create a rock cycle with the Gizmo.

A. Click **Magma**. How hot is magma?

1000 degrees Celsius

B. Click **Crystallization (below ground)**.

What kind of rock is formed when magma cools below the surface? Intrusive rocks such as granite and diorite.

C. Click **Exposure and weathering**. What forms when rocks break down?

Smaller particles such as cobbles, pebbles, sand, silt, and clay.

D. Click **Erosion and deposition**. In what ways are sediments transported?

They are transported by wind, rivers, or glaciers.

E. Click **Lithification and compaction**. (**Lithification** is hardening into rock.) What kind of rock is formed from sediments?

Sedimentary rock

F. Click **Increase temp. and pressure**. What kind of rock is formed?

Metamorphic rock

G. Click **Melt**. What is formed when rocks melt deep underground?

Magma

2. Describe: Select the PATH tab. What are the steps in this rock cycle?

1. Magma
2. Intrusive igneous rock
3. Soil
4. Sediments
5. Sedimentary rock
6. Metamorphic rock
7. Magma

3. On your own: On the SIMULATION tab, click **Start again**. In the spaces below, list three rock cycles. You can start anywhere, but each cycle must begin and end at the same point.

Cycle 1:

1. Sedimentary rock
2. Magma
3. Extrusive igneous rock
4. Soil
5. Sediments
6. Sedimentary rock

Cycle 2:

1. Metamorphic rock
2. Soil
3. Sediments
4. Sedimentary rock
5. Metamorphic rock

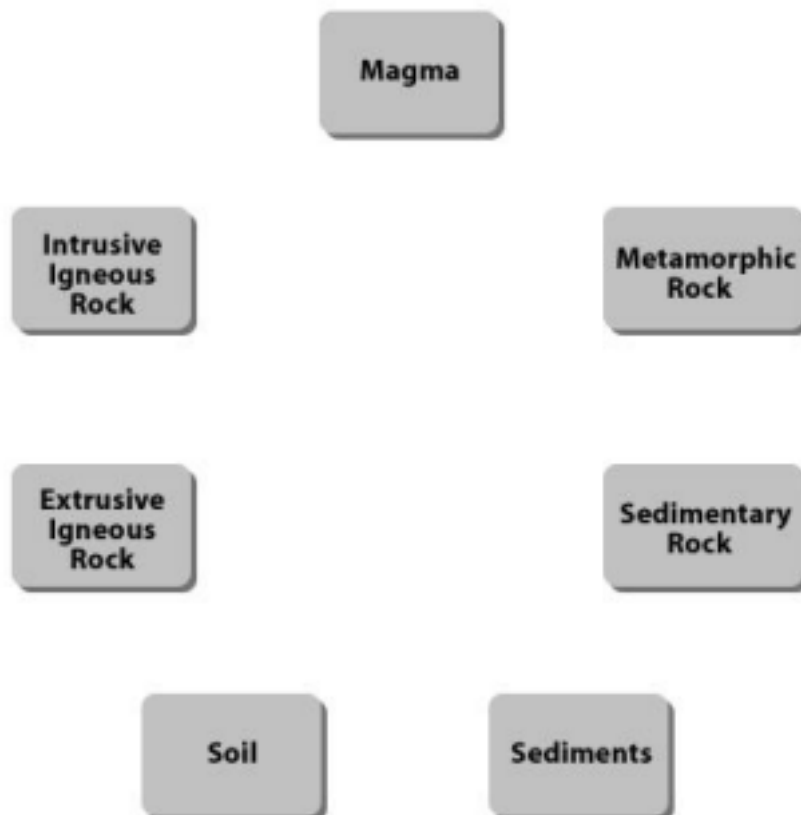
Cycle 3:

1. Intrusive igneous rock
2. Metamorphic rock
3. Magma
4. Intrusive igneous rock

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Activity (continued from previous page)

4. Diagram: The image below summarizes the different stations in the rock cycle. Draw an arrow to represent each possible transition from one rock type to another. Then label each arrow with the process that occurs, such as “**weathering**” or “**erosion and deposition**.”



5. Practice: List the steps that would cause each transformation below.

A. **Intrusive igneous rock** → **sedimentary rock**: when magma cools and solidifies

B. **Metamorphic rock** → sedimentary: when the rocks are subjected to high heat and pressure

C. Sediment → sedimentary rock: when magma cools and solidifies

D. Sedimentary rock → sediment: weathering and erosion