

Ride the Rock Cycle

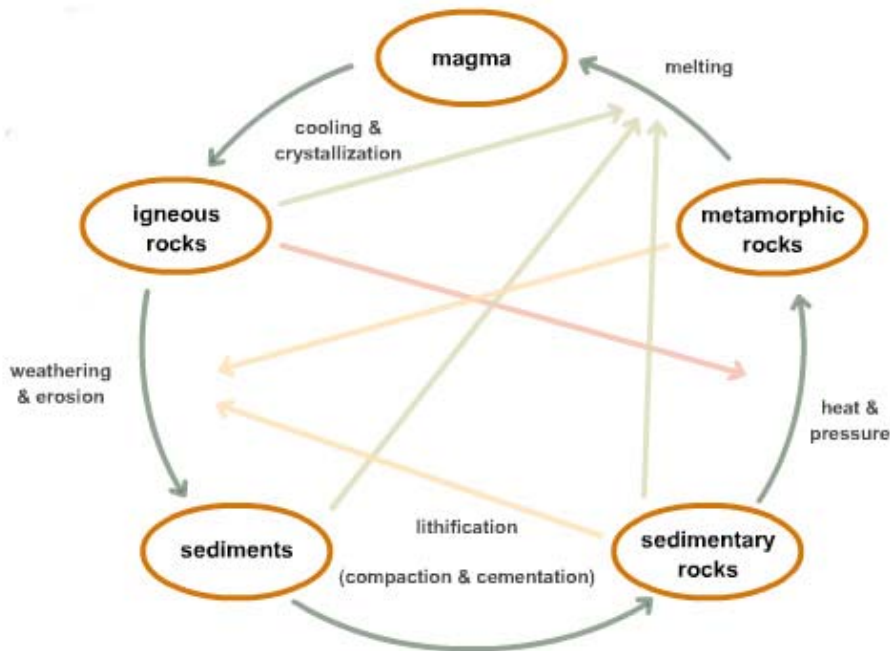
Grade Level: 5 – 6

Purpose: To teach students that the rock cycle, like the water cycle, has various stages and does not necessarily move linearly through those stages.

Suggested Goals: Students will gain an understanding of how a rock can move through the different stages of the rock cycle.

Targeted Objectives: As a result of this lesson, students will be able to:

1. Describe the rock cycle
2. Identify the various stages of the rock cycle



Background: A useful aid in visualizing the **rock cycle** is shown above. The three major rock types, igneous, metamorphic, and sedimentary, are shown. As you see, each may form at the expense of another if it is forced out of equilibrium with its physical or climatic environment by either internal or surficial forces.

Magma is molten rock. *Igneous* rocks form when magma solidifies. If the magma is brought to the surface by a volcanic eruption, it may solidify into an *extrusive* igneous rock. Magma may also solidify very slowly beneath the surface. The resulting *intrusive* igneous rock may be exposed later after uplift and erosion remove the overlying rock. The igneous rock, being out of equilibrium, may then undergo *weathering* and *erosion*,

and the debris produced is transported and ultimately deposited (usually on a sea floor) as *sediment*. If the unconsolidated sediment becomes lithified (cemented or otherwise consolidated into rock), it becomes a *sedimentary rock*. As the rock is buried the additional layers of sediment and sedimentary rock, heat and pressure increase. Tectonic forces may also increase the temperature and pressure. If the temperature and pressure become high enough, usually at depths greater than several kilometers below the surface, the original sedimentary rock is no longer in equilibrium and recrystallizes. The new rock that forms is called a *metamorphic rock*. If the temperature gets very high the rock melts and becomes magma again, completing the cycle.

The cycle can be repeated, as implied by the arrows. However, there is no reason to expect all rocks to go through each step in the cycle. For instance, sedimentary rocks might be uplifted and exposed to weathering, creating new sediment.

Materials/Preparation: Create the dice and posters for the different stations of the rock cycle game. [See attached patterns.]

Procedure:

Part I: Play the Rock cycle game. Set up your classroom with 8 areas at which a change in the rock cycle occurs. Each student starts at one area. At each area is a die that the student should role to determine what path they should take. It is possible for the student to remain at the same station for a long time. To make the game more interesting, my rule is that you can only stay at one station for 3 turns. Then you must go to another station. While at each station and while moving to the different stations, students must record what is happening on their journey chart. [See attached log.] After the game is over they will have a record of what happened.

Part II: Cartoons

After their journey is complete, students must create a cartoon of how their adventures in the rock cycle occurred. Points are given for use of correct terms. Each cartoon page should be divided so there are 12 boxes—room for 12 drawings. Students should turn in their adventure log and cartoon together so you can see what has occurred in their adventure.

Questions: What happened while you were on the rock cycle?

Extensions: Have students create a story or a travel brochure about their time on the rock cycle.

Assessment: Evaluate the students' journey logs and cartoons.

Lesson Specifics:

Skills: Students will need to use observation, inference, data collection skills to complete the activity.

Duration: 1 day

Group size: Project should be completed individually

Setting: Classroom

Illinois State Board of Education Goals and Standards:

- 12.E.3b:** Describe interactions between solid earth, oceans, atmosphere and organisms that have resulted in ongoing changes of Earth.
- 17.B.3a:** Explain how physical processes including climate, plate tectonics, erosion, soil formation, water cycle, and circulation patterns in the ocean shape patterns in the environment and influence availability and quality of natural resources.

Web Resources:

ISM Geology Online Rock Cycle

<http://geologyonline.museum.state.il.us>

Earth and Ocean Sciences Department of the University of British Columbia.

Introduction to Petrology; Rock Cycle

http://www.science.ubc.ca/~geol202/rock_cycle/rockcycle.html

Rock Cycle Burgess Shale Project

<http://www.scienceweb.org/burgess/geology/cycle1.html>

Rock Cycle Song

<http://www.chariho.k12.ri.us/curriculum/MISmart/ocean/roksong.htm>

Rock Cycle

<http://www.washington.edu/uwired/outreach/teched/projects/web/rockteam/WebSite/rockcycle.htm.htm>

Journey on the Rock Cycle

Name _____

This sheet is to help you write about your experiences as a rock during your journey on the rock cycle. You will need to describe your adventures at each spot and tell about what kind of rock you feel that you were.

- (1) I began my adventure at _____.
- (2) The first thing that happened was _____,
then I went to _____.
- (3) The next thing that happened was _____,
then I went to _____.
- (4) The next thing that happened was _____,
then I went to _____.
- (5) The next thing that happened was _____,
then I went to _____.
- (6) The next thing that happened was _____,
then I went to _____.
- (7) The next thing that happened was _____,
then I went to _____.
- (8) The next thing that happened was _____,
then I went to _____.
- (9) The next thing that happened was _____,
then I went to _____.
- (2) The next thing that happened was _____,
then I went to _____.
- (10) The next thing that happened was _____,
then I went to _____.
- (11) The next thing that happened was _____,
then I went to _____.
- (12) The next thing that happened was _____,
then I went to _____.

Challenge

Create a comic strip story of your experiences from the journey through the rock cycle!

by _____

--	--	--

--	--	--

--	--	--

--	--	--

--	--	--

Station: Earth's Interior

	Tectonic plates move Go to volcano		
Magma is forced up Go to volcano	Pressure occurs More layers Remain here	Pressure occurs Remain here	Pressure occurs Remain here
	Tectonic plates push upward Go to mountains		

Station: Soil

		Pressure occurs Go to earth's interior	
Pressure occurs Go to earth's interior	Rocks break down Remain here	Pressure occurs Go to earth's interior	Rocks break down Remain here
		Sediment being formed Remain here	

Journey Through the Rock Cycle

Cut out each die pattern and the signs for each station. Assemble dice by folding along lines and taping the edges together.

As the students travel through the rock cycle, they must roll the die at the station and follow the written directions.

Flood water causes redeposit of silt to flood plain
Go to soil

**Station:
River**

<p>Sediments form Go to soil</p>	<p>Water washes away layers Go to mountains</p>	<p>Silt washed into ocean Go to ocean</p>	<p>Sediments under pressure Go to earth's interior</p>
--------------------------------------	---	---	--

Ice melts carrying rocks
Go to river

**Station:
Ocean**

Sand washes up onto shore
Go to soil

<p>Ocean floor being subducted Go to earth's interior</p>	<p>Sand washes up onto shore Go to soil</p>	<p>Dust evaporates with water Go to clouds</p>	<p>Ocean floor being subducted Go to earth's interior</p>
---	---	--	---

Sand washes up onto shore
Go to soil

Rain
Go to ocean

Station: Clouds

Snow
Go to
mountains

Rain
Go to
soil

Snow
Go to
mountains

Rain
Go to
soil

Rain
Go to ocean

Station: Mountains

Wind erosion
occurs
Go to soil

Wind erosion
occurs
Go to soil

Ice melts
carrying rocks
Go to river

Glacier or
avalanche
occurs
Go to ocean

Ice melts
carrying rocks
Go to river

Wind erosion
occurs
Go to soil

Station: Volcano

Volcano erupts
spewing forth
lava
Go to mountain

Tectonic plates
push upwards
Go to
mountains

Magma
crystallizes
Remain here

Volcanic ash
and dust are
pushed into
atmosphere
Go to clouds

Crystallized
magma pushes
up to surface
Go to soil

Magma flows
into the ocean
Go to ocean