



Let It Sink In!

Earth's Systems



Brittany Bowens

Published by K20 Center

This work is licensed under a [Creative Commons CC BY-SA 4.0 License](https://creativecommons.org/licenses/by-sa/4.0/)

| | | | |
|--------------------|-----------------|-------------------|-----------------|
| Grade Level | 6th – 7th Grade | Time Frame | 160 minutes |
| Subject | Science | Duration | 3 class periods |

Essential Question

How do Earth's materials cycle through living and nonliving components?

Summary

In this lesson, students will learn about the different stages in which a rock can exist due to natural causes or human impact. Students will construct models that illustrate how biochemical processes cycle through living and nonliving organisms.

Snapshot

Engage

Students justify and evaluate preconceived notions about rocks and watch a clip of a natural disaster caused by rock transformation.

Explore

Students investigate different stresses that affect rock formation.

Explain

Students read an article to help construct explanations for the flow of the rock cycle.

Extend

In small groups, students research and create a model that shows the flow of different matter into and out of living and nonliving parts of the ecosystem.

Evaluate

Students assess and gather data from one another's work and use the information to answer the lesson's essential question.

Standards

Oklahoma Academic Standards (6th Grade)

ESS2: Earth's Systems

6.ESS2.1 : Develop a model to describe the cycling of Earth's materials and the flow of energy that drives these processes within and among Earth's systems.

6.ESS2.1.1: All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produces chemical and physical changes in Earth's materials.

Oklahoma Academic Standards (6th Grade)

7.LS2.3 : Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

7.LS2.3.2: Transfers of matter into and out of the physical environment occur at every level.

7.ESS3: Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments.

7.LS2.3.4: The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.

Attachments

- [Biochemical-Cycle-Let-It-Sink-In - Spanish.docx](#)
- [Biochemical-Cycle-Let-It-Sink-In - Spanish.pdf](#)
- [Biochemical-Cycle-Let-It-Sink-In.docx](#)
- [Biochemical-Cycle-Let-It-Sink-In.pdf](#)
- [Lesson-Slides-Let-It-Sink-In.pptx](#)
- [Rock-Cycle-Let-It-Sink-In - Spanish.docx](#)
- [Rock-Cycle-Let-It-Sink-In - Spanish.pdf](#)
- [Rock-Cycle-Let-It-Sink-In.docx](#)
- [Rock-Cycle-Let-It-Sink-In.pdf](#)
- [You-re-Stressing-Me-Out-Lab-Handout-Let-It-Sink-In - Spanish.docx](#)
- [You-re-Stressing-Me-Out-Lab-Handout-Let-It-Sink-In - Spanish.pdf](#)
- [You-re-Stressing-Me-Out-Lab-Handout-Let-It-Sink-In.docx](#)
- [You-re-Stressing-Me-Out-Lab-Handout-Let-It-Sink-In.pdf](#)
- [You-re-Stressing-Me-Out-Lab-Instructions-Let-It-Sink-In - Spanish.docx](#)
- [You-re-Stressing-Me-Out-Lab-Instructions-Let-It-Sink-In - Spanish.pdf](#)
- [You-re-Stressing-Me-Out-Lab-Instructions-Let-It-Sink-In.docx](#)
- [You-re-Stressing-Me-Out-Lab-Instructions-Let-It-Sink-In.pdf](#)

Materials

- Lesson Slides (attached)
- You're Stressing Me Out Lab Instructions (attached, one per student)
- You're Stressing Me Out Lab Handout (attached, one per student)
- Rock Cycle handout (attached, one per student)
- Biochemical Cycle handout (attached, one per student)
- Regular-size bars of Ivory soap (one per student)
- Copy paper (one sheet per group of three students)
- Glue sticks (one per group)
- Chalk (one set per group)
- Butcher paper (optional, one sheet per group)
- Markers (optional, one set per group)

20 minutes

Engage

Use the attached **Lesson Slides** to follow along with the lesson. Display **slide 3** and read aloud the essential question:

How do Earth's materials cycle through living and nonliving components?

Display **slide 4** and share the lesson objectives.

Display **slide 5**. Invite students to participate in an [Always, Sometimes or Never True](#) activity. As you go through each statement on **slides 6-13**, have students give a thumbs up for always, thumbs to the side for sometimes, or thumbs down for never. Be sure to ask each question separately and call on random students to give their opinions on the statement.

- All rocks are hard.
- Rocks can change form.
- Rocks make up the entire Earth.
- All rocks are the same.
- It's hard to tell how rocks originated.
- Rocks and minerals are the same thing.
- Humans are the cause of rock formations.
- Minerals are not important to my life.

Optional Enhancement

To enhance the Always, Sometimes, or Never True activity, consider engaging students in a more robust discussion by splitting the room into three sections, one for each category.

Ask students to choose a section of the room to move to as you read each statement and, when there, discuss their reasoning with others who made the same choice. Have a spokesperson from each group share with the whole class. After representatives from all three sections have shared, students can decide whether they want to change sections based on the arguments presented.

Be sure to set rules before beginning classroom debates. Remember that you are acting as the moderator—don't be biased to any viewpoints.

After wrapping up the Always, Sometimes, or Never True activity, show one or both video clips about sinkholes that have occurred in Oklahoma.

Clip 1 (**slide 14**): "[Massive Oklahoma Sinkhole appears overnight](#)"

Embedded video

<https://youtube.com/watch?v=Pz6EFS1fu1A>

Write down any questions that students have after watching the clips.

15 minutes

Explore

Gather the supplies for the lab and go to **slide 16**. Pass out copies of the **You're Stressing Me Out Lab Instructions** and the **You're Stressing Me Out Lab Handout**. Read the introduction aloud to review the three types of stressors that students will demonstrate.

Organize students into groups of three and give each group a bar of soap. Tell students that each group member will demonstrate one of the three types of stressors. Before each demonstration, ask students how they can go about showing this particular stressor. After each demonstration, have students record their observations on their lab handouts. Move around the room to monitor students and clear up any potential misconceptions.

At the end of the activity, have students use compressional stress to take the small soap remains that they have left and smash them together. Tell students that this is how sedimentary rocks are formed.

Teacher's Note: Stress Test Tips

- Images that can help explain to students how to perform each stress, as well as additional activities, can be found in Teach Engineering's [Soapy Stress Instructions](#).
- For an honors class, consider having students test the effects of the stressors on different brands of soap and compare that to what it could mean about the rate of change for different types of rocks.
- Make sure students do not rub their eyes and that they wash their hands before exiting the lab.
- Consider asking a local community leader, organization, or business to donate the soap.

Optional Lab Report

Consider asking students to write a lab report to reflect on their experience. The [R.E.R.U.N.](#) strategy can help students analyze and evaluate their findings. Be sure to go over the instructions and rubric to make sure students know what is expected of them.

40 minutes

Explain

Go to **slide 17** and ask students to read one of the following articles:

- Generation Genius's "[Read About Rocks, Minerals & The Rock Cycle](#)"
- Soft Schools' "[The Rock Cycle](#)"

Display **slide 18** and organize students into new groups of three. Pass out copies of the **Rock Cycle** handout to each student and one blank sheet of copy paper and a glue stick to each group. Ask students within each group to each pick a different stage of the rock cycle: igneous, sedimentary, or metamorphic.

Have students follow the directions on the handout to select and illustrate a type of rock that exists at their chosen stage and explain which processes must have occurred for the rock to be at that stage.

After students have completed the assignment, have group members arrange and attach their rocks around the outer edge of the copy paper in the correct order of the rock cycle. Ask them to label each component of the cycle and draw arrows showing the direction in which it moves.

Optional Activity

After students complete this activity, consider playing one of the following songs to reinforce the rock cycle or to help students self-assess their group's cycle:

- "[Rock Cycle Song](#)" (**slide 18**)
- "[We Will Rock You Song](#)" (**slide 19**)

60 minutes

Extend

Go to **slide 20** and pass out copies of the **Biochemical Cycle** handout. Organize students into groups of four. Tell them that now they will learn about some essential materials that living and nonliving factors cycle through the Earth. Assign each group one of the biochemical cycles: water, carbon, or nitrogen.

Ask students to research facts about at least three different stages of each cycle and what drives the movement to each part of the cycle. Make sure students cite where they are getting the information about biochemical cycles. Emphasize the importance of students working together to research and delegate tasks for illustrating the cycle. Since this activity moves outside, be sure to constantly circle and monitor the students' progress.

Teacher's Note: Research Resource

Encourage students to use keyword searches to locate research articles related to their assigned biochemical cycle. If students are unable to find an appropriate resource on their own, consider pointing them to the "[Intro to Biogeochemical Cycles](#)" article from Khan Academy.

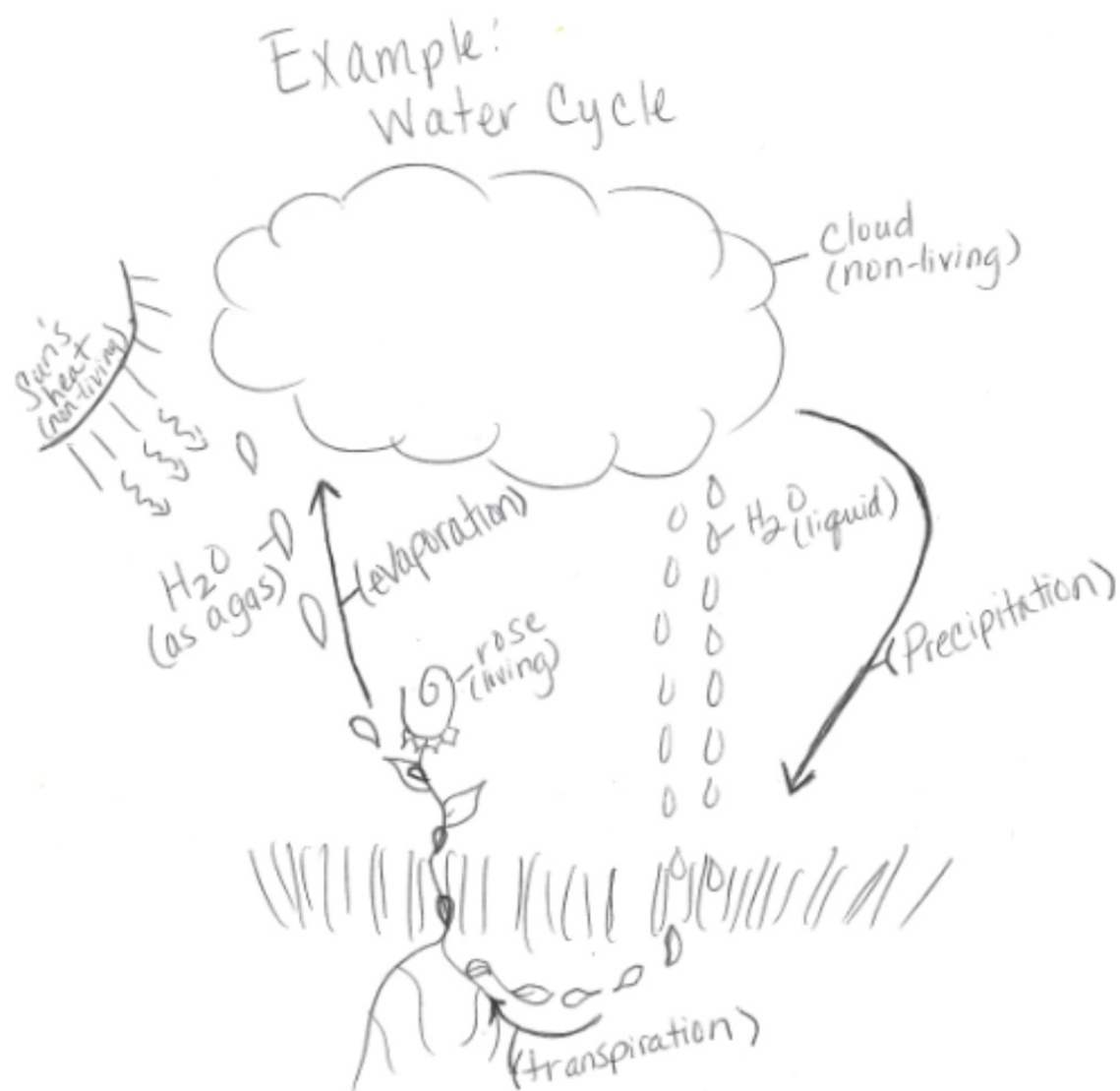
Once they have finished their research, take students outside. Provide each group with a set of chalk and ask them to draw their cycles on the pavement.

Teacher's Note: Rainy Day Alternative

If weather does not permit, consider providing each group with a large sheet of chart or butcher paper and markers to illustrate their cycles and hang around the room.

Student Example

The image below shows an example of what a student sketch could look like.



15 minutes

Evaluate

Move to **slide 21** and direct students to the second page of the Biochemical Cycles handout. Have students complete a [Gallery Walk](#) to view the other groups' cycles. Ask them to gather data on the stages each group chose to illustrate and take notes on their handouts. They should then evaluate this data and use the findings to draft an answer to the essential question:

How do Earth's materials cycle through living and nonliving components?

Remind students to use vocabulary that they learned in this lesson to respond to the essential question.

Resources

- EmilyB. (2012, October 29). We will rock you! (The rock cycle) [Video]. YouTube.
<https://www.youtube.com/watch?v=r68iEwYdbh4>
- Generation Genius. (2020, August 31). Read about rocks & minerals: Science for grades 6-8.
<https://www.generationgenius.com/rocks-and-minerals-reading-material-grades-6-8/>
- KOCO TV. (2015, June 05). Weatherford building about to be swallowed by sinkhole [Video]. YouTube.
https://www.youtube.com/watch?v=HCUthn8Z_KY&ab_channel=KOCO5News
- K20 Center. (n.d.). Always, sometimes, or never true. Strategies.
<https://learn.k20center.ou.edu/strategy/145>
- K20 Center. (n.d.). Gallery walk/carousel. Strategies.<https://learn.k20center.ou.edu/strategy/118>
- K20 Center. (n.d.). R.E.R.U.N. Strategies. <https://learn.k20center.ou.edu/strategy/819>
- Khan Academy. (n.d.). Intro to biogeochemical cycles.
<https://www.khanacademy.org/science/biology/ecology/biogeochemical-cycles/a/introduction-to-biogeochemical-cycles>
- NBCUniversal News Group.
(2016, Dec 5). NBC News - Breaking News & Top Stories - Latest World, US & Local News. [Online image].
http://media4.s-nbcnews.com/j/newscms/2016_49/1821236/sink_hole_ea406342d04bed2983c95f1e3f461e53.nbcnews-fp-400-280.jpg
- ParrMr. (2011, April 3). Rock cycle song [Video]. YouTube. <https://www.youtube.com/watch?v=53IMdHzvGCQ>
- Sister Christian. (2011, November 30). Massive Oklahoma sinkhole appears overnight [Video]. YouTube.
<https://www.youtube.com/watch?v=Pz6EFS1fu1A>
- Soft Schools. (n.d.). The rock cycle.
https://softschools.com/language_arts/reading_comprehension/science/493/the_rock_cycle/
- TeachEngineering. (2021, January 23). Soapy stress activity.
https://www.teachengineering.org/activities/view/cub_rock_lesson01_activity1