

For Grades 4-6: Completing the Cycle

Purpose:

To assess students' understanding of the rock cycle through a creative, hands-on assessment that allows students to assemble a model of the rock cycle.

Materials:

- Craft materials, such as poster board, construction paper, glue, scissors, tape, markers, and crayons
- Reference books (see Resources)
- Rock samples (e.g., granite, basalt, obsidian, sandstone, shale, conglomerate, marble, gneiss, limestone, pumice or scoria, quartzite)

Procedure:

Following a unit on rocks in which students learned about the rock cycle, students conduct this activity to help synthesize their learning. After reading the book *The Rock Factory*, review with students that the three main types of rocks form under different circumstances—igneous rocks form when molten magma or lava cools; sedimentary rocks form from the layering and compaction of sediments; and metamorphic rocks form from intense heat or pressure. It should be noted that it is not a circular cycle, as different rocks can get caught in a smaller part of the cycle. In other words, not all igneous rocks become sedimentary, nor do sedimentary in turn become metamorphic. A great graphic of this can be found at www.personal.psu.edu/users/c/1/c11161/insys%20441/main.html.

Using either samples of actual rocks or pictures of the rocks, ask the students to attempt to "match" an igneous or sedimentary rock with the rock it can be changed into and after the rock has gone through metamorphism. Examples of sequencings could be: granite to gneiss; sandstone to quartzite; limestone to marble; shale to slate. Although this may be difficult, hopefully students will be able to see that some metamorphic rocks have similar characteristics of the rocks from which they came. For example, some limestone rocks are creamy white or pale grey in color and appear to be layered and flat, whereas marble is a similar color. It is important for teachers to match up the "before" and "after" rocks carefully to aid the student in seeing similarities. Have students make statements about why they think the

"changed" rock was at one point the rock they chose. It could be something like "Gneiss has the same color minerals in it and the spots look like they are changed somehow." Sandstone looks like it has tiny crystals or pieces of sand cemented together, and quartzite has tiny crystals as well. When the students are describing their observations, have them try and describe how the rocks may have formed as well. For example, metamorphic rocks undergo intense heat and pressure to change the original rock into a new rock, but the new rock is still comprised of the same minerals as the original rock. To help with this task, create a list of key vocabulary on the board (e.g., igneous, sedimentary, metamorphic, weathering, compaction, magma, cooling, cementation, and deposition).

Using *The Rock Factory* and other references, ask students to construct a model of the rock cycle. They may want to simply draw it, or they may want to find and cut out pictures of the different types of rocks for each part. While they are doing this, they should be using the key vocabulary terms identified during the reading.

When students have completed their models of the rock cycle, they can share them with their group or the class.

Regardless of whether children are making observations about rocks and developing an initial idea about what a rock is or assembling a model of the rock cycle to serve as an assessment of their understanding, it is important to allow them to engage in activities that definitely ROCK!

Resource

DK Publishing. 2003. *Rocks and minerals*. New York: Author.
National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academy Press.

Staedter, T. 1999. *Reader's digest pathfinders: Rocks and minerals*. Pleasantville, NY: Reader's Digest Books for Children.

Connecting to the Standards

This article addresses the following *National Science Education Standards* (NRC 1996):

Content Standards

Standard D: Earth and Space Science

- Properties of Earth materials (K-4)
- Structure of the Earth system (5-8)