

WHAT DONE IT?: TEACHER GUIDE

Subject: Earth Science

Grade Level: Middle School

Last Updated: September 13, 2007

Case Summary

You are being commissioned by the Georgia Bureau of Investigation to help solve unsolved crimes in the area. Rocks are being thrown into windows to break into houses. The police have responded, but it seems that they failed to properly identify the rocks and keep them with the corresponding case.

Credits

This case was written by Jennifer J. Pokorny (PhD student, Psychology, Emory University, Atlanta, GA) and Yasmine M. McKenzie (teacher, Bethune Middle School, Atlanta, GA) fellows of the Emory University PRISM program (<http://www.prism.emory.edu>). Authors may be contacted at jpokorn@emory.edu

Learning Objectives

At the end of this case students will be able to:

1. identify various rocks both visually and by description
2. classify rocks by rock type (igneous, sedimentary, metamorphic)
3. illustrate the rock cycle

Georgia Performance Standards

S6E5. Students will investigate the scientific view of how the earth's surface is formed.

S6CS1. Importance of curiosity, honesty, openness, and skepticism in science.

S7CS5. Use of system, model, and change

Assessment

Student learning will be assessed with the handout/worksheet that must be filled out individually, though they can work in groups. Additionally, students will be assessed on their illustration/diagram of the rock cycle.

Implementation Strategy

Case will take place over two 60-minute class periods. Students will be able to work in pairs or in groups of 4 when identifying and classifying the rocks. Each student will be required to fill out their own worksheet and turn in. The illustrations/diagrams of the rock cycle are to be completed individually.

Day 1: 60 minutes total

- sponge question about the students' homework which was to read sections from the chapter on rocks (10 minutes)
- read through Scene 1 letter and hand out materials (5 minutes)
- read through case files of Scene 1 (10 minutes)
- student rotate through all rock stations and complete worksheet/case files (2 minutes at each station x 10 stations = 20 minutes)
- look through case files and the resource handout to fill in missing case files, mark ones that are still missing (5 minutes)
- again rotate through stations to fill in remaining (1 minute at each station x 10 stations = 10 minutes)

60 minutes total

- sponge question about reading from textbook (10 minutes)
- complete worksheet from previous day without rock samples (15 minutes)
- instructor reads through Scene 2 letter, hand out blank paper (3 minutes)
- brainstorm what the Scene 2 letter is asking them to do, how rocks change from one to another, what the rock cycle is (5 minutes)
- complete rock cycle illustration (20 minutes)
- complete self and peer evaluation, read through rubric before turning in all portions of assignment (7 minutes)

Case Notes

What went well:

The students liked moving around the classroom and looking at the rocks. For the large disruptive class we did not have the rock samples out – they only used the resource handout – so did not move around the room.

For later classes we read each case out loud (students or instructors).

What could be improved for next time:

For this case, students don't need to be moving around the room, and if they do, then the letter from Scene 1 should be changed to reflect exactly how they will be presented with the material (have resource handout, have pans with a rock sample, will need to go through all samples). A

better option would be to have at least 10 samples of each rock so that one could put together a bucket/pan with a sample of each rock in the bucket, as indicated in the letter. This may also help students understand what should be done. This is entirely dependent on what the school has available for use – for most rocks we only had 1 sample. Visit: <http://www.gamineral.org/education.html> ; mini-grants are available to help teachers purchase rock samples, they may also be able to loan some samples to the class.

Depending on the class, students may not even need the rock samples since they have a resource handout. For the larger, more disruptive class we only gave them the worksheet and the resource handout to use as a pair.

Should have students complete a box chart as a class after reading Scene 1 and Scene 2. This is good practice and helps them understand what is being asked of them before jumping right in and not knowing exactly what they are doing. The box chart can include: what we know, what we need to know, action plan). The action plan is key here so students know what to do instead of us giving them instructions.

Probably best to have them work in pairs, not larger groups, though this could be due to the age of the students as there were a couple of groups that did work very well together while others did not at all.

Need to really get the students to read the resource handout since all the information is there.

May want to change some of the wording of the resource handout as the students were not reading at grade level. Alternatively, a list of difficult words that are used in the handout could be added at the back with definitions.

Facilitator Guide:

Scene 1: Below is the handout that students receive consisting of the descriptions of each rock. The answers (rock name, rock type, and corresponding rock number) are in brackets. The numbers are arbitrary, it corresponds to the numbers already labeled on the rocks from the school's rock kits.

Case A: The rock looked like it was made of other rock fragments, some of which were fairly large. The pieces in the rock were rounded, like pebbles or cobble. [conglomerate, sedimentary, # 10]

Case B: This rock had very distinct bands and looked like it had layers of different minerals. In a past life it used to be granite. [gneiss, metamorphic, # 37]

Case C: The rock was very dark and made of fine-grains. The only way I could see the grains was with a microscope – not just with my eye or even with a magnifying glass. [basalt, igneous, # 7]

Case D: The rock was dark in color, black even, and was foliated. I know this because I dropped it against a table edge and a thin sheet split off. [slate, metamorphic, # 21]

Case E: The rock was very hard and strong. It also had a fossil of something that looked like a fish in it! I accidentally spilled some vinegar on it when I was making a salad later and it made the rock fizz. [limestone, sedimentary, # 1]

Case F: This rock was very hard and had small crystals in it. It broke when it came through the window and the break was very nice, right along the grain. [quartzite, metamorphic, # 40]

Case G: This rock was very hard and strong and had many different sizes of crystals. I could tell that it probably used to be limestone but then was subjected to high heat and pressure. [marble, metamorphic, # 2]

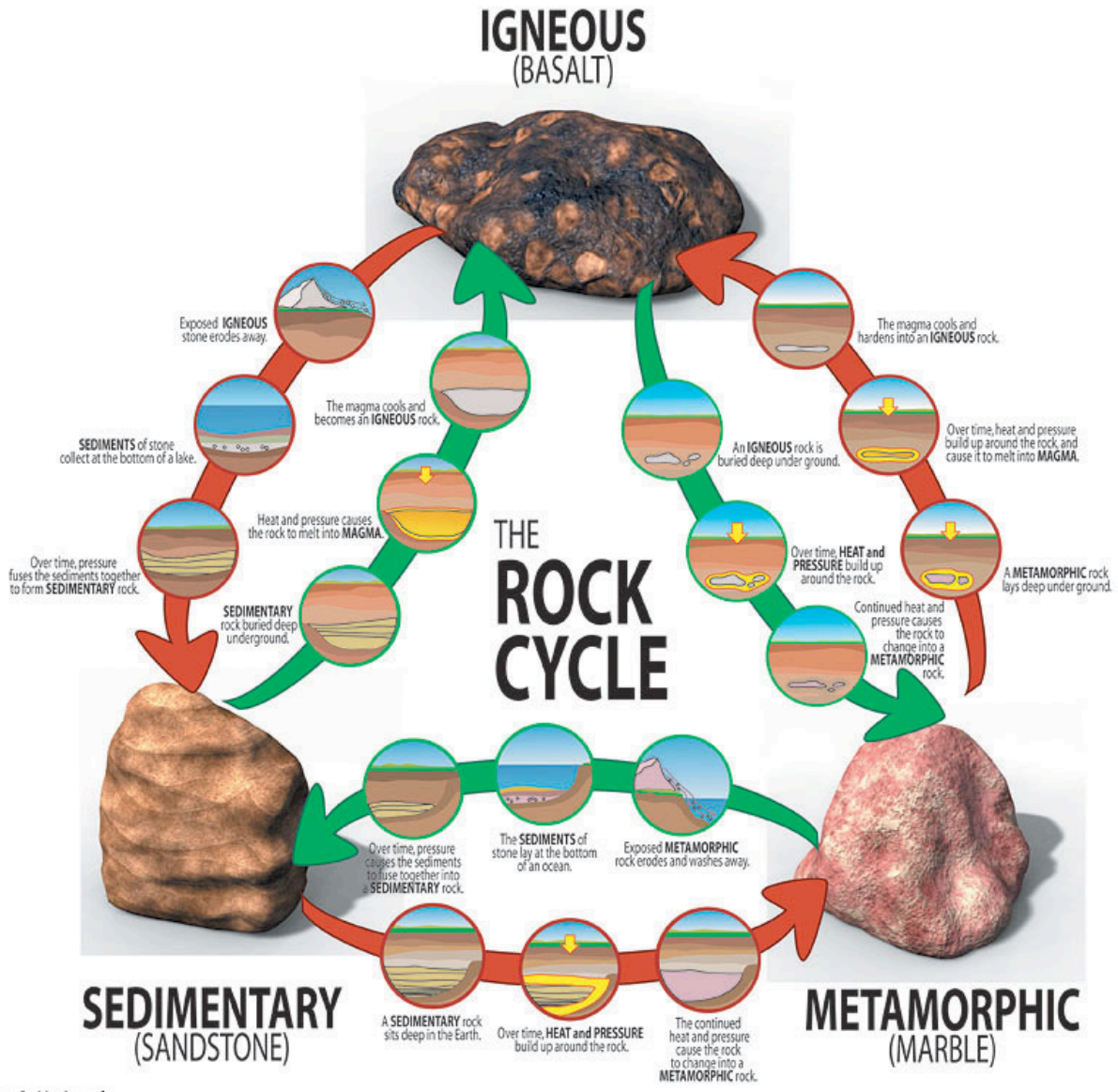
Case H: This rock was made up of 4 different minerals which were quite easy to see. I could tell that there was quartz, mica and hornblende but I'm not sure about the other mineral. [granite, igneous, # 5]

Case I: The rock looked like it was made of tiny grains of quartz. I think that this type of rock is formed in oceans, lakes and rivers... [sandstone, sedimentary, # 3]

Case J: This rock looked almost like a crystal. My mother told me that it was most likely made up of halite and formed when water evaporated. [rock salt, sedimentary, # 14]

Other notes: really get the students to read the handout. Once they do they understand what they should do, but before they only compare the rock to the pictures, which is misleading.

Scene 2: Example rock cycle



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Resources:

Textbook

Exline, J. D., Pasachoff, J. M., Simons, B. B., Vogel, C. G., Wellnitz, T. R. (2001). *Science Explorer: Earth Science*. Needham: Prentice Hall.

Information to create student handout:

Volcano World (2009). Rocks and minerals slide show. Retrieved August 15, 2009 from <http://volcano.und.edu/vwdocs/vwlessons/lessons/Slideshow/Slideindex.html>

Rock Hounds (1999). Discover how rocks are formed! Retrieved August 15, 2009 from <http://www.fi.edu/fellows/payton/rocks/lesson.htm>