Investigating Rocks

Overview

When to use

Use the activity to begin study of rocks.

Georgia Performance Standards

S6E5 Students will investigate the scientific view of how the earth's surface is formed.
S6E5(b) investigate the contribution of minerals to rock composition.
S6E5(c) classify rocks by their process of formation.
S6E5(d) describe processes that change rocks and the surface of the earth.

Setup

This activity is made specifically for use with the eight rocks included in the kit.

The 8-compartment divider tray to store the entire class set allows the samples to be quickly laid out on and retrieved from the 8-block Rock Origins picture sheets.

Arrange student seats in side-by-side pairs. Run the PowerPoint (InvRocks.ppt).

Place for each pair of students: one Rock Origins picture sheet; one Identification Flowchart, one "Rock Textures and What They Tell" sheet, and a set of the above rocks (one specimen placed on each of eight numbered pictures on Rock Origins sheet).

Place for each student: One Rock Data Chart (RockDataChart.pdf), for recording their answers, with the notes sheet InvRocksNotesSheet.pdf printed on the reverse side.

Rock Textures and Origins

Students should be seated in pairs. Guide the students through initial observations of all eight rocks, so they will understand what to look for in identifying the rocks. **Refer the rocks by number, not name, at this time.** (They will discover the names during the activity).

For identification to be effective, make sure the following features are noticed in specific rocks:

#	Rock name (do not disclose at this time)	Make sure that they notice…	#	Rock name (do not disclose at this time)	Make sure that they notice…
1	Conglomerate	rounded pebbles	2	Scoria	holes
3	Slate	grains that make it up are too tiny to see or feel	4	Volcanic Breccia (rhymes with "you betcha")	fragments of volcanic glass like #5, or sharp-cornered fragments of rocks.
5	Obsidian	made of volcanic glass	6	Granite	crystals of 3 different minerals: hornblende (black), quartz (gray), and feldspar (tan)
7	Sandstone	made of sand; feels like sandpaper	8	Limestone	Shells or crinoid fossils, (shaped like lifesaver candies)

The PowerPoint is organized to let students write down something to remember about each rock on the notes sheet. A possible script for guiding the students is as follows:

Ask for responses on naming the three classes of rocks. They then write igneous, sedimentary, and metamorphic at the top of the page (these names appear on the first click on the PowerPoint.) Check for previous knowledge about igneous rocks, the difference between lava (only when erupted) and magma (the general term, molten rock anywhere), and between intrusive (cooled inside the Earth, like Stone Mountain) and extrusive (cooled at the surface, like a volcano).

Prompt for which pictures suggest rocks might be igneous rocks (#2, #4, #5, and #6) See if they can recognize that #6, having cooled underground according to the text on the picture, is intrusive.

Categorize the students as "person A" (sitting to the left of the rocks) and "person B". Switch back and forth between calling on A or B to pick up a numbered rock and make any observations. Ideally the students' observations will tally with the summing up notes that the Powerpoint places on each igneous rock. Points to make: #2 is full of holes because gas was mixed with the relatively thin lava that flowed or spouted easily from the ground. The volcano in picture #5 (Mt. St. Helens) had a much thicker (more viscous) lava, as thick as tar, and over days the lava mounded up as the lava dome seen in the middle of the picture. The dome contains natural glass like #5, which forms when very thick lava cools very quickly. Under a lava dome, gas pressure builds up and the volcano may explode as in picture #4 (Mt. St. Helens only a few days after picture #5 was taken).

Students should look for fragments of volcanic glass, or at least pieces of rock with sharp corners, in #4. This is how geologists recognize that this rock formed from volcanic ash when a volcano exploded.

Rock #6 contains crystals (not glass) of three different minerals (tan/pink = feldspar; gray = quartz; black = hornblende) Make sure they recognize all three. Note that crystals take a long time to grow to visible size, evidence that the magma cooled slowly underground. (Note that like #2, #5, and #4, this is igneous.)

Leaving behind the topic of igneous rock, ask them why Stone Mountain has pebbles and sand on the rock – nobody dumped it there, but rocks weather. If those pieces stick together to make new rock, the rock would be what type? Sedimentary. Now ask one partner (A or B depending on turn-taking) to hold rocks #1 and #7 under the table as you guide them through comparing by touch. #1 contains pebbles while #7 is made of sand. You can then post the observations about these two rocks using the PowerPoint. The coarser of the two (#1) probably formed closest to eroding land such as the mountains in picture #1. Rock #3 was originally formed from clay that settled out in quiet water far from eroding mountains. #1, #7, and #3 all began as sedimentary rocks, but extra heat and pressure changed #3 to metamorphic (which is why the rock is tougher than the compressed clay it began as).

Rock #8 contains fossils of animals that lived in the ocean – perhaps the cylindrical stem pieces of the crinoids (sea star relatives) shown in picture #8, or shells. Have them examine, with a hand lens if possible, to see the fossils. This is a sedimentary rock.

Procedure for lab portion of activity

The second PowerPoint slide accompanies turning their paper back over to the Rock Data Chart. It directs them to complete the entire Name column first (method to be explained shortly) and only then to write in the gray part of the chart. It then encourages them to go down the Rock textures chart one picture and description at a time and find the rocks that match, rather than to hunt through the chart for a description that fits #1, #2, #3, etc. It also shows them how to fill in the How Formed column, based on the words in italics in the Interpretation column once they have figured out the texture.

Identification

The final slide shows using the flow chart to identify rock #1. To encourage an equal partnership, ask student A to hold the chart while B holds rock #1and answers questions about it. Walk them through identifying rock #1 as conglomerate, make sure all students have written the word down in the correct

position, then have them switch roles for rock #2. After they have recognized that rock #2 does not have visible grains let them work on their own for the remaining time.

Measuring Largest Grain

As pairs of students complete the first three columns of the chart, provide them a ruler so they can complete the last column. The last column gives them the opportunity to measure the largest grain (pebble in #1, piece of glass in #4, crystal in #6, fossil in #8) or write one of the other choices explained in the note at the bottom of the Data Chart.