



## School Adventure Program Junior Geologist Pre-visit and Post-visit Activities

### Dear Teacher,

We are excited about your upcoming visit to the Brooklyn Children's Museum, the world's first museum for children! We are looking forward to working with you and your students during your visit. The enclosed pre/post-visit materials are provided to help you prepare your students for participating in and getting the most out of the workshop. It includes learning concepts, vocabulary, discussion questions and activities that you can use before your introduction to the **Junior Geologist** program. In addition, we have included post-visit activities that will help you to reinforce and extend the learning back in the classroom.

If you have any questions about your visit or these materials, please contact Group Reservations at (718) 735-4400, extension 118. We look forward to working with you.

### Junior Geologist

What's a rock? What's a mineral? Students will explore geology -- the study of our earth -- through hands-on experimentation. Using rocks and minerals from the museum's collection, students will examine what they are, how they came to be, and how to classify them.

### Meets NYC Science Scope and Sequence Standards

- *Grade 2, Unit 1 Earth Materials:* Observe and describe the physical properties of rocks (size, shape, color, presence of fossils) and compare and sort rocks by size, color, luster, texture, patterns, hardness/softness. PS 3.1b,c; PS 3.1d,e; PS 3.1f
- *Grade 3, Unit 1 Matter:* Describe and compare the physical properties of matter (size, shape, mass/weight, volume, flexibility, luster, color, texture, hardness, odor, etc.). PS 3.1b,c
- *Grade 4, Unit 4 Interactions of Air, Water, and Land:* Investigate, measure, and observe the deposition of earth materials. PS 2.1d
- *Grade 5, Unit 2 Earth Science:* Differentiate between rocks and minerals PS 2.1e; PS 2.2g
- *Grade 6, Unit 2 Weather:* Matter is anything that takes up space and has mass and density. PS 3.1a; PS 3.1a,h

### During the program your students will:

1. Examine rocks and minerals and then classify them based on visible properties
2. Classify solids as rocks, minerals, or crystals
3. Use the Mohs scale to identify relative hardness of rocks

### Learning Components

1. Identify properties and opposites
2. Use known rock and mineral properties to sort new rocks and minerals
3. Perform an experiment to test a scientific question

### Vocabulary Words

**Rock:** natural, nonliving solid object that made up of one or more minerals

**Mineral:** natural, nonliving solid object, which is the same all the way through

**Crystal:** a solid whose molecules are arranged in a regularly repeating shape; by definition, all minerals have a crystalline structure. However, there are some inorganic crystals which are not minerals. All minerals are crystals but not all crystals are minerals.

**Property:** a property describes the way the object is; this may include color, texture, density, weight, length. These are all physical properties, in contrast to chemical properties which students will study later.

**Classify:** to sort objects into groups based on properties. Sort is a synonym of classify.

**Matter:** the substance or material of which all things are made. Matter has mass (and weight) and volume (it takes up space). Everything we can touch, taste, or smell has matter.



### Discussion Questions

What is a rock? What is a mineral? How can you tell the difference between the two? This program will focus on how we define solid, inorganic (nonliving) earth materials. Starting with observation, students will define and identify properties of matter and use them to sort and classify rock and mineral samples into groups of alike and not alike objects. At this point, students will learn the correct labels for the alike objects (e.g., sedimentary, igneous, metamorphic rocks) and have the visual evidence to help them tell different rocks and minerals apart. Then, the observation will move beyond easy visible properties—like color and luster—to examine hardness. Students will learn the Mohs scale and perform an experiment to determine how hard a given rock is.

### Pre-Visit Activities

#### 1. Take a rock walk

This will allow students to have prior knowledge of rocks in their area. Take the class on an outdoor field trip to a school yard or park in the area and look for evidence of rocks. You can give students a defined sampling area and have them collect different rocks they can see. Before returning to the classroom, look for very large rocks that cannot be moved and have the class observe them together. What does it look like? What does it feel like? Back in the classroom, use the collected rock samples to make statements about the rocks. You can use the rocks as a teaching tool for sorting, opposites (light and dark, hard and soft, rough and smooth) or comparison (this rock is harder than that rock).

#### 2. Animal, plant or never alive?

Help students prepare for study of rocks and minerals by first identifying inorganic objects. Hold up an everyday object (like a book or a stapler) and ask your students where they think it came from. How was it made? What materials were used to make it? Explain that everything on Earth is made from our natural resources, which generally fall into one of three categories: animals, plants, and things that were never alive. These types of items may be processed in different ways to create all the things we use every day. Create a chart with four columns on the blackboard or chart paper. Give each column a heading: **Object Name, Animal, Plant, and Never Alive**. Challenge your students to look around the classroom. What do they see? For each object they name, write its name in the appropriate column of the chart. Then discuss with your students the things that were used to make that object, and put a check mark in the corresponding categories. For example:

- The chalkboard is made of slate, so it belongs in the “never alive” category.
- Students’ shoes may be made from leather (animal) and/or synthetic materials (never alive).
- Desks are made from wood (plant), metal (never alive), and glue (animal).

Remember, some everyday objects may be made from all three categories of natural resources! Repeat step 4 as many times as you like. Once you have discussed the objects in your classroom, if time permits, ask your students to think about the things they see and use outside the classroom, too. What about cars, bicycles, and televisions? What are students’ homes made from? [By the way, the old game animal, vegetable, mineral isn’t quite right, because there are so many synthetic compounds which were never alive but also are not minerals.]

### Extend the Learning

#### 1. Rock density

Do all rocks float? Buy one piece of natural pumice and collect 10 other rocks, from the schoolyard or a local park. Have students observe and feel the rocks. Then explain that the rocks will be placed in water. Have students make predictions—will the rocks sink or float? Fill a bin with water and place one rock at a time in the water. Does it sink or float? Use the pumice stone last. What happened this time? The pumice stone is in fact the only rock that will float! Pumice is a kind of igneous rock, formed by a volcano. It has lots of enclosed holes throughout, full of gas bubbles, making the stone less dense, which is why it floats in water.

#### 2. Fossil exploration

Who doesn’t love dinosaurs? Explain to students that a lot of our knowledge about dinosaurs comes to us from the fossil record. Fossils can be rocks, but they aren’t always! To explore more about fossils, both dinosaur fossils and other animals, check out *The Fossil Factory: A Kid’s Guide to Digging up Dinosaurs, Exploring Evolution, and Finding Fossils* by Niles, Gregory, and Douglas Eldredge for fossil information and suggested classroom activities. You can also read *Fossils Tell of Long Ago* by Alikei Brandenberg.

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### 3. Mineral of the Day

Did you know that the Brooklyn Children's Museum has an enormous collection of rocks and minerals? Recently, the museums' curatorial staff have been sorting through all those rocks and minerals. To share information with the public, the curators have created a blog called Mineral of the Day. It includes scientific classification, common uses of the minerals, and beautiful photographs. Check it out at <http://mineraloftheday.tumblr.com/>. The blog will help you learn the difference between a mineral and a gemstone, identify common minerals we use everyday, and can lead to conversations about how scientists label minerals. You will notice that each entry includes a category (or family of minerals), Mohs hardness (which students already know about by now), and chemical formula, something that they will study in high school chemistry. Students can then try roughly matching rocks they have found to the minerals on the blog to consider which mineral(s) the rocks are comprised of.

**Other great web resources:** Build your own crystal: <http://www.sdnhm.org/kids/minerals/grow-crystal4.html>  
Identify rocks: <http://www.kidsgeo.com/geology-games/rocks-game.php>  
Practice using the Mohs scale: <http://www.fossweb.com/modules3-6/EarthMaterials/index.html>

### ADDITIONAL READINGS

#### For Teachers

*Geology: The Active Earth (Ranger Rick's Nature Scope)*  
National Wildlife Federation  
McGraw Hill 1997

*Simple Earth Science Experiments with Everyday Materials*  
Louis V. Loeschig  
Sterling Publishing Company Incorporated 1997

#### For Students

*The Rock Factory: A Story About the Rock Cycle*  
Jacqui Bailey  
Picture Window Books 2006

*Rocks and Minerals (Eyewitness Handbooks)*  
Chris Pellant  
Dorling Kindersley Publishing 1992

*Rocks and Minerals (National Audubon Society First Field Guide)*  
Edward Ricciuti and Margaret W. Carruthers  
Scholastic 1998

*Be Your Own Rock & Mineral Expert*  
Michele Pinet and Alain Korkos  
Sterling Publishing Company Incorporated 1997

### PORTABLE COLLECTION SUITCASES (Rented from BCM)

- **Fossils:** What was the world like millions of years ago? With this case, students play paleontologist and examine a real dinosaur footprint, a piece of petrified wood, a trilobite, and other fossils. The case includes authentic fossils, teacher's guide, books, and a geologic time chart.
- **Rocks and Minerals in Our Lives:** Along with learning about geology by studying 31 rock and mineral samples, students have a chance to compare them with a variety of objects made from those materials. The case includes specimens, teacher's guide, and books.
- **Volcanoes!** Your students will be erupting with excitement! Volcanic rocks, cinders, dust, ash, and other specimens help students learn about geology and understand what happens when a volcano erupts. The case includes specimens, teacher's guide, books, and a DVD.
- **Crystals:** Students are fascinated by the exotic shapes and colors of the 20 crystal specimens in this case. The teacher's guide provides activities for students, such as how to grow crystals in the classroom. The case includes specimens, teacher's guide, and books.

**Rental fee: \$100.00 for two weeks. Please contact Group Reservations at (718) 735-4400, extension 118.**