

Metamorphic Rocks Lab Information Sheet

- 1. Name of Lab:** Metamorphism and Metamorphic Rocks Lab
- 2. Authors:** Dr. Maria Gonzalez & Stephanie Sabatini
Revised (07/20/2021): Maria Gonzalez
- 3. Delivery Format:** (In-Person, but includes modifications for asynchronous delivery)
- 4. Audience:** Students in introductory lab courses
- 5. Big Ideas/Course Goals**
 1. Use observations to compare and contrast geologic materials and processes.
 2. Draw conclusions about geologic history of rocks.
- 6. Learning Objectives**

By the end of this lab, students will be able to:

 1. *Describe* the changes that a rock undergoes as it is metamorphosed and the metamorphic rocks they become.
 2. *Rank* degree of foliation using observations from hand samples and tectonic setting.
 3. *Correlate* agents of metamorphism with metamorphism type, plate boundary and rock type.
 4. *Identify* metamorphic rocks based on textural and compositional observations.
 5. *Discuss* the economic importance and the human health impact of metamorphic rocks
- 7. Intended levels of Inquiry included (per Buck et al., 2008)**

Activity 1: guided

Activity 2 structured/guided

Activity 3: guided

Activity 4: structured

Activity 5: guided inquiry

Activity 6: guided inquiry
- 8. Expected Prior Knowledge (e.g. previous lab activities)**
 - Processes that occur at plate boundaries
 - Common rock-forming minerals and their properties
 - Students should be familiar with the rock cycle (processes and products).
 - From lecture: Discussion about deformation and agents of metamorphism

The factors that affect rocks in the interior of the Earth (geothermal gradient and increasing pressure)

- Types of metamorphism (from lecture)
- General information about importance of metamorphic rocks (uses and as clues to early Earth History)

9. Expected Time for Lab (or for modifications):

Activities 1-5: Approximately 2 - 3 hours.

Activity 6 (Gallery walk) is optional and could require another class period if done in person. Activity 6 could also be assigned as homework.

10. Materials Required:

- Internet access (if asynchronous delivery)
- Hand lens (recommended)
- Hand samples (or high-resolution photos/videos) of the following metamorphic rocks: slate, phyllite, schist, gneiss, marble and quartzite. Optional: serpentinite and hornfels.
- Demonstration materials: pennies and clay
- Discussion Board (synchronous or asynchronous) or any other group discussion platform for virtual Gallery walk.

11. Materials Provided

a. Student Handouts:

https://docs.google.com/document/d/1ytcjgKnBWqFxPE5eb2aUAoasCs5wP-n_ntk_rvAXcY/edit?usp=sharing

b. Instructor Materials:

- Answer Key

c. Instructor's teaching notes: [Instructor tips and KEY](#)

12. References

- Reference to existing activity the new lab is based on (e.g. something from an existing lab manual or resource on Teach the Earth)*
- References that may be helpful to the instructor understanding the content*

Link to high resolution images if working online: *Because some of the images may already be labeled, instructors should select and download image files without the information*

Link to high resolution images:

Scott Brande's page: <https://omg.georockme.com/home> and/or

<https://meg.georockme.com/>

Virtual Samples sets: select [Metamorphic Rocks](#)

<http://qiqapan.com/>

<https://opengeology.org/historicalgeology/virtual-sample-sets/vss-metamorphic-rocks/>
[The Story of the Earth Chapter 2 Earth Materials.](#)

- Other sites: <https://www.flickr.com/photos/jsigeology/collections/72157632267667443/> images attribution is [CC-BY 2.0](#) Instructor could download images without their names for students to identify
- Activity 6: markers and [big sticky notes pads](#) or white boards (one per group)

c. *References/links to data sets used in this activity*

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<https://sketchfab.com/>
<http://gigapan.com/>

[The Story of the Earth Chapter 2 Earth Materials.](#)

Gallery Walk (Mark Francek): <https://serc.carleton.edu/introgeo/gallerywalk/index.html>

Teaching Geosciences with visualizations:

https://serc.carleton.edu/NAGTWorkshops/visualize04/gallery_walk.html

Asbestos, cancer and crayons: <https://abc7news.com/back-to-school-shopping-supplies-warning-dangerous-chemicals/3949861/>

Investigation finds asbestos in crayons and some kid's toys:

<https://time.com/3948342/asbestos-crayons/>