

### **3.C.5 Rocks: Observing Properties**

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*A hands-on introduction to rocks and their properties*

<b>Grade Level</b>	3
<b>Sessions</b>	(1): 1 at 40-60 minutes
<b>Seasonality</b>	Recommended before teaching life sciences' plant unit
<b>Instructional Mode(s)</b>	Whole Class, Individual
<b>Team Size</b>	2-4 students
<b>WPS Benchmarks</b>	03.SC.TE.01, 03.SC.TE.04, 03.SC.IS.01, 03.SC.IS.02, 03.SC.IS.03, 03.SC.IS.05, 03.SC.IS.06, 03.SC.ES.02, 03.SC.ES.05
<b>MA Frameworks</b>	3-5.TE.1.1, 3-5.ES.0.3
<b>Key Words</b>	Diagram, Igneous, Metamorphic, Properties, Rock, Sedimentary

### **Summary**

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This lesson allows students to study various types of rocks. After students have discussed “rocks” and “minerals”, they will observe and record observations about rocks using a “Rock Journal.”

### **Learning Objectives**

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*2002 Worcester Public Schools (WPS) Benchmarks for Grade 3*

1. 03.SC.TE.01 Identify materials used to accomplish a design task based on a specific property, e.g., weight, strength, hardness, and flexibility
2. 03.SC.TE.04 Describe different ways in which a problem can be represented, e.g., sketches, diagram, graphic organizers, and lists.
3. 03.SC.IS.01 Ask questions and make predictions that can be tested.
4. 03.SC.IS.02 Select and use appropriate tools and technology (e.g., calculators, computers, balances, scales, meter sticks, graduated cylinders) in order to extend observations.
5. 03.SC.IS.03 Keep accurate records while conducting simple investigations or experiments.
6. 03.SC.IS.05 Recognize simple patterns in data and use data to create a reasonable explanation for the results of an investigation or experiment.
7. 03.SC.IS.06 Record data and communicate findings to others using graphs, charts, maps, models, oral and written reports.

8. 03.SC.ES.02 Identify the three categories of rocks (metamorphic, igneous, and sedimentary) based on how they are formed, and explain the natural and physical processes that create these rocks.
9. 03.SC.ES.05 Examine rocks collected from the schoolyard or a field trip location, or brought in from home. Sort rocks into igneous, metamorphic, or sedimentary based on their physical properties.

### *2001 Massachusetts Frameworks for Grade 3*

1. 3-5.TE.1.1 Identify Materials used to accomplish a design task based on a specific property, i.e. weight, strength, hardness, and flexibility.
2. 3-5.ES.0.3 Identify the three categories of rocks (metamorphic, igneous, and sedimentary) based on how they are formed, and explain the natural and physical processes that create these rocks.

### **Additional Learning Objectives**

1. Students will improve writing and organizational skills by keeping a notebook and organizing a rock collection.

### **Required Background Knowledge**

1. A basic understanding of minerals (see lesson 3.C.4 Minerals: Observe and Identify).

### **Essential Questions**

1. What is a rock?
2. What are the differences between rocks and minerals?
3. What is an igneous rock?
4. What is a sedimentary rock?
5. What is a metamorphic rock?
6. What processes make these different types of rocks?
7. What properties are used to identify some of these rocks?

## **Introduction / Motivation**

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Explain to students that they will learn about rocks and their properties. Consider asking students what they already know about rocks. Students may explain the difference between rocks and minerals (See Vocabulary with Definitions).

## **Procedure**

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The instructor will:

1. *For homework, ask students to bring in three rocks from home in preparation for this lesson.*
2. Explain the three different types of rocks: igneous, metamorphic and sedimentary (see Vocabulary with Definitions).
3. Provide students with an observation notebook (See Appendix A: Instructor's Notes).
4. Ask students to write their names on the front of the "notebook" (worksheet) and to start a "Table of Contents" on the inside of the first page of the worksheet.
5. Ask students to observe the properties of the three rocks and minerals they have brought to class (see Appendix B: Identifying Rocks). Students should record these observations in their journals.
6. Ask students to identify as "igneous", "metamorphic", or "sedimentary", the rocks they brought from home.

## **Materials List**

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<b>Materials per Class</b>	<b>Amount</b>	<b>Location</b>
Rock Collection	One	Science store, internet

<b>Materials per Student</b>	<b>Amount</b>	<b>Location</b>
<u>Rock and Mineral Journal:</u> <u>Rocks Worksheet</u>	-One copy of instructions -One copy of cover page -One single-sided copy of observation sheet	End of lesson plan – print or photocopy

	-Two double-sided copies of observation sheet	
Magnifying Glass	One	Classroom

### **Vocabulary with Definitions**

1. *Gravity* – The natural force of attraction exerted by the Earth upon objects at or near its surface.
2. *Igneous* – Rocks formed from magma that has solidified beneath the Earth's surface.
3. *Luster* – Describes the way light reflects off the surface of a mineral (e.g. dull, waxy, greasy, oily, pearly, silky, glassy, resinous, metallic).
4. *Magma* – Molten rock.
5. *Metamorphic* – Rock formed when igneous or sedimentary rocks have been subjected to heat and pressure, usually from the Earth's crust.
6. *Mineral* – A naturally occurring, inorganic substance that has specific identifiable characteristics (e.g. coal, calcite, diamond, quartz, gold, carbon, salt).
7. *Rock* – A lump or mass of hard consolidated mineral matter (e.g. granite, limestone, slate).
8. *Sedimentary* – Rock formed from layers of material that have accumulated and hardened over time.

### **Assessment / Evaluation of Students**

The instructor may assess the students in any/all of the following manners:

1. Observe students at work and ensure that they can identify the three types of rock (metamorphic, igneous, sedimentary).
2. Collect student worksheets (notebook) and ensure that students identified the properties that helped them identify their rocks.
3. Ask students to describe the difference processes that form each rock type.

### **Lesson Extensions**

1. As a class, ask students to graph the various properties of their rocks and observe trends.

2. Teach lesson 3.C.6 Creating a Rock and Mineral Collection.

### **Attachments**

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1. Appendix A: Identifying Rocks
2. Appendix B: The Engineering Design Process
3. Rock and Mineral Journal: Rocks

### **Troubleshooting Tips**

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1. To be determined

### **Safety Issues**

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1. If students staple their own worksheets, they should use great caution not to injure their fingers.

### **Additional Resources**

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1. Good background on the differences between rocks and minerals:  
<http://www.rocks-and-minerals.com/> (accessed 5 January 2006).

Name \_\_\_\_\_

Date \_\_\_\_\_

### **Rock and Mineral Journal: Rocks**

1. Once you receive your rock, **observe** it closely. Look for the properties that your class discussed.
  - a. Does the rock have layers?
  - b. Does the rock appear to be made of grains that were cemented together?
  - c. Do the grains appear to be different sizes?
  - d. How heavy is your rock compared to the others that you have?
  - e. Does the rock appear to have many holes?
2. Try to identify the type of rock that you have.
3. Draw a picture of the rock and write a few sentences about some of its properties in your journal.
4. As you move to the next page, be sure to mark your page number in the top right corner.

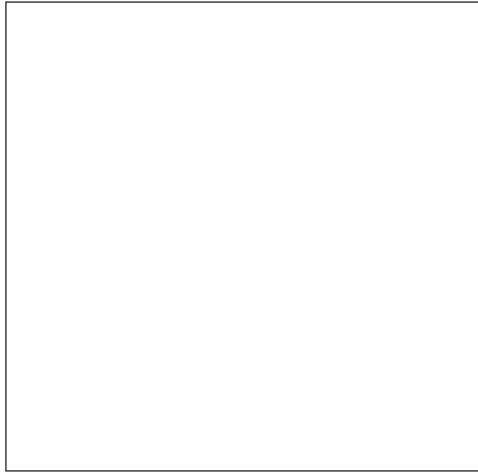
## My Rock Journal

Name: \_\_\_\_\_

Name of Rock: \_\_\_\_\_

Type of Rock: \_\_\_\_\_

Picture:



Description: \_\_\_\_\_

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1. What are some of the physical properties of this rock (color, texture, hardness)?

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2. How can you tell what kind of rock this is?

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3. If you were to build or make something using many of these rocks, what would you build or make? What properties make this rock suitable for what you would build?

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## **Appendix A: Instructors Notes**

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The teacher may assemble the notebooks or have students assemble them.

### Assembling Notebooks:

1. Fold each page of the notebook in half.
2. Place the cover page of your notebook face down on a flat surface.
3. Place the blank side of the single-sided copy of the observation page on top of the cover page.
4. Place the remaining double-sided observation pages on top of the single-sided copy.
5. Place two to three staples at the center of notebook.

## Appendix B: Identifying Rocks

Taken directly from: <http://www.minsocam.org/MSA/K12/rkcycle/typeofrock.html> (5 January 2006).

### What Type of Rock do I Have?

How to tell an igneous rock from a sedimentary rock from a metamorphic rock.



**Igneous** rocks are recognized by:

- the interlocking texture of the grains
- the presence of vesicles (holes) in extrusive igneous rocks
- may be dark-colored and heavy
- may display two grain sizes, one much larger than the other



**Sedimentary** rocks are recognized by:

- grains cemented together
- the presence of fossils
- light-colored and light weight
- may display interlocking grains but is very light weight



**Metamorphic** rocks are recognized by:

- the interlocking texture of large grains
- foliation (layering)
- banded light and dark colors
- "ching" sound instead of a "chunk" sound when tapped

## **Appendix C: The Engineering Design Process**

“The Engineering Design Process for Children” and associated text comes directly from: <http://www.mos.org/doc/1559> (accessed 7 February 2006).

### **The Engineering Design Process**



“The Engineering Design Process is a series of steps that engineers use to guide them as they solve problems. Many variations of the model exist. While having a guide is useful for novices who are learning about engineering, it is important to note that practicing engineers do not adhere to a rigid step-by-step interpretation of the process. Rather there are as many variations of the model as there are engineers. Because our curriculum project focuses on young children, we have created a simple process that depicts fewer steps than other renditions and that uses terminology that children can understand. The engineering design process is cyclical and can begin at any step. In real life, engineers often work on just one or two steps and then pass along their work to another team.”

“A few questions can guide students through each of the steps:

“ASK

- What do I want to do?
- What is the problem?
- What have others done?

“IMAGINE

- What could be some solutions?
- Brainstorm ideas.
- Pick one to start with that you think will work the best.

#### “PLAN

- Draw a diagram of your idea.
- Make lists of materials you will need to make it.
- Decide how it works. How will you test it?

#### “CREATE

- Build a prototype.
- Test it.
- Talk about what works, what doesn't, and what could work better.

#### “IMPROVE

- Talk about how you could improve your product.
- Draw new designs.
- Make your product the best it can be!"