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## RockBox Credits

list

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## **Section 1: What Is It?**

**Title:** Rock in a Sock

**Problem to be studied:** What visual and tactile observations can you make about a rock?

**Content Standard(s):**

- 3.2.4 B Describe objects in the world using the five senses
- 3.4.4 A Recognize basic concepts about the structure and properties of matter
- 3.5.4 B Know types and uses of earth minerals

**Process Standard(s):** Observing, classifying, identifying

**Assessment Strategies: (Evaluation)**

**Formative Evaluation:** Observe students as they draw and describe to be sure they use descriptive vocabulary

**Summative Evaluation:** “My Rock in a Sock... and Not” activity sheet. Descriptive paragraph

**Procedures:****Engage:**

Distribute rocks in socks, My Rock in a Sock handout, and drawing materials with instructions NOT to look in the sock. Each student should place their non-dominant hand into the sock and feel the rock. Assure participants that it is only a rock in the sock.

**Explore:**

With one hand in the sock, each student should draw the rock they feel in block number one. They should add as much detail as possible and color if they like, still only feeling the rock. When everyone is complete, each participant can take the rock out of the sock and examine it, comparing it to what they drew.

**Explain:**

In block number two have each participant draw their rock again with the advantage of actually being able to see it. When these are complete, compare then with the first drawing made. Finally, distribute the hand lenses and have each participant draw the rock again one more time, this time with the aid of the hand lens. The participant may draw the entire rock or choose to just draw a detailed portion of it.

**Elaborate:**

Write a descriptive paragraph about your rock.

**Suggested Grade Level:**

4-5

**Materials:**

- (Per student)
- One sock
- One rock
- Hand lens
- Student Activity Sheet
- Colored pencils/crayons

**Related Web Sites:**

- None used.

**Sources consulted in developing this lesson:**

- *Out of the Rock.*

<p><b>My Rock in a Sock... and NOT!</b></p> <p>-----</p>	

1

3

2

**Title:** Lucky to Have Layers

**Problem to be studied:** Do all rocks show visible bands or layers?

**Content Standard(s):**

- 3.2.4 B Describe objects in the world using five senses
- 3.4.4 A Recognize basic concepts about the structure and properties of matter
- 3.5.4 B Know types and uses of earth minerals

**Process Standard(s):** Observing, Classifying, Communicating, Comparing, Analyzing, Designing Models

**Assessment Strategies: (Evaluation)**

**Formative Evaluation:**

Summarize what you learned from the activity with the sand, the water, and the jar. Classify rocks from the rock box into two groups, those showing bands or layers and those not showing bands or layers.

**Summative Evaluation:**

Using a classmate’s Play Doh model of a selected rock sample, match the model to its original sample from the rock box.

**Procedures:**

**Engage:**

Add one scoop of mixed coarse sand to a small jar. Fill the rest of the jar with water. Shake the jar and allow it to stand to settle in layers.

**Explore:**

Examine each of the samples in the rock box. Divide the rocks samples into two groups. One group should be rocks that appear to have bands or layers.

**Explain:**

Select one of your layered rocks. Create a Play Doh model of the rock you selected.

**Elaborate:**

Exchange your Play Doh model with a classmate. Compare the model with the samples in the rock box to locate the rock it represents.

**Related Web Sites:**

- This Planet Really Rocks <<http://library.thinkquest.org/J002289/act.html>>

**Sources consulted in developing this lesson:**

- None used.

**Suggested Grade Level:**

4-5

**Materials:**

- rock box
- colored pencils or crayons
- mixed coarse sand
- small jars
- water

Name \_\_\_\_\_ Date \_\_\_\_\_

Rock samples with bands or layers

Numbers:

Rock samples without bands or layers

Numbers:

Sample number of my Play-Doh model:

**Title:** Can You See The Mineral Grains?

**Problem to be studied:** Do all rocks show visible mineral grains?

**Content Standard(s):**

- 3.1.4 C Identify patterns that regularly occur and reoccur in nature
- 3.1.7 C Identify patterns as repeating processes or recurring elements in science and technology
- 3.2.4 B Describe objects in the world using the five senses
- 3.5.4 B Know types and uses of earth materials

**Process Standard(s):** Observing, classifying, communicating, recognizing variables

**Assessment Strategies: (Evaluation)**

**Formative Evaluation:**

Observe students during Explore to be sure they are classifying samples into three categories

**Summative Evaluation:**

Select a sample from each category of mineral grain and illustrate, in color, each sample as it was viewed.

**Procedures:**

**Engage:**

Find a side of each rock that looks like it was recently broken. Use a hand lens to observe the rock. Look for mineral grains.

**Explore:**

Compare the rocks based on the sizes of their mineral grains. If a rock is smooth, the grains are too small to see.

**Explain:**

Write the name of each rock in one of the columns in the chart.

**Elaborate**

Compare your results to those of others. Explain any differences.

**Suggested Grade Level:**

4-5

**Materials:**

- Hand lenses – 1 per student
- Rock boxes
- Colored pencils/crayons
- Student activity sheets

**Related Web Sites:**

- None used.

**Sources consulted in developing this lesson:**

- Merlino, Kim. *New Jersey Rocks and Sediments Kit Teaching Guide and Student Activities*. Trenton: New Jersey Geological Survey, 2000.

Name \_\_\_\_\_ Date \_\_\_\_\_

Student Activity Sheet for Activity \_\_\_\_\_

### CAN YOU SEE THE MINERAL GRAINS?

1. Find a side of each rock that looks like it was recently broken. Use a hand lens to observe the rock. Look for mineral grains.
2. Compare the rocks based on the sizes of their mineral grains. If a rock is smooth, the grains are too small to see.
3. Write the name of each rock in one of the columns in the chart.

Comparing Grain Sizes		
Grains are too small to see with a hand lens	Can see small grains with a hand lens	Grains are large and can be seen without a hand lens

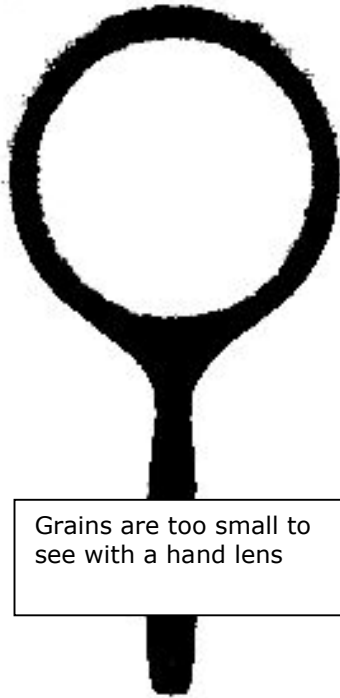
4. Compare your results to those of others. Explain any differences.

Name \_\_\_\_\_ Date \_\_\_\_\_

Student Activity Sheet for Activity \_\_\_\_\_

## CAN YOU SEE THE MINERAL GRAINS?

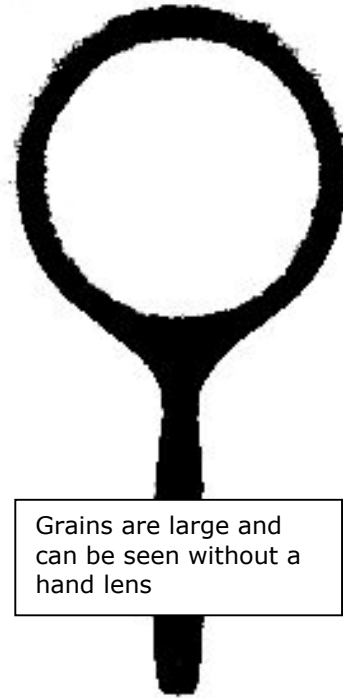
1. Select a sample from each category of mineral grain.
2. Illustrate each sample as seen through the hand lens.
3. Color each illustration using colored pencils/crayons.
4. Label each illustration.



\_\_\_\_\_  
Sample



\_\_\_\_\_  
Sample



\_\_\_\_\_  
Sample

Name \_\_\_\_\_ Date \_\_\_\_\_

Answer Sheet for Activity \_\_\_\_\_

### CAN YOU SEE THE MINERAL GRAINS?

1. Find a side of each rock that looks like it was recently broken. Use a hand lens to observe the rock. Look for mineral grains.
2. Compare the rocks based on the sizes of their mineral grains. If a rock is smooth, the grains are too small to see.
3. Write the name of each rock in one of the columns in the chart.

Comparing Grain Sizes		
Grains are too small to see with a hand lens	Can see small grains with a hand lens	Grains are large and can be seen without a hand lens

4. Compare your results to those of others. Explain any differences.

**Title:** Rocks Of Ages

**Problem to be studied:** Do all rocks found in Pennsylvania have the same age?

**Content Standard(s):**

3.1.4 D Know that scale is an important attribute of natural and human made objects, events and phenomena

3.5.4 B Know basic landforms and earth history

3.5.7 B Recognize earth resources and how they affect everyday life

**Process Standard(s):** Observing, interpreting data, classifying, space and time relationships.

**Assessment Strategies: (Evaluation)****Formative Evaluation:**

Check for student correctness of geologic periods on paper slips.

Check for correct sequencing

**Summative Evaluation:**

Create a geologic time line with correct placement of rock samples to matching geologic periods (and eras).

**Procedures:****Engage:**

Students will be directed to write the names of the geologic periods (and Precambrian era) on 12 separate slips of paper (or index cards). Use the explanation key provided at the bottom of the included PA. Geologic map. These cards are then placed in correct chronological order from youngest to oldest. Students are provided with an explanation that the rocks from across Pennsylvania have a great variety of ages.

**Explore:**

Students will then take the 12 rock box samples and place them with the correct color geologic period (card) which matches the location given on the included PA. geologic map. Students will compare the color key to the map colors and rock location points. The various rock box samples will have different corresponding Geologic ages. Some samples may have the same geologic age. These will be placed on the same paper geologic card. In place of separate cards a long strip of adding machine paper may be used. Divide the strip into 12 separate boxes each labeled with the geologic period.

**Explain:**

Students will identify the rock sample(s) that are the oldest and the youngest. Students will identify the rock sample that comes from the location closest to their school and determine its correct geologic age.

**Elaborate:**

Pennsylvania has a long geologic history. The rocks present across our state represent a very long history of the earth's formation. Students can determine the difference in age between any two selected rock samples. Students can describe the region of PA. In which the oldest and youngest rocks are found. Students can research the geologic period to which the rocks at their school belong. Create a poster to illustrate the conditions on earth and the living organisms that existed during this time period.

**Suggested Grade Level:**

4-5

**Materials:**

- PA. Rock Box
- Geologic map of PA with key to sample locations
- 12 index cards or slips of paper approx. 3 X 5 inches, or adding machine paper strip cut to a 36 inch length.
- Or use the provided
- Geologic period template
-

**Related Web Sites:**

- None used.

**Sources consulted in developing this lesson:**

- (Geologic Map Of Pennsylvania.)

### Rocks of Ages

Worksheet

Quaternary	Pennsylvanian	Ordovician
Tertiary	Mississippian	Cambrian
Jurassic and Triassic	Devonian	Lower Paleozoic
Permian	Silurian	Precambrian

What sample is the oldest rock in the collection? .....

What sample is the youngest rock in the collection? .....

Find the rock that is closest to the location of your school. What rock sample is the same age as the rocks around your school? .....

What is the name of the geologic period for the rocks found at your school? .....

Where in Pennsylvania would you travel to in order to find the oldest rocks? .....

# ANSWER KEY FOR GEOLOGIC AGES OF ROCK BOX SAMPLES.

(\*needs checking with final actual samples)

1. Sandstone, Mississippian
2. Shale, Ordovician
3. Limestone, Ordovician
4. Diabase, Triassic
5. Gneiss, Precambrian
6. Argillite, Triassic
7. Dolomite, Ordovician
8. Coal, Pennsylvanian
9. Metabasalt, Precambrian\*
10. Serpentine, Precambrian\*
11. Marble, Precambrian\*
12. River gravel, Quaternary

Oldest rocks in collection: 5,9,10,11\*

Youngest rocks in collection: 12

Age and name of geologic period for rocks around school:  
answers will vary depending on school location.

Region of state with oldest rocks: Southeastern counties.  
York, Lancaster, Chester Counties

## **Section 2: Where Does It Come From?**

Title: What is the Rock Cycle?

Problem to be studied: Where do rocks come from?

Content Standard(s):

- 3.1.7 A Explain the parts of a simple system and their relationship to each other
- 3.5.4 B Know types and uses of earth materials
- 3.5.7 A Describe earth features and processes

Process Standard(s):

Assessment Strategies: (Evaluation)

Formative Evaluation:

Monitor for correct recognition of rocks.

Summative Evaluation:

Completed worksheet

Procedures:

Engage:

Read about the three main types of rocks on pages 2-3 of *Rocks and Minerals of Pennsylvania*.

Explore:

Give students a copy of Rock Cycle Activity sheets A and B.

Explain:

Inform students that a rock can travel through the rock cycle to each of the three types of rocks.

Elaborate:

Extend the activity by tracing out the path of one rock through the rock cycle. (Ex. Limestone to marble to river stones) Use worksheet B to make a selection for each rock type. Draw an outline of the rock and draw its physical features.

Related Web Sites:

- None used.

Sources consulted in developing this lesson:

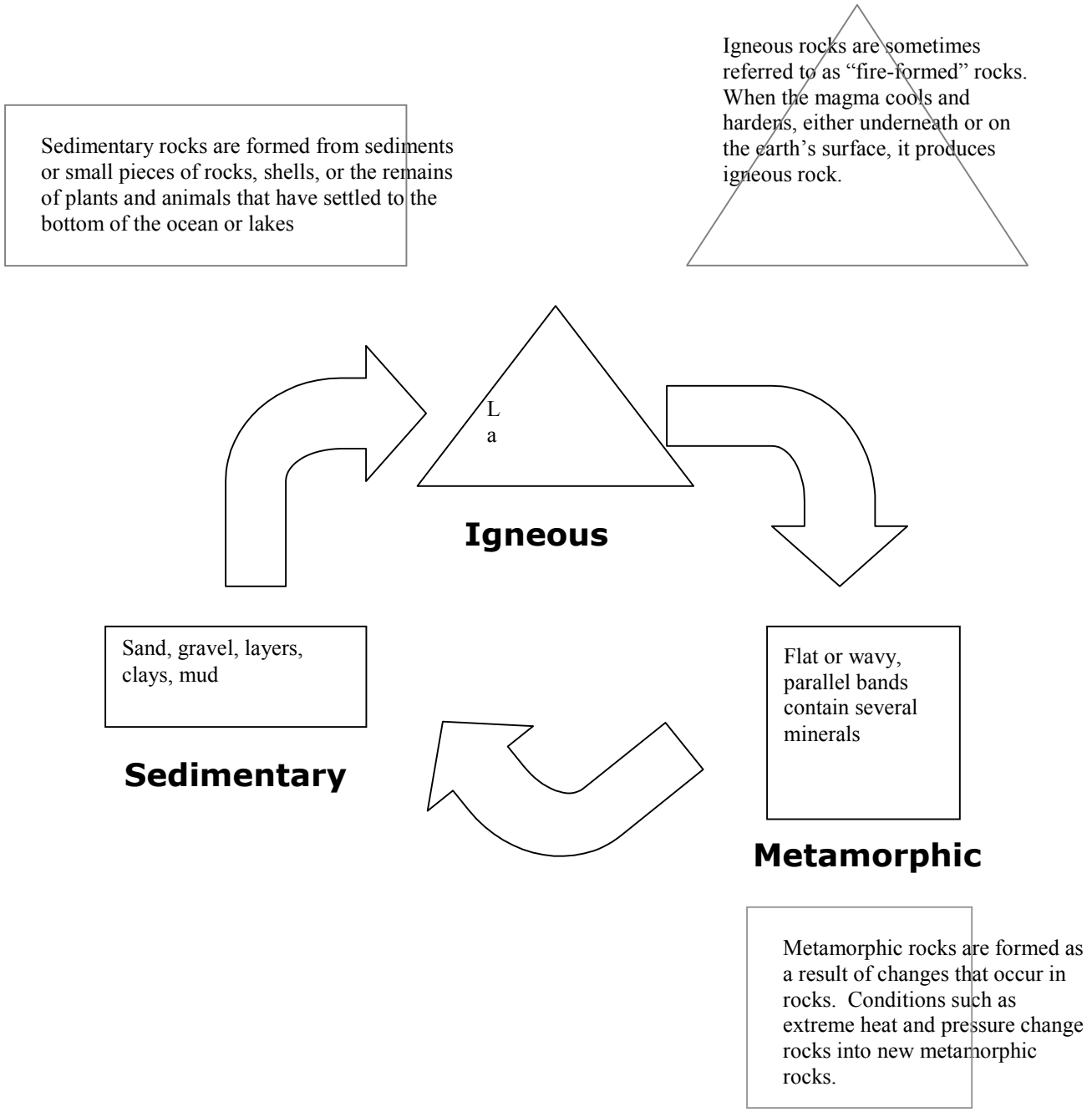
- Merlino, Kim. *New Jersey Rocks and Sediments Kit Teaching Guide and Student Activities*. Trenton: New Jersey Geological Survey, 2000.
- Out of the Rock.
- Pennsylvania Geological Survey. *Rocks and Minerals of Pennsylvania*. Harrisburg: Pennsylvania Geological Survey, 1991.
- **Understanding Earth**

Suggested Grade Level:

5-7

Materials:

- Rock Box samples 1 (sandstone), 4 (diabase), 5 (gneiss)
- Worksheets
-



**Title:** Where’s Rocky?

**Problem to be studied:** What parts of PA did the rocks come from?

**Content Standard(s):**

- 3.5.7 A Describe earth features and processes
- 3.5.7.B Recognize earth resources and how they affect everyday life
- 4.2.7 C Explain natural resource distribution

**Process Standard(s):**

**Assessment Strategies: (Evaluation)**

**Formative Evaluation:** Monitor students as they are working to check for understanding.

**Summative Evaluation:** Completed maps and worksheets.

**Procedures:**

**Engage:**

Using Physical Provinces Map of PA (Map 13), ask students to come up with an explanation of what the map shows. They can share with the class.

**Explore:**

Using county map, rock box, and limited box key (# - Rock – County) have students identify where each rock comes from on map by placing the number on the rock in the correct county (place rocks on map). Go over with class. Using province map and county map have student identify the physical province each rock is from on worksheet.

**Explain:**

Discuss with teacher. Option: use overhead of map with rock locations marked to go over.

**Elaborate:**

Using numbered map from previous exercise, compare to geological map (Map 7) to discuss how long ago these rocks were formed and what other types of rock could be formed in the same area.

**Related Web Sites:**

- None used.

**Sources consulted in developing this lesson:**

- Barnes, John H. and W. D. Sevon. *The Geological Story of Pennsylvania*. Harrisburg: Pennsylvania Geologic Survey, 2002.

**Suggested Grade Level:**

5-7

**Materials:**

- County Map of PA
- Map 7 (Geological Map of PA)
- Map 13 (Physical Provinces of PA)
- The Geological Story of PA (pgs 31-33 for teacher background info on physical provinces)

**Where's Rocky  
Worksheet**

Specimen #	Rock Name	County	Physical province
1	Sandstone	Somerset, Carbon	
2	Shale	Franklin	
3	Limestone	Lancaster	
4	Diabase	Berks, Lancaster	
5	Gneiss	Berks, Chester	
6	Argillite	Adams	
7	Dolomite	Lebanon, Huntingdon	
8	Coal		
9	Metabasalt	Adams	
10	Serpentinite	Lancaster	
11	Marble	York	
12	River Gravel	Armstrong, Clarion, Lawrence	

## **Section 3: What Is It Used For?**

**Title:** Matchmaker

**Problem to be studied:** What are the uses of different rocks found in PA?

**Content Standard(s):**

- 3.5.7.B Explain the value and uses of different earth resources  
 3.6.4 C Know physical technologies of structural design, analysis and engineering, finance, production, marketing, research and design  
 4.2.7.A Know that raw materials come from natural resources  
 4.2.7 C Explain natural resource distribution

**Process Standard(s):****Assessment Strategies: (Evaluation)**

**Formative Evaluation:** Monitor student understanding throughout lesson by evaluating verbal responses to engagement activity and checking progress throughout explore section. Redirect when necessary.

**Summative Evaluation:** To assess student understanding at end of lesson, look for correct matching between rock type and usage/product.

**Procedures:****Engage:**

Ask the students to come up with ideas of what the rocks in the rock kit could be used for or what product might be made from them. Try to come up with a use/product for each rock. Encourage students to look at qualities of the rocks (shape, color, texture etc.) to help infer its use. Give students about five minutes. At end of five minutes compile a class list of uses for each rock. Have students explain why they chose each particular use/product. (What qualities of the rock made them come to that conclusion?)

**Explore:**

Pass out note cards with uses of different rocks listed on them. Spread out on table with rock box. Explain to students that they should examine the properties of the rocks and try to determine what usage best fits each rock. When students think they have made a match, they should set that rock on top of the corresponding card. Give them 10-15 minutes to work on this in small groups. When time is up have each group explain to the other group why they decided to put each rock with the use they chose.

**Explain:**

Give students 2-3 clues (correct pairings of rock and use). Have them now reevaluate their choices and move their choices around as necessary. Reveal 2-3 more correct pairings, giving students time again to reorganize their pairings. Continue this until all groups have made correct matches for all rocks, or until all rocks and their uses are revealed.

**Elaborate:**

1. Bring in samples of finished materials such as shingles, Tums, bricks etc. and have students match rock samples up with actual materials.
2. For a Review Game: Give some students a use card, and other students a rock sample from the box. Have students find their "other half" and pair up. Switch cards and rocks around amongst different students and continue for several rounds.

**Suggested Grade Level:**

5-7

**Materials:**

- Rock Box
- Rock Uses Sheet (1 copy per rock kit) aka "Your world is Mined"
- Notecards (write uses of each rock on front of a notecard. On back side write the number of the corresponding rock.)

**Related Web Sites:**

- None used.

**Sources consulted in developing this lesson:**

- None used.

## Your World is Mined

Ask the students if they can identify what the various rocks are used for. Use the clues below to assess their knowledge of the various materials made from the rock box.

1. This rock is everywhere. Its hardness allows it to remain in high places. It is also used to make glass materials and is trouble for golfers landing in sand traps. On a larger scale this rock covers our beaches along the east coast.
2. Made from clay this rock forms many clay materials including pottery and dinnerware products. Bricks are made from this rock as well.
3. Most often seen on our highways and driveways, this rock material is used in cement products, as well as, for fertilizers and less commonly used in antacids.
4. This very dense material enables tombstones to last for many years. It is a dark building material that stands the test of time.
5. This very strong building material is commonly found in both barn and house foundations. Its appearance is also important to many homeowners.
6. Another tough building material is made from this rock. It is a hard baked clay-like shale material. These tough durable rocks can be broken into building stones.
7. This rock makes fertilizers more effective. Many mistake this rock for its limestone look-alike.
8. This fossil fuel material is high in carbon and pollutes less than its bituminous brother.
9. This igneous/metamorphic roofing material would get damaged from the sun if it weren't for these small rock sprinkles.
10. This greenish colored rock was good for carvings made by the Susquehanna Indians.
11. This beautiful rock is made into monuments to pay tribute to famous people. It is also known by some for coating on school writing paper.
12. Found in streams these smooth weathered stones are great looking for landscaping decorations.

## **Your World is Mined**

### Answers

1. Sandstone
2. Shale
3. Limestone
4. Diabase
5. Gneiss
6. Argillite
7. Dolomite
8. Anthracite (Coal)
9. Metabasalt
10. Serpentine
11. Marble
12. River Stone

**Title:** Good for Nothing?

**Problem to be studied:** What are the uses of different rocks found in PA?

**Content Standard(s):**

- 3.5.7.B Recognize earth resources and how they affect everyday life
- 4.2.4 B Identify products derived from natural resources
- 4.2.7.A Know that raw materials come from natural resources
- 4.2.7 B Examine the renewability of resources

**Process Standard(s):**

**Assessment Strategies: (Evaluation)**

**Formative Evaluation:** Monitor student understanding throughout lesson by evaluating verbal responses to engagement activity and checking progress throughout explore section. Redirect when necessary.

**Summative Evaluation:** To assess student understanding at end of lesson, look for correct matching between rock type and usage/product.

**Procedures:**

**Engage:**

Ask the students to come up with ideas of what the rocks in the rock kit could be used for or what product might be made from them. Try to come up with a use/product for each rock. Encourage students to look at qualities of the rocks (shape, color, texture etc.) to help infer its use. Give students about five minutes. At end of five minutes compile a class list of uses for each rock. Have students explain why they chose each particular use/product. (What qualities of the rock made them come to that conclusion?)

**Explore:**

Pass out note cards with uses of different rocks listed on them. Spread out on table with rock box. Explain to students that they should examine the properties of the rocks and try to determine what usage best fits each rock. When students think they have made a match, they should set that rock on top of the corresponding card. Give them 10-15 minutes to work on this in small groups. When time is up have each group explain to the other group why they decided to put each rock with the use they chose.

**Explain:**

Give students

**Elaborate:**

**Related Web Sites:**

- None used.

**Sources consulted in developing this lesson:**

- None used.

**Suggested Grade Level:**

5-7

**Materials:**

- Rock Box
- Rock Uses Sheet (1 copy per rock kit)
- Notecards (cut out text from usage sheet and glue to notecards)