**Journey Inside the Earth with Integrated Computer Activities**

**Grade Level:** 1st Grade (1st Semester)

**Presented by:** Julie Grotheer and Tammy Tinsley, Elbert County Charter School, Elizabeth CO

**Length of Unit:** 10-12 days (Ten 45 minute per day lessons and three 30 minute computer activities)

## I. ABSTRACT

A. This unit will introduce students to the physical systems of the earth. Using a multi-sensory approach, students will investigate the different layers of the earth, different types of rocks/minerals, volcanoes and geysers. Each lesson has an integrated computer activity. A culminating activity will include a field trip and or a guest speaker. At the end of the unit each student will have created a booklet. This booklet will include all activity sheets.

## II. OVERVIEW

### A. Concept Objectives

1. Develop an awareness of the physical features, structures, and processes of the earth's surface.
2. Develop an appreciation of earth's resources.

### B. Content covered from *Core Knowledge Sequence*

1. Inside the earth
   a. Layers: crust, mantel, core
   b. High temperatures
2. Volcanoes and geysers
3. Rocks and minerals
   a. Formation and characteristics of different kinds of rocks: metaphoric, igneous, sedimentary
   b. Important minerals in the earth

### C. Skill Objectives

1. Students will predict the results of an observable cause and effect relationship on the enviorment. (Colorado State Science Standard 1)
2. Students will describe interactions that produce a change in a system. (CSS 2)
3. Students will list the various interactions of earth systems on the stuctures and dynamics of earth's surface. (CSS 4)
4. Students will identify interrelationships among science, technology, and human activity. (CSS 5)
5. Students will apply skills learned in technology to use CD information systems as well as paint software in their investigation of earth systems.
6. Student will identify the three types of rocks.
7. Student will define a fossil, volcano and geyser.
8. Student will classify rocks according to their texture, color, hardness and type.
9. Students will identify important minerals of the earth.

## III. BACKGROUND KNOWLEDGE

### A. For Teacher

1. Farndon, John. *How the Earth Works.* Pleasantville, New Youk Readers Digest Association Inc.,1992. ISBN 0-89577-411-9.
2. Snedden, Robert. *The Super Science Book Of Rocks and Soils.* New York, New York, Wayland Publishers Ltd., 1994. ISBN 1-56847-224-2.
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4. Stidworthy, John. *The Changing World Earthquakes and Volcanoes*. San Diego, Ca. Thunder Bay Press, 1996. ISBN 1-57145-124-2.
5. Olson, Donald. *Eyes on Adventure Exploring Earth's Treasures*. Chicago, IL. Kidsbooks, Inc. 1996. ISBN 1-56156-481-8.
6. Kittinger, Jo S. *A Look at Rocks: From Coal to Kimerlite.* Published by Joe. S. Kittinger 1997. ISBN 0-531-20310-7.
7. The teacher may want to compile a collection of worksheets that the student will be using throughout the unit. At the end of the unit the student will have a booklet to show his/her family about the earth. It is suggested to use the Earth Diagram Appendix B (after completed) as the cover. The students can cut the diagram out and paste it to construction paper.

### B. For Student

1. Students need to know how to use MS Paint or similar software. In the paint/draw software, the students need to know how to use the paint bucket tool, marquee tool, insert text and click and drag text with a mouse.
2. Students need to be familiar with care and use of CD information systems such as Encarta 2000. They specifically need to know how to use a virtual tour, and how to use the find window to search for information.
3. Students need to recognize the seven continents as landmasses on the earth.
4. Students need to be familiar with what a magnet is, and that it attracts metallic materials.
5. Students need to recognize a rock as compared to a man made material.

## IV. RESOURCES

A. *Planet Earth / Inside Out*, by Gail Gibbons
B. *How the Earth Works,* by John Farndon
C. *Geology*, by Daniel Spero
D. *Rocks and Minerals*, by Steve Parker
E. *A New True Book: Rocks and Mineral,* by Illa Podendorf
F. *The Super Science Book of Rocks and Soils,* by Robert Snedden
G. *Earths Treasure*s, by Donald Olson
H. *How the Earth Works*, by John Farndon
I. Access to a computer with Encarta 2000 or another electronic encyclopedia as well as paint/draw software
J. *It Could Still be a Rock*, by Allan Fowler
K. *Discovering Science: Our Earth*, by Laura Cohen

L. Hard copy of "Rock Cycle Song" from web site http://www.chariho.k12.ri.us/curriculum/MISmart/ocean/rocksong.htm
M. *Making Fossils in Plaster* http://www.c-com.net/~kboyle1/Fossils.htm
N. *Volcanoes*, by Seymour Simon
O. *Earth Science for Every Kid*, by Janice Van Cleave
P. *Geyser*, by Brian Knapp
Q. *The Earth*, by Jo Ellen Moore

## V. LESSONS

### Lesson One: Earth's Layers

A. *Daily Objectives*
   1. Lesson Content
      a. Inside the earth
      b. Layers: crust mantle, core
      c. High temperatures
   2. Concept Objectives
      a. Develop an awareness of the physical features, structures, and processes of the earth's surface.
   3. Skill Objectives
      a. Students will describe interactions that produce a change in a system. (CSS 2)
      b. Students will list the various interactions of earth's systems on the structures and dynamics of earth's surface. (CSS 4)
      c. Students will apply skills learned in technology to use CD information systems as well as paint software in their investigation of earth's systems.

B. *Materials*
   1. Computer Lab time with MS Paint type of software; scanned document of Appendix B to Paint/Draw software or picture similar to Appendix B
   2. 4 different colors of play dough per student
   3. One apple to be sliced in half
   4. *Planet Earth / Inside Out*, by Gail Gibbons
   5. *How the Earth Works*, by John Farndon
   6. *Geology*, by Daniel Spero

C. *Background Notes*
   1. The earth consists of four layers: the inner core, outer core, mantle, and the crust. The inner core is a solid hot ball of iron and nickel with temperatures up to 11,000 degrees Fahrenheit. The outer core is approximately 1,300 miles thick. It consists of hot liquid iron and nickel. The temperature is 9,000 degrees Fahrenheit. The movement of the outer core around the inner core causes the earth's magnetic field. The mantle is 1,800 miles thick with temperatures up to 7,500 degrees Fahrenheit. Most of the mantle is solid, but also consists of molten rock. The crust of the earth is very thin and is made of rock and soil.

D. *Key Vocabulary*
   1. Core – innermost section of the earth

2. Mantle – middle layer of the earth, it is just beneath the crust
3. Crust – the top layer of the earth
4. Gravity – a force that draws something toward the center of the earth
5. Continent – land mass, there are seven on the earth
6. Molten - melted rock
7. Geologist – scientist who studies rocks and minerals
8. Magnetic field – a field of magnetism that is created by the earth's outer core moving around the inner core

E. *Procedures/Activities*

Day One (approximately 45 minutes)

1. Introduce our planet earth by using a globe, and what makes up the crust.
2. Read the book *Planet Earth/Inside Out*.
3. Ask students to identify the four layers with the use of visual aid found in the book *Geology*.
4. Discuss the characteristics of earth's layers.
5. Use the teacher-directed activity sheet Appendix A (Layers of the Earth). Have the teacher read the sentences to the students, and have the students volunteer the answer. The students can then print the correct word.

Day Two (in-class instruction 45 minutes and computer activity 30 minutes)

1. Review of the layers of the earth with the visual aid from Day One.
2. The teacher demonstrates the layers of the earth by cutting an apple in half. The teacher will compare the apple to the earth by showing the core as the earth's core, the white part you eat as the mantle, and the apple skin as the crust.
3. Utilize computer technology by using Appendix B to be inserted into a paint/draw program. The image can be scanned and then inserted into the paint document or the image can be free drawn into paint document. The students will be instructed to use the paint bucket tool to color the diagram of the earth's layers. For example, the inner core could be red, the outer core could be orange, the mantel could be yellow, and the crust could be brown. The students will then use the lasso or marquee tool to select the labels and click and drag the label to its appropriate position on the diagram. The student then can put his/her name and date on the diagram and print it out.
4. Each student will construct a small play dough model of the earth 3 inches diameter. Use different colors of dough to represent the four layers. Students may take the models home to demonstrate (with parent supervision) the layers of the earth by cutting the model in half.
5. Have the students trace the word on the vocabulary list one time and then print the word one time. Use Appendix C vocabulary handwriting sheet for this exercise.

F. *Evaluation/Assessment*

1. Teacher will evaluate student's participation in discussions, and completion of all activities.

**Lesson Two: Rocks and Minerals**

A. *Daily Objectives*

1. Lesson Content
   a. Rocks and minerals
   b. Formation and characteristics of different kinds of rocks: metamorphic, igneous, and sedimentary
   c. Important minerals in the earth
2. Concept Objectives
   a. Develop an awareness of the physical features, structures, and processes of the earth surface.
   b. Develop an appreciation of earth's resources.
3. Skill Objectives
   a. Students will predict the results of an observable cause and effect relationship on the environment. (Colorado State Science Standard 1)
   b. Students will describe interactions that produce a change in a system. (CSS 2)
   c. Students will identify interrelationships among science, technology, and human activity. (CSS 5)
   d. Students will apply skills learned in technology to use CD information systems as well as paint software in their investigation of earth systems.
   e. Students will identify the three types of rocks.
   f. Students will define a fossil, volcano, and geyser.
   g. Students will identify important minerals of the earth.
   h. Students will classify rocks according to their texture, color, hardness and type.

B. *Materials*

1. *Rocks and Minerals*, by Steve Parker
2. *A New True Book: Rocks and Minerals*, by Illa Podendorf
3. *The Super Science Book of Rocks and Soils*, by Robert Snedden
4. *Earths Treasure*s, by Donald Olson
5. *How the Earth Works*, by John Farndon
6. Access to a computer with Encarta 2000 or another electronic encyclopedia
7. *It Could Still be a Rock*, by Allan Fowler
8. *Geology*, by Daniel Spero
9. *Discovering Science: Our Earth*, by Laura Cohen
10. Sample of the three types of rocks
11. Hard copy of "Rock Cycle Song" from web site http://www.chariho.k12.ri.us/curriculum/MISmart/ocean/rocksong.htm
12. Appendix D (Rock Worksheet: Computer Activity)
13. Appendix E (Vocabulary Handwriting)
14. Appendix F (List of Rocks)
15. Appendix G (Rock Worksheet)
16. Plaster of paris

17. Water
18. Large bowl and a spoon
19. Paper cups (1 per student)
20. Sand
21. Straws
22. Leaves, flowers, or other natural items collected by the students
23. Jar of peanut butter
24. Box of graham crackers
25. 4 or 5 plastic knives
26. Large bag of taffy
27. Wax paper
28. Large bag of chocolate kisses
29. One small crock pot
30. Large plate or pan
31. Access to a freezer
32. *Making Fossils in Plaster* http://www.c-com.net/~kboyle1/Fossils.htm

C. *Background Notes*

1. For Teacher
   a. Be familiar with the use of an electronic encyclopedia. Look up each of the rocks in the encyclopedia to be sure that each has a picture so the student will be able to tell what color it is.
   b. There are three types of rocks. Igneous rocks they are formed from partially molten material called magma. Magma that reaches the earth's surface is called lava. The second type of rock is sedimentary which is formed when loose sediment hardens. Most fossils are found in sedimentary rocks. The last is metamorphic rock, which occurs when a rock undergoes change by heat and pressure. The rock cycle refers to how rock evolves from one type to another. Instruct the students the day before you begin the lesson to bring in a rock that will be on display in the classroom.
2. For Student
   a. The student must be familiar with using the find window in an electronic encyclopedia, and how to use the mouse on a computer.

D. *Key Vocabulary*

1. Sedimentary - layered rock
2. Metamorphic - rock that is changed by heat and pressure
3. Igneous – molten rock
4. Mineral – a chemical that forms naturally in the earth
5. Fossil – the remains of a life form preserved in stone
6. Geologist – a scientist that studies rocks and minerals
7. Erosion - the wearing down something

E. *Procedures/Assessment*

Day One (45 minutes)

1. Discuss rocks and how they are formed, show the examples.

2. Introduce the "Rock Cycle Song." It is suggested that at the beginning of each day during this lesson the song be sung. This may be incorporated into their music lesson.
3. Read and discuss *It Could **S**till Be a Rock*, by Allan Fowler.
4. Have student look at their rock and complete the worksheet (Appendix G).

Day Two (45 minutes)

1. Have the student rocks on display in the classroom.
2. Read and discuss the *Super Science Book Of Rocks and Soils* by Robert Snedden pages 4-5 and 8-9.
3. Discuss the three kinds of rocks. The teacher will need to print on the board the three types of rocks. Students can then state the characteristics of each type and the teacher can then write them on the board in a chart format.
4. Have the student complete activity sheet page 18 from *Our Earth* by Laura Cohen.

Day Three (45 minutes)

1. Review the three types of rocks, show samples from the rocks on display, and review the "Rock Cycle Song."
2. The students will make sedimentary and metamorphic rocks. Divide the kids into groups of 4-5. Each will get peanut butter, 12 crackers, a plastic knife, several pieces of taffy and some wax paper. Define a sedimentary rock and explain that the peanut butter and cracker will be layered to represent a sedimentary rock. For the metamorphic rock, the teacher will review how they are formed. The students will unwrap the taffy and place them on the wax paper. They will each take turns applying pressure with their hands which also applies heat to the taffy. The result will be a change in the look and form of the taffy and it will become one piece. Then the students can eat their rocks.

Day Four (45 minutes class time and 30 minutes computer time)

1. Review the three types of rocks, and the "Rock Cycle Song."
2. The activity of making an igneous rock will need to be done in incremental sections throughout the day. In the morning explain that they will be making an igneous type of rock. They will unwrap the kisses and drop them into the small crock-pot. By mid-day when they have all melted, the teacher will take the mixture out and place it in a shallow pan and place it in the freezer. At the end of the day the mixture should be hard. At this point the change in the form and shape will be discussed. The students or teacher will break the new form up for students to eat.
3. Read from *How the Earth Works*, by John Fardon pages 76-79.
4. Computer activity: Assign a rock from the Rock List in Appendix F. The students will write the name of their rock on the worksheet. They will then go into the computer lab. The teacher will give a visual demonstration on how to type in the rock into the search window, click on the results and answer the questions to the worksheet. After the students haves finished answering the questions they can draw a picture of their selected rock on the bottom of the sheet.

Day Five (45 minutes)

1. Sing the "Rock Cycle Song."
2. Discuss minerals and why they are important.
3. Read and discuss *Rocks and Minerals*, by Illa Podendorf, pages 26-38.
4. Use the rock display to show a possible source of minerals such quartz, talc, iron, etc.
5. Activity: *Making a Fossil From Plaster* from the web site indicated in the materials section.
6. Have the students trace the vocabulary list (Appendix E) and write each word one time.

F. *Evaluation/Assessment*

1. The teacher will evaluate the student's learning through participation in discussions. Cooperation and completions of group activity as well as completion of activity sheets may be used to assess the student.

**Lesson Three: Volcanoes and Geysers**

A. *Daily Objectives*

1. Lesson Content
   a. Volcanoes
   b. Geysers
2. Concept Objectives
   a. Develop an awareness of the physical features, structures and processes of the earth's surface.
3. Skill Objectives
   a. Students will predict the results of an observable cause and effect relationship on the environment. (Colorado State Science Standard 1)
   b. Students will describe interactions that produce a change in a system. (CSS 2)
   c. Students will list the various interactions of earth's systems on the structures and dynamics of earth's surface. (CSS 4)
   d. Students will identify interrelationships among science, technology, and human activity. (CSS 5)
   e. Students will apply skills learned in technology to use CD information systems as well as paint software in their investigation of earth systems.
   f. Student will define a fossil, volcano, and geyser.

B. **Materials**

1. *Volcanoes*, by Seymour Simon
2. *Earth Science for Every Kid*, by Janice Van Cleave
3. *Geyser*, by Brian Knapp
4. Computer time with Encarta 2000 virtual tour, if Encarta is not available then a simple search of volcano/geyser will provide a good visual for the student
5. Appendix H (Encarta Volcano Worksheet)
6. *The Earth*, by Jo Ellen Moore

7. ½empty tube of toothpaste
8. *Geysers of Yellowstone and Other Thermal Features* by Finley Holiday Film Corp

C. *Background Notes*
1. For Teacher
   a. A volcano is a mountain-shaped like cone. Hot metal rock pushes up through the cracks in the rock. Magma is melted rock in the earth's mantle. Lava is magma that comes out of the cracks in the crust. A geyser is a spring that sends steam and water into the air at random times.
2. For Students
   a. The student must have already been introduced to Encarta 2000 virtual tour. If the 2000 are not available then some other electronic encyclopedia should have been introduced to the student.

D. *Key Vocabulary*
1. Volcano – cone-shaped mountain that can erupt with lava
2. Magma – melted rock
3. Lava – cooled magma
4. Geyser – spring that can erupt with hot water

E. *Procedures/Assessment*

Day One (1 hour)
1. Discuss what is a volcano and define. Read and discuss the book *Volcanoes* by Seymour Simon.
2. Activity sheet page 33 from *The Earth* by Moore. Review with the student the parts of a volcano. Have the student write in the label into the square patches on the worksheet. Next have the student cut the labels out and glue them to the appropriate areas on the picture of the volcano.
3. The teacher will give a demonstration on what causes magma to move. The teacher will take a ½empty tube of toothpaste. The tube will be held up for the class to see with the cap on tight. The teacher will press against the tube with the thumb and finger. The paste will move inside the tube (squeeze from bottom to top). Take a pen and poke a hole close to the top of the tube. The toothpaste (because of pressure) will ooze out the hole.

Day Two (45 minutes classroom and 30 minutes computer time)
1. Discuss a geyser and define it. Discuss the characteristics of geyser. Share highlights of the book *Geyser* by Brian Knapp.
2. Show the video *Geysers of Yellowstone and Other Thermal Features* by Finley Holiday Film Corp (45min).
3. The students will go into the computer and view a 360-degree virtual tour on Encarta 2000 using the computer activity called Volcanoes using Encarta 2000 Virtual Tour (Appendix H). The teacher will need to first give an overview of the activity and read to the students as well as demonstrate how to get started with the Encarta 2000. This tour is the National Volcano Park In Hawaii. The students will circle the correct answers on the worksheet (Appendix H) after looking in the virtual tour.

The individual student or a group of students can do this. If the Encarta program is not available, perhaps a site on the web on volcanoes or even another electronic encyclopedia in which the student can just search for pictures of volcanoes and or geysers.

F. *Evaluation/Assessment*
   1. The teacher will evaluate the participation of the students during discussions, and activities.
   2. Completion of Inside the Earth Test (Appendix J)
   3. Completion of the booklet that includes the activity sheets

## VI. CULMINTAING ACTIVITY

There are many options for the Culminating Activity. The student could visit a museum, a guest speaker, or even visit a park. There are two activities that are strongly suggested. Only one activity needs to be done. The first possibility could be a guided tour of a local site that has geological significance. The second could be a guest speaker such as a Mineralogist, Geologist or a Metallurgical Engineer.

## VII. HANDOUTS/WORKSHEETS

It is recommended that the activity sheets be compiled into booklet form for each student to be utilized throughout the unit. It is suggested that the computer activity from Lesson One be used as the cover for the booklet. The student can cut the diagram out and glue it to construction paper.

A. **Worksheets**
   1. Activity sheet page 18 from *Our Earth* by Laura Cohen.
   2. Activity sheet page 33 from *The Earth* by Jo Ellen Moore (labeling the parts of a volcano)

B. **Appendices**
   1. Appendix A (layers In the Earth worksheet)
   2. Appendix B (computer activity Earth Diagram)
   3. Appendix C (vocabulary handwriting worksheet Lesson 1)
   4. Appendix D (rock worksheet: computer activity)
   5. Appendix E (vocabulary handwriting sheet Lesson 2)
   6. Appendix F (rock list)
   7. Appendix G (color your rock)
   8. Appendix H (volcano computer activity sheet)
   9. Appendix I (vocabulary handwriting sheet Lesson 3)
   10. Appendix J (Inside the Earth test)

## VIII. BIBLIOGRAPHY


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F. Geysers of Yellowstone and Other Thermal Features by Finley Holiday Film Corp.

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Appendix A

# Layers in the Earth

The outer layer of the earth is the **crust**. It is the part we live on.

The **mantle** is just under the crust. The **mantle** is about six miles under the crust.
It is made up of rocks and metal. Some of the rocks are liquid.

The **core** is the center of the earth it is very hot and all liquid. There is an **outer** core that moves around the **inner core.** This movement creates a **magnetic field.**

We walk on the Earth's _____.

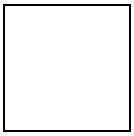
The deepest part of the Earth is the _____ .

The layer under the earths crust is the _____.

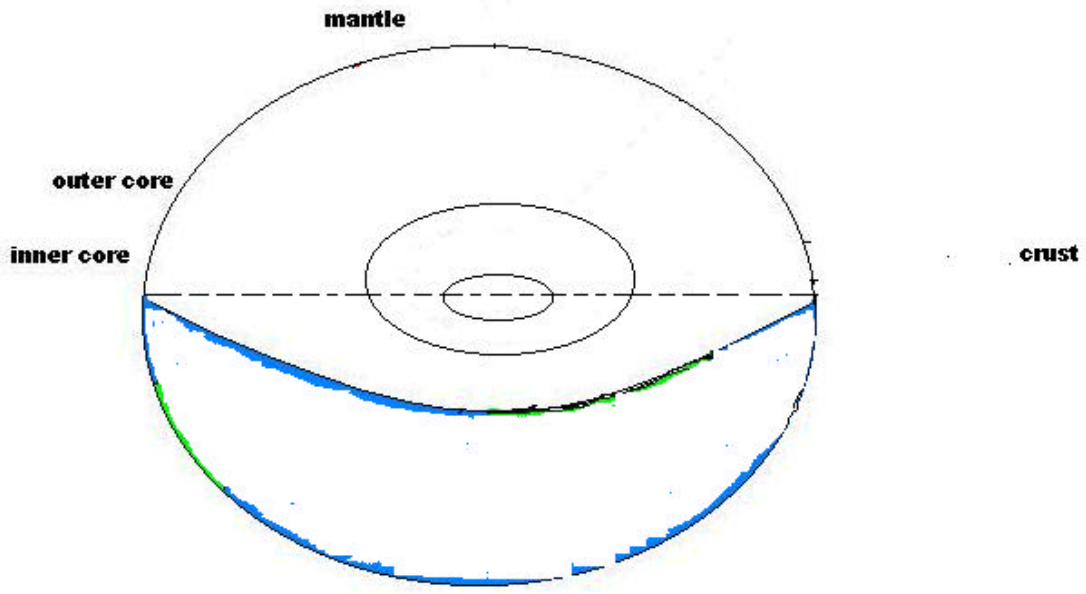
The hottest layer of the earth is _____.

The _____core moves around the inner core.

The coolest layer is the _____.



## Appendix B



Name_____

Appendix C

Vocabulary Lesson I

Trace each word 1 time

core

mantle

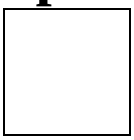
crust

molten

magnetic

Appendix D

# Rock Worksheet
# Computer Activity



1. The name of my rock is

_____

2. Type the name of your rock in the FIND window
3. The color of my rock is: BROWN GRAY

YELLOW WHITE RED BLACK

4. The type of my rock is

METAMORPHIC, IGNEOUS, SEDIMENTARY

5. The texture of my rock is

SMOOTH ROUGH

6. My rock looks SHINY DULL
7. In the space below DRAW a picture of your rock.

Name_____

Appendix E

Vocabulary Lesson II

Trace each word 1 time

sedimentary

metamorphic

igneous

geologist

Appendix F

# Rock List

## IGNEOUS

Granite

Basalt

**Obsidian**

Pumice

Quartz

## METAMORPHIC

**Slate**

Schists

Migmatit

Marble

Eclogite

**A. SEDIMENTARY**

Chalk

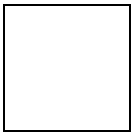
Coal

Sandstone

Shale

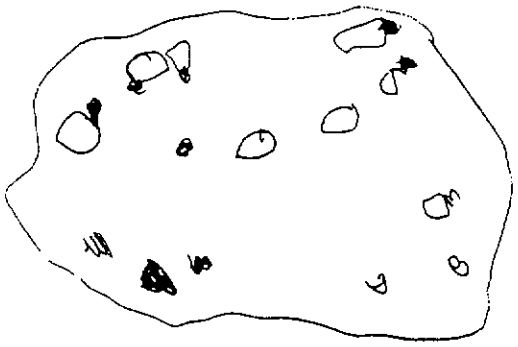
Limestone

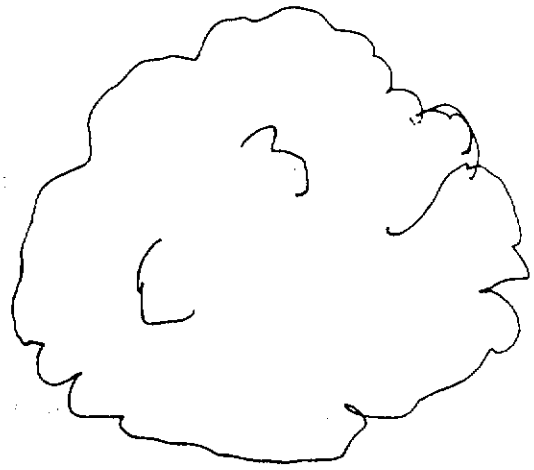
Dolomite

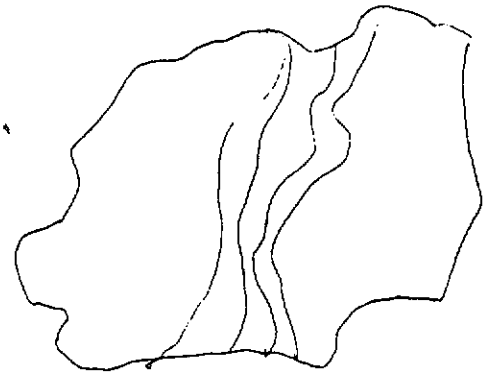


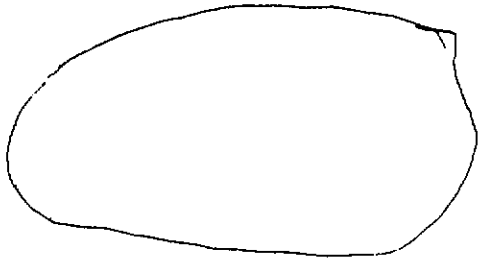
# Rock Worksheet

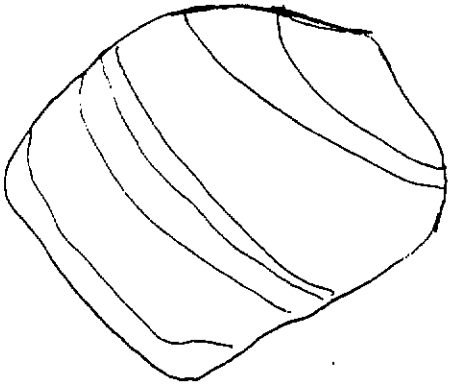
Directions: Circle the rock that looks most like your rock. Color it the same color as your rock.

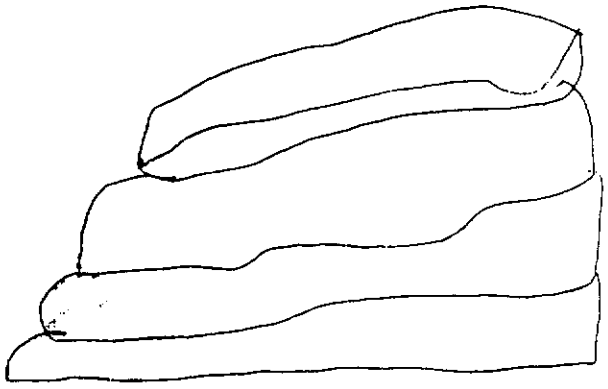












**Appendix H**

**Volcanoes (Virtual tour using Encarta 2000)**
**1st grade**

1. In the **FIND** box type in the word **VOLCANO**.

2. **CLICK** on the **Green** highlight box that is a Virtual tour

3. Put in **DISC 2**

4. What State is the park located in?
   Colorado Hawaii Texas

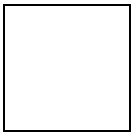
5. In the **RAINFOREST** what **COLOR** is the **OHIO BLOSSOM**?
   Red White Blue

6. Find the picture of the **VOLCANOLOGIST**. What color is his suit?
   **Silver Blue Red**

7. What color are the **SULFUR** deposits?
   Blue Yellow Red

8. Click the **X** at the UPPER RIGHT of the screen

9 Take out **Disc 2** and put it in the holder.



Name_____

Appendix I

Vocabulary Lesson III

Trace each word 1 time

volcano

geyser

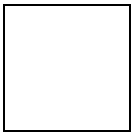
erupt

magma

lava

erosion

# Inside the Earth Science Test



**Directions:** Circle **YES** or **NO** after each statement.

1. Rocks are made of minerals. **Yes** **No**
2. Rocks are only in the mountains. **Yes** **No**
3. Magma that reaches the earth's surface is called lava. **Yes** **No**
4. When lava erupts it forms a mountain called volcanoes. **Yes** **No**
5. Igneous rocks are formed from magma. **Yes** **No**
6. Most fossils are found in sedimentary rock. **Yes** **No**
7. Metamorphic rocks melt. **Yes** **No**
8. Metamorphic rocks remain solid. **Yes** **No**
9. All rocks are smooth. **Yes** **No**
10. Rocks can change by erosion. **Yes** **No**

11. Volcanoes and geysers both erupt hot materials. **Yes No**

12. Minerals are used to make toothpaste, powder, lotion, medicines and even some foods. **Yes No**

13. Wind, rain and snow can cause erosion of rocks and mountains. **Yes No**

14. Draw a picture of how rocks change the shape of the earth.

Trace each word 1 time