Geology

Rocks and Minerals

Caves

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Science In Schools

Geology- Rocks and Minerals

Grade 5

This is a fifth grade hands on science unit in Rocks and Minerals, with two additional experiments on caves. Students will be given a box of rocks, and will learn how the rocks were formed and how to identify different rocks and minerals. The children will conduct streak tests, acid tests and will compare and analize their rock samples, recording their observations, and basing conclusions on those observations. There are ten experiments in the rocks and minerals section with two quizes. Games as well as a textbook have been included in this unit.

Experiments in this unit should be copied and placed in marked, or numbered, folders in a box. Allow students to get new sheets as needed. Students should be put into groups of 2, 3, 4, 5, or 6 students. By doing this the children can question each other, and can offer each other advice and help. Each group of students should receive a box of equipment with a materials list with a materials list in it. Attached to the back of the materials list should be the group clean up sheet. Each day one child, in in any group, should be in charge of the box for his/her group, making sure that everything is there and that the box is neat and clean. He/she then should sign the clean up sheet. In this manner

you can keep track of which students made a mess and which were clean. You may also wish to have your students make and use a log book. The log book is a place where your young scientists can write down what they are doing and what happened in their experiments that day. Many discoveries, in science, happened by accident. If scientists did not record what they were doing, their discoveries might have been lost forever.

Students work should be graded and returned to the student as soon as possible; this insures that students will not keep making the same mistakes sheet after sheet. You can hang up a copy of the grading sheet and use it as a check off sheet or as an incentive chart. Students can then check off experiments they have done.

Gregory Grambo
The Louis Armstrong Middle School

Contents

Chapter One- Rocks and Minerals

Chapter Two- Caves

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Appendix One

Appendix Two- Rocks and Minerals Text

The following text book was written by Mr.Ray Tereszkiewicz's fifth grade class in 1982. Credits are given in the text itself.

Chapter One

Rocks and Minerals

Materials List

You are responsible for all the materials in your box. Keep them neat and clean. Report all missing materials to your teacher

Corn oil
Cups
Ball
Nails
string
sticks
Streak plate
crayons
magnifier
jar / dirt / water
chalk
beaker
heat source
(hot plate - bunsen burner - stove)
Tripod (to hold beaker while heating)
Toothpicks

sugar
epsom salts
acid
sand
fossils
cave sample

Desk items

Box of balloons

Rocks

slate
schist
gneiss
basalt
conglomerate
limestone
Sandstone

Rocks

cement
beach pebbles
galena
calcite
hematite
pyrite
mica
quartz
talc
serpentine
pumice
obsidian
granite
feldspar
quartzite
marble
shale

Geology

Rocks and Minerals list

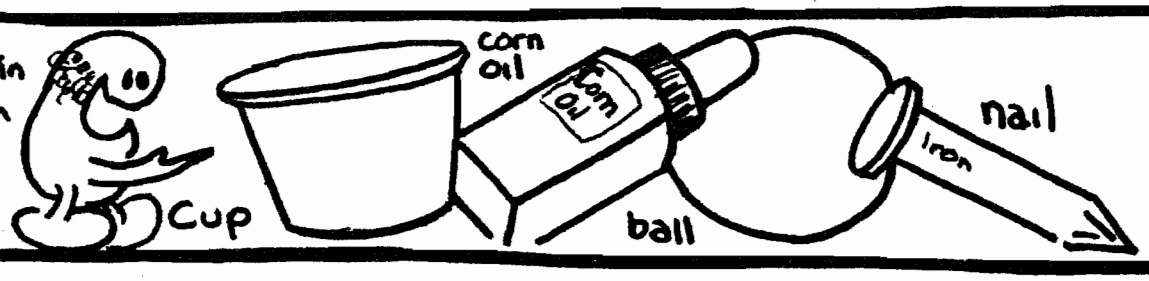
1- Hematite (Mineral)
2- Marble (Metamorphic)
3- Gneiss (Metamorphic)
4- Copper Ore (Mineral)
5- Feldspar[pink] (Igneous)
6- Obsidian (Igneous)
7- Graphite (mineral)
8- magnetite (mineral)
9- Agate (mineral)
10- Diabase (Igneous)
11- Talc (mineral)
12- Quartz (mineral)
13- Quartzite (metamorphic)
14- Gypsum (mineral)
15- mica [muscovite) (mineral)
16- Schist (metamorphic)
17- Pumice (igneous)
18- Serpentine (mineral)
19- Conglomerate (sedimentary)
20- Sandstone (sedimentary)
21- shale (sedimentary)
22- Gabbro (igneous)
23- Pyrite (mineral)
24- Galena (mineral)
25- calcite (mineral)
26- Basalt (Igneous)
27- Granite (Igneous)
28- Bituminous Coal (sedimentary)
30- Cement (man made sedimentary)
31- Limestone (sedimentary)
32- Slate (metamorphic)
A- Cave Sample calcite (mineral)

Name _____

Class ___ Group No ___

What lies under your feet? Experiment 1

1 Begin with



2 Many billions of years ago, when the Earth was formed, it was on fire. The fire was so hot that everything, even rocks and mountains, melted and became a liquid.

3 Strange things began to happen to the liquids

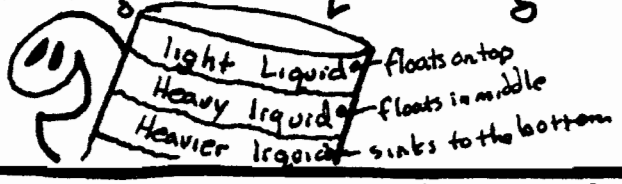
4 Put some water into a plastic cup. Put a few drops of corn oil into the water.

5 Describe what happens.

Why do you think this happens to the oil and water?

6 Put a nail into the water. Why did it sink?

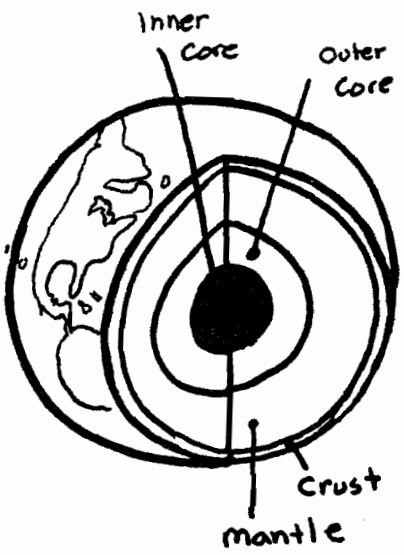
7 Heavier liquids began to sink. Lighter liquids began to float on top of the heavier liquids.



8) The liquids then began to cool leaving layers in the Earth.

The heavier things were to be found near the center, while lighter things were to be found near the top or of the Earth.

The layers of the Earth have names.



Zone	Thickness	Composition
Crust	8-30 miles	solid rocks like granite and basalt
Mantle	1800 miles	heavier rocks like iron
Outer core	1300 miles	melted iron and nickel (high temp)
Inner core	800 miles	solid iron and nickel (Temp 3000°c to 6000°c)

9) look at the ball in your box. How can you find out what is inside the ball without cutting it open (in half)?

10) When an oil company bores or drills for oil the company has to go through layers of rock. The drill bit (the part that does the cutting) is hollow. The rock goes up into the drill. Scientists can examine the borings to find out what is under your feet.

11) Rocks and Minerals near the crust of the Earth cooled off fast. Rocks and Minerals near the center of the earth are so far away from the rain which cooled off the crust, that it is still in a very hot, liquid state. There is so much pressure down there, this is due to all the heavy rock above it, that even though it is hot down there, the very center of the earth has been pressed into a solid metal ball.

Homework—

1- Why are heavy metals found in the core while lighter rocks and minerals are in the crust?

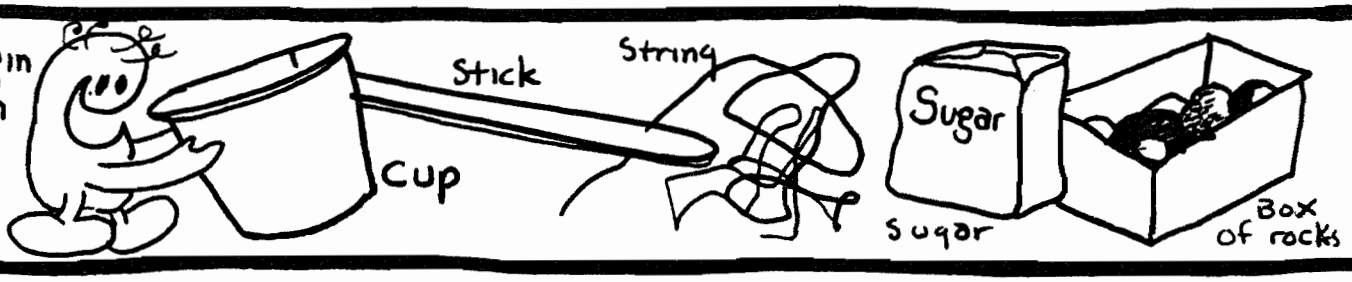
2- Where is the crust located?

Name _____

Class _____ Group No _____

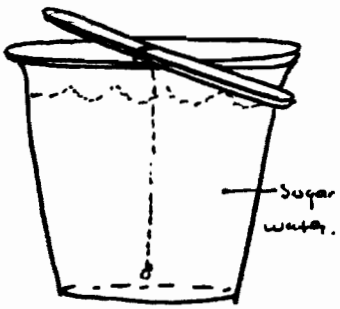
What are minerals? Experiment 2

1 Begin With



2 As the Earth began to Cool off, chemicals began to come together. The chemicals began to harden to become stone. The stones made of pure chemicals. are called minerals.

3 Try this experiment. In a beaker half filled with water, add sugar until it no longer dissolves. Heat the solution and add more sugar. Pour this solution into a cup. Hang a string in the cup and watch it over a few days.



Describe what happens

4 All chemicals come together in certain ways and forms certain shapes.

Examine some salt.

Describe its shape.

(you can draw it)

5 As the chemicals join together they seem to grow larger, still keeping their chemical structure or shape. We call these shapes crystals. Many minerals which are pure chemicals take on crystalline shapes.

6) There is something else about minerals. Minerals were never alive and are not made out of anything that was ever alive.

7) look in your box for the following materials (or minerals) Galena, Calcite, Hematite and Pyrite.

8) Draw and color a picture of each of the above minerals.

Galena Calcite Hematite Pyrite

9) How are minerals formed?

10) How do they differ?

11) How are they similar?

Homework–

1)- What is a mineral

2) Read Chapt I of Rocks around the World. What are two minerals and what are they used for?

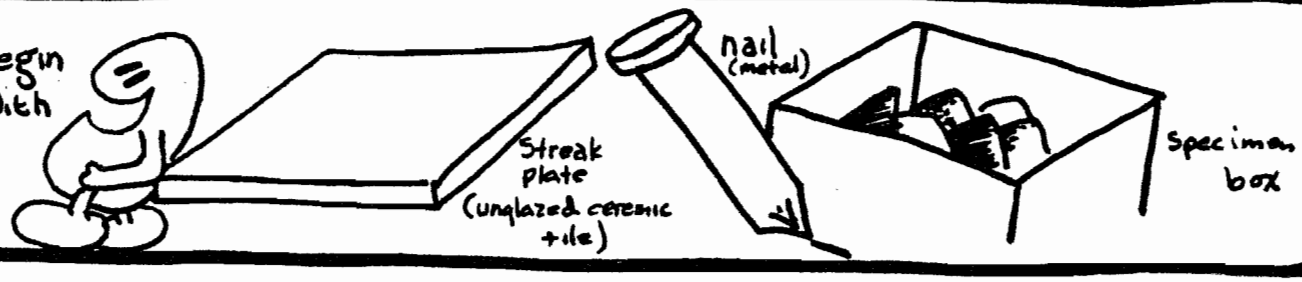
Name _____

Class ____ Group No ____

How can you identify minerals?

Experiment 3

1 Begin With



2 There are many different ways to identify minerals

3 Most minerals have some sort of color because of the chemicals they are made of.

4 Examine the following minerals. Describe their color

mineral	color
Galena	
Calcite	
Hematite	
Pyrite	

4 When light hits the surface of an object it reflects some of the light

Luster is the way a mineral reflects light from its surface.

5 Some words used to describe luster are Dull, Waxy, Glassy, and Metallic.
What are some others?

6 Describe the luster of these minerals

mineral	luster
Galena	
Calcite	
Hematite	
Pyrite	

7) Name two ways to identify minerals.

8) A third way to identify minerals is by Hardness. Hardness is the ability of one substance to scratch another. A mineral is said to be harder than any other mineral it can scratch. It is also softer than any material that can scratch it.

9) Try to scratch talc with the nail.

Which is harder?

10) Make a chart showing which minerals are softest and which are hardest.

Quartz, Talc, Galena, Pyrite, calcite Mica, Hematite, and Serpentine

Hardest	Softest

11) This is a hardness scale to which most minerals are compared to.

Mohs Hardness scale

Soft	talc	1	(this is another useful scale)
	gypsum	2	finger nail
	calcite	3	copper penny
	fluorite	4	
	apatite	5	knife blade glass plate & file
	Orthoclase	6	
	Quartz	7	Quartz
	Topaz	8	
	Corundum	9	
	Diamond	10	
hard	↑ mohs scale		

12) Streak is the color of the powder in a mineral. Every mineral has its own color streak. The color of the streak may not always be the same as the color of the mineral.

13) Scratch your minerals on the white side of the tile. Fill in the chart.

	Color of Streak
Galena	
Calcite	
Hematite	
Pyrite	
Quartz	
Talc	

Homework—

1- Name some ways to identify minerals.

2- Why can't scientists depend on only one of these tests to identify a mineral?

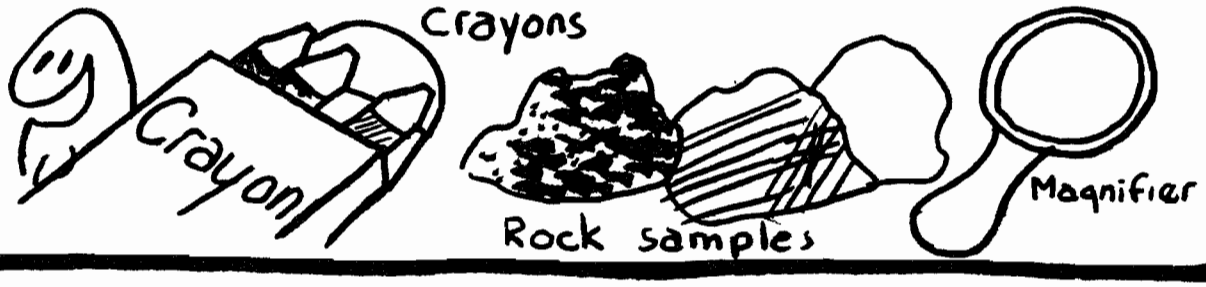
3- What is the Mohs scale?

Geology - Rocks and Minerals Name _____

Class _____ Group No ___

What are rocks? Experiment 4

1 Begin With



2 Look at the following rock samples.

pumice	quartzite
obsidian	marble
granite	shale
feldspar	

Draw a picture of two of the above rocks

3 How are these rocks different from minerals?

Minerals are made out of one specific set of chemicals. The whole thing is the same. Rocks on the other hand are made out of pieces of different minerals.

4 look at the granite. Why are there specs on it?

5 Very tiny rocks are called sand. Sand is made when larger rocks break apart into tiny specs. larger rocks can be called pebbles.

sand

pebbles

6 Very large rocks are called boulders.

7 Look at your rock samples.

Why do they have so many different colors?

8 Where can you find rocks?

9 Why are the rocks you find at the beach usually round edged? (not sharp)

No

10 How might the moving ocean water affect rocks in the sea?

Home work -

1- What is a rock?

2- What is sand?

3- How does a rock get its color?

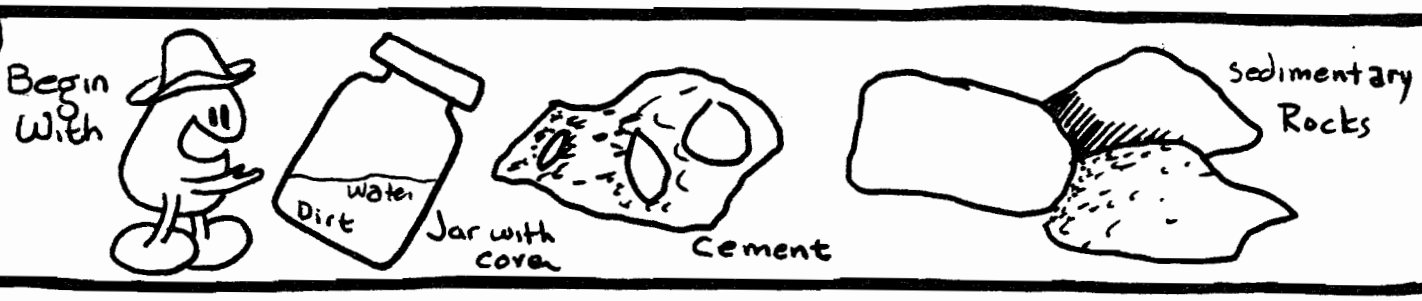
Name _____

Class _____ Group No _____

How are Sedimentary rocks formed?

Experiment 5

1



2 Put some dirt in a jar of water. Put the lid on the jar and shake it. Let it sit on the table. Describe what happens.

3 Why does the dirt sink?

4 This dirt is called sediment. In nature, small deposits of rock and sand can fall on each other. The deposits form layers on top of each other. The deposits then harden and turn into rock called sedimentary rock.

5 Look at the rock conglomerate. How do you think it was formed?

6 Look at the piece of cement. How is it similar to cement?

7 The following rocks are all sedimentary rocks; Sandstone, Shale, limestone and conglomerate. How can you tell?

8 When plants died millions of years ago the too piled on top of each other forming layers. These layers over time turned into coal

9 look at the jar of sand. How can you hold the pieces together?

10 How long a sedimentary rock will last in nature depends on how well its pieces or elements are glued together.

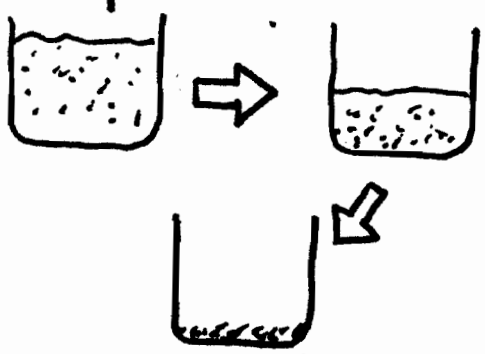
11 Sedimentary rocks can be made, or formed, another way.

How would the mud on the bottom of a river be affected if all the water disappeared?

12 The water carries minerals and deposits of rock.

What would happen to the salt in a glass of salt water if the water evaporates?

13 The deposits of minerals and salts would harden into rock as water evaporated.



Homework-

1- What are three ways that Sedimentary rocks can form?

2- How could a flower or plant become a rock?

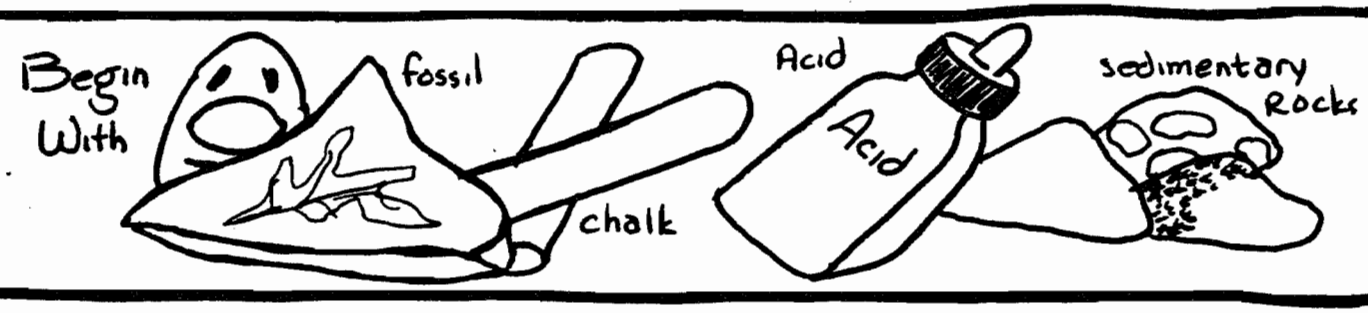
Name _____

Class ____ Group No ____

How can you identify sedimentary rocks?

Experiment 6

1



2 Examine a piece of concrete or cement.
How can you tell it is concrete if I did not label it?

3 What are some characteristics you can use to identify a rock like cement?

4 Look at the conglomerate. How do you think it was formed?

5 Look at the piece of sandstone.
Describe the size of the particles it is made of.

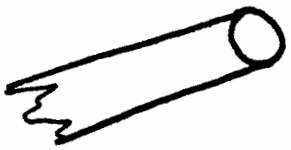
6 What would happen if a leaf got caught between layers of sediment as it settled?

7 look at the fossils. How did the prints, or pictures get there?

8 Fossils are sedimentary rocks.
Why do we say this?

9 Sediment, grains of sand, and stones are out together with a type of glue to form sedimentary rocks. Scientists think this glue is called calcite.

10 Calcite is made of calcium carbonate - $CaCO_3$. Chalk is also made of $CaCO_3$. Place a drop of acid on the chalk.



How is it affected?

10 Place a drop of acid on limestone and sandstone.
How are they affected?

11 Try this test on a mineral.

_____
mineral used

How was it affected?

12 How can acid be used to identify sedimentary rocks?

13 What are three ways to identify a sedimentary rock?

Homework -

1- How can you identify a sedimentary rock?

Geology ~ Rocks and Minerals

Name _____

Class ____ Group No ____

How are Igneous rocks formed?

Experiment 7

1 Begin With

2 As we talked in earlier experiments. Millions of years ago the Earth was in a hot molten state. Most minerals turned into a liquid. As the earth cooled so did the minerals. The slower it cooled the larger the crystals in the newly formed rock were.

3 This melting of rock is still going on in the center of the Earth.

4 look at the samples of Granite, Obsidian, and Basalt.

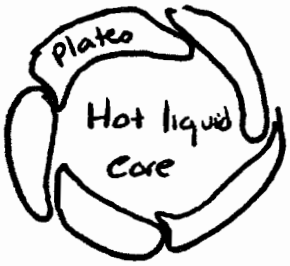
How are they similar?

How are they different?

5 These rocks were all formed from a volcano. Melted rock hardened to form all of them.

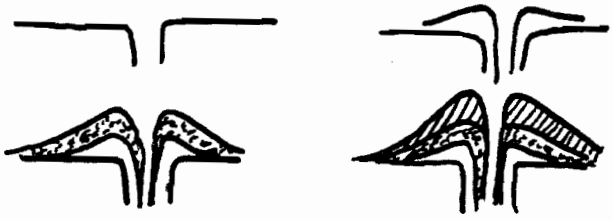
6 On the Earth, the continents sit on a thin skin called plates. These plates float on top of the melted core of the earth. The plates can overlap and move over each other.

7 Where one plate ends and another begins is a crack.



8 How could the liquid core of the earth get up to the surface?

9



As the lava, or liquid rock rises to the surface it pours out of a hole in the ground and cools. more lava pours on top of that until a mountain or Volcano forms.

10 These rocks formed by the hardening of molten (on fire) rocks are called <u>Igneous</u> rocks. Obsidian is glass formed by a Volcano. Pumice shoots out of a volcano so fast it cools with air bubbles in it.

Homework-

1- What is an igneous rock?

2- How is it different from a sedimentary rock?

3- What is lava and magma?

4- How is a volcano formed?

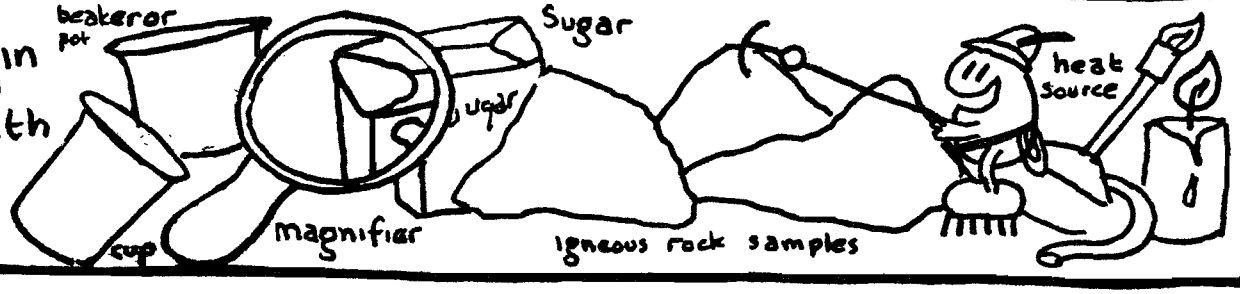
Name _____

Class ____ Group No ____

How can you identify igneous rocks?

Experiment 8

1 Begin With



2 Describe how igneous rocks are formed

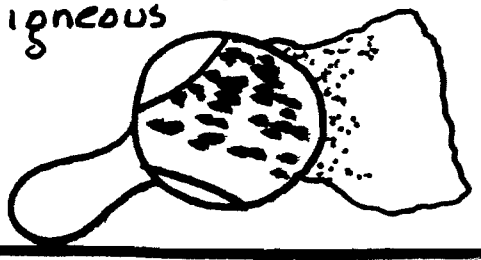
3 Look at samples of granite, basalt and limestone.

How are these rocks different?

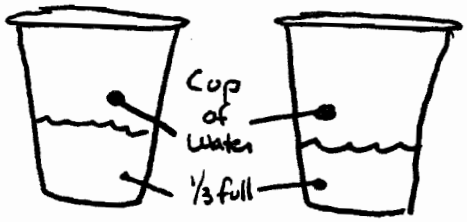
One of them is not an igneous rock it is a sedimentary rock. How can you tell which one it is?

4 What determines the color of the two igneous rocks you were looking at?

5 How can you use the size of mineral spec's in a rock sample to tell if it is an igneous rock?



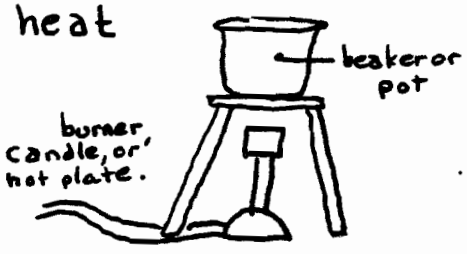
6 Set up these experiments



Add sugar until no more dissolves in the water.

let one evaporate slowly (It will take a few days)

Pour the other into a beaker and heat



7 Describe what happens as the sugar forms crystals.

8 Why does one have larger crystals than the other?

9 How would cooling rate affect the size of mineral crystals in an igneous rock?

10 Find 2 other igneous rocks How can you tell they were igneous rocks.

Rock Reason

11 look at these igneous rocks Finish the chart.

Rock	Color	Particle Size	Did it form slow or fast
Pumice			
Obsidian			
pumice			
basalt			
granite			

Homework -

1- How are igneous rocks formed?

2- What determines particle size?

3 - What are three (3) ways to identify igneous rocks?

Geology - Rocks and Minerals

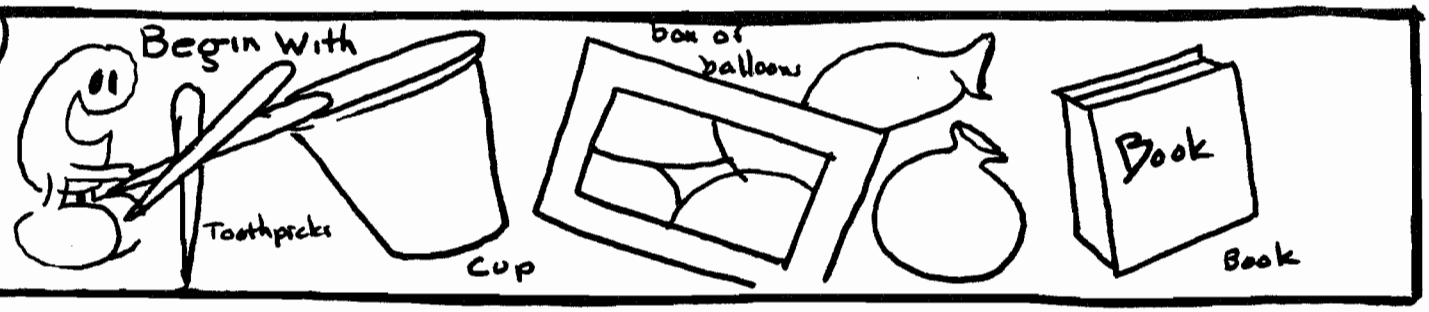
Name _____

Class ____ Group No ____

How are metamorphic rocks formed?

Experiment 9

1



2 How are sedimentary rocks formed?

3 How are igneous rocks formed?

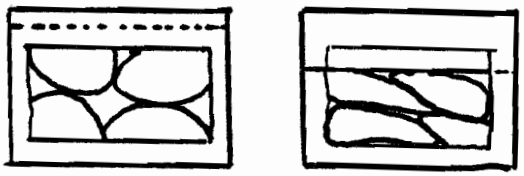
4 lets say we took a sedimentary rock and put it near a volcano. How would the water in the rock be affected by the heat from the volcano?

5 How would this evaporated water affect other rocks nearby

As the water dissolves minerals from other rocks new minerals are formed

6 Look at the box of balloons on the teachers desk. How would the shape of the balloons change as you press on the lid?

7) Why would it change?



8) How would rocks be affected as pressure increases? (tell me about the spaces between particles of rock)

New rocks formed from pressure are more compact than the ones they are made out of.

9) Take some toothpicks and break them in half. Put them in a cup and shake it. Pour toothpicks onto the table.

How are they arranged?

10) Put a book on top of the toothpicks on your desk and press hard.

How are the arranged now?

11) How have the arrangements changed?

This process of lining up into layers is called foliation. Pressure, heat, and foliation can change rocks into <u>metamorphic</u> rocks

Homework -

1- How can foliation cause a metamorphic rock to form?

2- How can heat and pressure form a metamorphic rock?

3- What is a metamorphic rock?

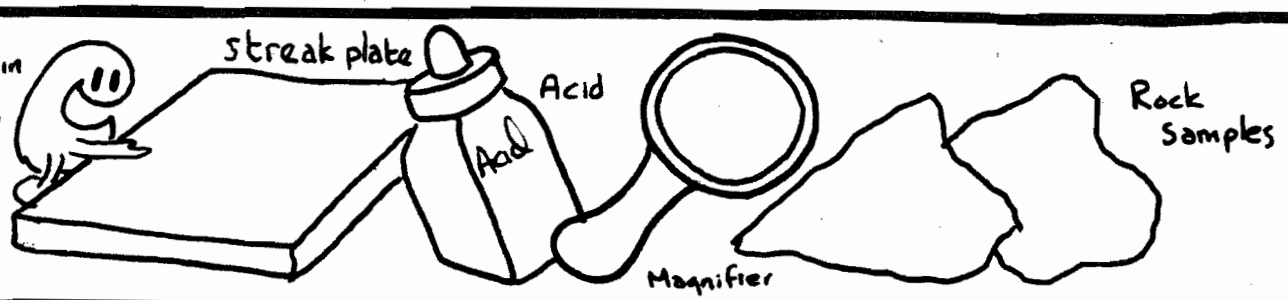
Name _____

Class ____ Group No ____

How can you identify metamorphic rocks?

Experiment 10

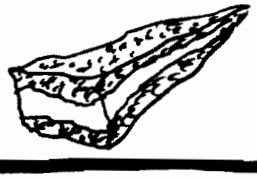
1



2 How are metamorphic rocks different from sedimentary rocks?

3 How are metamorphic rocks different from igneous rocks?

4 How are bands or layers formed in metamorphic rock?



5 Look at the schist. Are the bands thicker or thinner than those in gneiss?

6 Which is a metamorphic rock?

Why?

7 Why do you think a metamorphic rock would be harder than the rock it was formed from?

8 How can you find out?

9

Metamorphic Rock	Original Rock
marble	limestone
schist and slate	shale

Which is harder?

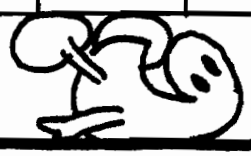
Use scratch test on Moh's scale

10 Why does acid bubble when you put it on sedimentary rocks?

11 How can you test to see which metamorphic rocks came from sedimentary rock?

12 Finish this chart

metamorphic rock	hardness test	streak test
Marble		
Quartzite		
Gneiss		



3 Fill in this chart

New Rock	Original Rock	Color	Particle Size	Is it from sedimentary or igneous
Marble	limestone			
Quartzite	Sandstone			
Gneiss	Granite			

Homework

1- How can you identify which rocks are metamorphic

Geology- Rocks AND Minerals

Name _____

Class ____ Group No ____

Quiz on Experiments 1-5

1- How can scientists find out what is below the Earths surface?

2- What are Minerals?

3- How can you identify minerals?

4- How are rocks different from minerals?

5- How are sedimentary rocks formed?

Geology - Rocks and Minerals

Name _____

Class ___ Group No ___

Quiz on Experiments 6-10

1- How can you identify a sedimentary rock?

2- What is an igneous rock? How is it formed?

3- How does cooling rate affect the formation of an igneous rock?

4- How are metamorphic rocks formed?

5- How can you identify a metamorphic rock?

Chapter two

Cavas

Geology – Caves

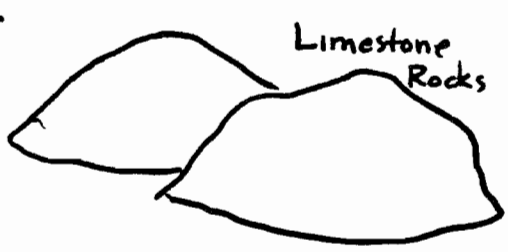
Name _____

Class ___ Group No ___

What are caves and how do they form?

Experiment 1

1 Begin With



2 When you study sedimentary rocks you will learn about a rock called limestone.

3 Put a drop of acid on the limestone rock. How is it affected?

4 When you think about acid you probably think of vinegar, hydrochloric acid; but what about soda? Soda contains carbonic acid. It may not be strong but it works just like other acids will on rock.

5 Carbonic acid is carbon dioxide (CO_2) gas in water. This acid can and will dissolve rock like the acid in step 3

6 Put some sugar in water. Where does it go?

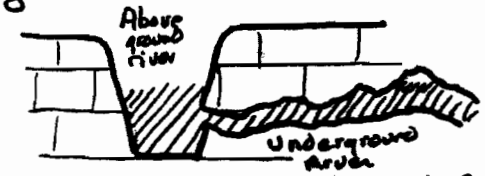
7 limestone is made of lime, which dissolves in acid just like the sugar did in the water

8 As rain falls it absorbes carbon dioxide from the air and becomes acid rain (or carbonic acid)

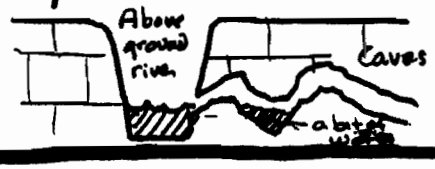
9 How does rain affect the ground?

10 Some rain water is used by the plants. Some goes to rivers an streams. Some just soaks into the ground. Below your feet lies a great deal of limestone. Water enters the limestone through little cracks. The acid turns the cracks into crevices. Soon the crevices turn into tunnels which meet and cross creating rooms. The acid has now created underground rivers which become wider and wider over thousands and millions of years.

11 The level (the height of the water) of these underground rivers is the same as the height of an above ground river.



This water level is called the <u>water table</u>. As the river dries up or sinks lower the water table also lowers. This leaves behind dry caves.



12 Caves are never completely dry.
Why do you think so?

Homework -

1- What is a cave?

2- How is it formed?

Geology - Caves

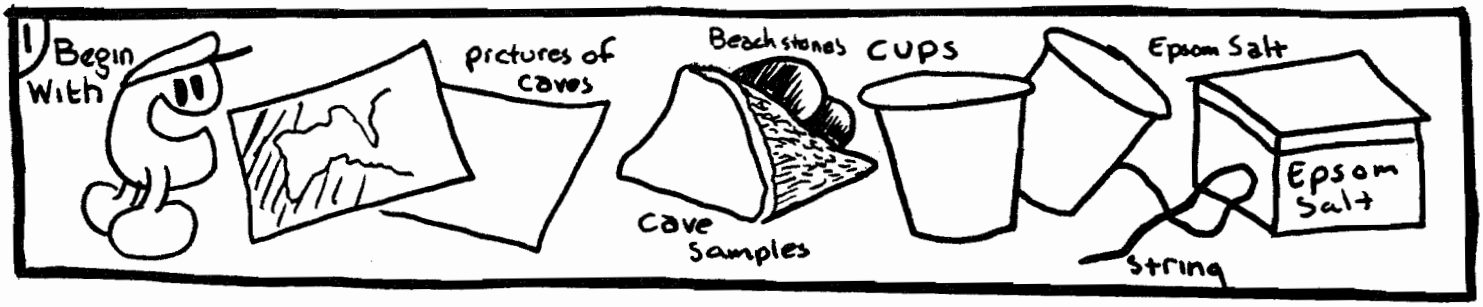
Name _____

Class _____ Group No ____

What is inside a Cave?

Experiment 2

1 Begin With



2 Take a look at the stones from the beach. How do the look?

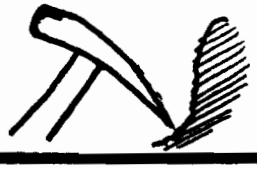
Draw me a picture of one of them.

3 How did moving water affect these rocks?

4 How do you think moving under ground water affects the walls of a cave?

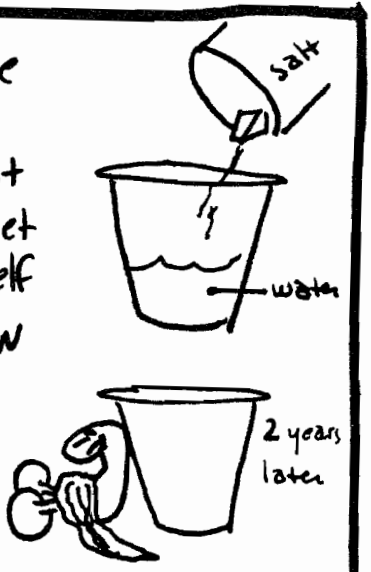
5 look at the cave sample. Why is one side smooth?

6 The rough side is where it was broken from the cave wall with a hammer.

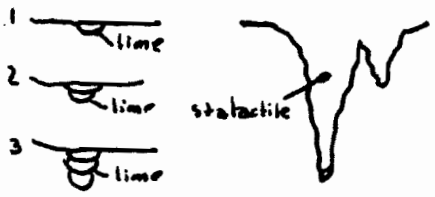


7 look at the pictures or slides of caves.
Why are the walls and floors so shiny and smooth

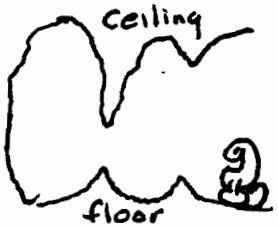
8 lets say you made a cup of salt water (you put salt into water.) You let it sit on a shelf for 2 years. How what you would find in the cup after 2 years?



9 lets remember that there is lime dissolved in the water in a cave. As it drips off the ceiling of a cave the water may evaporate leaving behind a bit of lime. Then another and another drop does the same. layers of lime build up forming stone icicles called stalactites.



The water may continue to fall. lime drips off stalactites and splashes to the cave floor where lime builds up again. This forms stalagmites



10 Set up this experiment. Dissolve as much <u>epsom salt</u> as you can into a cup of water. Puts some of this <u>solution</u> into 2 paper cups. Hang a string between them.

Describe what is happening after a week

Homework -

1- How are stalactites formed?

2- Why are cave walls smooth?

Geology - Caves

Name _____

Class ____ Group No ____

Quiz on Caves

1- What is a cave?

2- Describe how caves are formed?

3- Why are cave walls smooth?

4- What are stalactites and stalagmites?

5- How does carbonic acid affect limestone?

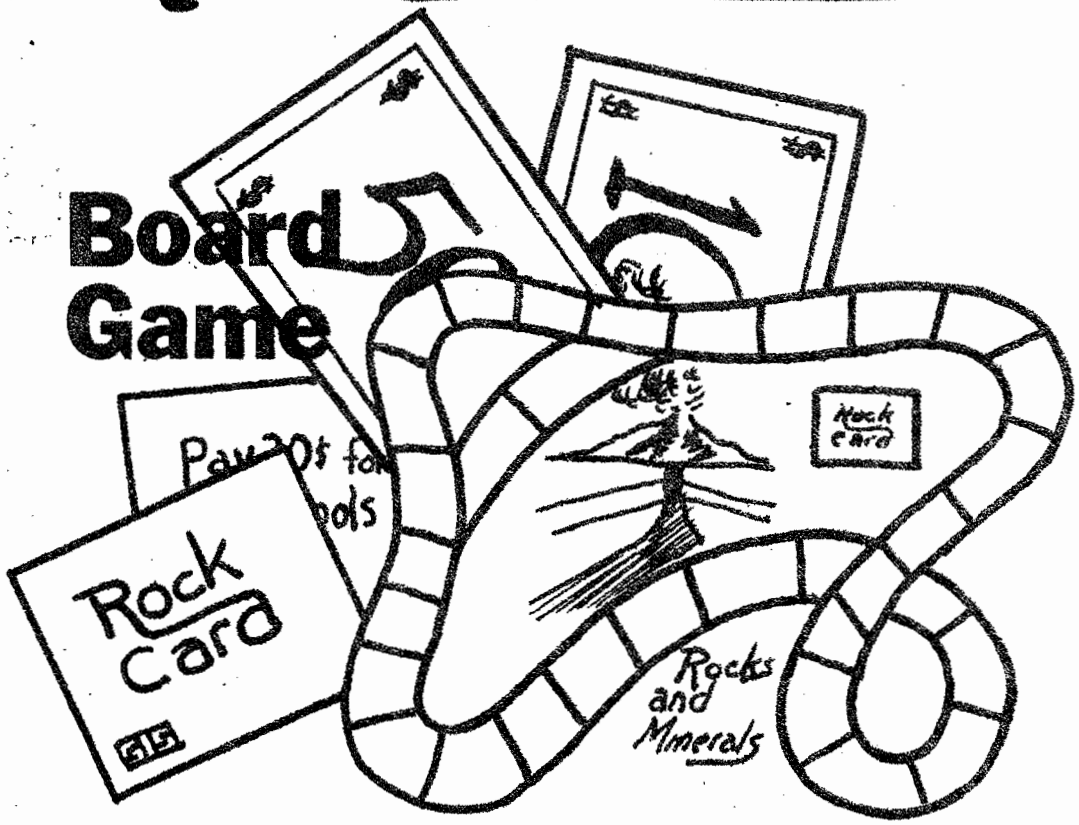
Chapter three

games

Science In Schools

Rocks and Minerals

Board Game



Rocks and Minerals

Board Game

SIS 201

Rocks and Minerals Board Game Instructions

The Object of the Game

To collect the most money while answering 20 questions.

To Begin

-Each player is given $250 from the bank

-Each player puts a playing piece on any space on the board.

To Play

-Roll die. Highest roll goes first

-Players move clockwise around the board

-When you land on a space you must do what it says. If it asks a question you must answer it correctly or you will lose a turn and $20.

-If you answer the question correctly,you are to stay on that space and the bank will give you $10.

-When you take a rock card, you must do as it says. Incorrect question answers will result in a loss of $50. You do not receive any money for a correct answer.

To Win

After the first player answers 20 questions correctly, the game is over. The player at that time with the most money is the winner.

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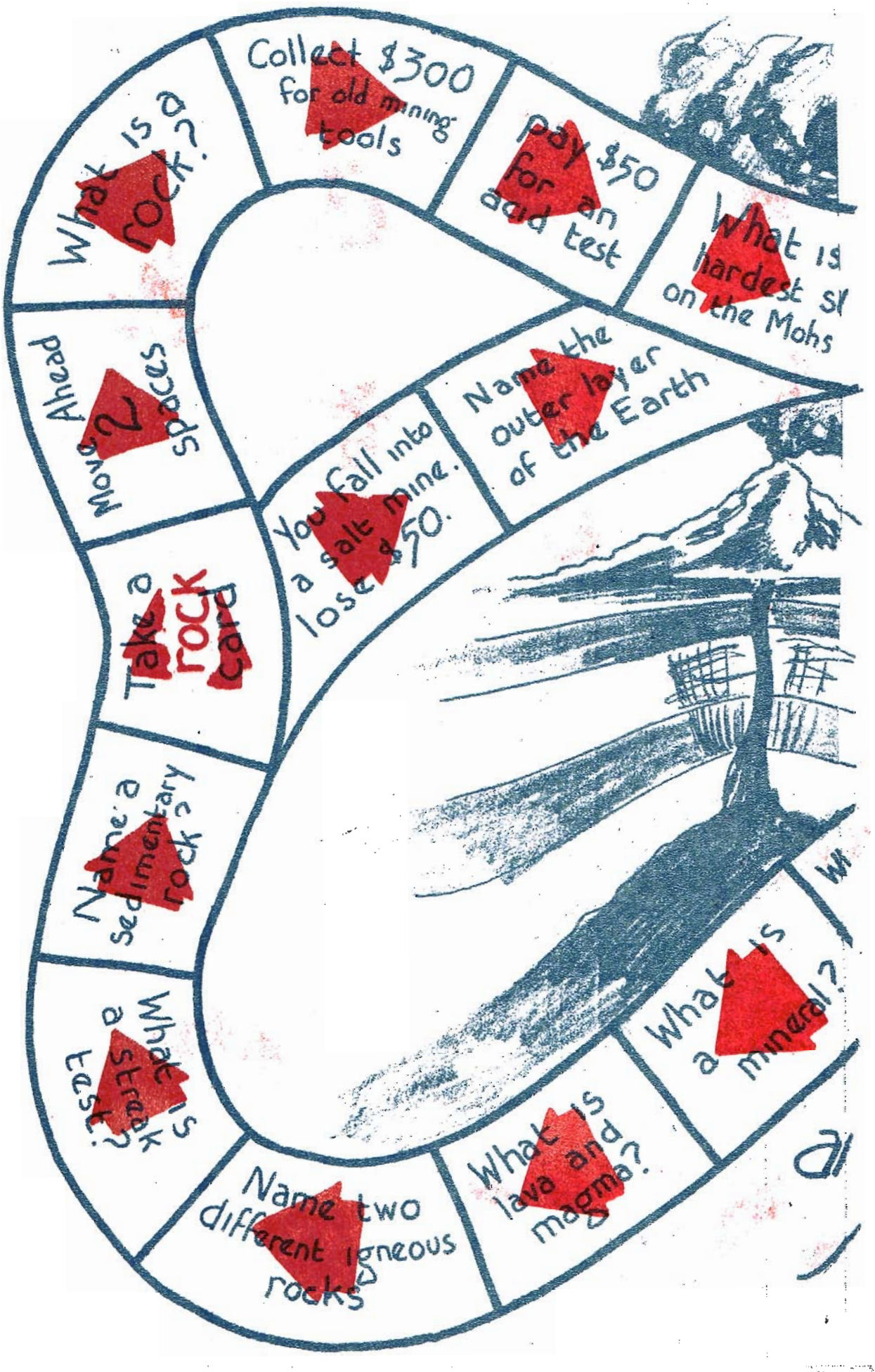
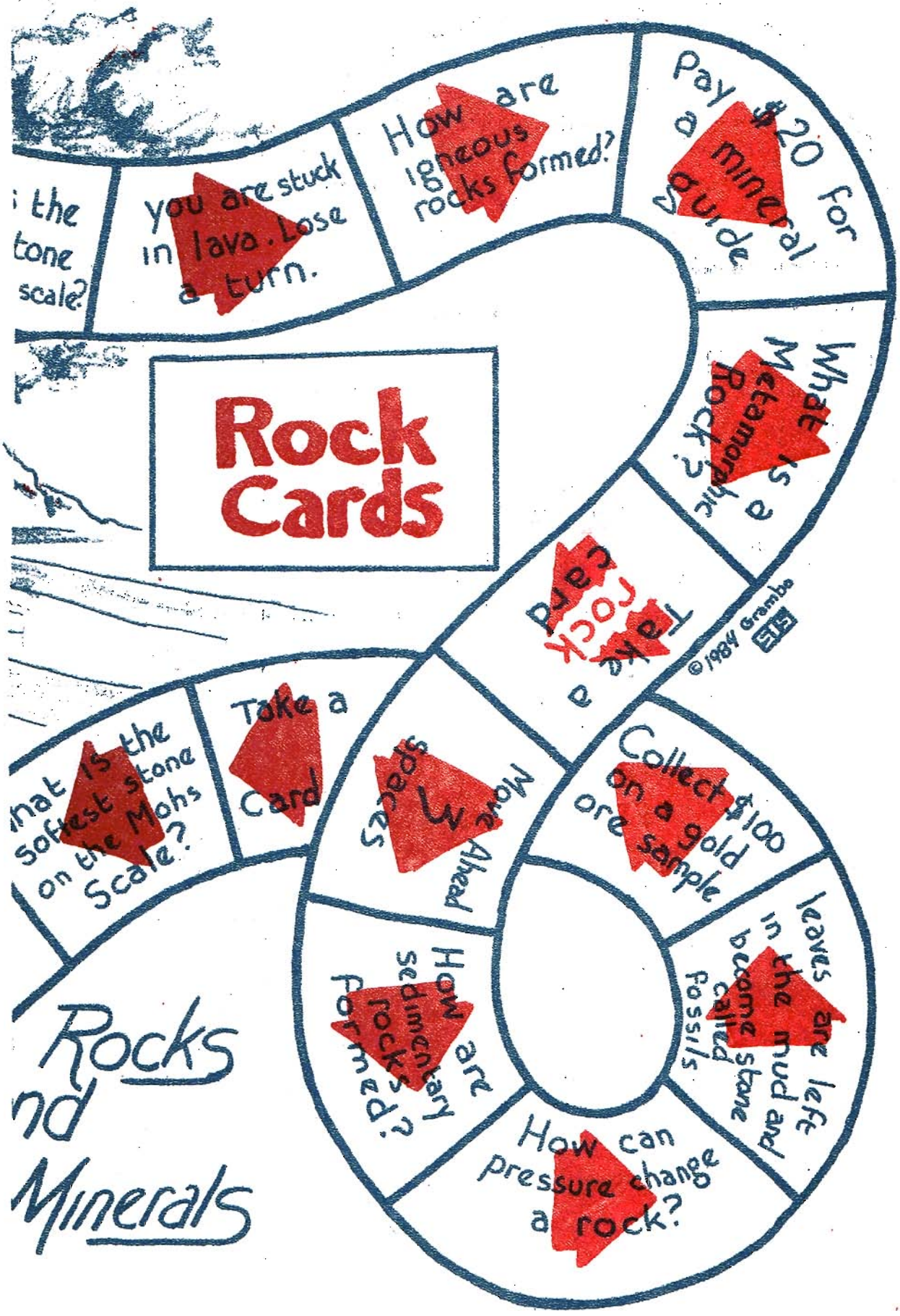
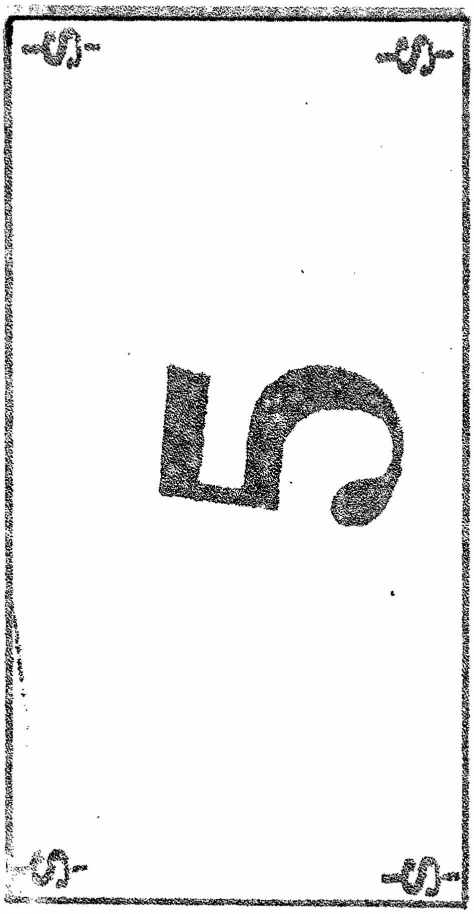
© Grambo

Skip one turn	What is hardness?	Take $10 and another card	Pay each player $50.	How can you identify a metamorphic rock?
How are sedimentary rocks formed?	How is limestone different from marble?	How can you identify granite?	What does luster tell you?	Where is the mantle located?
How do you make a streak test?	Igneous rocks come from...	How can you identify an igneous rock?	Sedimentary rocks are formed when...	You put acid on a rock and it bubbles. This tells you that the rock contains
Move ahead 3 spaces	minerals are...	Collect $200 for your rocks	Go back 10 spaces	Obsidian is a ____ rock.
Fossils are found in ____ rock.	Pay $50 for Supplies	Shale turns into ____.	Molten rock is called ____.	layers in a rock mean that it is a ____ rock.


Collect $300 for old mining tools
Pay $50 for an acid test
What is hardest s on the Mohs
Name the outer layer of the Earth
You fall into a salt mine. lose $50.
Take a rock card
Name a sedimentary rock?
What is a mineral?
What is lava and magma?
Name two different igneous rocks
What is ?
Move 2 Ahead spaces
What is rock?


Rock Cards
Pay $20 for a mineral guide
How are igneous rocks formed?
you are stuck in lava. Lose a turn.
the tone scale?
What is a Metamorphic Rock?
Take a Rock Card
©1984 Gramba
Collect $100 on a gold ore sample
Move 4 spaces Ahead
Take a Card
What is the softest stone on the Mohs Scale?
leaves are left in the mud and become stone called fossils
How can pressure change a rock?
How are sedimentary rocks formed?
Rocks
nd
Minerals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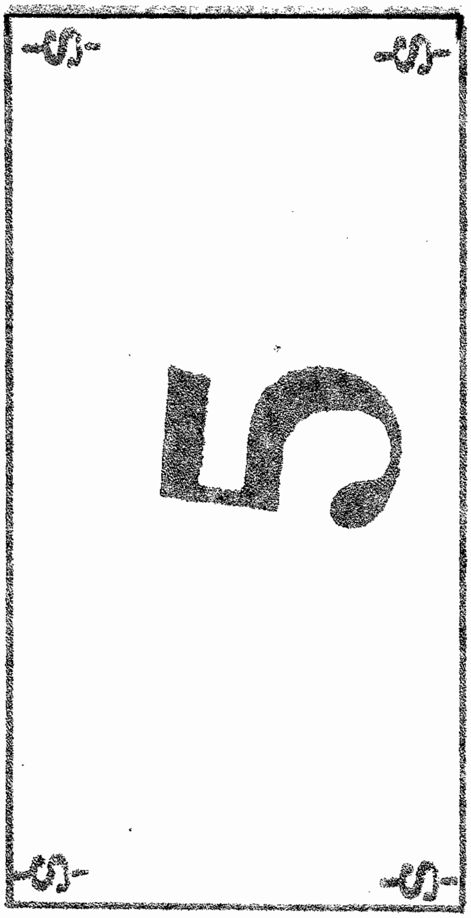
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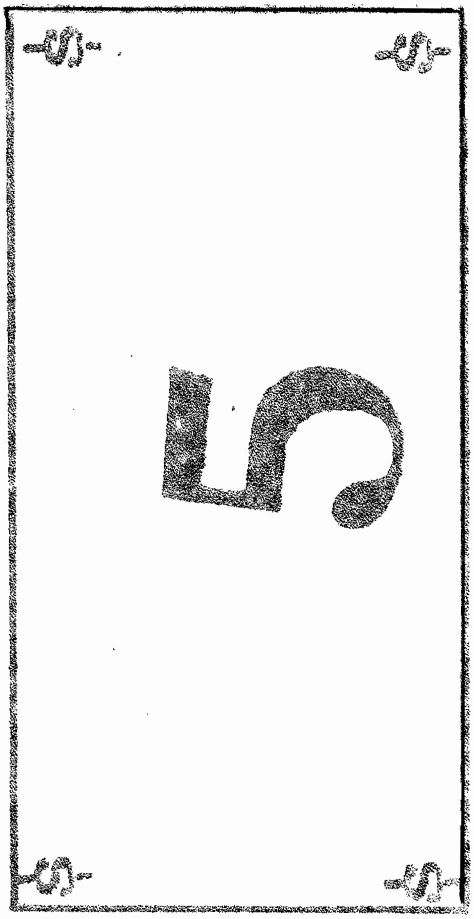
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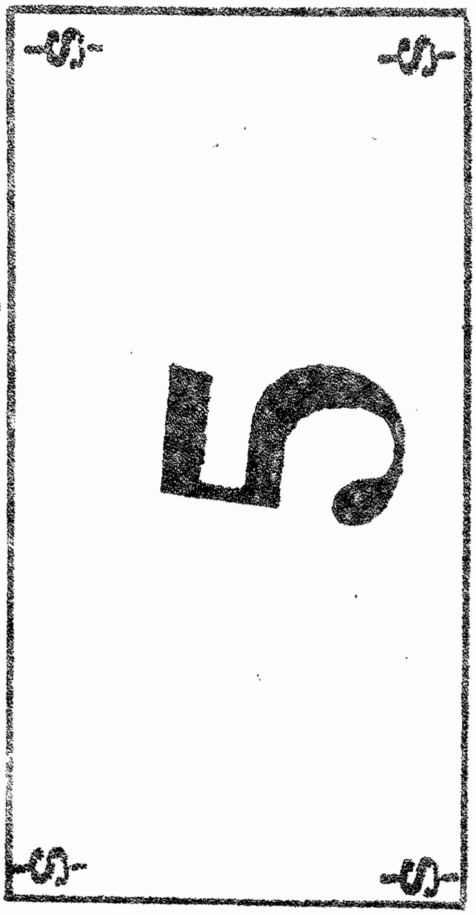
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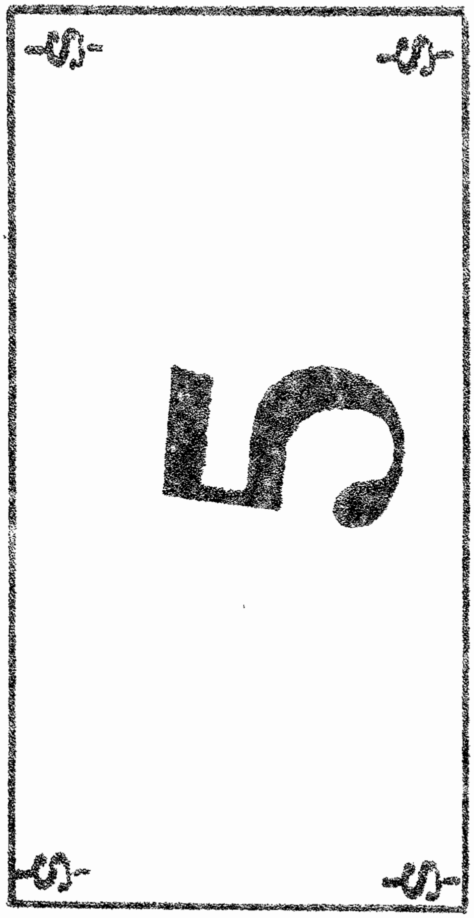
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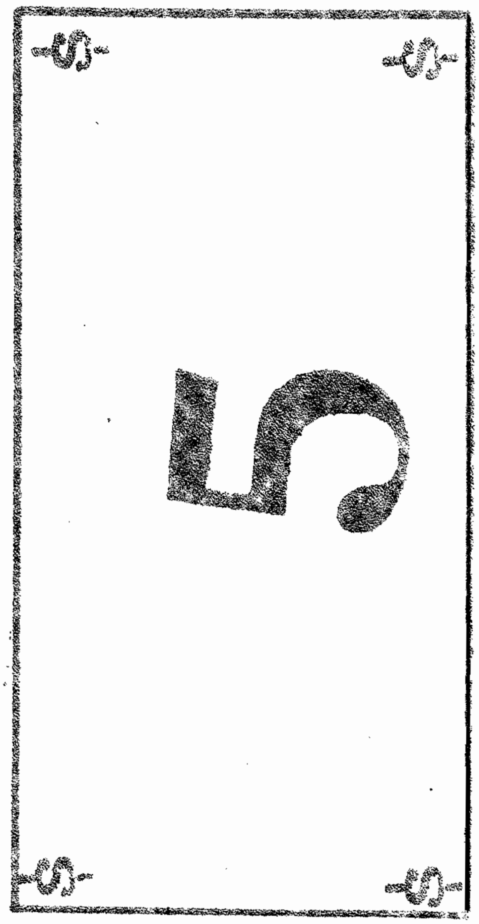
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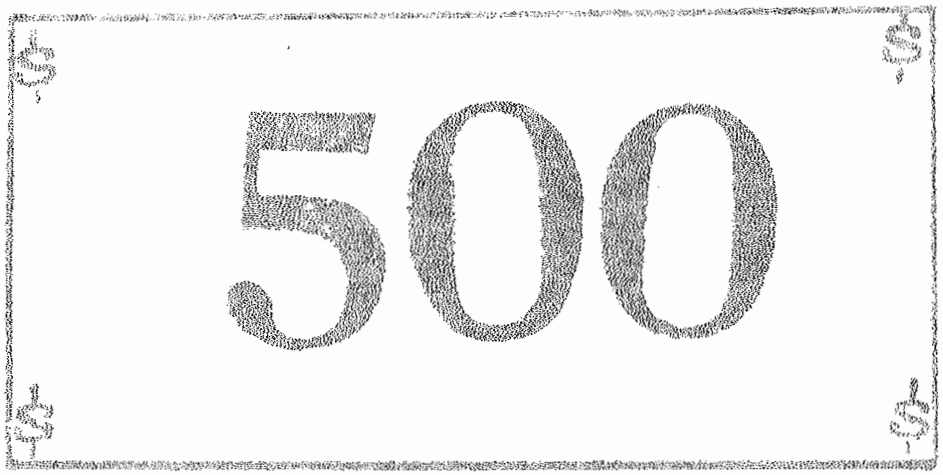
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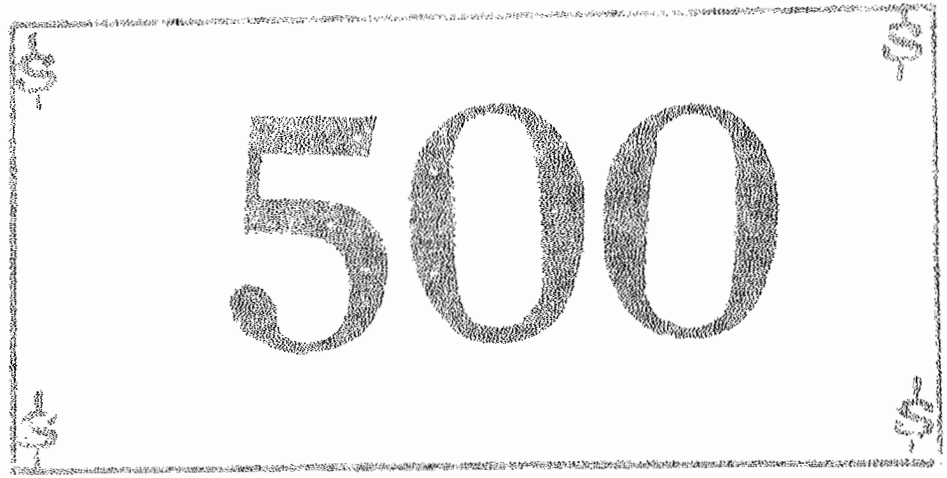
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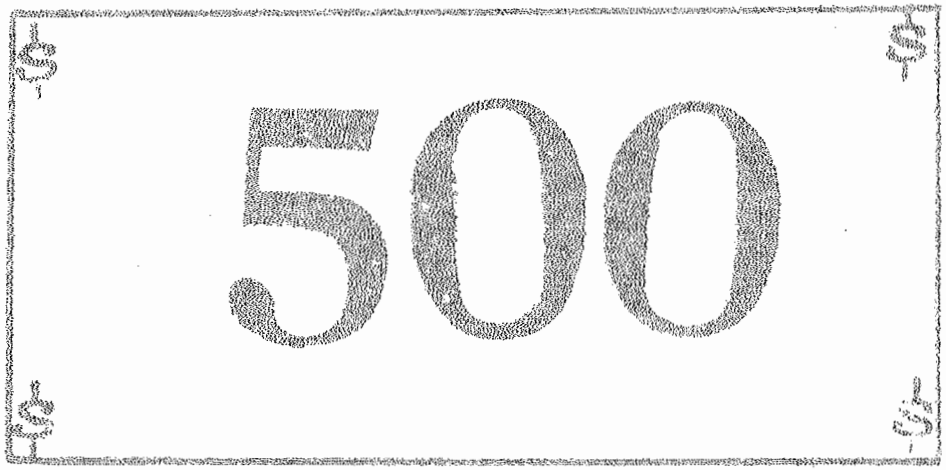
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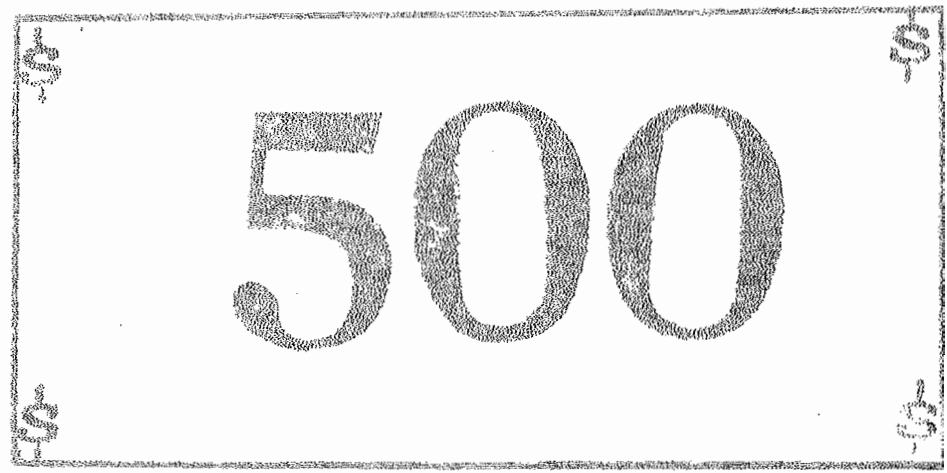
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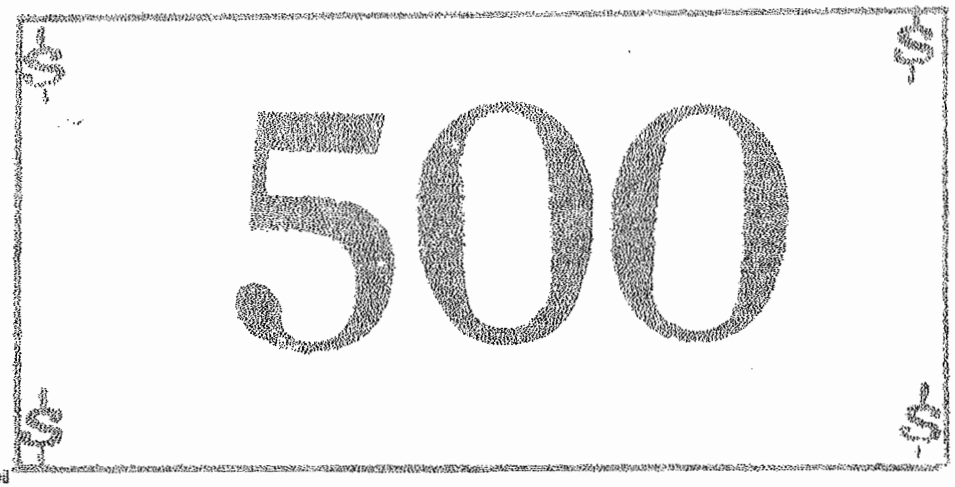
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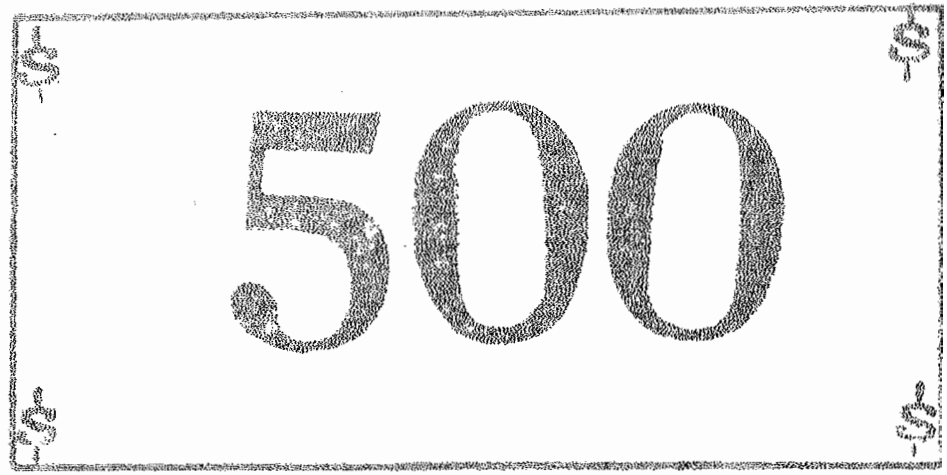
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Instructions and Game Rules

The object of this game is to score points by guessing the correct Science Word from a clue given by your partner.

1-This game is for four(4) people. Two on team No. 1 and two on team No. 2.
2-Flip a coin to see which team goes first..
3-One player on each team is the giver and one is the receiver.
4-The giver inserts a card into the bottom of the viewer and pushes it up until a word can be seen in the window.
5-The giver then gives a clue.
 -The clue must be a single word.
 -The clue cannot contain part of the Science Word.
 -You may not use your hands
 -You may not spell words for your partner.
6-Each word begins with a score of ten points. For each wrong guess the score lowers by one point. If the word is not guessed after ten clues, go on to the next word.No score for that word.
7-A team may pass a turn if they wish.
8-Teams keep score by using the point values in 6.
9-After each word the other team goes.Push card up.
10-The game is over when the card is finished. The highest score is the winning team.

Variations

See which team can complete a card the fastest.

Science Words

Rocks and Minerals

SIS 001

Science Words

Rocks and Minerals

Science In Schools

Science Words

Science Words

VIEWER

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Science Words

VIEWER

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Science Words

caves

Science Words 1

rocks and minerals

Science Words 2

rocks and minerals

Science Words 3

rocks and minerals

Science Words 4

rocks and minerals

Science Words 5

rocks and minerals

Science Words 6

rocks and minerals

Science Words 7

rocks and minerals

Science

caves

earth

underground

water

limestone

dissolves

rivers

tunnels

rooms

stalactites

stalagmites

Science 1

rocks and minerals

mineral

pure

crystal

color

hardness

luster

cleavage

scratch

density

fracture

Science 2

rocks and minerals

sedimentary

mud

heavy

sinks

layers

acid test

erosion

fault

weathering

moraine

Science 3

rocks and minerals

igneous

melted

rock

lava

magma

volcano

hardens

cools

flow

heat

Science 4

rocks and minerals

mineral

mica

quartz

pyrite

iron

talc

gypsum

galena

silver

gold

Science 5

rocks and minerals

sedimentary

shale

coal

conglomerate

fossils

sandstone

cement

dolomite

chalk

mudstone

Science 6

rocks and minerals

igneous

obsidian

pumice

granite

basalt

diabase

diorite

gabbro

pegmatite

volcanic ash

Science 7

rocks and minerals

metamorphic

slate

gneiss

quartsite

greenstone

marble

schist

soapstone

jade

serpentine

Appendix Duo

Materials List

You are responsible for all the materials in your box. Keep them neat and clean. Report all missing materials to your teacher

Corn oil
Cups
Ball
Nails
string
sticks
Streak plate
Crayons
magnifier
jar / dirt / water
chalk
beaker
heat source
(hot plate - bunsen burner - stove)
Tripod (to hold beaker while heating)
Toothpicks

Sugar
Epsom salts
acid
Sand
fossils
cave sample

Desk items

Box of balloons

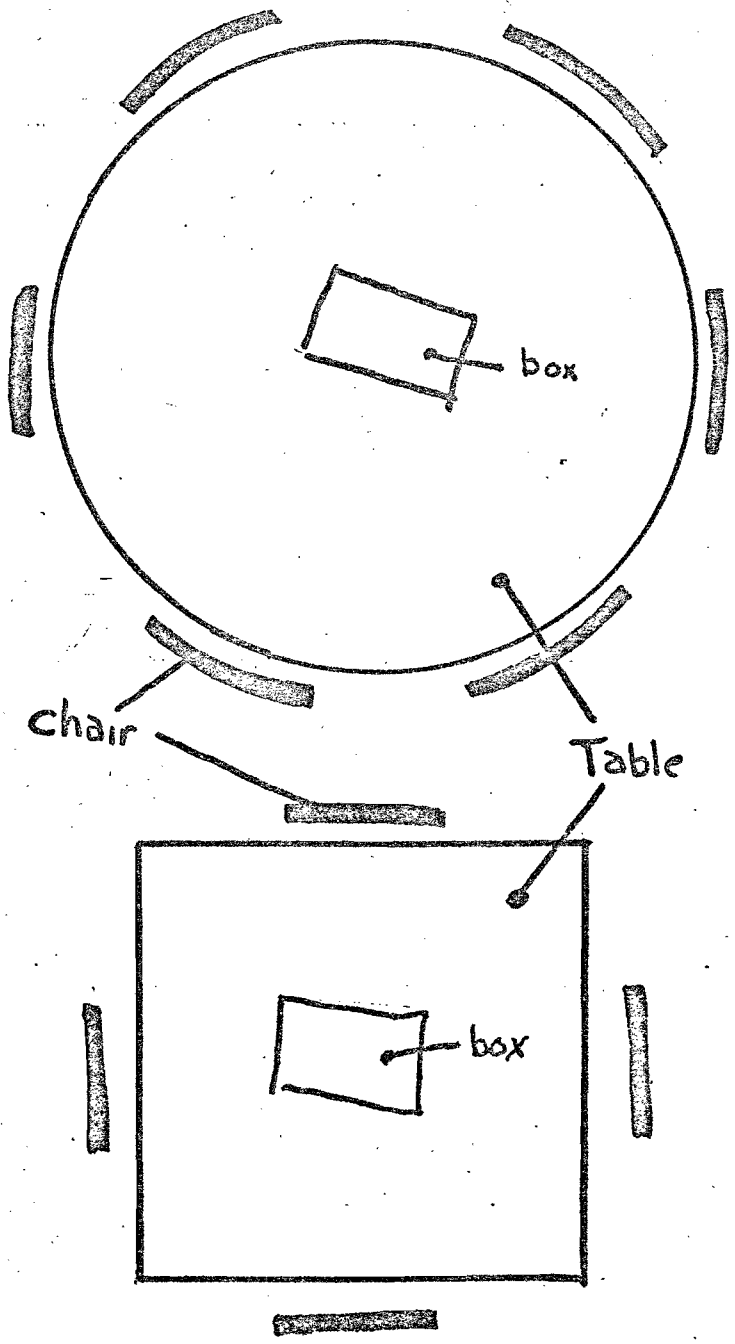
Rocks

slate
schist
gneiss
basalt
conglomerate
limestone
Sandstone

Rocks

cement
beach pebbles
galena
calcite
hematite
pyrite
mica
quartz
talc
serpentine
pumice
obsidian
granite
feldspar
quartzite
marble
shale

Setting up the room for group work



Place the box of materials in the center of the table. Allow students to sit around the table so they can talk and interact with each other. In this manner, children can question each other, and the work they are doing becomes more important than the front of the room or the blackboard.

If the children can face each other, they will be able to help each other.

Group No _____

Group clean up sheet

One person in your group must sign this sheet after your box is cleaned up. It is that persons responsibility to make sure the box is neat and clean. Take turns with other people in your group.

	Date	Name	Class	Period
Mon				
Tues				
Wed				
Thurs				
Fri				

grading sheet

Instructions

In the teacher's marking book, this sheet can serve as a place to grade or check off the experiment sheets that the students have completed. There is a space provided for quiz grades. This chart can be mounted on construction paper and hung on a wall in your classroom. Students can mark off all sheets you have corrected and handed back to them. By seeing other students test grades and experiment check offs, they may try to do better and work faster so the rest of the class will be proud of them.

grading sheet →

Log book — What is it?

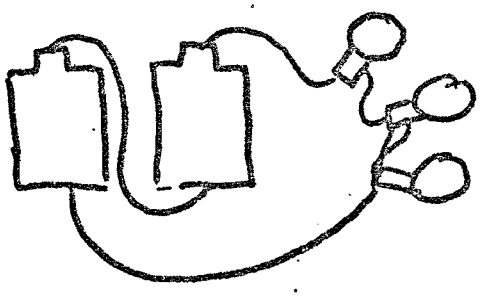
A log book is a place where a scientist writes his/her ideas, writes observations to experiments he/she is working on and draws conclusions to those experiments. Everything that happens good or bad should be reported in the log. Things not wanted should be crossed out not ripped out. Things you may not want now may become important later on. If information is torn out it may be lost forever.

log book pages should contain

Date or Week

Topic - Simple Circuits.

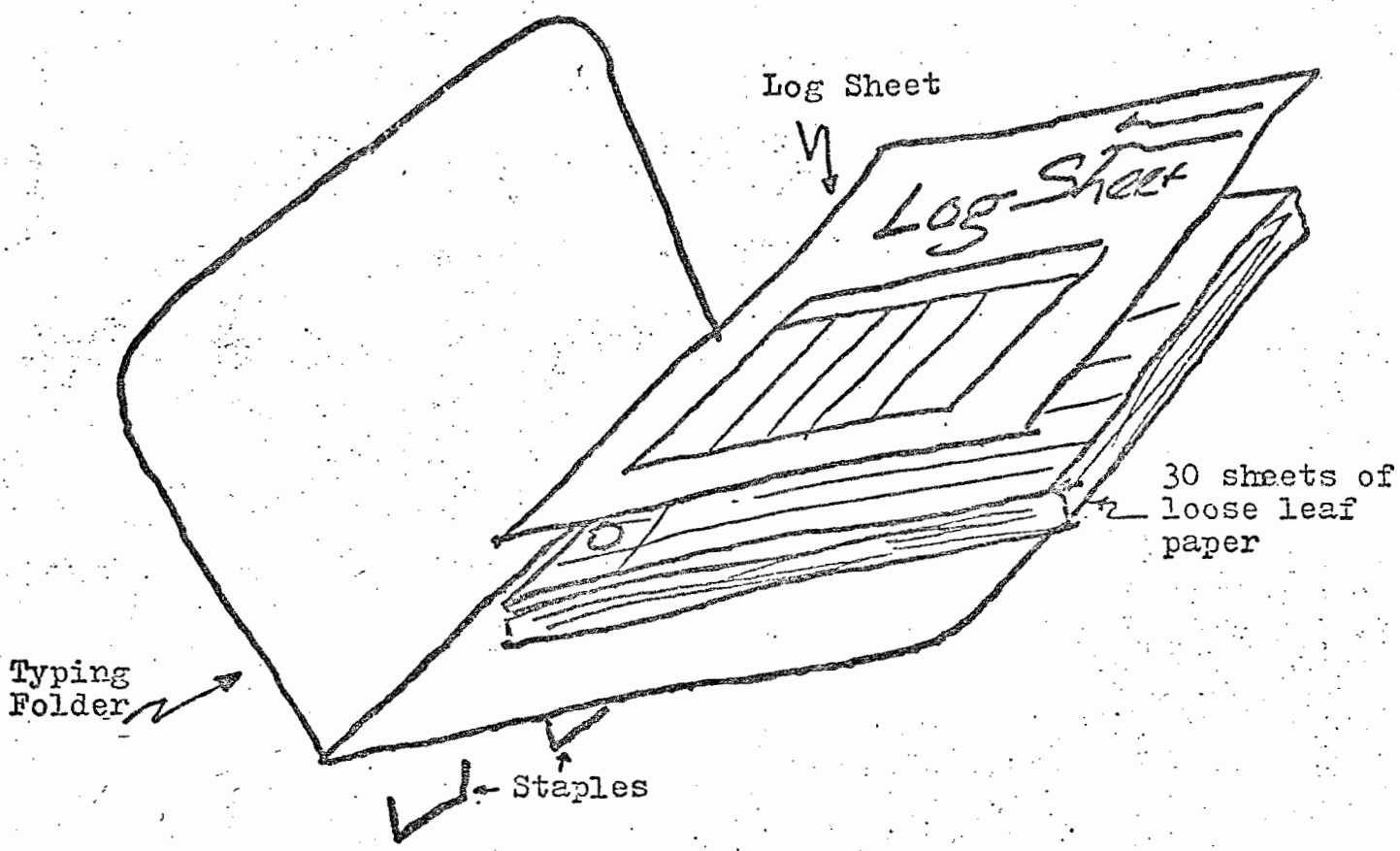
Ideas or Hypothesis - I tried to connect 3 bulbs, 2 batteries and some wire together so all bulbs go out when I remove one wire from the battery. This is what I did.



It worked

It could have tables - Salt and liquids

How To Set Up A Log Book



Bind 30 sheets of paper along with the log sheet into a typing filder. Staple folder closed so papers will not fall out. Place students name and class at the top of the folder. Students may wish to decorate their folders. Pass out folders at the beginning of the period. and collect them at the end. Store folders in a milk crate or in a box. Students will write a summary of each days experiment into the log book. Periodically check log books.

Name _____

Class _____

Science Log Book

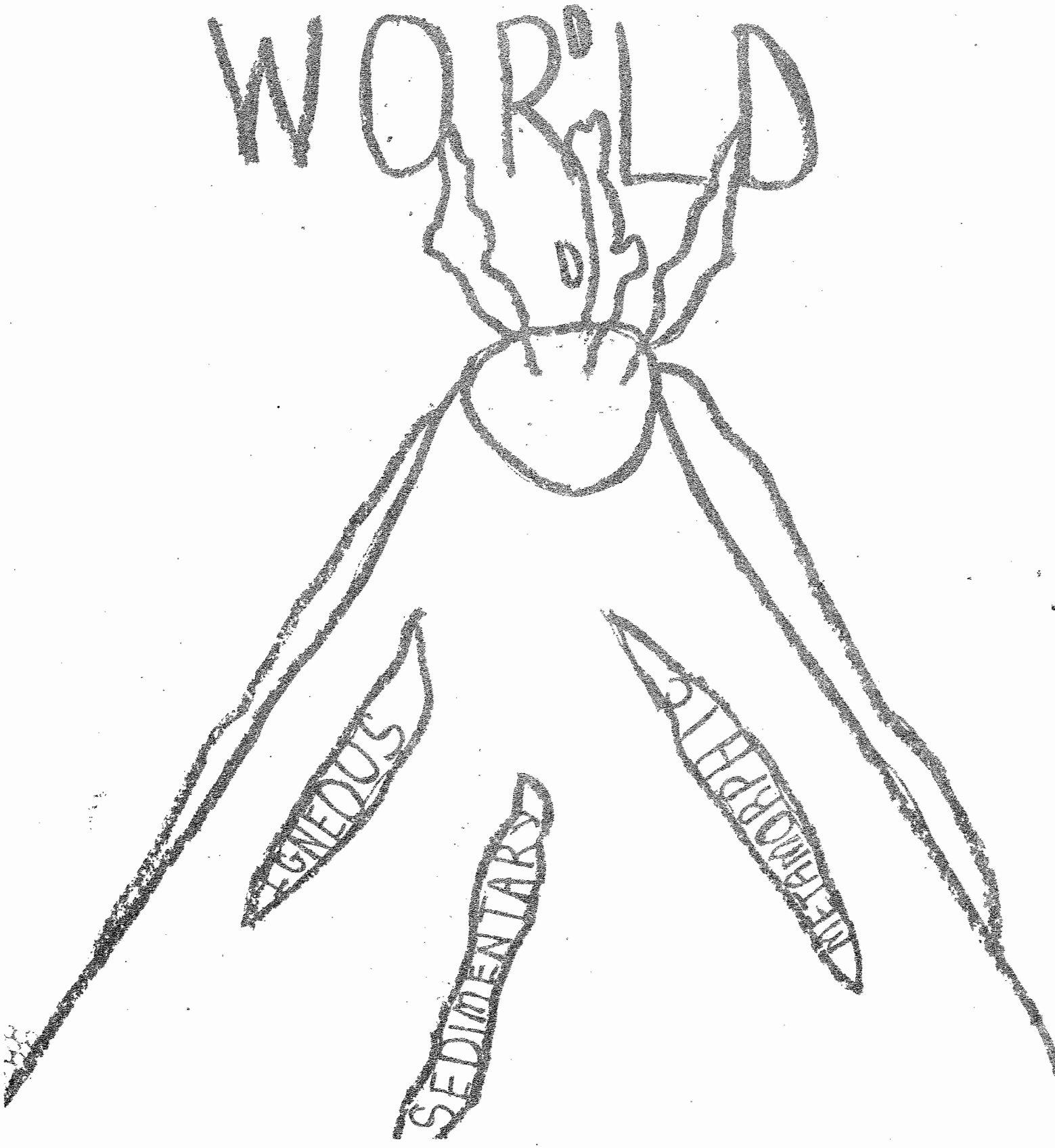
Dates From	To	Pages	Teacher's Comments	Checked By

Appandix two

Taxtbook- Rocks Around tha World

Written by Ray Taraszkiawicz's Fifth grade Science Class
1982

Rocks Around The WORLD



ROCKS AROUND THE WORLD

Authors & Illustrators:

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Edward Zahn.

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Executive Consultant: Mr. Ray Tereszkiewicz

Publisher: Mr. Gary Bao

1982

Table of Contents

Chapter I

MINERALS ROCKS AND MAN

The minerals and rocks have been of great importance to man since the dawn of human history. In the stone age, people began to make flint and other tools from rocks. They found out that rocks had naturally sharp edges caused by the way they broke, fractured. People were also fascinated by the beauty of rocks and minerals.

Gold was the first used for jewelery in the stone age, and silver came into use during the bronze age. By the time of the ancient Greeks, many minerals were in use. The modern names of some minerals are derived from Greek words.

Many magical beliefs surrounded minerals. For example, rock crystals, a kind of quartz was supposed to prevent tooth and internal bleeding. An opal wrapped in a bay leaf was supposed to make a person invisible. These superstitions prevailed during the 1200's. Some people still think it is lucky to wear their birthstones.

Chapter II

WHAT ARE ROCKS

About a half a billion years ago, the earth was being formed by exploding volcanoes oozing lava and by splitting earthquakes, reshaping the land. These two acts of nature is the source of the formation of rocks on the earth's surface.

Today, we find rocks all over. They come in different colors, shapes,and sizes. Many rocks form steep cliffs, narrow ridges and mountains with sharp peaks.

Most rocks are made of minerals. Some rocks which contain minerals are Diorite, Granite, Syenite, Mica, and Amphibole. The study of minerals is called mineralogy.

One characteristic of a mineral is its ability to streak. Streak is the color a mineral makes when it is rubbed against the back of a tile or some other piece of unglazed porcelain. Black minerals make dark red streaks, some green, purple, and blue minerals make white streaks.

Some rocks have crystals. This is known as crystal formation. Two rocks that have crystals are Pyrite, and Mica Schist. Another characteristic of a rock is the way it breaks. If a rock breaks and leaves jagged and pointed edges it is said to fracture. Slate is an example of a rock which fractures. On the other hand, if a rock breaks smoothly and cleanly it is said to have cleavage. Icelandic Spar is an example of a rock that cleaves. Some rocks may have luster, shine, and some rocks may be dull in color. The study of rocks is knwon as petrology - petra meaning rock.

Chapter III

IDENTIFYING ROCKS

As stated in the previous chapter, rocks contain minerals and crystals. Crystals are not always perfect, most crystals are found broken and chipped. Minerals come in various colors, shapes, and sizes. Each mineral has its own characteristics, red, heavy and shiny or it may be white very hard or glossy.

Rocks also have color. The color may be due to light passing through it or light being reflected from it. Rocks are found in many different colors including black and white.

If you can see through a rock like a glass window that rock is said to be transparent. A diamond is a transparent rock. A translucent rock just allows light to pass through it. Some rocks may be translucent when they are in thick pieces and transparent in thinner pieces. Rocks that allow no light to pass through is called an opaque rock. Gold is an opaque rock.

The luster of a rock is the way a rock shines when light is reflected from it. There are two kinds of luster; metallic and non metallic. A metallic luster looks like the surface of metal, gold, silver, and copper. Rocks that contain non metallic luster are pearly like Talc, and Calcite or waxy like Turquoise.

Hardness is another way of identyfing rocks. About 150 years ago, a scientist named Friedrich Mohs made up a scale of ten minerals, each harder than the other. The scale consists of: Talc, Gypsum, Calcite, Flurite, Apatite, Feldspar, Quartz, Topaz, Corundum, and Diamond.

Here is an example of how the scale works, Gypsum can scratch Talc,but can be scratched by Calcite. Flurite can scratch Talc, Gypsum, and Calcite, but Flurite can be scratched by Apatite, Feldspar Quartz... Diamond. Diamond can scratch all of the minerals and be scratched by none, because Diamond is the hardest.

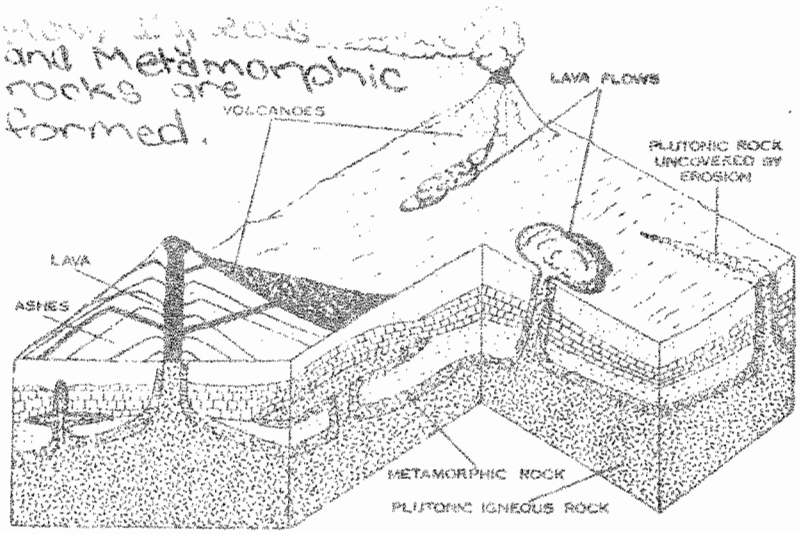
If you were to bear down on a mineral as you rub it across a square rough unglazed tile, the mineral will leave a powdery streak. This streak is used to identify minerals and it is another test that helps to identify rocks.

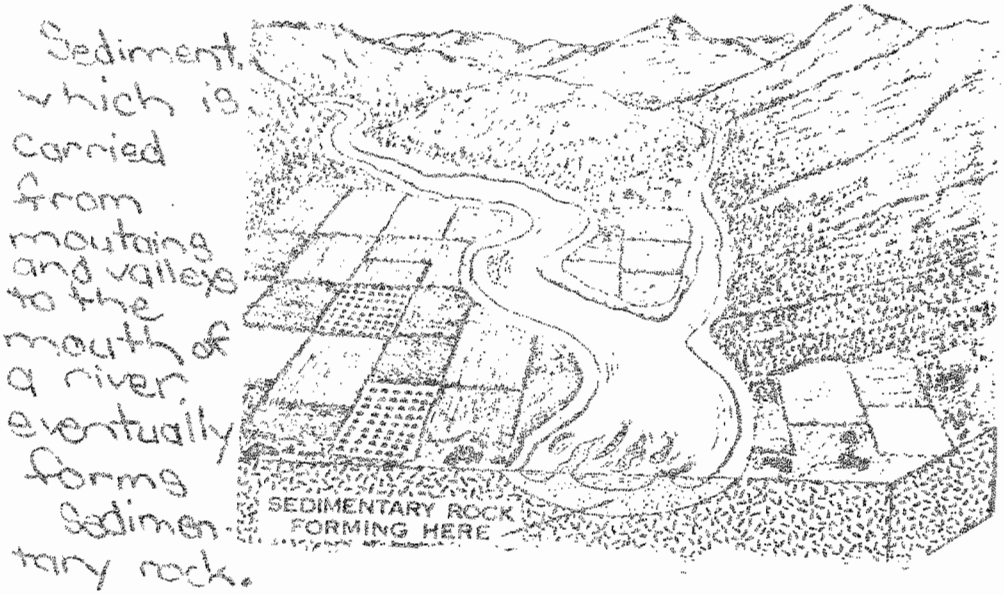
This test works because the streak may not be of the same color as the mineral being tested. For example, gold and Pyrite (or fool's gold) both are yellow in color and have a metallic luster. But gold has a golden streak and Pyrite has a greenish- black streak. So the streak test tells you the difference between gold and "fool's gold". The piece of unglazed tile is called the plate. The backs of most bathroom tiles are unglazed, and can be used for a streak plate.

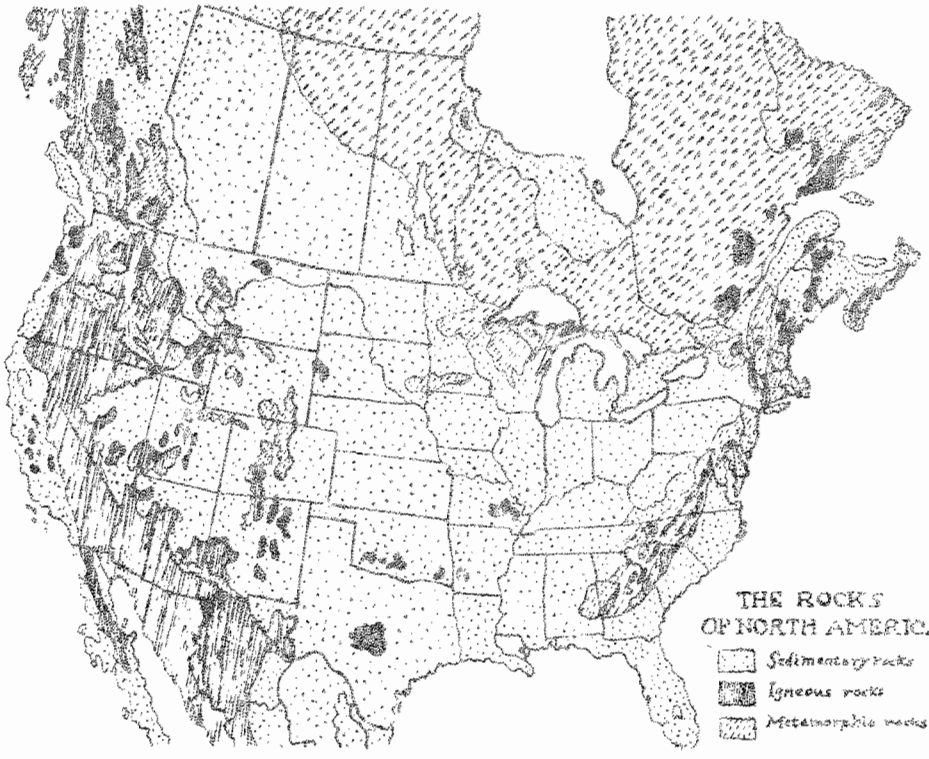
Cleavage and fracture is the way a mineral breaks. If a rock breaks so that it leaves a smooth flat surface, we say the mineral cleaves. Minerals that break into pointed and uneven pieces fracture. The way a rock breaks gives a clue to what type of rock it may be.

WAYS OF IDENTIFYING ROCKS & MINERALS

SULPHUR	yellow crumbles easily, maybe black , feels oily and bumpy.
CALCITE	can be scratched with a copper penny.
FELDSPAR	can't be scratched by a knife but can be scratched by glass .
QUARTZ	clear in color, can scratch steel and glass
TOPAZ	brown in color and can scratch Quartz,
DIAMOND	hardest mineral


and Metamorphic
rocks are
formed.
VOLCANOES
LAVA FLOWS
PLUTONIC ROCK
UNCOVERED BY
EROSION
LAVA
ASHES
METAMORPHIC ROCK
PLUTONIC IGNEOUS ROCK


Sediment,
which is
carried
from
moutains
and valleys
to the
mouth of
a river
eventually
forms
Sedimen-
tary rock.
SEDIMENTARY ROCK
FORMING HERE


THE ROCKS
OF NORTH AMERICA
Sedimentary rocks
Igneous rocks
Metamorphic rocks

6a

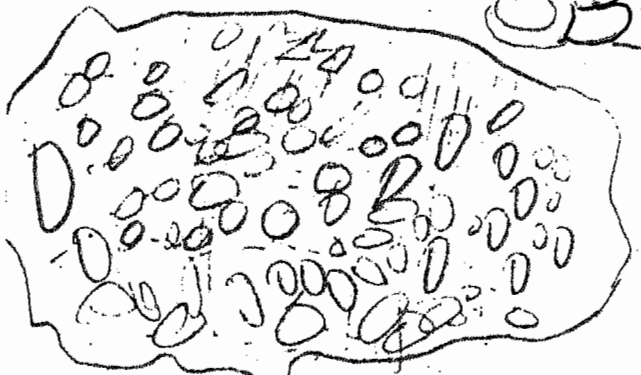
Chapter IV

ROCK FAMILIES

Igneous rocks are the first kind of rocks . The word Igneous means fire made and Igneous rocks are formed by volcanic action and magma from beneath the earth. When they are deep in the earth, all igneous rocks are in the form of magma, an extremely hot syrupy mixture of melted minerals. The magma rises into the earth's surface, crust, cools and hardens into different kinds or rocks. Igneous rocks can have cleavage or fracture. Igneous rocks can be light in color and weight. There is also intrusive and extrusive rocks. Intrusive rocks were formed inside the earth. Extrusive rocks were formed outside the earth. In texture Igneous rocks range from those with large crystals to glassy rocks with no crystals at all.

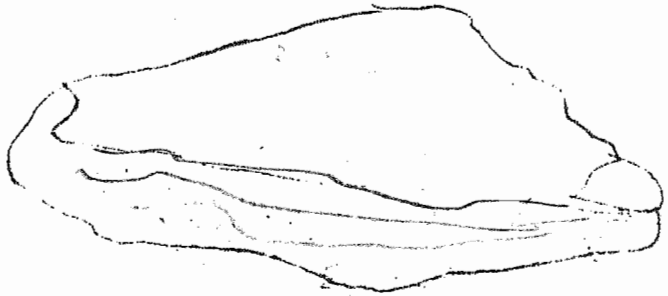
The next rock formed were the Sedimentary rocks. Sedimentary rocks are extremely varied, differing widely in texture, color and composition. Sedimentary rocks are made by two or more rocks cemented togother caused by nature. It takes many hundreds of years for a Sedimentary rock to form. Many

SEDIMENTARY ROCK

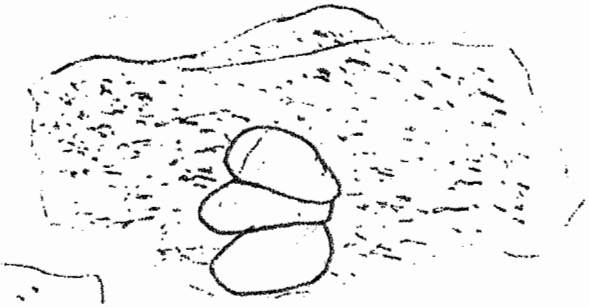


conglomerate

sandstone



Shale



Limestone

coal

Sedimentary rocks contain fossils. Fossils are plants or animals that stepped on a newly formed rock and got trapped there.

Metamorphic rocks consists of Igneous and Sedimentary rocks which were changed by heat and pressure. Changes may be hardly visable and may also be so great that it is almost impossible to determine what rock it once was. It mostly has crystal formations. Metamorphic rocks are made in two ways, by contact metamorphism, metamorphism caused by heat and pressure and regional metamorphism caused by mountain formations.
The word Metamorphic means changed in form and that is exactly what Metamorpic rocks are; rocks that have been changed in form by heat and pressure.

Chapter V

ROCKS AROUND THE WORLD

The most common type of Igneous rocks are Granite, Obsidian, Basalt, and Pumice.

Granite is famous for its beauty, strength, and durability and it is widely used in constructing monuments and buildings. Granite is resistant to weather and it takes a high polish.

Obsidian is nicknamed volcanine glass. Obsidian is an Igneous rock. It has been used for making arrow heads and primitive cutting tools. Obsidian is found in Wyoming.

Basalt is a common dark heavy rock that is widespread throughout the world. Basalt's color varies from a dark gray with greenish tinge to almost black and rusty brown.

Pumice is so light that it floats in water and may be scratched very easily. If you scratch Pumice with your finger nail lots of dust comes off. Pumice is gray

n color.

Shale, Sandstone, Limestone, and Conglomerate are the ost common of the Sedimentary rocks.

Shale or mudstone are mainly clays which have hardened. ressure turns Shale into Limestone. Its color is gray, lack and dull red. There is also Iol Shale which is very aluable for future energy.

Sandstone is formed by the action of wind, water, and ce on an older rock. Most Sandstone can either contain ea shells or can have marks of shells on them. Builders ike Sandstone because it is attractive and easy to build ith.

Limestone is one of the most common types of Sedimentary ocks and the most interesting. It is the most interesting ecause it can turn into manyother different rocks. The olor ranges from pure white to dirty reddish- brown.

Gneiss, Slate and Marble are Metamorphic rocks.

Gneiss which is pronounced nice is a Metamorphic rock. ; is formed from Granite and is hard to describe because it s so varied. It has crystals which form parallel layers.

Slate results from the metamorphism of Shale. Slate is frequently of a blue- gray color, but may be green or red. It is used for making roofs. This rock has fracture and therefor breaks unevenly . Slate can be found in Vermont, Maine and Pennsylvania.

Marble is recrystallized Limestone. It is normally white but can be yellow, pink, brown, green, or black. Marble is a rock that is formed by heat and pressure. It is a classic stone worked by sculptors as well as used by builders. Although it is good for building Granite is better because of weather resistance. Marble has cleavage.

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Chapter VI

A CLOSER LOOK

In this chapter we will be examining rocks in more detail. The first rock that we will look at is Basalt.

Basalt is an Igneous rock. It is made from lava. It is heavy. Freshly broken Basalt is dark gray, greenish purplish , or black. One variety shows small grains of Quartz. Basalt is a rock that erupts. A Scottish scientist melted Basalt and found that when it cooled quickly, it turned into a glassy material like some other volcanine rock. Broken up Basalt is used to make some roads. Basalt can be found where there are volcanoes. Basalt, boiling as it erupts from volcanoes, has a light foam which cools and hardens into Pumice.

Pumice is another Igneous rock. Pumice is a light spongy stone which comes form volcanoes. Pumice can be used to clean things to polish things and to smooth things. Pumice is gray in color and has little holes in it that looks like

something was eating away at it. Pumice is porous and is very light in weight. It is so light that it floats in water. The Pumice has a very hard and rough finish, and after constant use it gets smaller.

Many people use it to remove corns, calouses, and dead skin form their feet. It will also remove ink from the hands..

Granite is a coarse grained rock, widely distributed in the earth's crust. It is called the "king of rocks" because it is so hard. It is an Igneous rock, that when polished has a beautiful finish. New Hampshire is nicknamed the Granite state. Granite comes form the latin word granus- meaning grain . Granite is a prized stone used for carving. It color ranges from gray, pink, yellow, red, and green. The chief use of quarried Granite in the United States is for the engraving of tombstones and the creating of mausoleums. In England Granite boulders can be seen everywhere. Mostly all the continents are full of Granite.

Limestone a Sedimentary rock is made up mostly by calcium carbonate and it is usually a grayish color. Scientists

test natural rock to see if it is Limestone by pouring cold diluted Hydrochloric acid or Sulfuric acid on it. If it is Limestone it will give off bubbles of carbon dioxide. All Limestones are formed when the calcium carbonate crystallizes. Chalk and Marble are a kind of Limestone.

Limestone can be found in Illinois, Pennsylvania, Michigan, New York, Missouri, Tennessee, Iowa, Indiana, and Kentucky.

Limestone is a strong rock which has cleavage. It is used in the making of Limes. Limes are used in the making of mortar and on fields to improve the soil.

Pyrite is an unusual rock. It looks like an Igneous rock but it is not. It is a Sedimentary rock. The Pyrite rock is harder and more brittle than other rocks. It has crystal formation.

Many years ago Pyrite was thought to be gold because of the way it glitters and its luster. The rock was also important to fire- makers. He would be able to create a spark by striking the rock with a piece of flint.

Pyrite doesn't have cleavage and is very rough having craters,

Quartzite is a Metamorphic rock, The smooth, milky white or orange pebble you find on a beach, in a gravel driveway or a concrete sidewalk is probably Quartzite.

Of all the many kind of rock within the crust of the earth, none is as strong as Quartzite. No other rock will resist erosion as well, therefore, Quartzite stands up to form ridges, and mountains.

Quartzite is a result of a metamorphic change of Sandstone, made from grains of hard Quartz sand. The spaces between the grains were filled with Quartz grains dissolved in water. Then the sandstone was pushed deep within the earth. Under great pressure the Quartz grains and the Quartz cement were squeezed until they flowed together. Slowly the grains and the cement blended together and formed Quartzite.

Since Quartzite is such a hard rock it is not used to serve many purposes, because it costs too much to mine

and to cut.

Anthracite coal is classified as a Metamorphic rock. Millions of years ago swamps and forests covered much of the land. The climate was hot and moist and because of it plants, moss,and ferns,flourished. The sun poured its energy into the leaves and stems of the plants. The plants then changed this energy into starches and sugars which they used for growing. This cycle repeated itself over and over. After millions of years, the swamps dried out and under pressure the dead plants turned into coal.

There are six stages in the formation of coal. The most important stages are the fourth fifth and the sixth. The fourth stage is responsible for the creation of Bituminous Coal. This is also known as soft coal. Bituminous coal burns with much smoke and has a yellow flame. There is more of Bituminous coal than any other kind, which is classified as Sedimentary rock.

Anthracite coal is the fifth stage of coal. This coal is known as hard coal. It burns with little smoke and does not produce much of a flame. This is the best type of coal.

Diamonds are the sixth type of coal. Diamonds are coal that were put under terrific amount of pressure. Nature is the only one who can make Diamonds, that is why they are so valuable. The tremendous amounts of pressure placed on the coal changes the coal into pure carbon and thus creates the Diamond. The Diamond is the hardest known substance.

Chapter VII

ROCKS FROM OTHER WORLDS

When we examine rocks from the moon and from outer space it helps us to understand the origin of our planet.

When the space age started, geologists took pictures of the moon, Mercury, Venus, and Mars. Geologists studied the rocks and called them meteorites. We see them in the atmosphere as "meteors" or "shooting stars."

Moon rocks are quite unlike earth rocks, though they contain similar elements.

In six exciting but long voyages, Apollo astronauts collected 385kg which equals 850 lbs. They brought them back and geologists studied them. They were very different. That is why they are very surprising.

Chapter VIII

GUIDELINES FOR ROCK COLLECTORS

You need not travel all the way to the moon just to collect rocks, since rocks are all around us. Although, if you feel like collecting rocks now that you know how to identify them, there are some guidelines that you should know about.

These guidelines are stated by The Code of Ethics of the Federation of Mineralogical Society:

1) I will respect both private and public property and will do no collecting on privately owned land without the owners permission.
2) I will to the best of my ability, find out the boundary lines of the property which I plan to collect on.
3) I will learn all the laws governing collecting on public land and I will observe them.
4) I will not walk across or dig in cultivated land.
5) I will not cause any damage on purpose to property of any kind..
6) I will leave all gates opened or closed just the way I found them.
7) I will build fires in designated or safe areas owmly, and I will make certain that the fires are out when I leave.
8) I will throw away no burning materials.
9) I will fill all holes that I have dug.

10) I will not pollute wells, streams, creeks or other water supplies.

11) I will cause no willful damage to collecting materials((rocks, minerals) and will take only as much as I reasonably need.

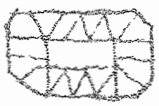
12) I will use no firearms or blasting materials in collecting areas .

13) I will cooperate with field trip leaders and those in authority in all collecting areas.

14) I will report to my club federation officers, Bureau of Land Management, or other proper authorities any depositions of petrified wood, or other materials on public lands so they can be protected for the enjoyment of future generations.

15) I will appreciate and protect our nations heritage of natural resources.

BIRTH STONES

JANUARY	FEBRUARY	MARCH	
			
GARNET	Amethyst	Aquamarine	Blood-Stone
Faithfulness	Sincerity	Courage	

April	May	June	Alexandrite
		pearl	
Diamond	Emerald		natural artifice
Innocence	Love	Health	light light

July	August	September
		
Ruby	Peridot/Sardonyx	Sapphire
Contentment	Married Happy	Clear Thinking

October	November	December
		
Opal  Tourmaline	Topaz  Citrine	Turquoise  Zircon
Hope	Fidelity	Prosperity

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