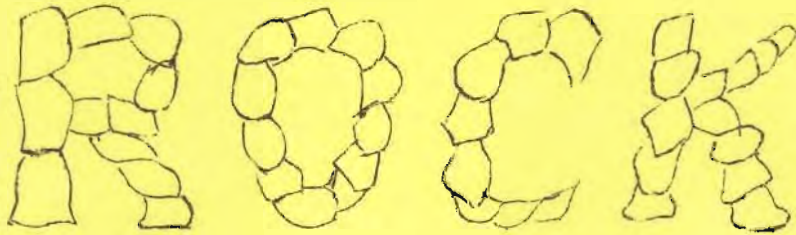


The



Presents

A NATURAL SCIENCE PROJECT

USING

"ROCKS"

--by Dolores B. Dace

A teacher's manual

HINT

A decorated box will enhance the value of your set. I usually use contact paper to cover the outside of the box. This is an easy way of guaranteeing the interest of your students. An attractive box will get their attention quickly.

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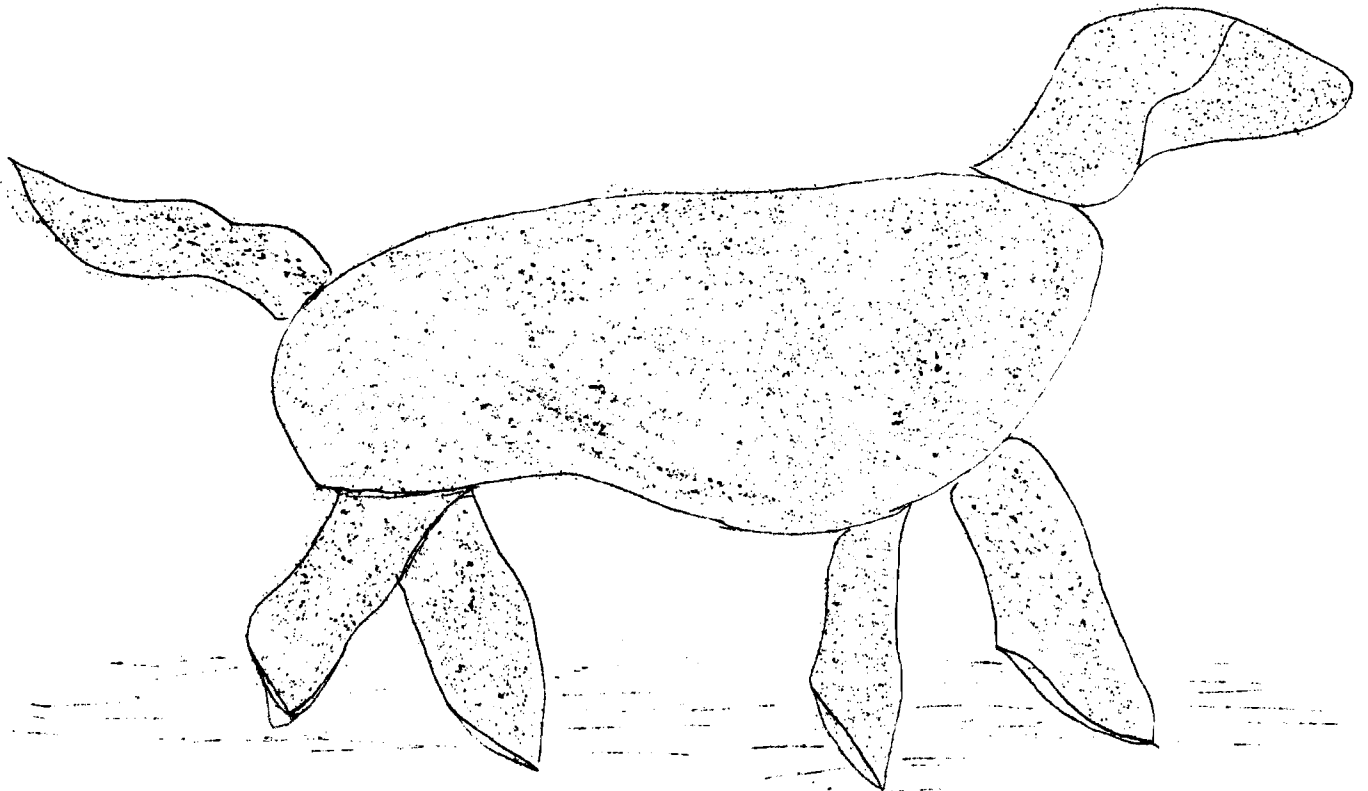
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A NATURAL SCIENCE PROJECT
USING
"ROCKS"

PART I

FOR TEACHERS OF PRESCHOOL CHILDREN (2.9 to 3½ years)

The "Rock Lady" project began as a science and literature project for a nursery school class taught by Mrs. Irene Kahn at the Center for Early Education in Los Angeles, in the spring of 1972. The idea for "Rocks" came to me in the middle of the night; and as I began it, more ideas developed. The idea of something tactile appealed to me since we see so often the "Don't touch!" sign at museums, art exhibits, or exhibits are under glass.

After extended research, many questions and few answers, more research and fewer books, the "Rock Lady" has decided to offer a few simple suggestions for a natural science project, using rocks, which can be useful for the teachers of the youngest preschoolers--the forgotten ones.

This could be a continual touching experience and a learning experience. There are many areas and facets of interest available in this project. Each child and each teacher will respond in a different way, and this is to be very much encouraged. There are no set rules or suggestions--except handle with care, use and reuse, and HAVE FUN!

Here are ways to use rocks in introducing the youngest children to the interesting world around them--simply and, I hope, effectively.

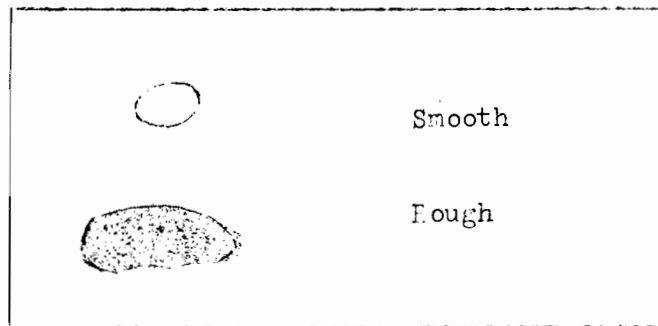
1. The rocks are mounted on matboard, chipboard, or other sturdy material. (8 x 10" or 9 x 11" is a good size.)
2. Use white glue generously.
3. Print all words in large, readable letters, using upper and lower case letters.
4. Use felt-tip pens, black, blue or brown; other colors are not as easily seen.

5. Spray the boards with flatif or varnish to enhance the color of the rocks and protect the surface of the boards.

6. They can be used over and over again to reinforce an idea or a simple concept.

With these young students you may use 3, 4, 5 boards at a time since their interest span is quite short. You may seat the class in a half circle near you, then they will be able to see and touch the boards easily.

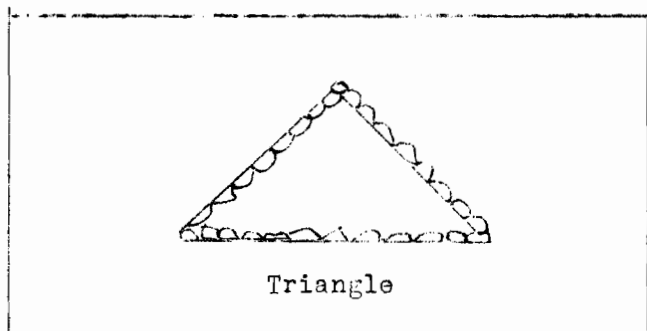
1. SENSE OF TOUCH - smooth, rough or sandy, flat, round, hard and soft, large or small. You may also talk about opposites. Polished rocks can be obtained from friendly "rock hounds"; rough or sandy ones can be found at the beach or desert. Flat, round and hard rocks are easy to find in most areas; for the soft texture, velvet material or cotton balls could be used. After mounting the object, be sure that the word is printed next to it--i.e., the object goes with the word. "Smooth" is printed to the right of the polished rock; and "rough" is printed beside a rough or sandy rock.



2. SHAPES - circle, triangle, square and rectangle.

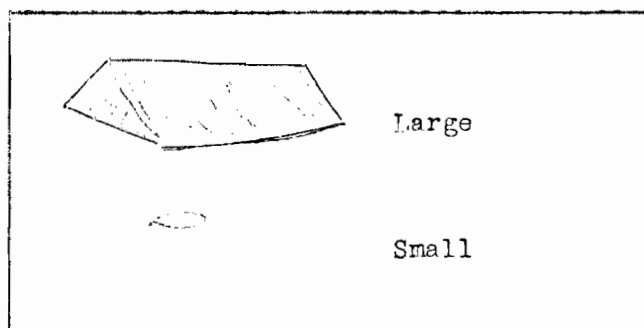
Many small rocks can be used for these shapes--rough, smooth, or polished make an interesting texture for touching. If you have very small pebbles (or sand) you can use them to outline the word printed on the board. This touch gives the child another exciting experience. Otherwise print the name of the shape below it with a marking pen. Make the square and the rectangle

of the same height so that the difference in the two shapes can be easily recognized.



You may then ask: "What shapes are the doors, windows, or lights? What shapes are the cups and napkins?" The children can relate shapes to objects around them.

3. SIZE - large and small.



Introduce size difference, but keep it simple for this age group. Use one large rock with the printed word opposite it, and a very small one treated in the same manner.

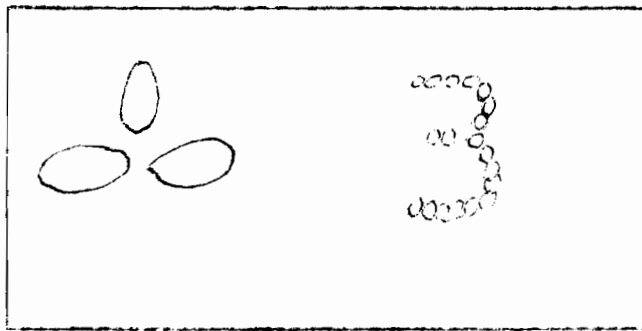
4. NUMBERS - 1 to 5.

There's no need to be fancy. 1 to 5 are the numbers introduced. Mount one rock on the left side of the board with the number "1" outlined with pebbles or sand, or print the number with a marking pen on the right side. Do the same with all the numbers--two rocks with the number "2", etc.

There is easy identity, curiosity and interest when a child can see, touch and trace the number. Encourage them to recognize the number, not just "parrot" the word.

"How many rocks did you count?" "Do you see the correct number?" "How old are you--can you find the right number?" "How many fingers on your hand?"

The game of "1, 2, 3, look and see" is fun to do. You may have the children close their eyes, and then look to see. Do they know the number? It is not necessary to show the numbers in order (with the 3-3 $\frac{1}{2}$ year olds)--mix them up.



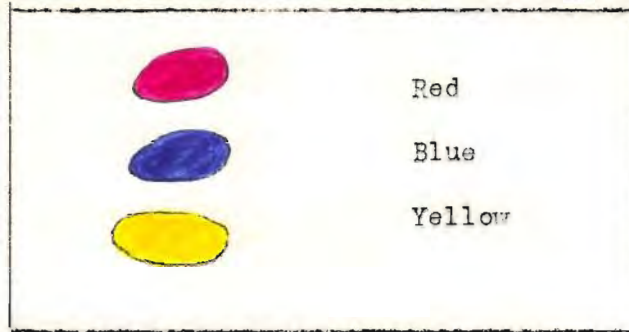
You need to be in charge of the tactile experience when the boards are being handled by your younger students. Loose rocks in a box nearby could satisfy the desire to pick up and handle the whole rock.

5. COLORS.

Introduce the primary colors--blue, red, yellow. Use acrylic paint on the three rocks--the colors are pure and it dries quickly. Mount the colored rocks on the left side and print the names of the colors on the right.

Natural colored rocks are hard to find in the three colors, hence the paint. Natural colors would be difficult for the 2.9-3 $\frac{1}{2}$ yr. olds to identify and could be confusing.

"Which color is at the top, or bottom, of the board?" "Which color is dark or light?" "Which is your favorite color?" "Does it match your dress or shirt?"



You may ask a child to touch a certain color, then let another child have a turn. They will all want to touch the colors.

6. IMAGINATION (for 3-3½ year olds).

Some rocks already have natural and recognizable designs in them, or a color in a rock may remind the child of something. Discuss this, and let them express their imagined idea of what they may see on the board or in a rock. Each child may have a different idea. It may be scary or funny, but please encourage their observation and interest. Simple designs can be made with rocks--a flower, an animal, a happy or sad face. Funny or silly names can be given to the creations--the joy of shared laughter is something else!



A rock collector will have no problem with this project; but others will have to look and ask for, or collect, rocks themselves. You may also ask and encourage the children to join in the project. Rocks can be the polished rejects from the tumbling machine of a friendly "rock hound" when they learn of your particular

interest. The rough, sharp-edged natural rocks found in the desert can be used; or the naturally polished and eroded pebbles found on various beaches, rivers or badlands of the nation add a whole new experience. "Rock picking" in national and state parks or forests is to be discouraged.

An ordinary rock is not really plain or ugly--it has different uses and it has its own story. It may be used on a building or a road, for jewelry or a sculpture, or it may tell how it was formed. It can encourage inquiry. "Where did it come from?" "How was it formed?" "Was it polished by the ocean, river, or in a tumbling machine?"

Look carefully and let your children share--they love to collect too. And ask questions!

When this project was presented to the youngest preschoolers, it was an exciting experience for me to see. These youngsters sat still for ten minutes and participated. They looked, listened and touched.

The teacher did say: "They tried diligently to take the rocks off the boards." So we learned that this needs to be a teacher-related experience. The children were fascinated, but they do need guidance when participating and sharing with a group. Let each child touch the rocks on each board and talk about how it feels or what shape it is. "Is it soft or hard? What shape is it? Which one do you like the best? What's your favorite color?"

After the touching, you may put the boards away and tell the children, "We will be using them another day." Loose rocks can be kept available in your science center so that they can examine individual rocks as they wish.

When presented to the 3-3 $\frac{1}{2}$ year old children, it was interesting to watch the response of children this age. They all wanted a turn to touch; and the teacher was comfortable with the presentation. When she was finished, one new young student said, "Let's do it again!"

The most recent presentation to a different group of 3¹/₂-4 year old children at another school in the Los Angeles area indicated that the project is easily accepted by students and their teachers.

Children's comments; and my replies:

"I didn't get a turn to touch the circle!"

"You will have a turn soon."

"How do you put them on?"

"With lots of white glue."

"Where do you find the rocks?"

"At the beach, or friends share part of their collections with me."

"Why does the 'Happy Face' have such a big nose?"

"Well, people have different sized noses. Is your nose smaller or larger than mine?"

"Can I see the rest of them in the box?"

"Next time you may see them."

"Why are the eyes different on the 'Sad Face'?"

"I didn't have two rocks that were exactly the same."

RESOURCE INFORMATION

In my research, I did find one book that applies to science and literature for nursery school children. It's written by Millicent Selsam, illustrated by Greta Elgaard, You and the World Around You. It's the type of book that can be used at different times in your classroom. A beautiful book.

Matboards can be obtained at your nearby art and frame shop. I buy matboard centers from Florence Gardner, 10534 W. Pico Blvd., L. A. 90064.

Rock samples can also be bought from Burminco Rocks and Minerals, 128 S. Encinitas, Monrovia, California, 91016. He has everything you might need.

If you need further information, write me at 8633 Hervey St., L. A. 90034. If you want to order a custom kit, you may contact me at the above address.

PART II

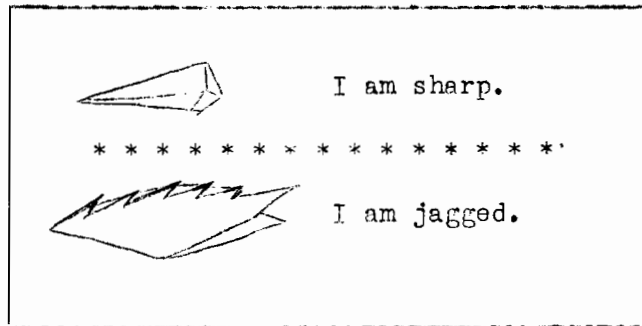
FOR TEACHERS OF THE PRESCHOOL (3½ yrs.) TO KINDERGARTEN (5 yrs.) CHILDREN

This group of youngsters will already be very curious about the world around them. They will have many questions and are anxious to explore and touch any new and interesting object. This science project could be used as a "reading readiness" experiment. Sometimes I use a few of the boards on a bulletin board within reach of the children.

When you present parts of this project, this younger group will be able to observe the boards for about five minutes, then they will be ready to touch the rocks. The kindergarten age will be able to participate a bit longer time (approx. eight minutes) and will be very anxious to touch every board. Your class may sit in rows on chairs or on floor near you and take turns handling the boards. Encourage them to share with their classmates; they are waiting for their turns too.

1. THE FIVE SENSES - touch, taste, smell, sound and sight.

A. Touch - In addition to the words already introduced in Part I (smooth, rough, flat, round, hard, soft, large, small), new words can be introduced: sharp, jagged, oval, medium, polished. The rocks illustrating the printed word can be mounted on a matboard or chipboard.



When you introduce the children to the boards, hold them up and read the words aloud. Discuss what they are seeing. "Knives are sharp. Some rocks may have sharp and jagged edges." You may ask them to hold the board carefully and

touch the mounted rock. "Which one is sharp? Which one is jagged? Are they rough or smooth?" After they have touched the various boards, they may want to ask questions. Please encourage this, and if you're not sure of the answer say so. "I'll try to find out tomorrow, okay?"

. B. Taste - "What, do rocks have a taste?" Yes; at least one kind does and it is salt (halite). Most children do not realize that salt comes from salt mines, wells, or evaporated sea water. Here is a chance to talk about and taste salt. Use kitchen salt or kosher salt (has larger crystals) for this experiment. Put just a little salt in the cupped hands of your students and let them taste it. Don't be surprised if some won't taste it and others will want seconds!

C. Smell - Rocks do have a smell when wet. Remember how it smells outdoors after a rain in the mountains or the country? Sandstone is fun to use because it does smell like mud after being placed in water. When the rock is thoroughly wet, take it out and sniff the rock. Let each child smell the rock while it is damp. "What does it smell like? Can you smell anything? Now watch it and see what happens." It's fascinating to watch the rock dry quickly because it is porous and absorbs the water. Also, notice that the water in the container becomes murky because of the rock eroding (a tiny bit) each time it is dipped in the water.

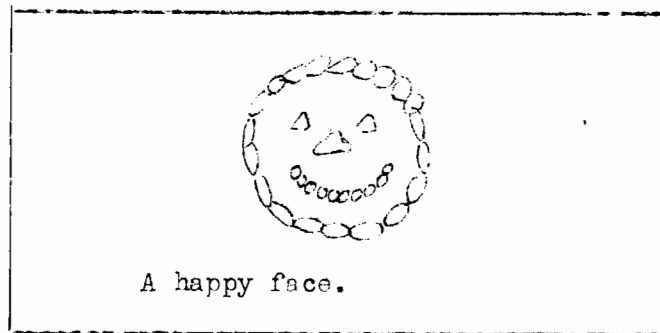
D. Sound - Rocks of different sizes are used in this experiment. You will need two fist-sized rocks, two quarter-sized rocks and two dime-sized rocks for this set (other sizes can be added if you like). When introducing sound, ask the children to "listen very carefully". "Do you hear a different sound when I tap the larger rocks together, and then the smaller ones? What happens when I tap the medium-sized rocks? Can you hear a difference?" If you have time, you may allow the children to do their own experiment with sound, only one or two at a time though!

You may also make shakers out of 35mm. film cans filled with 15 or 16 small pebbles (small, smaller and smallest; use different colors too--they can be used with the math set). Children just love these. As soon as they are placed in their hands, they just automatically begin shaking them. Using these shakers as percussion instruments can be a lot of fun when singing a song. The children may also discover that even though the shakers look the same, they may not sound the same.

E. Sight - Just looking at rocks can be fun and interesting. They have different colors. They may be formed in layers. Some have holes in them. "Do they look the same? Are they shiny and smooth, or rounded and rough?" Let the children carefully examine your collection. Be sure that they touch, lift, explore. Questions will be forming as they do this, and they will be discovering on their own.

It's also interesting to put rocks into a design, and ask them if they can identify it or give it a name. Some children may want to make a design of their own. The pebbles in the shakers can be used for this 'free form' experience. For your permanent (hopefully) boards, design and glue the rocks in a special form (simple designs are easily made).

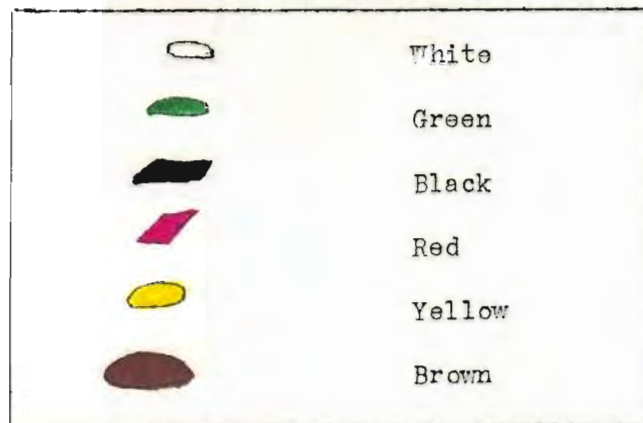
"What do you see? A happy face or a sad face?"



"Which one do you like best? How many rocks did I use on the mouth of the happy face?" "What color are the eyes? What shape is the nose? What shape is the outside? Can you touch the circle?" You can do your 'own thing' and it's great fun to share with your class.

2. COLORS

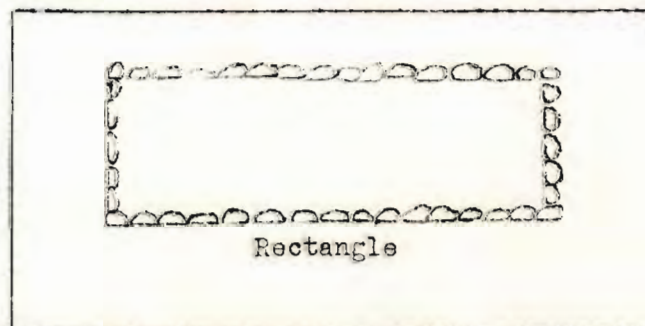
Natural colored rocks can be used for this set, or you can paint rocks with acrylic paints as mentioned in Part I. Glue the stones in a vertical row on the left side of the matboard. Print the word in upper and lower case letters on the right side opposite the color. Finding rocks with these natural colors is not all that easy!



When you present the color set, have the children say the colors aloud with you. Did you notice that blue is not easily found? You may occasionally find a turquoise blue, but a sapphire blue is very unlikely.

3. SHAPES - circle, triangle, square, rectangle, oval, half circle.

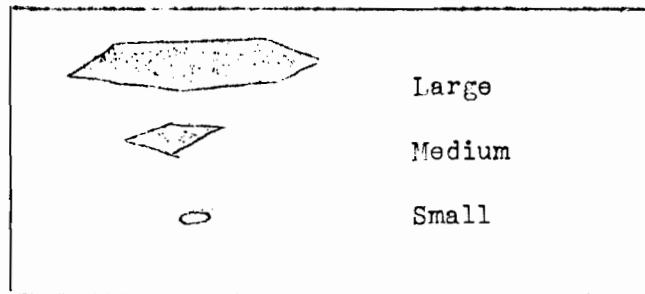
When I've made this set, I usually use small pebbles, sand or small polished rocks for these shapes. Occasionally I include somewhat larger rocks found in the desert because they are rough, sharp and have different shapes. Glue the pebbles on the board and print the word below the shape.



When talking about shapes, you may ask: "Does the circle and the oval look alike? Are the square and rectangle the same? What does the half circle look like to you? A cup? A bowl?" Be sure that the children trace the shapes with their fingers and talk about the shape they are touching.

4. SIZES - large, medium, small.

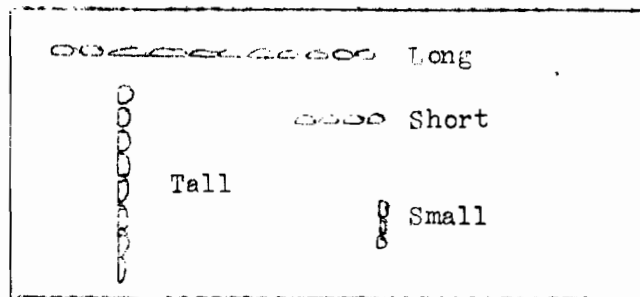
Mount the three rocks in graduated sizes on the matboard and print the words to the right side, as illustrated.



"Where is the medium-sized rock? The small one?" "Which rock is the largest?" Encourage the children to answer in terms of: "At the top. In the middle. At the bottom."

5. LINES - long, short, tall, small.

Each of these lines will be easy to mount. Any type of sand, pebble or stone can be used for this.

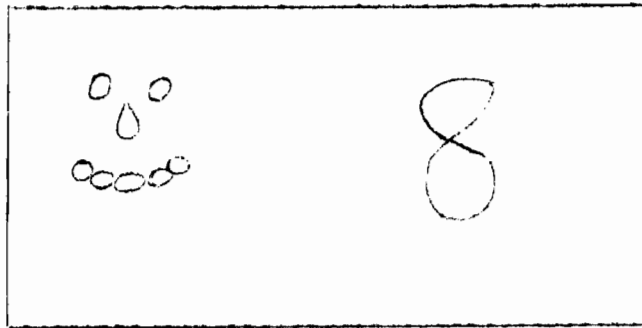


"Which lines go up and down? Which lines go from side to side? Which one is the long one?" Kindergarten children may be introduced to the terms-- horizontal and vertical, left and right.

6. NUMBERS: MATH IN SETS.

Collect small rocks and pebbles of various sizes and shapes (large rocks are not easily used for this set). Small or medium-sized stones are ideal for the number set; smaller pebbles are handy for the math set; and sand or tiny pebbles can be used for the plus and equal sign.

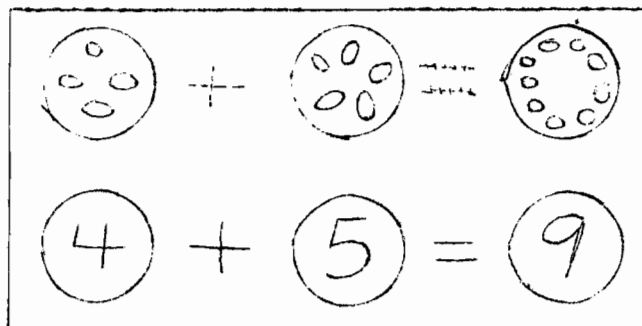
In the number set, you may use the numbers up to 10 or 12. For example, I had fun doing the number "8". I used two pebbles for the eyes, one oblong stone for the nose, and five pebbles for the mouth.



It's fun to use your imagination in any way.

The math set is made up in this manner; usually to the number 12.

The six circles are drawn with a felt tip pen. I first pencil in the circles, the plus and equal sign. Glue the number of rocks, as required, in each circle. Use sand or fine pebbles for the plus and equal sign on the upper set. The felt pen can be used to write in the numbers, plus and equal sign in the lower set.



When displaying these boards to the class, I usually have a piece of paper which hides the written numbers. In unison, we say aloud: "4 plus 5 equals (pause here) 9." Sometimes a child is incorrect, and we all count again to see if we agree. After counting, I take the paper away and ask: "Are we correct?" If so, we go on to another number. They also like to write the numbers and signs in the air with their fingers.

When you work with the nursery school children, you may show them the number boards, but cover the number with your hand or paper. After counting aloud, you then show them the number. "Did we count the right number?" Usually you may work with about four number boards (the nursery school children's interest span has to be considered here). When talking about the numbers, you may ask: "How many fingers on your hand? Can you show me three fingers? Now put one down, how many are there?" Let the children touch the rocks and trace the number with their finger--the best part is the touching!

Recently I presented the math set to a summer school class. When I had finished with the set, the children were anxious to touch all (not just a few) of the boards. Several boys kept asking for the paper. I finally understood that they wanted the paper to cover the numbers. That's exactly what they did!

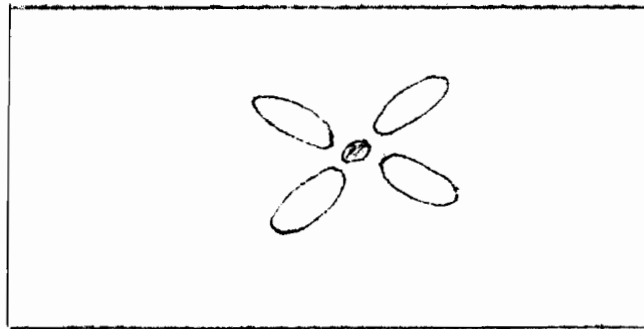
Either set can be adapted to each age group, but the math "set" concept is usually too difficult for the younger nursery school students. Older nursery school students and the kindergarten age can understand some of this.

It's also fun for the children to close their eyes and touch the pebbles with their fingertips. "How many pebbles have you touched? Are they smooth or rough? Can you touch a flat one? A round one?" Each teacher will be able to develop their own special way of presenting this material, and it can be used over and over again. The children in kindergarten can even help

you get the set back in order. They do like helping (and looking at the rest of the boards in the box).

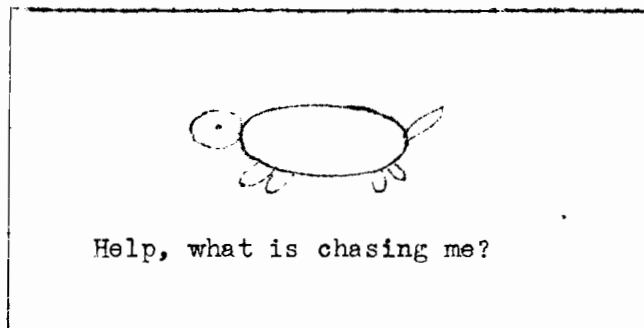
7. ART AND IMAGINATION.

Introducing art and imagination to your children can be easily done. For instance, 4 pebbles placed in a circular manner with a small, lighter pebble in the center just automatically looks like a flower.



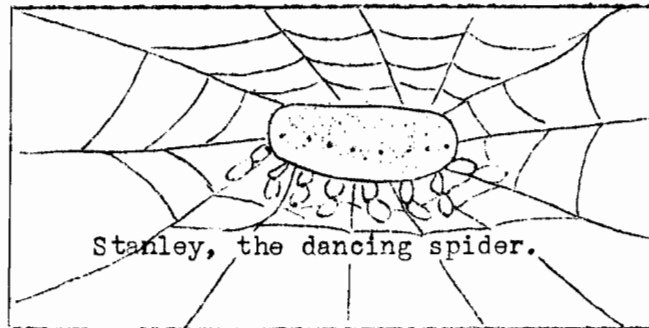
Show the children the design and ask: "What do you see? How many rocks are used?" "What colors are used? Is the center a light or dark color?"

A long oval rock, with a rounded pebble for a head, can be the beginning of an animal. Add four small pebbles for feet and a small narrow pebble for a tail. Giving this creature a name can be a project for the class.

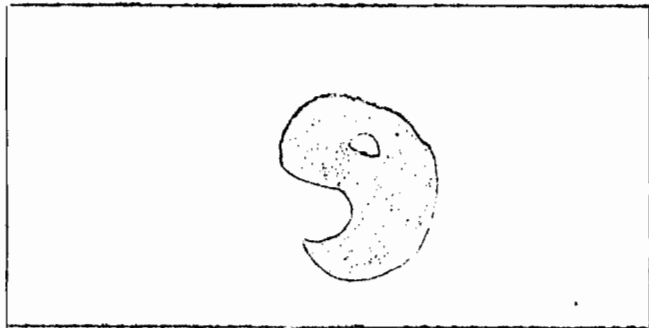


Show the class the animal and read aloud the sentence. "What animal is it?" "If it's a dog, what is chasing it?" Often their answers will be: "A cat." "A lion." "A man." "Another dog." They may even make up a fancier story.

In the original set, one of the favorite creations (done by my eleven-year old daughter) was: "Stanley, the dancing spider." A simple spiderweb design is drawn with a felt tip pen (black) for the background. A flat oval rock is used for the body with eight dots for eyes drawn on it. Small pebbles are used for the eight legs of the spider. "How many eyes does a spider have? Shall we count them?" "And how many legs?"



In other sets, I have had a wonderful time using my imagination, and the reaction of the children has been just great. They love to answer the questions and make up fancy names. Then they also see something that I didn't even think about in the first place! Here's an example:



I saw a face; some children saw a "9"; still others saw an ear!
Imagination, isn't that just something else!

The kindergarten children also responded to parts of the fossil and indian artifact set. There is more detail about these sets and the erosion set in Part III.

PART III
FOR TEACHERS OF FIRST THROUGH SIXTH GRADE

In the past year and a half, I have voluntarily presented this project in various classrooms of two different Los Angeles City Schools--from kindergarten through the sixth grade. The reaction has been good, by teachers and students. When the children and their teacher respond to my presentation, it's exciting for all of us. When the teacher trusts me with her class, I feel fine; when they join in too--oh, that's special! One teacher trusted me with her class but continued her paperwork. But you can't win them all, and that includes some students.

Since I'm not a familiar face in the classroom and have no pre-conceived ideas about the behavior of the students, I find that the children with discipline problems are usually very interested observers and good helpers. They are also sure that any missing rocks are returned! When you see that helpful, trusting face next to you--well, isn't it worth my quiet nervousness as I go into a new classroom? The other boys and girls also delight in the new terms, experience and information.

Time of presentation varies with the different grades. The lower grades do fine if the presentation is about 15 minutes long (10-12 boards are shown), and then you will need almost that much time for everyone to examine the boards. All the classes enjoy reading aloud together even though there are unfamiliar words introduced. They can be encouraged to read aloud the words they do know.

In the upper grades, you can use more boards (20-25) in a half-hour presentation. Touching the various rocks will take at least fifteen minutes. If there's enough time, there could be a question-answer time. If a child asks you a question and the answer is not at hand, say so. Be sure to encourage them to do research on their own (they may even want to start a collection of their own).

When I present any of the sets, I encourage the children to read aloud with me even though they may recognize only a few words. I read slowly, pronounce the words carefully and explain any new word or term as clearly and simply as possible. This experience helps in language development. You will also notice that I use simple explanations or information on the board. I did try to get as much detail as possible on the board, but I avoided complicated, technical terms whenever possible. I did not want to discourage the children. I did want to expose them to new ideas, words and information. The chemical, mineral, and geological data can be learned at a later time if the child has developed an interest.

It really is great when the children read the words on the board to themselves as they touch the rock, but when they discovered that I'd written notes on the back, they read that too, or asked for help! They also began to share--teachers and students. One young man gave me a rock and shell from Puerto Rico; a teacher at the same school gave me a rock full of fossils from Century City area and another teacher gave me a piece of coal from Pennsylvania. At another school, one teacher gave me coral from Hawaii, and another gave me a large rock full of fossils from the Topanga Canyon area. Each of these gifts added to the set. I have not been to any of these places, but these lovely people shared. Thank you.

As mentioned before, the response has been quite wonderful. Here are some comments received from "my fans".

First grade response: "I like the rocks. They feel good. Most of the time I don't get to see all of the rocks, but I want to." "Thanks for showing the rocks. I liked counting the rocks." "Thank you for showing us your rocks. I like the coal and the big rocks the best."

Fourth grade response from a newcomer in the area: "We didn't have a rock lady like you in New York."

Fifth grade response: "I like your rocks and fossils. I learned a very lot. I hope you come back soon." "I like the way your rocks feel and the way they look and I liked the dinosaur bone. We would like you to come back." "I like your fossils. I like you very much. Could you bring some copper ore? I hope you do."

1. FIVE SENSES - sound, sight, taste, touch, smell.

The set described earlier in Part I and II for the younger students can still be used for this presentation. Rocks of different sizes make different sounds when tapped together; salt (halite) still tastes like salt (and the kids like the tasting); damp or wet sandstone or shale rocks have a muddy smell.

Here you may introduce other objects that will involve the sight and touch. Listed below is some of the information that is included in the set. You may make your own set and use your own terms--these are just suggestions. The mounting has already been described in Part I and II.

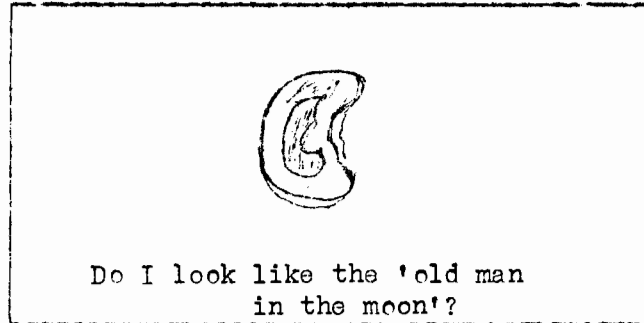
- a. I am a conglomerate. I have many pebbles stuck in me. I do have many colors.
- b. I am actinolite. I was found at Wrightwood, California. I am a relative of asbestos. I have crystals. I am fragile; I come apart easily.
- c. I am large. I am small. We are hard and firm.
- d. I have many colors; some edges are bumpy.
- e. I have few colors; my edges are smooth.
- f. I am slick and smooth; I am rough.

Other terms introduced are: shiny, tiny; dark, light; sharp, jagged; curved, angled lines; tall, straight lines; horizontal, vertical lines.

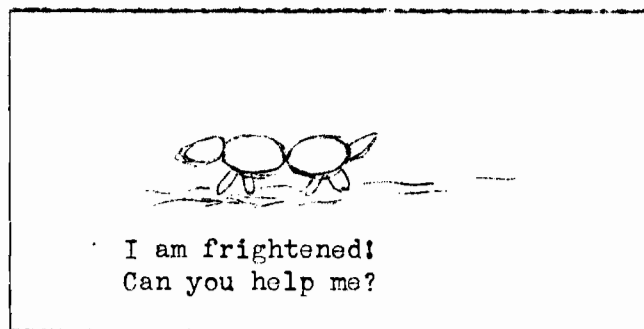
As part of the Five Senses, I usually include something that is different or fun to look at. I found a beach rock broken in half--like a half moon.

Printed on the board: "Do I look like the 'old man in the moon?'" Most of the younger children agree, while more of the perceptive older students see

the shape of the human embryo. Of course, it would be impossible to find a similar rock, but with this set, it can be shared.



Other rocks have scenes in them, or there is a recognizable profile. As mentioned before, you can build your own animal. A layered, eroded rock with a 'pointy' nose can begin an animal. Two oval sandstones (more or less dollar-sized) can be the body; small oblong stones can be the legs; and a small triangular shape can be the tail. Printed below your animal: "I am frightened! Can you help me?" The whole class will enjoy working verbally on this problem (even the quiet ones).



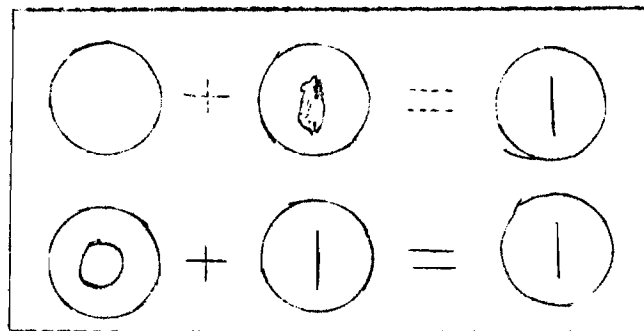
More fun can be had when you draw a design on a rock. This could be a project for the whole class. Use ink pens and imagination; let them do their own design, then spray with varnish.

2. MATH, NUMBERS AND SPATIAL RELATION.

All grades enjoy working with the math set (more detail in Part I and II). It also helps the child with a language or sight problem. Numbers--heard,

seen and touched, bring a better understanding of a new experience or confusing concept.

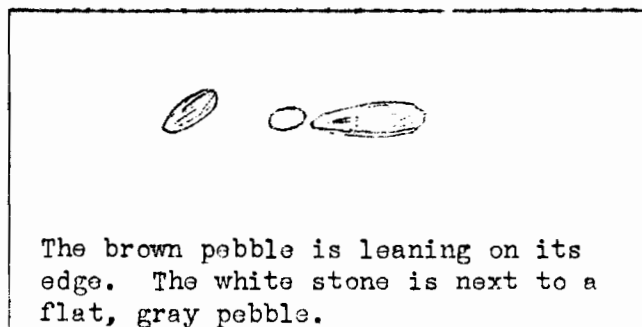
When I present the set to an older class, I hold up several boards at the same time and have the children add the total. This is fun and is a bit competitive and noisy at times. In the younger classes I use the boards one at a time to see if they recognize the answer. "Is it 8 or 9?" The actual numbers are written below and are hidden by a piece of paper. In unison read aloud: "4 plus 5 equals ?" "If you're not sure, then let's count together. Now, do we agree?" If one child is confused with the math in sets, then we work on it together. Zero plus 1 equals 1, but some children say 2. Here is a physical way to help a child learn an unfamiliar math concept.



With the older children, 3rd grade and up, we use the shakers.(detail in Part I and II, sound) as a math experience. I introduce it this way. "This is a game, and you will work in teams at your desk." After handing out the shakers to each table, I ask them to: "Make a circle; ...now divide it in half." Check each table and notice how the teamwork is going. "Please put them in sets of three. How many sets do you have?" I check with each team to encourage them to be involved. "Now put them in sets of four. How many do you have? You may continue this activity as time permits. You may make up your own game as you go or the children may have a suggestion to add. Be sure that all the pebbles are returned to their containers so that 'they will be ready for next time.'

With the lower grades, you may have the class put the pebbles in a row on the table. Some of them will put them in graduated sizes. Now the game is: "Please put the largest pebble in the container; now the smallest. Please put in a white one; a gray one; a brown one; a greenish one. How many do you have left?" Check with each team in the room. "Please put in a light one; a dark one; a tan one; and a red one. How many left now?" Check again. When it's time to put the remainder in the container, say: "Please put the remainder in the container." They will ask: "What's the remainder?" You may explain: "It's what is left on the table."

Spatial relation is a fancy term for: next to, above, below, beside, leaning, left, right, upper, lower, top, middle, bottom. This can be easily shown on your boards. "The white pebble is in the middle of the circle." Each design is mounted above or near the printed information. An example:



You may vary the sentences according to your design. After reading the printed words, you may ask: "Do the words agree with what you see?"

3. COLORS, SHAPES.

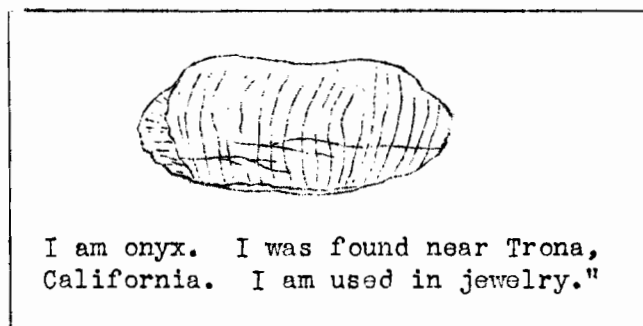
Colors - Even though the older children are familiar with colors and shapes, they still like going through the set (Part I and II) and touching each one. Here you can use natural colored rocks on your boards: white, clear; dark green; tan; dark gray; brown; dark red. If the rock has three colors, list them: white, gray, tan. Mount the rocks of the left side and print the words on the right side.

Shapes - By making the shapes with rocks of different textures you can be sure that the children will want to see and touch them. You can also introduce other shapes if you like: octagon, octahedron, tetrahedron, etc. These would be for the older students, and they might enjoy making part of the set themselves.

You may talk about the colors of the rocks of the triangle, circle, square, etc. "What color is the circle?" --if the rocks are of similar color. "Are the pebbles on the square smooth or rough?" "Which shape has the sharp, jagged rocks?" After the boards have been touched, the children may help you re-organize the set.

4. DESCRIPTION, USE AND LOCATION FOUND.

This set introduces several new terms (language development), some geography and inquiry. Each group of children will be interested in part of the set, whether he or she is in kindergarten or sixth grade. All you do is vary the time of your presentation according to the age of your class.



Description and Use. Here are some suggestions for your set.

"I am sodium granite. I am used on buildings."

"I am golden quartz. I am used on roads." (Write on back of board, "It's crushed and used for highways.")

"I am medium-grained granite. I am easy and fun to find. I am very strong and have been used as building stones for many years."

"I am marble. I am recrystallized limestone. Heat and pressure made me change--a metamorphic rock. I am very hard and tough and can be used for sculptures."

"I am a sedimentary rock. I have many layers of sediment. I am mud, sand and rock that settled to the bottom of rivers, streams or seas. Pressure from above hardens me."

"I am obsidian. I was once a part of a volcano. When the hot lava cools quickly, it looks like glass, natural glass. Indians used me for arrowheads."

Geography. Different stones, minerals and gems are found in many different places. Here's some ideas for your set. (I usually print the words so that they can be seen from across the room.)

"I am lava. I came from a volcano in Hawaii. Volcanoes are land builders; they built the Hawaiian Islands. California has volcanic cones too."

"I am called a tiger-eye. I was found in Africa. I have gold, brown and gray in me."

"I am amethyst. I was found in Mexico. I am often seen in jewelry."

"I am rose quartz. I was found in Brazil. I have not been polished."

"I am moss agate, and I was found in India. See the shiny crystals in me. I am clear and green."

"I am jasper. I was found in Utah. I can be made into jewelry."

"I am moss agate. I was found in Wyoming. I am easy to find and can be polished for jewelry."

Inquiry. After this presentation, there are lots of questions.

"Did you go to Africa?" "No, I bought the tiger-eye at a rock shop."

"Where did you find the sedimentary rock?" "A friend found it on a beach in northern California and gave it to me."

"How do they polish the rocks to make them so smooth and shiny?" "The rocks are tumbled in a machine for six weeks."

"How much is your collection worth?" "Nothing, except to me. Most of the rocks are 'found' rocks. Some very nice friends may give me some to add to collection. I've only bought a few."

"Can I have this rock?" "I'm sorry, but I need that rock so that I can share it with the next class. Someday you may start your own collection."

"Where do you get your information?" "I ask questions, I listen carefully, I have books that I use for research and I have friends who are very helpful."

"When did you start your collection?" "This collection was started recently, but as a child growing up on a farm in Wyoming, my parents and I collected agates, fossils, arrowheads, and pretty rocks. Then I collected rocks and did not use them, now I collect, use and share with you."

* * * * *

RESOURCE INFORMATION

Here is a list of the books I used for reference.

Chernoff, Goldie Taub - Pebbles and Pods. Illustrated by Margaret Harklius. Published by Scholastic Book Services, 1973. (Stone figures and designs.)

Evans, Eva Knox - Rocks and Rock Collecting. Illustrated by Raymond Perlman. Published by Golden Press, N. Y., 1955. (Helpful for younger children.)

Swenson, Valerie - Stones and Minerals, A Child's Book of. Published by Maxton Publishers, Inc., N. Y., 1955

Zim, Herbert S. and Paul R. Shaffer. Rocks and Minerals. Illustrated by Raymond Perlman. Published by Golden Press, N. Y., 1957. (For reference only - very detailed.)

PART IV

FOSSILS AND INDIAN ARTIFACTS

Indian artifacts and fossils give us information regarding the history and formation of the world around us. The interest in this set has been amazing; even the kindergarten age has enjoyed seeing part of it (and touching). If you can't find fossils or artifacts, you may be able to buy some for a small fee at a rock and gem show in your area, or you may have a friend who is a collector and will share. You also mount these items with white glue at the top or left side of the board, and then carefully print the information you wish to have on the board. Here are samples of the set.

"I am petrified wood. I was once a tree that fell into an old swamp. Dissolved quartz was in the water. The quartz became hard in the same pattern of the wood." (And it takes thousands of years for this process.)

"I am shale with a tar-like surface. I was found in the San Pedro, California area, not far from oil producing properties."

"I am shale with fossil imprints. Oil can be found near me. I am very old. I was found in Wyoming."

"I am a fossil. My name is gryphaea, or Devil's toenail. I lived during the Jurassic period, about 180 million years ago."

"I am a fossil--a belemnite. I was found in Wyoming. Once, long ago, about 180 million years ago, I swam in the ocean."

"We fossils tell of ancient geography and climate of the past. Once there was a sea, and it was warm. Millions of years later, there were mountains and plains instead."

"We are fossil fragments. The black rock is a gastrolith--found in the rib cage of a dinosaur." (A gastrolith is usually called: gizzard stone.)



I am a brown agate with white diatoms. I was shaped and used by the Chumash Indians.

"I look like an arrowhead. I may have been chipped away at the edges to form the point. The Chumash Indians may have hunted with me centuries ago."

"Most pelecypods (bi-valved mollusks) are bottom dwellers. Some are active swimmers; others burrow in sand and mud."

"We are turritellas. We are slender, long, about 4", and spiraled."

"Coal, oil and gas are fossil fuels. Oil is used for gasoline and oil. Heat and power come from coal and gas."

With this set, I usually have some fossils and artifacts loose so that they can be examined and handled more easily. A teacher gave me a large clam shell, and it is very popular. Parts of the shell can be seen and it is quite colorful. I also have a small rock that was formed by diatoms which are small unicellular algae, microscopic. All are carefully examined and returned to the set. The children usually have lots of questions, and I try to give as much information as I can. I also tell them about the books I used for research.

PART V
STORY OF EROSION

The story of erosion--how the earth changes--is hard for city children to understand, since they often do not see how land forms can change. When I started this set, I went to nearby beaches for the beginning of the erosion story. I took some colored photographs, mounted the prints and printed the accompanying story. Rocks and shells are also mounted to illustrate the story. Here is the way the story began:

"The tide pools of Cabrillo Beach are fun to see when the tide is low. On some rocks you can see limpets and chitons." (Limpets fasten themselves to the rock, and chitons make holes in the rock.)

"The jellyfish was caught in a tidal pool when the tide went out. Sea anemones are attached to the rocks. Little crabs are hiding in the rocky crevices."

"The force of the wind and waves have eroded these rocks. Some are broken; some are flattened."

"The rocks have been deposited at the base of the cliff. They are large; it takes a lot of water and force to move them. Each rock is eroded differently."

"The beach at Montana de Oro is beautiful. The waves roll in, and crash against the rocks! The cliffs are changed by erosion--but it takes many years!"

"We were once a part of the cliffs of La Jolla, but the wind and waves wore away the soil around us. We fell to the base of the cliff; and now the waves move us about, eroding us more!"

"Sea shells become eroded too. See how we have been broken into smaller pieces. One day we will become a part of the beach."



I was eroded by the sand and water
at the beach. I was a home for small
sea animals.

"Small microscopic creatures have made holes in me. How many holes can you see? There are so many holes that I am weakened and may fall apart."

"The rock was strong and hard; until the sun heated it. The cooling rain fell on it. The rock cracked! 'I have been broken apart!'" (Use a rock that's been broken into several pieces.)

"Some plants could grow in crumbled rock. Then they died, and fell into pieces. Now tiny pieces of plants and rocks are mixed together." (Use rocks and sand to illustrate this idea.)

"Slowly, slowly, the hard rock crumbled into smaller pieces. 'I am getting smaller, and smaller, and smaller!'" (Again, use small rocks, tiny pebbles and sand to show the happening. You may also want to print the word, 'smaller', with the letters becoming progressively smaller.)

"I grew in the tiny bits of rocks and plants. Then I died and became part of the tiny bits. Many years later I am part of the soil. Now the rain comes and new plants will grow." (You may mount a grass plant on the left side of the board, showing its roots in soil and sand.)

"Sandstone and limestone are sedimentary rocks. We are formed in layers. Once we were larger, but are eroded now." (These are common rocks.)

"We are sandstone slabs. Once we were a part of a large cliff by the ocean. We were worn away by the action of the wind and water." (Shale slabs can be used here.)

"We are granite. We were found in Alaska. The black shiny matter is mica; there's also quartz crystals in us. We do not erode easily."

When presenting this series to the lower grade students, I use 12-15 boards. I also have some limestone or sandstone rocks to show the actual process of erosion. Rub the two rocks together and they begin eroding--becoming sand. Have a box lid to catch the sand, and be sure that the children do not blow it or rub their eyes with their fingers. It does hurt when it gets in the eyes. Each child will be very anxious to have a turn--they really 'dig' watching the rocks wear away. They are eroding the rocks--even faster than nature does.

While putting the erosion series together, my family and I travelled to several different beaches. It was surprising to us to find that there are no two beaches alike along the coast of southern California. Pismo is different than Santa Monica and San Diego. Montana de Oro has more cliffs and less beach than La Jolla. Shell Beach is just a tiny beach with pebbles and shells.

Montana de Oro and Malago Cove near Palos Verdes are areas which should not have rock picking. If it's a preserve, a reserve, state park or beach, or a national park, you are not allowed to collect material. You spoil the natural setting of that area. In some areas, you may collect driftwood--it is replaced naturally. Otherwise, photograph and put your hands behind your back!

* * * * *

RESOURCE INFORMATION

Here is a list of some of the books I used for reference.

Frank H. T. Rhodes, Geology, illustrated by Raymond Perlman, published by Golden Press, N. Y., 1972.

Frank H. T. Rhodes, Herbert S. Zim, Paul R. Shaffer, Fossils, A Guide to Prehistoric Life, illustrated by Raymond Perlman, published by Golden Press, N. Y., 1962.

PART VI

ALPHABET

This is the set that I have just recently completed since the idea did not surface until 1973. This alphabet set has held the interest of most children in first through sixth grade. The rock, gem or mineral is mounted at the top of the board and the information printed below. Much of these rocks, minerals or gems can be obtained at a nearby museum, science center or a rock and gem show for a small fee. Finding some of the material forces you to use your imagination--- like Zzyzx Road near Baker, California for "Z"!

Here are suggestions for your set:

A is for: agate, amethyst, actinolite.

B is for: barite crystals, bentonite.

C is for: chrysophase, coral, coal.

D is for: desert opals, diatoms (diamonds, no way!)

E is for: emerald, erosion.

F is for: fire agate, fossils.

G is for: glaucophane, granite, garnet.

H is for: hornblende, Horse Canyon agate (Cal.), halite.

I is for: ilmenite, igneous, intrusive, iron.

J is for: jasper, jade.

K is for: kunzite.

L is for: limonite, limestone, lava, lodestone.

M is for: marcasite, marble, mica.

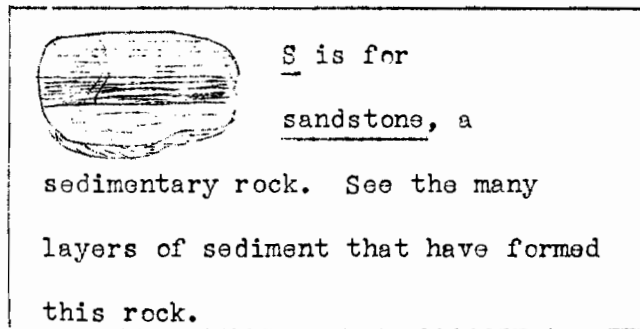
N is for: nephrite jade, nickel.

O is for: obsidian, onyx, opal.

P is for: petrified wood, pegmatite, peridot, pyrite.

Q is for: quartz, quartzite.

R is for: ruby, rhyolite.



T is for: tourmaline, topaz.

U is for: unikite, Utah artifacts.

V is for: volcanic rock.

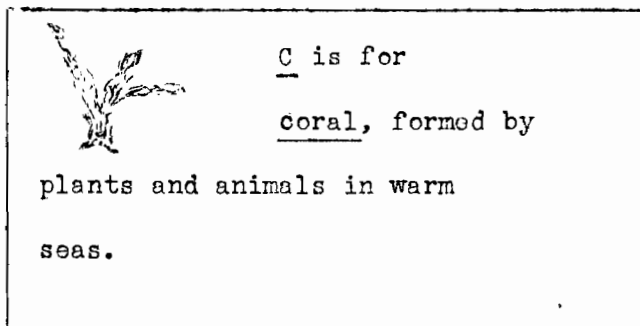
W is for: wulfenite, Wyoming fossils.

X is for: xanthoxenite.

Y is for: Yellowstone River agate from Montana.

Z is for: zinc, zircon, Zzyzx Road near Baker, Calif.

You may give any amount of information regarding your collection. You may mention where it was found, what it's used for, or how it's formed.



E is for emerald, a pegmatite mineral. When polished and cut, it is the birthstone for May.

I is for ilmenite from St. Urbain, Quebec, Canada. It is an ore of iron and titanium.

N is for nephrite jade. This sample came from Taiwan. It is a relative of actinolite, but is much stronger.

PART VII

STORY OF AN AREA

In the fall of 1972 we vacationed on Catalina Island, and I began this experimental story of an area. While we were there, we took the bus tour, and boat tours where I was able to take photographs of the coastline, Twin Harbors area and Avalon Bay. I was able to collect quite a few rocks that 'matched' the pictures. When I returned home, I mounted the photographs with rocks that had similar coloring shape. Examples are:

"Boats and seaplanes are fun to ride to Catalina. Bicycles can be ridden to Pebbly Beach where you can watch the seaplanes land." (photograph used here.)

"This rock was found on Avalon Bay beach. The smooth rounded edges tell you that the Chumash Indians used me as a tool."

"Pirates in the 1800's, and earlier, used to hide in the coves of Catalina. (This rock had a weird face on it.)

"Two mountain tops were leveled to make this airport. When the fog clears, small planes can land here." (A photograph of Catalina 'Airport in the Sky'.)



Little Gibraltar is a rocky point
along the rugged coastline of
Catalina.

Rocks of different colors were used with photographs of the shoreline.

"Volcanic rocks come in many sizes. They show that Catalina may have been formed by a volcano."

"Volcanic ash, rocks and lava flow can be easily seen on shore."

"Rocks from the rock quarry are used in the breakwater of the L. A. Harbor."

"Wild goats and pigs still roam the steep valleys and hills of Catalina Island."

"Buffalo and eucalyptus trees like the rich red soil of the Twin Harbors area. So do some people!" (Our two girls are in the photograph of the area.)

"The area of Twin Harbors is very scenic and has been used for several movies."

The children that have seen this set were quite interested in it. They enjoyed seeing pictures of our family. They liked looking and touching, and had many questions. "Who's that sitting on the tree stump?" "Those are our daughters--Lore and Barbara." "Where did you find the rocks?" "At Pebbly Beach, Avalon Bay and the Twin Harbors area. We weren't able to do any collecting when we went on the bus tour of the island."

Very recently a science resource teacher at another Los Angeles school came to see the natural science set. She was very interested in the Five Senses set and the Catalina story. She has asked me to present both sets to her school in the near future; and she also ordered the Five Senses kit. It will be interesting to see how her first and second graders react to the presentation.

If you like taking photographs, you may select an area near you that would be of interest to your class. In some areas where you can't pick rocks, this would be a good way of giving your class some up-to-date, interesting material. Slides might be nice, but mounted prints are more easily handled and examined.

PART VIII

IN THE WORKS ---

Since this project has continued to "build" itself, my mind has been busy thinking about new information to include. This summer I made a small number and shape set for a nursery school for the visually handicapped. There is no reason why this entire project could not be useful and interesting for blind children. There will need to be more research and questions before this can be done effectively.

I've recently completed a "Five Senses" kit for a young teacher of mentally retarded children. I hope they all enjoy the touching and the learning. As part of a science and remedial reading at a junior high school nearby, I made two sets--fossils and indian artifacts, and the story of erosion. The sets have been delivered, but I do not know how they are being used. Now to see whether or not they work with the young teenagers. My hope is that the young people will be interested enough to want to read--even though it may be one board at a time.

I have not worked on a mineral set yet; and I have found a place in Monrovia, Burminco's, where all kinds of samples can be purchased. The gentleman in charge is helpful and interesting. He also sells kits and a teacher's manual for use in classrooms. The information he gives in the manual is useful for the teachers of older children; it's too complicated for the younger ones.

It will be fun to assemble a mineral set (12-15 boards). A birthstone set might also be interesting to do. There is still so much to learn and to share, thank heavens!

You may wonder why I have prepared this manual with double spacing. The reason for this is to give you space to write your own notes, ideas, comments or questions. Stars in the margin, underlined words, added information will be very useful whether you're making your own set or using one.

Good luck

from the

Rock Lady

RESOURCE INFORMATION

If you are interested in making a fossil set, you may order a small set from the Greybull Museum in Greybull, Wyoming. They also have other nice rock samples. The zip code is 82426.

You may also want to use sea shells, rather than rocks, for your sets. Here are two books that might be useful for you.

R. Tucker Abbott, Seashells of North America, A Guide to Field Identification.

Illustrated by George F. Sandstrom, published by Golden Press, N. Y., 1968.

R. Tucker Abbott, Sea Shells of the World, illustrated by George and Marita

Sandstrom, published by Golden Press, N. Y., 1962.

If you are interested in the information on the sets for junior high students, you may contact me at 8633 Hervey Street., L. A. 90034. I will have about four mimeographed pages available.