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The Structure of the Earth

Grade Level: Kindergarten - 2nd

Vocabulary : Core
Mantle
Crust

Materials : Book: Planet Earth by Christopher Maynard, Warwick Press, London, 1974.
½ cup butter or margarine
3/4 cup confectioner's sugar
1 tablespoon vanilla
1½ cups flour
1/8 teaspoon salt
½ section of a maraschino cherry for each cookie
crushed corn flakes to coat each cookie
mixing bowl and utensils
1 egg white
1 oven

Objective : Through the making of an "Earth Cookie" the children will tangibly demonstrate that: the Earth is round, the inner structure of the Earth consists of 3 main sections: the innermost core which is extremely hot, the mantle which surrounds the core and which is not as hot as the core, and the crust on which are situated the Earth's land masses and oceans.

Procedure : Preliminary teaching/Review

1. The teacher has previously read (described) the section pertaining to the structure of the Earth in Maynard's book, Planet Earth.
2. Ask the children, "Who remembers what the shape of the Earth is like?" (round)
3. Ask the children, "Who remembers what is in the center of the Earth?" (the core)"What is it like?" (hot)
4. Ask the children, "Who remembers what we call the part surrounding the core?" "What is it like?" (the mantle; harder than the core but moveable)
5. Ask the children, "What is the part called around the outside of the Earth?" (the crust)"What is on the crust?" (land masses, oceans)

1. Have children wash their hands.
2. Follow the recipe printed at the beginning of this lesson. (This is also a math lesson and a sequence lesso
3. Each child has a paper towel or newspaper on the table or floor in front of them.
4. Give each child 1 tablespoon of the dough.
5. Say, "We are going to make this dough into the Earth. How can we do it?" (roll it into a ball) "Good. Do it.
6. "Poke a hole in the Earth ½ way through."
7. "Put this piece of cherry into the hole. What is it supposed to be?" (the core) "Gently squeeze the hole you made together and re-roll the Earth."
8. "Now we have the core and the mantle. Which part is the mantle?" (the dough)
9. "What do we need to go around the outside of the Earth?" (the crust)
10. Have each child now dip the dough into a bowl containing at least one unbeaten egg white. This allows the crushed corn flakes to adhere to the dough. The childre then gently roll the dough into the crushed corn flakes
11. Place cookies 1" apart on an ungreased baking sheet 12 to 15 minutes, or until set but not brown in a 350° oven.
12. Yield: 20 to 25 cookies. I doubled this recipe with no problems.
13. When ready to eat, cut one cookie open, review parts and EAT!

ariations :
1. You could use colored baker's dough, although for the younger child the thrill of eating the Earth is worth the extra effort of mixing, etc.
2. You can make a simple flannel board diagram of the Earth's structure which the children can do on their own
3. I had the class pantomime the sections of the Earth. They made themselves into a small ball representing the core; a larger ball representing the mantle; and, to represent the crust , they stretched themselves into a thinner circle.

xtensions
1. While the cookies were baking, I had the children color a diagram of the Earth's parts which was at the bottom of an explanation sheet and recipe to send home.

Tectonic Plates

Grade Level: Kindergarten - 2nd

Vocabulary : Pangaea
Tectonic Plates

Materials : Globe of the Earth
Map of the Earth
Various books about the Earth (see bibliography)
Blue paper
Cooking utensils
Oven
1/3 cup soft shortening
1/3 cup sugar
1 egg
2/3 cup honey
1 teaspoon vanilla
2 3/4 cups flour
1 teaspoon soda
1 teaspoon salt

Objectives : Through the making of "Tectonic Plate" cookies the children will tangibly demonstrate that: the Earth's continents were all one continent about 200 million years ago (Pangaea); these continents are splitting up and drifting apart; the splitting and moving of the tectonic plates causes earthquakes.

Procedure : Preliminary teaching/Review

1. Ask the children," Who remembers what the outside of the Earth is called?" (the crust)
2. "What is on the crust?" (land masses and oceans)
3. Tell the children the story of the Earth 200 million years ago when the continents were together. Show illustrations from the books named in the bibliography.
4. Compare the pictures of the Earth 200 million years ago and the globe today. Ask," What is different?" (the land masses are farther apart)
5. Show pictures of the Earth and the tectonic plates at different stages in the Earth's history.
6. Ask the children," What do you think is happening to the land masses?" (they are drifting apart)

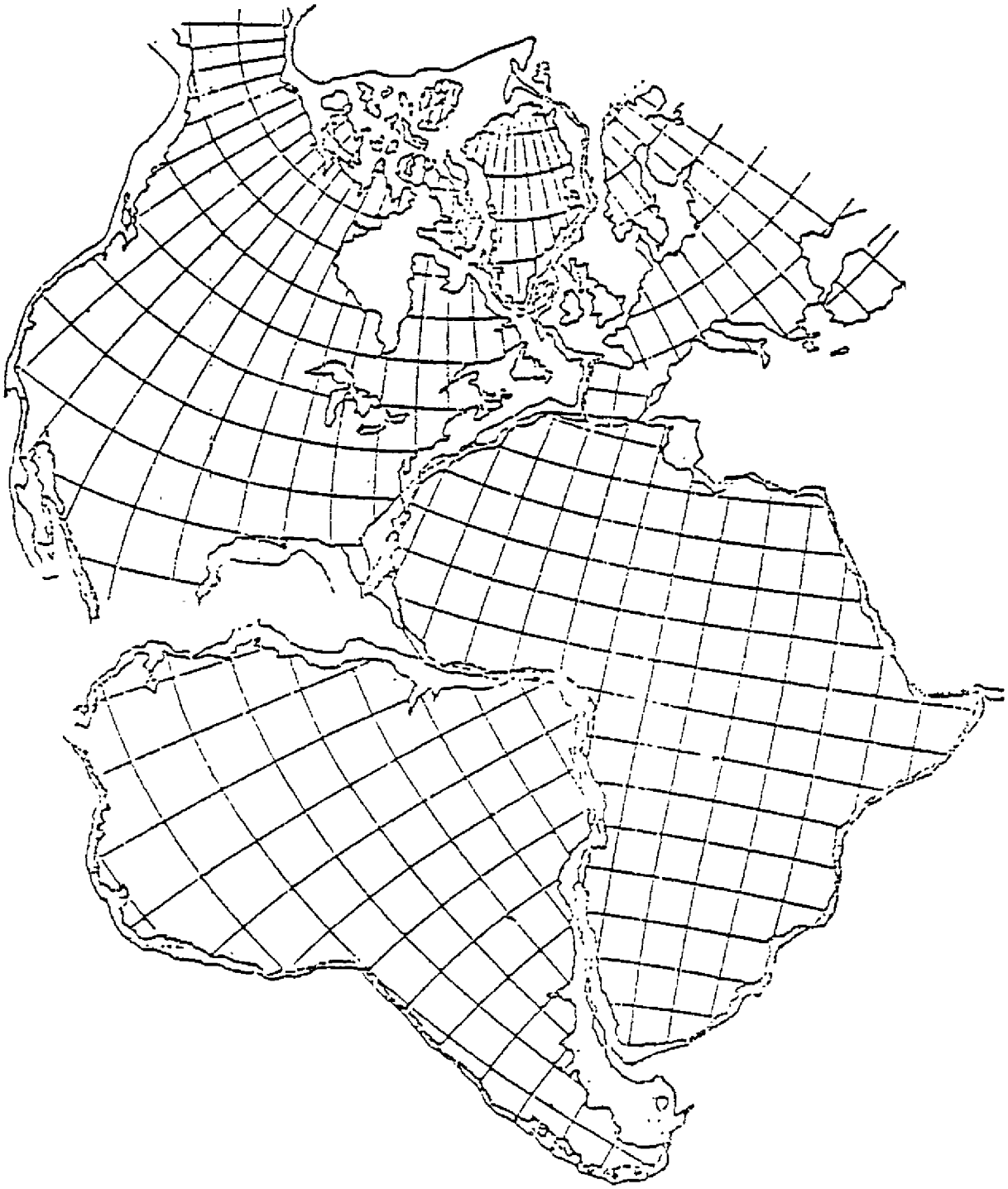
Procedure : 7. Ask the children, "What do you think happens when the tectonic plates move?" (earthquakes occur)

Activity : Making Tectonic Plate sugar cookies

Have the children wash their hands.

2. Mix the shortening, sugar, egg, honey and flavoring thoroughly. Blend flour, soda, salt; stir it into the shortening mixture. Chill dough. (the dough could be made the day before)
3. Roll dough ¼" thick.
4. Cut dough into Pangaea shape. Review .
5. Cut Pangaea into individual Tectonic Plates. Review.
6. Bake Tectonic Plate cookies in 375° oven 8 to 10 min.
7. When cool, place on blue paper.
8. Have children move the plates to correspond with the pictures of the Earth at various stages in the past.
9. Have children move the plates to their present location
10. Discuss what will probably happen to the plates in the future. (they will continue to move apart)
11. Eat the tectonic plates.

Variations : Have children pantomime the movement of the tectonic plates Groups of children bunched together with rope or yarn would represent the different tectonic plates. These groups would all be bunched together at first to represent Pangaea. Then at a signal from the teacher they would slowly move apart in their various bunches. When plates meet at continental collision spots (Nepal area) the children would form mountains.



Grade Level: Kindergarten - 2nd

Vocabulary: Fault
Slip
San Andreas Fault

Materials: 4 envelopes unflavored Gelatine
3 packages (3 oz. ea.) flavored gelatine
4 cups boiling water
cooking utensils
large shallow baking pan (13" x 9")
Various books about the Earth (see bibliography)

Objectives: Through the making of Jello fault zones the children will tangibly demonstrate that: Earthquakes occur along fault lines (in the Bay Area where 2 tectonic plates meet) as land slips past land or as land pushes against land to form mountains. When plates react in these ways earthquakes occur.

Procedure: Preliminary teaching/Review

1. Review tectonic plates taught in Activity #2.
2. Ask the children,"What do you think happens when two of these plates move past (slip) each other? "Do you think they move past each other smoothly or roughly?" (roughly)
3. "What do you think happens when these two great sections of Earth move past each other roughly?" (earth shakes)
4. "This is what happens when the San Andreas Fault in California moves."

Activity: Jello fault zone squares

1. Prepare Jello.
2. In large bowl, combine unflavored gelatine and flavored gelatine, add boiling water and stir until gelatine is completely dissolved. Pour into large shallow baking pan and chill until firm. Cut into squares to serve. Makes about 100 one-inch squares.
3. Give each child 2 squares of the Jello blocks.
4. Have the children demonstrate fault slippage with their two Jello blocks.

<u>activity</u> :

5. Ask the children,"What happens when you moved the two blocks of Jello past each other?" (resistance, the blocks shake and quiver.)
6. Have the children push the two Jello blocks against each other and ask,"What happens when the two blocks are pushed against each other?" (shake and "mountains" form. In some cases, splitting might occur)
7. Discuss and review that this is what happens along fault lines.

<u>variations</u> :

1. Children form 2 lines (parallel). Each line faces in opposite the other : ⇐ ⇒ These two lines represent the fault (San Andreas for children in this area).
2. At a signal from the teacher each line moves past the other in a right lateral slip motion (⇆).
3. Children could hold yarn or scarves with the child opposite them at the beginning of the demonstration and describe what happens to the yarn or scarf when the demonstration is finished. (the yarn or scarf should now be at an angle; not straight across.) This is a good demonstration of what happens to roads, streams, etc which happen to be on opposite sides of a fault.
4. Another demonstration of what happens to objects on faults would be to have the children build houses with table blocks. The houses would be built on two // pieces of tagboard, the house spanning the two pieces of tagboard. The houses should be anchored to the pieces of tagboard with clay (acting as the foundation). At a signal from the teacher the children would move the two pieces of tagboard past each other as they would in the San Andreas earthquake zone (right lateral slip) and observe the results. (the house should creak and fall apart if moved a significant distance.)

The Earth's Movement in an Earthquake

Grade Level: Kindergarten - 2nd

Vocabulary : Primary Waves (P waves)
Secondary Waves (S waves)

Objective : Through the use of movement, the children will demonstrate that: when an earthquake occurs 2 kinds of movement (I am only focusing on P and S waves) occur: P and S waves. P waves are straighter and faster than S waves which move in an undulating manner.

Procedure : Preliminary teaching/Review

1. Review Activity # 3 : the earth shakes when moved.
2. Tell/read to the children how P and S waves move.
   a. P and S waves start out from the same place where an earthquake occurs and at the same time.
   b. But the P wave is faster and straighter than the S wave.
   c. The S wave is slower than the P wave and moves up and down like a roller coaster.

Activity :

1. The children will pantomime a P wave.
   a. All the children face outwards from a tight circle.
   b. At a signal from the teacher all walk straight out from the center of the circle; quickly.
2. Have the children pantomime an S wave.
   a. All the children face outwards in a tight circle.
   b. At a signal from the teacher all walk out from the center of the circle moving their bodies in an undulating manner (this is best if they are lying down.)
3. Divide the class in half. One-half will be the P waves and one-half will be the S waves.
   a. Again, have the children form a tight, outward facing circle.
   b. At a signal from the teacher, the P waves walk out from the circle.
   c. At a second signal from the teacher, the S waves move outward from the circle at a slower pace than the P waves.

Activity : 4. Ask the children,"What would happen if you were a wall and an an S wave moved under you?" (you might break up)

Variations : 1. For those of you who are Disco Freaks; with appropriate Disco music, you and your class could work out a Disco routine incorporating a right lateral or left lateral slip, P and S waves.

2. After discussion of Seismograph recording and seismograr the class could frost a cake or individual cupcakes with white frosting. Melt 1 square unsweetened chocolat Drizzle a line across the white frosting. With a knife draw the chocolate across your base line to represent a seismograph.

Berdick, Jean. The Shape of the Earth. (Grades K-3) 1965. Rand McNally & Co., Chicago.

Lauber, Patricia. Earthquakes: New Scientific Ideas About How & Why the Earth Shakes.(Grades 4-8) 1972. Random House, New York.

May, Julian. Why the Earth Quakes.(Grades K-3) 1969. Holiday House Science Books, New York.

Maynard, Christopher. Planet Earth.(Grades 4-8) 1974. Warwick Press, London.

Zim, Herbert. What's Inside the Earth?(Grades 3-5) 1953. William Morrow & Co., New York.

Note: The pictures in the Christopher Maynard book are good for showing to a class while the teacher explains the different concepts. Of course, with all of these books, the teachers of very young children will have to adapt the texts to the level of their class.