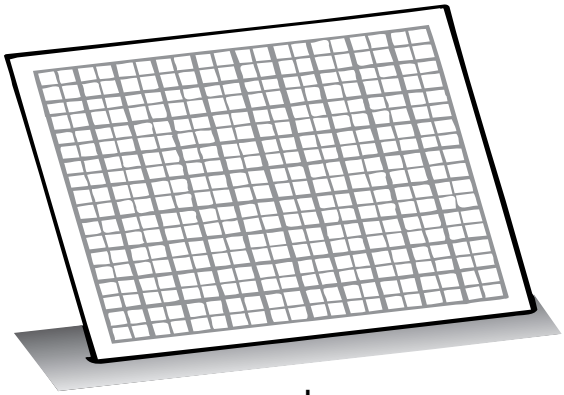
Chapter Science Investigation Name _____

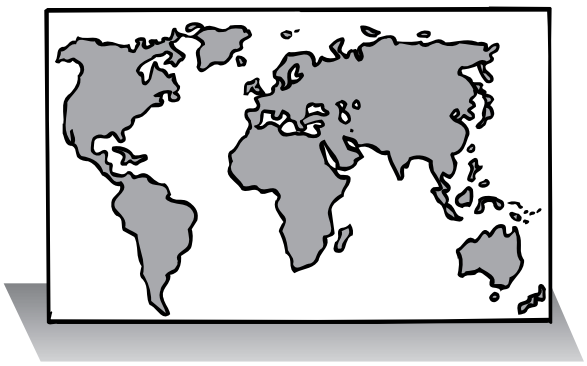
Researching Earth's Moving Crust

What You Need

newspapers, magazines, or the Internet



graph paper



a world map

Find Out

Do this activity to see what evidence exists today of plate movement or volcanic eruptions.

Process Skills

Communicating
Interpreting Data
Using Numbers

Time

- 30 minutes the first day
- 15 minutes each day for three weeks

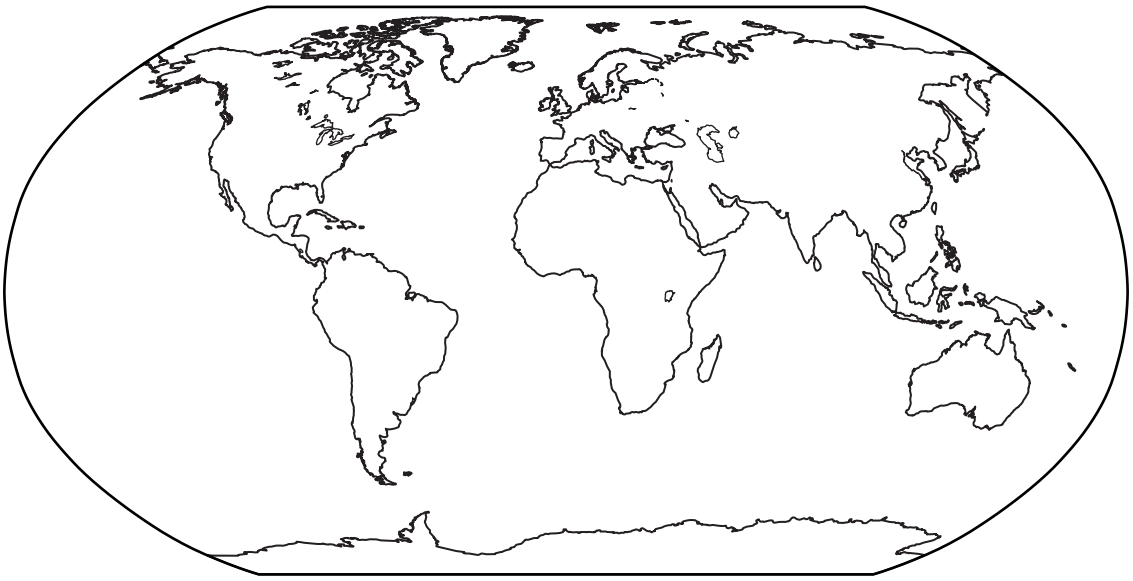
What to Do

1. **Locate** articles from 1990–2000 about volcanic eruptions and earthquakes in newspapers or magazines from the library or on the Internet.

2. Collect and **record** information for three weeks.

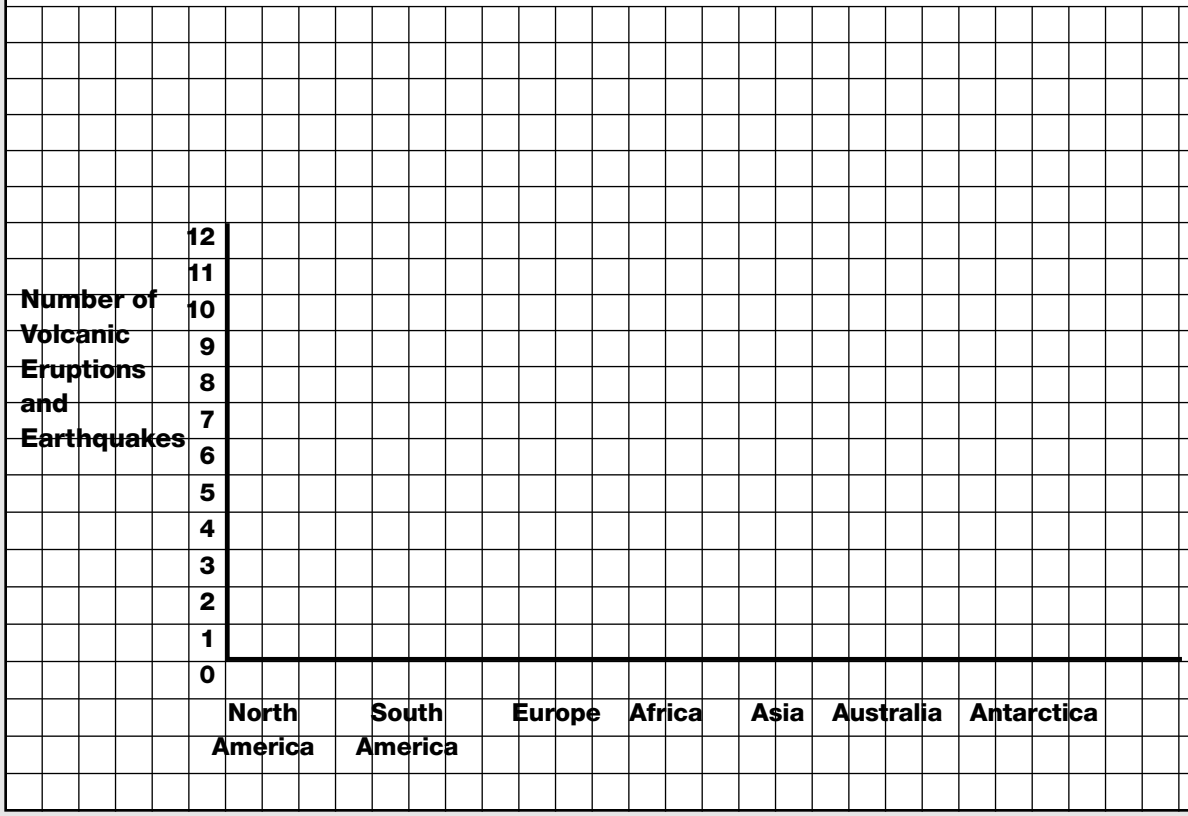
3. At the end of three weeks, prepare a bar **graph** of your results. The left side of the graph should show the numbers of volcanic eruptions and earthquakes identified over the ten-year period. The bottom of the graph should identify the continents.

4. **Record** the city, country, and continent of Earth's movements on the world map with red dots.



Recording Earth's Movements	
Time	**City, Country, and Continent of Volcanic Eruptions and Earthquakes**
Week 1 Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Week 2 Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Week 3 Day 1	
Day 2	
Day 3	
Day 4	
Day 5	

Graphing Earth's Movements from 1990–2000



Conclusions

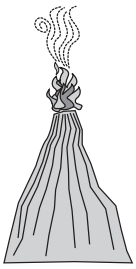
1. Where did most of the movements of Earth's crust occur over the ten-year span?
   Answers will vary depending on student data.

2. Were there clusters of movements near one another?
   Answers will vary depending on student data.

New Questions

1. The chain of volcanoes along Japan, surrounding the Philippines, down the Pacific Ocean off the eastern coast of Australia, then up the western coast of South, Central, and North America, forms the Ring of Fire. Based on what you know about plate tectonics, why do you think the Ring of Fire is an area of frequent earthquake and volcanic activity?
   The Ring of Fire has frequent earthquake and volcanic activity because it forms the boundaries where the Pacific Plate meets other continental plates.

2. Do your observations show any other patterns that might be explained in terms of plate tectonics? If so, what are they?
   Answers will vary, depending on student data. Students may observe earthquake or volcanic activity in regions other than the Ring of Fire. Further investigation may show the sites are related to other plate boundaries.



Name _____

ACTIVITY

Putting the Pieces Together

How many ways could you match the continents? **Record** the number of matches.

Number of Matches	By Shape	By Surface Features	By Shape and Surface
Answers will vary depending on students' choices.			

Make a **drawing** of the best fit you discover. Include a key that classifies where the geologic and surface features are on the map. Also make a map of the present-day positions of the continents.
Drawings will vary depending on students' choices.

Write a paragraph about your new map.
Paragraphs should be as detailed as possible, and include several geologic features and several surface features.

Name _____

Conclusions

1. How many different ways did the continents fit together with shapes and features? With shapes alone? With features alone?
Answers should come from students' charts.

2. Compare your map in Step 5 with the map in Step 6. How do they differ? Are any of the continents in the same place? Where would the north pole be on the map in Step 5? How do you know?
Answers will vary depending on students' experiences.

3. What do the fit of shapes and resources tell you about how likely your arrangement is?
Answers will vary, but may include that some pieces were very similar, or that it was like a jigsaw puzzle.

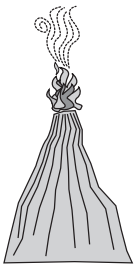
4. Did your paragraph include all of the information about your map, including your results?
Answers should match students' paragraphs.

Asking New Questions

1. What does the evidence of fit, for shapes and features, tell you about the continents and their relative positions?
the better the fit, the more likely the arrangement

2. If you lived 10 or 20 million years from now, how would you be able to figure out the relative positions of the continents of the twentieth century?
matching shapes, features, and fossils

3. How could your paragraph be useful to others who want to find out if the continents could have once been joined?
Answers will vary, but should include recognition that scientific diaries are important to others now and in the future.



Name _____

ACTIVITY

Making It Quake

Draw a diagram of your model village.
Diagrams should be reasonably accurate.

What do you predict will happen when you and your partner pull the cloth or plastic wrap?
Students may correctly predict that their actions will cause some of the things on the surface to fall over.

Record what happened when you pulled on the cloth or plastic wrap.
varying amounts of damage to the position of objects on the surface

Name _____

Conclusions

1. Why did you need cloth or plastic wrap at the bottom of the pan?
to represent Earth's lithospheric plates

2. What does the space between the two cloths represent?
a fault, which shifts in an earthquake

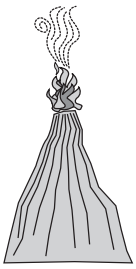
3. What happened when you pulled each strip in the opposite direction?
The objects on the surface were displaced.

4. If you had time, what happened when more force was used to pull the strips?
Answers will vary, but should include recognition that there is more destruction when more force is used.

Asking New Questions

1. Can you imagine how real cities could be damaged during an earthquake?
Answers will vary, but may include the fact that ground movement can be destructive or dangerous.

2. What steps could you take to minimize damage and injury if you lived in an area prone to earthquakes?
build away from known fault lines, and learn the safest place to be in the event of an earthquake



Name _____

ACTIVITY

Investigating Plate Tectonics

Draw some of the egg-piece puzzles you come up with. Circle the drawing that comes closest to fitting the pieces back together.
Diagrams should accurately reflect students' experiences.

Name _____

Conclusions

1. Did the pieces fit together perfectly?
generally not

   Why or why not?
Answers will vary based on the sizes of the pieces of eggshell.

2. Explain what happened to your eggshell when you pushed two pieces toward one another. What type of boundary did it represent?
Answers may vary, but should include that this represents a convergent boundary.

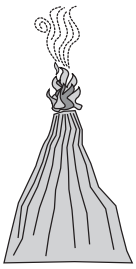
3. Explain what happens when you push the shells away from each other.
Answers may vary, but should include that this represents a divergent boundary.

4. What part of Earth did the water represent?
the asthenosphere

Asking New Questions

1. What other Earth processes did the egg and shell represent?
Answers may vary, but could include the drifting of the continents.

2. Imagine that your egg has been cut in half. Can you **infer** a comparison of the structure of Earth to the egg?
Answers may vary and may include that the yolk is the core and the white is the mantle. The missing shell would have been the crust.



Name _____

ACTIVITY

Moving On

Interpret the data for the current continental positions and what you know about continental drift to **predict** where the continents will be in ten million years.

Draw some sketches of the different versions of your model of Earth in ten million years.

Accept all reasonable drawings.

Name _____

Conclusions

1. What did you **predict** about the position of Earth's continents ten million years from now?
Students should recognize that the continents will continue to move and be in different positions.

2. Will they be in the same places or different ones?
different
How do you know?
by interpreting current evidence and making an assumption that it will continue

Asking New Questions

1. How is predicting different from guesswork?
Predicting is using knowledge and observations from the past to foretell what will happen in the future.

2. What further evidence do you need to better predict the future positions of the continents?
the present direction and average speed of drift

3. How could you test your predictions?
computer modeling; repeating the test over and over