pg 124:

1) Where in the world do most earthquakes occur?

2) Where in the world was the most recently recorded earthquake? Record the magnitude, intensity, and depth of the earthquake.

3) When and where in the United States was the last recorded earthquake? Record the magnitude, intensity, and depth of that earthquake.

4) How many earthquakes were recorded worldwide in the past week? What is the range of the magnitudes and depths of these earthquakes?

5) Find and record the magnitude, intensity, and depth of the most recent earthquake closest to where you live.

6) How many earthquakes were recorded in your home state this week? What was the largest magnitude earthquake? What was the smallest magnitude earthquake? What was the depth of these earthquakes?
(Students in California can skip question 7.)

7) How many earthquakes have been recorded in Oklahoma/California this week? Compare to California. What was the largest magnitude earthquake? What was the smallest magnitude earthquake? Record the depth of the deepest earthquake.

**pg.127 - Reflect:**

8) Describe any patterns made by the locations of earthquakes in your region. What pattern do you think you would observe if you recorded earthquakes that have happened for the past month?

**pg.129:**

9) What patterns of earthquake activity do you see worldwide?

10) Based on the data you have looked at so far, where do you think there might be plate boundaries?

11) What else do you think you need to know to more accurately and completely identify Earth’s plate boundaries?
3.5 Explore

What Can Earthquake Data Tell You About the Location of Plate Boundaries?

Seismologists are constantly recording earthquake data from around the world. They use seismograph information to determine the epicenter and magnitude of each earthquake.

Analyzing earthquake data can help seismologists determine how often and where earthquakes occur. The information can also tell scientists a lot about what is happening in Earth’s crust. In this section, you will analyze some data to identify where earthquakes occurred in the past week. Along with your class, you will then plot that information and see what you can find out about plate boundaries.

Although the 1994 California earthquake is known as the Northridge earthquake, seismologists later determined that the epicenter was actually located in Reseda, California, and not in the community of Northridge.
What Data Is Recorded About Earthquakes?

The United States Geological Survey (USGS) collects earthquake data from around the world. This data is included on their Web site, organized on maps and in lists. In this first exploration of earthquake data, you will work with your partner to identify the locations of recent earthquakes. You will also look at the data geologists use to describe them. To find this information, navigate the Web site and answer the questions below.

1. Where in the world do most earthquakes occur?
2. Where in the world was the most recently recorded earthquake? Record the magnitude, intensity, and depth of the earthquake.
3. When and where in the United States was the last recorded earthquake? Record the magnitude, intensity, and depth of that earthquake.
4. How many earthquakes were recorded worldwide in the past week? What is the range of the magnitudes and depths of these earthquakes?
5. Find and record the magnitude, intensity, and depth of the most recent earthquake closest to where you live.
6. How many earthquakes were recorded in your home state this week? What was the largest magnitude earthquake? What was the smallest magnitude earthquake? What was the depth of these earthquakes? (Students in California can skip question 7.)
7. How many earthquakes have been recorded in California this week? What was the largest magnitude earthquake? What was the smallest magnitude earthquake? Record the depth of the deepest earthquake.

Communicate

Share Your Ideas

Share your answers to the questions with the class. Discuss the questions and make sure everyone understands how to find information on the Web site. You will need to be able to navigate the Web site easily to find data about your region.
Earthquake Measurements

Estimating Miles from Kilometers

Understanding how a kilometer compares to a mile will help you better understand the depth of different earthquakes. On the USGS Web site, earthquake depth data is presented in kilometers (km). A kilometer is 0.6 miles, a little more than half a mile. So if an earthquake happened at a depth of 30 kilometers, you can estimate that it was about half of 30, or about 15 miles, beneath Earth's surface.

Measuring and Comparing Time

Suppose an earthquake hit San Francisco, California, at 4:00 AM. At what time did the earthquake happen? That depends on where you are. When it is 4:00 AM in San Francisco, it is 7:00 AM in New York, 12:00 noon in Greenwich, England, 8:00 PM in Beijing, China, and 12:00 midnight in Kamchatka, Russia.

Different places on Earth experience different times of day simultaneously. Because Earth is a sphere, when one side is facing the Sun and experiencing daytime, the other side is facing away from the Sun and experiencing nighttime. Our system of time is based on Earth's rotation. Earth makes one rotation every 24 hours. As Earth rotates, different places face the Sun.

Scientists around the world need a common way to talk about the time. If all scientists used local time, no one would be sure about when something happened. So, all scientists use a common time based in England called Coordinated Universal Time (UTC). UTC is always the same everywhere in the world.

For example, in standard time, when it is 6:00 AM in New York, it is 3:00 AM in Los Angeles, California. In New York and in California, the UTC time is 11:00. Because a day has 24 hours, UTC is recorded using a 24-hour clock. One hour later, when it is 7:00 AM in New York and 4:00 AM in California, UTC is 12:00. One hour later, UTC is 13:00.
Reflect

Describe any patterns made by the locations of earthquakes in your region. What pattern do you think you would observe if you recorded earthquakes that have happened for the past month?

Identify Earthquakes Around the World

Now that you know where earthquakes have happened in your region in the past week, you will work as a class to identify where earthquakes have been happening worldwide during the past week.

The Web site you just used allows you to select particular time periods and view lists of earthquakes during that time. As a class, look at the list of earthquakes from the past week with magnitude 4.5 and greater. Notice how many earthquakes are in this list.

Your teacher will assign you and your partner a set of these earthquakes to find and mark on the Big World Map. Work with your partner and follow the next procedure.

Sample earthquake data from USGS Web site.
On your *Three-page Map*, use a colored pencil to mark where you think there are plate boundaries.

For each plate boundary inference, how confident are you of the inference (a lot, a little)? What additional data would help support your plate boundary inference and make you more confident about it? Why?

In the places where you are still unsure of the plate boundaries, what data do you need to increase your confidence level?

**Communicate**

**Share Your Data and Ideas**

Share your plate boundary inferences with the class. At the same time, share the information you used. Observe each group’s plate boundary inferences, and listen to their supporting ideas. Note what your classmates are unsure of and why. Pay careful attention to where others think plate boundaries are, especially those that are near your region. If you disagree with where others have identified plate boundaries, or if you think they have not used their supporting evidence well, offer your advice and the evidence that supports it. Be respectful, even when you disagree with one of your classmates.

You will probably agree with some groups’ inferences about plate boundaries and disagree with others. There will be further opportunities to work with your classmates to better identify where plate boundaries are located. For now, notice what you disagree about and where people are unsure of boundary locations. Understand why they are unsure, and identify what further information is needed to resolve your disagreements. Also, think about how much or what type of data will increase your confidence about where plate boundaries are located.

As a class, answer these questions:

9. What patterns of earthquake activity do you see worldwide?
10. Based on the data you have looked at so far, where do you think there might be plate boundaries?
11. What else do you think you need to know to more accurately and completely identify Earth’s plate boundaries?