West Austin Hill Country
Elementary School

Objectives

-Students will describe what a fault is.
-Students will be able to link faults and earthquakes.
-Students will understand that ancient fault activity caused earthquakes in central Texas.

Materials

play-dough, the picture of the Central Texas Limestone located under the "What and Why" tab, the map showing the Texas Coastal Plain, Balcones Fault Zone, and the West Austin Hill Country located under the "What and Why" tab

Engagement

Show the picture of Central Texas limestone located under the "What and Why" tab. **Ask** the students to describe what they see. **Guide** the discussion to include the obvious "breaks" or fault lines in the rocks.

Explanation

Explain that faults are places where the Earth's crust breaks and rocks on one side slide past the rocks on the other side. The break itself is called a "fault." Thousands of feet of relative movement ("displacement") occurs along some of these faults. The movement does not happen all at one time and these movement events are what produce earthquakes. Most earthquakes are so small we can't feel them, but large earthquakes, which are uncommon, may cause lots of damage.

Exploration or Teacher Demonstration

Explain that they are going to explore how the Earth's crust may move when it breaks.

Give each student 2 pieces of play-dough. **Ask** the students to flatten each play-dough piece into a square or rectangle. **Explain** that the play-dough represents the earth's crust and that the students are going to produce "play-dough" faults and earthquakes. **Allow the students a few minutes to experiment** with the two play-dough pieces.

Ask a few students to share their discoveries with the class.

Guide the discussion to include the following types of movement.

Divergent earthquakes: pull the two pieces of play-dough apart. ← →
Transform earthquakes: slide the two pieces of play-dough past each other. ↓ ↑
Converging earthquakes: push the two pieces of play-dough together. → ←

If the play-dough buckles, the students have formed a mountain range! If one of the pieces of play-dough slips under the other one, they have created a subduction zone.

Collect the play-dough and **thank the students** for their cooperation.

Elaboration

Show the class the map of the Texas Coastal Plain, Balcones Fault Zone, and the West Austin Hill Country located under the "What and Why" tab. **Explain** that faulting occurred in Central Texas millions of years ago, when the coastal plains to the east bent downward while the more stable central Texas interior of the Llano Uplift remained relatively stable.

Share the following facts from the FAQ tab**.**

-How old is the faulting in Central Texas?
We don't know the exact age of Balcones faulting, but we are fairly sure that major movement along the fault occurred between 20 and 25 million years ago during the Miocene Period. See time scale, (PDF).

-How long did it last?
The faulting probably lasted several million of years, with approximately 700 to 1,000 feet of uplift occurring in numerous tiny steps.

-Did the faulting create earthquakes?
Probably many earthquakes rocked the Austin area, with movement occurring along the fault, much in the same way that active faults in California create earthquakes today.

-Can the Balcones fault still move and can it still create earthquakes?
The Balcones fault has not moved in recorded history, but this does not mean that it could not move again! Some think that the fault did move during the early Pleistocene, just over a million years ago. Also, two small earthquakes in the last 130 years (1893 and 1902) may have been caused by small movements along the Balcones fault.

Evaluation

Ask the students to predict how many earthquakes occur worldwide each year. **Explain** that while "big" earthquakes are fairly rare there are many earthquakes every year. **Ask** a student to describe what a fault is. **Ask** a student to describe how faults and earthquakes are linked.

Number of Earthquakes Worldwide for 2000 - 2005 Located by the US Geological Survey National Earthquake Information Center

Descriptor	Magnitude	Average Annually
Great	8 and higher	1
Major	7 - 7.9	17
Strong	6 – 6.9	134
Moderate	5 – 5.9	1319
Light (estimated)	4 – 4.9	13,000
Minor (estimated)	3 – 3.9	130,000
Very minor (estimated)	2 - 2.9	1,300,000
Based on observations since 1900		

Reference: http://neic.usgs.gov/neis/eqlists/eqstats.html