



## Earthquake Country Los Angeles

### Lesson Guide

With Suggested Connections to:

Science and Social Studies  
Language Arts  
Map Studies  
Mathematics  
Interdisciplinary Units

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#### Introduction:

Welcome to the *Earthquake Country Los Angeles (ECLA)* lesson guide. This guide may be used to enhance your lesson planning in your classroom, museum, community center, and many more learning environments.

Southern California is a vast natural laboratory where new discoveries about earthquakes are happening every day. Join Dr. Pat Abbott and the Southern California Earthquake Center in an introduction to this natural laboratory. ECLA can serve as a jumping off point for a variety of explorations into the fascinating world of earthquakes including investigations about earthquakes in other parts of the world.

The Southern California Earthquake Center (SCEC) is a multidisciplinary research and education community of over sixty institutions worldwide.

SCEC's mission is to gather new information about earthquakes in Southern California, combine knowledge into a comprehensive understanding of earthquake phenomena, and communicate this understanding to increase earthquake awareness, reduce economic losses, and save lives.

Earthquake readiness is a key message for learners of all ages. For information and extensive resources about earthquake readiness please visit the **Dare to Prepare!** website at: [www.daretoprepare.org](http://www.daretoprepare.org)

#### ECLA Educator Kits:

The ECLA Educator Kit includes an ECLA DVD, a book about plate tectonics, an educational resource CD, maps, and many other items. It is available for purchase from SCEC at a nominal cost. An online version of the Educator Kit including online access to the entire video is available cost free.

To access the free online kit and get ordering information for the DVD kit please visit: [www.scec.org/education/](http://www.scec.org/education/) and click on the *Earthquake Country Los Angeles Video Online Kit* link.



“Geologic history is a control on human history.” - Dr. Patrick L. Abbott, Host

## Video Overview

*Earthquake Country Los Angeles* consists of ten segments. Each segment varies in length (from three to five minutes). The segments are short enough for series of compact lessons.

The ten chapters of the video are:

1. Introduction
2. Plate Tectonics
3. San Andreas Fault
4. Strike-Slip Faults
5. Thrust Faults
6. Northridge Quake
7. Seismic Waves
8. Reducing Your Losses
9. Conclusion
10. Credits

## Suggestions for Science and Social Studies

1. Prior to showing the video, ask students what they know (or what they think they know) about the topic. Using brainstorming strategies, record their ideas on chart paper without comment. Then ask them to think of questions they have about the topic. Record this list on chart paper, too. You may generate your own questions before you show the video but if you ask students to generate questions, you will increase their attention.

2. After showing the video, review the list of what students thought they knew. Encourage students to add ideas and to delete or correct ideas they know now are incorrect.

3. Allow time for students to work in small groups to write summaries. Invite groups to share their summaries and compare the important ideas identified by different groups.

4. Look at the list of questions. Ask students to put a check by the questions that were answered by the video. Discuss how the video answered the questions.

5. Invite students to add questions raised by watching the video.

## Sample Questions

Process	Sample Questions
Starting the inquiry process	-Where do earthquakes occur? -What happens during an earthquake?
Observing things using senses and tools	-What does it feel like when there is an earthquake? -What happens to buildings during earthquakes?
Comparing and classifying characteristics of objects and events	- What different types of faults are there? - What kinds of waves are produced during an earthquake?
Ordering objects on a scale based on characteristics	-What is the magnitude scale? -How do earthquakes of different sizes compare? -How do different types of structures respond to earthquakes?
Identifying and describing relationships and interactions	- How is the topography of Los Angeles explained using plate tectonics? -What happens to earthquake (seismic) waves when they pass through soft sediments?
Inferring conclusion based on evidence and reasoning	- Can you identify the earthquake fault types based on geological evidence? - How can you better prepare your home for an earthquake?
Sharing information with others	- What did you learn? - How can you share what you learned using pictures, formulas, graphs or text in a presentation, discussion or report?

For middle school students doing science or social studies involves the process of observing, sequencing, comparing, classifying, relating, inferring and communicating.

An alternate strategy uses the video to focus on note taking.

## Skills

1. Have students prepare a notebook or summary sheet with the title of the video and the date. Engage them in a discussion of what they think main idea will be. Alternatively, give them learning objectives from your program of studies (or standards) that motivated your use of the video.

2. Stop the film at three to five pre-selected places. During each pause, have students write a summary of what they saw or learned in that segment of the video.

3. After viewing the video, allow the students a few minutes of silence to organize their thoughts and to write three to five sentences that describe what they learned from the video.

## Famous Earthquakes Mentioned in the Video

1857 - Fort Tejon earthquake  
 1906 - San Francisco earthquake  
 1925 - Santa Barbara earthquake  
 1971 - San Fernando earthquake  
 1987 - Whittier Narrows earthquake  
 1994 - Northridge earthquake

## Suggestions for Language Arts

### Reading Improvement

The topics in the video are intended to be of high interest. Use them to entice students to read magazine and newspaper articles, check out books from the library, or search the Internet for additional information. This focused approach may be successful in motivating the reluctant reader, too.

### Creative Writing

This activity encourages creative thinking and gives students practice in persuasive writing.

Challenge students to think of a video they would like to see. Encourage discussion in groups to get a wide range of ideas. The topics covered in *Earthquake Country Los Angeles* provide a good starting point.

- Have each student select one idea and outline a video.

- Challenge the student to write a paper (two pages typed) to convince Pat Abbott to produce a video on that topic.

- Remind them to consider the best grade level for the content, what students would learn, and why the video would appeal to a large range of students.

- Use writer workshops so students can critique, edit, and revise their papers.

## Vocabulary List

The following terms are in the video and may require further explanation.

Acceleration  
 Amplitude  
 Asphalt  
 Asthenosphere

Basin  
 Block  
 Blind thrust fault  
 Brittle movements

Carbon-14 dating  
 Coal  
 Cripple wall

Earthquake  
 Energy

Failure  
 Frequency  
 Friction

Geothermal energy  
 Geologic time  
 Geology

Lava  
 Lifelines  
 Lithosphere

Magma  
 Magnitude  
 Megapolis  
 Mountains  
 Mud  
 Mudstone  
 Mud pots  
  
 Natural gas  
  
 Obsidian  
 Oil  
  
 Petroleum geology  
 Pitch  
 Plate collisions  
  
 Radioactive dating  
 Rayleigh wave  
 Reservoir  
 Ridge  
 Rigid brick and mortar construction  
 Rosin  
 Rupture  
  
 Sand  
 Sandstone  
 Sediment  
 Seismic waves  
 Shear strength  
 Stress  
 Structural damage  
  
 Tectonics  
 Tectonic plates  
 Topography  
 Topsoil  
 Thrust fault  
 Trench  
 Trough  
 Triggering of earthquakes  
 Tsunami  
  
 Vibration  
 Volcanic domes  
 Volcanic rock  
 Volatile

## Suggestions for Map Studies

Many of the topics in *Written in Stone: Earthquake Country - Los Angeles* focus on different areas of Southern California. The following provides an opportunity to engage students in studying maps. There is a place name list at the end of this lesson guide.

### Geography

1. Using a map or globe, locate the area or areas in the video; identify the cities, mountains, highways and other features discussed in the video.

2. Use map keys to help find physical geographic information that includes altitude, climate, ecological region, and predominant landforms. Discuss how these are similar or different from where the student lives. What is the relationship between the geology of the region and the content of the video?

3. Find information that tells about the region's climate and geology. How is the information connected to the content of the video?

### Place Name List

#### Cities/Towns:

Alamo Heights  
 El Centro  
 Hollywood  
 Los Angeles  
 Méxicali  
 Northridge  
 Palmdale  
 Pasadena  
 San Diego  
 San Bernardino  
 San Francisco  
 Wrightwood

**Mountains/Hills/Valleys:**

Baldwin Hills  
 Bolsa Chica Mesa  
 Coast Ranges  
 Coachella Valley  
 Cheviot Hills  
 Dominguez Hills  
 Elysian Hills  
 Mecca Hills  
 Peninsular Ranges  
 Rosecrans Hills  
 San Bernardino Mountains  
 San Fernando Valley  
 San Gabriel Mountains  
 Santa Monica Mountains  
 Santa Susana Mountains  
 Sierra Nevada Mountains  
 Signal Hill  
 Transverse Ranges (western and eastern)

**Faults and Related Structures:**

Big Bend  
 Elysian fault  
 Elsinore fault  
 Hollywood Santa Monica fault zone  
 Newport-Inglewood fault zone  
 Palos Verdes fault zone  
 Sierra Madre-Cucamonga fault zone  
 San Andreas fault  
 San Clemente fault  
 San Jacinto fault  
 Santa Susana-Northridge fault zone

**Highways/Streets:**

Hollywood Boulevard  
 Interstate 5  
 Interstate 10  
 Interstate 15  
 Interstate 215  
 Rodeo Drive  
 Sunset Boulevard

**Tectonic Plates:**

North American Plate  
 Pacific Plate

**Points of Interest:**

Cajon Pass  
 Cape Mendocino  
 Coronado Islands  
 The Hollywood Sign  
 La Brea Tar Pits  
 Obsidian buttes (Salton buttes lava domes)  
 Palos Verdes Peninsula  
 Salton Sea  
 San Clemente Island  
 San Diego State University (SDSU)

University of California Santa Barbara (UCSB)  
 Vincent Thomas Bridge

**Regions:**

Baja California  
 Great valley  
 Gulf of California  
 Los Angeles basin  
 Mojave desert  
 North America  
 Santa Barbara channel  
 Western coast of the United States

**States/Countries:**

Alaska  
 United States of America  
 México (Los Estados Unidos de)  
 Baja California Norte  
 Baja California Sur

## Suggestions for Mathematics

Use the map key and measurements made with string or flexible tape measure to determine the size of the region.

- What is the approximate distance between a location in the video and the student's school?

- Using a scale such as kilometers to centimeters, estimate how long it would take to reach the destination by car (at 88 kph) or airplane (800 kph).

- Estimate how many people live in the region. To determine population density for the area, divide the number of people in the area by the size of the area. Do you think this is useful information? Explain your answer

## Suggestions for Interdisciplinary Units

The topics in *Written in Stone: Earthquake Country - Los Angeles* lend themselves to interdisciplinary or thematic units. Depending on the age of your students and your curriculum focus, a unit based on this film could last three to five days, or longer if necessary.

### Planning

Students learn best when they can answer questions, discuss and debate issues, and ask “what if?” In particular, role-playing and identifying issues or concerns spark interest and curiosity. Your task is to organize a value-free multidisciplinary unit that gives students the opportunity to develop conclusions based on evidence. This will require working with students to develop a project and a scoring rubric to evaluate it.

For a science unit, you may include earthquake waves, local geology, structural reinforcement, personal community safety or the effect of technology on society.

For a social studies unit, you may include differences in the interpretation of historical events (e.g. The Great San Francisco Earthquake of 1906); earthquake mythology; positive and negative views of expansion in earthquake prone regions worldwide; contributions of different members of society (scientists, engineers, first responders); or the influence of science and engineering on modern civilization.

It is very likely that many of your students or their families experienced an earthquake in another country. An interesting activity combining language arts and social studies is to have the student conduct a short interview of the family members who experienced the earthquake. Oral history is a vital component of social studies.

### Teaching

A few days before you begin the unit, introduce the topic to your class. Invite students to bring in pictures, books or other items from home. Announce the day you will begin the unit, establish a place where those items can be displayed safely, and outline a process for presenting and sharing those items.

1. Create a KWL chart. Engage students in brainstorming what they know, followed by what they want to learn. Remind students that they should not comment on the contributions of others. Evaluation, refinement and reflection take place later.
2. Show a video segment to introduce the content.
3. After discussing the video segment, ask students to think about issues raised in the video. Allow students several minutes to test their ideas in small groups. Then invite each group to formalize a question, issue or concern stemming from the video. List these for further conversation.
4. Use the activities included with the resource kit to work on vocabulary and main ideas in the video. Invite students to consider other issues that arise while reading, writing, and thinking creatively.
5. Return to the list of concerns or issues. Are any suitable as topics for research, debate, or point of view role-playing exercise?
6. Allow time for the class to agree on a question or statement that will guide the rest of your unit. Invite students to list the people who would be involved in a debate. This list may grow as students talk with their families.

For example, consider the allocation of money to design better structures to resist earthquakes.

Those involved could include a public health nurse who sees the budget cut, a scientist who seeks an opportunity to study a fault in Los Angeles, a taxpayer worried about less take-home pay, or an engineer who sees increased income from her company's growth.

In social studies, consider aspects of past earthquakes that were positive (resulted in better building codes) and negative (loss of life). Those involved could be a firefighter, a shop owner, school principal, mayor, and an engineer.

7. Work with groups to help students choose role. Make sure that at least three students prepare each role so they can work together and compare what they learn.

8. For the rest of the unit, each student should be encouraged to learn as much as possible about how the role was influenced by the topic. They should also learn how that role contributed or hindered progress. Encourage students to use resources from the library and the Internet to learn more. Students may create costumes to wear during role-playing.

Be sure to include time for students to share information about items brought from home.

9. Conclude by having the student prepare one of the following:

- Multimedia presentation
- Video that shows a point of view
- A role-playing activity demonstration for other classes
- A debate between representatives from opposing sides.

## Suggested Websites:

American Red Cross  
[www.redcross.org/](http://www.redcross.org/)

Automobile Club of Southern California  
[www.aaa-calif.com/](http://www.aaa-calif.com/)

California Earthquake Authority  
[www.earthquakeauthority.com/](http://www.earthquakeauthority.com/)

California Geological Survey  
[www.consrv.ca.gov/CGS/](http://www.consrv.ca.gov/CGS/)

California Integrated Seismic Network  
[www.cisn.org/](http://www.cisn.org/)

California Office of Emergency Services  
[www.oes.ca.gov/](http://www.oes.ca.gov/)

California Seismic Safety Commission  
[www.seismic.ca.gov/](http://www.seismic.ca.gov/)

California Seismic Safety Commission  
Homeowner's And Commercial Property Owner's  
Guides to Earthquake Safety  
[www.seismic.ca.gov/sscpub.htm](http://www.seismic.ca.gov/sscpub.htm)

Federal Emergency Management Agency  
[www.fema.gov](http://www.fema.gov)

Did You Feel It? - Report It!  
[earthquake.usgs.gov/eqcenter/dyfi.php](http://earthquake.usgs.gov/eqcenter/dyfi.php)

Earthquake Country Alliance:  
[www.earthquakecountry.info](http://www.earthquakecountry.info)

Insurance Information Network of California  
[www.iinc.org/](http://www.iinc.org/)

Landslide and Liquefaction Maps for Southern  
California  
[gmw.consrv.ca.gov/shmp](http://gmw.consrv.ca.gov/shmp)

Recent Earthquakes In Southern California  
[www.data.scec.org/recenteqs.html](http://www.data.scec.org/recenteqs.html)

San Diego State University Department of  
Geological Sciences  
[www.geology.sdsu.edu/](http://www.geology.sdsu.edu/)

Southern California Clickable Fault Map  
[www.data.scec.org/faults/faultmap.html](http://www.data.scec.org/faults/faultmap.html)

Southern California Earthquake Data Center  
[www.data.scec.org/](http://www.data.scec.org/)

Southern California Earthquake Center  
[www.scec.org](http://www.scec.org)

Southern California Shake Maps  
[www.cisn.org/shakemap/sc/shake/](http://www.cisn.org/shakemap/sc/shake/)

United States Geological Survey Earthquake  
Hazards Program:  
[earthquake.usgs.gov](http://earthquake.usgs.gov)

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Credit: Southern California Earthquake Center, an NSF+USGS Center

## Appendix:

### ECLA Alignment with State of California Content Standards

*It is important to maintain the spirit of inquiry by focusing the teaching on questions that can be answered by using observational data, the knowledge base of science, and processes of reasoning.* (NSES - National Research Council, 1996).

### Alignment with California Science Content Standards

**Grade 5:**

6. a – i

**Grade 6:**

1. a – g 2. d 3. a 4. c 7. a – h

**Grade 7:**

4. a – g 7. a - e

**Grade 8:**

1. a – f 2. d,e,f 8. a – d 9. a – g

Source:

Science:

[www.cde.ca.gov/be/st/ss/scmain.asp](http://www.cde.ca.gov/be/st/ss/scmain.asp)

Science Framework:

[www.cde.ca.gov/re/pn/fd/sci-frame-dwnld.asp](http://www.cde.ca.gov/re/pn/fd/sci-frame-dwnld.asp)

### State of California Science Standards and Framework

The ECLA video and Educator Resource Kit supports the content standards mandated for California public schools.

The creators of this kit provide these materials as means to enhance curriculum, instruction, and professional development.

### Alignment with Other Content Areas

For information about alignment with other content areas please consult the State of California Department of Education website.

Math:

[www.cde.ca.gov/ci/ma/cf/](http://www.cde.ca.gov/ci/ma/cf/)

History-Social Studies:

[score.rims.k12.ca.us/sub\\_standards/cal\\_hist\\_socsci\\_frame\\_stan.html](http://score.rims.k12.ca.us/sub_standards/cal_hist_socsci_frame_stan.html)