



Earthquake Country Los Angeles

Lesson Guide

With Suggested Connections to:

Science and Social Studies
Language Arts
Map Studies
Mathematics
Interdisciplinary Units

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

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/ 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/

Automobile Club of Southern California
www.aaa-calif.com/

California Earthquake Authority
www.earthquakeauthority.com/

California Geological Survey
www.consrv.ca.gov/CGS/

California Integrated Seismic Network
www.cisn.org/

California Office of Emergency Services
www.oes.ca.gov/

California Seismic Safety Commission
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

Federal Emergency Management Agency
www.fema.gov

Did You Feel It? - Report It!
earthquake.usgs.gov/eqcenter/dyfi.php

Earthquake Country Alliance:
www.earthquakecountry.info

Insurance Information Network of California
www.iinc.org/

Landslide and Liquefaction Maps for Southern
California
gmw.consrv.ca.gov/shmp

Recent Earthquakes In Southern California
www.data.scec.org/recenteqs.html

San Diego State University Department of
Geological Sciences
www.geology.sdsu.edu/

Southern California Clickable Fault Map
www.data.scec.org/faults/faultmap.html

Southern California Earthquake Data Center
www.data.scec.org/

Southern California Earthquake Center
www.scec.org

Southern California Shake Maps
www.cisn.org/shakemap/sc/shake/

United States Geological Survey Earthquake
Hazards Program:
earthquake.usgs.gov

Credits:

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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

Science Framework:

<http://www.cde.ca.gov/ci/sc/cf/>

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/

History-Social Studies:

http://score.rims.k12.ca.us/sub_standards/cal_hist_socsci_frame_stan.html