EarthComm: Chapter 3: Earthquakes and Your Community

Performance Task: In the Chapter Challenge the students' community has asked their school to assess the earthquake hazard in their area and to find ways to reduce any damage. They have been asked to present these plans to the public as a public service message (video or audio) and in a brochure. The message should address the following items: (1) educate the public about why earthquakes occur, (2) explain how earthquakes transmit energy, (3) explain the effects associated with earthquakes, and (4) suggest ways to reduce the damage caused by earthquakes.

Activity	Description	Earth Science Principles	Durable Materials (class of 40 students)	Consumable Materials (class of 40 students)	Instructional Map
Getting Started, Scenario, Chapter Challenge and Assessment Criteria	Students answer an open-ended question about the causes and effects of earthquakes. Students read a description of the 1906 San Francisco Earthquake and then begin planning their Chapter Challenge tasks. Students develop the criteria for assessing their Chapter Challenge projects.		None needed		• 1 class period
Activity 1: **An Earthquake in Your Community**	Students use a model to learn how energy stored in rocks is released in the form of an earthquake. They then use Slinkys to explore the movement of earthquake waves through the Earth, and make inferences about the effects these waves may have on the Earth's surface	• Earthquakes • Earthquake or seismic waves • Epicenter and focus	• 4 Heavy duty slinkys • 20 fault block models	• Cut strips from Styrofoam cups	• 2 Class Periods • Think About It • Investigate Parts A through C, rotating in groups • Digging Deeper, #2 and 4, • Note: Question 4a should read "Can you detect any discernible difference in wave speed?"

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					• Understanding and Applying What You Have Learned" #3. • Preparing for Chapter Challenge
Activity 2: **Detecting Earthquake Waves**	Students construct a simple seismometer and then learn how to interpret seismograms to determine arrival times of the two types of seismic waves. They can then use the Internet to learn how to determine the epicenter of an earthquake.	• Seismometer • Interpreting seismograms • Using travel-time curves	• Spiral spring or thick rubber band • 1 large fishing weight • 1 sturdy box or milk crate • Stopwatch	• Piece of heavy paper • Pencil or felt-tipped marker • 10 rolls adding machine tape	• 2 Class Periods • Think About It • Investigate – Do 1 and 2 as a demo, students do steps 3-7. • Check Your Understanding, #2a and #4. • Understanding and Applying, #1a and 4a-b • Preparing for the Chapter Challenge

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Activity 3: **How Big Was It?**	Students rank the observed effects of a single earthquake to determine the earthquake's approximate origin. A web-based exercise then allows students to examine how scientists use an earthquake's amplitude to determine its magnitude	• Earthquake intensity • Effect of local geology on earthquake intensity • Earthquake magnitude		• 40 copies of Blackline Master Earthquake 3.1 Map of Eastern United States.	• 2 Class Periods • Think About It • Investigate Part A • Digging Deeper • Check Your Understanding, # 3-5 • Understanding and Applying, #1-3
Activity 4: **Earthquake History of Your Community**	Students use maps to examine and describe the distribution of earthquakes at global, regional, and local scales. By examining earthquake data, along with relationships between faults and earthquakes, students determine the potential risk for future earthquakes in their community.	• Earthquake patterns and plate tectonics • Faults • Earthquake risks	• 3 maps, "This Dynamic Planet" • 10 State Geologic Maps	• 10 copies of Blackline Master Earthquakes 4.2 Earthquake Risk for the United States	• 1 Class Period • Think About It • Investigate – Do as a teacher led activity but with students having maps; look at question 2 and explain within the activity. • Digging Deeper • Check your Understanding, #1,2 • Understanding and Applying, #1 and #3 as an extension, connect to Belmont site.
Activity 5: **Lessening Earthquake**	Students construct a map of earthquake intensities based on recorded observations to determine the approximate origin of the earthquake, and investigate how the effects	• Isoseismal map • Earthquake hazards • Tsunami	• Local topographic map • Copy of municipal building code for your		• 1-2 Class Periods • Think About It • Investigate 2 a-d, 3, do step 5 using local seismic hazard map

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Damage	felt vary in relation to the epicenter. Students then look at the geologic changes and destruction associated with earthquakes around the world, and finally assess the earthquake risks of their won community and how to prepare themselves during an earthquake.	• Earthquake preparedness	community		from web. • Check Your Understanding • Understanding and Applying, #1.
Activity 6: **Designing "Earthquake -Proof" Structures**	Students build models to investigate factors that make buildings stable or unstable during earthquakes. They interpret photos to gain insights into damage caused by real earthquakes. They also use a model to understand how wave frequency influences vibrations of structures. They think about how the buildings in their community would respond in an earthquake.	• During of shaking • Direction of motion • Influence of underlying materials on behavior of structures • Resonance	• Two square pieces of wood • 30 cm thin metal strip • Small C-Clamp • Stopwatch	• Lump of modeling clay	• 1-2 Class Periods • Think About It • Investigate • Check Your Understanding • Understanding and Applying
Chapter Challenge	Students prepare and present their Chapter Challenge projects.				• Report Preparation • Presentations