

This is a study guide to help you to organize your notes based on the Objectives for this Module. This is not graded and is provided only as a study aid. To use it, fill in the table. Box 1 will ask you to redefine the terms or explain the concept. Box 2 will ask you to give an example or try to apply the concept to a new situation. Box 3 will ask you to provide information about where you can find this information. Provide enough information in this box for you to be able to use this box as a reference to finding the information again.

Describe an earthquake and explain how they are measured (magnitude and Mercalli, including shake maps).

<p>Draw diagram 6.1 from your textbook in the box below. Define earthquake. What causes shaking? Give examples of earthquakes (locations, magnitude, and date) from the module.</p> <p style="text-align: center; font-size: 48px; color: lightgray;">1</p>	<p>Where is this information located?</p> <p style="text-align: center; font-size: 48px; color: lightgray;">3</p>
<p>Explain the Magnitude scale. How frequent are different magnitude earthquakes? How is it related to a seismograph?</p> <p style="text-align: center; font-size: 48px; color: lightgray;">1</p>	<p>Where is this information located?</p> <p style="text-align: center; font-size: 48px; color: lightgray;">3</p>
<p>Explain the Mercalli Intensity Scale. Give a listing of the intensity ratings. How are these related to a Shake Map?</p> <p style="text-align: center; font-size: 48px; color: lightgray;">1</p>	<p>Where is this information located?</p> <p style="text-align: center; font-size: 48px; color: lightgray;">3</p>

Explain the earthquake cycle, how it relates to plate tectonics, and scientific knowledge.

Draw a diagram of the earthquake cycle.	Where is this information located?	
1	3	
Define the Theory of Plate Tectonics.	Do the plates have to move in order for earthquakes to exist? Why or why not?	Where is this information located?
1	2	3
Briefly explain how scientific knowledge is created.	Why is the Earthquake Hypothesis a hypothesis and not a theory?	Where is this information located?
1	2	3

Understand the importance of rock strength, strain, and rock rupture (breaking) as it relates to earthquakes.

Explain how rock strength is related to strain.	Where do rocks break? What is breaking when an earthquake happens?	Where is this information located?
1	2	3

Describe the effect of different earth materials to the movement of earthquake waves and the resulting effect on damage to human structures.

Describe the following seismic waves.	Generally, how do seismic waves cause damage?	Where is this information located?
<p>P-waves</p> <p style="text-align: center;">1</p> <p>S-waves</p> <p>R-waves</p> <p>L-waves</p>	<p style="text-align: center;">2</p>	<p style="text-align: center;">3</p>
<p>Explain material amplification. What rocks attenuate seismic waves? What rocks amplify seismic waves?</p>	<p>Explain Indiana and California's rock setting. How do they affect wave propagation? How does this affect directivity of seismic waves?</p>	<p>Where is this information located?</p>
<p style="text-align: center;">1</p>	<p>Indiana –</p> <p style="text-align: center;">2</p> <p>California –</p>	<p style="text-align: center;">3</p>
<p>Explain wave frequency and how it relates to resonance.</p>	<p>Explain why different height buildings are susceptible to damage based on the frequency of the seismic waves. Is it better to be in a tall or short building during an earthquake? What else matters?</p>	<p>Where is this information located?</p>
<p style="text-align: center;">1</p>	<p style="text-align: center;">2</p>	<p style="text-align: center;">3</p>
<p>Explain ground acceleration.</p>	<p>How does this affect buildings? How is it measured?</p>	<p>Where is this information located?</p>
<p style="text-align: center;">1</p>	<p style="text-align: center;">2</p>	<p style="text-align: center;">3</p>

List and describe the major natural and man-made effects of earthquakes (how earthquakes cause damage).

Describe the following effects.	Describe how the following have made the natural effects even worse (creating more hazards). Why are earthquakes in poor areas so much more devastating?	Where is this information located?
<p>shaking and ground rupture –</p> <p style="text-align: center; font-size: 2em; color: lightgray;">1</p> <p>liquefaction –</p> <p>landslides –</p> <p>fires –</p> <p>disease –</p> <p>groundwater effects –</p> <p>changes in elevation –</p>	<p>overpopulation –</p> <p style="text-align: center; font-size: 2em; color: lightgray;">2</p> <p>fire –</p> <p>falling debris –</p> <p>structure collapse –</p> <p>Why are poorer areas more affected?</p>	<p style="text-align: center; font-size: 2em; color: lightgray;">3</p>

Indicate geologically where earthquakes occur and where on Earth the major risks are.

Look at one of the many maps linked to in the module. Where do earthquakes occur?	Why do they occur in these areas? What tectonic settings result in earthquakes?	Where is this information located?
1	2	3

Compare Indiana and California in terms of earthquake risk and shaking.

California	Indiana	Where is this information located?
<p>Tectonic setting –</p> <p>Depth of Focus –</p> <p>Frequency of earthquakes –</p> <p>Rocks at depth –</p> <p>Rocks at surface –</p> <p>Why would you want to live here (in terms of earthquake risk)?</p> <p>Why wouldn't you?</p>	<p>Tectonic setting –</p> <p>Depth of Focus –</p> <p>Frequency of earthquakes –</p> <p>Rocks at depth –</p> <p>Rocks at surface –</p> <p>Why would you want to live here (in terms of earthquake risk)?</p> <p>Why wouldn't you?</p>	<p>3</p>

Relate case studies of major earthquakes to principles and terms.

Describe the case study.	What caused the earthquake in terms of tectonic and rock setting?	Describe the earthquakes that you would expect here. Would you expect them to result in damage? Why or why not?
New Madrid Seismic Zone		
Anatolian Fault Zone		

Describe earthquake.	What caused the majority of the damage and loss of human life?	Could this have been prevented or predicted? How?
Indonesian Earthquake / Indian Ocean Tsunami 2004		
Haiti Earthquake 2010		