



Teacher's Pre- and Post-Program Visit Guide

Program	Forces of Nature: Seismology
Grade Level	Grades 4-8
Time	50 minutes
Location	Museum of Natural History & Science

Program Objectives

- Students will simulate and observe the natural forces of earthquakes, tsunamis and volcanoes through lab experiments.
- Students will cooperate in teams to explore variables through simple experiments, form general hypotheses about outcomes, record and report their results.
- Students will be introduced to convection as a variable in the buildup of an earthquake or a volcano.

Program Description

Earthquakes, volcanoes and tsunamis are more common than you might think. Explore the forces at work to create these catastrophic events. Students will work in teams to create their own hypothesis' through hands-on experimentation.

Major Vocabulary and concepts

volcano	variable	earthquake
hypothesis	seismic waves	controlled experiment
aftershocks	P and S waves epicenter	mantle
core	crust	

Ideas for pre-visit activities

- At school, have students explore the computer simulations of these natural disasters at National Geographic *Forces of Nature* web site:
www.nationalgeographic.com/forcesofnature
- Go over the vocabulary and concepts above.
- Research, read and discuss local historical or recent personal accounts of earthquakes, tsunamis, and volcanoes.
- Compare maps of where these phenomena occur around the world.

Ideas for post-visit activities

- See the OMNIMAX® film *Forces of Nature* or *Ring of Fire*.
- In your classroom, continue one of the experiments from the program or create your own test to research the hypotheses students' formed about a force of nature. How will you set up a controlled experiment to test your hypothesis? Carry out the experiment recording the data and then analyze your results. Do you need another series of tests or a different test to confirm your results?
- Invite a geologist to visit and speak in your classroom. Prepare questions for the guest to answer.

Standards

Ohio: Earth & Space Science, Science & Technology, Scientific Inquiry, Scientific Ways of Knowing

Kentucky: Earth & Space Science, Scientific Inquiry, Applications & Connections

Indiana: The Physical Setting, The Mathematical World, The Nature of Science & Technology, Scientific Thinking, Common Themes

Related Exhibits and Features

- OMNIMAX film *Forces of Nature*
- OMNIMAX film *Ring of Fire*

Resources

- National Geographic *Forces of Nature* web site:
www.nationalgeographic.com/forcesofnature
- USGS (United States Geological Survey) Exploring Earth Hazards:
http://interactive2.usgs.gov/learningweb/explorer/topic_hazards.htm
- *Volcano: The Eruption*, by Patricia Lauber
- *Volcanoes and Earthquakes*, by Susanna Van Rose
- *Earthquakes*, by Franklyn Mansfield Branley
- *Volcano: The Eruption and Healing of Mount St. Helens*, by Patricia Lauber
- *Forces of Nature: The Awesome Power of Volcanoes, Earthquakes, and Tornados*, by Catherine O'Neill Grace