



Teacher's Pre- and Post-Program Visit Guide

Program	Forces of Nature
Grade Level	4 - 8
Time	90 minutes
Location	Museum of Natural History & Science Classrooms

Program Objectives

- Students will simulate and observe the natural forces of thunderstorms, tornadoes, hurricanes, 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 and as the driving force behind storms.

Program Description

Hurricanes, tornadoes, volcanoes and earthquakes. Take a closer look at how these monster storms and earth shattering events form and how scientists study them.

Major Vocabulary and concepts

volcano	variable	earthquake
hypothesis	seismic waves	controlled experiment
seismologist	tornado	hurricane
convection	meteorologist	thunderstorms

Suggested things to do in your classroom before the program

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

Suggested things to do after the program

- At the Museum, see Omnimax® film, *Forces of Nature*, *Tornado Alley* 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 or a meteorologist to visit and speak in your classroom. Prepare questions for the guest to answer.
- See if a person who has been through a tornado or hurricane can speak to the class about their encounter. Write a story, poem, etc. using the images and emotions they encountered.

Curriculum and Standards Addressed

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
- Omnimax® film: *Storm Chasers*
- Omnimax® film: *Tornado Alley*

Resources

- National Geographic *Forces of Nature* website: 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 By Catherine O'Neill Grace, 2004 National Geographic Society
- NOAA-National Oceanic and Atmospheric Administration website: www.noaa.gov/
- Tornadoes by Seymour Simon
- Hurricane and Tornado (Eyewitness Books Series), by Jack Challoner
- Hurricanes by Seymour Simon