

- There are definite physical patterns and connections on Earth, such as the frequent seismic activity found in the “Ring of Fire” in the Pacific. However, earthquakes can occur outside of plate boundaries. Ask students to research the geological causes of what are known as “intraplate” quakes, list historical examples of these quakes (such as the one that devastated the city of New Madrid, Missouri in 1811–12) and discuss the likelihood of this type of seismic activity occurring in these geographic areas in the future. More information may be found at the following United States Geological Survey web site:  
[neic.usgs.gov/neis/eq\\_depot/usa/1811-1812.html](http://neic.usgs.gov/neis/eq_depot/usa/1811-1812.html)
- A census database is filled with all kinds of information about the population of a place. Break students into small groups and ask each group to research the most recent world population data available. Utilizing this information, some groups may create accurate population distribution maps and other groups may develop accurate population density maps for regions and countries in the Americas, Europe, Asia and Oceania. Each group may also create lists of the most populated countries and the most densely populated countries in the world. Excellent research material may be found at the following web site:  
[sedac.ciesin.columbia.edu/plue/gpw/index.html?main.html&2](http://sedac.ciesin.columbia.edu/plue/gpw/index.html?main.html&2)
- In 2002, the NASA Earth System Science Pathfinder program helped launch the GRACE mission — two satellites that will reveal crucial information about Earth and its atmosphere. For example, over the course of the five-year mission, the satellites will help scientists determine changes in the mass of ice sheets — a key indicator of climate change. Ask students to read the GRACE mission’s brochure, and write summaries of how GRACE hopes to help scientists better understand Earth’s climate and future climate change. The brochure may be found at the following web site:  
[www.csr.utexas.edu/grace/publications/brochure/](http://www.csr.utexas.edu/grace/publications/brochure/)

### Suggested Internet Resources

Periodically, Internet Resources are updated on our web site at [www.LibraryVideo.com](http://www.LibraryVideo.com)

- [www.nationalatlas.gov/](http://www.nationalatlas.gov/)  
The United States Department of the Interior’s “National Atlas of the United States of America” provides mapmaking tools and a variety of dynamic maps and offers informative articles on the geography of America.
- [vulcan.wr.usgs.gov/Glossary/PlateTectonics/description\\_plate\\_tectonics.html](http://vulcan.wr.usgs.gov/Glossary/PlateTectonics/description_plate_tectonics.html)  
The United States Geological Survey presents detailed descriptions and a wide variety of maps to support geologic concepts such as plate tectonics, the “Ring of Fire” and other “hot spots.”
- [www.colorado.edu/geography/gcraft/notes/gps/gps\\_f.html](http://www.colorado.edu/geography/gcraft/notes/gps/gps_f.html)  
The University of Colorado’s “Global Positioning System Overview” offers a wealth of information on the many features of this satellite navigation system.
- [aa.usno.navy.mil/faq/docs/world\\_tzones.html](http://aa.usno.navy.mil/faq/docs/world_tzones.html)  
The U.S. Naval Observatory provides a “World Time Zone Map.”

### Suggested Print Resources

- Erickson, Jon. *Making of the Earth: Geological Forces that Shape our Planet*. Facts on File, New York, NY; 2000.
- Olesky, Walter. *Mapping the Seas*. Franklin Watts, New York, NY; 2002.
- Ross, Val. *The Road to There: Mapmakers and their Stories*. Tundra Books, Plattsburgh, NY; 2003.

#### TEACHER'S GUIDE

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#### TITLES IN THIS SERIES

- ENVIRONMENT & SOCIETY
- GEOGRAPHIC PERSPECTIVES: THE UNITED STATES OF AMERICA
- HUMAN SYSTEMS
- PHYSICAL SYSTEMS
- PLACES & REGIONS
- THE WORLD IN SPATIAL TERMS

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## THE WORLD IN SPATIAL TERMS

Grades 5–9

The study of geology brings together various dimensions of Earth, so that we can increase our knowledge of both the physical and human processes that shape the planet. Enhancing geographic literacy with an in-depth analysis of the spatial aspects of human existence provides students with insight into some of the most challenging questions facing Earth. As world population surges past the six billion mark, as globalization intensifies social and economic interconnections and as the physical environment becomes more and more threatened, *Geography for Students* offers students a unique opportunity to grasp their increasingly complex world and gain a better understanding of their place in it.



## Program Summary

At a glance, the world seems to be very disorganized and chaotic. However, when we study Earth closely, we begin to see that there are definite patterns and associations that exist in the planet's physical and human systems. Using a variety of tools such as maps, databases and aerial photography, geographers can gather a whole range of information that provides a complex, yet understandable, snapshot of the vast interconnected world around us. Geographers also utilize modern technologies such as Global Positioning Systems and Geographic Information Systems, tools that operate behind the scenes to make people's lives better and easier. Individuals use internal maps based on their own knowledge and personal experiences to navigate from place to place and to make their geographic region a more comprehensible place.

## Vocabulary

**geography** — The study of the relationship between people and places. Geography includes the landforms, climate, vegetation, population and natural resources of a place.

**Ring of Fire** — A geographic zone around the Pacific Ocean where there is frequent volcanic and seismic activity caused by shifting tectonic plates.

**time zone** — One of the 24 divisions of the world of approximately 15 degrees of longitude where everyone sets his or her clock to show the same time.

**aerial photography** — Photographs that are taken at high altitudes from an aircraft or satellite that help locate and record site positions for mapping purposes.

**database** — A collection of systematically arranged information stored on a computer, which can be easily accessed, managed and updated.

**Geographic Information System (GIS)** — A computer-based system that records and stores geographic information. GIS helps geographers to answer specific questions and allows people to make informed decisions related to land-use patterns, power management, sustainable agriculture and transportation network improvements.

**Global Positioning System (GPS)** — A group of 24 orbiting satellites that can help pinpoint one's location almost anywhere on Earth.

**mental map** — A subjective map, or a picture in one's mind, that is based on personal knowledge and experiences.

**sketch map** — A map that is a written version of a subjective mental map — an individual map unique to each person.

**chronometer** — An instrument that calculates longitude at sea. It was an important invention that had a profound effect on the history of navigation and exploration. Essentially the size of a pocket watch, it was invented by Englishman John Harrison in 1761.

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**Mercator Projection** — An early map projection that was used during the Age of Exploration, which distorts land areas away from the equator.

**Robinson Projection** — A widely used map projection that has some distortions near the poles.

**Winkel Tripel Projection** — A map projection with slightly curved lines that represents Earth with minimal distortion.

**legend** — A table or list of symbols that helps explain the information contained on a map.

**cartography** — The art or science of mapmaking.

**sextant** — An instrument used in celestial navigation to determine latitude and longitude.

**Zebra Mussel** — An exotic, invasive species of mussel inadvertently brought to the United States by European ships, which wreaks havoc on freshwater ecosystems.

## Pre-viewing Discussion

- A doctor uses a stethoscope to listen to your heart. An astronomer uses a telescope to study planets and stars. What tools do geographers use to study Earth's human and physical patterns?
- Being as detailed as possible, describe the route you take from your house to your school; from school to your house; from your house to your favorite restaurant.
- Why is it important for us to have good maps? What decisions can maps help us make?

## Focus Questions

1. What is the main purpose of geography and geographers?
2. What is the nature of a spatial relationship? How do geographers study these relationships?
3. Where is the Ring of Fire? What consistent activity can be found in this region?
4. How do time zones help us organize our world? Where does one time zone end and another time zone begin?
5. Why do we study the relationship between people and the world in which they live?
6. What is the most common way to represent geographical information?
7. What is aerial photography? How does it help find basic human and physical patterns?
8. What is a database? Provide an example as it relates to geography.
9. What is GIS? Provide a concrete example of how it is used.

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10. How does GPS help people identify locations around the world?
11. What is the difference between a mental map and a sketch map?
12. What information can be derived from distribution maps?
13. How did invention of the chronometer affect the history of navigation and exploration?
14. Why do geographers use map projections?
15. Who was Karl Mollweide?
16. Why is a Mercator projection map not considered to be accurate?
17. Why is the Winkel Tripel projection map often used by map publishers?
18. What standard features do most maps have?

## Follow-up Discussion

- Geography can help determine the impact a growing population may have on a community and allow us to plan better in the case of natural disasters. Predict the impacts of a rapidly growing population on an urban area, and speculate about steps you would take as a city planner living in an area vulnerable to tropical storms.
- Because of its regular pattern of volcanic and seismic activity and its easily recognizable location on a map, the Ring of Fire is considered a perfect illustration of geographic patterns. Brainstorm additional examples of physical patterns in other parts of the world.
- Geographers study patterns of physical and human phenomena and how those phenomena are interconnected. List geographic factors that determine human settlement patterns. What factors would you consider in determining where you would like to reside in the future?

## Follow-up Activities

- By understanding volcanoes, geographers can not only help the people who are affected by volcanic eruptions, but help to plan our communities so that they are less affected by those natural hazards in the future. The volcanic Hawaiian Islands were created over a period of millions of years. Ask students to research and summarize the geologic processes that created the Hawaiian Islands, including the Loihi submarine volcano — the newest Hawaiian volcano, which will most likely form an island in many thousands of years. Students may also relate the theme of its unique location to the culture of the Hawaiian Islands. As a follow-up, ask students to identify on a map the approximately 40 other active "hot spots" that researchers have identified on Earth. Valuable research information may be found at the following web site:  
[volcano.und.edu/vwdocs/frequent\\_questions/group5\\_new.html](http://volcano.und.edu/vwdocs/frequent_questions/group5_new.html)

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