

- Describe the relief of your classroom, taking into consideration the desks, chairs and furniture in the room.
- If you were placed in an unknown location with high relief and given a topographic map of the area, explain how you would use the map to help you.
- Generate a list of the types of maps that you have seen (e.g., street maps, subway maps, treasure maps) and provide an explanation of the content and usefulness of these maps. How do these maps differ from topographic maps? When are the different types of maps most useful?

Follow-up Activities

- Students can generate their own topographic maps of a landscape that they have created. Provide groups of students with clay from which they can mold a mountain. After the mountain is completed, have students draw three rings around it, equally dividing the mountain into four segments. Students can then take fishing line and, as they hold it tightly, slice through the mountain along the lines they drew. Once the students have created four segments, they can take the bottommost and largest segment, and trace it on a sheet of paper. Repeat this process until students have traced each layer. Students will then have a topographic map!
- Provide several topographic maps from resources such as the U.S. Geological Survey (see www.usgs.gov). Encourage groups of students to analyze their maps, recording as many observations as they can (e.g. the steepest location, the flattest location, the most difficult point-to-point trek). Have groups share their results and compare their findings.
- As a class, research local landscape regions. Encourage students to find landscapes with high and low relief or landforms with unique physical features. If possible, visit several of these areas and make detailed observations of the physical qualities of these landscapes.

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.libraryvideo.com

- www.usgs.gov/education/teacher/what-do-maps-show/WDMSTGuide.html

The United States Geological Survey has a Learning Web site that contains activities and lesson plans for Earth science topics. The "What Do Maps Show" section provides a teacher's guide and activities for learning about topographic maps.

- terraweb.wr.usgs.gov/TRS/kids/VRML.html

The U.S. Geological Survey also hosts a "TerraWeb for Kids" page with Earth science activities, one of which enables kids to create their own 3-D landscape.

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- fermi.jhuapl.edu/states/states.html
This "Color Landform Atlas of the United States" Web page contains topographic and satellite maps for each state.
- www.blm.gov/education/gisactivity/index2.html
At this Web site, students can plan the ideal location for a campground in Utah by analyzing the physical features of a given area.

Suggested Print Resources

- Bramwell, Martyn. *How Maps Are Made*. Lerner Publications, Minneapolis, MN; 1998.
- Bramwell, Martyn. *Mapping Our World*. Lerner Publications, Minneapolis, MN; 1998.
- Perham, Molly and Julian Rowe. *Landscapes*. Watts, Danbury, CT; 1996.
- Van Burgh, Dana, Elizabeth N. Lyons and Marcy Boyington. *How to Teach With Topographic Maps*. National Science Teachers Association Press, Arlington, VA; 1994.

TEACHER'S GUIDE CONSULTANT

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Topography

Grades 5-8

Students in grade 5-8 classrooms possess a wide range of background knowledge. Student response to this video program is sure to be varied, so the teachers at these grades need all the help they can get! This guide has been designed to help the 5-8 science teacher by providing a brief synopsis of the program, previewing and follow-up questions, activities, vocabulary and additional resources.

Before Viewing: Extensive research tells how important it is for the teacher to discover what the students know — or think they know — about a topic, before actually starting a new unit. Therefore, after prompting discussion with the pre-viewing questions, lead your class to create an "Everything We Think We Know About..." list. You may also wish to preview key vocabulary words, and have students raise additional questions they hope will be answered.

After Viewing: Have your students share video excerpts that fascinated or surprised them, then challenge your students to prove or disprove the accuracy of the facts they put on their "Everything We Think We Know About..." list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.



Program Summary

The Earth's surface has many different physical features, called terrain or landscape, which make it appear flat in places, while bumpy in others. The topography of a given area is the way in which the terrain is configured in terms of position and elevation. There are three major kinds of landscape on the Earth's surface — mountains, plateaus and plains — which are defined by their relative elevation above sea level. Relief is the term used to describe the changes in elevation in a given region; as a result, flat plains are considered to have relatively little relief while bumpy mountains have high relief.

Mountains are one type of landscape and are defined as landforms that rise more than 600 meters (2,000 feet) above the surrounding region with fairly steep slopes. Individual mountains can be found all over the world, but mountains are often grouped into ranges, systems and belts. Mountain ranges are groups of mountains that were formed in the same way at the same time. Similar types of mountain ranges join to form mountain systems. Mountain systems and ranges together create mountain belts, like the Circum-Pacific belt, which rings the Pacific Ocean.

Rising between 600 and 1,500 meters above sea level, plateaus are another type of landscape that are lower in elevation than mountains yet higher than plains. Plateaus have a flat or sloping top with little relief. When plateaus erode, they can leave deep canyons, mesas and buttes. Mesas are table-like formations with flat tops and steep sides, while buttes are shaped similarly to mesas but on a smaller scale.

The third type of landscape, plains, are extensive areas of flat lands that usually do not rise very far above sea level. Plains are characterized by minimal relief and rich soils. There are low-elevation coastal plains and higher interior plains.

Cartographers, or mapmakers, make topographic maps that show relief in a given area. In this type of map, contour lines connect all points with the same elevation. Contour lines that are close together show steep relief, while those spread further apart show more gradual relief. Cartographers use three-dimensional aerial photography, satellites and special equipment on research vessels to create these useful and unique maps.

Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

relief — The variation or change in the elevation of land terrain.

terrain — The physical features of land.

topography — The shape of the Earth's surface and the way its physical features are arranged, especially in terms of their positions and elevations. Topography is also the art and science of re-creating the features of the Earth's surface on maps.

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landscape — The physical features of the Earth's surface found in a given region.

elevation — The height above sea level.

mountain — A landform that rises more than 600 meters (2,000 feet) above its surrounding landscape with steep slopes and a peak.

mountain range — A group of mountains that were formed in the same way at the same time

mountain system — More than one mountain range in a given area.

mountain belt — A group of mountain ranges and systems.

plateau — An extensive, raised, flat-surfaced area that has slopes or cliffs on one or more sides. Plateaus rise between 600 and 1,500 meters above sea level, extending for many miles with little relief.

mesa — A large, table-like landform that is the result of plateau erosion.

butte — A table-like landform like a mesa, but smaller in size. Buttes are also the result of plateau erosion.

plains — Areas of extensive flat land that do not rise far above sea level.

coastal plains — Areas of flat land along sea coasts that are low in elevation.

interior plains — Areas of flat land that are found inland and are usually higher in elevation than coastal plains.

cartographers — People who make maps.

topographic maps — Also called topographical, relief or contour, these maps show the topography of the land, using contour lines at regular elevation intervals.

contour lines — Markings on a topographic map that indicate the elevation of the land being represented on the map. Contour lines that are drawn closer together indicate steep slopes on the land, and lines that are farther apart represent less steep topography.

Pre-viewing Discussion

Before students generate their list of "Everything We Think We Know About..." for this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

- What is topography and how can it be mapped?
- What types of terrain have you observed in your community or through travel? Describe the types of landscape that you have seen and discuss the relief of these areas.

After the class has completed their "Everything We Think We Know About..." list, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

Focus Questions

1. What is the topography of a landscape?
2. What are the three major kinds of landscape?
3. What is the relief of a landscape?
4. What is responsible for the changes in the Earth's topography over its nearly five-billion-year history?
5. Why are topographic maps relatively accurate over time despite changes in the Earth's surface?
6. How do scientists differentiate between a mountain and other kinds of landscape?
7. How is the height of a mountain measured?
8. Explain the differences among these terms: mountain range, mountain system and mountain belt. Locate at least one example of each on a world map.
9. What effects can mountains have on the surrounding area?
10. How do plateaus differ from other types of landscape?
11. Can you identify three landforms that can result from the erosion of plateaus? Explain and describe each.
12. What are the distinguishing characteristics of plains?
13. What are two types of plains? Locate an example of each type on a map.
14. How are coastal and interior plains similar and different?
15. What are topographic maps and how are they made?
16. What are the basic parts and the purpose of a topographic map?
17. How have the methods for making topographic maps changed over time?
18. How are topographic maps of the ocean floor made?
19. Describe how topographic maps can be useful to various people.

Follow-up Discussion

Research indicates that students will retain their previous misconceptions about a topic, in preference to new information, until they actively recognize and correct their own errors. Therefore, it is important to have your students re-examine the facts/beliefs they put on their "Everything We Think We Know About..." list. It might also be helpful to review the list by marking each entry with a "+" or "-" to show which facts were correct and which were incorrect.

Thought-provoking discussions provide a good way to assess the overall depth of student understanding. The following are some suggested discussion topics. *(Continued)*