WHAT IS EARTH SCIENCE?

#3535

OPEN-CAPTIONED
CLEARVUE/eav
1996
Grade Levels: 8-12
25 minutes
2 Instructional Graphics Enclosed
DESCRIPTION

Earth sciences explore the materials and forces that shape our world. This broad overview examines each of its four branches: astronomy, meteorology, geology, and oceanography. Presents the tools used in each discipline, the contributions of famous scientists, and looks at current research. Touches on VLAs, space exploration, and more. Speculates on the future for space travel, our atmosphere, fossil fuels, and life in the sea.

ACADEMIC STANDARDS

Subject Area: Science

- **Standard: Understands essential ideas about the composition and structure of the universe and the Earth’s place in it**
  - **Benchmark:** Knows that although the origin of the universe remains one of the greatest questions in science, current scientific evidence supports the “big bang” theory, which states that between 10 and 20 billion years ago, the entire contents of the universe expanded explosively into existence from a single, hot, dense, chaotic mass; our solar system formed from a nebular cloud of dust and gas about 4.6 billion years ago (See Instructional Goal #3 and #5)

- **Standard: Understands basic Earth processes**
  - **Benchmark:** Understands the concept of plate tectonics (e.g., the outward transfer of the Earth’s internal heat and the action of gravitational forces on regions of different density drive convection circulation in the mantle; these convection currents propel the Earth’s crustal plates which move very slowly, pressing against one another in some places and pulling apart in other places) (See Instructional Goal #6)

INSTRUCTIONAL GOALS

1. To list the four branches of earth science.
2. To list some of the way astronomers gather data.
3. To discuss the origin of the universe.
4. To explain the job of a meteorologist.
5. To present ideas how the earth may have formed.
6. To explain how earthquakes occur.
7. To name several alternate energy sources.
8. To describe the effects of the ocean on the earth.

VOCABULARY

1. astronomy
2. big bang
3. biosphere
4. celestial body
5. crust
6. Doppler weather radar
7. El Niño
8. equator
9. faults
10. magma  
11. fossils  
12. galaxies  
13. geology  
14. geothermal  
15. geysers  
16. hydroelectric  
17. kelp  
18. meteorite  
19. meteorology  
20. oceanography  
21. plate  
22. plate-tectonic theory  
23. resources  
24. Richter scale  
25. submersibles  
26. super nova

BEFORE SHOWING

1. List the various branches of science and discuss the focus of each.
2. Introduce and discuss the following quotes about science exploration:
   a. “We shall not cease from exploration and the end of all our exploring will be to arrive where we started.” T. S. Eliot
   b. “My goal is simple. It is complete understanding of the universe and why it is as it is and why it exits at all.” Stephen Hawking
   c. “The most incomprehensible thing about the world is that it is comprehensible.” Albert Einstein
3. List the four branches of earth science: astronomy, meteorology, geology, and oceanography.
   a. Why is astronomy considered a part of earth science?
   b. What do scientists in each field study?
   c. How is the scientific method applied in each field?
4. Complete a True or False worksheet before or during the video. (See INSTRUCTIONAL GRAPHICS.)

DURING SHOWING

Discussion Items and Questions

1. View the video more than once, with one showing uninterrupted.
2. Pause at the pictures of the following scientists and briefly point out the contributions they made:
   a. Copernicus
   b. Galileo
   c. Charles Richter
3. Pause at the section showing the meteorite crater in Arizona. Explain that the diameter of this crater is about 4,100 feet.
4. Pause at the section listing the five layers of the earth’s atmosphere and explain the location of each.
5. Pause at the section showing the major plates. Point out where earthquakes are likely to happen.
AFTER SHOWING

Discussion Items and Questions

1. What are the four branches that make up earth sciences?
2. Who is known as the founder of modern astronomy?
3. What does VLA stand for? What is it used for?
4. What is the big bang theory?
5. What role does the sun play in sustaining life on earth?
6. How does the moon affect the oceans’ tides?
7. How do meteorites help scientists understand the universe better?
8. What space probe is helping to study the planet Jupiter?
9. What famous space telescope serves as a tool for astronomers?
10. During which decade did meteorologists start learning to predict hurricanes?
11. What are some tools that meteorologists use to predict weather?
12. How do meteorologists, airline pilots, and ship captains work together?
13. How do the five layers of the atmosphere protect the earth?
14. How is the ozone layer sometimes damaged and what effect does this have on life on earth?
15. What is the plate-tectonic theory?
16. Why is it difficult to predict earthquakes?
17. How does studying volcanoes help geologists learn about the earth’s past and predict the earth’s behavior?
18. What is the word for remains of plants and animals that have hardened into rock?
19. What are natural resources?
20. As the earth’s population increases, this places a burden on its natural resources. Name some alternative energy sources.
21. What covers over 70% of the earth?
22. How do the studies of meteorology and oceanography overlap?
23. In the 1960s, it was discovered that mountain ridges stretched for 40,000 miles under the ocean. Discuss why scientists had not detected that before.
24. Where do oceanographers perform experiments today?
25. What does SCUBA stand for?
26. For what is mineral-rich kelp used?
27. What is El Niño and why is it of concern to scientists?
28. In what years did El Niño cause $8.1 billion dollars in storm damage around the globe?
29. What are some negative impacts that humans have on the ocean?

Applications and Activities

1. Complete a crossword puzzle using terms relating to earth science. (See INSTRUCTIONAL GRAPHICS.)
2. Design a computer-generated table about meteorites. Include information such as location, type, size, and year found.
3. The Iroquois compared the earth to a turtle. Research poetry and other literary works to find other metaphors used to describe the earth.
4. Report on careers in astronomy, meteorology, geology, and oceanography. Include information such as college requirements, salary, demand, and location of work.
5. Report on theories of how the universe was created.
6. Research the present status of El Niño and La Niña.

**INSTRUCTIONAL GRAPHICS**

- TRUE OR FALSE
- CROSSWORD PUZZLE ABOUT EARTH SCIENCE

**RELATED RESOURCES**

Captioned Media Program

- Asteroids, Comets and Meteorites (Revised) #2037
- Atmosphere: On the Air #3213
- Discovering the Changing Surface of Our Earth #2555
- Dynamic Earth, The: Changes in its Surface #2558
- Earth, The: Changes in its Surface (Revised) #2056
- Earth, The: Resources in its Crust (Revised) #2057
- Earth’s Atmosphere, The #2170
- Hidden Fury: The New Madrid Earthquake Zone #3043
- History of Astronomy #3137
- Hurricanes, Tornadoes and Other Weather #1506
- Improving Weather Management #2188
- Journey Through the Solar System #2618
- Ozone #2675
- Physical Oceanography #2631
- Shooting Stars #3177
- Telescope: Window to the Universe, The #2019
- Understanding Weather: Storms #2692
- Universe, The #3310
- What’s a Natural Resource #2142
- What is Biology? #3533
- What is Chemistry? #3534
- What is Science? #3537

**World Wide Web**

The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and “kid-safe” sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- CURIOUS ABOUT ASTRONOMY?
  [http://astrosun.tn.cornell.edu/students/kornreich/curious/curious.html](http://astrosun.tn.cornell.edu/students/kornreich/curious/curious.html)
Contains an archive of questions and answers about topics related to astronomy. Also has a list of astronomy-related Web sites for different levels.

- **EARTHNET** [http://agc.bio.ns.ca/EarthNet/](http://agc.bio.ns.ca/EarthNet/)
  Consists of ideas for classroom activities, glossary of terms related to earth science, and a list of earth science Web sites.

- **VOLCANO WORLD** [http://volcano.und.nodak.edu/](http://volcano.und.nodak.edu/)
  Contains information, pictures, and games related to volcanoes. Has a “Volcano of the Week” section as well as an index of the major points of interest on the Web site.

- **THE WHY FILES** [http://whyfiles.news.wisc.edu/](http://whyfiles.news.wisc.edu/)
  Consists of weekly features from headlines in science. Has archive listings and a “Cool Science Images” feature.

- **METEORITES AND THEIR PROPERTIES** [http://meteorites.lpl.arizona.edu/](http://meteorites.lpl.arizona.edu/)
  Contains information about the origin of meteorites, their structure, craters, and tests of suspected meteorite specimens.

- **WEATHERNEX** [http://cirrus.sprl.umich.edu/wxnet](http://cirrus.sprl.umich.edu/wxnet)
  Provides access to thousands of forecasts, images, and weather links.
True or False Worksheet

Directions: If the statement is true, write “T.”
If it is false, write “F.”

1. Galileo is known as the founder of modern experimental science.

2. Many scientists believe that the universe is continuing to expand.

3. Meteorology is the study of meteorites.

4. The Richter scale is used to measure earthquakes.

5. The ocean covers 40% of the earth’s surface.

6. “El Niño” is an ocean current that contributes to unusual weather in many parts of the world.

7. Astronomy is not a branch of earth science.

8. The VLA is an instrument used to study the ocean’s tides.

9. The ozone layer of the atmosphere is of minor importance to the earth’s survival.

10. Geology is the study of the earth’s surface, such as rock formations and canyons.
ACROSS

2. Meteorologists obtain most of their weather forecasting information from the twice-daily simultaneous release of ______ from hundreds of locations worldwide.

6. The study of the stars, planets, and other celestial bodies.

10. The study of the earth’s structure, composition, history, and origin.

11. The founder of modern astronomy, he was the first scientist to propose that the sun, not the earth, is the center of the solar system.

12. The condition of the atmosphere’s temperature, moisture, and air movement.

13. An instrument that magnifies distant objects and makes them appear closer.

14. The hardened remains of plant or animal life from a previous geological period, found in layers of sediment.

15. The magnitude of an earthquake is measured by the ______ scale.

DOWN

1. After the earth’s surface cooled around the still-molten interior, enormous stresses created deep cracks, called ______, in the crust.

3. The shaking of the earth’s crust caused by breaking and shifting of rock beneath the surface.

4. Plants release oxygen during the process called ______.

5. The founder of modern experimental science, he perfected the telescope and verified Copernicus’s theory that the sun was the center of the solar system.

7. The study of the oceans’ size, shape, wave patterns, plants, and animals.

8. The study of weather and weather forecasting.


Word List

- astronomy
- balloons
- Copernicus
- earthquake
- El Niño
- faults
- fossils
- Galileo
- geology
- meteorology
- oceanography
- photosynthesis
- Richter
- telescope
- volcanologist
- weather
WHAT IS EARTH SCIENCES?

- Ballons
- Earth
- Hotolosce
- Copernicus
- Weather
- Telescope
- Fossils
- Richter
- Geology
- Astronomy
- Palin
- Aye
- Sky
- Ray
- Section
- Geology
- Scientist
- Telescope
- Sky
- Richter
PLEASE RETURN LESSON GUIDE WITH VIDEO

Lesson guide also available online at www.cfvc.org

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