

Branches of Earth Science

BEFORE YOU READ

After you read this section, you should be able to answer these questions:

- What are the four major branches of Earth science?
- What are some special branches of Earth science?

What Is Geology?

Earth is a large and complicated place. How do scientists study it? The answer is that no one scientist studies all parts of Earth. Instead, different scientists study different parts of the planet. The study of different parts of Earth is called *Earth science*. There are many different *branches*, or types, of Earth science.

Geology is one branch of Earth science. **Geology** is the study of the origin, history, and structure of Earth. It also includes the study of the processes that shape Earth. A scientist who studies geology is called a *geologist*.

In most cases, a geologist studies one specific part of the Earth. For example, *volcanologists* study volcanoes. *Seismologists* study earthquakes. *Paleontologists* study the history of life on Earth. ✓

What Is Oceanography?

Another branch of Earth science is oceanography. **Oceanography** is the study of the sea. Scientists who study oceanography are called *oceanographers*.

Like geologists, oceanographers may focus on certain areas of oceanography. For example, *biological oceanographers* study the living things in the oceans. *Chemical oceanographers* study the amounts of different chemicals in ocean water.



Many oceanographers use special tools, such as this submarine, to study the oceans.



Describe As you read this section, make a chart describing the four main branches of Earth science. In your chart, define each branch and give the term used to describe a scientist who studies it.



1. Describe What do seismologists study?

TAKE A LOOK

2. Identify What do oceanographers study?

SECTION 1 Branches of Earth Science *continued*

What Is Meteorology?

Meteorology is a branch of Earth science that deals with Earth’s atmosphere, especially weather and climate. Scientists who study meteorology are called *meteorologists*. ✓

Many meteorologists try to *forecast*, or predict, the weather. In most cases, weather forecasts help to make our lives more comfortable. Sometimes, meteorologists can help save people’s lives by predicting severe weather, such as hurricanes and tornadoes. These predictions can warn people to leave an area before severe weather strikes.

✓ **READING CHECK**

3. Define What is meteorology?

TAKE A LOOK

4. Explain How can meteorology save people’s lives?

Critical Thinking

5. Compare What is the main difference between astronomy and other branches of Earth science?



These meteorologists are risking their lives to gather information about tornadoes. This information may help other meteorologists better predict where and when tornadoes will strike.

What Is Astronomy?

Astronomy is the study of the universe. *Astronomers* are scientists who study stars, asteroids, planets, and other objects in space.

Most objects in space are very far away. Therefore, astronomers depend on technology to help them study these objects. For example, astronomers may use telescopes to study distant stars and planets.

You may wonder why astronomy is a branch of Earth science if astronomers study objects far from the Earth. The reason is that many astronomers use information about other planets and stars to learn more about the Earth. For example, some astronomers study ancient stars in the universe. The information they gather can help them to predict how changes in our sun may affect the Earth.

SECTION 1 Branches of Earth Science *continued*

What Are Some Other Branches of Earth Science?

Geology, oceanography, meteorology, and astronomy are the four main branches of Earth science. However, there are many other branches of Earth science.

ENVIRONMENTAL SCIENCE

Environmental science is the study of how humans interact with the environment. Environmental scientists help people learn ways to preserve the environment and to use resources wisely. ✓

ECOLOGY

Ecology is the study of relationships between living things and their environments. Ecologists study communities of organisms and their environments to better understand how organisms behave. Ecologists work in many fields, including agriculture and forestry.

GEOCHEMISTRY

Geochemistry combines the studies of geology and chemistry. Geochemists study the chemicals that make up Earth materials such as rocks, minerals, and soil. They can use this information to learn how the Earth materials formed. Geochemists may also study the effects of human-made chemicals on the environment.



Geochemists may take rock samples and analyze them in a laboratory.

GEOGRAPHY AND CARTOGRAPHY

Geography is the study of the surface features of the Earth, such as continents, rivers, and mountains. Many geographers work in *cartography*, or map-making. Cartographers use information from photographs and computers to make maps. They may also study the ways that areas change with time.

READING CHECK

6. Identify Give two things that environmental scientists can help people learn to do.

Say It

Discuss In a small group, talk about different jobs that Earth scientists can have. Who may Earth scientists work for? What kinds of work could they do every day?

TAKE A LOOK

7. Describe What do geochemists study?

Section 1 Review

SECTION VOCABULARY

<p>astronomy the scientific study of the universe</p> <p>geology the scientific study of the origin, history, and structure of Earth and the processes that shape Earth</p>	<p>meteorology the scientific study of Earth's atmosphere, especially in relation to weather and climate</p> <p>oceanography the scientific study of the ocean, including the properties and movements of ocean water, the characteristics of the ocean floor, and the organisms that live in the ocean</p>
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1. **List** What are the four major branches of Earth science?

2. **Infer** What kind of Earth scientist would most likely study thunderstorms? Explain your answer.

3. **Explain** Why is astronomy a branch of Earth science?

4. **Compare** How is environmental science different from ecology?

5. **Explain** Why do astronomers depend on technology?

6. **Define** What is geography?

Earth Science Answer Key

Chapter 1 The World of Earth Science

SECTION 1 BRANCHES OF EARTH SCIENCE

1. earthquakes
2. oceans
3. the study of Earth's atmosphere, weather, and climate
4. Meteorologists can predict severe weather in time for people to get out of the way.
5. Unlike other branches of Earth science, astronomy deals with the study of objects and materials not found on Earth.
6. Preserve the environment; use resources wisely.
7. the chemicals that make up Earth materials

Review

1. astronomy, geology, meteorology, oceanography
2. a meteorologist, because meteorologists study weather
3. Many astronomers use information from other bodies in the universe to learn more about the Earth and our solar system.
4. Environmental science is the study of how humans interact with the environment. Ecology is the study of how all organisms, not just humans, interact with their environments.
5. The objects they study are very far away, so astronomers use technology to see them.
6. the study of the surface features of the Earth

SECTION 2 SCIENTIFIC METHODS IN EARTH SCIENCE

1. Answers will vary. For a person 5 feet tall, the fraction is about 0.06.
2. a series of steps scientists use to answer questions and to solve problems
3. Answers will vary.
4. a possible answer to a question

Step in scientific methods	How did David Gillette apply this step?
Forming a hypothesis	He thought that the bones came from a new kind of dinosaur.

6. pieces of information gathered by experimentation or observation

7. A controlled experiment is set up by a scientist to study one variable at a time. When scientists use observation to collect data, they cannot control the variables.

Step in scientific methods	How did David Gillette apply this step?
Testing hypotheses	He made many measurements of the bones.

9. to help them form explanations based on the data

Step in scientific methods	How did David Gillette apply this step?
Analyzing results	He made a table to compare the shapes and sizes of his bones with the bones of known dinosaurs.

11. Answers will vary. In general, negative results can tell scientists that they are looking in the wrong spot or can point them in new directions.

Step in scientific methods	How did David Gillette apply this step?
Drawing conclusions	He concluded that the dinosaur was a new species.

13. Sharing results allows other scientists to test them and determine whether they are reliable.

Review

1. The scientist can make observations about the natural world and collect data from the observations.
2. Scientists ask questions to guide their research. The questions help them to plan experiments that focus on the most important things they want to learn.
3. Answers will vary but should be reasonable.
4. Write a paper, give a talk, or publish on the Internet.
5. Answers include: A scientist might share his or her findings several times. He or she might repeat an experiment if the results are questioned or to obtain more data.

SECTION 3 SCIENTIFIC MODELS

1. to study very large or very small things
2. a model that you can see or touch
3. a model made of equations and data
4. Computers can do many calculations quickly and accurately.