



The Nature of Science

section 1 What is science?

Before You Read

Have you ever wondered how something works? On the lines below, describe a time that you wondered how something worked. Did you find out how it worked? Explain how.

What You'll Learn

- what science is and what science cannot answer
- what theories and laws are
- identify a system and its parts
- the three main branches of science

Read to Learn

Learning About the World

When you think of a scientist, do you think of someone in a laboratory with charts, graphs, and bubbling test tubes? Anyone who tries to learn about the natural world is a scientist—even you. **Science** is a way of learning more about the natural world. Scientists want to know why, how, or when something happened. Learning usually begins by keeping your eyes open and asking questions about what you see.

What kinds of questions can science answer?

Scientists ask many questions. How do things work? What are they made of? Why does something take place? Some questions cannot be answered by science. Science cannot help you find the meaning of a poem or decide what your favorite color is. Science cannot tell you what is right, wrong, good, or bad.

What are possible explanations?

Learning about your world begins with asking questions. Science tries to find answers to these questions. However, science can answer questions only with the information that exists at the time. Any answer found by science could be wrong or could change because people can never know everything about the world around them.

Study Coach

Outlining As you read the section, create an outline using each heading from the text. Under each heading, write the main points or ideas that you read.

FOLDABLES™

A Build Vocabulary

Make the following Foldable to help you define and learn the vocabulary terms in this section.

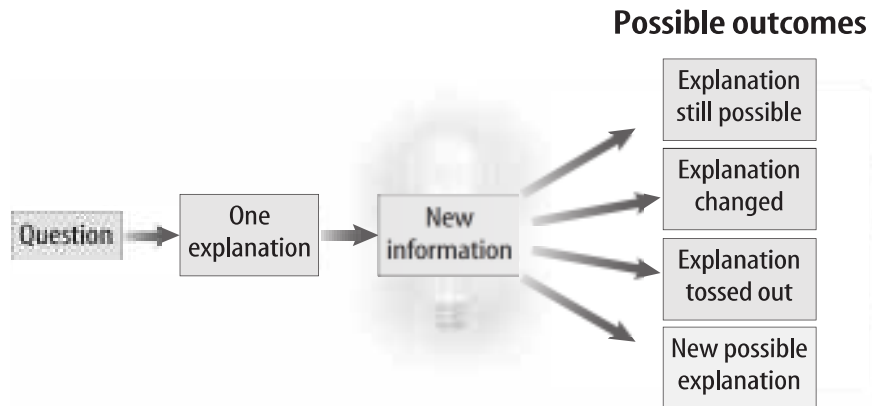


How does new information affect old explanations?

As time passes, people learn more about the world around them. As you can see in the diagram below, new information might make scientists look at old ideas and think of new explanations. Science finds only possible explanations. For example, people once thought Earth was the center of the solar system. Through the years, new information about the solar system showed this is not true.

Picture This

- 1. Explain** Look at the diagram to the right. How can new information affect an old explanation for something?



What are scientific theories?

A **scientific theory** is an attempt to explain a pattern seen repeatedly in the natural world. Theories are not just guesses or opinions. Theories in science must have observations and results from many investigations to back them up. They are the best explanations that have been found so far. Theories can change. As new data are found, scientists decide how the new data fit the theory. Sometimes the new data do not support the theory. Then scientists can change the theory to fit the new data better.


What are scientific laws?

A **scientific law** is a rule that describes a pattern in nature. For an observation to become a scientific law, it must be observed happening over and over again. The law is what scientists use until someone makes observations that do not follow the law. A law helps you predict what will happen. If you hold an apple above the ground and drop it, it always will fall to Earth. The law tells you the apple will fall, but the law does not explain why the apple will fall. A law is different from a theory. It does not try to explain why something happens. It simply describes a pattern.

Reading Check

- 2. Determine** Which describes a pattern in nature, a scientific theory or a scientific law?

Systems in Science

Scientists can study many different things in nature. Some scientists study how the human body works. Others might study how planets move around the Sun. Still others might study the energy in a lightning bolt. What do all of these things have in common? All of them are systems. A **system** is a group of structures, cycles, and processes that are related to each other and work together. Your stomach is a structure, or one part of, your digestive system. 

Where are systems found?

You can find systems in other places besides science. Your school is a system. It has structures like school buildings, furniture, students, teachers, and many other objects. Your school day also has cycles. Your daily class schedule and the school calendar are examples of cycles. Many processes are at work during the school day. Your teacher may have a process for test taking. Before a test, the teacher might ask you to put your books away and get out a pencil. When the test is over, the teacher might ask you to put down your pencil and pass the test to the front of the room.

In a system, structures, cycles, and processes work together, or interact. What you do and what time you do it depends on your daily schedule. A clock shows your teacher that it is time for your lunch break. So, you go to lunch.

How are parts of a system related to a whole system?

All systems are made up of other systems. For example, the human body is a system. Within the human body are many other systems. You are part of your school. Your school is probably part of a larger district, state, or national system. Scientists often solve problems by studying just one part of a system. A scientist might want to know how the construction of buildings affects the ecosystem. Because an ecosystem has many parts, the scientist might study one particular animal in the ecosystem. Another might study the effect on plant life.

The Branches of Science

Science is often divided into three main parts, or branches. These branches are life science, Earth science, and physical science. Each branch asks questions about different kinds of systems.

Reading Check

3. **List** What are the three parts of a system?



Think it Over

4. **Describe** Buildings usually have a heating system. Write each of the following by the part of the system it best represents. *turning on and off, thermostat, spreading heat*

Structure:

Process:

Cycle:

 **Reading Check**

5. **Apply** What might an Earth scientist study that is not on Earth?

 **Think it Over**


6. **Apply** Which of the following is an example of technology? Circle the correct answer.
- a. finding out how light travels
 - b. creating solar-powered cars
 - c. deciding which rock is the hardest
 - d. making strong plastic

What is life science?

Life science is the study of living systems and the ways in which they interact. Life scientists try to answer questions like “How do whales know where they are swimming in the ocean?” and “How do vaccines prevent disease?” Life scientists can study living things, where they live, and how they act together.

People who work in the health field, like doctors and nurses, know a lot about life science. They work with systems of the human body. Some other people that use life science are biologists, zookeepers, farmers, and beekeepers.

What is Earth science?

Earth science is the study of Earth systems and systems in space. It includes the study of nonliving things such as rocks, soil, clouds, rivers, oceans, planets, stars, meteors, and black holes. Earth science also includes the weather and climate systems on Earth. Earth scientists ask questions like “How do you know how strong an earthquake is?” and “Is water found on other planets?” They make maps and study how Earth’s crust formed. Geologists study rocks and Earth’s features. Meteorologists study weather and climate. There are even volcanologists who study volcanoes. 

What is physical science?

Physical science is the study of matter and energy. Matter is anything that takes up space and has mass. Energy is the ability to cause matter to change. All systems—living and nonliving—are made of matter.

Chemistry and physics are the two areas of physical science. Chemistry is the study of matter and the way it interacts. Chemists ask questions like “What can I do to make aspirin work better?” and “How can I make plastic stronger?” Physics is the study of energy and its ability to change matter. Physicists ask questions like “How does light travel through glass?” and “How can humans use sunlight to power objects?”

How are science and technology related?

Learning the answers to scientific questions is important. However, these answers do not help people unless they can be used in some way. Technology is the practical use of science in our everyday lives. Engineers use science to create technology. The study of how to use the energy of sunlight is science. Using this knowledge to create solar panels is an example of technology.