Chapter 1  Introduction to Earth Science

Section 1.5 What Is Scientific Inquiry?

This section describes methods used for scientific inquiry.

Reading Strategy

Comparing and Contrasting  As you read, complete the Venn diagram by listing the ways that a hypothesis and a theory are alike and how they differ. For more information on this Reading Strategy, see the Reading and Study Skills in the Skills and Reference Handbook at the end of your textbook.

Hypothesis

1. What is a hypothesis?  
   A hypothesis is a possible scientific explanation for how or why things happen.

2. Is the following sentence true or false? Before a hypothesis can become an accepted part of scientific knowledge, it must be tested and analyzed.  
   true

3. Describe a well-known hypothesis that was discarded because it was found to be untrue.  
   Sample answer: The Earth-centered model of the universe. In this model, Earth was at the center of the universe. The other planets and the sun revolved around Earth.

4. Circle the letter of each sentence that is true about hypotheses.

   a. If a hypothesis can’t be tested, it is not scientifically useful.
   b. Hypotheses that fail rigorous testing are discarded.
   c. A hypothesis is a well-tested and widely accepted principle.
   d. The concept of plate tectonics is a hypothesis.

5. Is the following sentence true or false? Sometimes more than one hypothesis is developed to explain the same set of observations.  
   true

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Theory

6. ☐ A scientific ________ theory ________ is well tested and widely accepted by the scientific community and best explains certain observable facts.

7. Describe a scientific theory that is currently accepted as true. **Sample answer:** The theory of plate tectonics explains the origin of the continents and ocean basins, plus the occurrence of mountains, earthquakes, and volcanoes.

Scientific Methods

8. Circle the letter that best answers the question. What is the process of gathering facts through observations and formulating scientific hypotheses and theories called?
   a. scientific hypothesis
   b. scientific theory
   c. scientific method
   d. scientific testing

9. Complete the flowchart showing the basic steps of the scientific method.

Collect scientific facts through observation and measurement. → Develop one or more working hypotheses or models to explain observed facts or measurements.

Test hypotheses using observations and/or experiments. → After extensive testing, accept, modify, or reject the remaining hypothesis.

10. Is the following sentence true or false? All scientists follow the same steps outlined above when doing scientific research. **false**
WordWise

Complete the sentences by using the scrambled vocabulary terms below.

troasnmyo  ymteeogorlo  tmsaohpeer
ttldeaiu  tidelngou  coountr  lavterin
eoghspsree  ncourtt  ilnes  essithopyh
yggeool  gocoaitprph  pma  mstyes
oieepshbr  yhdroeeshrp  traeh  ncsiece

The name of the group of sciences that deal with Earth and its neighbors in space is called ______Earth science______.

All the water on Earth makes up the ______hydrosphere______.

A word that means “study of Earth” is ______geology______.

A distance measured in degrees north or south of the equator is called ______latitude______.

A distance measured in degrees east or west of the prime meridian is called ______longitude______.

The ______contour interval______ tells you the difference in elevation between two adjacent lines on a topographic map.

Lying beneath both the atmosphere and the ocean is the ______geosphere______.

A ______system______ can be any size group of interacting parts that form a complex whole.

An untested scientific explanation is called a ______hypothesis______.

The gaseous envelope surrounding Earth is called the ______atmosphere______.

A ______topographic map______ represents Earth’s three-dimensional surface in two dimensions.

The elevation on a topographic map is shown using ______contour lines______.

The ______biosphere______ includes all life on Earth.

The study of the atmosphere and the processes that produce weather and climate is ______meteorology______.

The study of the universe is ______astronomy______.