

Chapter 12

Text Pages 326–333

STUDY GUIDE

● Fossils

Match the terms in Column I with their descriptions in Column II. Write the letter of the correct phrase in the blank at the left.

Column I

- _____ 1. fossil
- _____ 2. cast
- _____ 3. mold
- _____ 4. index fossil
- _____ 5. carbonaceous film
- _____ 6. petrified remain

Column II

- a. Fossil from a species that existed on Earth for a short period of time
- b. Fossil made from a thin film of carbon atoms and molecules
- c. Remain, imprint, or trace of a once-living organism
- d. Hard and rocklike fossil
- e. Cavity left in rock by a decayed organism
- f. Produced when a cavity is filled in with solid matter

Circle the word in the blank that makes the statement correct.

- 7. (Impressions, Fossils) are preserved remains or traces of life-forms.
- 8. Organisms have a better chance of being preserved if they have (hard, soft) parts.
- 9. A hard, rocklike fossil, called a (petrified, trace) fossil develops when minerals fill spaces left when the original substance dissolves.
- 10. A carbonaceous (decay, film) fossil is made when pressure and heat force out gases and liquids, leaving a thin residue of the organism.
- 11. A (mold, cast) is made when sediments fill in a cavity and harden.
- 12. (Original, Carbon) remains have been preserved in frozen ground and in amber.
- 13. Preserved tracks and other evidence of animal activity are called (index, trace) fossils.
- 14. Fossils of life-forms that existed on Earth for a short period of time and were widespread geographically are called (index, trace) fossils.
- 15. Fossils show that the (environment, elevation) of Antarctica has changed greatly.

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REINFORCEMENT

● Fossils

Write the word “no” in front of statements that do not describe a fossil. Write “fossil” if the statement describes a fossil. After each fossil description, name the type described.

- _____ 1. Dinosaur tracks in rocks _____
- _____ 2. Bird tracks in snow _____
- _____ 3. Dinosaur leg bone containing quartz instead of calcium _____
- _____ 4. Insect in amber from a pine tree _____
- _____ 5. Oil formed from sea animals of long ago _____
- _____ 6. Rocklike wood from a tree that lived millions of years ago _____
- _____ 7. Sandstone showing ripple marks from water _____
- _____ 8. Living pine tree more than 4000 years old _____
- _____ 9. Thin cavity in a rock showing where a shell had decayed _____
- _____ 10. Shell-shaped mineral found in rock cavity _____
- _____ 11. Flesh, fur, and bones of a woolly mammoth preserved in frozen ground _____
- _____ 12. Arrowhead made thousands of years ago _____
- _____ 13. Burrows of worms that lived millions of years ago _____
- _____ 14. Rocklike parts of a species of fish that lived a short time in several parts of the world _____
- _____ 15. Thin layer of carbon from the remains of a plant that lived thousands of years ago _____

Answer the following questions on the lines provided.

16. What three kinds of information can geologists gather from a study of fossils? _____

17. What must happen to a dead organism if a fossil is to form? _____

18. What do you know about a rock layer found on a mountain if you find a seashell fossil in the layer? _____

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REINFORCEMENT

● Extinction of Dinosaurs

Answer the following questions on the lines provided.

1. What does the term *extinct* mean? _____

2. What did the remains of dinosaurs found in the western United States tell us? _____

3. Before their extinction, how long had dinosaurs dominated Earth? _____

4. What are three theories regarding the extinction of the dinosaurs? _____

5. How does the presence of iridium in clay deposited about when the dinosaurs became extinct support two theories of dinosaur extinction? _____

6. What do the sun's rays have to do with two of the theories of dinosaur extinction? _____

7. How would changes in the environment have affected the dinosaurs? _____

8. What have we learned from dinosaurs' becoming extinct? _____

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● Extinction of Dinosaurs

Use the words in the boxes to fill in the blanks.

dominant

mammals

160 million

intelligent

Dinosaurs were abundant on Earth's land for about _____ years. These fast, agile, and _____ animals were the _____ land animals. Only after the end of their rule did another class of animals, _____, increase.

Alvarez
iridium
collisiondinosaurs
dust
theoryextinct
meteoritewestern
66 million

The remains of _____ have been found in the _____ part of the United States. These great animals have been _____ for about _____ years. Two scientists, Luis and Walter _____, have uncovered traces of _____ in rock layers. They now think they know why the animals died. Their _____ is that Earth and a _____ from space had a _____. This raised _____, which dimmed the sun's light. The meteorite's impact would also account for the iridium deposit.

mineral

photosynthesis

temperature

volcanic activity

The meteorite collision has been rejected by some scientists who think increased _____ is a more likely theory. Either event would explain the presence of the rare _____ iridium and would have resulted in a dimming of the sun. This would kill plants that depend on the sun for _____ and would lower Earth's _____.

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REINFORCEMENT

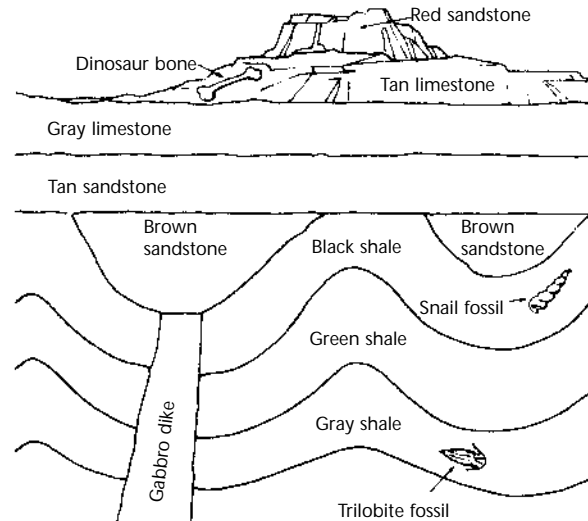
● Relative Ages of Rocks

In the blank at the left, write the term that completes each statement.

- _____ 1. Natural laws govern the way geologists determine the age of rock deposits. This technique is called _____ .
- _____ 2. The principle of _____ states that an older rock layer and things buried in it are underneath young layers unless the layers have been disturbed.
- _____ 3. Forces generated by _____ may overturn rock layers.
- _____ 4. Some rock layers are incomplete. The gaps are called _____ .
- _____ 5. A common cause of gaps in rock layers is _____ .

Look at the cross-sectional view of the rock layers shown in the diagram below. For each question, decide which of the two named materials is older. Assume the layers have not been overturned. Write the name of the older material on the line provided.

- _____ 5. tan sandstone and brown sandstone
- _____ 6. brown sandstone and gray limestone
- _____ 7. gabbro dike and brown sandstone
- _____ 8. gabbro dike and gray shale
- _____ 9. snail fossil and trilobite fossil
- _____ 10. snail fossil and dinosaur bone
- _____ 11. snail fossil and green shale
- _____ 12. dinosaur bone and red sandstone
- _____ 13. red sandstone and gray limestone
- _____ 14. tan limestone and tan sandstone
- _____ 15. tan limestone and gray limestone



Complete the following statement.

16. The type of unconformity shown in the diagram is a(n) _____

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● Absolute Ages of Rocks

Use the words in the boxes to fill in the blanks.

absolute dating
age
atoms

element
isotopes
lead-206

neutrons
radioactive
uranium-238

Besides relative dating, geologists use another method to determine in years the _____ of rocks and other objects. It's called _____.

It's a process that uses the properties of the _____ in objects.

Elements can have atoms with different numbers of _____ in their nuclei. Some of these _____ undergo a process of _____ decay. When the isotope decays, a new _____ is formed. An example of this decay is the change of the isotope _____ to _____.

carbon-14
daughter product
half-life

nitrogen-14
parent material

radiometric dating
uniformitarianism

Another example of decaying isotopes is the isotope _____, which decays to _____. The original isotope in this process is called the _____. The isotope that results from the decay is the _____.

Every radioactive _____ has a certain rate at which it decays to its _____. This rate is known as its _____.

Calculating the absolute age of a rock is called _____. Long before this was possible, a Scottish scientist estimated that Earth was millions of years old. He used the principle called _____, which states that Earth's processes occurring today are similar to those that occurred in the past.

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REINFORCEMENT

● Absolute Ages of Rocks

Match the terms in Column I with their definitions in Column II. Write the letter of the correct phrase in the blank at the left.

Column I

- _____ 1. absolute dating
- _____ 2. half-life
- _____ 3. radioactive decay
- _____ 4. radiometric dating
- _____ 5. uniformitarianism

Column II

- a. Time it takes for half of the atoms in an isotope to decay
- b. Breaking down of a neutron into a proton and an electron
- c. Principle that Earth processes occurring today are similar to those that occurred in the past
- d. Process that uses the properties of atoms in rocks and other objects to determine their ages
- e. Calculating the absolute age of a rock by measuring the amounts of parent and daughter materials in a rock and by knowing the half-life of the parent material

Follow the steps below to demonstrate the radioactive decay of carbon-14. Then answer the questions.

1. Cut a strip of paper 8 cm long. Think of the paper as all of the carbon-14 in an animal when it died.
2. The idea is to show how you find the age of a rock that contains an animal fossil by using the half-lives of isotopes. Cut the strip of paper in half.
3. Discard one half of the paper. This represents the decayed material. Record the cut in Item 6 below with an X.
4. Continue by cutting the second half of the paper in half. Record the cut below.
5. Continue Steps 3 and 4 until the paper is so small you cannot make another cut. Record each cut you make.
6. Number of cuts: _____
7. What is the total number of times you were able (practically) to cut the sample in half?

8. Each cut represents the half-life of carbon-14. What length of time is represented by each cut?

9. Multiply the number of cuts by the half-life of carbon-14. What is the total amount of time represented by the cuts? _____
10. Could using the half-life of carbon-14 determine when dinosaurs died? Explain.

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CHAPTER REVIEW

● Clues to Earth's Past

Part A. Vocabulary Review

Circle important terms in the puzzle that tell about clues to Earth's past. Then write each word or phrase next to its description.

U N I F O R M I T A R I A N I S M Y
 X Y U N C O N F O R M I T I E S M B
 E B K C D Y C A R B O N O K V D E M
 R A D I O A C T I V E B E C A K Y L
 P R A D I O M E T R I C Z A T I N V
 O R I G I N A L R E M A I N S K Z C
 L F R E L A T I V E D A T I N G D F
 I R F O S S I L S N F B Z N L P D E
 N T K L A B S O L U T E D A T I N G
 I V M O L E X T I N C T F T D C X L
 N W T G V G M H L B K J Z B C V E Z
 A Y O Y K B J H A L F L I F E K D Y

- _____ 1. Remains, imprints, or traces of once-living organisms
- _____ 2. Method using properties of atoms in rocks and other objects to determine their ages
- _____ 3. What dinosaurs became when there were no longer any living members of their species
- _____ 4. Method of dating rocks when the amounts of parent and daughter materials are measured
- _____ 5. Principle stating that Earth's processes occurring today are similar to those that occurred in the past
- _____ 6. Element found in tissues of most organisms
- _____ 7. Gaps found in rock records
- _____ 8. Method used to determine the order of events and relative ages of rocks by examining the position of rocks in a sequence
- _____ 9. Kind of decay or change in which a new element eventually forms
- _____ 10. Time it takes for half of the atoms in a radioactive element to decay
- _____ 11. Branch of science that includes the study of rocks and fossils
- _____ 12. Actual organism or parts of organism protected from decay

Chapter Review (continued)**Part B. Concept Review****I. Making a Chart**

Complete the chart to describe different types of fossils.

Type of fossil	Description
1. Petrified remains	
2. Carbonaceous film	
3. Mold	
4. Cast	
5. Trace fossils	
6. Index fossils	

II. Writing

Answer the questions on the lines provided.

1. What are two possible causes of the extinction of dinosaurs? _____

2. How do geologists use fossils to determine rock ages? What are these fossils called? _____

3. Explain how a dead organism may become a fossil. _____
