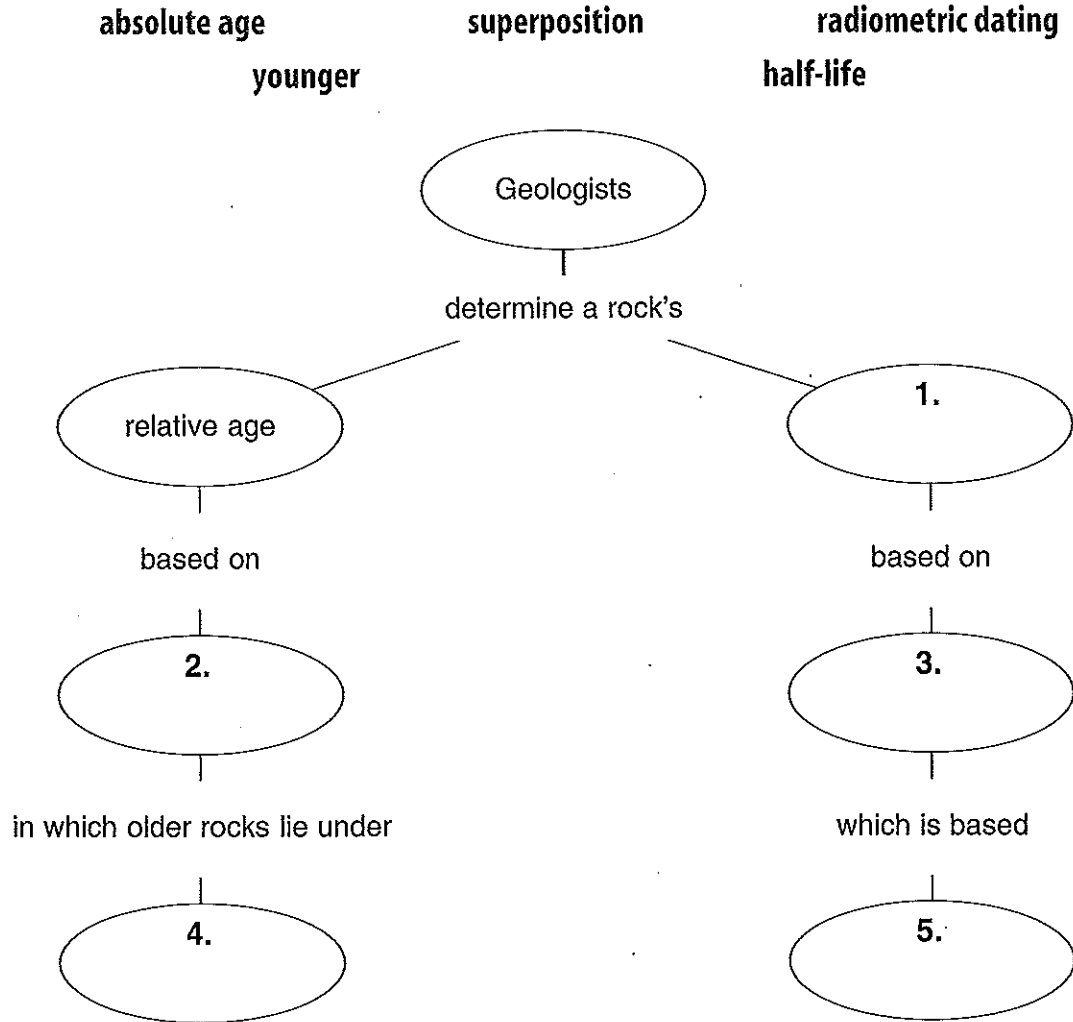


Directions: Use the following terms to complete the concept map below.



Directions: Circle the terms in parentheses that best complete the sentences.

6. (Permineralized remains, Carbon films) are fossils in which the spaces inside are filled with mineralized groundwater.
7. An insect trapped in amber is an example of (a trace fossil, original remains).

SECTION



Reinforcement

Fossils

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

IF FOSSIL - What type?

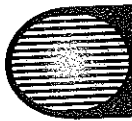
- | | |
|--|-------|
| _____ 1. oil formed from sea animals of long ago | _____ |
| _____ 2. bird tracks in snow | _____ |
| _____ 3. shell-shaped mineral found in rock cavity | _____ |
| _____ 4. insect in amber from a pine tree | _____ |
| _____ 5. dinosaur tracks in rocks | _____ |
| _____ 6. sandstone showing ripple marks from water | _____ |
| _____ 7. rocklike parts of a species of fish that lived a short time in parts of the world | _____ |
| _____ 8. arrowhead made thousands of years ago | _____ |
| _____ 9. dinosaur leg bone containing quartz instead of calcium | _____ |
| _____ 10. flesh, fur, and bones of a woolly mammoth preserved in frozen ground | _____ |
| _____ 11. thin cavity in a rock showing where a shell has decayed | _____ |
| _____ 12. burrows of worms that lived millions of years ago | _____ |
| _____ 13. living pine tree more than 4000 years old | _____ |
| _____ 14. thin layer of carbon from the remains of a plant that lived thousands of years ago | _____ |

Directions: Answer the following questions on the lines provided. (Complete sentences)

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

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

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



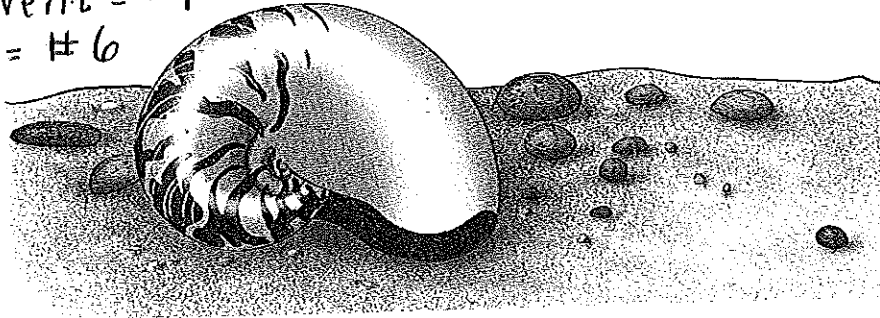
Directed Reading for
Content Mastery

Section 1 ■ Fossils

Directions: Complete the following sequencing activity.

1. Put the events below in the correct sequence on the lines provided.

1st event = #1
Last = #6



- _____ a. The sediment is squeezed and cemented together into rock.
- _____ b. The seashell becomes buried in sediment.
- _____ c. Other sediments fill the hollow place and harden into rock.
- _____ d. A seashell falls into the mud.
- _____ e. Someone finds the fossil of a seashell buried in sediment and rock.
- _____ f. Holes in the rock let water and air reach the seashell and dissolve it, leaving behind a hollow place in the rock.

Directions: 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

- _____ 2. fossil
- _____ 3. cast
- _____ 4. mold
- _____ 5. index fossil
- _____ 6. carbonaceous film
- _____ 7. permineralized remains

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. remains 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

SECTION
2

Reinforcement

Relative Ages of Rocks

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

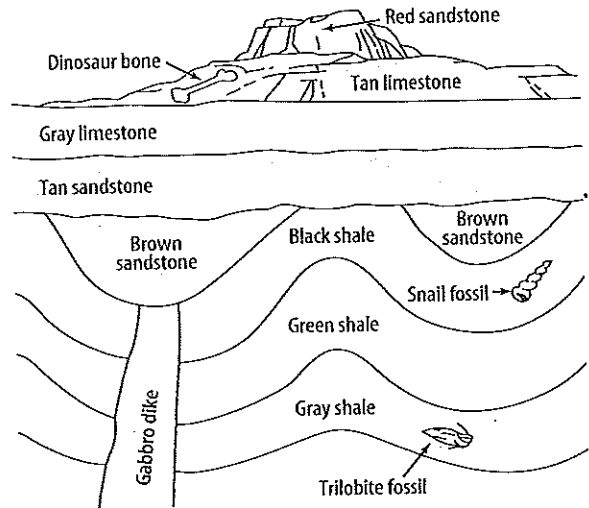
- _____ 1. Natural laws govern the way geologists determine the age of rock deposits. This technique is called _____.
- _____ 2. The principle of _____ states that an older rock layer and things buried in it occur beneath younger layers unless the layers have been disturbed.
- _____ 3. Some rock layers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

Directions: Look at the cross-sectional view of the rock layers shown in Figure 1. 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.

Meeting Individual Needs

- _____ 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
- _____ 16. The type of unconformity shown in Figure 1 is a(n) _____.

Figure 1





Directed Reading for
Content Mastery

Section 2 ■ Relative Ages of Rocks

Section 3 ■ Absolute Ages of Rocks

Directions: *In the blank at the left, write the letter of the term or phrase that best completes each statement.*

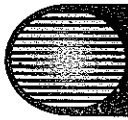
- _____ 1. In layers of undisturbed sedimentary rock, the oldest rocks are on the _____.
- a. top b. bottom
- _____ 2. The statement that old rocks are on the bottom in layers of undisturbed rock is called the _____.
- a. principle of superposition b. tectonic theory
- _____ 3. Sometimes layers of rock are overturned by forces generated by _____.
- a. superposition b. mountain building
- _____ 4. Determining the age of rocks by examining their position in a layer is called _____.
- a. relative dating b. faulting
- _____ 5. Gaps in rock layers are called _____.
- a. faults b. unconformities
- _____ 6. The type of unconformity in which an erosional surface exists in one of several horizontal layers is called a(n) _____.
- a. angular unconformity b. disconformity
- _____ 7. Matching of rock layers in two different areas is called _____ the layers.
- a. concluding b. correlating
- _____ 8. One way to match rock layers that are apart is to see if the same type of _____ are found in both places.
- a. fossils b. water
- _____ 9. In absolute dating, geologists determine the age of rock by reading its _____ decay.
- a. organic b. radioactive
- _____ 10. When an isotope in the rock decays, a new _____ is formed.
- a. element b. proton


**Directed Reading for
Content Mastery**
**Key Terms
Clues to Earth's Past**

Directions: Match the following terms with the definitions below. Write the terms on the lines provided.

- Record letter AND word.
- A. absolute age D. carbonaceous film I. superposition L. cast
 B. mold E. unconformity G. half-life J. index M. fossils
 C. remains F. relative H. decay K. dating N. uniformitarianism

- _____ 1. any gap in a rock record
- _____ 2. the remains, imprints, or traces of prehistoric organisms
- _____ 3. the thin film of carbon that shows the outline of an organism
- _____ 4. Permineralized _____ are fossils in which the spaces inside are filled with minerals from ground water.
- _____ 5. the age, in years, of a rock or other object
- _____ 6. A _____ age is something's age in comparison to something else.
- _____ 7. the time it takes for half of the atoms in an isotope to decay
- _____ 8. Radioactive _____ is the breaking down of some isotopes into other isotopes and particles.
- _____ 9. principle that says if rocks are undisturbed, older layers are under younger layers
- _____ 10. Radiometric _____ is a method used to calculate the absolute age of a rock.
- _____ 11. cavity in rock from which an organism has decayed.
- _____ 12. the principle that Earth processes occurring today are similar to those that occurred in the past
- _____ 13. fossil created when a sediment fills a mold and hardens
- _____ 14. A(n) _____ fossil is the remains of an organism that lived during a specific time that is used to define the age of a particular rock layer.

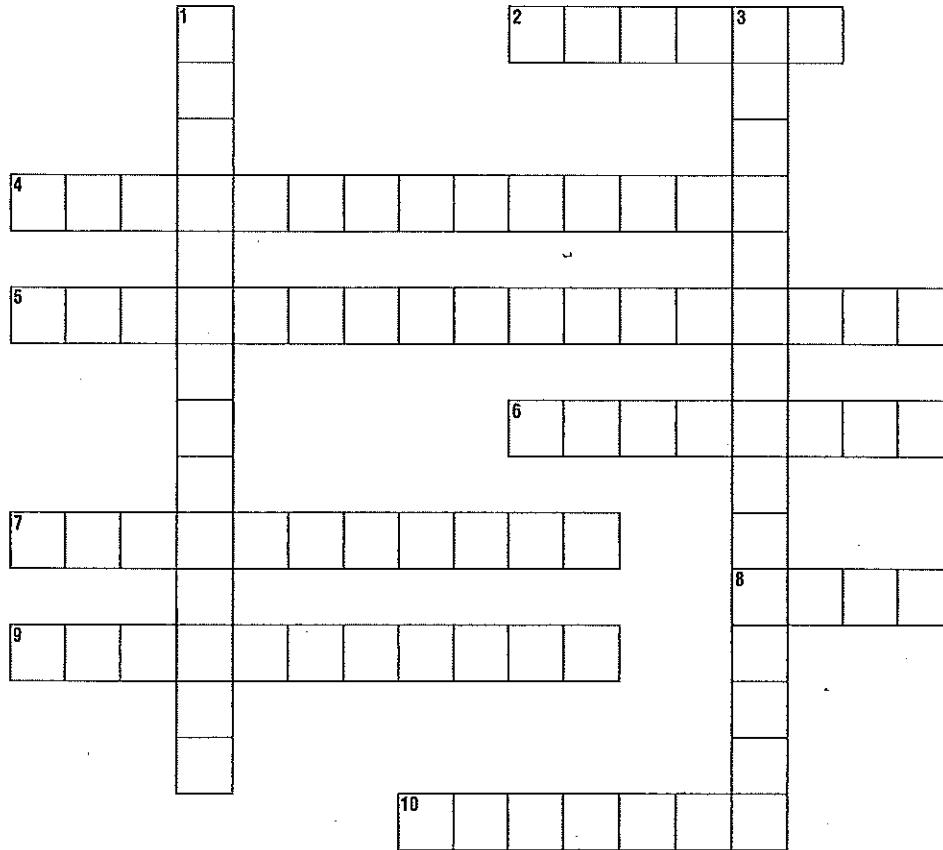


Chapter Review

Clues to Earth's Past

Part A. Vocabulary Review

Directions: Use the clues below to complete the crossword puzzle.



Across

2. Element found in tissues of most organisms
4. Method using properties of atoms in rocks and other objects to determine their ages
5. Principle stating that Earth's processes occurring today are similar to those that occurred in the past
6. Time it takes for half of the atoms in a radioactive element to decay
7. Kind of decay that results in the formation of a different element
8. Cavity left in rock by a decayed organism
9. Method of dating rocks when the amounts of parent and daughter materials are measured
10. Remains, imprints, or traces of once-living organisms

Down

1. Gaps found in rock records
3. Actual organism or parts of organism protected from decay

Chapter Review (continued)

Part B. Concept Review

Directions: Complete the chart to describe different types of fossils.

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

Directions: Answer the questions on the lines provided. (Complete sentences)

7. Explain what the concept of uniformitarianism means.

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

9. Explain how a dead organism may become a fossil.



Clues to Earth's Past

Section 1 Fossils

- A. 1 _____ study fossils and reconstruct the appearance of animals.
- B. 2 _____—remains, imprints, or traces of prehistoric organisms
- Fossils can form if the organism is quickly 3 _____ by sediments.
 - Organisms with 4 _____ are more likely to become fossils than organisms with soft parts.
- C. Types of 5 _____
- Fossils in which spaces inside are filled with minerals from groundwater are called 6 _____ remains.
 - 7 _____ results when a thin film or carbon residue forms a silhouette of the original organism; carbonized plant material becomes 8 _____.
 - 9 _____—cavity in rock left when the hard parts of an organism decay
 - If sediments wash into a mold, they can form a 10 _____ of the original organism.
 - Occasionally 11 _____ remains are preserved in a material such as amber, ice, or tar.
 - 12 _____—evidence of an organism's activities
 - Can be 13 _____ left in mud or sand that became stone
 - Can be trails or 14 _____ made by worms and other animals
- D. 15 _____—abundant, geographically widespread organisms that existed for relatively short periods of time
- E. Fossils can reveal information about past land forms and 16 _____.

Section 2 Relative Ages of Rocks

- A. Principle of 17 _____—process of reading undisturbed rock layers
- 18 _____ rocks in the bottom layer
 - 19 _____ rocks in the top layers
- B. How old something is in comparison with something else is its 20 _____.
- The age of 21 _____ rocks can be determined by examining layer sequences.
 - The age of disturbed rocks may have to be determined by 22 _____ or other clues.

Note-taking Worksheet (continued)

- c. 23 _____—gaps in rock layers
- 24 _____ unconformity—rock layers are tilted, and younger sediment layers are deposited horizontally on top of the eroded and tilted layers.
 - A layer of horizontal rock once exposed and eroded before younger rocks formed over it is called a 25 _____.
 - 26 _____—sedimentary rock forms over eroded metamorphic or igneous rock.
- D. The same rock layers can be found in different locations; fossils can be used to 27 _____ those rock layers.

Section 3 Absolute Ages of Rocks

- A. 28 _____—age, in years, of a rock or other object; determined by properties of atoms
- B. Unstable isotopes break down into other isotopes and particles in the process of 29 _____ decay.
- 30 _____—an isotope's neutron breaks down into a proton and an electron with the electron leaving the atom as a beta particle; a new element forms due to proton gain.
 - 31 _____—an isotope gives off two protons and two neutrons as an alpha particle; a new element forms.
 - The time it takes for half the atoms in an isotope to decay is the isotope's 32 _____.
- C. Calculating the absolute age of a rock using the ratio of parent isotope to daughter product and the half-life of the parent is called radiometric 33 _____.
- 34 _____ dating is used to date ancient rocks millions of years old.
 - 35 _____ dating is used to date bones, wood, and charcoal up to 75,000 years old.
 - Earth is estimated to be about 4.5 billion years old; the oldest known rocks are about 36 _____ years old.
- D. 37 _____—Earth processes occurring today are similar to those that occurred in the past.