

Chapter 12 Geologic Time

Section 12.1 Discovering Earth's History

This section explains how geologists use rocks to interpret Earth's history.

Reading Strategy

Identifying Main Ideas As you read, fill in the first column of the table with a main idea and add details that support it in the second column. 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.

Main Idea	Details
1.	
2.	
3.	
4.	
5.	

Studying Earth's History

- ☞ What information about Earth's history do rocks record?

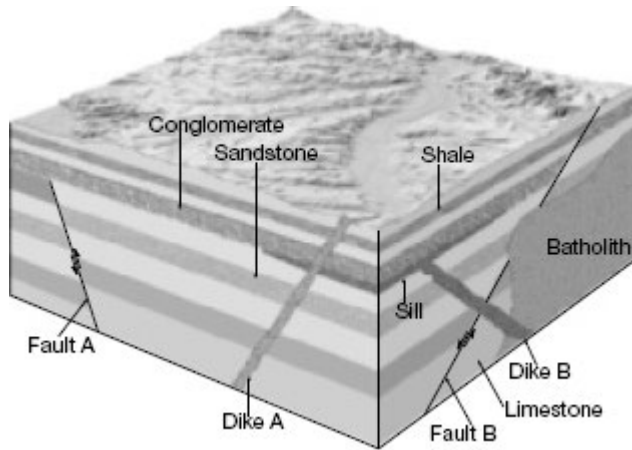
- ☞ Is the following sentence true or false? By examining the rock record, we have learned that Earth is much younger than it was previously thought to be. _____
- ☞ The concept that the processes at work on Earth today were also at work long ago is known as the principle of _____.

Relative Dating—Key Principles

- ☞ Is the following sentence true or false? Scientists use relative dating to tell how long ago events occurred on Earth. _____
- ☞ What is the principle of original horizontality? _____

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6. Use the following figure to complete each sentence comparing the relative ages of the features. Where indicated, identify the law or principle you used to arrive at your answer.
- Dike B is _____ than fault B.
Law or principle: _____
 - The shale is _____ than the sandstone.
Law or principle: _____
 - Dike B is _____ than the batholith.
Law or principle: _____
 - The sandstone is _____ than Dike A.
 - The conglomerate is _____ than the shale.



Reading the Rock Record

Match each description with its term.

- | Description | Term |
|-----------------------------------------------------------------------------------------------------|-------------------------|
| _____ 7. represents a long period when deposition stopped, erosion occurred, and deposition resumed | a. angular unconformity |
| _____ 8. two sedimentary rock layers separated by an erosional surface | b. disconformity |
| _____ 9. represents a period when deformation and erosion occurred | c. unconformity |
10. Circle the letter of the task of matching up rocks of similar age in different regions.
- correlation
 - superposition
 - uniformitarianism
 - unconformity

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Section 12.2 Fossils: Evidence of Past Life


This section discusses how fossils form and how they are used to correlate rock layers.

Reading Strategy

Monitoring Your Understanding Complete the chart. After you finish this section, correct and add details as needed. 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.

Fossils	How Fossils Form	How Fossils Are Used
a.	b.	c.

1.  What are fossils? _____

2.  Is the following sentence true or false? An extinct organism is one that is still found on Earth. _____

Types of Fossils

3. Casts are a common type of _____.
4. Circle the letter of the type of fossil formed when an organism is buried in sediment and then dissolved by underground water.

a. coprolite	b. trace fossil
c. cast	d. mold

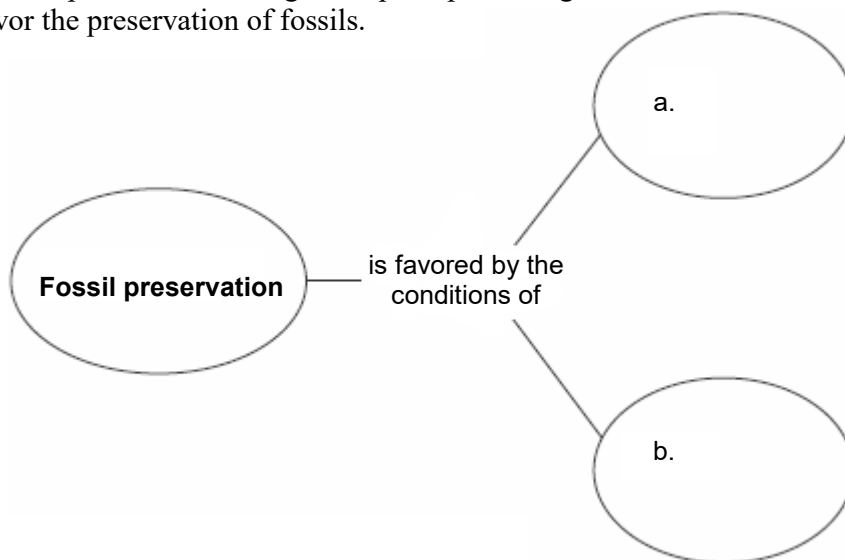
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Match each example with its type of fossil. Some types will be used more than once.

Example	Type of Fossil
_____ 5. frozen mammoth	a. preserved remains
_____ 6. animal footprint	b. trace fossil
_____ 7. fly in amber	

Conditions for Fossilization

8. Complete the following concept map showing conditions that favor the preservation of fossils.



Fossils and the History of Life

9. Fossil organisms succeed each other in an order that is definite and determinable according to the principle of _____.
10. According to Darwin's theory of evolution, one species can evolve into another through the process of _____.

Interpreting the Fossil Record

11. What are index fossils? _____

12. Is the following sentence true or false? Scientists use fossils to interpret and describe ancient environments. _____

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Section 12.3 Dating With Radioactivity

This section explains how radioactivity is used to determine the age of rocks.

Reading Strategy

Monitoring Your Understanding Preview the key concepts, topics, headings, vocabulary, and figures in this section. List two things you expect to learn about each. After reading, state what you learned about each item you listed. 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.

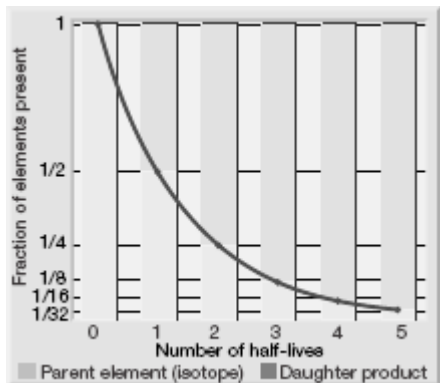
What I expect to learn	What I learned
1.	
2.	

What Is Radioactivity?

1. Is the following sentence true or false? Isotopes of the same element have different numbers of neutrons. _____
2. The process by which unstable nuclei spontaneously decay is known as _____.
3. Circle the letter of the final result of radioactive decay.
 - a. parent element
 - b. radioactive isotope
 - c. stable daughter product
 - d. unstable daughter product
4. Circle the letter of what decays first during radioactive decay.
 - a. parent element
 - b. stable isotope
 - c. stable daughter product
 - d. unstable daughter product

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Use the graph to answer the following three questions.



5. After one half-life, what fraction of the parent element has decayed to a daughter product? _____
6. After three half-lives, what fraction of the daughter product has formed?

7. How many half-lives must pass before only 1/32 of the parent element remains undecayed to a daughter product? _____

Radiometric Dating

8. The procedure called _____ provides a way to determine the ages of rocks that contain certain radioactive isotopes.
9. Is the following sentence true or false? A radioactive isotope decays at a varying rate from the time it forms. _____
10. What begins to happen to radioactive uranium as soon as a mineral containing it crystallizes from magma? _____

11. What conditions are needed for an accurate radiometric date to be obtained from a mineral sample? _____

Dating with Carbon-14

12. Circle the letter of the ratio of two substances that is compared in a sample of a dead organism during radiocarbon dating.
 - a. carbon-12 to uranium 238
 - b. carbon-14 to carbon-12
 - c. uranium-238 to lead-206
 - d. uranium-238 to carbon-12
13. Is the following sentence true or false? Radiometric dating is rarely used to determine the age of sedimentary rocks.

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Section 12.4 The Geologic Time Scale

This section discusses the geologic time scale and difficulties with constructing it.

Reading Strategy


Outlining As you read, complete the outline of the important ideas in this section. Use the green headings as the main topics and fill in details from the remainder of the text. 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.

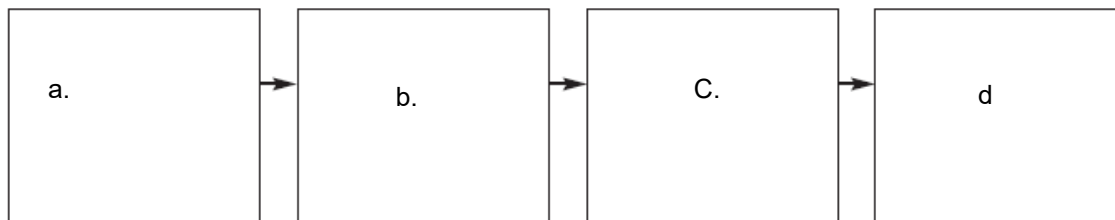
I. Structure of the Time Scale
A. _____
a. geologic time scale: _____

b. eon: _____
c. Precambrian time: _____
B. _____
d. era: _____
C. _____
e. period: _____
f. epoch: _____

1. What is the geologic time scale? _____

Structure of the Time Scale

2.  Complete the following flowchart with the types of subdivisions of the geologic time scale, from longest to shortest expanse of time.



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3. Is the following sentence true or false? The Precambrian represents a much longer part of Earth's history than the Phanerozoic.

4. Why do geologists know so little about Precambrian history?

5. The Precambrian time starts at _____ and continues until the start of the _____ period over 4 billion years later.

6. Circle the approximate percentage of the geologic time scale that Precambrian time comprises.

- a. 44 percent
- b. 50 percent
- c. 73 percent
- d. 88 percent

7. The eon called the _____ began about 540 million years ago.

8. Circle the letter of the eras into which the Phanerozoic is divided.

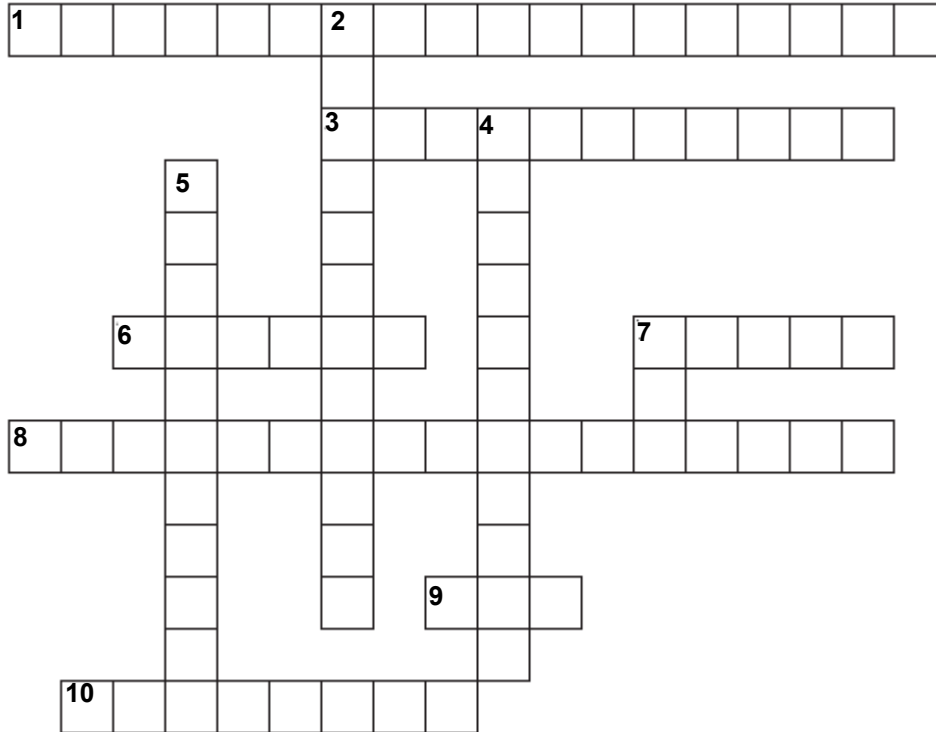
- | | |
|-----------------------------------|----------------------------------|
| a. epoch, period, eon | b. Proterozoic, Archean, Hadean |
| c. Triassic, Jurassic, Cretaceous | d. Paleozoic, Mesozoic, Cenozoic |

9. Is the following sentence true or false? Periods such as the Tertiary are characterized by more profound life-form changes than those of eras. _____

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WordWise

Test your knowledge of vocabulary terms from Chapter 12 by completing this crossword puzzle.



Clues across:

1. states that in an undeformed sequence of sedimentary rocks, each bed is older than the one above it
3. task of matching up rocks of similar age in different regions
6. subdivision of an era
7. shorter than a period on the geologic time scale
8. principle that states that the same physical, chemical, and biological laws operate today as in the past
9. greatest expanse of time on the geologic time scale
10. time when one half of a parent isotope is decayed

Clues down:

7. expanse of time (example: Paleozoic)
2. represents a break in the rock record
4. _____ dating: method of using carbon-14 to find the age of dead organisms
5. time indicator that is a particularly useful means of correlating rocks of similar age in different regions