Name: _____ Class: _____ Date: _____ ID: A

Earth's History and Fossil Record Short Study Guide

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

____ 1. On the geologic time scale, the smallest unit of time is called a(n) ____.
a. era
b. eon
c. period
d. epoch

____ 2. When part of the rock record is destroyed, the erosional gap that forms is a(n) ____.
a. inclusion
b. key bed
c. unconformity
d. superposition

____ 3. Which of the following is used to determine the absolute age of a rock?
a. relative-age dating
b. correlation
c. permineralization
d. radiometric dating

____ 4. Index fossils are useful to geologists if the fossils ____.
a. have lived over a short period of time
b. are not easily recognized
c. are not widely distributed geographically
d. are scarce

____ 5. What are fossil insects preserved in hardened tree sap called?
a. trace fossils
b. gastroliths
c. coprolites
d. amber

____ 6. Molds, casts, coprolites, and petrified wood are all example of ____.
a. fossils
b. radioactive isotopes
c. unconformities
d. disconformities

____ 7. The Phanerozoic Eon includes the Paleozoic, Mesozoic, and ____.
a. Cenozoic Periods
b. Jurassic Periods
c. Tertiary Epochs
d. Cenozoic Eras

____ 8. The Archean and Proterozoic are examples of ____.
a. eons
b. periods
c. epochs
d. eras

____ 9. Which of the following lists the units of geologic time in order from shortest to longest?
a. era, eon, period, epoch
b. epoch, eon, period, era
c. eon, era, period, epoch
d. epoch, period, era, eon

____ 10. An example of a trace fossil includes a ____.
a. cast of a clam
b. worm trail
c. mud crack
d. raindrop impression

Short Answer

11. Much of northern New Jersey was covered with glaciers during the last ice age. While digging in this region, a geologists discovers bands of light- and dark-colored clays just below the surface. What are these sediments and how is the geologist most likely to determine their age?

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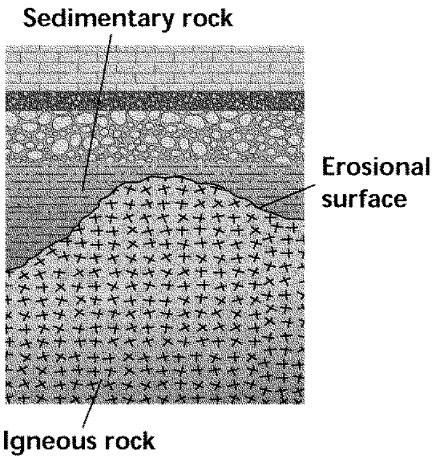
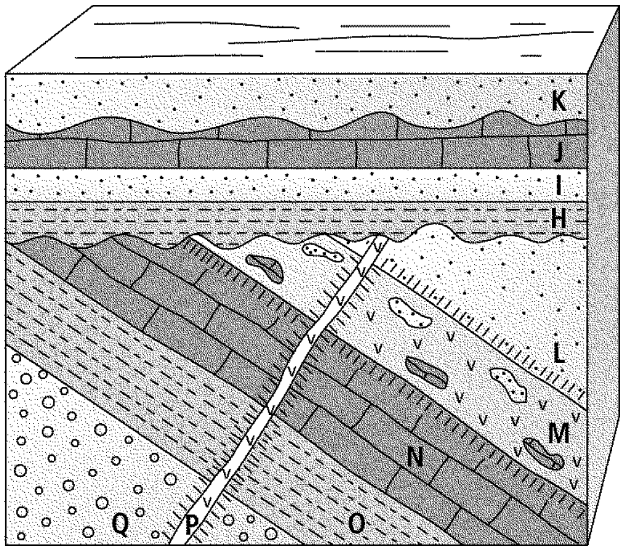
12. Identify the type of unconformity shown in the diagram below and describe how it formed.



13. Identify the two types of unconformities in the diagram below and describe how they formed.



14. Contrast relative-age dating and absolute-age dating.

15. Describe how geologists use index fossils. List the characteristics that make an index fossil.

Radiometric dating has proved invaluable to scientists in the attempt to determine how long ago Earth formed. A granite intrusion found in South Africa that contains inclusions of the metamorphic rock quartzite is believed to be one of the oldest rocks on Earth. Using radiometric dating, scientists determined the age of the rock to be approximately 3.2 billion years.

16. From this data, what conclusion can you draw about the age of Earth? Explain your answer.

17. Use the data above to state a hypothesis about the age of Earth. Describe how you would go about testing your hypothesis.

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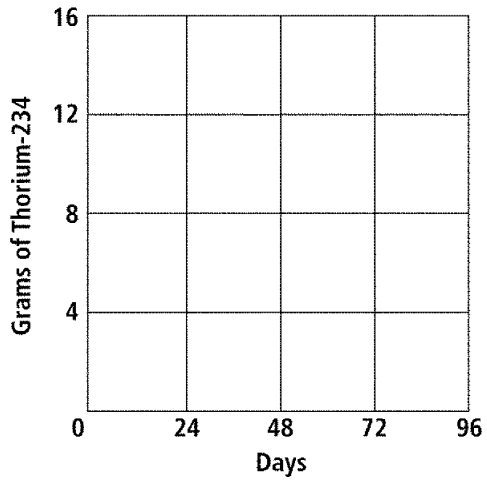
In a laboratory, you produce a quantity of the radioactive isotope thorium-234. Over the course of several weeks, the unstable isotope decays, and you measure the amount of thorium-234 remaining in the sample. You obtain the following data.

Days Elapsed	Grams of Thorium-234 Remaining
0	16
12	11
24	8
36	6

18. Use the data to determine the half-life of thorium-234. Explain your answer.

19. Use the data to complete the graph below.



20. How long will it take for 15 grams of the original thorium-234 to decay?

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Problem

The table lists commonly used radioactive isotopes and their half-lives. Study the table and answer the following questions.

Half-Lives of Selected Radioactive Isotopes		
Radioactive Isotope	**Approximate Half-Life**	**Decay Product**
Rubidium-87	48.6 billion years	Strontium-87
Thorium-232	14.0 billion years	Lead-208
Potassium-40	8.4 billion years	Argon-40
Uranium-238	4.5 billion years	Lead-206
Uranium-235	0.7 billion years	Lead-207
Carbon-14	5730 years	Nitrogen-14

21. Which isotope has the longest half-life?
22. Which stable element does Uranium-238 decay into?
23. Which isotope would be most helpful in dating bones thought to be about 6000 years old?
24. After 28 billion years, what percentage of an original sample of Thorium-232 will remain undecayed?

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Earth's History and Fossil Record Short Study Guide
Answer Section

MULTIPLE CHOICE

1. D
2. C
3. D
4. A
5. D
6. A
7. D
8. A
9. D
10. B

SHORT ANSWER

11. They are varves, or glacial lake sediments. Their age can be determined by comparing them to other varves, whose ages are known, from different lakes in the area.
12. It is a nonconformity. The nonsedimentary rock was uplifted and exposed at the surface by weathering and erosion, then the erosional surface was buried when the sedimentary rock was deposited.
13. An angular unconformity occurs below layer H. It formed when the layers below were uplifted and the surface was eroded, followed by the deposition of H. A disconformity occurs between layers J and K. It formed when J was eroded, followed by the deposition of K.
14. Relative-age dating places the ages of rocks and the events that formed them in order, without exact dates. This is done by comparing one event with another or one rock with another rock. In contrast, absolute-age dating determines the actual age of a rock, a fossil, or an object. This is done through radiometric dating, a process that determines the ratio of parent material to daughter product in a given sample of rock or fossil.
15. Geologists use index fossils to correlate rock layers over large geographic areas or to date a particular rock layer. To be useful, an index fossil must be easily recognized, abundant, and widely distributed geographically. It must also have lived over a short period of time.
16. Prior to the formation of the granite, a sandstone layer must have been deposited that underwent metamorphosis to form quartzite. The quartzite was then intruded by magma that cooled and crystallized into granite. Pieces of quartzite that became dislodged during the intrusion became incorporated into the granite as inclusions. From this, you can conclude that Earth is at least as old as the quartzite, and older than the granite, or more than 3.2 billion years old.
17. Students should hypothesize that Earth is more than 3.2 billion years old. To test this hypothesis, they might look for rocks that would be older than the granite such as the source of the quartzite inclusions, which would likely be found surrounding the granite in the rock record. They could sample and use radiometric dating to determine the age of the rocks.

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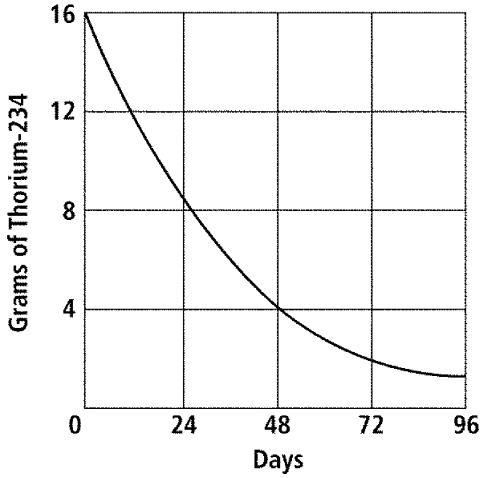
18. The half-life of thorium-234 is 24 days. After 24 days, half (8 grams) of the original amount of thorium-234 (16 grams) decayed.
19. 

20. 96 days, or 4 half-lives

PROBLEM

21. Rubidium-87
22. Lead-206
23. Carbon-14
24. 25 percent

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