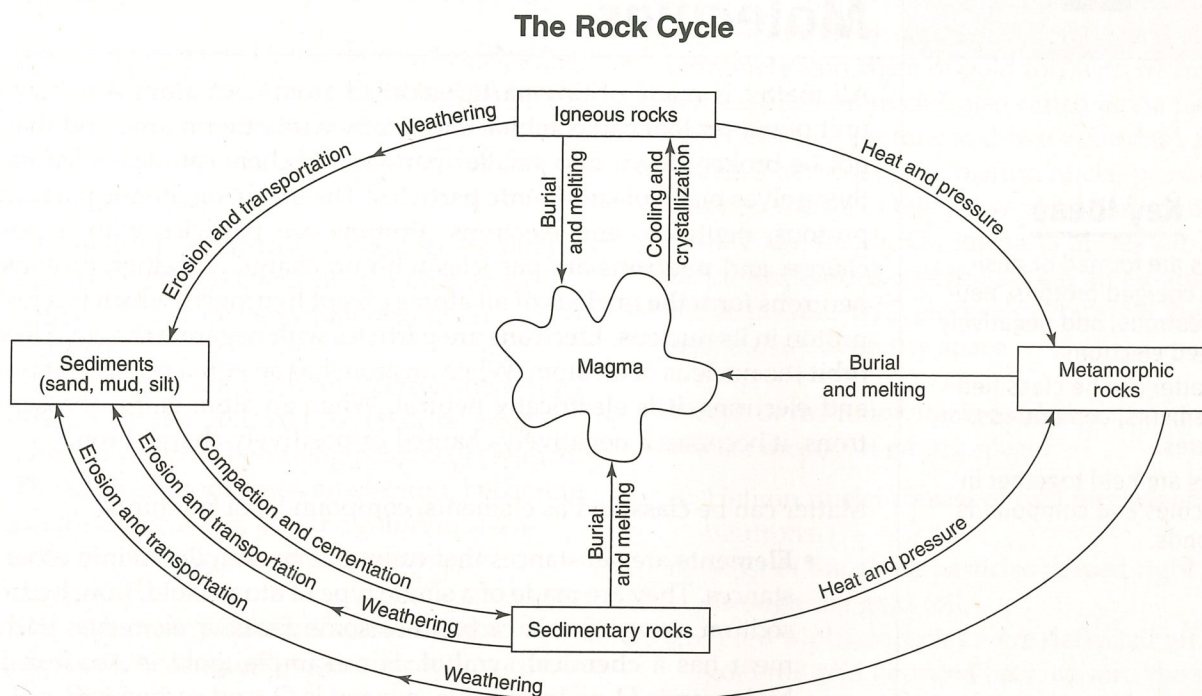


Questions 13 through 15 refer to the following diagram.



13. Which of the following statements is supported by the information in the diagram?

- A. The rock cycle is a continuous process of rock formation, destruction, and reformation.
- B. Sedimentary rocks form under conditions of heat and pressure.
- C. Metamorphic rocks form under conditions of compaction and cementation.
- D. Sediments form only from sedimentary rocks.

14. Fossils can form when plant or animal remains are buried under sand, mud, or silt. These materials can be compacted to form rock. A hiker knew she had found a(n)

Select... because it contained the fossilized imprint of a fish.

- igneous rock
- sedimentary rock
- rock formed from magma

15. What is magma?

- A. melted rock
- B. crystallized rock
- C. cooled rock
- D. eroded rock

16. In open-pit mining, surface layers of soil and rock are stripped to obtain coal, ores, or minerals. It is cheaper than shaft mining because there is no underground work.

Which of the following is the most likely reason that some countries restrict open-pit mining?

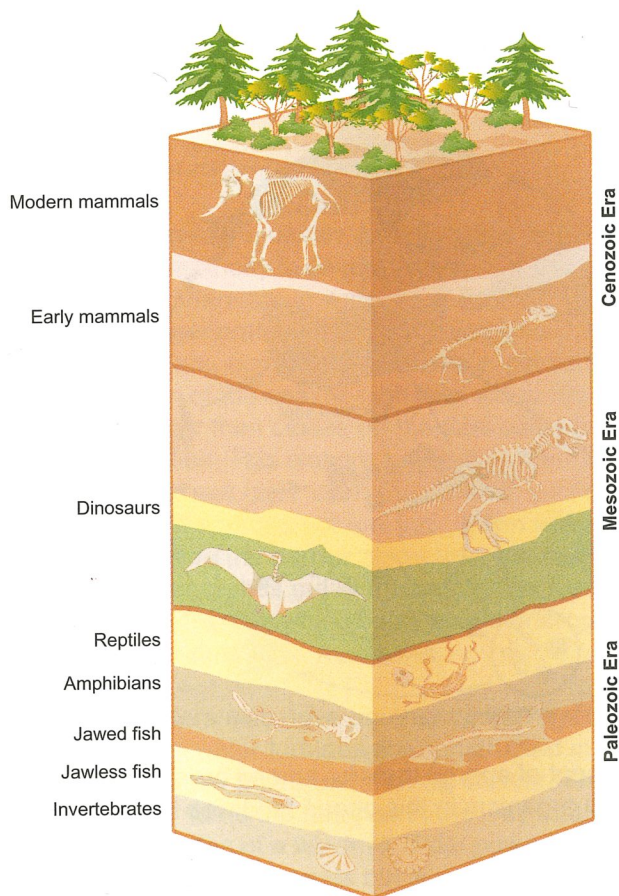
- A. There are no underground deposits.
- B. Open-pit mining is more dangerous than shaft mining.
- C. Open-pit mining destroys valuable land.
- D. Open-pit mining yields low-grade coal, ores, and minerals.

Answers and explanations start on page 707.

DIRECTIONS: Study the information and diagram, read the question, and choose the **best** answer.

DETERMINING AGES OF ROCKS

Scientists use observations of rock, radiometric dating, and fossils to determine the ages of rock layers. In an undisturbed column of rock, the oldest layer is at the bottom, and the youngest is at the top. The sequence of geological events, therefore, can be seen in the rock. The times in Earth's history when certain plants or animals lived is also known. Therefore, fossils found in rock, as demonstrated in the diagram, can help approximate the rock's age. Radiometric dating can identify the exact age of rock through the use of radioactive isotopes. Isotopes are forms of an element with the same number of protons but different numbers of neutrons. Some isotopes decay, or lose their radioactivity, at a different rate. When scientists know the amount of a radioactive isotope in a rock, the known rate of decay for the isotope, and the amount of the isotope and the product of its decay in a rock, they can pinpoint the age of the rock.



2. Based on the diagram, when in geologic time did jawless fish likely come into existence?

A. the middle of the Paleozoic Era
B. the end of the Paleozoic Era
C. the middle of the Mesozoic Era
D. the end of the Cenozoic Era

DIRECTIONS: Read the passage and question, and choose the **best** answer.

Through observation and measurement of certain astronomical events, scientists estimate that Earth is about 4.54 billion years old. Through the process of radiometric dating, scientists can identify the exact age of rock by using radioactive isotopes. The various isotopes decay at specific rates and yield certain products when they decay. Scientists can measure the amounts of a particular isotope and the product of its decay within a rock sample. Then they can calculate the age of the rock sample. Scientists have found a mineral determined to be about 4.4 billion years old in a younger rock. They think it was eroded from an older rock.

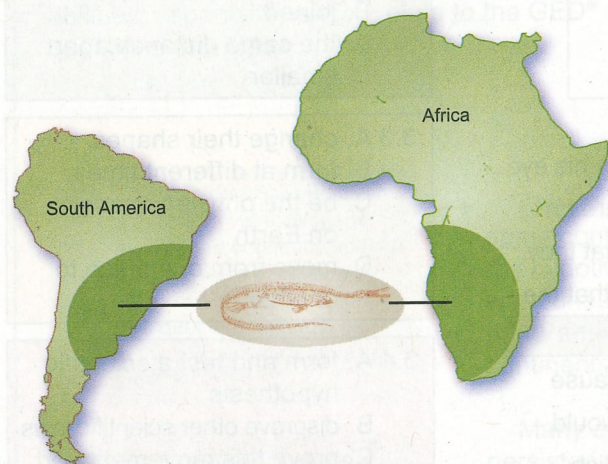
13. Which statement expresses a conclusion that can be reached about the dating of rock?
- A. Scientists must know the order in which layers of rock were deposited in land formations to know the exact age of rock.
B. Scientists can use radioactive or nonradioactive isotopes for radiometric dating.
C. Knowing the rate of decay of a radioactive isotope is essential in radiometric dating.
D. After a certain amount of time, the radioactive isotopes in rock destroy it, making radiometric dating of the rock impossible.

3 Master the Skill

DIRECTIONS: Study the information and diagram, read each question, and choose the **best** answer.

MESOSAURUS FOSSIL LOCATIONS

Geologists have discovered fossils of an ancient reptile called *Mesosaurus* in just two places on Earth: eastern South America and southwestern Africa. Evidence from fossil-dating techniques indicates that *Mesosaurus* lived during the Permian Period, about 300 million to 270 million years ago. It was about 1 meter long and lived in freshwater habitats. A valid hypothesis is that the fossils were found only where they were because those places were once joined. Scientists use the fossils as evidence to support the theory of continental drift.



5. Scientists continue to look for evidence to support existing theories. Which finding would strengthen the fossil evidence support for the continental drift theory?
 - A. *Mesosaurus* fossils are equally common all over the world.
 - B. *Mesosaurus* was a poor long-distance swimmer.
 - C. A species today exists that descended from *Mesosaurus*.
 - D. The *Mesosaurus* fossils on the two continents actually came from different species.
6. Fossils of an ancient fern also have been cited as evidence for the continental drift theory. Based on the locations of Earth's continents, where have these fossils **most likely** been found?
 - A. southern Africa and Antarctica
 - B. South America and North America
 - C. Asia and Europe
 - D. Canada and Mexico

7. Some scientists did not accept *Mesosaurus* fossils as evidence that South America and Africa once were joined. They hypothesized that the animals might have moved between the continents on a land bridge. What evidence would have supported the land bridge hypothesis and helped refute the continental drift theory?
 - A. maps showing how the land bridge would have looked
 - B. signed statements from other scientists expressing the same idea
 - C. remnants of the land bridge on the seafloor today
 - D. the presence of land bridges between some continents today

DIRECTIONS: Study the table, read the question, and choose the **best** answer.

SOME MAJOR EVIDENCE FOR PLATE TECTONIC THEORY

General Evidence	Examples
A. Shapes of coastlines	"Fit" of southwestern Africa and eastern South America
B. Fossil evidence	Fossils of an animal found only in eastern South America and southwestern Africa
C. Similarities in rock layers on separate continents	Appalachian Mountains in North America and mountains in Europe with same layers of rock
D. Geologic processes (earthquakes, volcanic eruptions)	Occurrence most common around the Pacific Ocean

8. The theory that tectonic plates—huge slabs of rock covering Earth's surface—push together and pull apart to cause landforms developed from many lines of evidence. Which pieces of evidence for plate tectonic theory also relate to the theory of continental drift?
 - A. A and B
 - B. A and C
 - C. A, B, and C
 - D. B, C, and D