

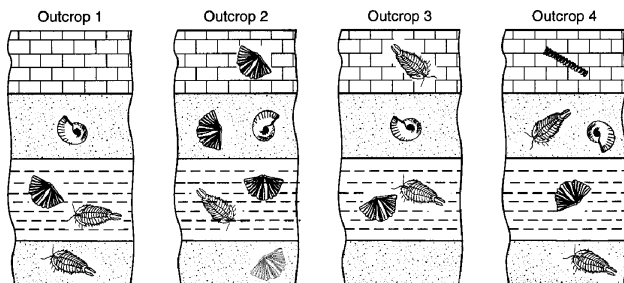
Name: \_\_\_\_\_

Date: \_\_\_\_\_





1. Which bedrock would be most likely to contain fossils?
- A. Precambrian granite                      B. Cambrian shale  
 C. Pleistocene basalt                      D. Middle-Proterozoic quartzite

2. Which life-form existed on Earth during the same time period?
- A. trilobites and mastodons  
 B. ammonoids and Naples trees  
 C. armored fish and flowering plants  
 D. dinosaurs and early humans

3. The diagrams below represent the rock layers and fossils found at four widely separated rock outcrops.

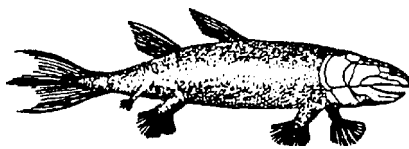


Which fossil appears to be the best index fossil?

- A.       B.       C.       D. 

4. Which statement about the species of animals and plants that lived on Earth in the past is best supported by the fossil record?
- A. Most became extinct  
 B. Most lived on the land  
 C. Most were preserved in metamorphic rock  
 D. Most appeared during the Cambrian period

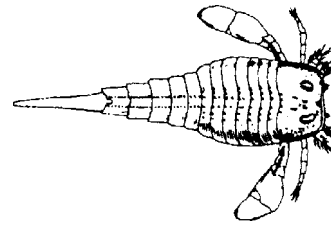
5. The primitive lobe-finned fish shown below is thought to be an ancestor of early amphibians.



This evolutionary development from fish to amphibian is believed to have occurred during the

- A. Triassic Period                      B. Devonian Period  
 C. Tertiary Period                      D. Permian Period

6. Base your answer(s) to the following question(s) on the *Earth Science Reference Tables*, the index fossil diagram below, and your knowledge of Earth science. This index fossil was found in surface bedrock in New York State.



This index fossil is representative of a group of invertebrate animals known as

- A. trilobites                      B. stromatolites  
 C. brachiopods                      D. eurypterids

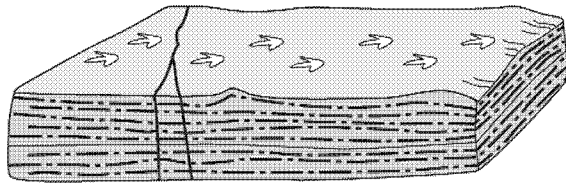
7. During which geologic time period was this particular species alive and most abundant?
- A. Cambrian      B. Jurassic      C. Silurian      D. Tertiary

8. Index fossils, such as the one in the diagram, are useful to geologists for correlating rocks because each species
- A. was narrowly distributed and became extinct after a long geologic existence  
 B. was widely distributed and became extinct after a short geologic existence  
 C. is easily found and is living today  
 D. is rarely found and is no longer living

9. Which information could scientists most easily infer about the location where this index fossil was found?
- A. environmental conditions that existed when the animal lived  
 B. change in the seafloor-spreading rates from the time this animal lived to the present  
 C. length of time necessary to form the igneous rock in which this fossil was found  
 D. amount of radioactive carbon-14 in Earth's atmosphere when this animal lived

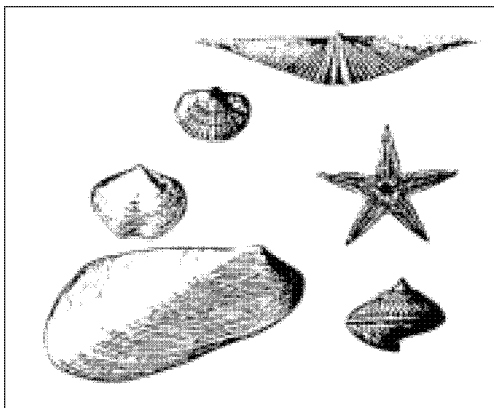
10. The surface bedrock in which this index fossil was found is most likely composed of
- A. basalt                      B. granite  
 C. limestone                      D. anthracite coal

11. Which animals do scientists believe could have been hunted by humans, based on evidence such as stone spearpoints found embedded in the animals' bones?
- A. dinosaurs                      B. mammoths  
C. armored fishes                D. trilobites
12. Fossils would most likely be found in a sample of
- A. limestone                      B. granite  
C. quartzite                        D. metaconglomerate
13. Base your answer(s) to the following question(s) on the diagram below, which represents a rock sample containing fossilized *Coelophysis* footprints. The sample was found in New York State.



The siltstone layer containing the dinosaur footprints was turned into rock by

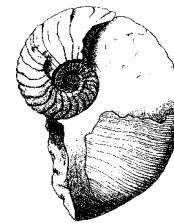
- A. folding and faulting            B. burial and cementation  
C. weathering and erosion        D. deformation and melting
14. According to current knowledge of New York State fossils, during which geologic time period were these footprints most probably made?
- A. Cambrian    B. Devonian    C. Triassic    D. Tertiary
15. The accompanying diagram represents the fossils found in a bedrock formation located in central New York State.



In which type of rock were the fossils most likely found?

- A. igneous rock that formed in an ocean environment  
B. igneous rock that formed in a land environment  
C. sedimentary rock that formed in an ocean environment  
D. sedimentary rock that formed in a land environment

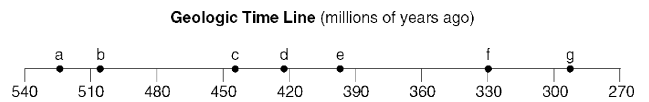
16. Carbon-14, an isotope used to date recent organic remains, would most likely be useful in determining the age of a fossil
- A. trilobite                              B. *Coelophysis*  
C. armored fish                        D. Beluga whale
17. Near which location in New York State would a geologist have the greatest chance of finding dinosaur footprints in the surface bedrock?
- A. 41° 10' N latitude, 74° W longitude  
B. 42° 10' N latitude, 74° 30' W longitude  
C. 43° 30' N latitude, 76° W longitude  
D. 44° 30' N latitude, 75° 30' W longitude
18. The diagram below shows a fossil found in the surface bedrock of New York State.



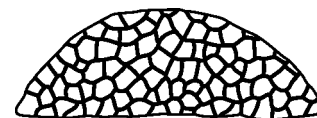
**Centroceras**

Which other fossil is most likely to be found in the same age bedrock?

- A. *Phacops*                              B. condor  
C. *Coelophysis*                        D. *Tetragraptus*
19. Which group of organisms, some of which were preserved as fossils in early Paleozoic rocks, are still in existence today?
- A. brachiopods                        B. eurypterids  
C. graptolites                          D. trilobites
20. Base your answer(s) to the following question(s) on the geologic time line shown below. Letters *a* through *g* on the time line indicate specific reference points in geologic time.






Place an **X** on the geologic time line, so that the center of the **X** shows the time that the coral index fossil *Lichenaria* shown below existed on Earth.



21. A fossil shell contains 25% of the original amount of its carbon-14. Approximately how many years ago was this shell part of a living organism?
- A. 5,700 years ago                      B. 11,400 years ago  
 C. 17,100 years ago                      D. 22,800 years ago

22. Base your answer(s) to the following question(s) on the table of index fossils shown below and on your knowledge of Earth science.

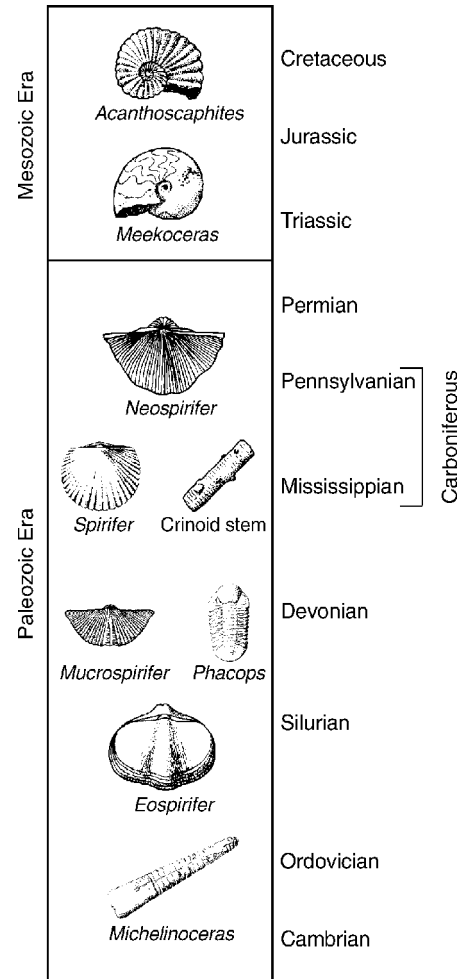
Table of Index Fossils		
		
Eospirifer	Manticoceras	Phacops

During what geologic time period did the oldest index fossil shown in this table exist?

23. State *one* characteristic of a good index fossil.
24. Complete the classification table by filling in the general fossil group name for *each* index fossil.

Index Fossil	<i>Eospirifer</i>	<i>Manticoceras</i>	<i>Phacops</i>
<b>General Fossil Group</b>			

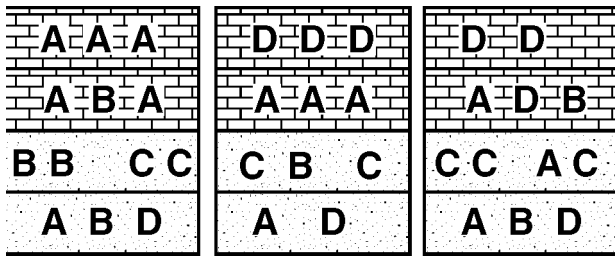
25. Base your answer(s) to the following question(s) on the chart, which shows the geologic ages of some wellknown fossils.



The *Spirifer*, Crinoid stem, and *Neospirifer* fossils might be found in some of the surface bedrock of which New York State landscape region?

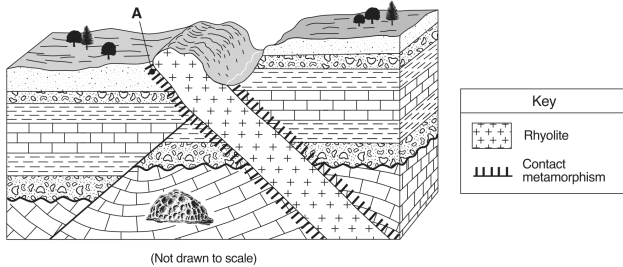
- A. the Allegheny Plateau southeast of Jamestown  
 B. the Catskills near Slide Mountain  
 C. the Adirondack Mountains near Mt. Marcy  
 D. the Erie-Ontario Lowlands northeast of Niagara Falls
26. Which New York State fossil is found in rocks of the same period of geologic history as *Meekoceras*?
- A. Condor                                      B. Placoderm fish  
 C. *Eurypterus*                                D. *Coelophysis*

27. The three cross sections of sedimentary bedrock shown below represent widely separated surface exposures of layers that contain fossils. Letters A, B, C, and D represent four different marine fossils found in these rock layers. Which letter best represents an index fossil?



- A. A      B. B      C. C      D. D

28. Base your answer(s) to the following question(s) on the block diagram below, which shows rock units that have not been overturned. Point A is located in the zone of contact metamorphism. A New York State index fossil is shown in one of the rock units.



State the evidence shown by the block diagram that supports the inference that the fault is older than the rhyolite.

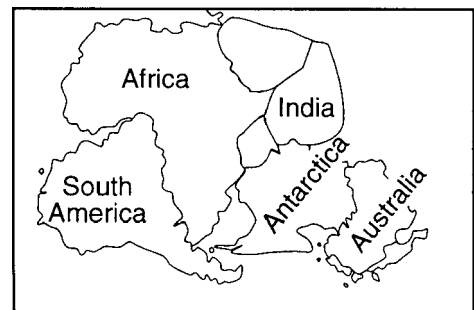
29. Identify the geologic time period when the index fossil shown in the block diagram was a living organism.  
\_\_\_\_\_ Period
30. Identify the crystal size of the minerals in rhyolite and explain what this size indicates about the rate of cooling of the magma from which it formed.  
Crystal size: \_\_\_\_\_  
Explanation: \_\_\_\_\_
31. Identify the metamorphic rock that most likely formed at point A.
32. Describe *one* piece of evidence that would indicate that the valley shown on the surface of the block diagram had been eroded and deepened by a glacier.
33. A 65.5-million-year-old impact crater in Mexico provides evidence for the cause of the
- A. breakup of Pangaea  
B. evolution of the earliest corals  
C. Alleghenian orogeny  
D. extinction of ammonoids

34. Base your answer(s) to the following question(s) on the cross sections below and on your knowledge of Earth science. The cross sections represent three bedrock outcrops, 1, 2, and 3, found several kilometers apart. The geologic time period when each sedimentary rock layer formed is shown. The symbols ☆, ○, X, □, and △ represent fossils of different types of organisms present in the rock layers.

Outcrop 1	Outcrop 2	Outcrop 3
Permian X	Devonian ○	Permian △ X
Pennsylvanian X △	Silurian △	Pennsylvanian △ X
Mississippian X	Ordovician □	Devonian ○ △
Devonian ○ □	Cambrian ☆	Silurian △

Draw the fossil symbol that represents the best index fossil. Describe *one* piece of evidence shown in the outcrops that indicates that this fossil has characteristics of a good index fossil.

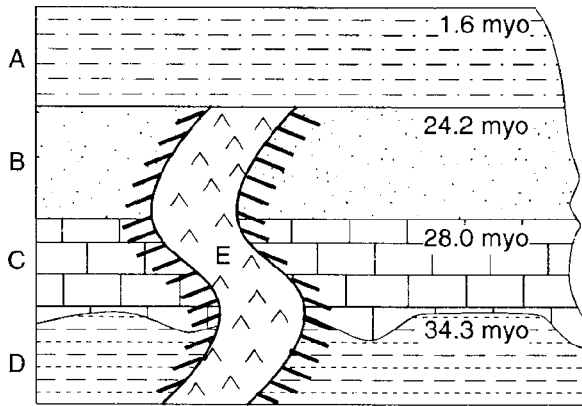
35. Write the outcrop number of the cross section that could be found in New York State. Describe the evidence that supports your answer.
36. Explain why the index fossil *Coelophysis* is *not* preserved in any of the rock outcrops.
37. What is the estimated age of Earth?
- A.  $4.6 \times 10^6$  years      B.  $4.6 \times 10^7$  years  
C.  $4.6 \times 10^8$  years      D.  $44.6 \times 10^9$  years
38. The accompanying diagram shows how scientists think some of Earth's continents were joined together in the geologic past.



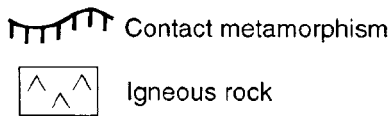
When do scientists think these continents were joined together?

- A. during the Tertiary Period, only  
B. from the Cretaceous Period through the Tertiary Period  
C. from the Devonian Period through the Triassic Period  
D. during the Cambrian Period, only

39. The accompanying geologic cross section below represents a cliff outcrop. Some bedrock layers are labeled as millions of years old (myo). Letters A through E represent different rock types.



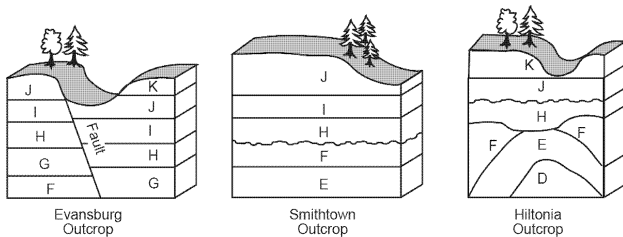
Key:



What is a possible age of igneous rock E?

- A. 1.5 million years old      B. 12 million years old  
 C. 28 million years old      D. 40 million years old
40. Which major mountain-building episode is most recent?
- A. Grenville orogeny      B. Taconian orogeny  
 C. Acadian orogeny      D. Appalachian orogeny

41. Base your answer(s) to the following question(s) on the *Earth Science Reference Tables*, your knowledge of Earth science, and the block diagrams below, which represent three widely separated outcrops. All rock layers are sedimentary. No overturning has occurred. Layers labeled with the same letter are the same age.



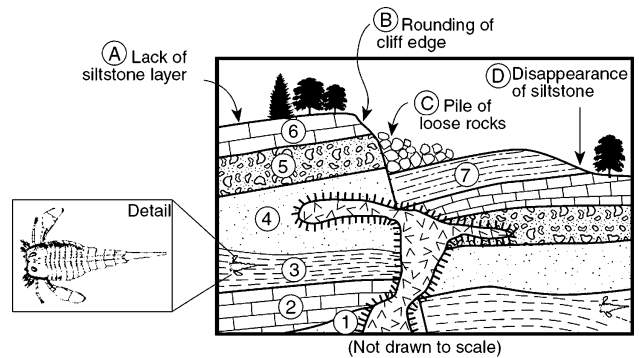
The fault in the Evansburg Outcrop is younger than

- A. G, only      B. J, only  
 C. G and J, only      D. F, G, H, I, and J

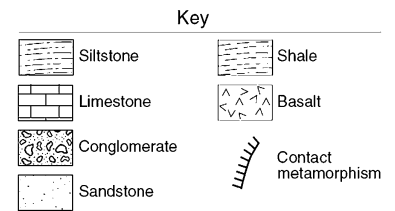
42. Which method would provide the most reliable evidence for the idea that layer J was deposited at the same time in each location?
- A. measuring the percentage of the mineral cement in each J layer  
 B. measuring the thickness of each J layer  
 C. comparing the mineral composition of each J layer  
 D. comparing the fossils in each J layer

43. Which order of events occurred at the Hiltonia Outcrop between the formation of layer F and the beginning of the deposition of layer H?
- A. uplift → erosion → faulting → deposition  
 B. folding → uplift → erosion → subsidence  
 C. subsidence → erosion → deposition → faulting  
 D. folding → erosion → faulting

44. Base your answer(s) to the following question(s) on the diagram below of a cross section of a portion of Earth's crust. Letters A through D represent landscape features, and numbers 1 through 7 represent rock layers. The detail shows a fossil found in layer 3.



(Not drawn to scale)



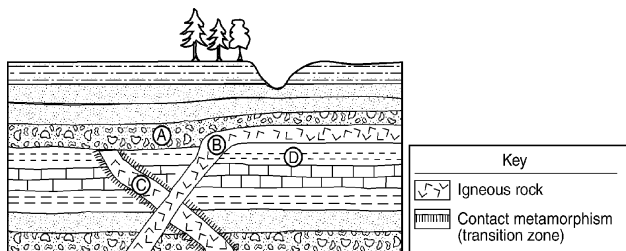
What is the correct sequence of events from oldest to most recent in the geologic history of this area?

- A. deposition of layers from 1 to 7 → intrusion of basalt → faulting  
 B. deposition of layers from 1 to 7 → faulting → intrusion of basalt  
 C. deposition of layers from 7 to 1 → intrusion of basalt → faulting  
 D. deposition of layers from 7 to 1 → faulting → intrusion of basalt

45. Base your answer(s) to the following question(s) on the cross section provided below.

The cross section represents a portion of Earth's crust.  
Letters A, B, C, and D are rock units.

In relation to rock units A and B in the cross section, when was igneous rock C formed?



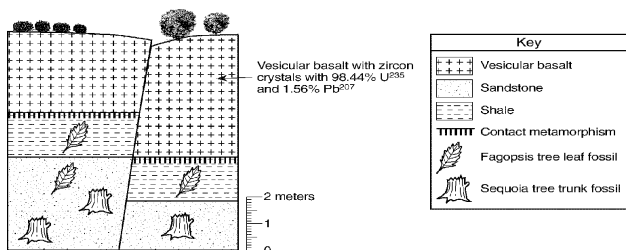
46. Which event occurred earliest in geologic history?

- A. appearance of the earliest grasses
- B. appearance of the earliest birds
- C. the Grenville Orogeny
- D. the intrusion of the Palisades Sill

47. According to the Geologic History of New York State in the Earth Science Reference Tables, the inferred latitude of New York State 362 million years ago was closest to

- A. where it is now
- B. the North Pole
- C. the Equator
- D. 45° south

48. Base your answer(s) to the following question(s) on the geologic cross section provided, which represents an outcrop of various types of bedrock and bedrock features in Colorado.

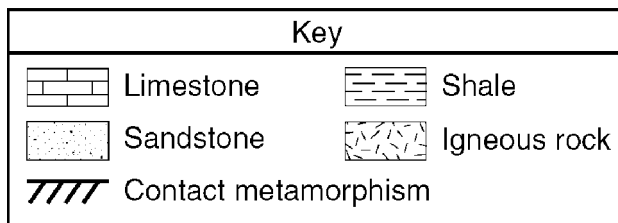
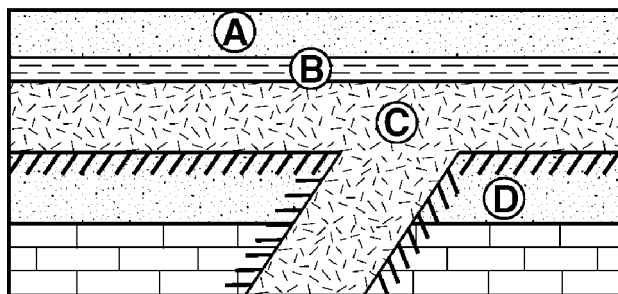


Place the geologic events listed in order by numbering them from oldest (1) to youngest (4).

- \_\_\_\_\_ The fault was formed.
- \_\_\_\_\_ The shale was deposited.
- \_\_\_\_\_ The vesicular basalt was formed.
- \_\_\_\_\_ The sandstone was deposited.

49. The diagram below shows a geologic cross section. Letters A through D represent different rock units.

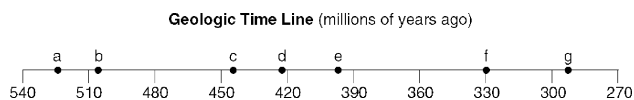
Surface



Which sequence correctly shows the age of the lettered rock units, from oldest to youngest?

- A. A → B → C → D
- B. C → D → A → B
- C. D → B → A → C
- D. D → C → B → A

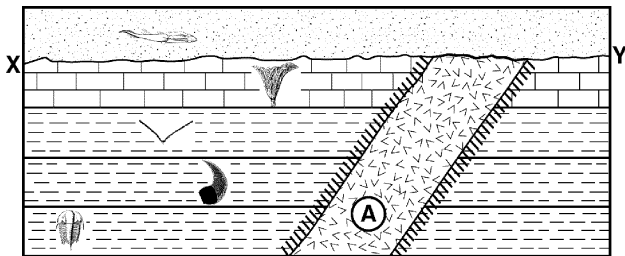
50. Base your answer(s) to the following question(s) on the geologic time line shown below. Letters a through g on the time line indicate specific reference points in geologic time.



Letter a indicates a specific time during which geologic period?

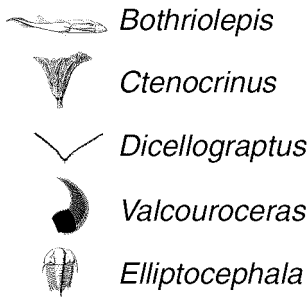
- 51. Identify the mountain building event (orogeny) that was occurring in eastern North America at the time represented by letter g.
- 52. Identify *one* letter that indicates a time for which there is no rock record in New York State.

53. Base your answer(s) to the following question(s) on the geologic cross section below and on your knowledge of Earth science. The cross section shows New York State index fossils in rock layers that have not been overturned. Rock unit A is an igneous intrusion and line XY represents an unconformity.



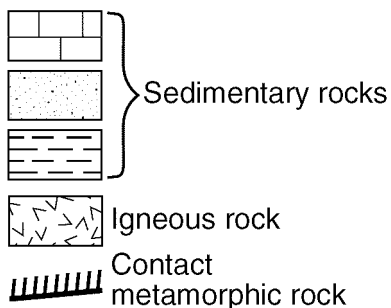
Key

Index Fossils



Key

Rock Units



Identify *one* piece of evidence shown in this cross section that indicates that the igneous intrusion, A, is older than the sandstone layer.

54. New York State has no bedrock from which geologic time period?
- A. Cambrian B. Devonian C. Permian D. Cretaceous
55. What is the geologic age of the surface bedrock of most of the Allegheny Plateau landscape region in New York State?
- A. Cambrian B. Devonian C. Silurian D. Ordovician
56. During which era did the initial opening of the present-day Atlantic Ocean most likely occur?
- A. Cenozoic B. Mesozoic  
C. Paleozoic D. Late Proterozoic

57. During which geologic time period did the earliest reptiles and great coal-forming forests exist?
- A. Devonian B. Quaternary  
C. Mississippian D. Pennsylvanian
58. Which statement best explains why geologic materials from the Quaternary Period must be dated by using radioactive isotopes different from the isotopes used to date materials from the Cambrian Period?
- A. All rocks contain radioactive substances  
B. Some isotopes decay faster than others  
C. Not all isotopes form stable decay products  
D. The decay of atoms occurs as a random event
59. The half-life of a radioactive substance is mainly controlled by the
- A. amount of the substance  
B. composition of the substance  
C. pressure acting on the substance  
D. temperature of the substance
60. Why are radioactive substances useful for measuring geologic time?
- A. The ratio of decay products to radioactive substances remains constant in rocks.  
B. The half-lives of radioactive substances are short.  
C. Samples of radioactive substances are easy to collect from rocks.  
D. Radioactive substances undergo decay at a predictable rate.
61. The characteristic of the radioactive isotope uranium-238 that makes this isotope useful for accurately dating the age of a rock is the isotope's
- A. organic origin  
B. constant half-life  
C. common occurrence in sediments  
D. resistance to weathering and erosion
62. A whalebone that originally contained 200 grams of radioactive carbon-14 now contains 25 grams of carbon-14. How many carbon-14 half-lives have passed since this whale was alive?
- A. 1 B. 2 C. 3 D. 4
63. Due to radioactive decay, an igneous rock sample now contains one-fourth of the amount of potassium-40 that it originally contained. The age, in years, of this rock sample is approximately
- A.  $0.7 \times 10^9$  y B.  $1.3 \times 10^9$  y C.  $2.6 \times 10^9$  y D.  $5.2 \times 10^9$  y