


## Topic 10 - Earth's History

1. Base your answer to the following question on the data table below. The table shows the percentage of original carbon-14 remaining in three different fossils. The approximate ages of the gastropod shell and the tree wood are shown in years. The age of the human bone has been left blank.

**Data Table**

<b>Fossil</b>	<b>Original <sup>14</sup>C Remaining (%)</b>	<b>Approximate Age (y)</b>
gastropod shell	50	5,700
tree wood	25	11,400
human bone	12.5	

What is the approximate age of the human bone fossil?

- A) 5,700 y      B) 17,100 y      C) 22,800 y      D) 39,900 y
2. 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**
3. Approximately how many years ago did the solar system originate?
- A) 570,000,000      B) 1,000,000,000  
C) **4,500,000,000**      D) 10,000,000,000
4. Much of the evidence for the evolution of lifeforms on Earth has been obtained by
- A) studying the life spans of present-day animals  
B) radioactive dating of metamorphic rock  
C) correlating widespread igneous ash deposits  
D) **examining fossils preserved in the rock record**
5. Fossil pollen has been recovered from sediments deposited in late-Pleistocene lakes. The pollen's geologic age can most accurately be measured by using
- A) rubidium-87      B) potassium-40  
C) oxygen-18      D) **carbon-14**
6. The photograph below shows the bedrock structure of a limestone outcrop.
- 
- Which process is responsible for the deformation of this bedrock?
- A) **folding**      B) weathering  
C) mass movement      D) volcanic activity
7. Which group of organisms survived mass extinctions that marked the ends of both the Paleozoic Era and the Mesozoic Era?
- A) ammonoids      B) graptolites  
C) eurypterids      D) **gastropods**

Base your answers to questions **8** through **10** on the reading passage and the drawing below and on your knowledge of Earth science.

### **Fossil With Signs of Feathers Is Cited as Bird-Dinosaur Link**

Paleontologists have discovered in China a fossil dinosaur with what are reported to be clear traces of feathers from head to tail, the most persuasive evidence so far, scientists say, that feathers predated the origin of birds and that modern birds are descendants of dinosaurs.

Entombed in fine-grained rock, the unusually well-preserved skeleton resembles that of a duck with a reptilian tail, altogether about three feet in length. Its head and tail are edged with the imprint of downy fibers. The rest of the body, except for bare lower legs, shows distinct traces of tufts and filaments that appear to have been primitive feathers. On the backs of its short forelimbs are patterns of what look like modern bird feathers.

Other dinosaur remains with what appear to be featherlike traces have been unearthed in recent years, but nothing as complete as this specimen, paleontologists said. Etched in the rock like a filigree decoration surrounding the skeleton are imprints of where the down and feathers appear to have been.

The 130-million-year-old fossils were found a year ago by farmers in Liaoning Province in northeastern China. After an analysis by Chinese and American researchers, the fossil animal was identified as a dromaeosaur, a small fast-running dinosaur related to velociraptor. The dinosaurs belonged to a group of two-legged predators known as advanced theropods . . .

*excerpted from "Fossil With Signs of*

*Feathers Is Cited as Bird-Dinosaur Link"*

*John Noble Wilford*

*New York Times April 26, 2001*

The drawing below shows an artist's view of the dinosaur, based on the fossilized remains.

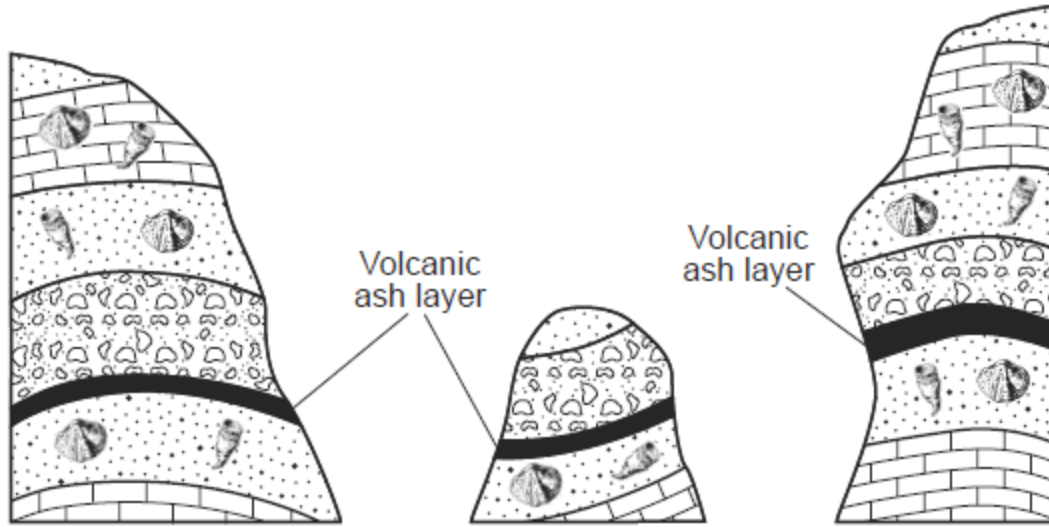


5. The reference to the bird-dinosaur link is most likely referring to the concept of
- A) plate tectonics  
B) **evolution**  
C) dynamic equilibrium  
D) recycling
9. During which period of geologic time have paleontologists inferred that the feathered dinosaur mentioned in the passage existed?
- A) Cambrian      B) **Cretaceous**      C) Paleogene      D) Permian
10. This feathered dinosaur is not considered an index fossil because it
- A) existed too long ago  
B) was preserved in ash  
C) was a land-dwelling animal  
D) **was found in only one area**

11. When did the Jurassic Period end?
- A) 66 million years ago  
B) **144 million years ago**  
C) 163 million years ago  
D) 190 million years ago
12. Evidence indicates that 251 million years ago a mass extinction of many life-forms occurred on Earth. Which form of life became extinct at this time?
- A) **trilobites**              B) dinosaurs  
C) mammoths             D) eurypterids

13. An observer discovers shallow-water marine fossils in rock strata at an elevation of 5,000 meters. What is the best explanation for this observation?
- A) The level of the ocean was once 5,000 meters higher.  
B) Violent earthquakes caused crustal subsidence.  
C) Marine organisms have evolved into land organisms.  
D) **Crustal uplift has occurred in this area.**

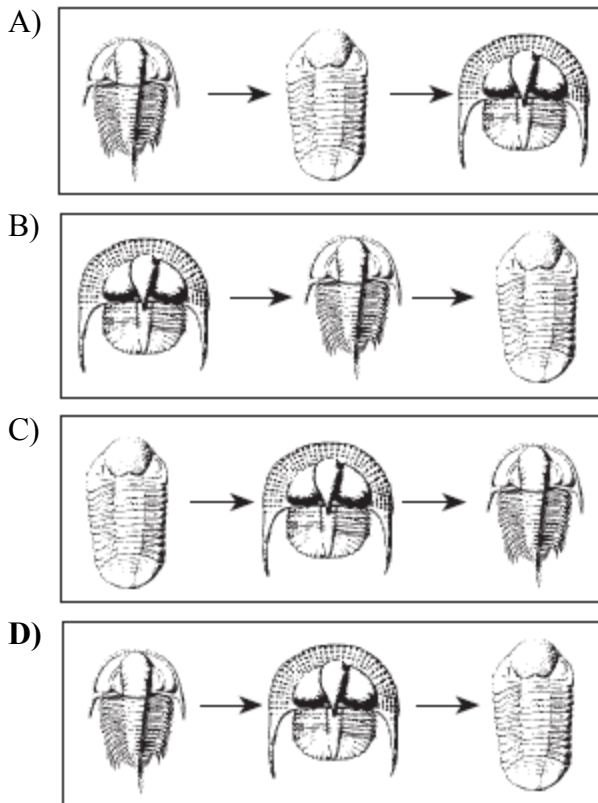
14. The cross sections below represent three bedrock outcrops found several kilometers apart.



Which statement best explains why the volcanic ash layers are useful for correlating the relative ages of the bedrock in the three outcrops?

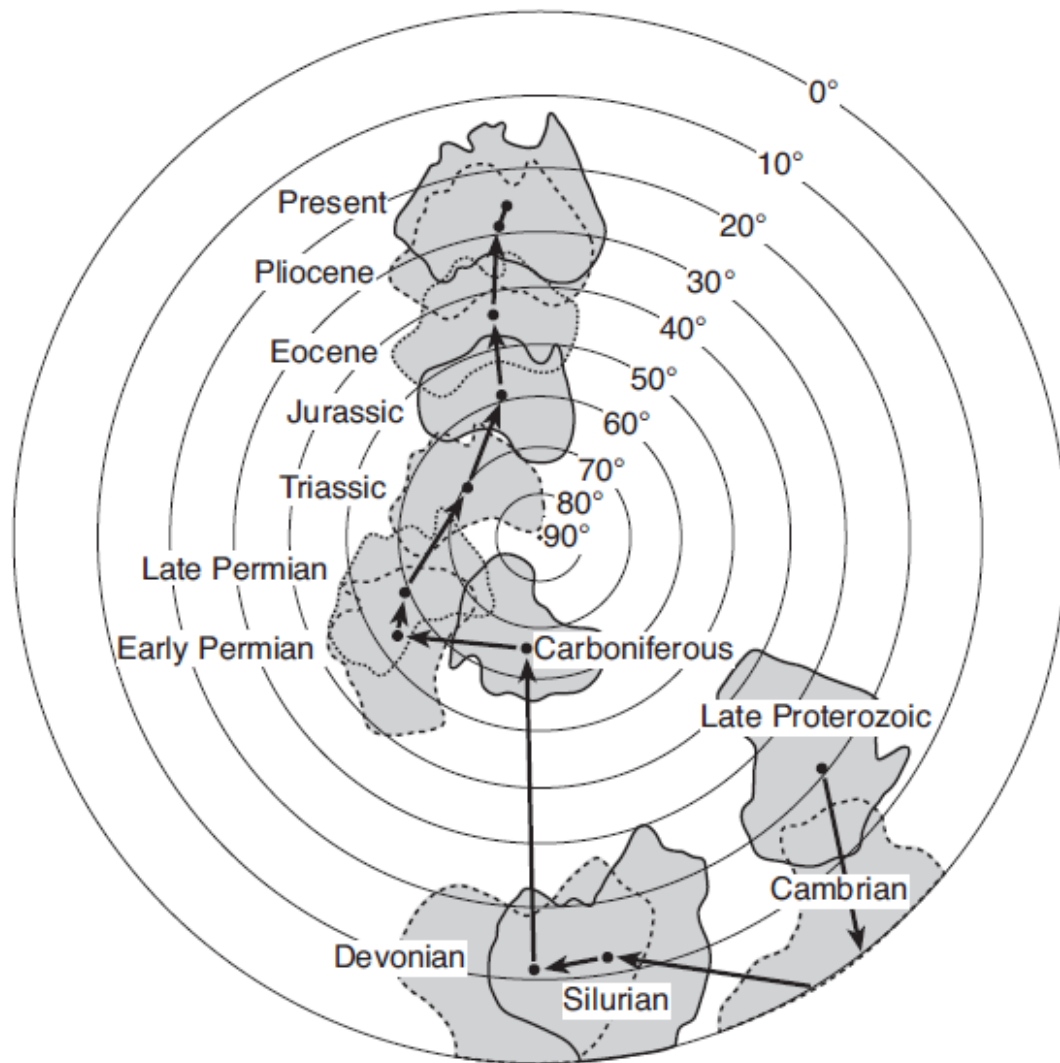
- A) The ash was deposited over a large area when a volcano erupted.
- B) There are no fossils found within the volcanic ash.
- C) The volcanic eruptions that produced the ash layer occurred over a long period of geologic time.
- D) The volcanic ash is found between many different layers of bedrock.

15. Which fossil sequence is in order from oldest to youngest?



## Topic 10 - Earth's History

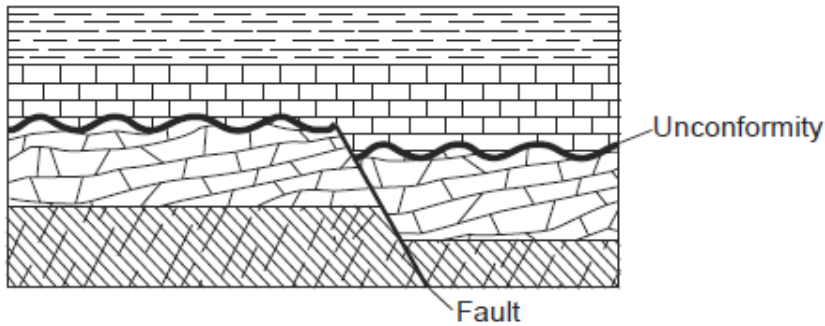
Base your answers to questions 16 and 17 on the map below, which shows Earth's Southern Hemisphere and the inferred tectonic movement of the continent of Australia over geologic time. The arrows between the dots show the relative movement of the center of the continent of Australia. The parallels of latitude from 0° to 90° south are labeled.



16. The geographic position of Australia on Earth's surface has been changing mainly because
- A) the gravitational force of the Moon has been pulling on Earth's landmasses
  - B) heat energy has been creating convection currents in Earth's interior**
  - C) Earth's rotation has spun Australia into different locations
  - D) the tilt of Earth's axis has changed several times
17. During which geologic time interval did Australia most likely have a warm, tropical climate because of its location?
- A) Cambrian**
  - B) Carboniferous
  - C) Late Permian
  - D) Eocene

## Topic 10 - Earth's History

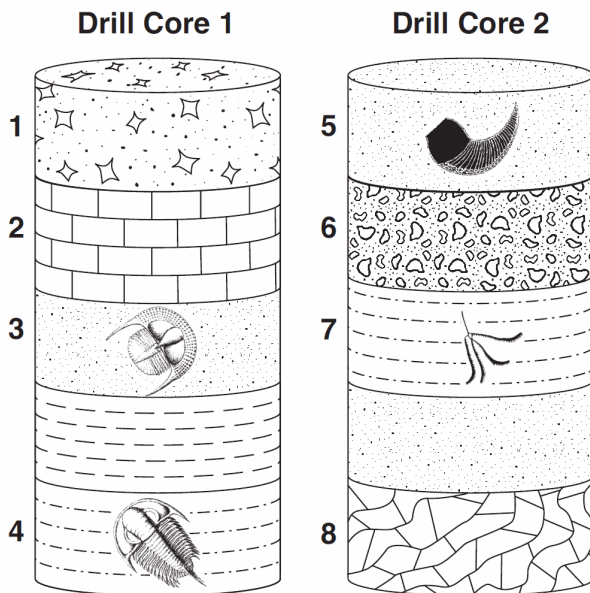
18. The geologic cross section below shows rock layers that have not been overturned.



The fault is older than the

- A) slate      B) marble      C) unconformity      **D) shale**

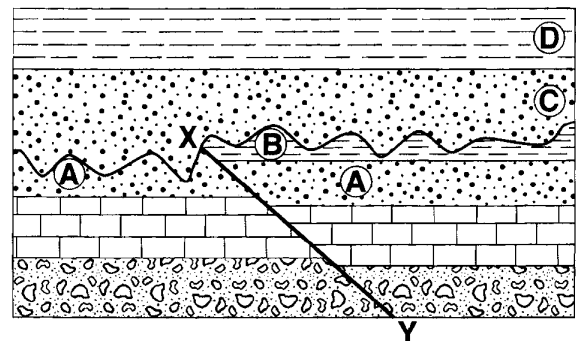
19. The drill-core samples below were taken from two locations 1000 kilometers apart. Rock layers 1 through 8 have been labeled. Some index fossils are shown in the layers.



Which numbered layers most likely formed at the same time?

- A) 1 and 6      B) 2 and 8  
C) 3 and 5      D) 4 and 7

20. The geologic cross section below shows bedrock layers *A* through *D*. Line *XY* is a fault.

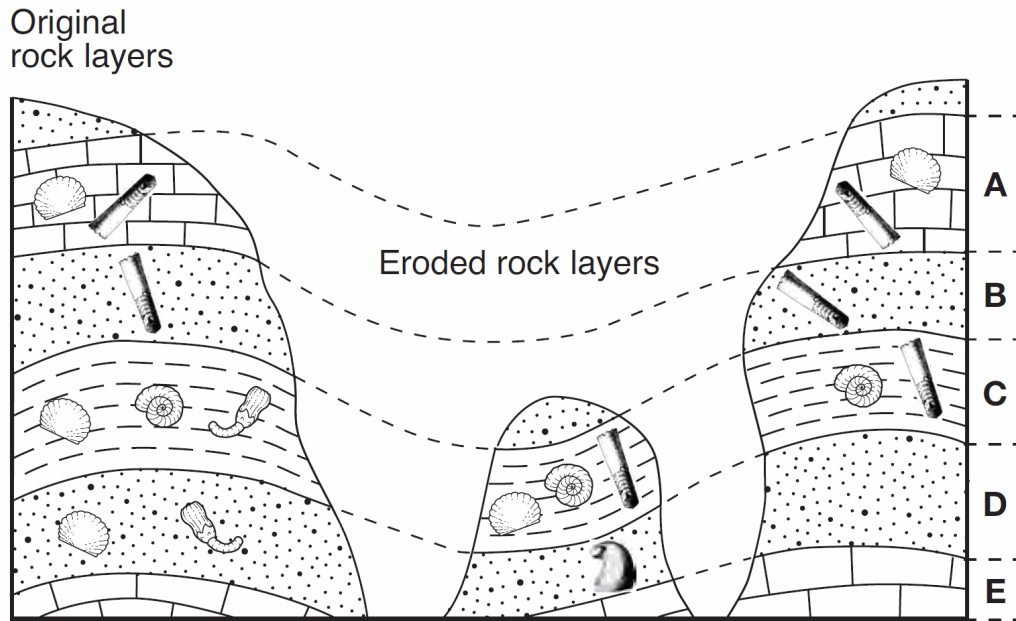


The fault most likely occurred after

- A) all bedrock layers were formed  
B) layer *C* formed, but before layer *D* formed  
C) layer *A* formed, but before layer *B* formed  
**D) layer *B* formed, but before layer *C* formed**

## Topic 10 - Earth's History

21. The diagram below represents three bedrock outcrops. The layers have *not* been overturned. Letters *A* through *E* identify different rock layers. Fossils found in the rock layers are shown.



Which fossil could be classified as an index fossil?



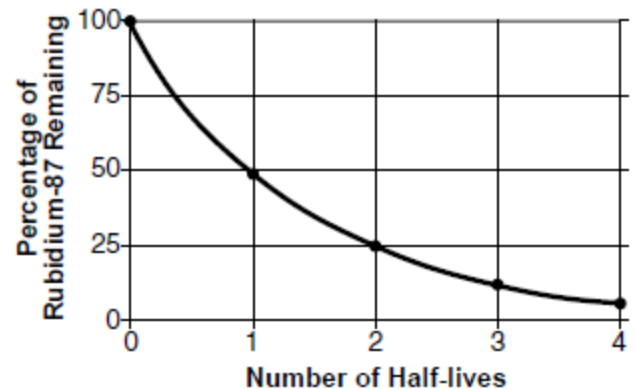
22. The block diagram below represents a geologic cross section of a mountain range.



What action most likely formed this mountain range?

- A) contact metamorphism
- B) glacial erosion
- C) volcanic eruptions
- D) **earthquake faulting**

23. The graph below shows the radioactive decay of rubidium-87.

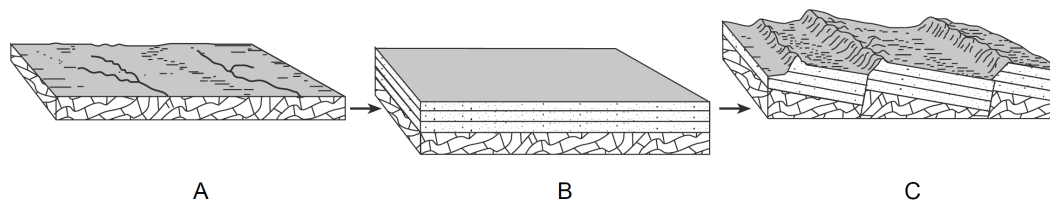


What percentage of rubidium-87 atoms will be left after four half lives?

- A) 25.0%
- B) 12.5%
- C) **6.25%**
- D) 3.125%

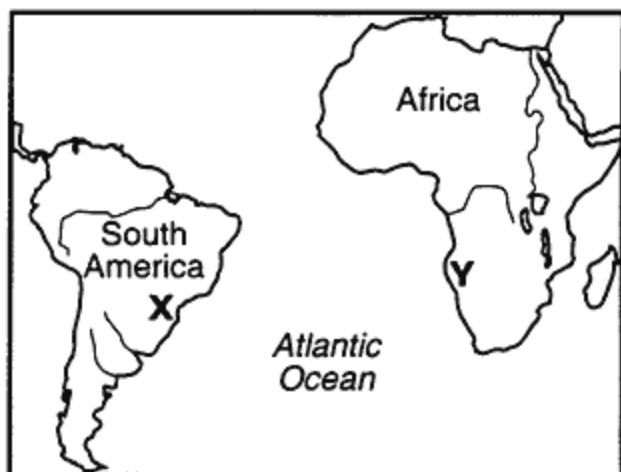
## Topic 10 - Earth's History

24. The sequence of block diagrams below shows stages of development of a landscape. The stages are labeled *A*, *B*, and *C*.



Which sequence of geologic processes best describes the events that created each stage shown?

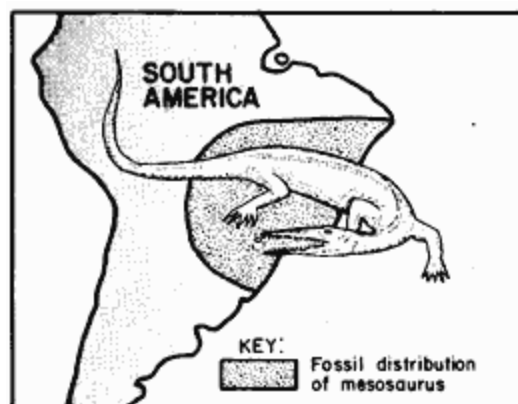
- A) erosion → subsidence and deposition → uplift and faulting  
 B) uplift and deposition → flooding → folding and erosion  
 C) metamorphism → erosion and deposition → volcanic eruptions  
 D) uplift and erosion → subsidence and erosion → folding
25. The map below shows the present-day locations of South America and Africa. Remains of *Mesosaurus*, an extinct freshwater reptile, have been found in similarly aged bedrock formed from lake sediments at locations *X* and *Y*.



Which statement represents the most logical conclusion to draw from this evidence?

- A) *Mesosaurus* migrated across the ocean from location *X* to location *Y*.  
 B) *Mesosaurus* came into existence on several widely separated continents at different times.  
 C) **The continents of South America and Africa were joined when *Mesosaurus* lived.**  
 D) The present climates at locations *X* and *Y* are similar.

26. On what other landmass would you most likely find fossil remains of the late Paleozoic reptile called *Mesosaurus* shown below?



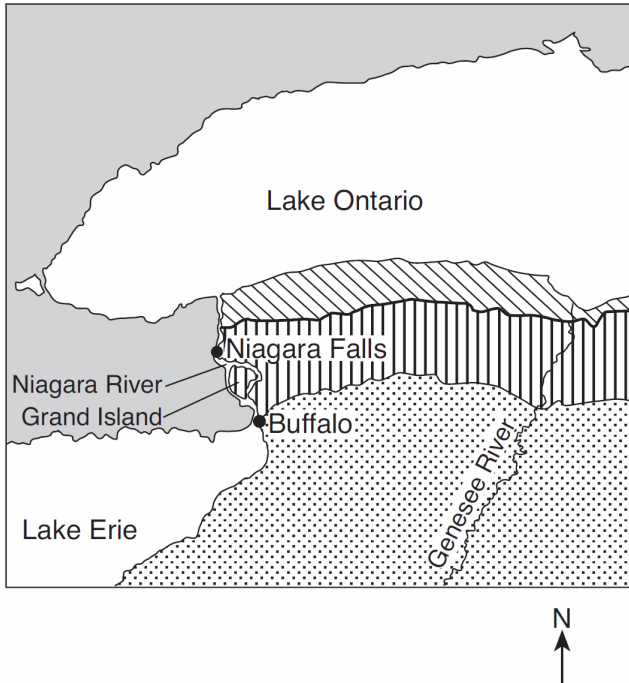
- A) North America   
 B) Africa   
 C) Antarctica   
 D) Eurasia 



## Topic 10 - Earth's History

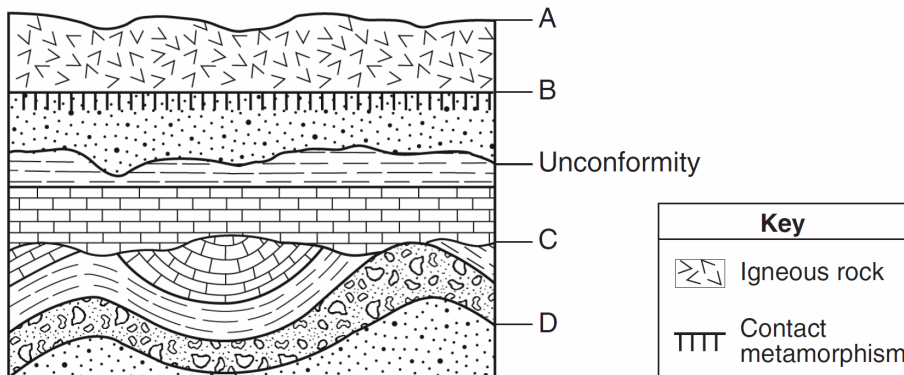
27. Base your answer to the following question on the map below, which shows the generalized bedrock of a part of western New York State.

**Generalized Bedrock Map**



During which geologic time period was the surface bedrock of Grand Island formed?

- A) Cambrian      B) Ordovician      C) **Silurian**      D) Devonian
28. The cross section below represents several rock units within Earth's crust. Letter *A* represents Earth's surface. Letters *B*, *C*, and *D* indicate boundaries between rock units. One of the unconformities is labeled.

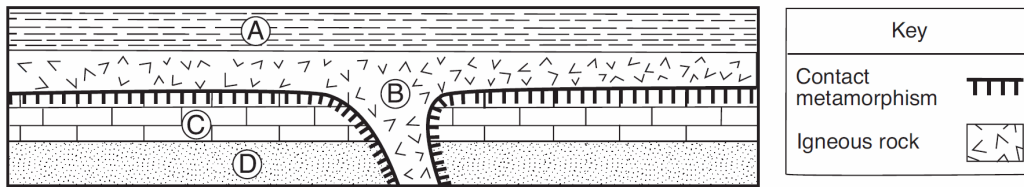


Which lettered boundary is most likely another unconformity?

- A) *A*      B) *B*      C) *C*      D) *D*

## Topic 10 - Earth's History

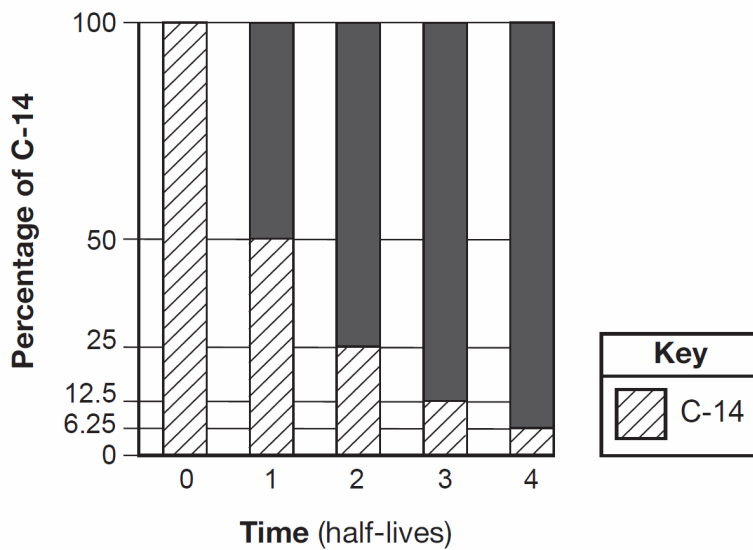
29. The cross section below shows four rock units, *A*, *B*, *C*, and *D*.



Which rock unit is youngest in age?

- A) *A*                      B) *B*                      C) *C*                      D) *D*

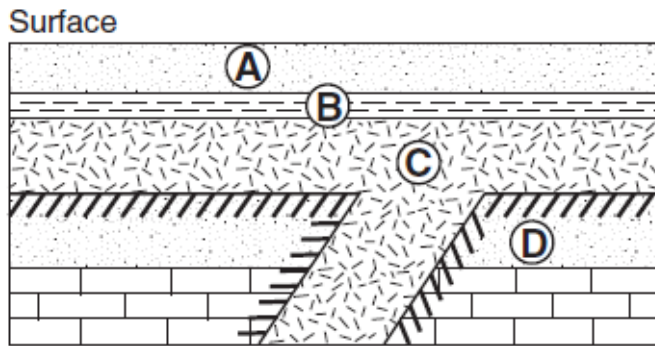
30. A bar graph of the radioactive decay of carbon-14 is shown below.



The solid black sections of the bars on the graph represent the percentages of

- A) carbon-14 from the original sample that has not decayed  
 B) uranium-238 from the original sample that has not decayed  
 C) **nitrogen-14 decay product resulting from the radioactive decay**  
 D) lead-206 decay product resulting from the radioactive decay

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

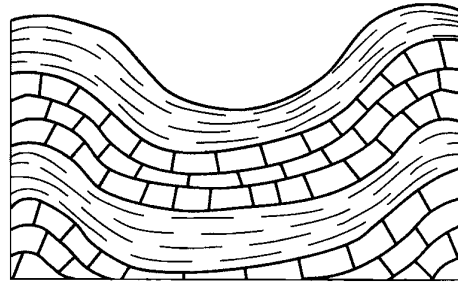


Key			
	Limestone		Shale
	Sandstone		Igneous rock
	Contact metamorphism		

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

- A)  $A \rightarrow B \rightarrow C \rightarrow D$     B)  $C \rightarrow D \rightarrow A \rightarrow B$   
 C)  $D \rightarrow B \rightarrow A \rightarrow C$     **D)  $D \rightarrow C \rightarrow B \rightarrow A$**

32. The cross section below shows a portion of Earth's crust.



Which observation provides the most direct evidence that crustal plate collision has occurred near this region?

- A) alternating layers of shale and limestone bedrock  
 B) absence of an igneous intrusive rock  
 C) different thicknesses of the sedimentary layers  
**D) folding of the sedimentary layers**

**Answer Key**  
**Topic 10 - Earth's History**

1.   **B**
  2.   **D**
  3.   **C**
  4.   **D**
  5.   **D**
  6.   **A**
  7.   **D**
  8.   **B**
  9.   **B**
  10.   **D**
  11.   **B**
  12.   **A**
  13.   **D**
  14.   **A**
  15.   **D**
  16.   **B**
  17.   **A**
  18.   **D**
  19.   **C**
  20.   **D**
  21.   **C**
  22.   **D**
  23.   **C**
  24.   **A**
  25.   **C**
  26.   **B**
  27.   **C**
  28.   **C**
  29.   **A**
  30.   **C**
  31.   **D**
  32.   **D**
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