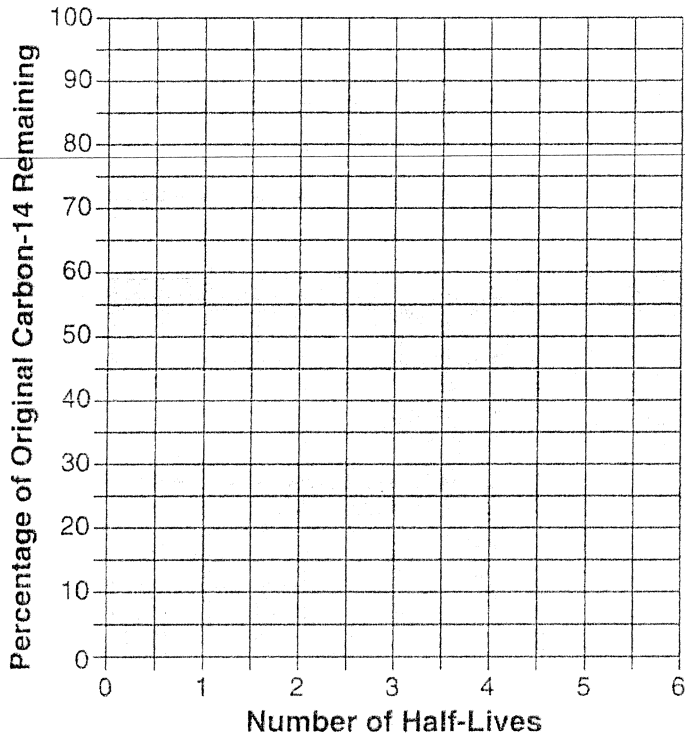


Base your answers to questions 1 through 3 on the data table below, which shows the radioactive decay of carbon-14. The number of years required to complete four half-lives has been left blank.

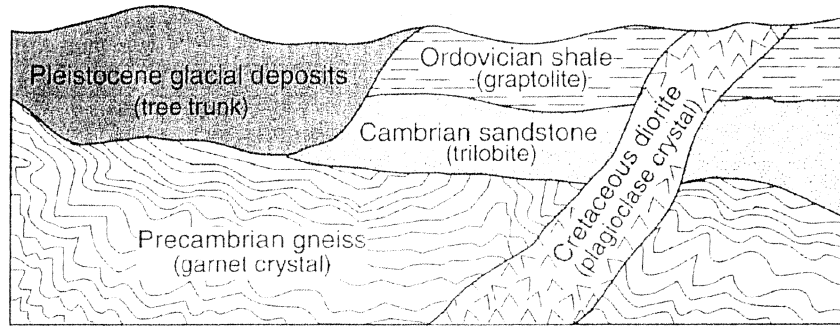
### Radioactive Decay of Carbon-14



### Radioactive Decay of Carbon-14

Number of Half-Lives	Percentage of Original Carbon-14 Remaining	Time (years)
0	100	0
1	50	5700
2	25	11,400
3	12.5	17,100
4	6.3	
5	3.1	28,500
6	1.6	34,200

The cross section below shows part of Earth's crust. The objects in parentheses indicate materials found within each rock unit or deposit.



Which object in parentheses could be accurately dated using carbon-14? Explain your answer.

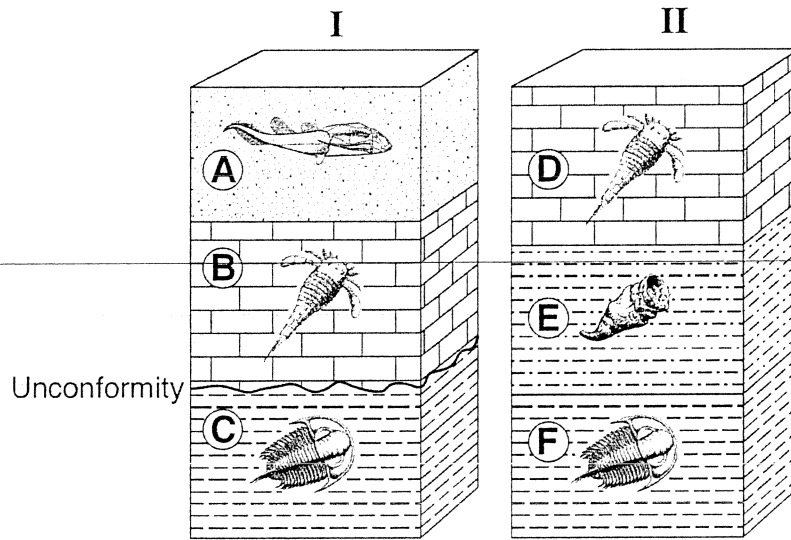
- How long does it take for radioactive carbon-14 to complete four half-lives?
- On the grid above, construct a graph that shows the radioactive decay of carbon-14 by plotting and X to show the percentage of original carbon-14 remaining after *each* half-life. Connect the Xs with a smooth, curved line.

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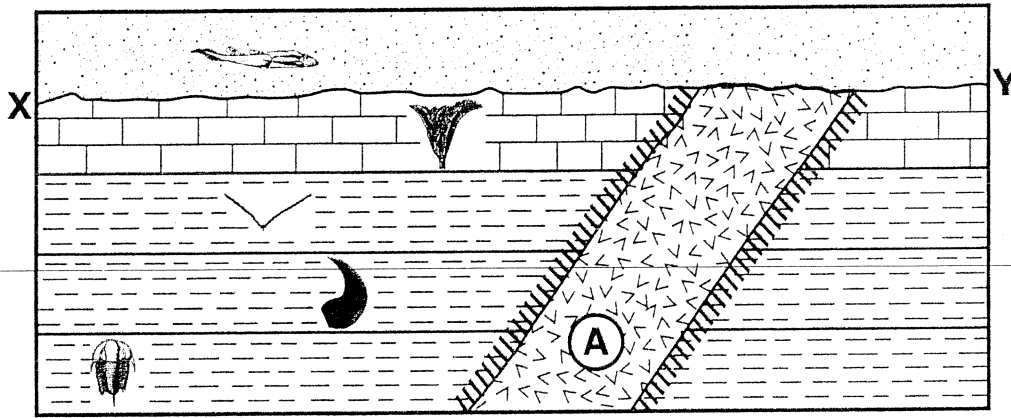
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Base your answers to questions 4 through 7 on the diagrams below, which represent two bedrock outcrops, I and II, found several kilometers apart in New York State. Rock layers are lettered *A* through *F*. Drawings represent specific index fossils.



4. Explain why carbon-14 can *not* be used to find the geologic age of these index fossils.
5. Describe *one* characteristic a fossil must have in order to be considered a good index fossil.
6. Identify *two* processes that produced the unconformity in outcrop I.
7. During which geologic time period was rock layer *C* deposited?

Base your answers to questions 8 through 12 on the geologic cross section below. The cross section shows Vermont 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	
	<i>Bothriolepis</i>
	<i>Ctenocrinus</i>
	<i>Dicellograptus</i>
	<i>Valcouroceras</i>
	<i>Elliptocephala</i>

Key	
Rock Units	
	} Sedimentary rocks
	Igneous rock
	Contact metamorphic rock

8. Identify one piece of evidence shown in this cross section that indicates that the igneous intrusion, *A*, is older than the sandstone layer.
9. Describe the type of depositional environment in which the fossilized organisms lived.
10. Each index fossil existed for a relatively short geologic time interval. State one other characteristic that each fossil must have to be considered an index fossil.
11. Identify the coral index fossil that would most likely be found in the same layer as the index fossil *Ctenocrinus*.
12. Based on fossil evidence, determine the geologic period during which the unconformity formed.

Base your answers to questions 13 and 14 on the table of index fossils shown below and on your knowledge of Earth science.

Table of Index Fossils		
		
Eospirifer	Manticoceras	Phacops

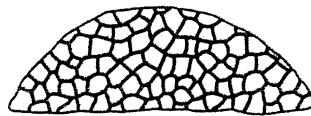
**Fossil Classification**

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

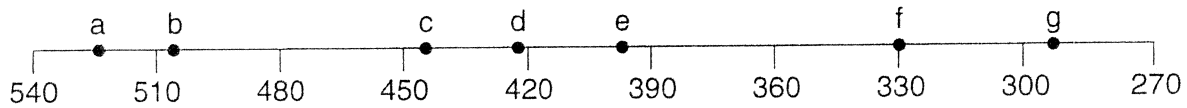
13. Complete the classification table above by filling in the general fossil group name for *each* index fossil.

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

Base your answers to questions 15 through 18 on the geologic time line shown in your answer booklet. Letters *a* through *g* on the time line indicate specific reference points in geologic time.



**Geologic Time Line (millions of years ago)**



15. Identify *one* letter that indicates a time for which there is no rock record in New York State.

16. Identify the mountain building event (orogeny) that was occurring in eastern North America at the time represented by letter *g*.

17. Letter *a* indicates a specific time during which geologic period?

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