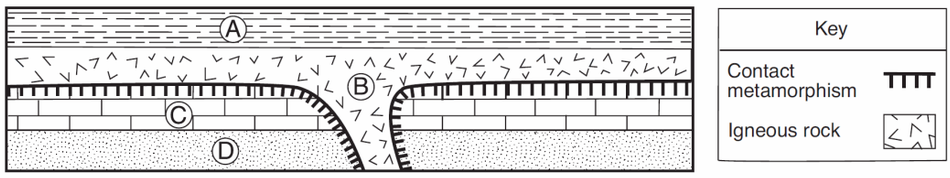
Name

Geologic History Practice
Earth Science

Date

Period

1. 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*

2. Evidence of mass extinctions of life-forms is preserved in the fossil record. It is inferred that some of these extinctions occurred because of

A) tsunami B) asteroid impacts
C) earthquakes D) solar eclipses

3. Antarctica's location and climate changed over the last 200 million years because Antarctica moved

A) northward, resulting in a colder climate
B) northward, resulting in a warmer climate
C) southward, resulting in a colder climate
D) southward, resulting in a warmer climate

4. Which group of organisms is inferred to have existed for the *least* amount of time in geologic history?

A) placoderm fish B) eurypterids
C) trilobites D) dinosaurs

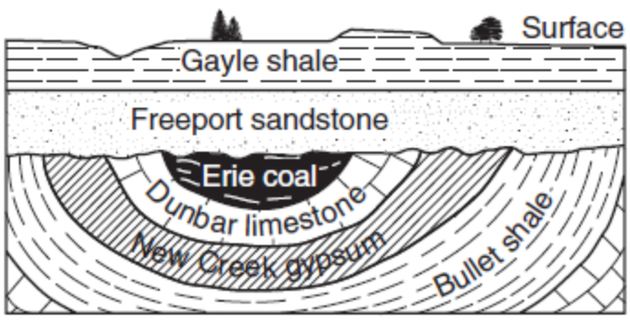
5. The division of Earth's geologic history into units of time called eons, eras, periods, and epochs is based on

A) absolute dating techniques
B) climatic changes
C) seismic data
D) fossil evidence

6. Which radioactive isotope is most often used when determining the age of fossil bones found in sediments deposited during the Holocene Epoch?

A) potassium-40 B) uranium-238
C) carbon-14 D) rubidium-87

7. The diagram below represents a geologic cross section of a portion of Earth's crust.



Folding and erosion occurred after the formation of the

A) Erie coal, but before formation of Freeport sandstone
B) Gayle shale
C) Freeport sandstone
D) Dunbar limestone, but before formation of Erie coal

8. In order for an organism to be used as an index fossil, the organism must have been geographically widespread and must have

A) been preserved by volcanic ash
B) existed for a geologically short time
C) lived in shallow water
D) lived on land

9. 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.

10. Which characteristic is most useful in correlating Devonian-age sedimentary bedrock on the East Coast with Devonian-age sedimentary bedrock in other parts of the world?

A) index fossils B) color
C) particle size D) rock types

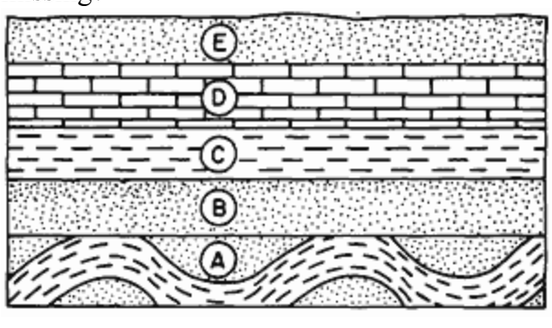
11. Which event occurred earliest in geologic history?

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

12. How old is a fossil that has radioactively decayed through 4 half-lives of carbon-14?

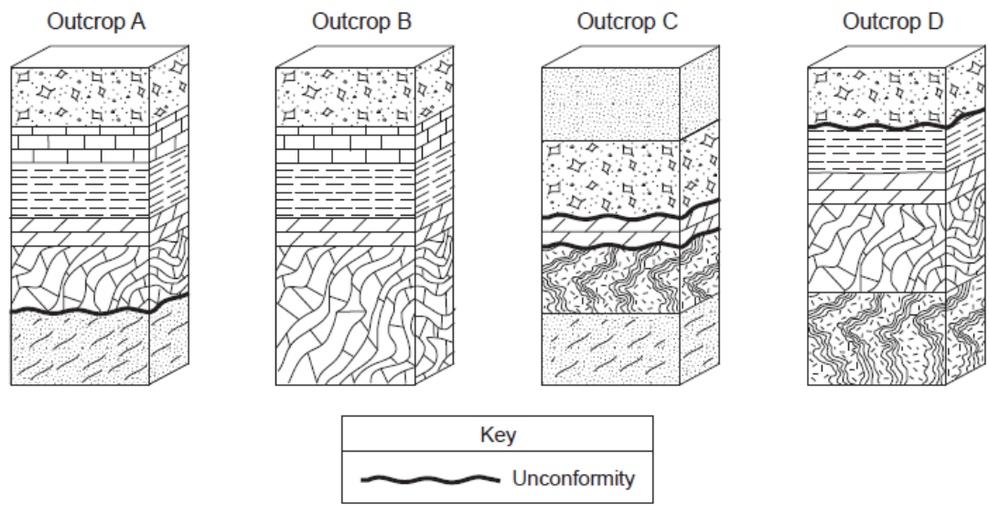
A) 28,500 years B) 5,700 years
C) 22,800 years D) 17,100 years

13. In the geologic cross section shown below, between which two layers is part of the rock record most likely missing?



A) *A* and *B* B) *B* and *C*
C) *C* and *D* D) *D* and *E*

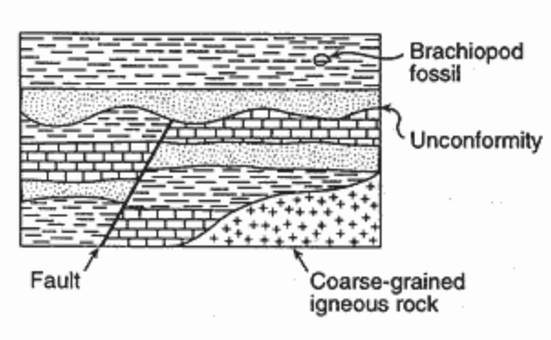
14. Base your answer to the following question on the block diagrams of four rock outcrops, *A*, *B*, *C*, and *D*, located within 15 kilometers of each other. The rock layers have not been overturned.



When the rock layers at outcrops *A*, *B*, *C*, and *D* are correlated, which rock layer would be determined to be the oldest?

A) quartzite B) gneiss C) sandstone D) marble

15. Which feature in the geologic cross section below was formed by erosion?



A) coarse-grained igneous rock
B) fault
C) brachiopod fossil
D) unconformity

16. Thin layers of volcanic ash act as excellent time markers in the correlation of bedrock because volcanic ash

A) falls to Earth over a large area in a short period of time
B) stays in the atmosphere for millions of years
C) is easily eroded and lasts only a short time on Earth's surface
D) is deposited over millions of years

17. An unconformity between two sedimentary layers is most likely produced by

A) uplift followed by extensive erosion, submergence, and deposition
B) a period of extrusive vulcanism followed by another period of extrusive vulcanism
C) the deposition of gravel followed by the deposition of sand and silt
D) continuous sedimentation in a deep basin over a long period

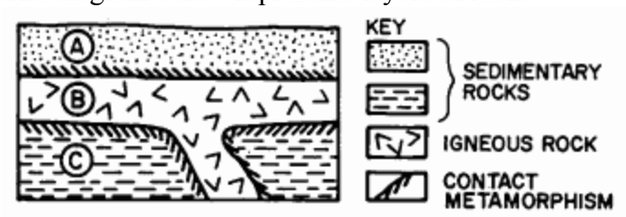
18. If a sample of a radioactive substance is crushed the half-life of the substance will

A) decrease B) remain the same
C) increase

19. Which geologic event occurred in New York State at approximately the same time that eurypterids were becoming extinct?

A) the formation of the Catskill Delta
B) the uplift of the Appalachian Mountains
C) the opening of the Atlantic Ocean
D) the intrusion of the Palisades Sill

20. The diagram below represents layers of rock.



Rock layer *A* is inferred to be older than intrusion *B* because

A) parts of layer *A* were altered by intrusion *B*
B) layer *A* is composed of sedimentary rocks
C) layer *B* is located between layer *A* and layer *C*
D) parts of layer *C* were altered by intrusion *B*

21. Which sequence shows the correct order of Earth's geologic time intervals from oldest to youngest?

A) Cenozoic → Paleozoic → Archean → Mesozoic → Proterozoic
B) Archean → Mesozoic → Cenozoic → Paleozoic → Proterozoic
C) Archean → Proterozoic → Paleozoic → Mesozoic → Cenozoic
D) Cenozoic → Mesozoic → Paleozoic → Proterozoic → Archean

22. Which radioactive substance has the longest half-life?

A) rubidium-87 B) carbon-14
C) potassium-40 D) uranium-238

23. A fossil formed 11,400 years ago. Which percentage of the original amount of carbon-14 remains in the fossil?

A) 100% B) 50%
C) 25% D) 12.5%

24. The table below shows information about Earth's geologic history. Letter *X* represents information that has been omitted.

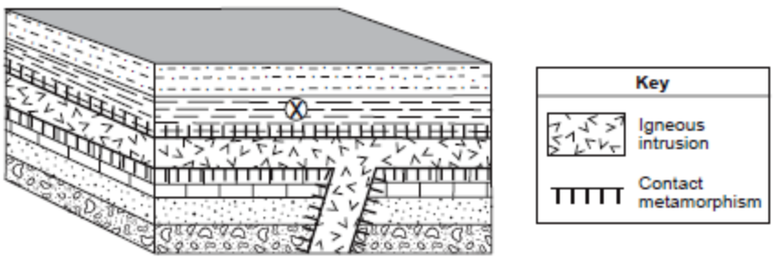
Period	Million Years Ago	Index Fossil Found in Bedrock	Important Geologic Event
Triassic	251 to 200	*Coelophysis*	X

Identify *one* important geologic event that occurred in New York State that could be placed in the box at *X*.

25. Which geologic event occurred in New York State at approximately the same time as the extinction of dinosaurs and ammonoids?

A) advance and retreat of the last continental ice sheet
B) deposition of the sands and clays underlying Long Island
C) initial opening of the Atlantic Ocean
D) formation of the Queenston Delta

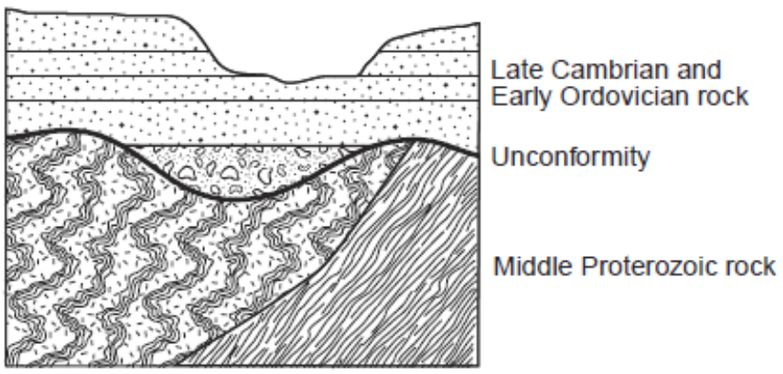
26. Base your answer to the following question on the block diagram below and on your knowledge of Earth science. The diagram represents an igneous intrusion that solidified between some layers of sedimentary rock. Letter *X* represents an index fossil in a sedimentary rock layer. The rock layers have not been overturned.



(Not drawn to scale)

Describe *one* characteristic of fossil *X* that makes it a good index fossil.

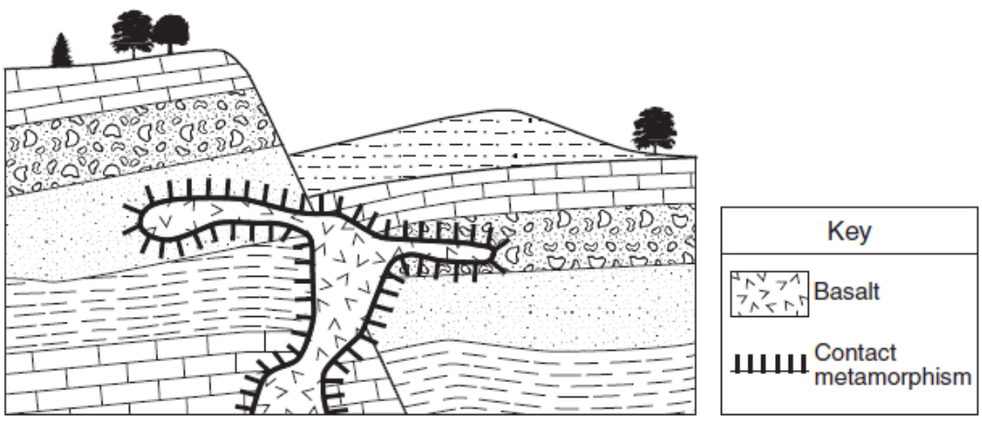
Base your answers to questions **27** and **28** on the cross section below and on your knowledge of Earth science. The unconformity is located at the boundary between Middle Proterozoic rock and Late Cambrian and Early Ordovician rock.



27. Identify by name the oldest New York State index fossil that could be found in the Early Ordovician bedrock.

28. Identify *one* geologic process that occurred in this region that produced the unconformity in this outcrop.

Base your answers to questions **29** through **31** on the geologic cross section below. The rock layers have not been overturned.



(Not drawn to scale)

29. The index fossil *Dicellograptus* was found in the shale layer. During which geologic time period did this shale layer form?

30. Explain why carbon-14 could *not* be used to determine the age of the Dicellograptus fossil.

31. Describe *one* piece of evidence from the cross section that supports the inference that the fault is older than the basalt intrusion.

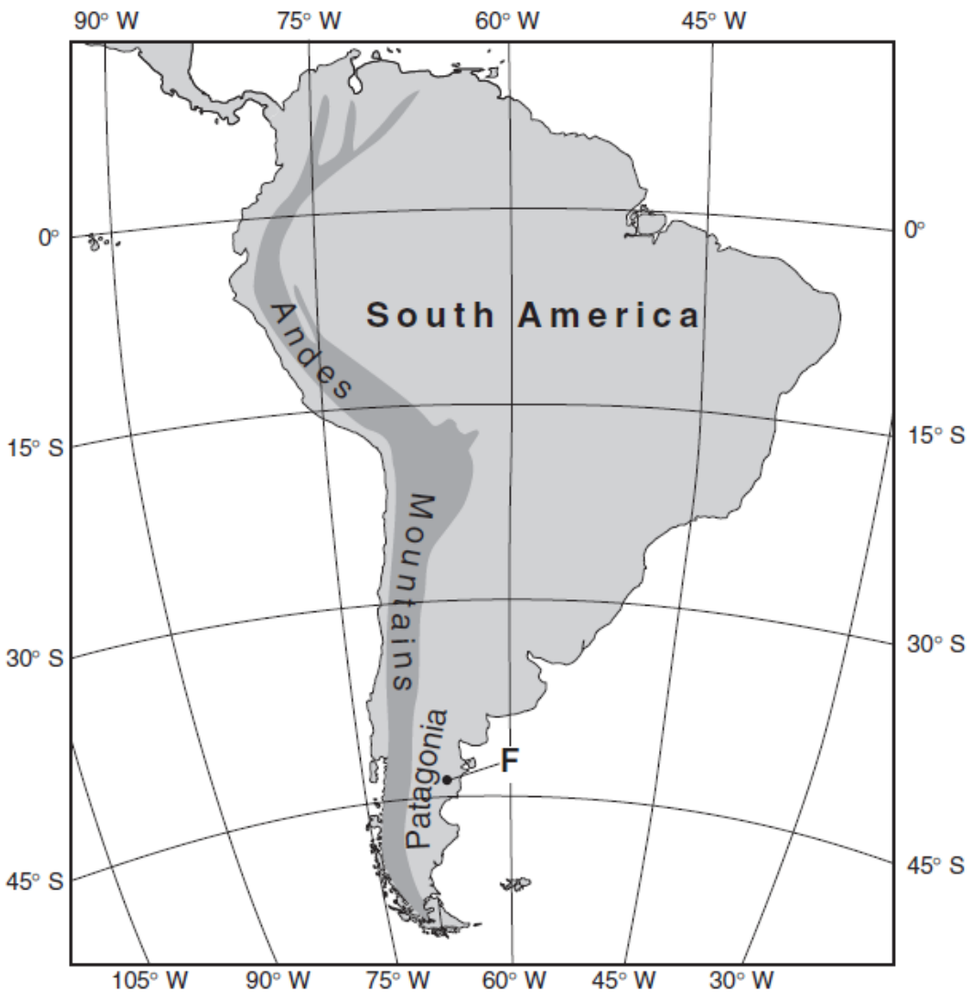
Base your answers to questions **32** through **35** on the passage and map below. Point *F* on the map shows the location where an unusual mammal fossil was found.

Fossil Jaw of Mammal Found in South America

Paleontologists working in Patagonia have found the tiny fossil jaw that may be the first evidence of early mammals in South America.

The fossil, which measures less than a quarter-inch long, is believed to be from the middle or late Jurassic Period. Researchers said it suggests that mammals developed independently in the Southern Hemisphere.

The fossil, named *Asfaltomylos patagonicus*, was discovered in a shale formation in Patagonia. Dinosaurs were the dominant land animal at that time. Mammals were tiny, and hunted insects in the dense tropical vegetation. The now-arid region also has yielded some remarkable dinosaur fossils from the same period in a vast ancient boneyard covering hundreds of square miles.



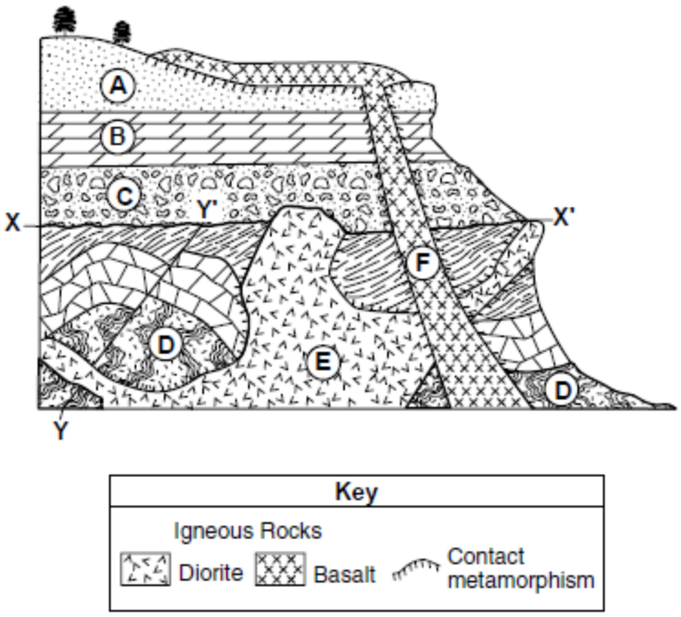
32. State *one* method used by geologists to determine the age of the bedrock in which this ancient mammal fossil was found.

33. What other life-form first appeared on Earth during the geologic period when *Asfaltomylos patagonicus* existed?

34. State the name of the dominant sediment particle that was compacted to form the shale in which this fossil was found.

35. State the latitude and longitude of point *F*, to the *nearest degree*, where the fossil *Asfaltomylos patagonicus* was discovered. Include the correct units and compass directions in your answer.

Base your answers to questions **36** through **38** on the cross section below and on your knowledge of Earth science. On the cross section, letters *A* through *F* represent rock units. Line *XX'* indicates an unconformity and line *YY'* indicates a fault. No overturning of rock layers has occurred.



36. List the letters of rock units *D, E, F,* and fault *YY'* in the correct sequence from oldest to youngest.

_____ → _____ → _____ → _____

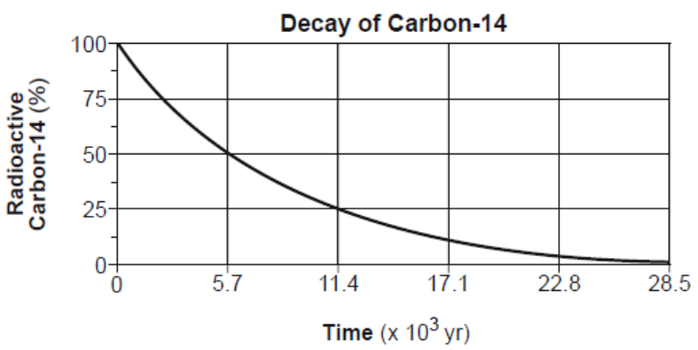
Oldest ⟶ Youngest

37. List two processes that produced unconformity *XX'*.

38. Identify the name of the rock formed in the zone of contact metamorphism between rock units *A* and *F*.

_____

39. Base your answer to the following question on the graph below and on your knowledge of Earth science. The graph shows the rate of decay of the radioactive isotope carbon-14 (^{14}C).



Complete the flow chart below by filling in the boxes to indicate the percentage of carbon-14 remaining and the time that has passed at the end of each half-life.