Rock Timeline Clues

Use strata and fossils to explain relative age in Earth history.

MS-ESS1-4 "Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle every word or phrase that signals relative age. Then number the shellfish fossils, ash layer, and plant fossils in paragraph 2 from 1, oldest, to 3, youngest.

Reading Earth's Layered Record

1 Earth's history is about 4.6 billion years long, far longer than any single rock layer can show. Scientists organize this vast history into sections on the geologic time scale. The sections mark major changes, such as the first evidence of life, the building of a mountain chain, or a widespread extinction. Scientists do not place these changes in order by guessing. They study rock strata, the stacked layers of sedimentary rock, and fossils preserved inside them. Together, these records provide evidence for relative age.

2 In an undisturbed stack of strata, lower layers formed before layers above them. This principle helps scientists compare events even when they cannot yet assign an exact number of years. Suppose shellfish fossils appear in several lower layers, while leafy plant fossils appear only in higher layers. The shellfish evidence is relatively older than the plant evidence. If the same distinct fossil is found in rock formations far apart, it can help scientists match layers. A volcanic ash layer between the shellfish-bearing and plant-bearing layers formed after the shellfish layers and before the plant layers.

3 These clues let scientists build explanations about Earth's past. Scientists first check whether layers have been tilted, folded, broken, or overturned. Tilting alone can preserve the order of a coherent stack that has not been overturned. Folding or faulting may repeat or reverse the visible order, so original order must be checked or reconstructed. They compare formations, fossil patterns, and contacts between layers to reconstruct what happened. When evidence from many places supports the same sequence, scientists use it to organize major events on the geologic time scale. The scale is a shared timeline of Earth history, based largely on the order shown by rocks and fossils.

2 ANSWER WITH EVIDENCE

Use the passage

1. What condition must rock layers meet before scientists can use lower layers as evidence that an event happened earlier?

2. What does the passage conclude about the relative ages of the shellfish fossils and the leafy plant fossils? Use layer position as evidence.

3. How can finding the same distinct fossil in rock formations far apart help scientists organize Earth's history?

4. How does evidence from many rock formations help scientists use the geologic time scale?

3 YOUR TURN

Your own words

At an undisturbed, not overturned cliff site, algae fossils are in the lowest layer, a thin ash layer is above them, and reptile footprints are in a higher layer. Write a three-sentence scientific explanation that puts the three events in relative order and explains how this evidence could organize a small part of the geologic time scale.

ANSWER KEY

Rock Timeline Clues

GRADES 6-8 · MS-ESS1-4

PART 1 · READ AND MARK

Circle every word or phrase that signals relative age. Then number the shellfish fossils, ash layer, and plant fossils in paragraph 2 from 1, oldest, to 3, youngest. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What condition must rock layers meet before scientists can use lower layers as evidence that an event happened earlier?	**The original sequence must be preserved or reliably reconstructed. In a coherent stack that has not been overturned or reordered, originally lower layers are older; tilting alone need not change that order.**
2	What does the passage conclude about the relative ages of the shellfish fossils and the leafy plant fossils? Use layer position as evidence.	**The shellfish fossils are older because they occur in lower layers, while the plant fossils occur in higher layers.**
3	How can finding the same distinct fossil in rock formations far apart help scientists organize Earth's history?	**It helps scientists match layers in different locations and compare their relative ages.**
4	How does evidence from many rock formations help scientists use the geologic time scale?	**When many places support the same sequence, scientists use that evidence to organize major events on the shared timeline.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The algae fossils are oldest because they occur in the lowest layer of an undisturbed stack. The ash eruption happened after the algae layer but before the layer with reptile footprints, so the footprints are youngest. This rock sequence organizes these events from oldest to youngest on the geologic time scale.

Accept equivalent explanations that use the undisturbed condition and correctly order algae fossils, ash, and reptile footprints. The explanation should connect rock-layer evidence to organizing events by relative age on the geologic time scale. Accept the distinction between preserved order and perfectly horizontal layers: a tilted, coherent, non-overturned sequence can retain its original order. Do not require an absence of all tilting.