Clues in the Cliff

Use rock layers and fossils to explain geologic time.

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

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each fossil or footprint clue, circle each era name, and number the three cliff layers from oldest (1) to youngest (3). Use your marks to connect the rock evidence to the geologic time scale.

A Walk Through Cedar Canyon

1. At Cedar Canyon, a trail cuts past three rock layers in an undisturbed cliff. The lowest layer is dark shale with trilobite fossils. Above it lies sandstone with dinosaur footprints. The highest layer is clay with fossil horse teeth. Each layer began as loose sediment and later hardened into rock. In an undisturbed stack, lower layers formed before higher ones. The fossils and footprints give clues about the living things present when the sediments were deposited. A person walking up the trail sees evidence from different parts of Earth's past.

2. The geologic time scale groups Earth's long history into named parts, including the Paleozoic, Mesozoic, and Cenozoic eras. Scientists built these divisions by comparing rock layers and changes in fossils across many places, not by studying one cliff alone. Trilobites lived during the Paleozoic. Nonbird dinosaurs left tracks during the Mesozoic. Horses appeared during the Cenozoic. These fossil clues help place Cedar Canyon's layers in that broad order. The eras do not last the same number of years, and a layer does not mark every event in its era.

3. Between the sandstone and clay, a rough surface shows that the older rock was worn down before new sediment covered it. Some rock that might have recorded that interval is missing. Scientists call this a gap in the local rock record. The cliff still shows that the dinosaur footprints came before the horse teeth, but its layers cannot tell exactly how long the gap lasted. Matching fossils and rock layers at other sites can add evidence. The time scale organizes the larger story even when one cliff preserves only pieces of it.

2 ANSWER WITH EVIDENCE

Use the passage

1. Which Cedar Canyon layer is oldest? What evidence supports your answer?

2. How do the fossils and footprints help place Cedar Canyon's three layers in the order of the Paleozoic, Mesozoic, and Cenozoic eras?

3. Why did scientists compare rock layers and fossils from many places when building the geologic time scale?

4. What can you tell about the order of the dinosaur footprints and horse teeth? What can you not tell about the time between them?

3 YOUR TURN

Your own words

At a second, undisturbed cliff, a bottom mudstone layer holds clam fossils, a middle sandstone layer holds leaf prints, and a top gravel layer holds deer bones. In 3 or 4 sentences, use the layers as evidence to explain their order and how comparing their fossils with those at other sites could help place them on the geologic time scale. State one thing this evidence alone cannot tell you.

ANSWER KEY

Clues in the Cliff

GRADE 6 · 6.ESS1.4

PART 1 · READ AND MARK

Underline each fossil or footprint clue, circle each era name, and number the three cliff layers from oldest (1) to youngest (3). Use your marks to connect the rock evidence to the geologic time scale. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Which Cedar Canyon layer is oldest? What evidence supports your answer?	**The shale is oldest because it is the lowest layer in the undisturbed cliff.**
2	How do the fossils and footprints help place Cedar Canyon's three layers in the order of the Paleozoic, Mesozoic, and Cenozoic eras?	**Trilobites in the lowest layer lived during the Paleozoic, dinosaur footprints in the middle layer date from the Mesozoic, and horse teeth in the highest layer point to the Cenozoic.**
3	Why did scientists compare rock layers and fossils from many places when building the geologic time scale?	**One cliff may preserve only pieces of Earth's history. Other sites can provide evidence missing from its rock record.**
4	What can you tell about the order of the dinosaur footprints and horse teeth? What can you not tell about the time between them?	**The footprints came before the horse teeth because their layer is lower. The layers cannot show exactly how long the gap between them lasted.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The mudstone formed first because it is the lowest layer, followed by the sandstone and then the gravel. Scientists could compare the clam fossils, leaf prints, and deer bones with fossils at other sites to help place these layers in parts of the geologic time scale. These layers alone cannot tell us exactly how many years passed between them.

Accept explanations that use the undisturbed position of the layers to establish relative order and describe fossil comparisons as a way to place layers in geologic history. Do not require students to name eras for the second cliff, since its evidence does not establish them.