Clues in Stone

Use rock layers to explain slow and rapid changes

4.11 "Construct explanations of Earth's changes over time through slow and rapid processes, citing evidence found in rock formations and fossils in rock layers."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Number the three layers from oldest to youngest, underline one clue in each layer, and circle words that tell how quickly the mud, sand, or ash collected.

A Story in Three Layers

1. At a road cut, a scientist finds three flat rock layers that have not been tipped or flipped. The bottom layer is gray mudstone with fossil fish. Mud slowly settled in quiet water and hardened into this rock. The fish fossils show that this place was covered by water when the mud collected. Since the layers are undisturbed, the bottom layer formed before the layers above it.

2. The middle layer is sandstone. It has ripples left by moving water and fossil bird tracks on its surface. Birds walked on wet sand near the water's edge. Over many years, sand covered the older mud, and the edge of the water moved across this place. The fossils and rock marks help explain how a watery spot became a sandy shore.

3. A thin layer of volcanic ash rests on the sandstone and covers some bird tracks. Ash can fall in a short time during an eruption, then harden into rock. That makes the ash layer a clue to a rapid event, unlike the slow buildup of mud and sand. The scientist uses the order of the layers to tell the story: water covered the place, a shore formed, and ash fell later.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the fish fossils in the bottom layer help explain what this place was like first?

2. How do the ripples and bird tracks in the middle layer show that this place changed?

3. What evidence points to a rapid event after the birds walked there?

4. Use evidence from two layers to explain a slow change and a rapid event at this place.

3 YOUR TURN

Your own words

At a different site, the bottom rock layer holds sea shell fossils. The layer above contains fossil tree roots. A thin ash layer lies on top. Write three or four sentences explaining a possible slow change and a rapid event in order, using at least two clues from these layers.

ANSWER KEY

Clues in Stone

GRADE 4 · 4.11

PART 1 · READ AND MARK

Number the three layers from oldest to youngest, underline one clue in each layer, and circle words that tell how quickly the mud, sand, or ash collected. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the fish fossils in the bottom layer help explain what this place was like first?	**The fish fossils show that water covered this place when the bottom layer formed.**
2	How do the ripples and bird tracks in the middle layer show that this place changed?	**The ripples show that water moved over the sand, and the bird tracks show that birds walked on wet sand near the water's edge.**
3	What evidence points to a rapid event after the birds walked there?	**Volcanic ash covers some bird tracks. Ash can fall quickly during an eruption, so it fell after the birds made the tracks.**
4	Use evidence from two layers to explain a slow change and a rapid event at this place.	**Mud and sand collected slowly, forming the lower layers. Volcanic ash fell quickly during an eruption and formed the top layer.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The sea shell fossils suggest that seawater once covered this place. Later, the shore may have moved as new layers slowly built up. Fossil tree roots show that trees then grew here on land. Finally, ash fell quickly during an eruption and covered the older layers.

Accept other reasonable explanations that use the stated fossil and layer clues, place the ash event last, and distinguish slow change from rapid ashfall. Do not require students to name the cause of the shoreline's movement.