After the Impact

Use evidence to explain sudden and gradual changes in life on Earth.

ESS.5.b "Construct an explanation based on evidence of how catastrophic and long-term events have impacted life on Earth, including mass extinctions."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one catastrophic event and one long-term change. Circle two kinds of rock or fossil evidence, then number the steps in one cause-and-effect chain from an event to a change in life.

Two Speeds of Change

1. At the end of the Cretaceous Period, about 66 million years ago, a large asteroid struck near what is now Mexico's Yucatán Peninsula. A thin layer of rock from that time contains unusually high levels of iridium, an element more common in asteroids than in Earth's crust. The same layer contains shocked quartz, crystals damaged by extreme pressure. Beneath the layer, dinosaur fossils are common in some deposits; above it, fossils of nonbird dinosaurs disappear. A huge crater at Chicxulub provides another clue. Together, these observations connect a sudden impact with a major change in life.

2. The impact threw dust and soot into the atmosphere and likely blocked enough sunlight to sharply reduce photosynthesis. With less plant growth, many land food webs lost their base. In the oceans, many kinds of tiny photosynthetic plankton also declined or vanished, leaving less food for animals higher in marine food webs. Fossils show that about three quarters of species died out around this boundary, including all nonbird dinosaurs. Some birds, mammals, and other organisms survived. Their survival did not mean conditions stayed the same: as ecosystems recovered, surviving groups spread into habitats left vacant by extinct species.

3. Not every change in life began with a single disaster. Millions of years later, climates in many regions gradually became cooler or drier, and grasslands expanded over long spans of time. Fossil grass pollen and tiny silica particles from grasses in ancient soils record their spread. In some horse lineages, fossils from later periods show taller teeth with more wear-resistant surfaces than those of earlier relatives. Grasses often contain gritty silica that wears teeth down as animals feed. These records support an explanation: long-term changes in climate reshaped habitats, and populations with traits suited to grazing became more common. Unlike the impact, this change unfolded across many generations.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the rock layer, crater, and dinosaur fossils support the explanation that an impact changed life on Earth?

2. Explain how dust and soot from the impact could cause extinctions in both land and ocean food webs.

3. How do the grass and horse fossils support an explanation of change over many generations?

4. Compare how quickly the two events changed life. Give one piece of evidence from the passage for each event.

3 YOUR TURN

Your own words

Suppose sunlight stayed blocked much longer after the impact. Predict how this would affect the survival and later recovery of life, using two details from the passage as evidence. Explain the steps between your evidence and your prediction.

After the Impact

PART 1 · READ AND MARK

Underline one catastrophic event and one long-term change. Circle two kinds of rock or fossil evidence, then number the steps in one cause-and-effect chain from an event to a change in life. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the rock layer, crater, and dinosaur fossils support the explanation that an impact changed life on Earth?	**The iridium and shocked quartz in the rock layer, along with the Chicxulub crater, support an impact. Nonbird dinosaur fossils disappear above the layer, linking the impact to a major loss of life.**
2	Explain how dust and soot from the impact could cause extinctions in both land and ocean food webs.	**Dust and soot reduced sunlight and photosynthesis. Less plant growth on land and fewer photosynthetic plankton in the oceans left less food for animals higher in both food webs.**
3	How do the grass and horse fossils support an explanation of change over many generations?	**Grass remains record expanding grasslands, while later horse fossils show taller, more wear-resistant teeth. Together, they support the explanation that grazing traits became more common as habitats changed.**
4	Compare how quickly the two events changed life. Give one piece of evidence from the passage for each event.	**The impact was sudden, and nonbird dinosaur fossils disappear above the impact-era rock layer. Climate and habitat changes unfolded over many generations, as shown by grass remains and differences between earlier and later horse fossils.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

If sunlight stayed blocked much longer, fewer plants and photosynthetic plankton might survive because both need light. The passage says reduced plant growth weakened land food webs, while declining plankton left less food in marine food webs. A longer shortage could cause more animals in both places to die. With fewer surviving groups, ecosystems might take longer to recover, even where extinct species had left open habitats.

Accept other reasonable predictions that connect at least two passage details to a longer period of reduced sunlight. Students should explain how a change at the base of a food web could affect survival or recovery.