Clues Across Oceans

Build an explanation of continental drift from several kinds of evidence

ESS.6.a "Construct an evidence-based explanation of continental drift, basing conclusions on comparisons of coastlines, fossils, ages of rocks, climate, and magnetic patterns."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline observations about coastlines, fossils, rocks, climate, and magnetism. Number two observations that work together to support the same conclusion, then use them in your answers.

What the Atlantic Reveals

1. On a globe, the eastern edge of South America appears to nestle against the western edge of Africa. Shorelines are not perfect puzzle pieces: waves wear them down, and sea level changes. Scientists therefore compare several clues instead of trusting shape alone. Fossils of Mesosaurus, a small freshwater reptile that lived about 280 million years ago, occur in rocks on both continents. This animal was unlikely to swim across a wide saltwater ocean. Its remains on opposite shores raise a question that a coastline match cannot settle by itself: were these lands once connected?

2. Rock records supply another comparison. In parts of Brazil and western Africa, ancient rock belts have similar rock types, structures, and ages. Some rocks on opposite sides of the Atlantic formed more than 2 billion years ago. If those belts are placed next to each other, their patterns line up across today's ocean. Climate clues also seem out of place until the continents are rearranged. Scratches cut by ancient glaciers and deposits left by ice appear in regions of South America, Africa, India, Australia, and Antarctica. Their directions make more sense when those lands are grouped near the South Pole.

3. Later, ships measured magnetism in the Atlantic seafloor. As molten rock cools at the Mid-Atlantic Ridge, magnetic minerals record the direction of Earth's magnetic field. That field has reversed many times. Bands with alternating magnetic directions form matching sequences on opposite sides of the ridge. Ocean crust also tends to be youngest at the ridge and older farther away. Together, the bands and ages indicate that new crust forms at the ridge and moves outward. This process can widen the ocean between continents, linking the older clues on land to a physical way for continents to separate.

2 ANSWER WITH EVIDENCE

Use the passage

1. If coastline shape were the only evidence available, why would the claim that South America and Africa were once joined be weak?

2. How do the Mesosaurus fossils and the ancient rock belts strengthen the same conclusion in different ways?

3. Why do the glacial scratches and ice deposits support a change in the positions of southern continents?

4. How do the magnetic bands and crust ages together explain a way for continents to move apart?

3 YOUR TURN

Your own words

Two imagined continents, Alder and Birch, have roughly matching facing coasts, fossils of the same land-dwelling dinosaur, matching 150-million-year-old sandstone layers, and an ocean ridge between them with mirrored magnetic bands. Write five or six sentences arguing whether they moved apart, using at least three kinds of evidence and explaining why coastline shape alone is not enough.

ANSWER KEY

Clues Across Oceans

HIGH SCHOOL · ESS.6.a

PART 1 · READ AND MARK

Underline observations about coastlines, fossils, rocks, climate, and magnetism. Number two observations that work together to support the same conclusion, then use them in your answers. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	If coastline shape were the only evidence available, why would the claim that South America and Africa were once joined be weak?	**Waves wear down shorelines and sea level changes, so their shapes alone cannot establish that the continents were joined.**
2	How do the Mesosaurus fossils and the ancient rock belts strengthen the same conclusion in different ways?	**Mesosaurus fossils on both continents suggest the freshwater animal lived across connected land. Rock belts with matching types, structures, and ages suggest those regions were once joined.**
3	Why do the glacial scratches and ice deposits support a change in the positions of southern continents?	**The directions of the glacial evidence make more sense when the southern continents are grouped near the South Pole than when they remain in their present positions.**
4	How do the magnetic bands and crust ages together explain a way for continents to move apart?	**Matching magnetic bands on either side of the ridge and crust that gets older farther away indicate that new crust forms at the ridge and moves outward, widening the ocean.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Alder and Birch likely moved apart after being connected. Their facing coasts fit roughly, but changing shorelines mean shape alone is not enough evidence. Fossils of the same land-dwelling dinosaur on both continents suggest the animal could once travel across connected land rather than a wide ocean. The matching 150-million-year-old sandstone layers add evidence that the regions once lay together. Mirrored magnetic bands around the ridge indicate that new ocean crust formed on both sides and moved outward, widening the ocean between the continents.

Accept explanations that connect each observation to a conclusion rather than merely listing clues. Magnetic bands support seafloor spreading, which provides a way for continents to separate.