NO PREP

Continental Drift and Seafloor Spreading Made Simple

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Name: Period: Date:

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Early Ideas About Moving Continents

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Early Ideas About Moving Continents

In the early 20th century, a German scientist named Alfred Wegener proposed a bold idea: the continents were not fixed in place but had once been joined together in a supercontinent he called Pangaea. Over millions of years, they slowly drifted apart to their current locations. This became known as the theory of continental drift. At first, Wegener's idea was controversial. He provided evidence such as the close fit between the coastlines of South America and Africa, fossil records showing the same species on continents separated by oceans, and similarities in rock formations across different continents. However, scientists at the time criticized Wegener because he could not explain the force that moved the continents. Without a clear mechanism, his theory remained debated for decades. Today, we know Wegener was correct—though incomplete. His work laid the foundation for the modern understanding of plate tectonics, which combines continental drift with new discoveries about the ocean floor. This shift in scientific thinking shows how evidence can challenge accepted beliefs and lead to breakthroughs in knowledge.

Discovery of Seafloor Spreading

In the 1950s and 1960s, scientists studying the ocean floor uncovered new evidence that solved the mystery of how continents move. Using sonar mapping, they discovered long underwater mountain ranges called mid-ocean ridges, such as the Mid-Atlantic Ridge. At these ridges, molten rock from the mantle rises, cools, and forms new oceanic crust. This process is known as seafloor spreading. Magnetic patterns on the seafloor provided further proof. When magma solidifies, iron minerals inside align with Earth's magnetic field. Over millions of years, Earth's magnetic poles have reversed many times. Scientists found symmetrical patterns of these magnetic stripes on both sides of mid-ocean ridges, confirming that new crust

forms and pushes older crust outward. This discovery explained the driving force behind continental drift. Continents are carried along like passengers on conveyor belts of moving oceanic crust. Together, continental drift and seafloor spreading merged into the comprehensive plate tectonic theory we accept today.

Continental Drift Meets Plate Tectonics

By combining Wegener's ideas with discoveries about the ocean floor, scientists developed the theory of plate tectonics, which explains how Earth's surface is constantly reshaped. Today, GPS technology confirms that plates continue to move at slow but steady rates. This explains not only the positions of continents but also earthquakes, volcanoes, and the creation of mountain ranges. The story of continental drift and seafloor spreading is more than just geology—it is an example of how science evolves. Wegener's theory was once rejected but later supported by new tools and evidence. It reminds us that scientific ideas must be tested, revised, and sometimes even replaced when better explanations emerge.

Key Information: Table: Evidence for Continental Drift and Seafloor Spreading

Evidence	What It Shows
Continental coastlines fit	South America and Africa once connected
Fossil records	Same species found on separate continents
Rock formations	Similar mountain ranges across different continents
Magnetic stripes on seafloor	Symmetry proves new crust forms at ridges
Mid-ocean ridges	Direct observation of seafloor spreading

Case Study: The Mid-Atlantic Ridge

The Mid-Atlantic Ridge is one of the most striking examples of seafloor spreading in action. Stretching from the Arctic Ocean down through the Atlantic, it is the longest mountain range on Earth, mostly hidden beneath the sea. Here, the Eurasian Plate and North American Plate are moving away from each other, while the South American Plate and African Plate also diverge. As magma rises, it creates new ocean floor and gradually pushes the continents apart. Measurements show that the Atlantic Ocean widens by about 2 to 5 centimeters every year. This means New York and London are slowly drifting farther apart, though the change is too small to notice in a lifetime. The Mid-Atlantic Ridge is also geologically active, with frequent volcanic eruptions and earthquakes as the plates separate. Scientists use submarines, deep-sea drilling, and satellite imaging to study the ridge, providing direct evidence of seafloor spreading and continental movement. This case shows how a once-controversial idea became accepted science through measurable, observable data.

1. What evidence at the Mid-Atlantic Ridge supports the theory of seafloor spreading?

_____

_____

2. Why does the Mid-Atlantic Ridge demonstrate how continents move apart over time?

_____

_____

Multiple Choice

1. Who first proposed the theory of continental drift?

    a) Charles Darwin

    b) Alfred Wegener

    c) James Hutton

    d) Marie Tharp

2. What evidence confirmed seafloor spreading?

    a) Volcanic eruptions on land

    b) Fossil records on different continents separated by oceans

    c) Earth's gravitational pull

    d) Symmetrical magnetic stripes on the ocean floor

3. How much wider does the Atlantic Ocean grow each year at the Mid-Atlantic Ridge?

    a) 0.1–0.5 centimeters

    b) 20–50 centimeters

    c) 2–5 centimeters

    d) 10–20 centimeters

Matching

Write the letter of the correct definition on the line next to each term.

Term	Definition
1. ___ Continental Drift	A) Longest mountain range, mostly underwater
2. ___ Pangaea	B) Divergent boundary creating new crust
3. ___ Seafloor Spreading	C) Movement of continents over time
4. ___ Mid-Atlantic Ridge	D) Combined theory explaining Earth's geology
5. ___ Plate Tectonics	E) Supercontinent that once joined all the continents

Fill-in-the-Blank

1. Alfred Wegener used _____ to show continents once fit together.

2. New oceanic crust forms at _____ ridges.

3. Earth's _____ reversals created magnetic stripes on the seafloor.

Short Answer

Answer each question in 2-4 complete sentences.

1. Why was Wegener's original theory of continental drift rejected by many scientists?

_____

_____

_____

2. How did the discovery of seafloor spreading help explain continental movement?

_____

_____

_____

3. Why is the Mid-Atlantic Ridge important for understanding plate tectonics?

_____

_____

_____