

Plate Tectonics

By 1965, investigations led to the proposal that Earth's surface was broken into seven large plates and several smaller plates. It was further suggested that these plates are rigid, and that their boundaries are marked by earthquakes and volcanic activity. In recent years, satellite pictures have documented the existence of plate boundaries. An especially visible example is the San Andreas Fault in California.

Plates interact with one another at their boundaries by moving toward, away, or alongside each other. Faults are examples of boundaries where two plates slide horizontally past each other. Mid-ocean ridges mark boundaries where plates are forced apart as new ocean floor is being created between them. Mountains, volcanic-island arcs, and ocean trenches occur at the boundaries where plates are colliding, causing one plate to slide beneath the other. The network of crustal plates and the geologic activity caused by their movement is referred to as *plate tectonics*.

The original continental-drift theory suggested that continents plowed through the ocean floor like ships. Plate tectonics, on the other hand, holds that continents are carried along together with the surrounding seabed in huge plates—much like rafts frozen into the ice on a flowing stream.

There are several major plates. The North American plate comprises North America and the western half of the North Atlantic seafloor. The South American plate includes South America east to the Mid-Atlantic Ridge.

30 The African plate contains Africa and its surrounding seafloor. The Antarctic plate has Antarctica and surrounding seafloor. The Eurasian plate includes Europe, Asia, and nearby seafloor. The Pacific plate underlies the Pacific Ocean. Recently, an international

35 team of geologists and other researchers analyzing seafloor measurements discovered that what was classified as the Indo-Australian plate may actually be two separate plates—one with the Indian subcontinent and the adjacent seabed, and the other with Australia

40 and surrounding waters.

Scientists believe that, in addition to the great, slow convection currents that carry plates about Earth, there are also smaller, rapidly rising *mantle plumes*, columns of hot material rising from deep within Earth. (Earth

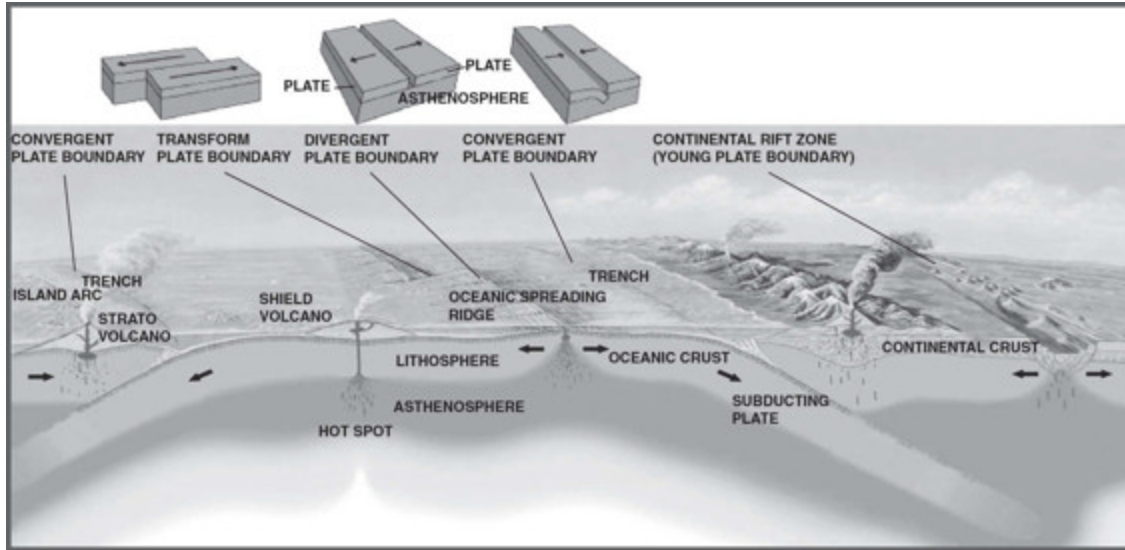
45 is believed to be composed of an inner solid core, a

Most of the isolated mid-plate volcanoes, such as
50 those of Hawaii and Yellowstone, lie at one end of a
line of extinct volcanoes that grow steadily older with
distance from the active center. Hawaii's Mauna Loa
is at the extreme southeastern end of the rest of the
Hawaiian island chain. The volcanoes in this chain
55 become steadily older and less active to the northeast.
Likewise, Yellowstone's hot springs and geysers are
at the eastern end of a line of extinct volcanoes that
extend into Idaho. Such a line of volcanoes suggests
that the crust of Earth is passing over a hot spot, or hot
60 spots, in the deeper mantle. As the crustal plate moves,
the hot spot "punches" up a line of volcanic and hot-
spring activity.

Indeed, the motions of the Pacific plate are
compatible with the direction of the Hawaiian chain
65 and the ages of its volcanic islands. Plate motion has
slowly moved the volcanic islands away from the hot
spot that created them. In other words, the Hawaiian
island chain traces the motion of the Pacific plate.

As molten rock flows up along the mid-ocean
70 ridges to create new seafloor, the lava flows more
abundantly in certain spots, producing volcanic
islands. Scientists believe that these places of abundant
lava flow may be hot spots that occur between two
separating plates. Two such plates underlie the large,
75 highly volcanic island of Iceland, which straddles
the Mid-Atlantic Ridge. On one side is the North
American plate; on the other, the Eurasian plate.
Similarly, ridges extend from the active volcanic island
of Tristan da Cunha westward to South America and
80 eastward to Africa. Some geologists propose that,
although such hot spots do not actually move plates,
they may mark weak points in the mantle, which
in turn help determine the lines along which plates
fracture and separate.

85 Hot spots of volcanic activity often occur at
the junction where plates collide. Examples are
the volcanic Azores, which arise where the North
American, Eurasian, and African plates meet.
Another—Macquarie Island, south of New Zealand—
90 marks the meeting point for the Pacific, Antarctic, and
Indo-Australian plates. These hot spots may be fueled
in part by plate collision.



1. Based on the information in the passage it can be reasonably inferred that
 - A. geological theories are only proven with the help of technological advances.
 - B. improvements in satellite technology advanced plate tectonics theory.
 - C. the plate tectonics theory was created in 1965.
 - D. the San Andreas Fault proved the veracity of plate tectonics theory.
2. In the third paragraph (lines 20-25), what is the distinction the author draws between continental-drift theory and plate tectonics?
 - A. Fluidity versus immobility
 - B. Drifting along versus pushing with purpose
 - C. Moving through versus moving with
 - D. Sailing on oceans versus rafting through streams
3. As used in line 42, "convection" most nearly means
 - A. liquefying.
 - B. melting.
 - C. mobilizing.
 - D. transferring.
4. In line 56, what is the most likely reason the author introduces Yellowstone's hot springs?
 - A. As an example of a mid-plate volcano
 - B. As proof that plates slide past each other
 - C. As support for an opposing theory
 - D. As an example of a mid-ocean ridge
5. Which choice provides the best evidence for the answer to the previous question?
 - A. Lines 3-5 ("It was...activity")
 - B. Lines 54-55 ("The volcanoes...northeast")
 - C. Lines 60-62 ("As the...activity")

D. Lines 65-67 ("Plate...them")

6. As used in line 64, "compatible" most nearly means

A. consistent.

B. adaptable.

C. opposed.

D. skewed.

7. What is the most likely reason the author mentions Iceland?

A. To offer an example of an island created at a mid-ocean ridge

B. To show a contrast between an island and a continent

C. To prove that an island can also be a volcano

D. To assert that the Mid-Atlantic Ridge connects two plates

8. Which choice provides the best evidence for the answer to the previous question?

A. Lines 9-12 ("Plates...other")

B. Lines 41-44 ("Scientists...Earth")

C. Lines 49-52 ("Most...center")

D. Lines 69-72 ("As...islands")

9. The principal rhetorical purpose of the phrase "Some geologists...separate" (lines 80-84) is to

A. suggest that scientists are still investigating plate tectonic theory.

B. emphasize the lack of data supporting how fractures separate.

C. reveal that some scientists disagree with the major tenets of plate tectonics.

D. expose a weakness in the continental-drift theory.

10. It can be reasonably inferred from information in the passage and the diagram that

A. continental rift zones always occur beside the ocean.

B. hot spots are molten plumes that travel through the lithosphere to the surface.

C. mid-ocean ridges are caused by the presence of subducting plates.

D. oceanic crust is more rigid than continental crust

Question	Correct Answer
1	B
2	C
3	D
4	A
5	C
6	A
7	A
8	D
9	A
10	B