The Ring of Fire

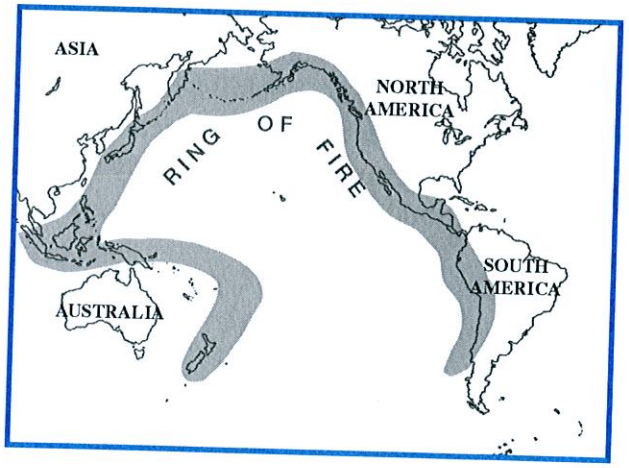
Located in the Pacific Ocean, the Ring of Fire is a band of about 500 active volcanoes. The Ring of Fire extends in a loop of roughly 30,000 miles around the edges of continents and islands from western South America to Alaska in the north and from eastern Asia to New Zealand in the south. It includes some of the most intense earthquake and volcanic activity in the world. Why is this area so volatile? The answer can be found in the composition of the earth's structure and its movement.

Earth is a planet that is divided into layers: the crust, the mantle, the outer core, and the inner core. The outer layer of the earth is the **crust**. Made of granite and basalt, the crust extends around the entire surface of the earth and ranges in thickness from about 4 to 40 miles. Below the crust is the **mantle**. This layer consists of slowly flowing, melted rock, or **magma**, and is approximately 1,800 miles thick. The layer below the mantle is the **outer core**. The outer core is about 1,400 miles thick and is believed to be made of molten rock composed primarily of iron, nickel, and silicon. Finally, the **solid inner** core is the earth's innermost layer. Made of iron and nickel, the inner core is about 1,500 miles thick and reaches scorching temperatures of up to 13,000°F.

The earth's continents are situated on its outer crust. In 1915, scientist Alfred Wegener proposed the theory of **continental drift**. According to the theory, the seven continents—Asia, Africa, Antarctica, Europe, North America, South America, and Australia—were once joined together, about 200 million years ago. Over time, this gigantic land mass, called Pangaea, broke up and drifted apart.

In the 1960s, geologists began to question the reasons for this apparent movement of the continents. According to the theory of **plate tectonics**, the earth's crust is not a solid sheet of rock but consists of about 10 large plates and several smaller ones that float slowly across the hot, molten rock of the mantle underneath them. Among these large sections of crust are the Pacific, Nazca, Indian-Australian, South American, North American, Eurasian, African, Antarctic, and Arabia plates. Embedded in these rocky plates are the seven continents.

The movement of the Pacific Plate specifically contributes to the explosive volcanic activity and frequent earthquakes associated with the Ring of Fire. Nearly two-thirds of the active volcanoes in the world occur in the Ring of Fire. As the Pacific Plate shifts and slides, it collides with neighboring plates. Cracks and fissures occur along the edges of the plates. When magma and expanding hot gases rise toward the earth's surface, they are forced up through these cracks or weak spots in the earth's crust near the plate boundaries. As a result, a volcanic eruption occurs. As the fiery magma escapes onto the earth's crust, it cools, turns black, and hardens. This hardened magma, called lava, piles up around the opening in the earth, or **vent**, through which it came.



The following chart lists where and when some of the most violent, destructive volcanic eruptions have occurred in the Ring of Fire.

Volcano	Location	Year
Tambora	Indonesia	1815
Cotopaxi	Ecuador	1877
Krakatoa	Indonesia	1883
Mayon	Philippines	1897
Tacaná	Guatemala	1902
Parícutin	Mexico	1943
Mount St. Helens	Washington, U.S.	1980
El Chichon	Mexico	1982
Nevado del Ruiz	Colombia	1985
Pinatubo	Philippines	1991

Many earthquakes also happen where the boundaries of the earth's plates meet. Some of the world's most catastrophic earthquakes have occurred in the Ring of Fire. Typically, earthquakes take place at plate boundaries where sections of rock continually slide past each other. Due to the stress resulting from the grinding motion of the plates, large blocks of rock in the earth's crust bend. If the pressure on the rock is greater than the strength of the rock, the rock breaks or shifts, releasing tremendous waves of energy in all directions. During an earthquake, the ground shakes violently because the earth's crust suddenly breaks and shifts.

This chart lists where and when some of the most devastating earthquakes have taken place in the Ring of Fire.

Earthquake	Location	Year
Caracas	Venezuela	1812
Concepcíon & Santiago	Chile	1835
Tokyo	Japan	1857
Yakutat Bay	Alaska, U.S.	1899
Yokohama	Japan	1923
Anchorage	Alaska, U.S.	1964
Mindanao	Philippines	1976
Tangshan	China	1976
Mexico City	Mexico	1985
Kobe	Japan	1995

An account of all the significant geological events that have happened in the Ring of Fire would be daunting. Nearly every year, thousands of volcanic eruptions or earthquakes happen here. In the future, as the plates of the earth's crust continue to crash into one another and separate in their ever-changing dance, countless volcanoes and earthquakes will likely be recorded.

39. What is the ***main*** purpose of this selection?

A to explain what a volcano is and how it erupts

B to provide information about the Ring of Fire

C to describe the causes and effects of earthquakes

D to persuade readers to visit countries near the Ring of Fire

40. What is the ***most likely*** reason that the author uses bold print in the selection, as with the words *mantle* and *vent*?

A to emphasize important content words

B to help the reader write a summary

C to break up the paragraphs

D to highlight significant statistics

41. Which statement ***best*** summarizes the theory of plate tectonics?

A The earth's continents were once joined all together in one land mass.

B The earth consists of the crust, the mantle, the outer core, and the inner core.

C The earth's surface is made of different plates that move apart and collide.

D The earth's most active volcanoes and earthquakes occur in the Ring of Fire.

42. Which quotation from the selection ***best*** illustrates why this area of the Pacific Ocean is called the Ring of Fire?

A "Embedded in these rocky plates are the seven continents."

B "It includes some of the most intense earthquake and volcanic activity in the world."

C "Earth is a planet that is divided into layers: the crust, the mantle, the outer core, and the inner core."

D "During an earthquake, the ground shakes violently because the earth's crust suddenly breaks and shifts."

43. How might reading this selection help you when you study volcanoes and earthquakes in earth science?

A You will know the causes and effects of earthquakes.

B You will know the causes and effects of volcanoes.

C You will know the names of the most destructive volcanoes and earthquakes in the world.

D You will know what the Ring of Fire is, where it is located, and why it is such a volatile area.

44. According to the map, which of these places has the ***most*** land along the Ring of Fire?

A South America

B North America

C Asia

D Australia