Is It a Volcano? Answer Key

Location 1: Volcanic

Kutkhiny Baty, Kamchatka Peninsula, Russia

Kutkhiny Baty, located near Kurile Lake in the Kamchatka peninsula in the Russian Far East, is a unique valley made up of white pumice. Pumice is a lightweight igneous rock that forms when the lava expelled from an explosive eruption comes into contact with water, cooling rapidly. As the lava cools, it transforms into a solid with gas trapped inside of it. The Kutkhiny Baty valley and Kurile Lake were formed thousands of years ago, due to a large volcanic explosion. As the volcano erupted, lava was ejected into the air, cooling into pumice which was then scattered across the land. Over time, erosion carved the pumice deposits into a spectacular valley complete with large, obelisk-like cliffs.

Location 2: Not Volcanic

Marble Rocks, Madhya Pradesh, India

The Marble Rocks is a gorge made of soft, white marble along the Narmada River, near the town of Bhedaghat in the Indian state of Madhya Pradesh. It was formed by erosion—as the Narmada river flows through the Dhuandhar waterfall at a rapid speed, it squeezes through a narrow gorge. The run-off from the waterfall creates high water pressure against the gorge, which allows it to be easily eroded.

Marble is a metamorphic rock which consists predominantly of limestone or calcite. It forms when limestone is exposed to high temperatures and pressure, causing the calcite in the limestone to recrystallize.

Location 3: Not Volcanic

Coyote Buttes, Utah, United States

Coyote Buttes, near the Arizona–Utah border, is a series of rock formations that run along Paria Canyon. The sand that would eventually transform into the Navajo Sandstone that makes up Coyote Buttes was deposited 190 million years ago. It is the remains of an erg—a flat desert area covered in sand dunes. Sandstone is a sedimentary rock comprised of sand-size grains of minerals, rocks, and other organic material. It forms when sand deposits in bodies of water compress against quartz and calcite minerals—the pressure exerted by the minerals causes the sand to solidify. Over time, this continuous compression forms solid sandstone.

The most famous rock formation within Coyote Buttes is known as The Wave. It is made up of sandstone dunes that have been compacted into sandstone. The sandstone was then eroded by flooding, river run-off, and wind over a vast period of time. This erosion has given The Wave its unique patterns, with years of bleaching and iron oxide deposits adding red, orange, and pink hues to the stone.

Location 4: Not Volcanic

Bacuit Bay, Palawan, Philippines

Bacuit Bay is a series of islands and islets off the coast of El Nido, a coastal town in the Philippine province of Palawan. Along the bay, in shallow waters close to North Vietnam and South China, karst limestone cliffs tower over the water. The cliffs were formed 250 million years ago out of thick layers of coraline deposits. Around 60 million years ago, as a result of the collision of India and Mainland China, these layers slowly rose out of the sea.

Limestone is a sedimentary rock made up of calcium carbonate. It is most commonly found along the seafloor. Limestone is formed when shell, coral, and algae debris at the bottom of the ocean press together with calcium carbonate. Over time, as more sediment begins to compact with the shell debris, it cements together, forming solid rock.

Is It a Volcano? Answer Key

Location 5: Not Volcanic

Mount Everest, Himalayas

With an altitude of 8,848 meters, Mount Everest—located in the Mahalangur subrange of the Himalayas—is the highest mountain in the world. The mountain was given its Western name in 1856 by the British surveyor George Everest, who was head of a survey commissioned to establish the mountain's height. In Nepalese, the mountain is known as Sagarmatha, and in Tibetan, Chomolungma. The first successful ascent of Mount Everest was achieved by Tenzing Norgay and Edmund Hillary on May 29, 1953.

Mount Everest formed over 65 million years ago, as the result of the Eurasian plate and the Indo–Australian plate repeatedly colliding. The rapid movement caused the mountain to rise 15 cm northward per year out of the Tethys Ocean, a Mesozoic ocean located between the ancient supercontinents Gondwana and Laurasia. As the mountain rose, skeletal remains and debris from the ocean floor merged, transforming into limestone—this limestone can be found on Mount Everest's peak.

Other layers of sedimentary rock can be found on Mount Everest, including shale and pelite. Shale—the most abundant sedimentary rock in the Earth's crust—is a soft rock that forms due to the compaction of mud and easily splits into layers. Often found in layers of limestone and sandstone, shale typically forms in environments where mud, silts, and other sediments are deposited in gentle transporting currents and become compacted, for example: in the deep ocean floor or basins of shallow seas.

Location 6: Volcanic

Mount Thielsen, Oregon, United States

Mount Thielsen, which stands 2,799 meters at its peak, is an extinct shield volcano located in the High Cascades in the US state of Oregon. While the volcano was active for approximately ten million years, its eruptive activity ceased around 250,000 years ago.

Mount Thielsen's unique structure is the result of glacier flow which has eroded the mountain. The Lathrop Glacier, named after its discoverer Dr. Theodore Lathrop, is one of the last glaciers that remain on the mountain. Erosion has exposed a central volcanic cone composed of basaltic andesite (an igneous rock commonly found in shield volcanoes in the Oregon Cascades). Erosion has also worn away the mountain's summit crater, forming a horn-shaped peak that protrudes from the mountain's top. The peak is known for its ability to attract lightning, earning it the nickname "the Lightning Rod of the Cascades."

Location 7: Volcanic

Mauna Loa, Hawaii, United States

Mauna Loa (Hawaiian for "Long Mountain") is a basaltic shield volcano located on the Island of Hawai'i in the US state of Hawaii. A shield volcano is a gently sloping mountain produced from a large number of typically very fluid lava flows. The world's largest and most active volcano—it rises 4,169 meters above sea level—Mauna Loa has erupted 33 times since 1843, most recently in 1984. The volcano has been active for around 700,000 years.

About 90% of Mauna Loa is covered in lava flows less than 4,000 years old. The basalt rock that forms Mauna Loa's core gives clues as to how the Hawaiian Islands formed. When lava rapidly cools, it hardens into solid basalt—this igneous rock is commonly found on the ocean floor and in ancient seabeds that have, over time, become dry land. The islands' formation began with a basalt eruption from an oceanic hot spot—a plume of magma that rises deep from the ocean floor. The eruptions continued repeatedly, causing the volcanic cone to grow larger and larger until it merged with the rest of the land that now makes up the Island of Hawai'i.

Is It a Volcano? Answer Key

Location 8: Volcanic

Deccan Traps, Deccan Plateau, west central India

The Deccan Traps, located on the Deccan Plateau in west central India, are one of the largest igneous provinces in the world. A large igneous province refers to an area that contains a significant amount of igneous rocks: in this case, basalt. Rising to nearly 2,000 meters in height and covering an area of roughly 200,000 square miles—around the size of the states of Washington and Oregon combined—the Deccan Traps consist of flat-lying basalt lava flows.

Some scientists believe the Deccan Traps formed as the Indian plate passed over the Reunion hot spot, a still-active volcanic island located in the Indian Ocean. Some also speculate that the Deccan Traps played a role in the extinction of the dinosaurs—most of the basalt rock within the Deccan Traps erupted between 65 and 60 million years ago. Gases released by the eruptions may have changed the global climate, leading to the demise of the dinosaurs.

Location 9: Volcanic

Prestahnúkur Volcano, Highlands of Iceland

The Prestahnúkur Volcano is a large subglacial shield volcano west of the Highlands of Iceland. The volcano is made up of rhyolite, and has a small magma chamber. Rhyolite is an extrusive igneous rock with a high silica content—it forms as a result of effusive volcanic eruptions, where granitic magma reaches the surface and cools rapidly.

There have been no large-scale eruptions in modern times, with the last dating to 900 CE. Large-scale eruptions on Prestahnúkur can last for years, with a low extrusion rate—basaltic in nature, these eruptions come from a central vent or short fissure.

Location 10: Volcanic

Mount Aniakchak, Alaska, United States

Mount Aniakchak, in the Aleutian Range in the US state of Alaska, is a volcanic caldera predominantly made up of basaltic andesite, a volcanic rock containing 55% silica. It formed around 3,400 years ago as the result of a voluminous eruption which caused pyroclastic flows to travel toward the Bering Sea and Pacific Ocean.

There have been at least 40 explosive eruptions in the caldera in the last 10,000 years.

Location 11: Not Volcanic

Flatirons, Colorado, United States

The Flatirons are rock formations found near the town of Boulder, in the US state of Colorado. The rock formations are composed of a particular type of bedrock made up of sandstone and conglomerate (another type of sedimentary rock). The sand and gravel that make up the Flatirons were deposited approximately 280 million years ago by rivers and creeks located on the eastern side of an ancient mountain range known as the Ancestral Rocky Mountains. As the rivers and creeks transported sand and gravel from the mountain's peaks, they eroded the mountains. In turn, they deposited the sand and gravel, which compressed and cemented in a solid, 300-meter thick layer, which we call the Fountain Formation. When the mountains eroded completely, newer rock layers were formed on top of the Fountain Formation. The Laramide orogeny—a major uplifting of the Earth, also referred to as mountain-building—then tilted and moved the rock, creating the Flatirons as we see them today.