

Denali: The High One

National Park Service

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Denali National Park and Preserve



Denali means “the high one” in Koyukon, one of the Alaska Native languages of this region. And high it is! At 20,310 feet tall, Denali is the tallest mountain in North America. It is the pinnacle of a long arc of mountains called the Alaska Range. This mountain range is being created by movement of the plates that make up the Earth’s crust. The Pacific plate is slowly moving northwest and crashing into the North American plate. As the more dense Pacific plate *subducts*, or goes under, the lighter North American plate, it causes the land above it to buckle like the hood of a car during a collision. The buckled bedrock forms the Alaska Range and its highest peak, Denali.



Geologic forces are at work in Denali. Glaciers, wind, rain, frost, and water *erode* the mountains, and yet Denali is still growing! The Pacific plate continues to crash into and subduct beneath the North American plate, causing Denali to continue growing at a rate of 1 millimeter per year. That may seem slow, but at that rate it will rise one kilometer in the next million years, a short period in geologic time.

Most people in Alaska live in cities and towns where they can sometimes see Denali looming on the horizon, marvel at the storms on its slopes, and fish the rivers that carry away the Alaska Range piece by piece. We also feel the jolt of earthquakes from movement as the plates crash together, proof of the powerful forces at work within the Earth.

Are there geologic forces at work near you? What kind of landforms do you live near?

Which Mountain is Highest?

Mountains can be measured in different ways; you can look at their overall height or their *relief*, the distance from the base to summit. Using a calculator, decide which mountain you think deserves the title of tallest mountain on Earth.



Mauna Kea in Hawai'i is a dormant volcano. 13,803 feet of Mauna Kea is above sea level, but the base of the volcano is the sea floor. 19,697 feet is underwater. What is Mauna Kea's height from base to summit?

$$13,803 + 19,697 \text{ feet} = \underline{\hspace{2cm}} \text{ feet}$$



Denali is part of the Alaska Range, a 600-mile arc of mountains. The base of Denali sits around 2,000 feet above sea level and rises to 20,310 feet. What is Denali's height from base to summit?

$$20,310 - 2,000 \text{ feet} = \underline{\hspace{2cm}} \text{ feet}$$



Mount Everest in the Himalayan mountains of Asia is well-known as the tallest mountain. However, it begins on a 14,000-foot-high plain and summits at 29,028 feet. What is Mount Everest's rise from base to summit?

$$29,028 - 14,000 \text{ feet} = \underline{\hspace{2cm}} \text{ feet}$$

Challenges when Climbing Denali

Denali is an inspiration for many. It will always be a magnet for explorers, artists, scientists, and those who are awestruck by the sight of one of the world's biggest, coldest, and most beautiful mountains. *What inspires you in the natural world?*

People from around the world attempt to climb Denali. In doing so, they embark on a physical and mental journey that challenges them in many ways. To climb Denali safely and successfully takes planning, training, and a little bit of luck – at least for the weather! *As you read about the challenges associated with summiting Denali, think about a great challenge in your life. What steps did you take to overcome it? How did you feel when you overcame your challenge?*



The route: There are a few different routes up Denali. The West Buttress, West Rib, Cassin Ridge, and Muldrow are the most frequently climbed routes. In recent decades, over 90% of climbers on Denali climb the West Buttress, which is pictured above. The average West Buttress attempt takes 17 to 21 days, round trip. *What challenging activity would you want to do for three weeks?*



Weather is a huge obstacle to successfully summiting Denali. Many consider it the world's coldest mountain because of its combined high elevation and subarctic location. Wind is a factor as well, with gusts over 100 mph recorded at 14,200 feet. Climbers come prepared with gear that helps to prevent frostbite and hypothermia.

Trusting your team and knowing their skills is incredibly important in mountaineering. *When was the last time you were on a team?* You shared a common goal on that team and there was probably a risk that you might lose a game or do poorly on an assignment, but mountaineering teams have a lot more at stake. While traveling, especially over glaciers, teammates are roped to one another in case someone falls into a crevasse (a crack in a glacier) or down a steep slope. If one team member falls, the others stop them using their body weight and use the ropes to pull them out. *How would you feel about entrusting your life to your teammates? How might you practice for that kind of challenge?*



Altitude sickness: High in the earth's atmosphere the air is less dense, which means that there is less oxygen available to breathe. Mountaineers are exercising hard as they climb and therefore need a lot of oxygen. If they don't get enough, they can get altitude sickness, the symptoms of which include headache, nausea, and shortness of breath. On other super-high mountains like Mount Everest, climbers often use supplemental oxygen that they carry in tanks. On Denali climbers aren't allowed to carry oxygen because the tanks can become litter which harms the environment. Instead, Denali mountaineers plan rest days and sleeping locations carefully in order to allow their bodies to acclimate, or grow accustomed, to the elevation.

Would you ever want to try climbing Denali? Whether you come as a visitor, an employee, or a mountaineer, we look forward to welcoming you!