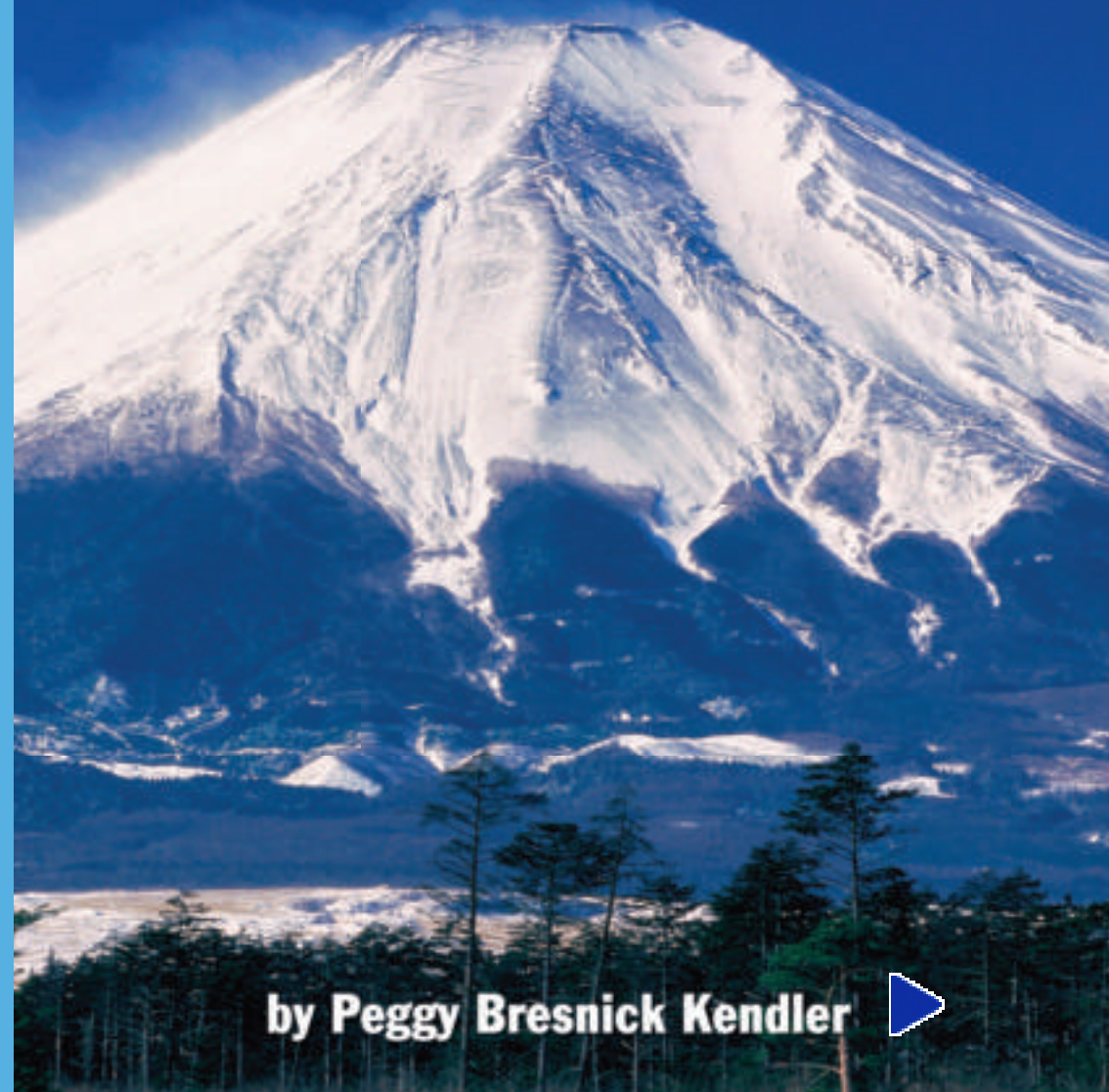


California
Science

California
Science

Earth Sciences

Mountains OF THE WORLD



Genre	Comprehension Skill	Text Features	Science Content
Nonfiction	Sequence	<ul style="list-style-type: none">• Map• Diagrams• Labels• Glossary	Earth's Surface

Scott Foresman Science 4.7



scottforesman.com



by Peggy Bresnick Kendler



Vocabulary

deposition
earthquake
erosion
fault
landform
landslide
soil
transport
volcano
weathering

Extended Vocabulary

altitude
cirque
col
couloir
fjord
glacier
magma
sediment
spur
tectonic plate

Picture Credits

Every effort has been made to secure permission and provide appropriate credit for photographic material. The publisher deeply regrets any omission and pledges to correct errors called to its attention in subsequent editions.

Photo locators denoted as follows: Top (T), Center (C), Bottom (B), Left (L), Right (R), Background (Bkgd).

Opener: H Nara/PanStock/Panoramic Images/NGS Image Collection; 2 (B) Index Stock Imagery; 6 (BL) Martin Bond /Photo Researchers, Inc.; 10 Ric Ergenbright/Corbis; 12 Jamie Marshall/P. Mansbridge/Alamy Images; 13 (BR) Royal Geographical Society, London; 16 Jamie Marshall/Alamy Images; 17 Daryl Balfour/Getty Images; 18 H Nara/PanStock/Panoramic Images/NGS Image Collection; 19 (CR) Dennis Flaherty/Photo Researchers, Inc., (CL) Dr. B. Booth/GSF; 20 Walter Bibikow/PhotoLibrary.

Scott Foresman/Dorling Kindersley would also like to thank: 23 (BR) Jet Propulsion Lab (JPL)/DK Images.

Unless otherwise acknowledged, all photographs are the copyright © of Dorling Kindersley, a division of Pearson.

ISBN: 0-328-23562-8

Copyright © Pearson Education, Inc. All Rights Reserved. Printed in the United States of America. This publication is protected by Copyright, and permission should be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form by any means, electronic, mechanical, photocopying, recording, or likewise. For information regarding permission(s), write to Permissions Department, Scott Foresman, 1900 East Lake Avenue, Glenview, Illinois 60025.

1 2 3 4 5 6 7 8 9 10 V010 13 12 11 10 09 08 07 06



Mountains OF THE WORLD

by Peggy Bresnick Kendler





What You Already Know

Earth's surface is made of a layer of rock called the crust. The crust covers all of Earth, even under the oceans.

The natural features that cover Earth's surface are called landforms. Plains, mountains, valleys, and canyons are all landforms. Some landforms take shape slowly, while others form very quickly.

One way landforms change is through weathering. Weathering is the process that breaks rocks in Earth's crust into smaller pieces. Chemical weathering causes the chemicals in rocks to change into other materials. These materials can break apart, wearing down the rock. Physical weathering does not change rocks into new materials, it changes only their size. Physical weathering can be caused by plants, ice, and water.

When rock is broken down a lot, it turns into soil. Soil is the thin layer of loose, weathered material that covers most the land on Earth. It is made up of sand, silt, clay, and some decaying matter called humus.



Weathered material is transported, or carried, from place to place. Erosion is the movement of weathered materials away from a place. It can be caused by wind, water, living things, and gravity. Deposition is the laying down of pieces of rock and soil. Water, wind, and glaciers can deposit materials. Through these processes, parts of Earth's surface are worn down as other parts are built up.

Sometimes Earth's surface changes very quickly. A landslide is one way this can happen. A landslide happens when gravity pulls a lot of weathered material down a slope.

Volcanoes and earthquakes can also cause rapid changes. Earth's crust is divided into huge pieces called plates. Most earthquakes and volcanoes are along places where plates meet. Earthquakes happen at faults. Faults are breaks or cracks in rocks where Earth's crust can move.

Rocks are constantly being created, destroyed, and moved around. Have you ever wondered how the forces that shape landforms make mountains? Keep reading to find out.

mountain scene, Aspen, Colorado





Earth's Mountains

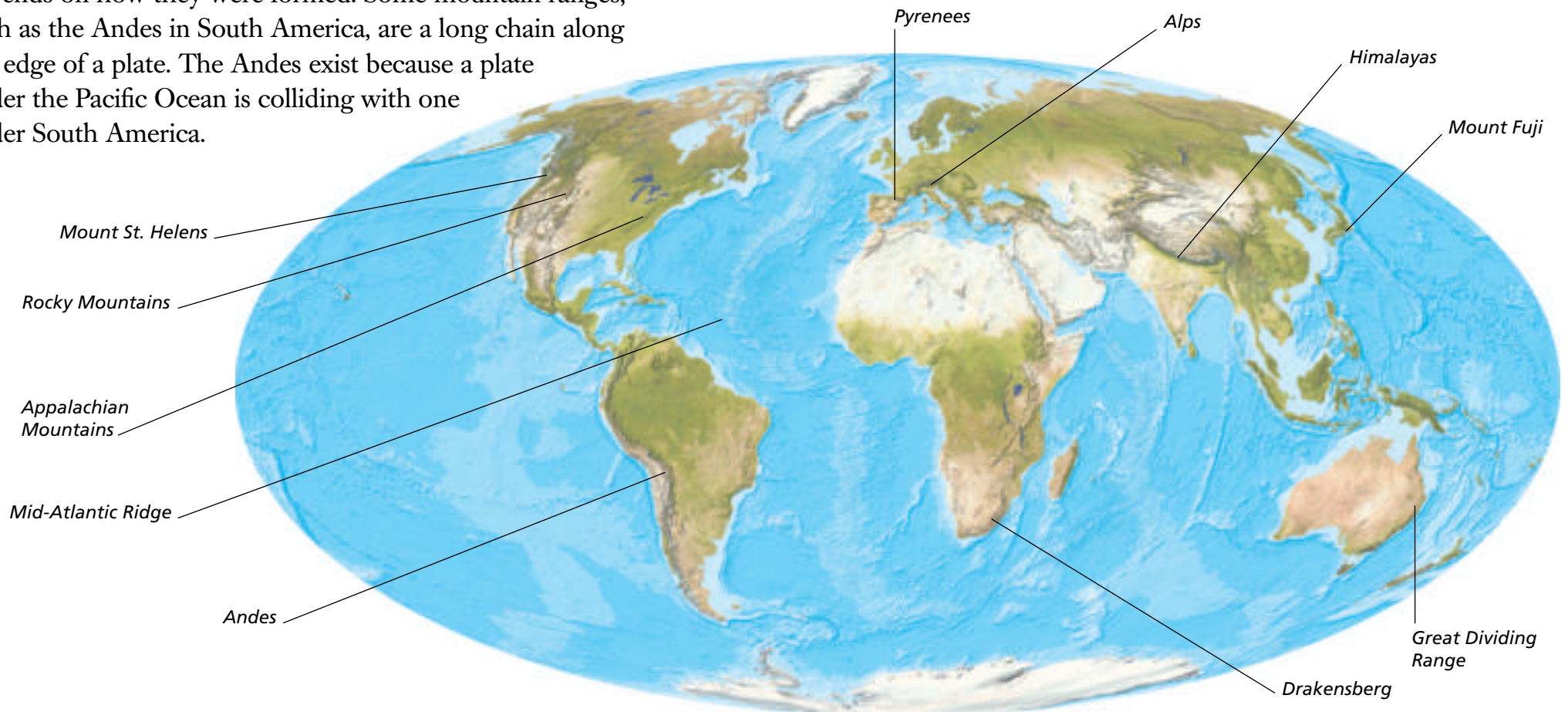
A mountain is a high point of land that rises steeply from its surroundings. A mountain range is a long chain or series of mountains. Mountains and mountain ranges are found all over the world, on each of the seven continents. They can rise from the dry land or from the sea floor. The highest mountain peaks on Earth are topped with snow all year.

A few mountains have no other mountains near them, but most are part of ranges. The location of mountain ranges depends on how they were formed. Some mountain ranges, such as the Andes in South America, are a long chain along the edge of a plate. The Andes exist because a plate under the Pacific Ocean is colliding with one under South America.



Fold mountains are formed when two large plates crash into each other and fold upward. The Himalayas are fold mountains formed by the Indian plate moving against the Asian plate. Other mountains, such as the Drakensberg of Africa, were formed by many volcanic eruptions.

Whether craggy and rocky or smooth and icy, the Earth's mountains are a source of awe and wonder. Each of these huge landforms has a fascinating history.





How Mountains Are Formed



The Earth's crust is broken up into tectonic plates.

Mountains are typically formed when the Earth's tectonic plates shift. The Earth's crust is made up of about a dozen large and small tectonic plates.

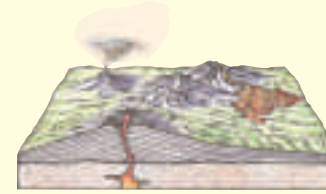
There are three different ways the plates can meet. They can move away from each other, separated by a crack with lava flowing out of it. One plate can slide under another, often creating a deep-sea trench. They can also slide past each other, creating friction that can cause earthquakes.

Sometimes one of these meetings causes mountains to form. For instance, when two sea floor plates separate because hot rock is rising up between them, that rock can pile up into a string of mountains called a mid-ocean ridge.



These layers of rock have been folded as a result of collision between plates.

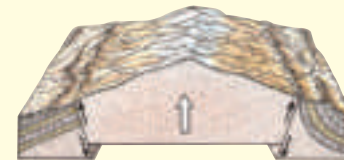
Types of Mountain



Volcanic mountains are formed and shaped by volcanic eruptions.



Fault block mountains are made when two plates move away from each other, allowing one plate to rise.



Dome mountains are pushed up by pressure from molten rock below.



Fold mountains are created when two plates collide and the rock folds.



Fold mountains are formed when two plates meet and crash into each other. The collision forces a thick layer of rock into folds that create a series of mountains. Fault block mountains form when a part of a plate breaks and rises up in huge blocks. Fault block mountains can form when two plates move apart.

Volcanic mountains are created by volcanic eruptions. Lava and ash released from volcanoes build up to form mountains. Dome mountains are created in almost the same way as volcanic mountains. But instead of molten rock erupting to build a mountain, it simply pushes the Earth's crust upward to form a dome.



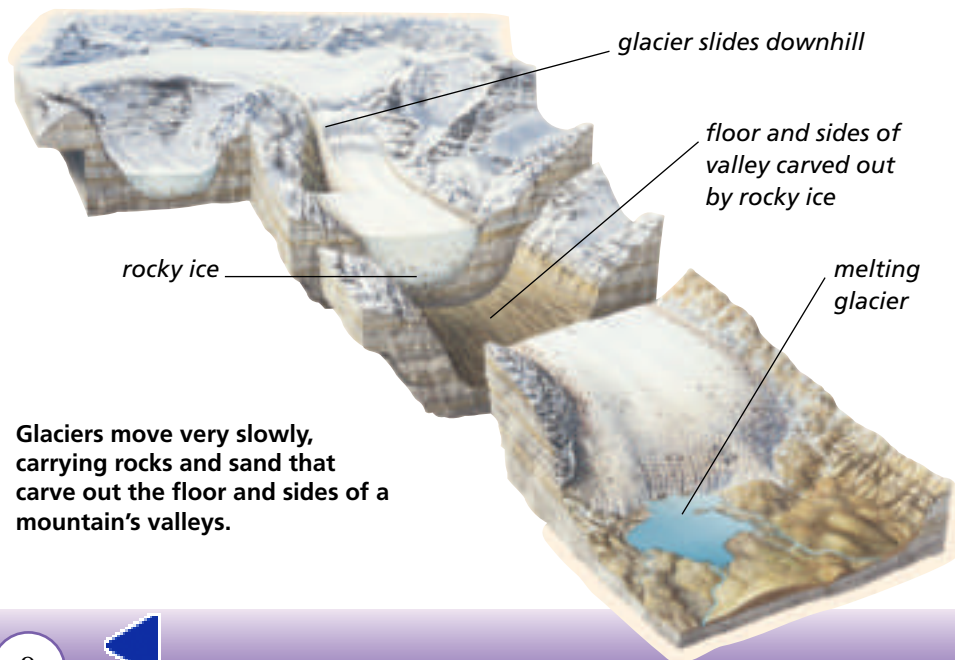


Erosion

Although it is impossible to see, mountains are changing all the time. Sometimes they are growing. At other times mountains are being eroded by natural forces, such as frost, ice, rain, and wind. Erosion is the process in which materials from the Earth's crust are worn away or loosened and then moved from one location to another.

Over millions of years, erosion will cause all mountains to slowly crumble to the ground. Peaks that are now very tall and sharp will one day be low, round hills.

One of the most powerful forces of erosion is the glacier. Glaciers are masses of ice that can be miles thick. Glaciers move very slowly across land, taking rocks, soil, and sediment with them. As glaciers move, they erode the land underneath them, grinding it down with their incredible weight. As it moves over a mountain, a glacier can carve parts of it into steep-walled valleys.



Some mountains are considered young; others are said to be old. The Scottish Highlands in Scotland and the mountains of Norway are old mountains. They are more than 350 million years old. Glaciers eroded the Scottish Highlands, forming sharp peaks and deep valleys. In Norway, glaciers carved out sea inlets, called fjords, in the mountain valleys.

Norwegian fjords were created by glacial erosion.

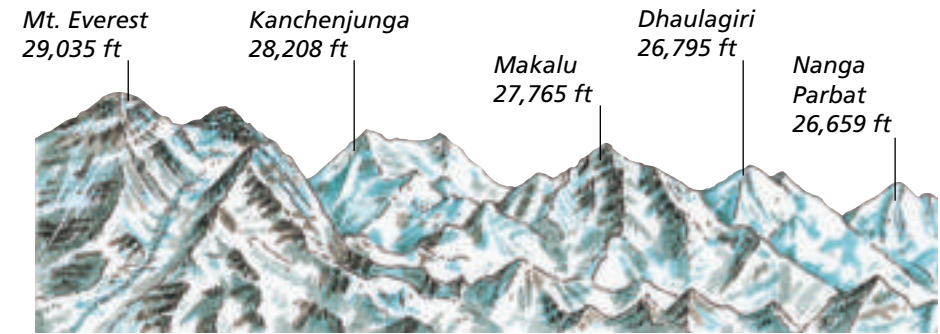




The Himalayas

The Himalayas are a mountain range located between southern and northern Asia on the border separating China and Nepal. They make up the largest mountain range on Earth. They have the tallest mountains. The Himalayas are fold mountains that formed when the plate below India pushed into the plate below Asia.

More than 200 million years ago, present-day India, Africa, Australia, and the Americas were one continent. Over the next few million years, the giant landmass began to break apart into the continents we know today. But India began to move northward toward Asia. The impact of India meeting Asia created the Himalayas. The Indian plate pushed underneath what is now Tibet and lifted it up to form the mountain range.



Five peaks of the Himalayas

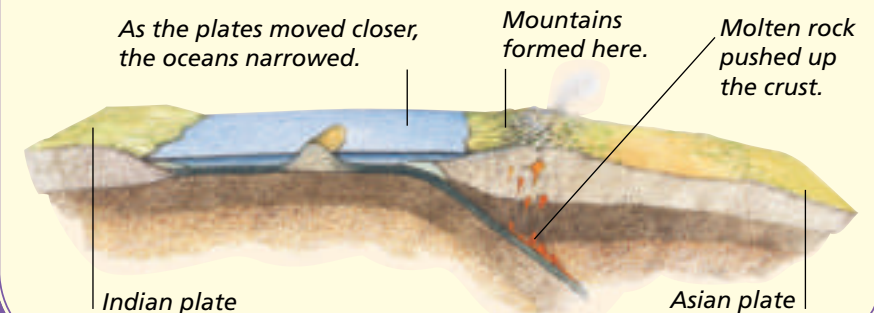


The plate that carried India into Asia is still moving in the same direction, causing the Himalayas to grow slowly. The same forces that shaped the Himalayas also formed the Karakoram range in northeast Pakistan and northern India, close to the border of China. This range also includes many tall peaks. Among them is K2, the second-tallest mountain in the world.



The Formation of the Himalayas

The Himalayas were formed when the plate that carried India collided with the continent of Asia. The force of the impact folded the Earth's crust to form the largest and tallest mountain range on the planet.

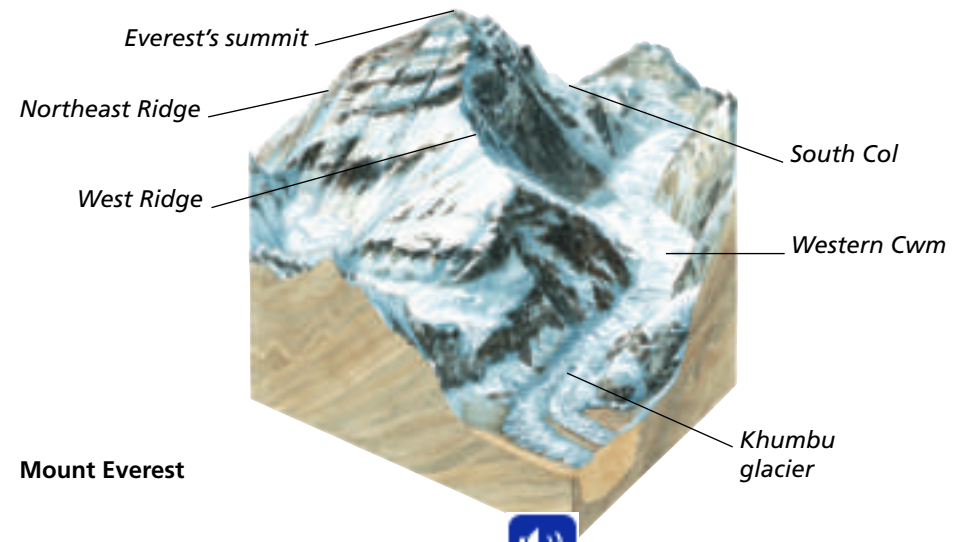




Mount Everest

The world's tallest mountain is Mount Everest, a peak that's part of the Himalaya mountain range on the border of Tibet and Nepal. Mount Everest is 29,035 feet high, more than five miles above sea level!

The shape of Mount Everest is unique. The mountain is shaped like a three-sided pyramid and is surrounded by glaciers named Khumbu, Rongbuk, and Kangshung. This striking mountain has many different features. The Western Cwm, for instance, is a huge glacial cirque, or steep-walled, horseshoe-shaped valley created by a glacier. The South Col is a low spot in the southeast ridge of the mountain. The Khumbu icefall was created when the Khumbu glacier began to move down the steep slope. Winds can blow with hurricane strength on the summit of Mount Everest, which is covered in ice all year long.



Mount Everest



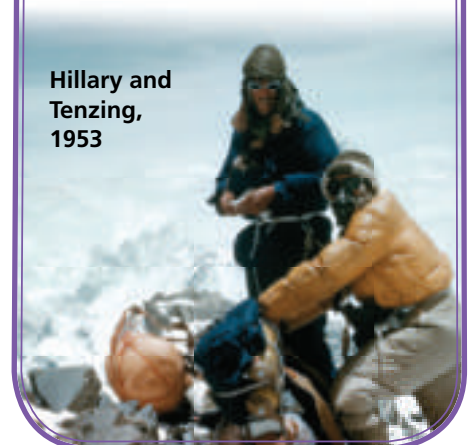
As the altitude increases, the air becomes very thin and has less and less oxygen. On the summit of Mount Everest, there is much less oxygen in the air than at the base of the mountain, and it is very difficult to breathe. The temperature at the top of the mountain can be as cold as -100°F .

Despite the danger, thousands of people have tried to climb Everest. Only about twelve hundred men and women from sixty-three nations have made it to the summit so far.

Climbing Everest

The first successful climb to Everest's summit was on May 29, 1953. Sherpa Tenzing Norgay of Nepal and Edmund Hillary of New Zealand reached the summit of the world's tallest mountain after a climb that took seven weeks.

Hillary and Tenzing, 1953





The Alps

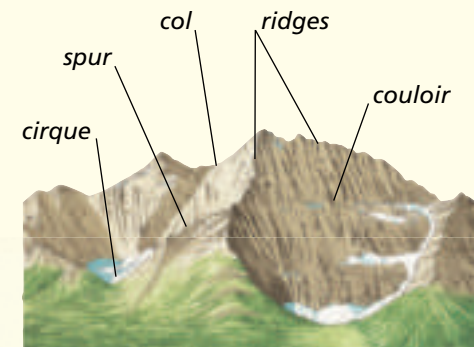
The Alps, located in south central Europe, is the highest and largest mountain range on that continent. The Alps covers tens of thousands of square miles and stretches across parts of southern France, northern Italy, Switzerland, Germany, Austria, and Slovenia. This mountain range has several hundred peaks, many more than twelve thousand feet tall.

Like the Himalayas, the Alps are fold mountains, created when a collision between plates of Africa and Europe pushed rocks and sediment northward. Large glaciers further shaped the Alps, carving out cirques, spurs, cols, ridges, and couloirs. The overflow of ice flowed into the valleys, making them wide and deep. The walls of the valleys curve gently into the floors, giving them a U shape.

One of the best-known peaks in the Alps is the Matterhorn, which is in southwest Switzerland near the border with Italy. Glaciers have carved this mountain into a sharp, steep, pyramid shape. The highest peak in the Alps is Mont Blanc in southeastern France. It rises to about 15,770 feet.

Mountain Features

The Alps have been shaped by glaciers, creating many different features that give them a unique appearance. On a single mountain, there may be cirques, spurs, cols, couloirs, and ridges.



Up to an altitude of about six thousand feet, pine forests grow on the Alps. Summits above 9,800 feet are so cold that they are covered with glaciers and snow year-round. Some peaks, such as the Matterhorn, are so steep and jagged that not much snow and ice sticks to them. The valleys are not ice-covered and are home to millions of people.



The Andes

The Andes run along western South America, rising steeply along the coast of the continent. About five thousand miles long, the mountain chain begins in Chile in the south and reaches as far north as Venezuela. The range averages 150 miles wide. Its peaks average 12,000 feet high.

The highest peak in the Andes is Aconcagua, which rises 22,834 feet above sea level in western Argentina, near Chile. Many of the passes through the Andes are very high, narrow, and steep.



About 30 million years ago, the rocks that make up the Andes were lifted up when the Nazca plate began to slide under the South American plate. The ocean crust was drawn down into the mantle and melted. It became new magma that rose up and erupted in many places onto the surface of the Earth.

The Andes are one of the longest mountain chains in the world. They stretch from north of the equator to near Antarctica. There is a wide range of climates in the Andes. The northern part of the chain is very warm and rainy. Tropical rain forests can be found. The southern end of the Andes is very cold, since it is close to the Antarctic. Very few people live in that area.



Mountain Weather and Altitude

The weather can vary quite a lot on a mountain, depending on the altitude. While the weather may be clear and sunny at the base, the mountain's peak might be cloudy, windy, and frigid. Mt. Kilimanjaro rises from the hot plains of Africa, but has been known to have snow and ice on its summit year-round.



Mt. Kilimanjaro



Mount Fuji

Mount Fuji is the highest mountain in Japan and rises 12,388 feet above sea level. It is actually a volcano, but it hasn't erupted in nearly three hundred years. It is shaped like a cone and has a snow-capped peak. At the summit, there is a circular crater that is about sixteen hundred feet wide and about eight hundred feet deep. The volcano is covered nearly everywhere with lava flows from the eruptions of thousands of years ago.

Mount Fuji is actually made up of three separate cones: Komitake, Old Fuji, and New Fuji volcanoes. Eruptions from each of these volcanoes have caused lava flows, mudslides, and avalanches that deposited debris and sediment down the side of the mountain.

Mount Fuji is considered a sacred mountain by Japanese people. It is visited by thousands of people from all over Japan and around the world. Because Mount Fuji is such an important mountain to the Japanese people, many temples have been built on its slopes.



Active Volcanoes

An example of an active volcano is Mount St. Helens in Washington State, which erupted violently in 1980. The eruption lasted nine hours and reduced the mountain's height by 1,312 feet. It left a crater nearly two miles across and destroyed enough trees to build 300,000 houses.



before eruption



after eruption



People looking for adventure also come to Mount Fuji. Thousands of climbers hike to the summit each year. The mountain is also popular with artists who photograph and paint pictures of it. These artists must be lucky to see the mountain on a clear day, because a lot of the time the view of Mount Fuji is blocked by clouds and fog.

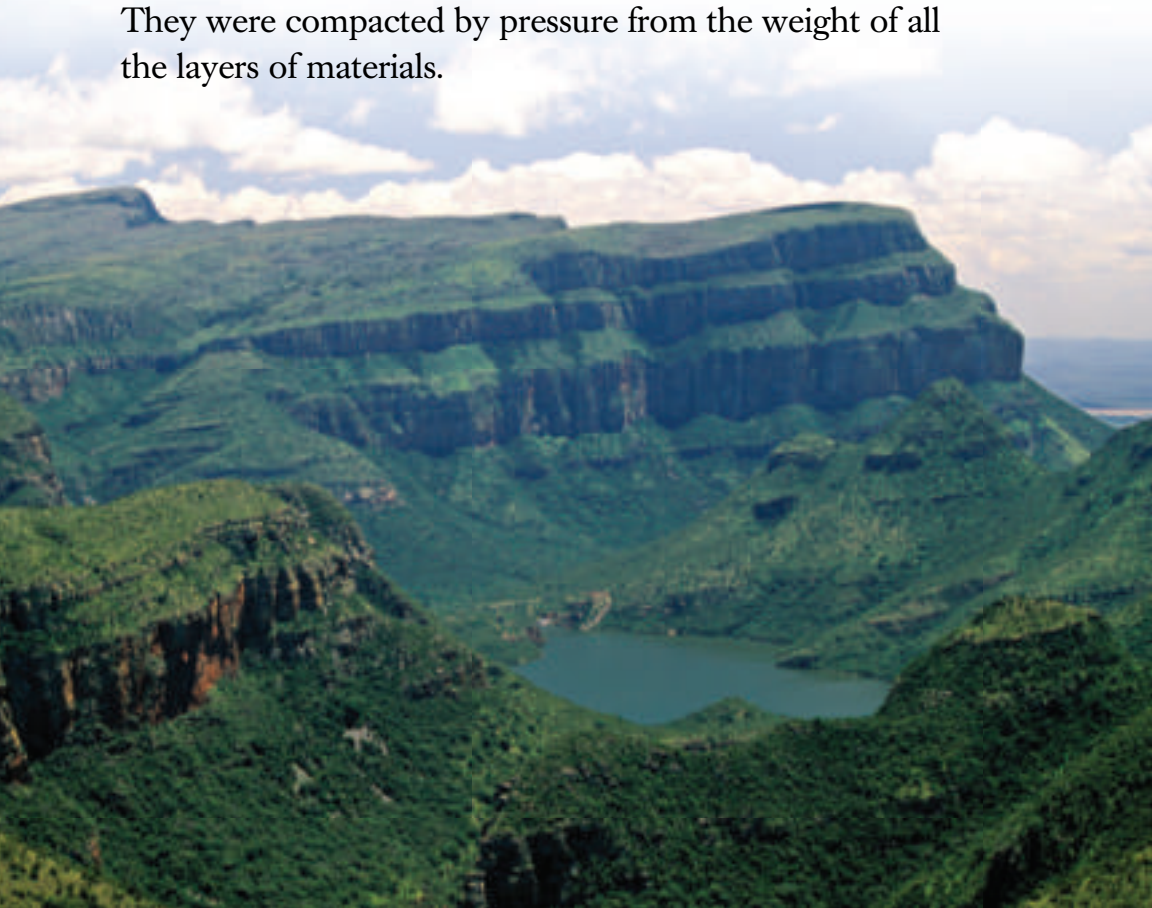




The Drakensberg

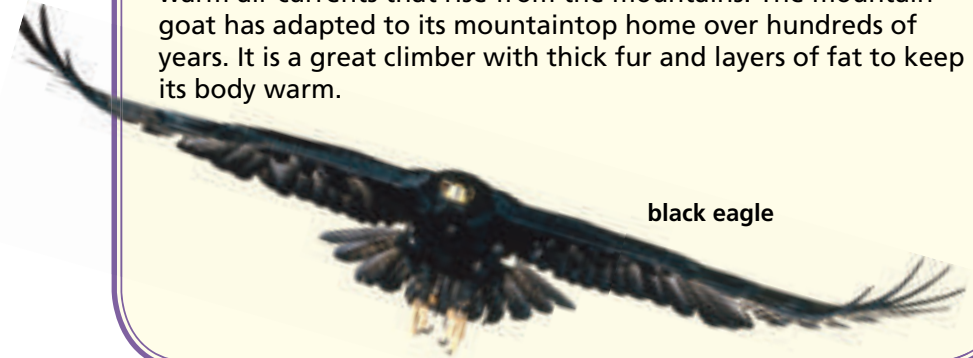
The Drakensberg is a beautiful mountain range on the continent of Africa. Located mostly in South Africa, the range extends for about seven hundred miles. Its highest peak is Thabana Ntlenyana, which is 11,425 feet above sea level.

The Drakensberg range was formed billions of years ago. The area was a large inland lake on a huge continent that was made up of present-day Africa, Australia, New Zealand, South America, and Antarctica. Mud and sediment were deposited for millions of years into the area. They were compacted by pressure from the weight of all the layers of materials.



Mountain Wildlife

Many animals are specially adapted to survive in the mountains. The black eagle builds its nest on the edges of cliffs and soars on warm air currents that rise from the mountains. The mountain goat has adapted to its mountaintop home over hundreds of years. It is a great climber with thick fur and layers of fat to keep its body warm.



black eagle



Over millions of years, more layers of sediment were deposited, including some deposits containing early dinosaur fossils. Eventually, the movement of the Earth's crust caused the large continent to crack and break apart. Lava flowed out of the cracks and covered the land.

Lava flowed slowly and cooled over and over again. This built up a deposit of rock with many holes that later filled with minerals. At the same time, lava flowing into underground cracks resulted in different landforms.

After the lava flows were cooled, they were eroded. The Drakensberg range separates a high plateau from a lower one. Water flowed from the high area to the lower one, shaping the Drakensberg of today. The combination of the hard lava layer on top and the softer rocks underneath caused a unique pattern of weathering. The lava created flat caps on top of the mountains, while the easily eroded rock beneath was carved into steep sides.





Mountain Facts

Some mountains are unusual because of where they are located or how they were formed. Others are unique in their shape or for some other feature.

Did you know that in Hawaii there is an enormous volcanic mountain that's mostly underwater? Mauna Kea is the tallest volcano on the Big Island of Hawaii. From the sea floor to its summit, it rises more than 32,000 feet. But only 13,796 feet of it is above the ocean's surface. If this volcano were on dry land, it would be taller than Mount Everest!

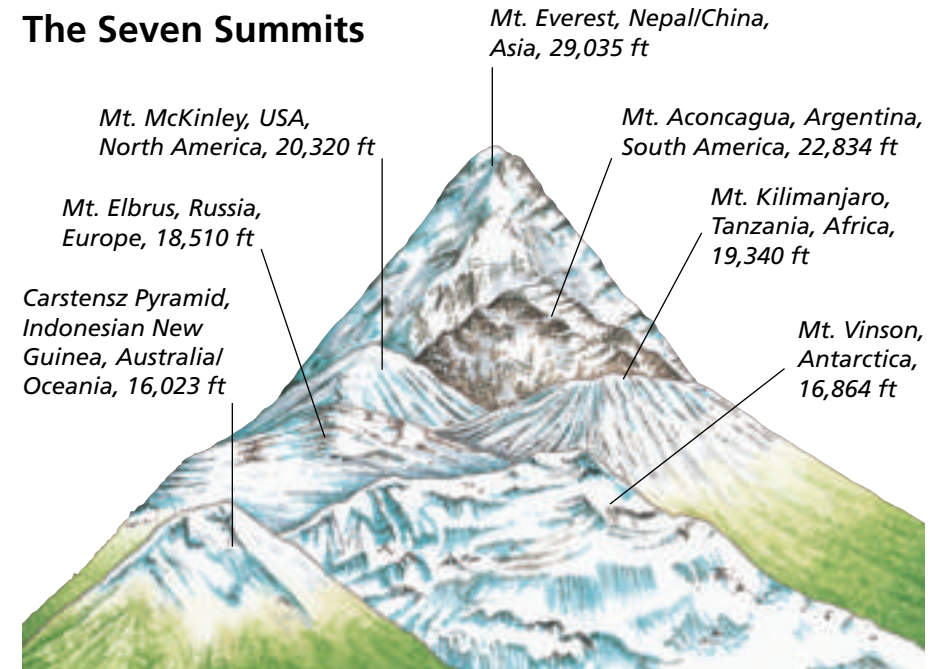
The largest mountain range on Earth is actually underwater. The Mid-Atlantic Ridge runs from Iceland to Antarctica and was formed about 240 million years ago.

The Seven Summits are the tallest peaks on each of the seven continents. The peaks are Carstensz Pyramid in New Guinea, Vinson Massif in Antarctica, Mount Elbrus in Russia, Mount Kilimanjaro in Tanzania, Mount McKinley in Alaska, Mount Aconcagua in Argentina, and Mount Everest in Nepal. Very few people have been able to climb to the top of all seven peaks.

Mauna Kea



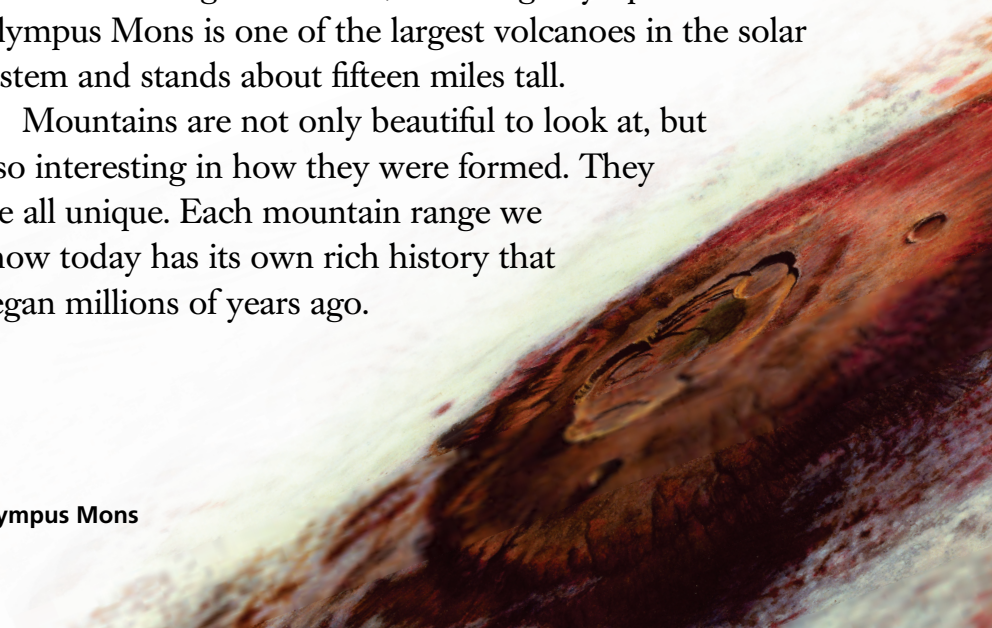
The Seven Summits



Mountains don't have to be on Earth to be unique and interesting. Although Mars is only about half as large as Earth, it has several large volcanoes, including Olympus Mons. Olympus Mons is one of the largest volcanoes in the solar system and stands about fifteen miles tall.

Mountains are not only beautiful to look at, but also interesting in how they were formed. They are all unique. Each mountain range we know today has its own rich history that began millions of years ago.

Olympus Mons





Glossary

altitude	height above sea level
cirque	a steep-walled, horseshoe-shaped valley that is scooped out of the side of a mountain by a glacier
col	a low spot on a ridge
couloir	a steep gorge running down the side of a mountain
fjord	a narrow sea inlet formed by glacial erosion and then filled with water
glacier	a huge mass of ice and snow that moves very slowly downhill, grinding down the land beneath it
magma	molten rock inside the Earth
sediment	weathered material that has been deposited by natural forces
spur	a small ridge
tectonic plate	a huge piece of the Earth's crust

What did you learn?

1. Explain what happens when one of Earth's plates slides underneath another one.
2. How are the Himalayas and the Alps similar? How are they different?
3. What is the largest mountain range on Earth? Where is it located?
4. **Writing in Science** Mountains are all shaped by natural forces in a process called erosion. Write one page to explain how these forces work to erode Earth's mountains. Use examples of specific mountain ranges found in this book.
5. **Sequence** Describe the sequence of events that led to the formation of the Drakensberg.

