NO PREP

Mountains

Rising Giants of Earth's Surface

Includes: Student reading, case study, differentiated questions, teacher key

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Name: Period: Date:

Mountains: Rising Giants of Earth's Surface

Origins of Mountains

Few features dominate the landscape as dramatically as mountains. They rise through tectonic forces, primarily at convergent boundaries, but can also appear via volcanic activity or fault-block uplift. Folding, faulting, and uplift processes are collectively termed orogeny, a slow-motion collision that piles rock layers higher over millions of years. The resulting peaks can reach altitudes where glaciers carve out dramatic valleys, further shaping the terrain. Elevation alone doesn't define a mountain; local relief, cultural significance, and steepness factor in. The Himalayas continue to grow as the Indian and Eurasian Plates press together. In the western United States, the Tetons or the Sierra Nevada exemplify fault-block mountains, where large crustal blocks are lifted along faults, leaving steep fronts and more gradual back slopes. Volcanic mountains like Mount Fuji in Japan build up from successive lava flows and ash deposits, achieving symmetrical cones that can tower above plains.

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Types of Mountains

Fold mountains like the Alps or the Andes often feature complex layering of rock, twisted into intricate folds by immense compressional forces. Fault-block mountains arise when crust is stretched, causing large slabs to tilt or uplift. Volcanic mountains form from repeated eruptions, layering molten rock that cools into basalt, andesite, or other igneous materials. Over time, erosion sculpts mountain surfaces, carving ridges and valleys that expose the internal structure. Glacial action leaves a distinct imprint, especially on "younger" ranges still cold enough to sustain ice. Glaciers grind rock, creating U-shaped valleys, sharp aretes, and pyramidal horns like the famed Matterhorn in the Alps. Weathering from wind, rain, and temperature fluctuations can also shape the contours, eventually reducing lofty peaks to more subdued

landscapes. Because these processes span countless millennia, mountains can appear eternal to us, though they are geologically transient.

Mountains and Climate

Mountains significantly influence weather. Air forced up a slope cools and condenses, producing orographic rainfall on the windward side. Meanwhile, the far side often becomes a rain shadow, fostering a drier environment. Thus, the same mountain range can feature lush forests on one side and semiarid conditions on the other. Additionally, temperature drops as altitude increases, so higher elevations often have alpine conditions that mimic polar regions. These climatic differences create biodiversity hotspots. Unique plant and animal species adapt to the thinner atmosphere, colder temperatures, and steeper slopes. Mountains also serve as water towers, capturing snow and rain that feed rivers. When glaciers recede due to warming trends, downstream communities may face water shortages or disrupted hydropower. Monitoring mountain ecosystems and ice cover helps scientists predict potential impacts on agriculture and urban water supplies.

Human Interactions

Civilizations often flourish near mountains for resources—metal ores, timber, and reliable water sources. Beyond material needs, many cultures attach spiritual and historical significance to peaks. Yet steep slopes and harsh weather challenge infrastructure and transportation. Terraced farming is one solution in mountainous areas, as it reduces soil erosion and makes use of gravity-fed irrigation. Tourism has become a vital economic engine in regions like the Swiss Alps, the Rocky Mountains, or the Himalayas. Ski resorts, trekking paths, and scenic vistas draw global visitors, but can also pressure local ecosystems through overdevelopment, waste generation, and water usage. Balancing tourism with environmental preservation and cultural integrity demands careful planning. Governments and local communities often implement park regulations, limit construction, and promote sustainable trekking or skiing.

Key Information: Table

Mountain Type	Process	Example
Fold Mountains	Compression of rock layers	Himalayas, Alps

Mountain Type	Process	Example
Fault-Block Mountains	Uplift along normal faults	Sierra Nevada, Tetons
Volcanic Mountains	Accumulated lava/ash deposits	Andes, Mount Fuji

Case Study Excerpt (Eco-Tourism in the Himalayas)

Towering above South Asia, the Himalayas have long captivated explorers and pilgrims alike. In the modern era, trekkers flood iconic sites like the Everest region, seeking adventure and stunning vistas. While these tourists bring valuable income, local officials note the steep rise in litter, strain on water resources, and deforestation for cooking fuel. As more lodges and guesthouses open to accommodate visitors, the natural landscape feels the impact. Recognizing these challenges, regional governments and nonprofits launched eco-tourism initiatives. Villagers now participate in trash cleanups along popular trails, and certain paths have mandatory green fees that funnel back into conservation projects. Alternative energy sources—like solar cookers—are promoted to reduce firewood collection. Guiding services also receive training on responsible trekking, teaching visitors to respect local culture and minimize waste. Although the Himalayas still grapple with climate threats like glacial retreat, early signs suggest eco-tourism can help protect fragile high-altitude ecosystems. Communities benefit economically while safeguarding the majestic terrain that draws global fascination. Travelers, in turn, gain deeper appreciation for the mountain environment and the people who call it home.

1. Which environmental challenges arise from increased tourism in the Himalayas?

2. How do eco-tourism strategies try to balance human activities with mountain preservation?

Multiple Choice

1. Fold mountains form primarily through:
    a) Rocks bending under compressional forces
    b) Deposition of river sediments in flat coastal regions
    c) Wind carving out cliffs
    d) Magma pushing plates apart

2. Rain shadows develop on the:
    a) Peaks where glaciers accumulate
    b) Same side of mountains that receives heavy rainfall
    c) Leeward side, where descending air becomes drier
    d) Coastlines far from mountain ranges

3. Volcanic mountains differ from fold mountains because they:
    a) Never exceed 1,000 meters in elevation
    b) Require no tectonic activity
    c) Only form under oceans
    d) Arise from magma building up at the surface

Matching

Write the letter of the correct definition on the line next to each term.

Term	Definition
1. ___ Orogeny	A) Accumulated lava layers forming a cone or peak
2. ___ Fault-Block Mountain	B) High-altitude climate conditions with thin air
3. ___ Rain Shadow	C) Compression leading to the folding and uplift of rocks
4. ___ Volcanic Mountain	D) Drier zone found downwind of a mountain range
5. ___ Alpine Environment	E) Mountain created by movements along normal faults

Fill-in-the-Blank

1. _____ mountains often arise where crust is pulled apart, creating tilted blocks.

2. _____ is the process of mountain-building driven by tectonic forces.

3. High peaks serve as _____, storing snow that supplies rivers.

Short Answer

Answer each question in 2-4 complete sentences.

1. Why are mountain regions often considered biodiversity hotspots?

2. In what ways can tourism both benefit and harm mountain communities?

3. How might climate change affect the role of mountains as water towers?