

Earth Science

Chapter 11- Deformation of the Crust

Section 2 - How Mountains Form

E.Q.: *Explain and compare the different types of plate collisions that form mountains.*

STANDARDS:

SES2. Students will understand how plate tectonics creates certain geologic features, materials, and hazards.

- a. Distinguish among types of plate tectonic settings produced by plates diverging, converging, and sliding past each other.**
- b. Relate modern and ancient geologic features to each kind of plate tectonic setting.**

SES6. Students will explain how life on Earth responds to and shapes Earth systems.

- d. Describe how fossils provide a record of shared ancestry, evolution, and extinction that is best explained by the mechanism of natural selection.**

Objectives:

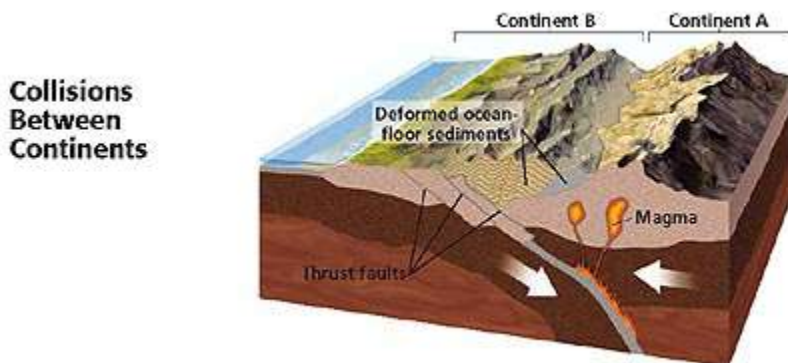
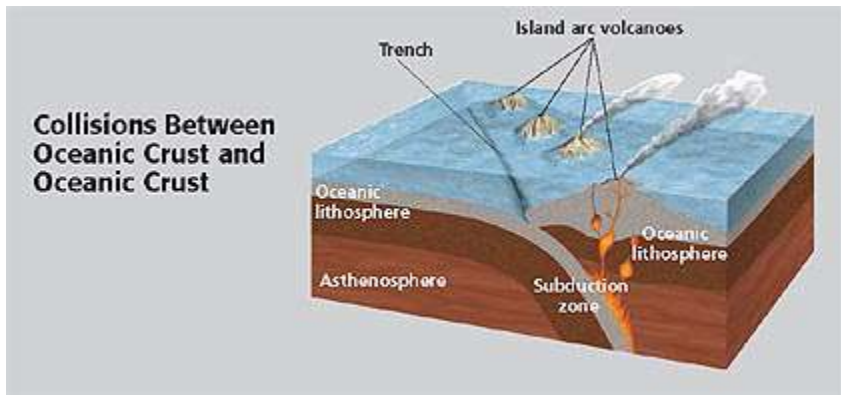
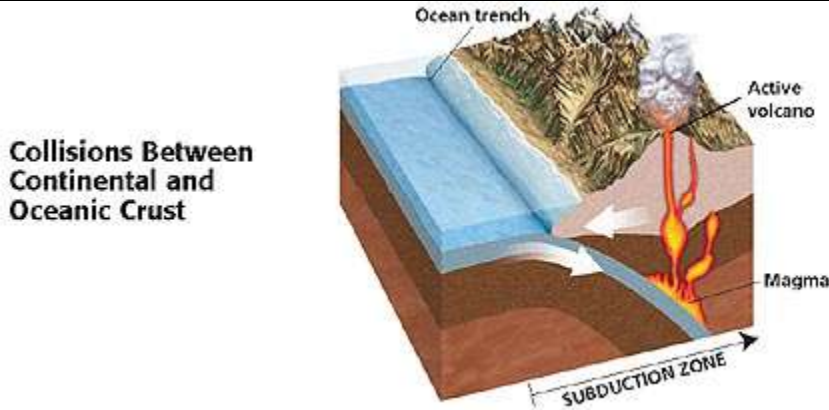
- Identify the types of plate collisions that form mountains.**
- Identify four types of mountains.**
- Compare how folded and fault-block mountains form.**

Mountain Ranges and Systems

- mountain range - a series of mountains that are closely related in orientation, age, and mode of formation**
- A mountain is the most extreme type of deformation.**
- A group of mountain ranges that are adjacent is called a mountain system.**
- The largest mountain systems are part of two larger systems called mountain belts.**

- Earth's two major mountain belts are the circum-Pacific belt and the Eurasian-Melanesian belt.
- The circum-Pacific belt forms a ring around the Pacific Ocean.
- The Eurasian-Melanesian belt runs from the Pacific islands through Asia and southern Europe and into northwestern Africa.

The diagram below shows how mountains form.



- The circum-Pacific and the Eurasian-Melanesian mountain belts are both located along convergent plate boundaries.

- **Scientists think that the location of these two mountain belts provides evidence that most mountains form as a result of collisions between tectonic plates.**

Collisions between Continental and Oceanic Crust

- **Some mountains form when oceanic lithosphere and continental lithosphere collide at convergent plate boundaries.**
- **In this type of collision, the oceanic lithosphere subducts beneath the continental lithosphere, producing large-scale deformation which uplifts high mountains.**
- **In addition, the subduction of the oceanic lithosphere causes partial melting of the overlying mantle and crust.**
- **This melting produces magma which can erupt to form volcanic mountains on Earth's surface.**
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Collisions Between Oceanic Crust and Oceanic Crust

- **Volcanic mountains commonly form where two plates whose edges consist of oceanic lithosphere collide.**
- **In this collision, the denser oceanic plate subducts beneath the other oceanic plate.**
- **As the denser oceanic plate subducts, fluids from the subducting lithosphere cause partial melting of the overlying mantle and crust.**
- **The resulting magma rises and breaks through the oceanic lithosphere.**
- **These eruptions of magma form an arc of volcanic mountains on the ocean floor.**

Collisions Between Continents

- **Mountains can form when two continents collide.**
- **An example of this type of collision is the formation of the Himalaya Mountains in which the oceanic lithosphere of the Indian plate subducted beneath the Eurasian plate.**
- **When the continental lithosphere of both plates collided, subduction stopped, but the collision continued.**
- **The intense deformation that resulted from the collision uplifted the Himalayas.**
- **Because the plates are still colliding, the Himalayas are still growing taller.**
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Reading Check

Why are the Himalayas growing taller today?

The Himalayas are growing taller because the two plates are still colliding and causing further compression of the rock, which further uplifts the mountains.

Types of Mountains

Folded Mountains and Plateaus

- ***folded mountain* - a mountain that forms when rock layers are squeezed together and uplifted**
- **The highest mountain ranges in the world consist of folded mountains that form when continents collide.**
- **The same stresses that form folded mountains also uplift plateaus, which are large, flat areas of rock high above sea level.**

- **Most plateaus form when thick, horizontal layers of rock are slowly uplifted so that the layers remain flat instead of faulting and folding.**
- **Most plateaus are located near mountain ranges.**
- **Plateaus can also form when layers of molten rock harden and pile up on Earth's surface or when large areas of rock are eroded.**

Fault-Block Mountains and Grabens

- ***fault-block mountain* - a mountain that forms where faults break Earth's crust into large blocks and some blocks drop down relative to other blocks**
- **Where parts of Earth's crust have been stretched and broken into large blocks, faulting may cause the blocks to tilt and drop relative to other blocks.**
- **The same type of faulting that forms fault-block mountains also forms long, narrow valleys called grabens.**
- **Grabens develop when steep faults break the crust into blocks and one block slips downward relative to the surrounding blocks.**
- **Grabens and fault-block mountains commonly occur together.**

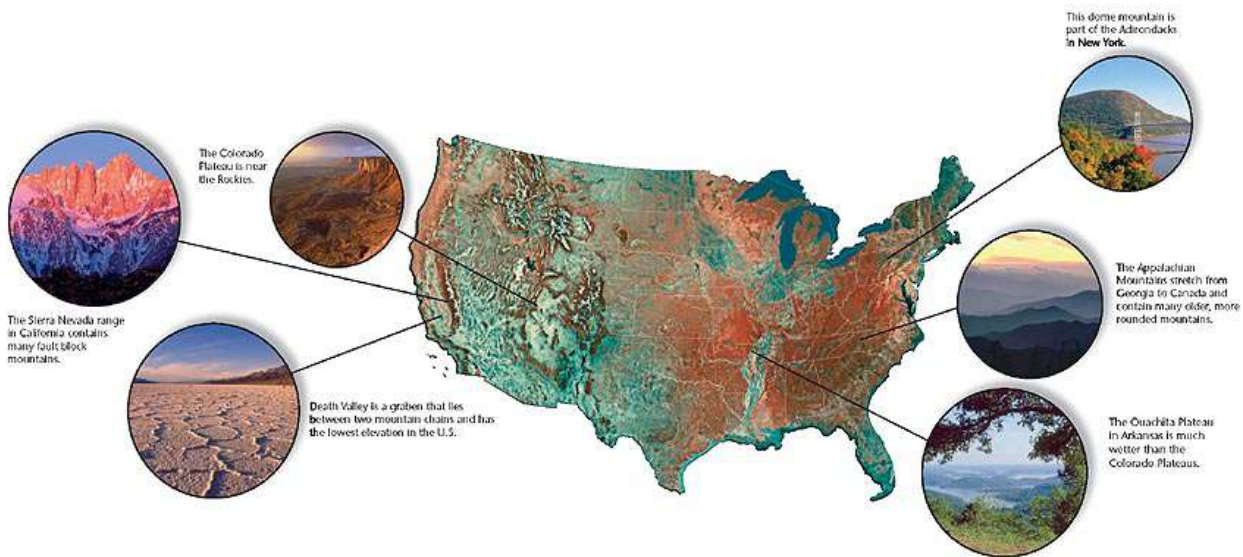
Dome Mountains

- ***dome mountain* - a circular or elliptical, almost symmetrical elevation or structure in which the stratified rock slopes downward gently from the central point of folding**
- **Dome mountains are rare, and form when magma rises through the crust and pushes up the rock layers above the magma.**

Volcanic Mountains

- Mountains that form when magma erupts onto Earth's surface are called *volcanic mountains*, which commonly form along convergent plate boundaries.
- Some of the largest volcanic mountains are part of the mid-ocean ridges along divergent plate boundaries.
- Other large volcanic mountains form on the ocean floor at hot spots.

Types of Mountains



Reading Check

Name three types of mountains found in the United States.

Your answer may include three of the following: folded mountains, fault-block mountains, dome mountains, and volcanic mountains.