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Warm-Up | Forces in Earth's Crust

Lesson Question

How does stress in Earth's crust change Earth's surface?

Lesson Goals

Explain how stress in the crust affects Earth's surface.

Explain why faults form in particular areas.

Identify land features that result from plate movement.

Words to Know

Fill in this table as you work through the lesson. You may use the glossary to help you.

normal fault	a fault created by tension resulting in the hanging wall moving down relative to the footwall
reverse fault	a fault created by compression resulting in the hanging wall moving up relative to the footwall
shearing	a type of stress caused by rocks trying to move past each other in opposite directions
anticline	a fold in rock caused by compression that bends upward in an arch
strike-slip fault	a fault in which rock layers move past each other horizontally
tension	a type of stress created by rocks pulling away from each other that thins the rock
syncline	a fold in rock caused by compression that bends downward
plateau	a high, table-like formation caused when part of the crust rises upward

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Words to Know

compression	a type of stress created by rocks pushing against each other
fault-block mountain	a mountain formed when one side of a fault is thrust upward while the other side drops downward

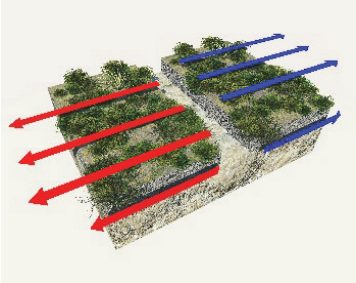
The Theory of Plate Tectonics

The theory of plate tectonics states that pieces of the [lithosphere] are slowly but constantly moving.

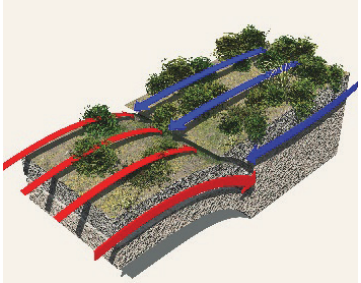
- The motion is driven by convection [currents] in the mantle.
- This theory explains the [formation], movement, and [subduction] of Earth's plates.

Plate Boundaries

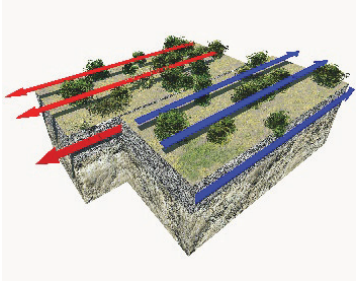
Plate boundaries are areas where the edges of Earth's plates meet. They extend deep into the lithosphere. Faults form along these boundaries.



[Divergent] Boundary



[Convergent] Boundary



[Transform] Boundary

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Slide 2

Stress on Earth's Surface

Types of Stress

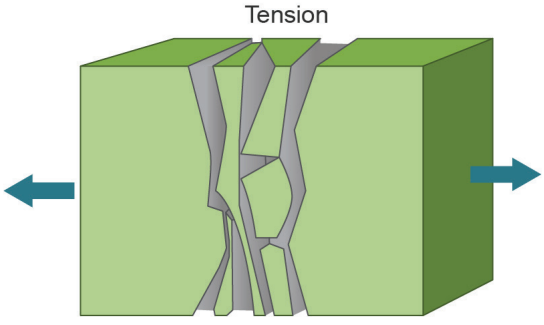
- Tension
- **Compression**
- Shearing

Tension

Tension is a type of [stress] that occurs where plates move apart.

- [Rocks] stretch apart.
- Stretching causes rocks to become [thin] in the middle.

Tension often occurs at [divergent] boundaries.



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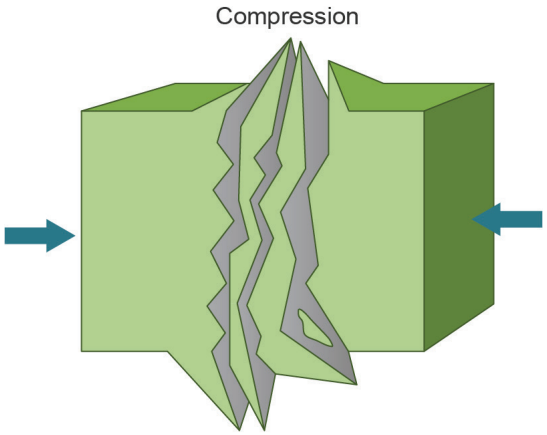
Compression

Compression is stress that occurs when one plate pushes against another.

- Rocks squeeze together until they fold and [break].

Compression often occurs at [convergent] boundaries.

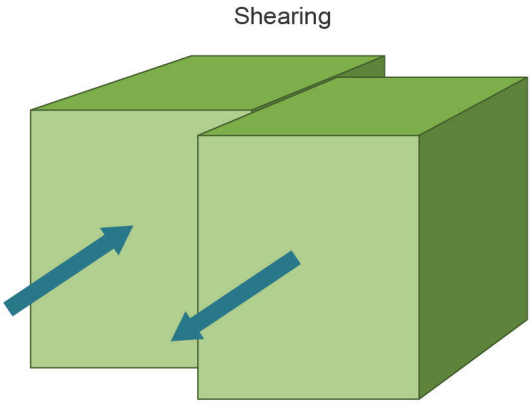


Shearing

Shearing is a type of stress caused when a rock mass is pushed in [opposite] directions.

- Rocks break and [slip] apart.
- Rocks change shape.

Shearing is common at [transform] boundaries.



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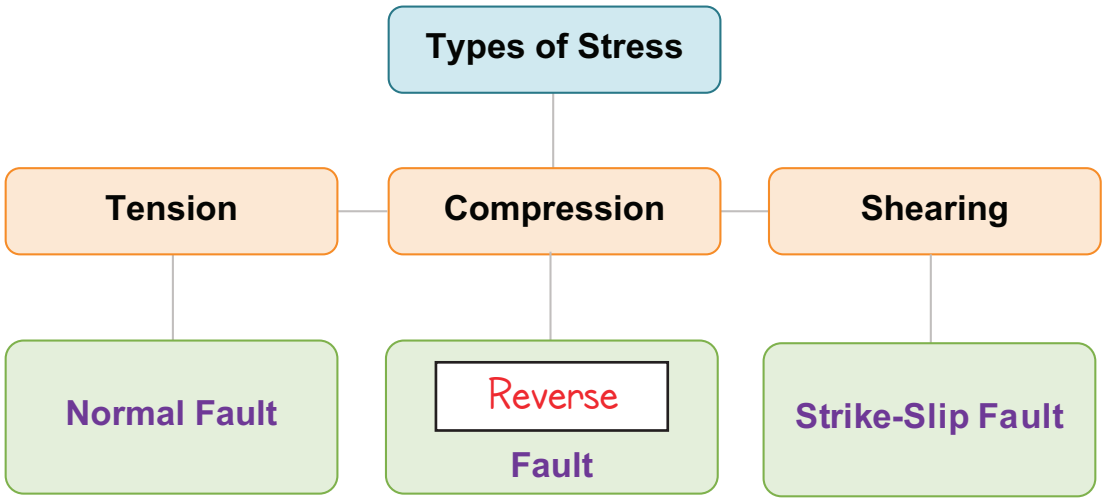
Slide 5

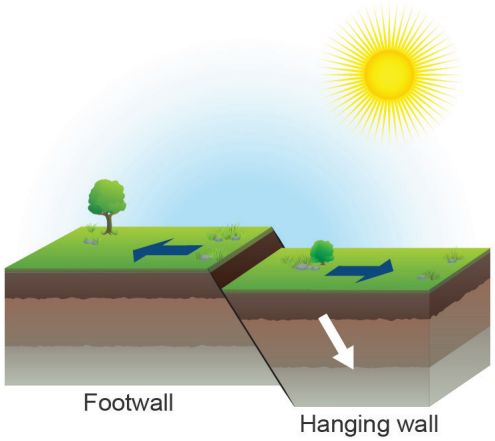
Types of Faults



Normal Faults

A normal fault is caused by [tension].

- The plates are moving away from the fault.
- The hanging wall lies above the fault.
- The footwall lies below the fault.
- The hanging wall moves [downward] at a normal fault.



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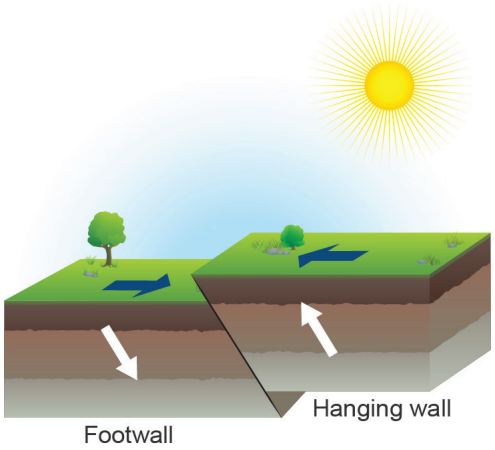
Reverse Faults

A reverse fault is caused by [compression].

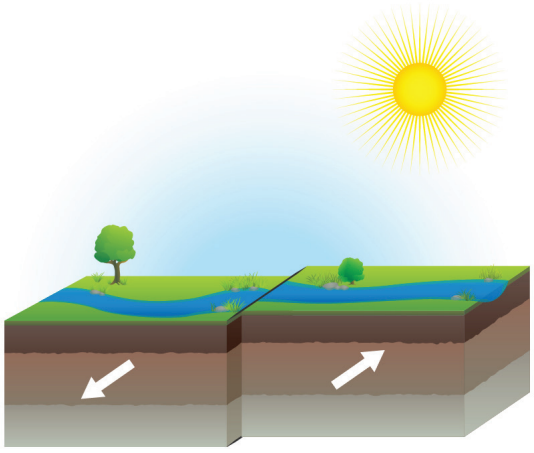
- The plates are moving toward the fault, [colliding] into each other.
- The hanging wall moves up, sliding over the [footwall].



Strike-Slip Faults

A strike-slip fault occurs in areas of [shearing].

- [Plates] slide past each other in opposite directions.
- Plates have very little or no [vertical] movement.



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Sedimentary Basins

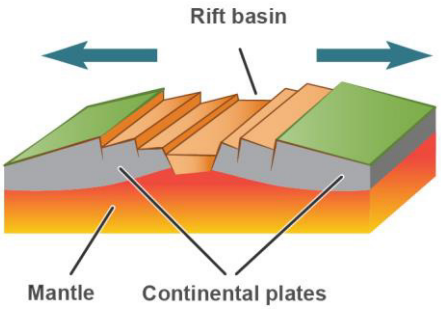
Forces in Earth's crust can form sedimentary [basins], which are:



- depressed or low areas in Earth's crust.
- areas where sediments are deposited.
- formed through the movement of tectonic [plates].

Basins at Divergent Boundaries

Tectonic activity at divergent boundaries form [rift] basins.



- As two plates separate, Earth's [crust] is stretched.
- Weaker crust moves [down] at normal faults.

Sediments are deposited until it forms a rift basin.

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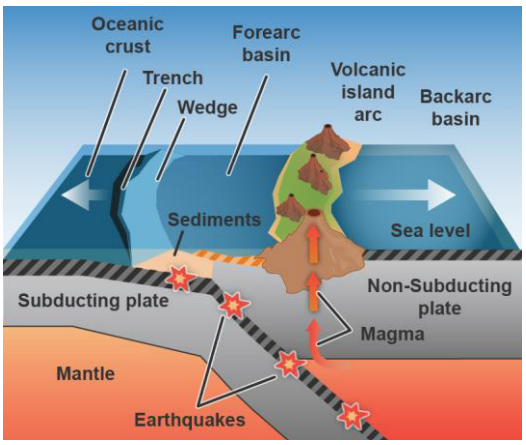
Slide 5

Tectonic activity at convergent boundaries form [wedge] and arc basins.

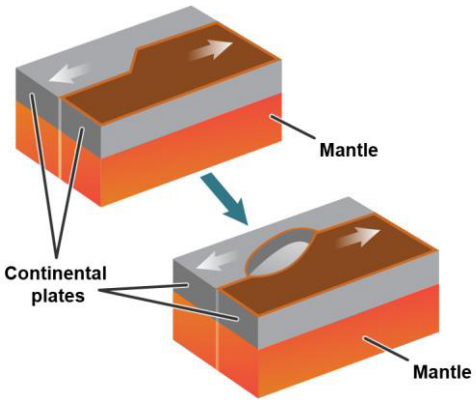
- Where the two plates collide, a wedge is formed at reverse faults.
  - [Sediments] are deposited on the wedge.
- The meeting of the plates compresses the oceanic crust, forming a volcanic island arc.
  - [Basins] can be formed at the forearc and backarc regions.



Basins at Transform Boundaries

Tectonic activity at transform boundaries form strike-slip basins.

- When [bent] or curved plates move past each other, a depression is formed.
- Sediments are deposited in the [depression].



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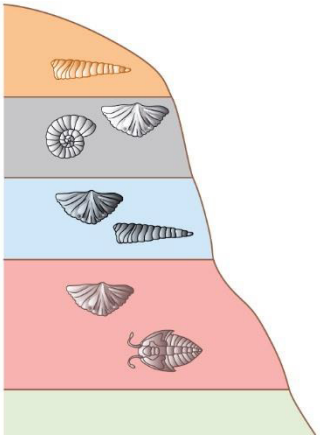
Importance of Sedimentary Basins

Information and products are contained in sedimentary rocks.



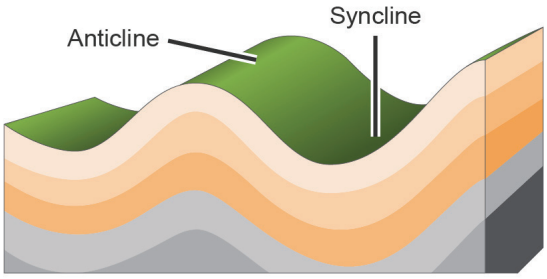
- Sedimentary rocks tell us about Earth's [history].
- Sedimentary rocks contain valuable resources such as:
  - gemstones.
  - precious [metals].
  - [fossil] fuel.

Slide 8

Folding of the Crust

Folds form when compression squeezes [rocks] together.

The compression causes rocks to bend without [breaking].



- [Anticline] is a fold in rock that bends upward in an arch.
- [Syncline] is a fold in rock that bends downward.

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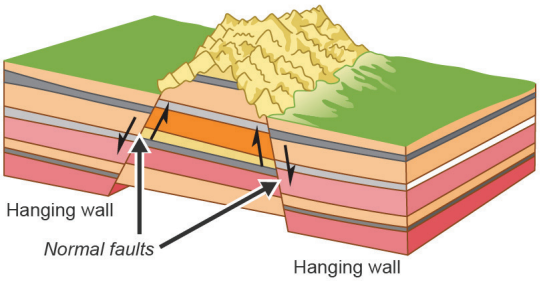
Slide 8

Stretching of the Crust

The crust stretches due to tension .

- This stress causes normal faults.
- Parallel normal faults can create **fault-block** mountains .
- Created when the hanging walls from parallel faults slip down



Uplifting of the Crust

Some stresses on the crust force the uplifting of rocks.

- When a large, flat block of rock is pushed upward, a plateau forms.
- A plateau contains many flat layers and is wider than it is tall .

Slide 10

Surface Formations Created by Stress

Different types of stress lead to the formation of different features on Earth's surface.



Anticline

Himalayas, Asia



Fault-block mountains

Wheeler Peak, Nevada



Plateau

Mt. Roraima, South America

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Summary | Forces in Earth's Crust

Lesson Question

How does stress in Earth's crust change Earth's surface?

Answer

(Sample answer) Stresses in Earth's crust cause Earth's plates to move. The movement of the plates leads to the formation of landforms such as mountains. It can also lead to seafloor spreading.

Slide 2

Review: Key Concepts

- Earth's plates pull apart, crash into each other, or slide past each other.
- This causes stress in the [crust].
- Each type of stress is connected to a type of fault.
  - Tension – normal faults
  - Compression – reverse faults
  - Shearing – [strike]-slip faults
- [Landforms] develop based on the type of stress experienced in the crust.
  - Anticlines, synclines, fault-block mountains, and plateaus

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Use this space to write any questions or thoughts about this lesson.

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