

## Warm-Up

## Earth's Interior



## Lesson Question

How is Earth's interior characterized?



## Lesson Goals

Explain how geologists learn about Earth's interior.

Compare and **contrast** the three main layers of Earth.



## Words to Know

Write the letter of the definition next to the matching word as you work through the lesson. You may also use the glossary to help you.

B epicenter

A. the place deep inside Earth where a shift in Earth's crust occurs, causing an earthquake

C lithosphere

B. the place on Earth's surface directly over the focus of an earthquake

A focus

C. a rigid layer composed of the crust and the upper mantle

G seismic waves

D. the layer of the mantle on which the lithosphere floats

F mantle

E. the outermost layer of Earth that forms Earth's surface

D asthenosphere

F. the thick region between Earth's core and crust

E crust

G. waves of energy that travel through Earth's crust and interior



### Geologists

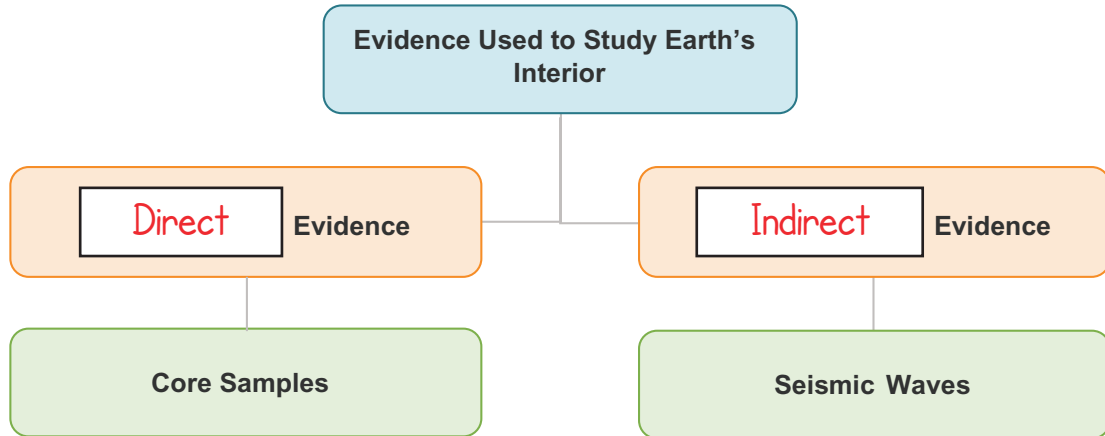
Geologists are scientists who study the solid earth.

- Forces that shape Earth
- Rocks and minerals of Earth
- Materials that form solid earth

Slide

2

### Geologic Evidence



### Direct Geologic Evidence

Geologists study direct evidence of Earth's interior by collecting core **samples**.

- A core sample is a cylinder-shaped section of rock drilled out of the earth.
- Core samples provide **clues** about Earth's interior.

Slide

2

### Indirect Geologic Evidence

Seismic waves provide indirect evidence.

- Caused by **earthquakes**
- Travel through Earth's **interior**
- Have two centers: **epicenter** and **focus**
- Radiate **outward**
- Are studied using seismographs

5

### Seismic Waves

Geologists use seismic waves to study Earth's interior.

- Primary (P) waves:
  - move like a **spring**.
  - travel through **solids** and **liquids**.
- Secondary (S) waves:
  - move like **ripples** in water.
  - travel through **solids** only.

## Instruction

## Earth's Interior

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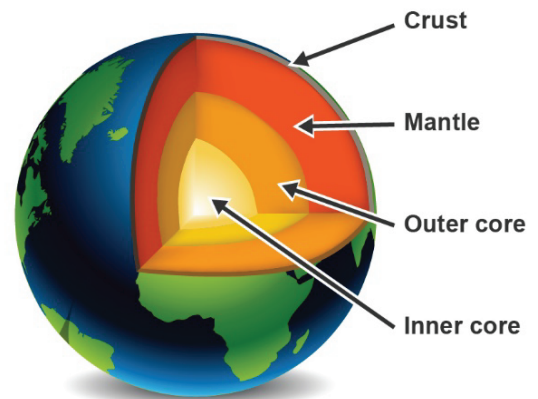
5

## The Main Layers of Earth

Geologists have identified three main layers of Earth.

- Crust
- Mantle
- Core

The three layers vary in size, composition, temperature, and pressure.

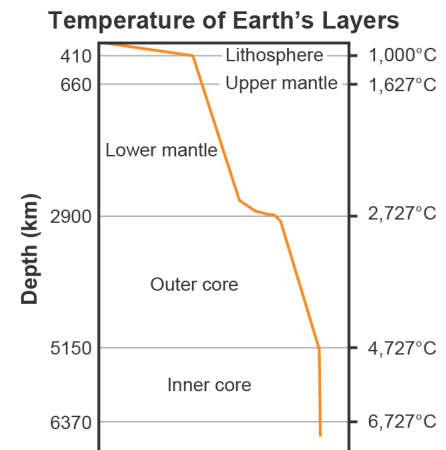


7

## Change in Temperature

Earth's layers vary in temperature.

- Closer to the surface, temperatures are relatively cool.
- Heat is left over from the formation of Earth and radioactive substances in the core.



## Instruction

## Earth's Interior

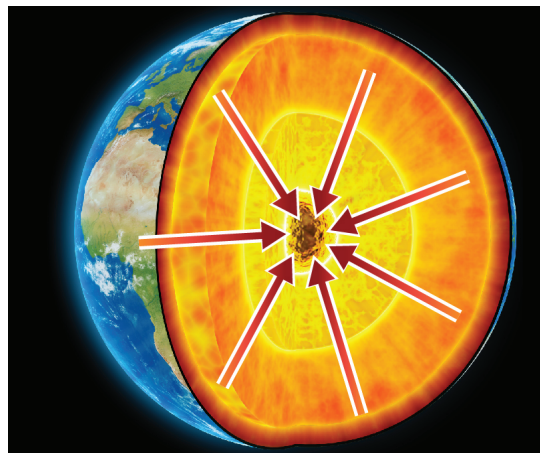
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7

**Change in Pressure**

Earth's layers vary in pressure.

- Pressure increases from the surface of Earth toward the **core**.
- Increased pressure is due to the weight of rock pressing **inward**.



10

**The Crust**

The crust is the **outermost** layer of Earth.

- Solid rock
- **Continental** crust and oceanic crust
- Soil and water that cover Earth

# Instruction

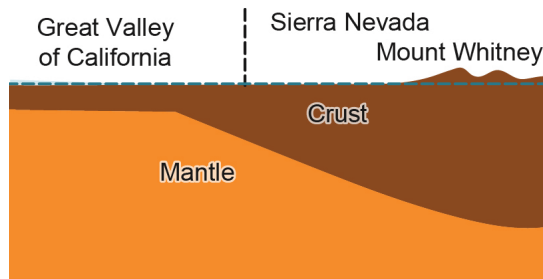
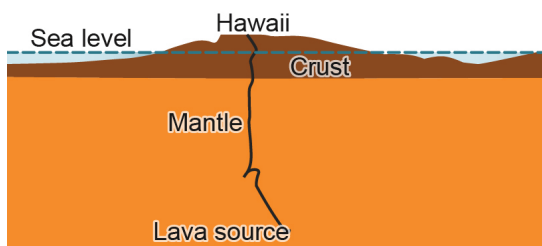
## Earth's Interior

Slide

10

### Earth's Crust

Earth's crust varies in **thickness**.



Usually about 5–40 **kilometers** thick, up to 70 kilometers thick

Thicker under **mountains**, thinner beneath oceans

### Oceanic vs. Continental Crust

Oceanic and continental crust have several **differences**.

#### Continental Crust

- Composed mostly of **granite**
- Up to **70** kilometers thick
- Less **dense**
- Older

#### Oceanic crust

- Composed mostly of **basalt**
- 5–10 kilometers thick
- **Denser**
- Younger

# Instruction

## Earth's Interior

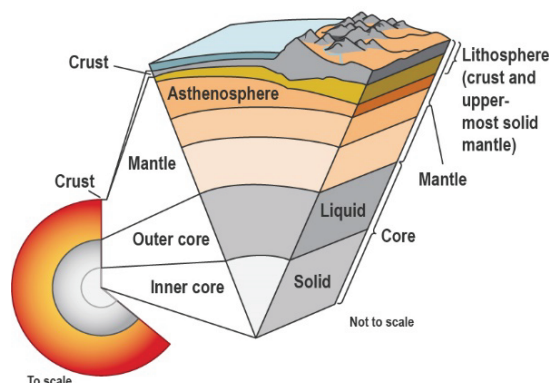
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12

### The Mantle

The mantle is about 40 kilometers under Earth's surface.

- Solid layer of hot rock
- Nearly 3,000 kilometers thick
- Denser than the crust
- **Lithosphere**, asthenosphere, and lower mantle



### The Layers of the Mantle

	Lithosphere	Asthenosphere	Lower Mantle
<b>Location</b>	uppermost part of mantle and crust	below lithosphere	below asthenosphere
<b>Thickness</b>	100 km	180 km	2,250 km
<b>Consistency</b>	Solid	Tarry consistency	Solid



Slide

12

### The Core

The core of Earth is mostly iron and nickel.

- 3,486 kilometers thick
- Outer core: molten metal, 2,266 kilometers thick
  - May create Earth's magnetic field.
- Inner core: solid metal, 1,220 kilometers thick

## Summary

## Earth's Interior

**Lesson Question**

How is Earth's interior characterized?

**Answer**

(Sample answer) Earth's interior is identified by four layers: the crust, mantle, outer core, and inner core. Each layer is characterized by the way waves move through it, as well as the characteristics, temperature, and pressure of the layer.

Slide

2

**Review: Key Concepts**

Geologists use two main types of evidence to learn about Earth's interior.

**Direct Evidence**

- Core samples
  - Provide clues about conditions inside the Earth

**Indirect Evidence**

- Seismic waves
  - Provide clues about Earth's internal structure based on the speed and path of the waves

# Summary | Earth's Interior

Slide  
**2**

## Review: Key Concepts

### Crust

- Outermost layer
- Solid rock: both dry land and ocean floor
- Thinner under ocean; thicker under mountains

### Mantle

- Solid layer of hot rock
- Three parts: solid lithosphere, tarry asthenosphere, and solid lower mantle

### Core

- Two parts: molten outer core and solid inner core

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