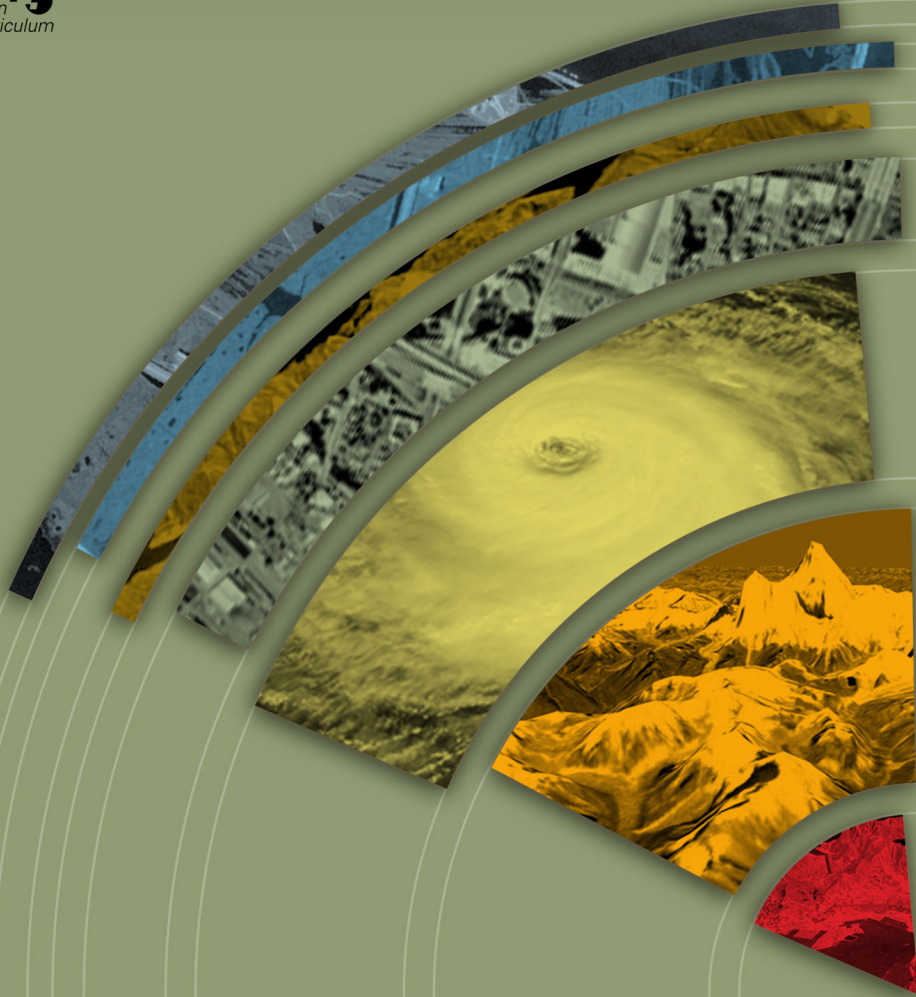


Simulation
Curriculum



THE
**LAYERED
EARTH**

Interactive Earth Science Curriculum
for Grades 8–12
Exploring Geology

From the Makers of the Award-Winning Starry Night® Curriculum

Untitled

Fullscreen Home Tools View Search

EarthGuide Favourites

Unit **E** Earthquakes Lessons

Getting Started

- Unit Concept Map
- Big Ideas and Expectations
- What Do You Already Know?
- Unit Activity Preview

Unit Lessons

- Literacy Link: Mark Twain's First Earthquake
- E1: Earthquakes and Faults
- E2: Earthquakes and Waves
- E3: The Strength of Earthquakes
- E4: Seismic Waves and the Earth's Interior
- E5: Living with Earthquakes

Wrap Up

- What Do You Know Now?
- Unit Activity

Arctic Ocean

North Pacific Ocean

North Atlantic Ocean

South Pacific Ocean

NORTH AMERICA

SOUTH AMERICA

EUROPE

Navigation icons: Home, Tools, View, Search, Fullscreen, Home, Tools, View, Search, Navigation (Home, Back, Forward, Refresh, Stop, Fullscreen, Print, Help)

E1-2 Where are Earthquakes Located?

Earthquakes can occur almost anywhere but tend to be more frequent in some areas.

Learning Activity

- [Click here](#) to view the crustal plate boundaries.
- [Click here](#) to view the crustal plate boundaries and a world plot of earthquakes. Rotate the globe to view the data.
- [Click here](#) to see all this data plotted on a flat map.

1. Is there a link between geography and the location of earthquakes?
2. Where do most of the world's earthquakes seem to take place?

View Answers

1. Is there a link between geography and the location of earthquakes?

Although individual earthquakes can appear almost anywhere, it is quite clear that there is a distinct pattern visible. The vast majority of earthquakes occur on or near the edges of the earth's crustal plates. This is a major clue in determining exactly what causes earthquakes.

2. Where do most of the world's earthquakes seem to take place?

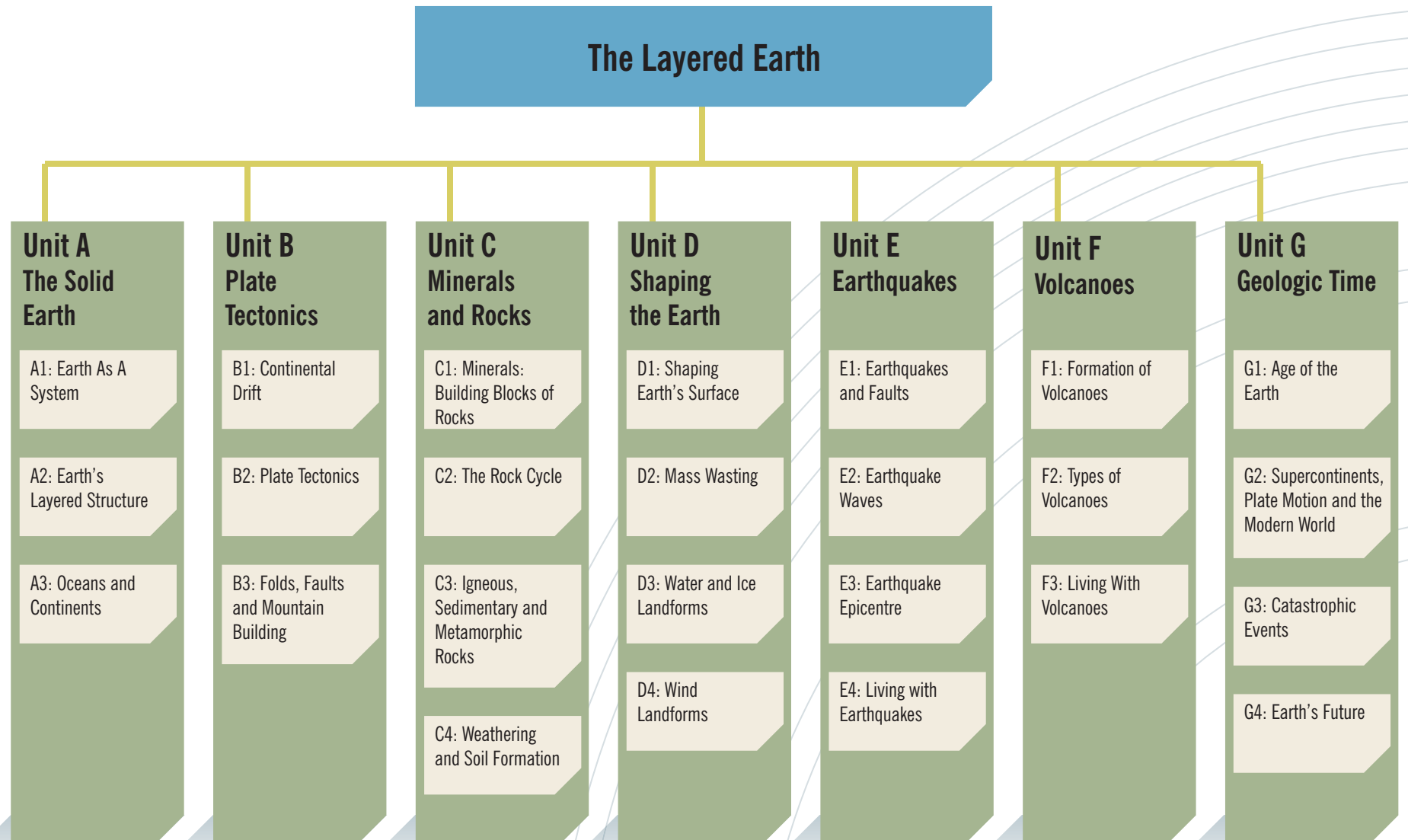
Most of the world's earthquakes seem to take place around the rim of the Pacific Plate.

[E1-3: What Causes an Earthquake? >](#)

? Did You Know?
 The only states in the U.S. to not experience any earthquakes between 1975 - 1995 were Florida, Iowa, North Dakota, and Wisconsin.



The Layered Earth: Content Overview



The Layered Earth: Unit Big Ideas

The Layered Earth

Unit A The Solid Earth

Big Ideas

The Earth's dynamic system consists of several components that operate interactively.

The geosphere is one component of the Earth system.

Earth has two types of crust that help shape the character of Earth's surface.

Internal heat drives convection that moves crustal plates over Earth's surface.

Unit B Plate Tectonics

Big Ideas

Science is a dynamic process, whereby new knowledge brings new and better understanding.

The Earth's surface consists of small and large plates that are constantly in motion.

The motion of these plates explains major geological events and the many features of Earth's surface.

Unit C Minerals and Rocks

Big Ideas

Minerals have a unique composition while rocks are composed of a combination of minerals.

The rock cycle continuously forms, changes and reforms rock.

Rocks break down to help form soil.

The exploitation and use of minerals have both positive and negative consequences.

Unit D Shaping the Earth

Big Ideas

Internal and external forces modify the Earth's surface.

Earth's major landforms are largely shaped by the work of running water, ice and wind.

Humanity has a major impact on Earth's surface.

Unit E Earthquakes

Big Ideas

Earthquakes are caused by the interaction of Earth's plates.

Technology is used to determine the characteristics and behavior of earthquakes.

Earthquakes can be used to determine the internal structure of the Earth.

Earthquakes can result in major social and economic impacts.

Unit F Volcanoes

Big Ideas

Volcanoes result from active geological processes.

Volcanoes are classified by the chemical composition of lava.

Volcanoes can result in major social and economic impacts.

Unit G Geologic Time

Big Ideas

Geological evidence is used to determine the age of the Earth.

The arrangement of continents has changed over time as a result of plate motion, and will continue to change.

The history of life is related to the movement of the continents.

Catastrophic events can have a major impact on life on Earth.

The Layered Earth: Unit A. Lesson Key Concepts

The Layered Earth: Unit A, The Solid Earth

A1: Earth as a System



How is studying the different components of Earth and their interactions with each other important?

Key Concepts

A system is made up of a number of interdependent, interacting parts that act together to form a complex whole.

The geosphere, hydrosphere, biosphere, and atmosphere come together to form the Earth system.

A2: Earth's Layered Structure



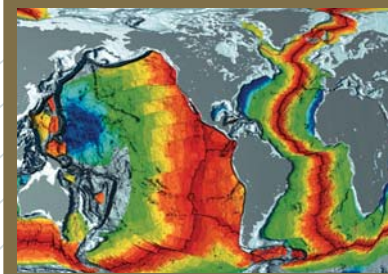
What powers the internal processes that produce volcanoes, earthquakes and mountains?

Key Concepts

Earth's internal heat powers convection in the mantle and this causes the plates to move across Earth surface and interact with one another.

Advances in seismology, computer modeling, and mineralogy and crystallography at high temperatures and pressures give insights into the internal composition and structure of the Earth.

A3: Oceans and Continents



How do continental and oceanic crust differ?

Key Concepts

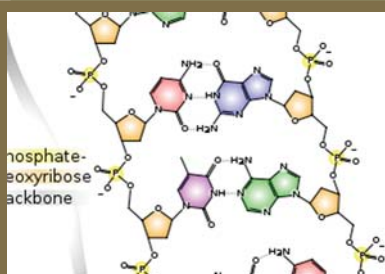
Differences in composition and density define the nature and behaviour of oceanic and continental crust.

The largest features of the continents can be divided into two categories: mountain belts and the stable interior. The ocean floor is divided into three major topographic units: continental margins, deep-ocean basins, and oceanic ridges.

The Layered Earth: Unit B. Lesson Key Concepts

The Layered Earth: Unit B, Plate Tectonics

B1: Continental Drift



How does the scientific process deal with new or conflicting information?

Key Concepts

Science is a dynamic process, whereby new knowledge brings new and better understanding.

The Earth's crust is constantly in motion.

B2: Plate Tectonics



Why is plate tectonics a better explanation for the movement of the continents?

Key Concepts

The lithosphere is broken into plates that are constantly in motion.

Plate tectonics successfully accounts for the observed motion of the continents.

Interacting plate boundaries are distinguished by three types of movement.

B3: Folds, Faults and Mountain Building



How does plate movement help shape the Earth's surface?

Key Concepts

Plate motions and boundary interactions produce forces that can cause rock to deform and fracture.

Most deformation can be explained by plate movement.

The Layered Earth: Unit C. Lesson Key Concepts

The Layered Earth: Unit C, Minerals and Rocks

C1: Minerals: Building Blocks of Rocks



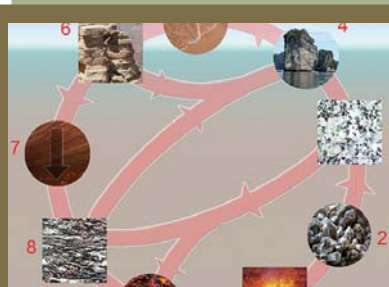
What's the difference between a mineral and a rock?

Key Concepts

Each individual mineral has a unique composition and structure, while rock is composed of a combination of different, constituent minerals.

The exploitation and use of minerals have both positive and negative consequences.

C2: The Rock Cycle



What is the rock cycle and how does it work?

Key Concepts

The rock cycle continuously forms, changes and reforms rock, such that Earth's total rock mass remains unchanged.

C3: Igneous, Sedimentary and Metamorphic Rocks

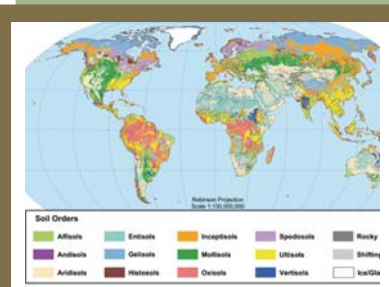


What are the processes that produce the different types of rock?

Key Concepts

The characteristics of a rock indicates the process by which it formed, and the environment in which the process took place.

C4: Weathering and Soil Formation



How do Earth System's sub-systems interact to produce soil?

Key Concepts

Soil formation is influenced by the interaction of geological, biological and meteorological processes.

The Layered Earth: Unit D. Lesson Key Concepts

The Layered Earth: Unit D, Shaping the Earth

D1: Shaping Earth's Surface



What processes are involved in producing Earth's many different landforms?

Key Concepts

Earth's landforms are produced by the combination of tectonic forces, and the processes of weathering, erosion and deposition.

Landforms are classified by the process that formed them.

D2: Mass Wasting



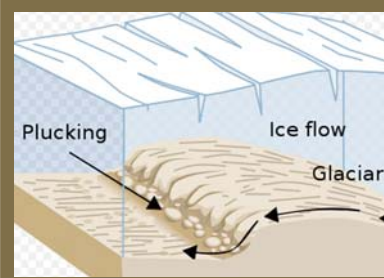
What role does gravity play in shaping Earth's surface?

Key Concepts

Mass wasting is the movement of rock fragments down an incline by the force of gravity.

Mass wasting can create a variety of landforms.

D3: Water and Ice Landforms



What role does water and ice play in shaping Earth's surface?

Key Concepts

Water and ice can help shape the surface of the Earth.

D4: Wind Landforms



What role does wind play in shaping Earth's surface?

Key Concepts

Wind can help shape the surface of the Earth.

The Layered Earth: Unit E. Lesson Key Concepts

The Layered Earth: Unit E, Earthquakes

E1: Earthquakes and Faults



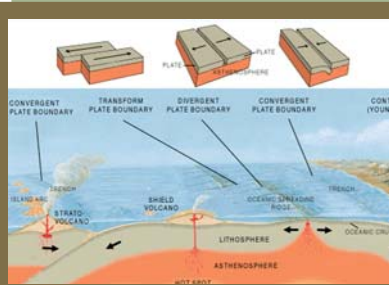
What is an Earthquake?

Key Concepts

Earthquakes are caused by the interaction of Earth's plates.

The sudden release of that stored energy, in the form of movement along the fault, produces an earthquake.

E2: Earthquake Waves



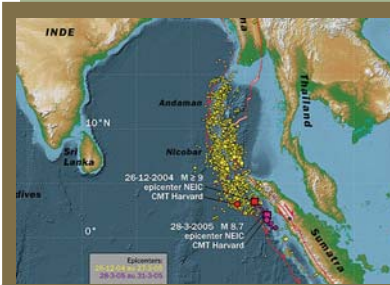
How is energy transmitted during an earthquake?

Key Concepts

Earthquake surface waves travel through Earth's outer layer.

Earthquake waves that travel through the Earth's interior are subdivided into primary (p) and secondary (s) waves.

E3: Earthquake Epicentre



How is the point of origin of an earthquake determined?

Key Concepts

The knowledge of earthquake waves and their speed can be used to locate the epicenter and hypocenter of an earthquake.

The severity of an earthquake is governed by factors such as distance from the epicenter and hypocenter, local geology and type of construction used in the area.

E4: Living with Earthquakes



What is the impact of earthquakes on society?

Key Concepts

Earthquakes have major impacts on society.

Technology can be used to limit the effects of earthquakes on society.

The Layered Earth: Unit F. Lesson Key Concepts

The Layered Earth: Unit F, Volcanoes

F1: Formation of Volcanoes



How are volcanoes formed?

Key Concepts

Most volcanoes occur along plate boundaries.

Volcanoes that occur away from plate boundaries are due to rising plumes of hot mantle rock ("hot spots").

F2: Types of Volcanoes



How do we classify volcanoes?

Key Concepts

The shape of a volcano is determined by the chemical composition of the magma.

F3: Living With Volcanoes



What are the major social and economic impacts of volcanoes?

Key Concepts

Volcanoes have both positive and negative effects on society.

