



## LOOKING AT THE EARTH

When Neil Armstrong walked on the moon, he said the earth was “*like a beautiful jewel in the sky*”, because he felt the earth was seen as land and water coming together with huge swirls of clouds.

### **How the Earth is Viewed from Outer Space**

The surface of the earth is made of water, land and surrounded by air and there are many differences between the height and depth of the earth’s surface. The earth is part of a system of planets that revolve around the sun. Apollo 8 mission, astronaut Bill Anders said, “*We came all this way to explore the Moon, and the most important thing is that we discovered the Earth.*” The view of the earth from space has expanded our understanding of how the planet works.



A view of the Earth as seen by the Apollo 17 crew traveling toward the moon.

## The Solar System

Earth is part of the solar system, made up of all objects that revolve around the sun and is the only planet in the solar system known where life exists. The sun is the center and largest object of the solar system, and the earth is the third planet from the sun. Its great *mass, the amount of matter it contains*, keeps objects revolving around it.

## Earths Measurement

Earth is about 93 million miles from the Sun. The diameter of the earth at the equator is about 8,000 miles and the distance is shorter at the poles of the equator. Earth is considered one of the smaller planets, yet it is the largest of the terrestrial planets in the Solar System in diameter, mass and density.

For additional information about the Earth, click on the NASA web site.

<http://nasascience.nasa.gov/>

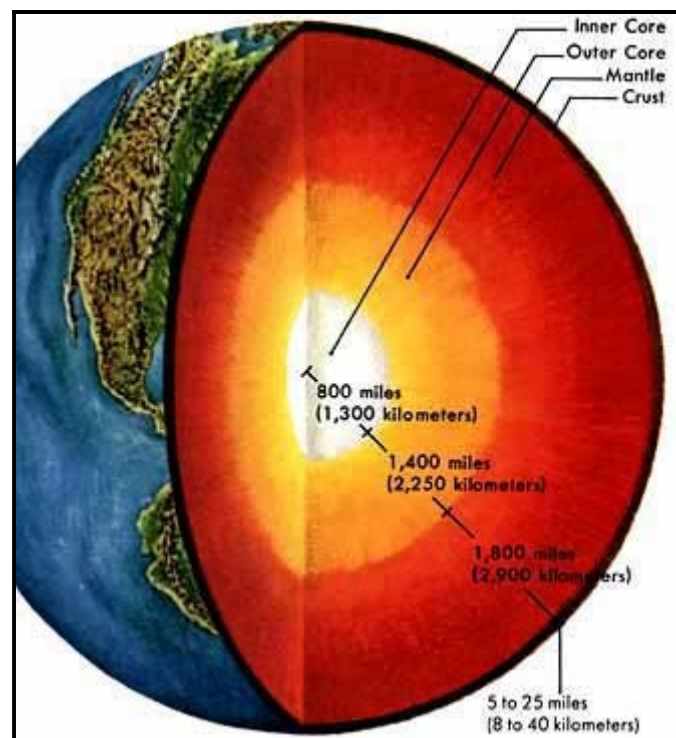
## Water, Land and Air

About 70 percent of the earth's surface is water. The ocean, lakes, rivers and other bodies of water are the part of the earth known as the *hydrosphere*, which is a key to the water cycle. The other 30 percent of the earth is made up of land. The land makes up the part of the earth known as the *lithosphere, or the earth's crust and upper mantle*. The earth's crust is the outermost part of the lithosphere and underlying the crust is the upper mantle, a relatively brittle part of the earth's interior. When someone states that everyone and everything live together on the surface, this is known as the *biosphere, the part where life is found*. The *atmosphere* or *air* surrounds

the planet Earth with a mixture of gases that become thinner and fades into space. Some examples of how the atmosphere works, is that it absorbs energy from the sun, recycles water, works with climate control, protects warming of the surface through heat retention and helps reduce extreme temperatures.

## The Structure of the Earth

The earth is made up of three layers, the *core*, the *mantle* and the *crust*. *The core, which makes up the center of the earth*, is divided into an inner core and an outer core that is a hot metal made up mostly of nickel and iron. *The mantle is a layer of dense hot rock* that is the thickest layer of the Earth. The outer layer, next to the mantle, is the *crust*. *The crust is a thin layer of rock that floats in the upper mantle and* includes the continents and oceans.



### Britannica Activity 1

All of your life you have learned that you live on Earth, a planet in the solar system orbiting the Sun with an atmosphere that contains oxygen. But how much do you really know about the various features of the Earth that make it the unique planet that it is? Earth, the only planet in our Solar System able to sustain life as we know it, is presented from many perspectives in the following activity.

If you have been using the Split Screen view for this unit, you may want to switch now to the Lesson view. It will make the activity easier to see. You may need to change your pop-up blocker settings in order to see the activity. Click the start button below to begin. After you complete the activities close the Britannica window to return to your VLA screen.. Click the

Britannica Online button to begin the activity.



## Internal Forces

As time went by, the surface of the earth has changed greatly. Even now, you may not be aware of it, but the surface of the earth is changing as this unit is being read. Plate tectonics or as most scientists would state that moving plates are large slabs of rock and when plates spread apart, gaps form in the surface. What happens when the plates come together? When plates come together, a trench forms because the plates slide underneath each other.

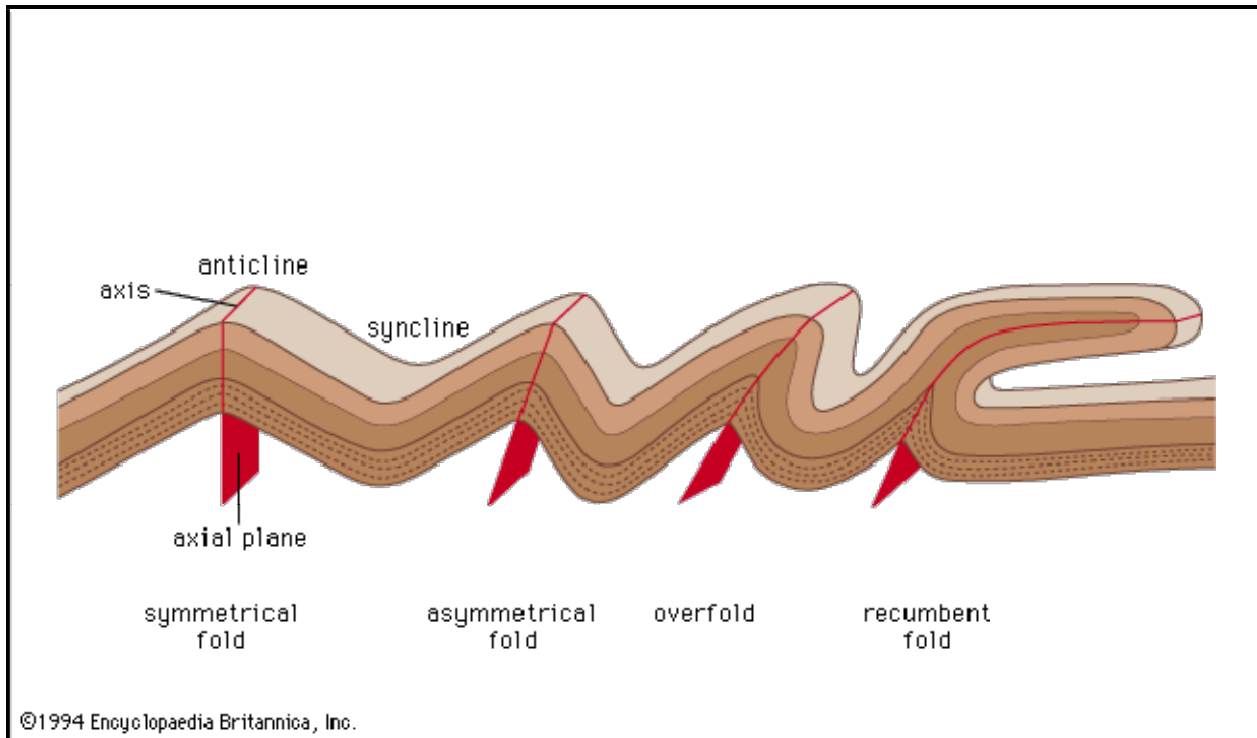
## Britannica Activity 2

The following activity explains the proposed theory of plate tectonics, that the Earth's surface is composed of plates that rest on and slide over a layer of partially molten rock.



Have you ever experienced an earthquake? An ***earthquake is a sudden movement in the plates*** and as these movements change the surface of the land and the floor of the ocean, they trigger landslides and occasionally volcanic activity. ***Volcanoes*** are mountains with ***lava, melted rock that rises through the crust of the earth*** and lava of intermediate composition form something known as ***block lava***, which is when the lava is too block, then the flow of the lava is blocked and pressure builds up. What happens when something has too much pressure? When something has too much pressure, it will explode with great force, the same applies with volcanoes. Volcanoes are mostly known because they are above sea level, but it is said that the majority of the volcanoes lie beneath the sea.

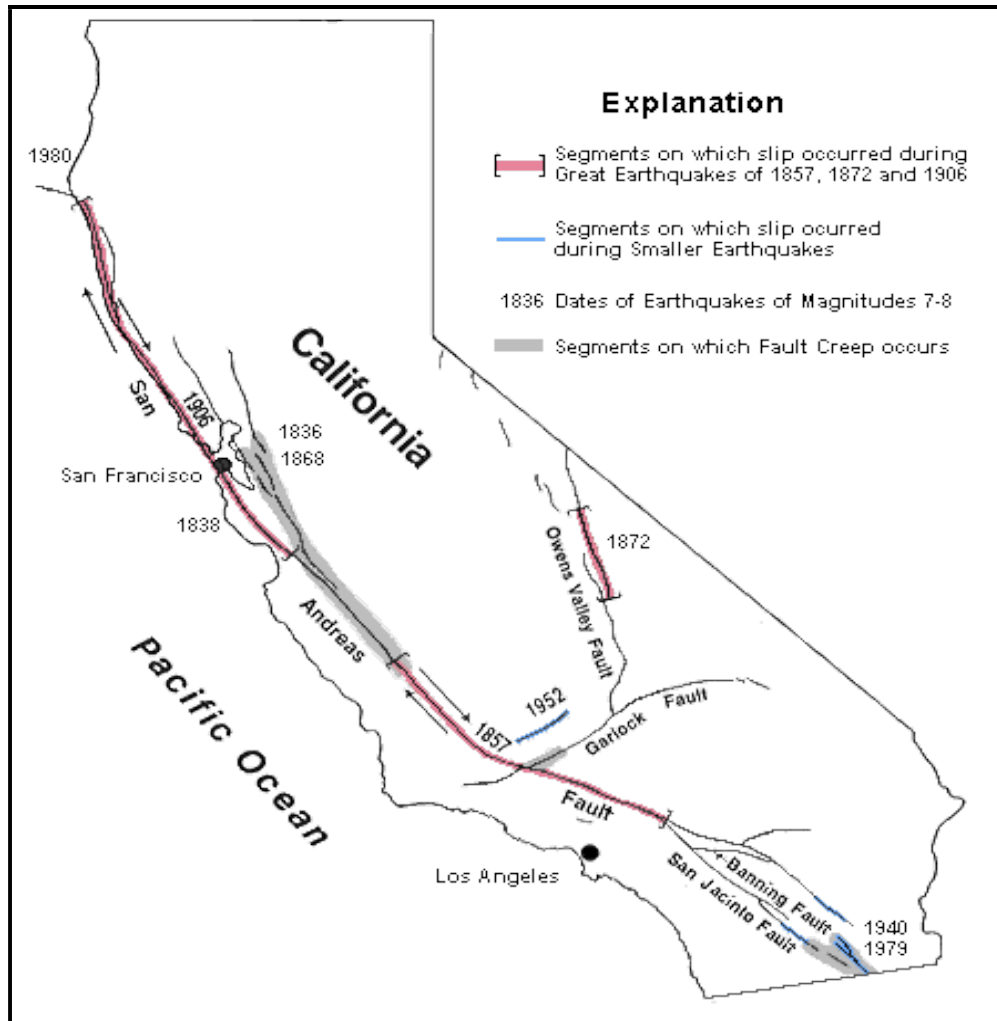
Internal forces can break down surfaces as well. ***Folds are bends in layers of rock*** and when the plates squeeze the surface of the earth and pressure is applied for a long period of time, the surface slides and the rock bends instead of breaking.



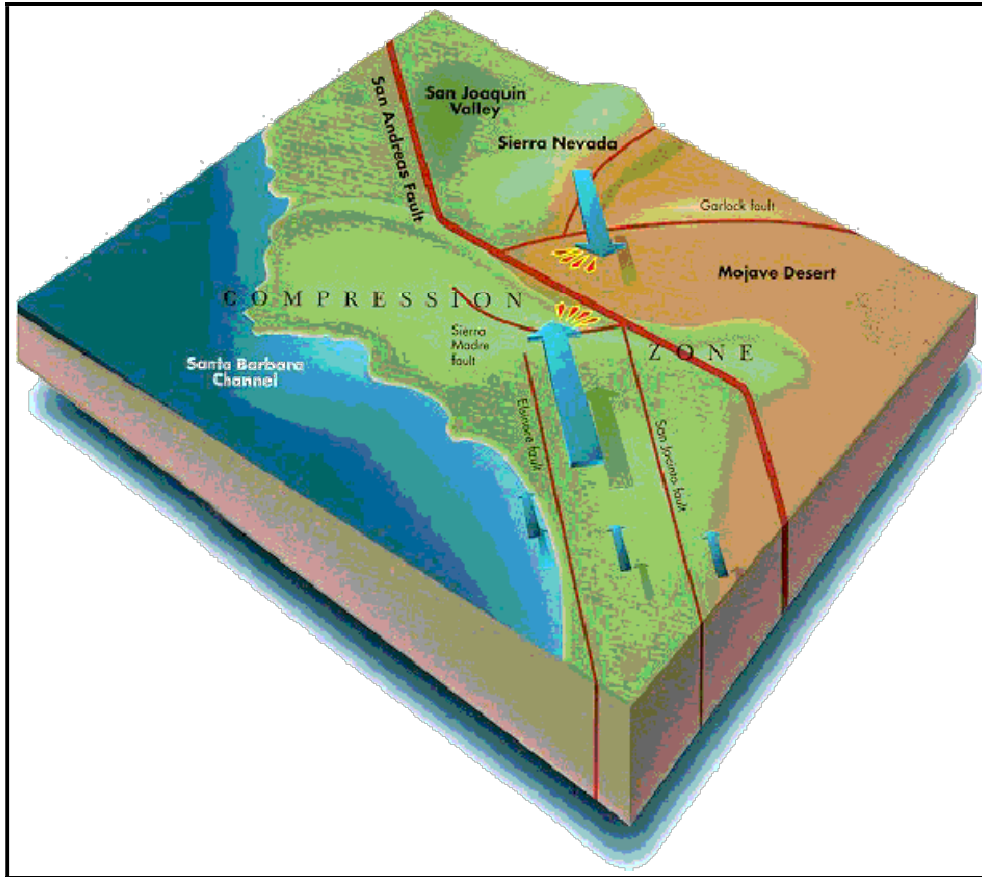
Other internal forces are ***faults, a break or a crack in the earth's crust where there is movement.*** Faults are usually called a ***lateral fault*** when the movement is along the center of the earth, a ***normal fault***, when the crust has been extended during a vertical movement or a ***reverse fault***, which is opposite of a normal fault during a vertical movement. Normal and reverse faults are examples of ***dip-slip*** faults, where the movement along the fault is in the direction of dip. These breaks occur when the land around the fault cannot fold any more. Have you heard of the San Andreas Fault in California, when sudden movement along the fault caused the great San Francisco earthquake and fire?

### **Where Is It?**

The figure below shows the general location of the [San Andreas Fault](#) and several other major faults in California.



The San Andreas Fault system and other large faults in California: different segments of the fault display different behavior.



Read more information on San Andreas Fault by clicking on the following link and/or [PDF File](#).  
<http://pubs.usgs.gov/gip/earthq3/where.html>

### Britannica Activity 3

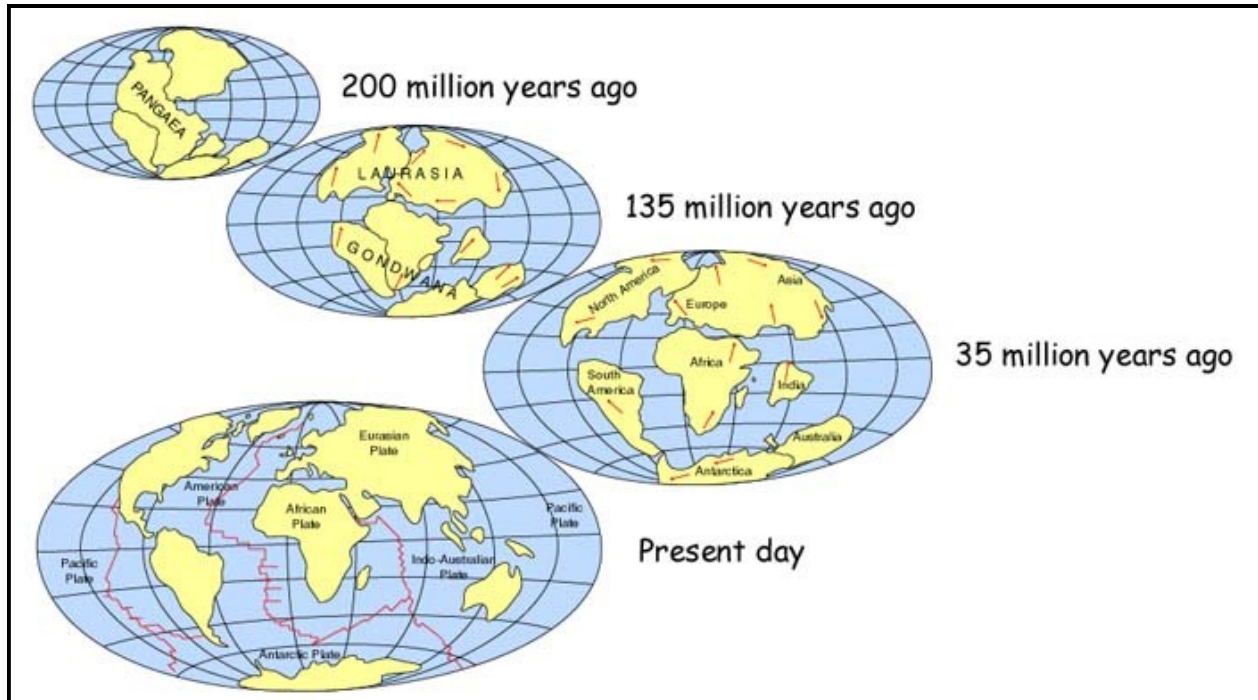
In this activity you will use the narration, and animation to construct mental models of the two major concepts of rock deformation: faulting (breaking and movement) and folding (bending) of rock layers.



Both volcanoes and earthquakes are the cause of *tsunamis, or sea waves that move through water*, with some of the waves being over 50 feet high. Earthquakes occur when different plates meet each other. Many earthquakes occur in the Pacific Ocean, an area called the *Ring of Fire*, a boundary where the plates that should hold the Pacific Ocean together, meet the plates that hold the continent in place.



It is a common belief that around 240 million years ago all the land masses were joined together and as the ocean floor and continents spread to their current places this was known as **continental drift**.



What is the opposite of internal forces? Yes, the opposite of internal forces is external forces and they can change the surface of the earth. We know rocks are always breaking into smaller pieces. This occurs through weathering and erosion. **Weathering is the breakdown of rocks and minerals at or around the earth's surface.** There are two types of weathering, **chemical weathering and physical weathering.** The first form called **chemical weathering** is when the rocks dissolve chemicals that cause them to disintegrate.

**Physical weathering** does just the opposite; it increases the sizes of the rocks because when water seeps into the crack it expands as it freezes. Another force that changes the surface of the earth is known as **erosion, which is the wearing away of the earth's surface,** the most powerful form of erosion is water. Erosion occurs by means in which glaciers erode or wear away the terrain, known as land.

Glaciers are large bodies of ice that move across the surface of the earth. The glaciers change the land by destroying forests and altering the flow of rivers. Over the past 2 million years, glaciers have moved across the surface of the earth, naming this period the Ice Age. There are two types of glaciers **sheet** and **mountain** glaciers. As the name suggests sheet glaciers are long sheets of ice that are most common in areas that are difficult to access or at high elevations,



Antarctica is covered by sheet glaciers. The second type of glaciers, mountain glaciers occur when snow falls on the mountains and turn into ice.

Let us begin talking about the various types of land on the earth. The natural features of the earth are called landforms, which help people locate specific places with specific features to help influence where they settle.

Geographers divide the land into seven large landforms, which are known as continents. In the western hemisphere, North and South America are found. Europe, Africa, Asia are found in the Eastern Hemisphere. As mentioned earlier, Antarctica is found on the southern end; it is under an enormous sheet of ice with Asia being the largest continent and Australia being the smallest.

Within the continents, there are four major types of landforms: *mountains, hills, plateaus* and *plains*. When you notice that land rises above the rest of the land these are mountains. You may have heard them called the highlands because they are the highest landform.

A plateau is higher than the land that surrounds it consisting of at least one steep side called a cliff, while plains are flat. Hills also rise above the land, but they differ from mountains because they are more rounded and lower. There are several types of landforms. Have you ever noticed Florida? Florida is a peninsula, a piece of land with water on all three sides. When a piece of land is surrounded by water on all sides, it is called an island. When there are islands grouped close together, these are called archipelagos, which are usually large number of scattered islands found in the open sea or ocean.

Are landforms only on land? Of course, not, there are many different landforms on the ocean floor, which is the most widespread surface feature of Earth. Did you know the continents often expand underwater? When the plate tectonics expand, move away from the ridges and carry continents, this expansion and movement is called a *Continental drift*. As mentioned earlier, on the ocean floor one can find mountains that have formed because the Earth's surface is formed of different plates, which slide into one another or drift apart.

While looking at the picture, refer back to the content to see the different landform explanations.



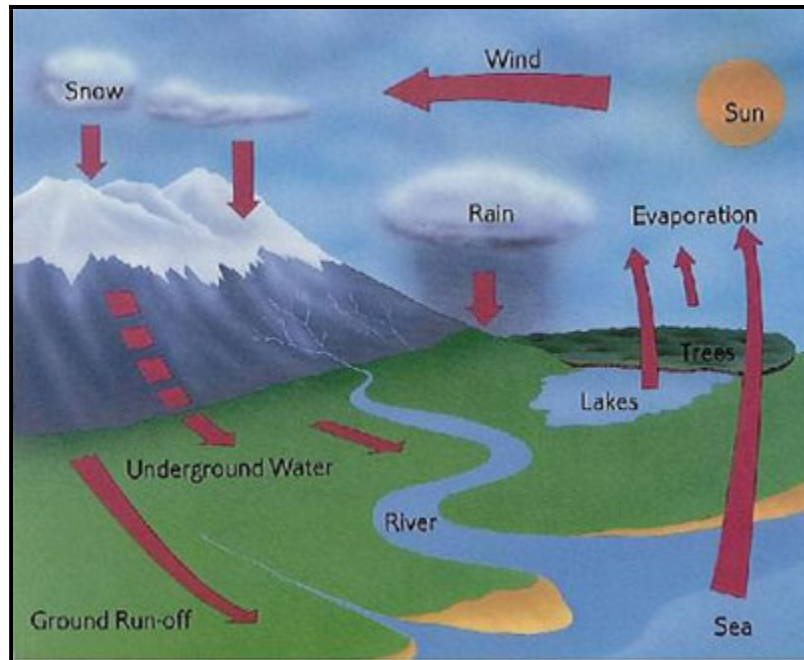
## Water

As stated earlier, water makes up 70% of the surface of the earth. Unlike landforms, the amount of water remains mostly the same. One source of freshwater is called ground water, which lies beneath the surface of the earth and as the groundwater finds openings in the land surface emerges as freshwater springs. Eventually, the water reenters the ocean, where the water cycle started. Lakes, streams and rivers are examples of freshwater. People are known to use ground water through wells.

### The Water Cycle

The water supply remains constant because of the **water cycle**. This process is the movement of water from the ocean to the air, then to the ground, and back to the ocean. The water cycle remains a vital method for supporting life on land, and is a primary factor in the erosion of surface features over geological periods.

For additional information on the Water Cycle, click on [http://www.windows.ucar.edu/tour/link=/earth/Water/water\\_cycle.html](http://www.windows.ucar.edu/tour/link=/earth/Water/water_cycle.html) or [PDF File](#).



The process begins with **evaporation or the change of water into gas**. By the heat from the sun, the vapor rises from the ocean into the air, causing moisture. When the clouds become too full of moisture, the moisture is returned to the earth in the form of rain or snow. Because of gravity, the water flows downward towards the ocean. The amount of water that evaporates is about the same that falls back to the earth.

Most of the water found on the earth is **salt water**, usually referring to water from the sea or oceans. The large body of salt water is divided into four oceans: **Atlantic, Pacific, Indian** and **Arctic Oceans**. Smaller bodies of water include **gulfs, seas** and **bays**. The Mediterranean Sea is the world's largest sea, surrounding three continents Europe, Asia and Africa.

Roughly, around 95% of the water is saltwater and we know that we cannot drink saltwater. Why you might ask? One reason we should not drink saltwater is that a person would become dehydrated quickly. Soon, we will have to find new ways of changing seawater to freshwater to meet the needs of people. Currently, about two percent of the water is available for drinking.

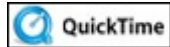
## Lakes, Streams and Rivers

There are smaller bodies of water found on our earth. Lakes are bodies of water surrounded by land, not part of the ocean, larger and deeper than a pond, and are usually fed by a river. Streams are flowing natural waters, regardless of size and are an important instrument of the water cycle. Smaller streams, sometimes called creeks, flow through lakes and together, lakes and streams form rivers, which are large natural streams. Rivers have been important for farming because river valleys and plains provide fertile soils; in addition, they have also been important for travel,

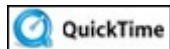
transportation, trade routes and an energy source. Today rivers are still used to power hydroelectric plants and their water turbines.

## Discovery Education Videos

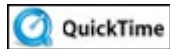
The following videos describe the properties of water, the ocean current, the water cycle, and how humans affect the oceans. There are many great demonstrations and terms used throughout the clips. This video series also touches on hot topic issues such as water pollutants and how humans are hurting the oceans, and thus its food supply.



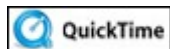
What Are the Properties of Water? (01:18)



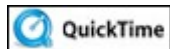
What Is the Water Cycle? (01:44)



How Do the Oceans Affect Our Weather and Climate? (03:50)



What Is an Ocean Current? (01:28)



How Have Humans Interacted With the Ocean? (04:16)

## Natural Resources

Elements from the earth that are not made by man, but can be used by the people are called **natural resources**. People must develop natural resources and that is why the earth relates to human life because the earth helps produce what humans need to survive. The earth creates oxygen, produces soil for farming and along with plants and animals, the earth forms part of the food chain. We use the earth to make our lives easier. Can you heat your home without coal? No, coal is what is called a fossil fuel, which is taken from the earth. Worldwide, coal is the largest source of fuel for converting energy to electricity and carbon dioxide emissions. In addition, the earth has many minerals that are made from non-living things.

## Value of Resources

Does everyone value everything the same? Of course, not, people in some regions of the world may value resources more than in other regions of the world. Location is one way we value resources differently. In the Middle East, they do not value oil as much we do in the United States. The value of resources may change if the United States becomes less dependent on oil.

We still must find ways to manage our resources so future generations have access to them. **If people are able to grow these resources**, they are called **renewable resources** because they are replenished or reproduced easily and can be renewed if maintained and not sold too quickly. Examples of renewable resources are the forests, plant life and grasslands. **If we are unable to replace, remake or regenerate a resource**, like many found in the earth, such as fossil fuels, these resources are known as **non-renewable resources**. Examples of **non-renewable resources** are coal, natural gas and oil.

The distribution of resources will influence how countries relate to one another, because goods are limited and countries have become interdependent on each other. Countries in the Southeast are dependent on the United States for wheat; in turn, we are dependent upon them for part of our oil supply. This interdependence on each other has led to many conflicts because rulers believed their countries need the resources other countries have.

## **Unit Summary**

The earth is made up of water, land and air. The land makes up the lithosphere, while the air makes up the atmosphere. Sections of the earth crust move which causes continents to move away. External forces such as wind and gravity helped shape the surface of the earth by a process called erosion.

Landforms are the physical makeup of the earth with the major types of landforms being mountains, hills, plains and plateaus. Water is both a physical feature and a resource and is limited and controlled by the water cycle.

The natural resources are not divided up evenly among the countries of the world requiring countries to become interdependent on each other. There are two types of resources, renewable resources that can be replaced, and non-renewable resources, which cannot be replaced.



Now answer questions 1 through 25.