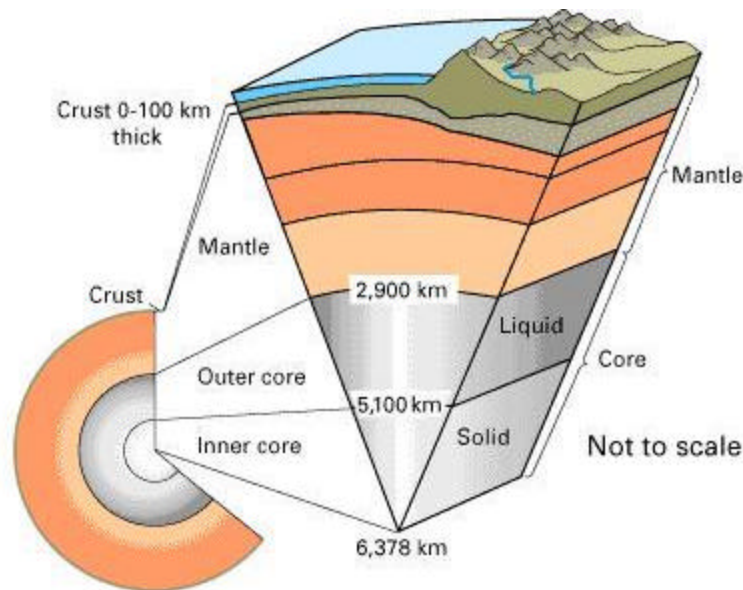


Scientists think that the Earth was created about 5 billion years ago.

That is quite late in the history of the Universe, which -- as we told you in our last Instruction -- is thought to have begun about 15 million years ago with an almost unimaginable explosion called The Big Bang.

At first, the Earth was just a ball of molten rock and gasses. As it began to cool, dense materials like iron sank down into its core. Lighter materials like compounds of oxygen and water rose toward the surface.

That's why the Earth is made up of different layers -- as you can see in this cross section:



There are three layers in the Earth: the Crust, the Mantle and the Core.

For another way to look at them, click:

<http://mediatheek.thinkquest.nl/~I1125/en/fullstruct.htm>



The Crust

The outer layer of the Earth is called the crust.

It is made up of rock that floated to the surface when the Earth was formed.

It is not a continuous layer, but is made up of large masses called tectonic plates. These plates drift slowly across the Earth's surface (*tectonic* means *moving*).

The movement of these plates creates mountains and valleys.

At weak points in the crust, it causes volcanic eruptions.

And when plates bump into each other, earthquakes occur -- emitting shock waves or vibrations called *seismic waves*.

The crust is the Earth's coldest layer. There are two parts to it -- the Oceanic Crust and the Continental Crust.

The Oceanic Crust

The Oceanic Crust lies beneath the oceans. It is between 4 to 7 miles (6 - 11 km) thick. Its rocks are heavy and young, not more than 200 million years old. They are mostly basalt, which has a gritty volcanic structure.

The Continental Crust

71% of the surface of the Earth is water. The remaining 29% is land. This land is called the Continental Crust.

It is divided into six parts. These parts are called *continents*.

At the present time, the continents are Eurasia (Europe & Asia), Africa, North America, South America, Antarctica and Australia. But since the Earth is always changing, the continents are too.

The Earth's crust is thicker beneath the continents than it is beneath the oceans. The Continental Crust is between 20 to 25 miles (30 to 40 km) thick -- with a maximum of 45 miles (70 km) thick.



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It is older, too. Some of its rocks are 3.8 billion years old. They are mostly igneous rocks, which means they were formed from molten magma or lava pushed up from beneath the Earth's surface.

The Continental Crust is divided into two layers. The upper layer is mostly granite, while the lower layer is primarily basalt and diorite (a kind of rock formed from the impurities in granite).

The Mantle

The layer of rock just below the Earth's crust is called the Mantle.

It contains most of the Earth's mass -- 80% of it.

It is divided into two parts: the Inner Mantle and the Outer Mantle.

The Inner Mantle

The Inner Mantle is nearest the Earth's Core. It is sometimes also called the Lower Mantle.

It is between 190 miles (300 km) and 1800 miles (2890 km) below the Earth's surface.

Scientists think it is made up of sulfides and oxides of silicon and magnesium. Its temperature is 5400 degrees Fahrenheit (3000 degrees Celsius) -- but even at that temperature the rock is solid because it is under such tremendous pressure.

The Outer Mantle

The Outer Mantle is between 7 and 190 miles (10 - 300 km) beneath the Earth's crust.

Its temperature is between 2520 and 5400 degrees Fahrenheit (1400 to 3000 degrees Celsius).

It is much thinner than the Inner Mantle.

Like other things we are talking about today, the Outer Mantle is made up of two layers.



The bottom layer is tough liquid rock that is probably made up of silicates of iron and magnesium. Scientists sometimes call it the *Asthenosphere*.

The upper layer is made of the same stuff, but it is firmer because it is cooler. Scientists often refer to this layer and the Earth's crust together as the *Lithosphere* -- especially when describing the way it moves.

The *Lithosphere* floats on the *Asthenosphere* like an iceberg floats on the ocean or a marshmallow floats hot chocolate.

The Core

The innermost part of the Earth is the Core. It is about 1800 miles (2900 km) beneath the Earth's surface.

It is a dense ball of iron and nickel and is divided into two layers: the Inner Core and the Outer Core:

The Inner Core

The Inner Core -- the center of the Earth -- is solid and about 780 miles (1250 km) thick. It is from 3200 to 3960 miles (5150 - 6370 km) below the Earth's surface.

It is primarily made of iron and nickel. But scientists think it contains sulfur, carbon, oxygen, silicon and potassium too.

It is very very hot -- from about 9032 to 10,832 degrees Fahrenheit (5000 - 6000 degrees Celsius). But the pressure is so great that even at those temperatures it remains solid.

Because the Earth rotates, The Outer Core spins around this Inner Core. This creates a dynamo effect, which is what causes the Earth's magnetism.



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The Outer Core

The Outer Core is about 1800 to 3200 miles (2890 -- 5150 km) below the Earth's surface. It is made up of iron, some nickel and about 10% sulfur and oxygen.

The temperature in the Outer Core is about 7200 - 9032 degrees Fahrenheit (5000 degrees Celsius) so it remains liquid.

As we said, it is the relationship between the Inner and Outer Cores that causes the Earth's magnetism.

Convection Currents

Because the Core of the Earth is so hot, it radiates currents of heat upward toward the upper layers.

These currents of heat are called *convection currents*. They cool down as they get nearer the surface and move into a horizontal direction along the bottom of the crust.

These convection currents are what cause the movement in the tectonic plates that we told you about -- the movement that results in volcanic eruptions and earthquakes.

We'll tell you more about tectonic plates -- and plate tectonics -- in an upcoming Instruction.