Technically, the very outermost layer of the Earth is the one that we live in – the atmosphere. The atmosphere contains all the air we breathe and is where our weather comes from. Although we often use the term “air,” the atmosphere is made out of many gases like nitrogen (78%), oxygen (21%), and carbon dioxide and other gases (1%). The average temperature of the atmosphere is about 14°C. Because there isn’t a distinct boundary between the atmosphere and outer space, it is estimated that the atmosphere is around 100 km thick.

Most of what we know about the inside of the Earth comes from studying earthquake waves. Scientists discovered that earthquake waves near the surface of the earth move more slowly than waves that pass through the interior of the earth. Also, they noticed the wave did not pass through the earth in a straight line but were bent by some dense, internal structure of the earth. By studying the patterns of these waves, we discovered that the outside layers of the earth are less dense than the inside. Scientists today continue to study waves caused by earthquakes to better understand the interior of our planet. Here is some of what we know so far.

The crust is the outermost layer of the earth and is divided into two types: oceanic crust and continental crust. The crust is relatively thin compared to the earth’s other layers. The thickness of the crust varies from 7 km in the oceanic crust to 30-50 km on the continental crust. The temperature of the crust at the surface depends on where you are. The temperature of the crust can be up to 870 degrees Celsius in its deepest parts. The crust is composed of light materials like silicon, aluminum, and oxygen.

The top 250 Km of the mantle is a special layer of the Earth – the asthenosphere. The rock here is hot enough that it flows like asphalt and is considered what we call a plastic. A plastic is a solid that can actually flow – like toothpaste or Ooblek. It is the layer which is responsible for the drifting of tectonic plates. The asthenosphere is made of the same materials as the mantle. The mantle is the largest layer of the earth. The mantle itself is 2900 km thick. Its temperature ranges from 500 degrees Celsius at the top asthenosphere or Moho to 2000 degrees Celsius at its deepest. The mantle is actually a solid that is composed of partially melted rock, iron, magnesium and calcium.

The core of the earth is divided into two parts. The outer core lies beneath the mantle and can reach temperatures up to 5000 degrees Celsius. Due to high temperatures, all its components are in a liquid state. The outer core is 2200 km thick. This layer is composed of melted iron, melted nickel, and sulfur. Because it is liquid, it flows constantly. It is the layer that is responsible for creating the earth’s magnetic field, which is important not only in navigating, but in protecting us from harmful solar radiation.

The inner core is located at the very center of the earth and is approximately 1200 km thick. Like the outer core, it is composed of iron and nickel. The temperatures at the core of the earth can reach 7000-9000 degrees Celsius. Because pressure is so great at the center of the planet, the iron and nickel cannot flow and the inner core remains a solid. The pressure is so powerful, that if you were to journey to the center of the earth, you would be squished into something the size of a marble (Ouch)!
Part 1: Getting to know you...
Use the information sheet to fill in this table about the layers of the Earth:

<table>
<thead>
<tr>
<th>Name of Layer</th>
<th>Temp</th>
<th>Phase of Matter</th>
<th>Thickness</th>
<th>Composition (What’s it made of?)</th>
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Questions:

1. Which layers of the Earth aren’t solid?

2. Which layer of the Earth is the thinnest?

3. Which layer of the Earth is the thickest?

4. Which layer of the Earth is the reason why we have earthquakes?

5. Why is the inner core of the Earth a solid when the outer core is hot enough to be a liquid?
**Part 2: Dig a Little Deeper**

The diagram below shows the layers of the Earth’s interior. First, write the name of the layer of the Earth that each line is pointing to for letters A-E. Then write the thickness of the layers in blanks 1-4. Finally color each layer of the Earth according to whether it is solid, liquid, or plastic. Make a color key in the space provided.

**Color Key**

<table>
<thead>
<tr>
<th>Solid</th>
<th>Liquid</th>
<th>Plastic</th>
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<tbody>
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</table>
Analysis and Conclusions:

1. Which part of the model represents the following layers of the Earth?
   a. Crust
   b. Mantle
   c. Outer Core
   d. Inner Core

2. Is the asthenosphere present in your model? Explain.

3. How could you redesign this model to better represent the Earth’s interior?

4. Using at least 2 complete sentences, state what you have learned about Earth’s layers from this activity.