2.2 Explore

A Model of Earth's Structure

model: a representation of a process, system, or object that makes it possible to examine some aspects of the process, system, or object.

Benny Makmur is from the island of Java. His island is one of many that make up the nation of Indonesia. Indonesia is one of the most volcanically active regions of the world. In his letter, Benny shares a **model** of Earth's structure that the teacher presented to his class. A model is a representation of a process, system, or object that makes it possible to examine some aspects of the process, system, or object. Benny will tell you some ways that Earth is like a cracked, hard-boiled egg. You may have a real one to examine as you read Benny's letter. If you do not have one to look at, imagine one as you read.

Be a Scientist

Models

Useful models are at a size that people can easily examine. To use a model to investigate, the model needs to be similar to the real world in ways that are important for what the scientist is investigating.

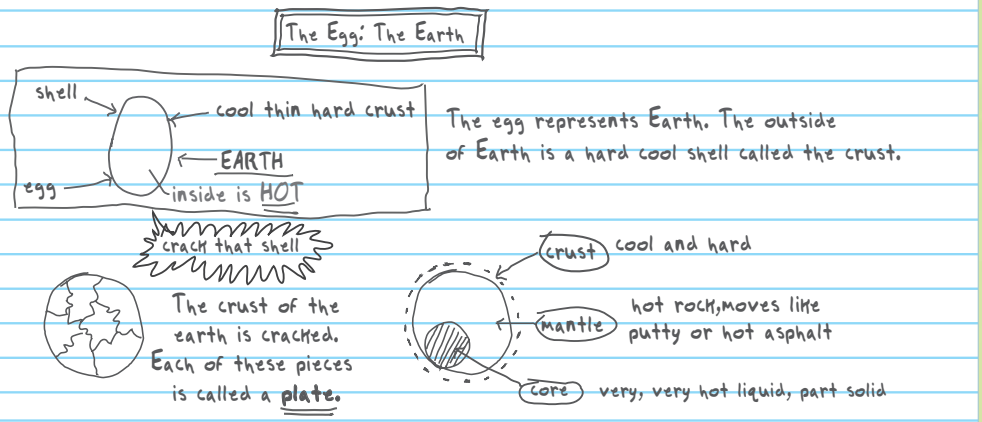
A globe is an example of a familiar model. A globe represents Earth's shape and usually some surface features. When you look at a globe, you can see that Earth is a sphere. You also see where there are continents, oceans, and mountains. A globe helps you examine Earth and the continents all at once. This would not be possible without this model.

Hello from the island of Java!

I think I have an idea about movements that cause earthquakes and volcanic eruptions. My science teacher told us about the structure of Earth. Even though scientists cannot actually look into Earth, they observe earthquakes and volcanoes and try to figure out what is happening. This helps them understand Earth's structure.

Because Earth is so big and we cannot look inside it, scientists use models to illustrate what they understand. Below is a copy of my notes from science class. In class, we used an egg as a model to illustrate Earth's **crust**—its outside layer—and Earth's interior. I think it was pretty cool. See what you think.

Journal Notes from Benny Makmar of the Island of Java



The pieces of the cracked shell are like giant puzzle pieces that make up Earth's crust. These pieces are called plates, and they sometimes move, leading to earthquakes or volcanic eruptions. Scientists call the movement **plate tectonics.** I think the hot **mantle** and **core** are helping to move the plates of the crust. The crust gets carried along as the hot mantle moves.

What do you think? I look forward to hearing from you.

Sincerely,
Benny Makmur
Island of Java
Indonesia

crust: the outermost layer of Earth, composed of rock.

plates: sheets of rock that include part of Earth's crust.

plate tectonics: the theory that Earth's crust is divided into a number of plates, and the study of how the plates move and interact with one another.

mantle: the zone of earth beneath the crust and above the core. It is divided into the upper mantle and the lower mantle.

core: the central part of Earth made of iron and nickel. It consists of a liquid outer core and solid inner core.

Stop and Think

1. What does Benny think is moving to cause earthquakes and volcanic eruptions?
2. Use evidence from the photographs you examined earlier to identify strengths in Benny's model.
3. Use what you know about Earth and evidence from the photographs you examined earlier to identify weaknesses in Benny's model. What is missing from his model?
4. How convinced are you about Benny's model? What else would you need to know to determine the accuracy of Benny's model?
5. How do you think scientists can determine what the inside of Earth looks like beneath the crust?

What's the Point?

Scientists cannot look deep inside Earth. But by observing earthquakes and volcanoes on Earth's surface, they can get some information about the structure of Earth. Benny's letter tells you that Earth has three major layers. The outermost layer is called the crust. The crust is broken up into sections called plates. Below the crust is the mantle, Earth's middle layer. Beneath that is Earth's innermost layer, the core. The movement of plates causes earthquakes and volcanoes. The theory of plate movement is called plate tectonics.