



Investigation 1:

There's No Place Like Home



Key Question

Before you begin, first think about this key question.

What characteristics does the planet Earth have and how do scientists know this?



A look at Earth from space.

Think about what you already know about the Earth. Write down two things that you feel confident you know about the Earth as a planet. You may want to draw a picture as well. Then, write down how you think scientists have discovered these things about the Earth. What tools or methods do you think they have used?

Materials Needed

For this investigation your group will need:

- colored pencils or markers and blank paper
- diagram of the Earth, showing the different layers
- relief map or globe of the Earth
- 5" x 8" index cards
- computer with Internet access, if possible

When you finish, share your ideas with other students in your group. Make a group list of what you know and what questions you would like to investigate about the Earth and how scientists study the Earth. Keep this list for later in your investigation.



Investigate

1. Use the ideas and drawings about the Earth that your group members have already finished. Work together to draw two sketches.
 - a) One sketch should show the Earth as if you were looking down on it from space. Try to show as many features of the planet as you can. Label any features (continents, oceans, mountains, etc.) that you know.



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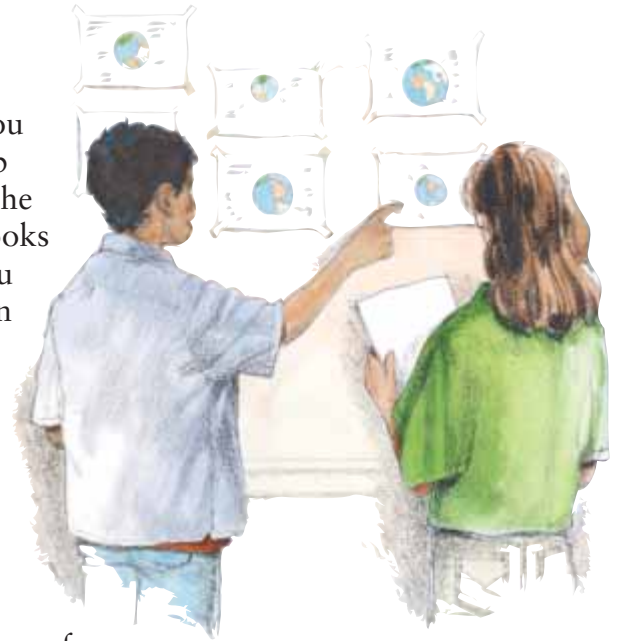


Inquiry

Making Diagrams

Sometimes the best way to show the results of a scientific investigation is by drawing a diagram. Complicated concepts can often be illustrated more easily than they can be explained in words. The diagram should be labeled.

b) The second sketch should show what you and your other group members think that the inside of the Earth looks like. Imagine that you could cut the Earth in half. Do your best to show what it might look like beneath the surface. Label your sketch with descriptions of the different parts you have drawn. If you know the names of any of the Earth's layers, label these, but don't worry if you don't know this yet.



2. Label your drawings with your group's initials. Then post them up in a gallery around the room. Taking your journals, go on a "tour" around the gallery.
 - a) Write down ideas that other groups have about the outside and inside of the planet.
3. When you finish the tour, talk about these ideas in your group. What ideas did you get from the other groups?
4. Now, look at the world map or globe your teacher will provide. Also look at the diagram of the inside of the Earth in the **Digging Deeper** section.
 - a) How are your drawings (and those of your classmates) similar to or different from these maps and diagrams?
 - b) What surprised you about the maps and diagrams?
 - c) Use this new information to make your drawings as accurate as possible.
5. Next make a "Planet Card" (like a baseball card) about the Earth. Draw a picture of the Earth on one side of a 5" x 8" card and put important information that you have learned about the Earth on the back. You might include information on the following topics:

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- What the surface of the Earth is like.
- What the interior of the Earth is like.

As you continue reading this chapter and learn more about the Earth, you can add to the Planet Card. You can also make other Planet Cards as you learn about the other planets in the Solar System. These cards can be used as a review tool later.

6. At the beginning of this **Investigation**, you also wrote down your thoughts about how scientists found out about the characteristics of the Earth. Share your thoughts with your group. Then, as a group, choose one question that you wish to investigate further. Possible topics may include, but are not limited to, the following:
 - How did scientists discover the composition of Earth's atmosphere?
 - How do scientists know what the inside of Earth is like?
 - How deep are the oceans and how can you be sure about this?
 - How high are the highest mountain ranges on Earth?
 - What is the deepest spot in the ocean?
 - Where is the highest mountain?
7. Your class will go to the library or computer center in your school to research these topics. Be sure to ask for help from your teacher if you are having difficulty finding the information you are looking for.
8. When you finish your research, think of a way that you can present your information so that your classmates find it interesting and informative. You might want to use a PowerPoint™ presentation, an overhead transparency, a poster, photographs, or even some tools.
 - a) Prepare your group's presentation.
9. Make your presentation, being sure to answer any questions from your classmates.
 - a) As other people are presenting, refer to your original ideas about the Earth. Add information as you discover it. Save all this information for later investigations.



Inquiry

Scientific Questions

Science inquiry starts with a question. Scientists take what they already know about a topic, then form a question to investigate further. The question and its investigation are designed to expand their understanding of the topic. You are doing the same in this investigation.



As You Read...

Think about:

- 1. What are the layers of the Earth?**
- 2. What are the Earth's systems?**



Earth as viewed from space. Which parts of the Earth systems can you see in this photo?

Digging Deeper



EARTH, A CONSTANTLY CHANGING PLANET

Earth Systems

The Earth has many features and parts that work together in important ways. One way to study the Earth is to look at its different parts and understand how they are connected. With this information, you can begin to understand how the planet works and how it is always changing. Parts of the Earth that work together are known as systems. Planet Earth has four main systems: the atmosphere, the biosphere, the hydrosphere, and the geosphere.

Atmosphere

The picture shows Earth as viewed from space. Notice the clouds that surround the planet. They are part of an envelope of gases, called the atmosphere, that surround the Earth. When you look up into the sky from the Earth's surface, you are looking into the Earth's *atmosphere*. The gases in the atmosphere play an important role in all the Earth systems. For example, 21% of the Earth's atmosphere is oxygen. Many organisms (living things) need the oxygen in the air to live. Another important gas in the atmosphere, carbon dioxide, is used by plants to make food. Ozone is a naturally occurring gas found in a layer of the atmosphere called the stratosphere. At this level, ozone protects life on Earth from harmful energy given off by the Sun. Finally, the swirling cloud layer that you see in the photograph is condensed water vapor. This water vapor plays an important role in Earth's weather systems.



Biosphere

The Earth supports millions of different types of living organisms that make up part of the Earth's *biosphere*. Organisms survive in many places, from high atop mountains to the extreme environments of the deep ocean floor. Some live on land surfaces, while others live below thousands of meters of glacial ice. Many organisms that once lived on the Earth no longer exist. They could not adjust when conditions such as climate and food supplies changed drastically. Fossils in ancient rocks are evidence that these organisms once did live on the Earth.

Hydrosphere

Water covers nearly 71% of the Earth's surface. The part of the Earth that contains water is known as the *hydrosphere*. Most of the water on the Earth's surface is in the oceans. Oceans are found in basins that are huge depressions in the Earth's surface. Water can be found on the Earth's land surface as streams, rivers, ponds, and lakes. Water exists underground in soil and rocks. Water in the form of vapor (gas) is an important part of the Earth's atmosphere. Water is also in the cells of every living thing on the Earth.



This image shows a massive phytoplankton bloom off the coast of Tasmania. Phytoplankton are part of the Earth's biosphere.

Geosphere

The Earth is made of layers of rock, which together make up the *geosphere*. A relatively thin layer of solid rock called the crust covers the Earth's surface. The crust has a wide variety of shapes. In some places it takes the shape of hills, mountains, slopes, or canyons. In other places it takes the shape of flatlands, shorelines, or even meteorite craters. The shape of the land is always changing. One reason for these changes is that the





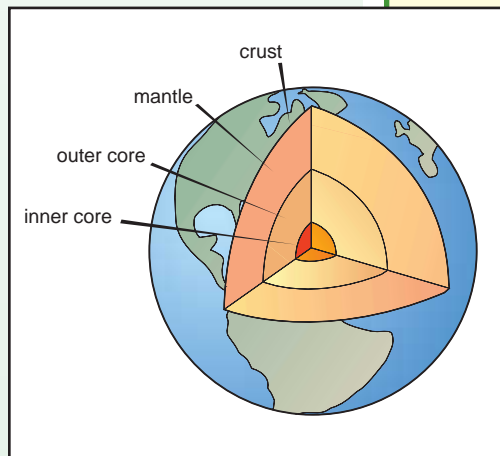
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The shape of Earth's crust is always changing. This image shows the mountains and valleys of the Himalaya Mountains.

Earth's massive continents are constantly being moved by processes deep within the Earth. Many of these processes occur in the part of the geosphere that lies beneath the crust. This part is called the mantle. The rocks in the mantle are continuously being squeezed, deformed, and moved in different directions. Sometimes the rocks of the crust move upward to form mountain ranges. Mountain ranges

can even be found beneath the oceans and are called mid-ocean ridges.



Processes deep within the Earth's interior change the shape of the landscape.

Deep beneath the Earth's mantle are two other layers: the outer core and the inner core. Both the inner and outer cores of the Earth are made mostly of iron. The inner core is solid and the outer core is liquid. These four layers – the crust, mantle, outer core, and inner core – make up Earth's geosphere.

Examining the Earth's systems provides an explanation for many of the most important features of how planet Earth works. Scientists use this knowledge when they study other planets. They compare the Earth's systems to the systems of other planets to understand how those planets work. The more they know about the Earth, the more they can learn about the other planets in the Solar System.



Review and Reflect

Review

1. What questions about the inside and outside of the Earth were you able to answer through this investigation?
2. What questions about how scientists know about the Earth were you able to answer?

Reflect

3. What ideas about the inside and outside of the Earth surprised you the most?
4. What ideas about how scientists learn about the Earth were most interesting to you? Why were they interesting?

Thinking about the Earth System

5. What are the four main systems of Earth?
6. Describe two ways that the atmosphere and biosphere are connected. Remember to write any connections you find on the *Earth System Connection* sheet.
7. How do Earth's systems help scientists study other planets?

Thinking about Scientific Inquiry

8. In which parts of the investigation did you:
 - a) Ask your own questions?
 - b) Record your own ideas?
 - c) Revise your ideas?
 - d) Use your imagination?
 - e) Share ideas with others?
 - f) Find information from different sources?
 - g) Pull your information together to make a presentation?