

What's Inside The Earth?

I. Creating a Scale Drawing of the Interior of the Earth

A. Review of Scaling

Depending on the level of your students, you may need to do a short activity about scaling before making a scale drawing of the Earth.

Materials: Paper, index cards, rulers

1. Tell the students to draw a scale drawing of their tabletop, using a scale of 1 inch = 1 foot (or whatever scale is appropriate for your class). If appropriate, remind them of ratio and proportion.
2. Give the students an index card. Challenge them to make a scale drawing of the tabletop on the index card. They will have to determine an appropriate scale first. (They may not use any additional cards or paper to the card given.)
3. Discuss with the students what steps are needed to follow when creating a scale drawing.

B. Drawing a Scaled Cross-Section of the Earth

Materials: Paper, Rulers, Diagram of the Earth's layers

1. Ask the students to draw a picture of what they think the interior of the Earth consists of.

After a short discussion, show them what is known about the structure of the Earth. It is essential to emphasize that most of what we know is from indirect evidence – there is a fair amount of inference. Emphasize to the kids that we will return to earthquakes and waves, and that we're asking them to reserve judgment on the evidence until they know more about waves.

2. Give students the data of distance, temperature and chemical composition and have them create a scale drawing of a cross-section of the Earth's interior from surface to center. Insist that the students do it in such a way to show that their cross-section is clearly part of a sphere. They should label their diagram with distance, temperature and chemical composition.

(Note: When you show them the diagram of the Earth's interior, you may want to choose diagrams that are purposely not to scale so they don't just copy the picture. Be sure to tell them that it is not to scale, however.)

Have a short discussion with the students about anything they noticed during this activity. Students will invariably be surprised at how thin the crust is compared to the rest of the Earth.

II. The Earth as an Apple

Materials: One apple for every two students cut in $\frac{1}{2}$ across the middle (so you can see the “star”), metric ruler with millimeter markings

3. Hand out a half apple and ruler to each student. Have them measure the diameter of the apple and record it.
4. Ask the question, “If this were a scale model of the Earth, how thick would the crust be?”
5. Have the students estimate the actual thickness of the Apple skin. Compare the thickness of the skin to scaled thickness of the crust. The two numbers should be close to the same order of magnitude. (Of course this depends on the size and type of apple!)
6. Have a short discussion with your class about what this activity tells them about the size of the crust relative to the size of the Earth. This is a good time to talk about how far humans have drilled into the Earth – no effort to drill through the crust has ever been successful, so we’ve literally only scratched the surface of the Earth.

III. Scale Model of the Earth

Materials: Recycled or other materials students bring from home, asst. art and measurement supplies

1. Challenge the students to create a scale model of the earth. They must include the interior layers, and lithospheric features: at least one oceanic plate, at least one continental plate, at least 3 plate boundaries including a divergent, convergent and transverse boundary.
2. Models can be made of any materials the students wish, and must student designed and made.
3. Present the models to the class, and/or arrange to display them, as in a “museum”

IV. Plate Tectonics

Nature of the mantle

-Corn starch/water activity to show how the “solid” mantle can flow, and still fracture.

(http://www.utm.edu/departments/cece/old_site/eighth/811.shtml)

-Convection activities to show how convection currents occur in the mantle. One such activity is as follows:

1. Fill a 1000 ml beaker, or large clear jar about $\frac{2}{3}$ full of very cold water.
2. Fill a 150 ml. beaker or small jar with very hot water, colored with food coloring.
3. Cover the small jar with plastic wrap, and put on a rubber band to hold it on really tightly. Work quickly so the water doesn’t cool.
4. Poke a small hole in the center of the plastic wrap
5. Students predict what they think will happen when the small jar is put into the large jar.
6. Put the small jar in, and observe.
7. To observe movement at the surface, put in small pieces of paper, like what you get when you punch holes in paper
8. Discuss what was observed, being sure to bring differences in density into the discussion.

Plate Tectonics

-Use visualizations to illustrate what happens at plate boundaries. Some useful websites include:

US Geological Survey

<http://www.nature.nps.gov/geology/usgsnps/animate/pltecan.html>

Plate Movement Visualizations, Carleton College

<http://serc.carleton.edu/NAGTWorkshops/visualization/collections/PTMovements.html>

Essentials of Geology

<http://www.wwnorton.com/college/geo/egeo/animations/ch2.htm>

Plate Tectonics for Middle School Science Teachers

<http://msteacher.org/epubs/science/science1/animations.aspx>

My Science Box

<http://www.mysciencebox.org/plates>

-Sea Floor Spreading Activity

Either use a modeling activity that you already have to demonstrate sea floor spreading, or use one of the following:

Model of Seafloor Spreading Teacher's guide

<http://www.ucmp.berkeley.edu/fosrec/Metzger3.html>

My Science Box

<http://www.mysciencebox.org/seafloor/lesson>

Teaching Note: Activities Five and Six of Earth Structure fit well in the Plate Tectonics progression