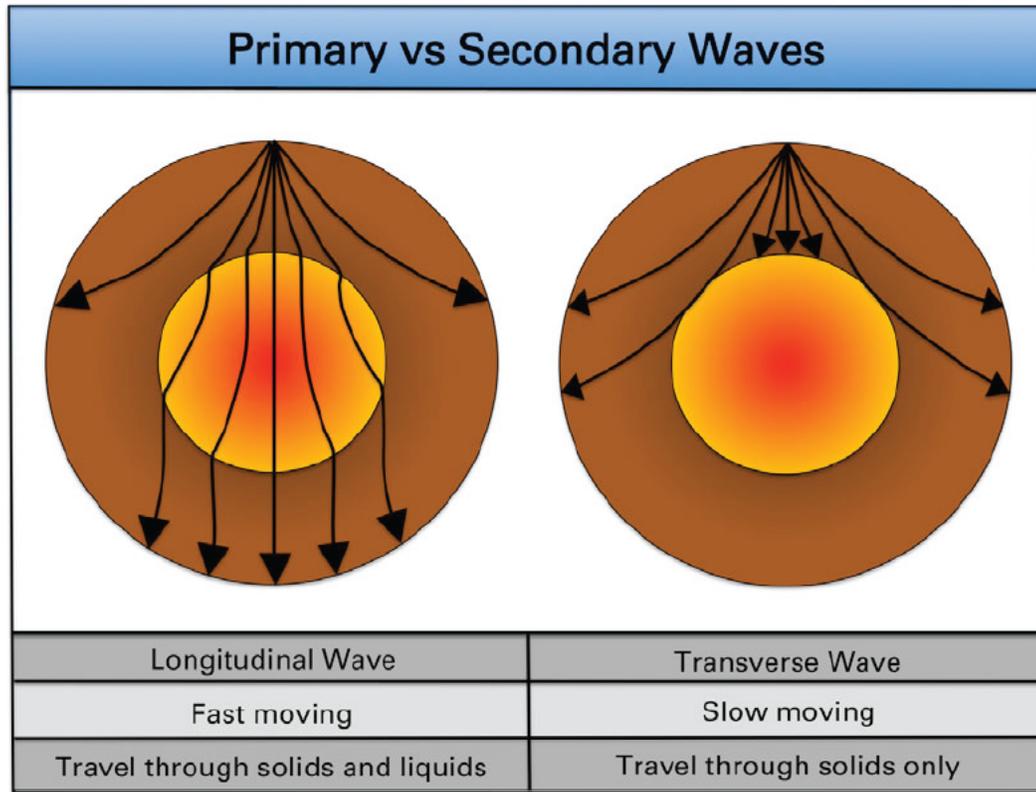


1.2

SCALING OUT EARTH'S LAYERS

What evidence do scientists use to determine the Earth's internal composition and structure?



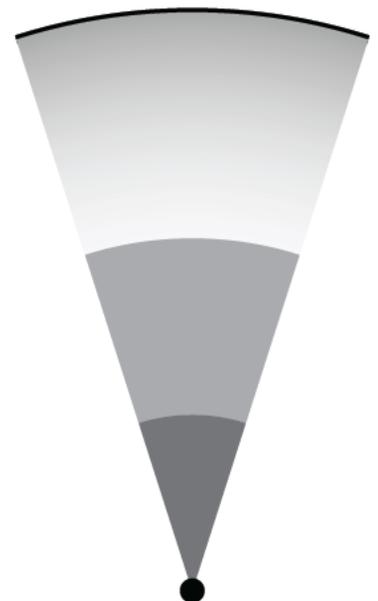
Visit the Kahn Academy for a tutorial on "Seismic waves and how we know Earth's Structure" khanacademy.org/science/cosmology-and-astronomy/earth-history-topic/seismic-waves-tutorial/v/seismic-waves

MATERIALS

- Scientific calculator
- 1 brass brad
- Tape
- Kite string (2.2 m long)
- Meter stick
- Colored pencils, markers, crayons
- 18-in wide roll of butcher paper (cut 2.0 meters long)

DIRECTIONS

1. Place a small piece of tape folded over the end of the paper in the center.
2. Insert a brass brad in the center of one end of the butcher paper through the piece of tape (this will represent the center of the Earth).
3. Measure up from the brass brad and mark each scaled distance from the center of the earth (see "Setting up your model of Earth's layers" on the next page for scaled distances).
4. Tie the string around the brass brad. (You will use this to arc your distances from the center of the earth to the different layers)



1.2 SCALING OUT EARTH'S LAYERS CONTINUED

- Pull the string taught, wrap a pencil in the string at the marked distance and arc your circles out to the edge of the paper. (*repeat for each distance*)
- Lay the meter stick and strike a line from the brass brad to the edge of the earth's crust along the edge of the paper.
- Erase any of the arcs that extend outside the edge of the wedge you just drew in.
- Label each layer with name, thickness, and any other physical/chemical properties. (*information can be listed in the areas outside of the wedge*)
- Color each layer with colors specified by instructor.

Setting up your model of Earth's layers:

The radius of the Earth is roughly 6371 km, and your model that you are creating will be 150 cm.

- Calculate Conversion Factor: cm Model/km earth's radius
 _____ = model conversion factor (cm/km)

Imagine one of our layers of the Earth was 2,345 km thick, how many cm would that be on our scaled earth?
(Model conversion factor x thickness of the layer in km)

- Calculate 2,345 km in cm here: _____ cm
 (*Check this with your Instructor before you move on*)

Write in the accepted values given to you by your instructor and calculate the scaled value in cm using your model conversion factor from above. These scaled values will be used to generate your scaled model of earth's layers.

| | |
|---------------------------------------------------------------------------------------------------------|----------------------------------|
| Atmosphere: 1,000 km | Scaled model thickness: _____ cm |
| Crust (average): 22.5 km | Scaled model thickness: _____ cm |
| Upper Mantle: 70 km | Scaled model thickness: _____ cm |
| Asthenosphere: 660 km | Scaled model thickness: _____ cm |
| Lower mantle: 2155 km | Scaled model thickness: _____ cm |
| Outer Core: 2250 km | Scaled model thickness: _____ cm |
| Inner Core: 1216 km | Scaled model thickness: _____ cm |
| Moho (Don't forget to include this on your model, just use a red line, label it off to the side) | |
| Lithosphere (Label the lithosphere as part of your model) | |
| Average Depth of Oil & Gas Drilling in Ohio: 1.8 km | Scaled model thickness: _____ cm |
| Kola Superdeep Borehole, Russia = 12.262 km | Scaled model thickness: _____ cm |

Visit this site to watch a video on the Kola Superdeep Borehole: [youtube.com/watch?v=zz6v6OfoQvs](https://www.youtube.com/watch?v=zz6v6OfoQvs)

REFLECTION

- What evidence do scientists use to determine the Earth's internal composition and structure (depth/thickness of its internal layers)?
- What occurs at the boundaries between the different layers that allow scientists to distinguish between the different layers of the Earth? What causes this to occur?
- Name the layers of the Earth from the densest to the least dense.
- Describe how the Earth's layers were formed.

TEACHER TIPS

- Choose some of the best models to make half of the Earth on the wall in your classroom or in the hallway.
- Add in convection cells to the mantle during the introduction to plate tectonics.