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Inge Lehmann

What's at the heart of planet Earth?

Inge Lehmann – Danish seismologist 1888-1993

When she was little, Inge Lehmann attended the only co-educational school in Denmark and so received a very good education, which was also quite modern at the time.
Once she grew up, she began working for a surveyor's office, assisting with the installation of seismographs in various parts of Denmark and Greenland. This was the first time she was able to work with and learn more about these devices.
Seismographs are used to measure Earth tremors. They register seismic waves – the sorts of waves which flow through the insides of our planet, invisible to the naked eye, caused by earthquakes and explosions resulting from human activity.

This is the sort of school where girls and boys study together.
Surveyors provide measurements needed to create maps and plan construction projects.

Seismology – the study of Earth tremors – fascinated Inge, and at age of 40 she graduated from university for the second time in her life – becoming the first ever Danish seismologist. For the next 20 years, she was the only person working in this field in all of Denmark!
At the beginning of the 20th century, scientists still thought that beneath the Earth's hard outer crust there was a layer of molten rocks which filled the whole centre of our planet.
Inge kept studying her seismographs each and every day, finding something to be amiss in this theory. The seismic waves she was recording did not seem to pass evenly straight through the centre of the Earth, but seemed to become oddly broken up.
She then produced a mathematical model of the Earth, based on her measurements, which showed that there was something else at the very centre of our planet.

A mathematical model of Planet Earth is a picture based on figures extracted from detailed studies.

The Earth in cross-section

Inner core

Lehmann discontinuity

Outer core

Upper mantle

Earth's crust

And in this way he discovered the Earth's Core! This happened in 1936.

The Earth is made up of various layers. On the outside, it is covered by the Earth's crust, which supports the seas, oceans, lands and all living creatures. When we look beneath the crust, we see the rocky upper mantle. At the very centre of the Earth is the core.

The core is made of liquid iron and nickel – its temperature approaches that of the surface of the Sun and is almost as large as our Moon! The outer core surrounds the inner core, and between them is a layer of Lehmann discontinuity – thus named after the person who discovered it.

Inge received numerous awards and honorary doctorates for her discoveries, but she never stopped working – she published her last scientific research paper when she was 99 years old!

Make your own seismograph!
It's simple!

You will need the following:

a cardboard box which will serve as a stand,

a paper cup, fitted inside the box,

a thin string

a marker or soft pencil

a handful of pebbles

a piece of paper

two rubber bands

scissors

1. Turn the box as shown in the picture, the opening facing towards you. If it has flaps, you will have to cut these off.
2. Drill two holes in the top of the box (several centimetres apart) then make holes in the paper cup – two on the sides, at the top, and one in the centre of the bottom of the cup. Best you ask an adult to help!
3. Thread the string through the holes at the top of the cup.
4. Poke the marker through the hole in the bottom of the cup, so the writing end sticks out the bottom. The marker should be fixed firmly in the cup's rim. You can use the two rubber bands to help fix it in place. Wrap the band around the marker and poke it into the cup. The end now poking out the bottom should be fitted with another rubber band.
5. Place the cup in the box, and the ends of the string which emerge from it thread through the holes inside the box. Tie them on the outside, as shown in the drawing. The marker should rest against the bottom of the box.
6. Tip the cup and fill it with pebbles.
7. You can now put the piece of paper under the marker. Any time someone shakes the box or the table it is on, and you move the page beneath the marker, it will draw a zigzag line which will be a record of the tremors (seismograph). Depending on how strong the tremors are the line will be more or less jagged. This is how seismographs work, being even more sensitive in real life.