



Measuring Cores

Practice using Rulers

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Background

This activity was created as a result of the blog about measuring being an underrated skill in science (released in EXP 393). In hard rock cores (samples from the ocean floor in the shape of a tube) sometimes have fractures that fill up with minerals. These fractures are called veins because they are filled and no longer an empty space. Scientists will measure these veins to know where they show up on the core, how long they are, and later find out what they are filled with. The direction of the veins can also help scientists estimate the direction of stress that caused the initial fractures to form. This is a quick introduction to using a ruler, understanding how to read a ruler, and how we can use a ruler to measure lengths of veins in basalt cores.

Additional Resources

- *Introducing the International Ocean Discovery Program*
 - <https://www.youtube.com/watch?v=0nydKlpZdIU&list=PLroDmZEKRHPMCtFMzjx-Zg7plqnIqWMjI&index=2&t=242s>
- *How Science Works*
 - <https://www.youtube.com/watch?v=i9tsdAQBcfM&list=PLroDmZEKRHPMCtFMzjx-Zg7plqnIqWMjI&index=3&t=0s>
- *PNN Special Report Life on Board*
 - <https://www.youtube.com/watch?v=n0bcIoALDFg&list=PLroDmZEKRHPMCtFMzjx-Zg7plqnIqWMjI&index=4&t=341s>



Activity Summary

Students will be able to practice measuring the length of veins and communicating their observations to their classmates.

Next Generation Science Standards

HS-ESS2-5 Earth's Systems

Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

College and Career Readiness Standards for Adult Education

CCR Anchor 1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

Level A (K-1): Represent and solve problems involving addition and subtraction.

Level A (K-1): Measure lengths indirectly and by iterating length units.

Level A (K-1): Represent and interpret data.

Target Audience

Adult obtaining their High School Diploma or equivalency

Skills:

- Using a ruler
- Making observations
- Recording data
- Communicating data

Time Required

~ 1 hour

Materials Needed

- Rulers with both inches and centimeters
- Various objects to measure
- Images of cores with ruler in the photo (linked here)
- Pencil and paper

Resources Provided:

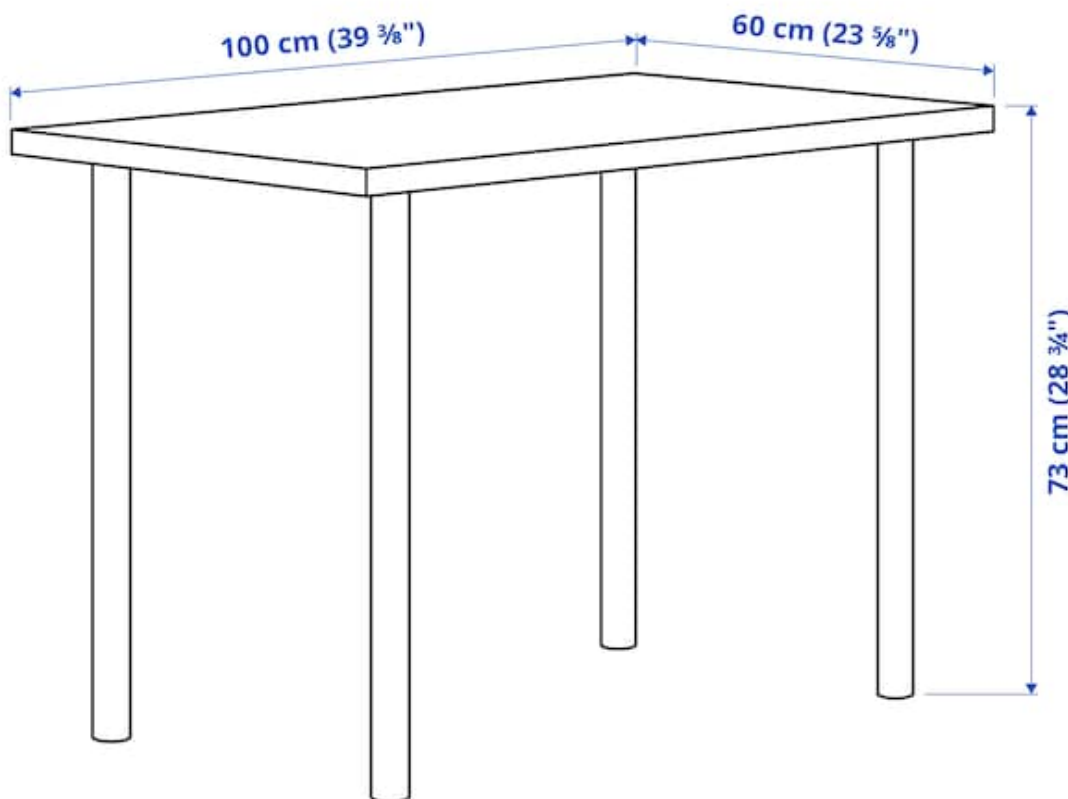


- Images of inch and centimeter breakdown
- Images of cores with ruler in photo
- Empty data table

Activity Description

Make sure everyone has a ruler and printout for the two units of measurement. Demonstrate how to measure the length, width, and height of a 3D object. Write down how you would communicate the size and then repeat it aloud.

For example, you can show this picture:





The table's height is 73 cm or 28 $\frac{3}{4}$ inches. The inches in the photo are shown as “ which is a way to indicate inches sometimes. Make a point to mention the abbreviation for centimeters is always lowercase cm, and the shortened version of inches is always in lowercase or shown as a double quotation mark.

Then have the students try it themselves. Measure the length, width, and height of two different items. Have them write down the measurements and then communicate the length, width, and height to the class or a partner.

For the transition to the next part of the lesson, you can say this: *Geology is a field of science in which scientists study the rocks of Earth. To understand the differences we see in rocks from the around the world, we have to measure them and measure the features we might see in them. Rocks can have veins, crystals, and parts that are different colors. In hard rock cores deep from the ocean floor sometimes have fractures that fill up with minerals. These fractures are called veins because they are filled and no longer an empty space. We can measure how big or wide those features are, so we can get an idea of what kinds of things have affected that rock through time.*

A ship called the D/V JOIDES Resolution goes out to sea to collect rocks from the seafloor, so we can learn more about the history of Earth. When the rocks are brought up to the ship, we can make observations of their size and other features. There are rulers everywhere in the ship's labs, so we can make those observations quickly.

We will now do an activity where we will practice measuring sizes of veins, crystals, and other features we can find. We will add them to a data table that will act as a record of our observations. This is exactly what the scientists on board the ship have to do so they can share the results with scientists back on shore.

Now pass out the core piece photo file name: 352_U1439C_31R_4A_65-87cm-Dry (linked here)

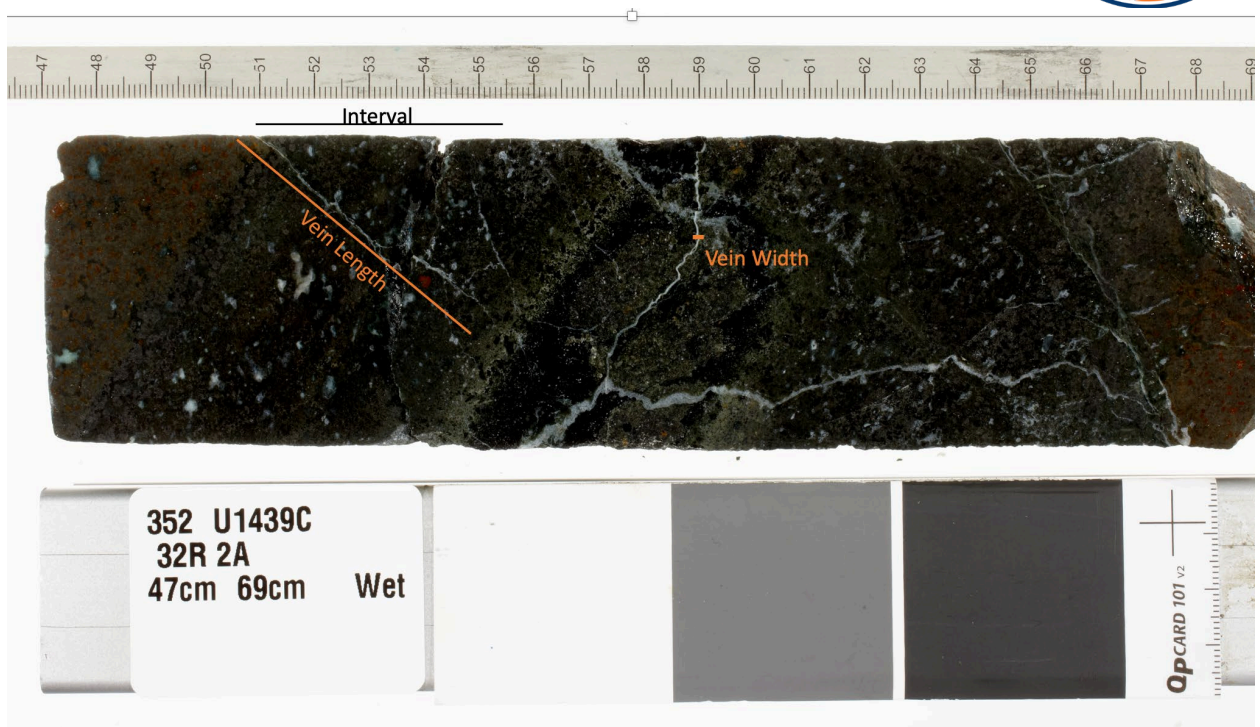


Please note that you will be focusing on just centimeters from now on.

As a group, determine the length of the core piece. (This is not the whole core that was taken from the ground, just a piece of the full-length core.) This is to just get used to looking at the ruler on the image.

Then have students work as partners to get the length of the veins (white lines) and the width of the veins.

- For the veins that are perpendicular to the ruler, get a scrap piece of paper, trace the vein on it, and compare it to the ruler in the photo. This will be the Vein length.
- To record the interval, first write down the measurement from the digit on the ruler to the next digit. For example, if the vein starts at 60 cm and ends at 65 cm, write these down in Vein start, and Vein End.
- Have students label the veins with letters so they know what measurement goes with what vein.
- Make sure to not use a real ruler for the Vein activity since it would be a different proportion to the ruler the photo is taken against. When you print the image for each student, have them cut out the ruler so they can use that as their ruler.



Use this data table:

Vein label (use a letter)	Vein start (interval)	Vein End (interval)	Vein length	Vein Width	Perpendicular to ruler? (Y/N)	Parallel to ruler? (Y/ N)

After the data table is complete:

- Now you will have students practice communicating what they have measured. Have students make observations about their data. Anything they notice? (It can focus on the longest veins or shortest veins, or it can focus on



how many veins have the same direction with regards to the position of the ruler.)

- For example: “In a core section, there are three veins that are of the same length, 2 cm, but they each go in different directions.”
- Have them present their observations to the class.

Why do the scientists measure the veins?

The scientists on the *JOIDES Resolution* measure the veins so they can understand what processes might have occurred to create the veins. They measure width to understand how much fluid moved through the fracture carrying all the minerals that are now solid.

Extra: Feel free to look at the supplemental picture of a full core (352U1439C27.png) and have students practice identifying the various parts of the core with veins. The section on the left is the topmost part of the core, while the sections toward the right are the sequential bottom parts. (Imagine putting them one on top of each other in sequence).

- The rocks get broken up as we drill, so they are not all the same shape.
- Photo linked here

Exit ticket:

- Ask: What did you learn today? Where in your daily life do you think you will use measurements? What questions do you have about the cores we looked at?