

Who's Ruling Who? Exploration

Problem:

1. How many decimal places do measurements need?
2. How do the increments on a measuring device affect the accuracy of measurements?

Materials:

rulers A, B, and C
objects 1, 2, and 3

Procedure:

In this activity you will be asked to measure the length of three objects using three different measuring sticks. Before beginning, prepare a data table in which to record your measurements of the three objects using rulers A, B and C. When measuring, you are allowed to guess one digit of your measurement. First, you write down the digits you know for sure. Then you estimate one more decimal place. For example, if your measuring device is marked in 20 cm increments only, and you were measuring the length of this page, the digits you know for sure is 20 cm. You may then estimate to one additional decimal place. You may then come up with a length of 27, 28 or even 29 cm using that particular measuring device.

1. Measure the length of object 1 with Ruler A. Record the digits you know for sure.

Now estimate or guess one extra digit for the length of object 1. Record the length of object 1. Circle those digits which are known for sure. Underline the digit which you estimated.
2. Repeat the measurement of object 1 using Ruler B and Ruler C. Enter the measurements in your data table. Make certain that you estimate the last decimal place in your measurement. Once again, circle those numbers which you know for sure. Underline the digit which was estimated.
3. Measure objects 2 and 3 with each of the 3 rulers, recording your data in the table. Continue to circle those numbers which you know for sure. Underline the digit which you guessed.
4. Find a classmate with whom to compare measurements. After discussion, check with the instructor and remedy any discrepancies.

Summing Up:

1. Compare the measurements made using Ruler A with those made with Ruler B. Which measurement do you think is more accurate? Why?
2. Compare the measurements made using Ruler A with those made with Ruler C. Which ruler do you think can make more accurate measurements? Why?
3. Write a rule that states the number of digits that should be recorded when using any measuring device.
4. What conclusion can you draw about the accuracy of measurements of length based on the number of increments on a ruler?