In the Range

Grades 3 - 6

Overview

Students will interpret the rounding involved in measuring to identify the possible range of a given measurement.

Math Concepts

- rounding whole numbers
- rounding decimals
- measurement with metric units (length, mass, capacity)

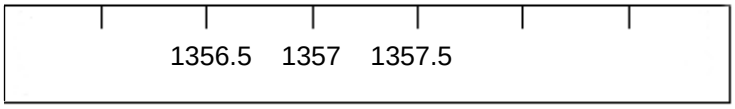
Materials

- TI-15
- pencil
- meter sticks or metric measuring tapes
- student activity (p.27)

Introduction

1. Have students measure the length of a table or desk in the room and record the measurement to the nearest millimeter, for example, 1357 mm.

   Discuss how measurements in millimeters can be recorded as 1357 mm or as thousandths of meters, 1.357 m. Note that the measurement was rounded to 1357 mm because it fell somewhere between ½ of a millimeter less than 1357 mm (1356.5 mm) and ½ of a millimeter more than 1357 mm (1357.5 mm).



2. Have students then use rounding to record the same measurement to the nearest centimeter (136 cm or 1.36 m).

3. Enter the original measurement on the calculator as 1.357 and fix the display at two decimal places.

4. Have students fix the display at one decimal place. Ask:
   What does this number represent? (The measurement rounded to the nearest tenth of a meter, or the measurement rounded to 14 decimeters.)

- To fix the display at 2 decimal places, press Fix 0.01 Enter.
- Have students discuss how the display of **1.36** matches their rounding of the measurement to 136 cm.

5. Have students fix the display to no decimal places. press Fix and then 1. to display **1**. Ask: *What does this number represent?* (The measurement rounded to the nearest meter.)

6. Introduce the *In the Range* game by secretly entering a number on the calculator with three decimal places to represent a measurement in millimeters; for example, 2.531. Then display the number rounded to the nearest whole number (3). Show this display to students.

7. Tell students that this number represents the measurement of a length of board to the nearest meter. Ask students:
What could its measurement be if it had been measured to the nearest decimeter?
(2.5 m to 3.5 m)

8. Round the original number to the nearest tenth (2.5). Ask students:
Does this lie within the range we identified?

9. Repeat for measuring to the nearest centimeter (hundredths) and millimeter (thousandths). (The range for centimeters would be 2.45 to 2.55, with 2.53 lying within that range; and the range for millimeters would be 2.525 to 2.535, with 2.531 lying within that range.)

10. Have students work in pairs to play the game and record their observations on their student activity pages.

To round to the nearest whole number, press Fix 1. Enter.

To round to the nearest tenth, press Fix 0.1 Enter.

Collecting and Organizing Data

As students are playing the game, focus their attention on the patterns that are developing by asking questions such as:

- *When you record a measurement, why is rounding always involved?*
- *When you read a measurement, what interval should that measurement always indicate to you?* (½ a unit less or ½ a unit more)
- *How would this interval look on a number line (or meter stick)?*
- *How is ½ represented in the metric system?*
- *How are you deciding how to represent the range of possible measurements? What patterns are you using?*

Analyzing Data and Drawing Conclusions

To guide students in the analysis of their data, ask questions such as:

- *What range is indicated by every measurement?*
- *What patterns did you use in identifying the range of possible measurements?*
- *How would you use these patterns to round 256.0295 to the nearest tenth?*

Continuing the Investigation

Have students replace the units of length with units of mass (grams, centigrams) or capacity (liters, milliliters) to notice the same patterns.

Have students discuss why this decimal place-value approach with the calculator does not work for measurements in yards, feet, and inches. Have them identify what range a measurement would lie in if it was measured to the nearest yard, nearest foot, and nearest inch. (For example, 2 yards would lie between 1 yard and 18 inches and 2 yards and 18 inches.)

In the Range

Name _____

Date _____

Collecting and Organizing Data

Have your partner secretly enter a measurement with three decimals places into the calculator, and then fix the number to be rounded to the nearest whole number. Now look at the display and answer the following questions:

1. What is the measurement to the nearest meter? _____

   a. What could be the range of the measurement if it had been measured to the nearest tenth of a meter (decimeters)?

      _____

   b. Set [Fix] to the nearest tenth ([0.1]).

      What is the measurement to the nearest tenth? _____

      Is that within the range you identified? _____

2. What is the measurement to the nearest tenth of a meter? _____

   a. What could be the range of the measurement if it had been measured to the nearest hundredth of a meter (centimeters)?

      _____

   b. Set [Fix] to the nearest hundredth ([0.01]).

      What is the measurement to the nearest hundredth? _____

      Is that within the range you identified? _____

3. What is the measurement to the nearest hundredth of a meter? ___

   a. What could be the range of the measurement if it had been measured to the nearest thousandth of a meter (millimeters)?

      _____

   b. Set [Fix] to the nearest thousandth ([0.001]).

      What is the measurement to the nearest thousandth? _____

      Is that within the range you identified? _____

In the Range

Name _____

Date _____

Analyzing Data and Drawing Conclusions

Identify three measurements to the nearest millimeter that would be:

a. 10 m when rounded to the nearest meter. _____

b. 9.0 m when rounded to the nearest tenth of a meter (decimeter).

_____

c. 9.05 m when rounded to the nearest hundredth of a meter (centimeter).

_____