No More Peas, Please!: Measurement and Geometry

(i) Overview

Students will use nonstandard units of volume and calculators to estimate the number of peas it would take to fill a room.

Grade Levels: 3–5

Concepts

- Whole numbers

- Ratio

- Multiplication

- Proportion

- Capacity measure

⭐ Materials

- ▦ TI-10 and TI-15 Explorer™ calculators

- *Counting on Frank*

  Clement, Rod (Milwaukee, WI: G. Steven's Children's Books, 1991)

- Student activity sheet

- Measuring tools (string, tape measure, rulers, containers, cubes, dice, marbles, counters, balances, etc.)

- Pencils or markers

✔ Assessment

Throughout the activity, questions are included for formative assessment. Student work should be used as a check for understanding. Have the students use measuring tools along with the TI-10 or the -15 Explorer™ calculator to complete the activity.

Modified from No More Peas, Please! from Uncovering Mathematics with Manipulatives, the TI-10, and the TI-15 Explorer™ Calculator

Introduction

1. Read to the class the book *Counting on Frank.* Discuss the different examples of measurement in the story.

    Examples: The length of the ball point pen's line is linear measure; the number of Franks it takes to fill the bedroom is volume.

2. Start two lists and display them:

    - Situations in which units of length are helpful.

    - Situations in which units of volume are helpful.

3. Divide the class into small groups of students. Ask students to suggest ways to determine the number of peas that artist drew in the illustration.

4. Have students use the number of peas in the illustration to predict the number of peas it would take to fill their classroom.

5. Challenge students to develop a method to find out the number of peas it would take to fill the classroom.

6. Ask students to write a detailed plan for finding the number of peas it would take to fill the classroom.

    Note: To use the activity with younger children, have them estimate the number of peas needed to cover the desktop (surface area) rather than to fill the room (volume).

Collecting and Organizing Data

While students are working on their project, ask questions such as:

Questions for Students:

- ❖ *What measurements are you taking? Why did you choose those?*

- ❖ *What measuring tools are you using? Why did you use those?*

- ❖ *Are there any measurement tools on the supply table you think would not be helpful in solving this problem? Why?*

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Using the Calculator

- *How are you using the calculator to help solve this problem?*

- *How will you decide if the answer you come up with is reasonable?*

Analyzing Data and Drawing Conclusions

After students have described the method they would use to find the number of peas it would take to fill the room, have them discuss their results as a whole group. Ask questions such as:

Questions for Students:

❖ *Was the illustration in the book helpful in designing a way of finding the number of peas it will take to fill this room? Why or why not?*

❖ *What measuring tools did you use? Why did you choose them?*

❖ *What measuring tools would not be helpful? Why?*

❖ *What do all of the helpful measuring tools seem to have in common?*

❖ *What was the most difficult part of this problem? Why?*

❖ *If we were to choose one method of solving this problem from among all of those suggested, which would it be? Be prepared to support your suggestion with sound, logical reasons.*

❖ *What is the difference between two-dimensional measuring tools and three-dimensional measuring tools?*

Using the Calculator

- *What problems did you experience using the calculator in this problem? How did you solve those problems?*

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Continuing the Investigation

Have students:

- Test the plan they designed for finding the number of peas.

- Make up other measurement problems using the story *Counting on Frank*. Have students write each problem on one side of a card and write one method of solving it on the reverse side.

- Students can write their results on the board and the class can discuss the range of answers.

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SOLUTIONS

Student Activity

Name _____

Date _____

Focus: Use estimation to measure.

No More Peas, Please

Collecting and Analyzing Data

Materials we will need:

[Answers will vary. Possible answer: measuring containers of different sizes, pea-sized objects.]

To find out how many peas it will take to fill this room, we will:

[Answers will vary. Possible answer: use the illustration from the book *Counting on Frank*, as a guide.]

Analyzing Data and Drawing Conclusions

The method we chose will work because:

[Answers will vary. Possible answer: we are using the best measuring tool and following the procedure shown in the book.]

Questions we thought of while we were doing this activity:

[Questions will vary. Possible questions: What other objects can we measure using this method? How would our procedure change if we used larger items like building blocks?]

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