EXPLORATIONS

Activity 7

Making Cookies

Concepts/Skills

- Proportional reasoning
- Computation
- Problem Solving

Materials

- TI–15
- Student activity pages (pp. 47 - 49)
- Grocery store ads that show the cost of flour, sugar, and butter
- Recipe for Bonnie's Favorite Sugar Cookies (p. 50)
- Chart paper
- Markers
- Using the TI-15 (p. 51)

Overview

Students will reduce a school cafeteria recipe for cookies to a household-sized recipe. Problem solving will use compatible numbers to choose smaller measurements that are easier to use.

Focus

- Present the following situation to the students: You received a box of chocolates for Valentine's Day. There are 35 chocolates in the box. You want them to last for two weeks, eating about the same number each day. How many chocolates can you eat each day?
- Discuss possible ways to solve the problem. Allow students to work on solutions. Since 35 is not evenly divisible by 14, they need to decide what to do with the remainder. Students can choose how to divide. One method is **35** [÷] **14** [Enter]. Another is **35** [Int÷] **14** [Enter]. A discussion about the two different answers may be helpful.
- Review with the students the number of days in two weeks. Ask them to determine the fraction that represents one day. Ask the students what would happen if 35 is multiplied by $\frac{1}{14}$. Have them enter **35** [×] **1** [n] **14** [d] [Enter] into the TI-15. Have them compare the answer they got by dividing with a whole number and the answer they got by multiplying with a fraction. Explain that dividing by 14 tells one part of 14 parts and multiplying by $\frac{1}{14}$ tells $\frac{1}{14}$th of the whole. Discuss why either method can tell them how many chocolates could be eaten each day.

First Things First

For students not ready for the open-ended problem, start with the *First Things First* activity page.

Presenting the Problem

Present the *Making Cookies* activity page to the students. Discuss the problem and the final products they are to create.

Discuss the similarities between the *Focus* section and the *Making Cookies* activity page. Remind students that when dividing a recipe to make a smaller amount, the proportions of each ingredient must remain the same.

Discuss the type of measuring tools typically used in the kitchen: 1 cup, $\frac{3}{4}$ cup, $\frac{2}{3}$ cup, $\frac{1}{2}$ cup, $\frac{1}{3}$ cup, and $\frac{1}{4}$ cup. If their calculations indicate that $\frac{3}{5}$ cup would be the best, they will need to modify the amounts to use standard kitchen measuring tools. Ask the students, "Since $\frac{3}{5}$ cup is not a standard measuring tool for recipes, which measuring cup or combination of cups would give you the closest amount?" Depending on their mathematics experience, students can use a common denominator as a comparison, convert to decimal equivalents or fraction manipulatives to compare the various fractions.

Evaluating the Results

Have students present their completed results to the class.

After the presentations, have students discuss the various approaches used. Discuss the similarities and differences between the group solutions. Have students confirm that the calculations were done correctly.

Have students compare the various prices for cookies. Ask them to select one or more groups that would make the class the most money at the bake sale. Have them justify the selection with information from the posters.

Have groups evaluate how the TI-15 was used to help solve this problem.

Student Activity

Name _____

Date _____

Activity 7

Making Cookies: First Things First

The Problem

Cooks often change recipes to make more or less than amount specified in the original recipe. If a cook wants to make half as many cookies as the recipe, he can multiply each ingredient amount by $\frac{1}{2}$ and know how much half of each ingredient is. So if a recipe calls for 2 cups of flour, 2 multiplied by $\frac{1}{2}$ is 1. Half of the recipe requires 1 cup of flour.

Working the Problem

1. Suppose a recipe makes 5 dozen cookies and you want to make 1 dozen. What fractional part of 5 dozen is 1 dozen? How do you know?

2. The recipe calls for 1 pound of flour. You know that there are about 4 cups of flour in one pound. How much flour do you need? The amount of cookies you want to make is $\frac{1}{5}$ of the batch. To find out how much flour, multiply 4 cups by $\frac{1}{5}$.

   Enter **4** × **1** n **5** d Enter. What do you get?

   Explain your result.

   Enter the answer in the table on the next page.

   Unfortunately, measuring cups do not include fifths. Is the answer closer to $\frac{3}{4}$ or $\frac{2}{3}$?

   Here is a way to compare these measures: there are 16 tablespoons in 1 cup. How many tablespoons are there in $\frac{4}{5}$ cup?

3. Enter **16** × **4** n **5** d Enter. What do you get?
   Enter the answer in the table on the next page. Use the whole number part of the answer for the next calculation.

   Since there are 16 tablespoons in a cup and the whole number part of the last answer was 12, you can use that fraction to help decide whether $\frac{4}{5}$ cup is closer to $\frac{2}{3}$ cup or $\frac{3}{4}$ cup.

   What fractional part of a cup is $\frac{12}{16}$?

4. Enter **12** n **16** d Enter. Then simplify the fraction by entering Simp Enter. If you can simplify it again, enter Simp Enter.
   What do you get? Enter the answer in the table below.

   Is this fraction close to $\frac{4}{5}$ cup?

   How do you know?

   Would you need to add or remove tablespoons of flour to make it closer to $\frac{4}{5}$ cup?

   How much would you add or remove?

	Answers
$\frac{1}{5}$ of the flour	
$\frac{4}{5}$ cup flour in tablespoons	
$\frac{12}{16}$ cup simplified	

   Sometimes, changing a recipe is not that easy. Since the original recipe needed 4 cups of flour, what fractions would have been easier to calculate than $\frac{1}{5}$? Why do you think so?

Name _____

Date _____

Activity 7

Making Cookies

The Problem: How much money can we make at a bake sale if we sell Bonnie's Favorite Sugar Cookies?

Your team is in charge of a bake sale for your class. The school cafeteria makes wonderful sugar cookies. Your teacher wants everyone in the class to make a batch of the sugar cookies to sell at the bake sale. When you receive the recipe from the cafeteria manager, it makes almost 200 cookies, uses pounds of flour and sugar, and is too much for anyone to make at home. Your teacher tells you to reduce the recipe to make a batch of three dozen cookies.

The Facts

- One pound of flour contains about 4 cups of flour.
- One pound of sugar contains about 2 cups of sugar.
- One pound of butter contains 2 cups of butter.

The Task

1. Your team will make a chart showing the following:
   - The cafeteria recipe and your version of the recipe to make three dozen cookies
   - The cost of the ingredients
   - The cost of three dozen cookies
   - The cost per cookie
   - The profit for one batch of cookies based on three different cookie prices
   - A recommended price for a cookie
2. Each member of the team will write an explanation of the processes used to solve the problem. The explanation will include:
   - How the team decided on the amounts in the small batch of cookies
   - How the team calculated the cost of the cookies
   - How the price per cookie was determined

Bonus - Take the small batch recipe home and make the cookies. Bring the cookies back to class to share.

Bonnie's Favorite Sugar Cookies

Ingredients

- 10 lb. flour
- 4 lb. sugar
- 8 lb. butter
- $\frac{1}{3}$ cup vanilla extract
- 1 cup milk
- Extra granulated sugar for rolling

Directions

Cream the butter until light. Gradually add the sugar, beating until light and fluffy. Beat in the vanilla and the milk. Gradually stir in the flour. The mixture will be very stiff. Continue mixing until the dough comes together in the bowl.

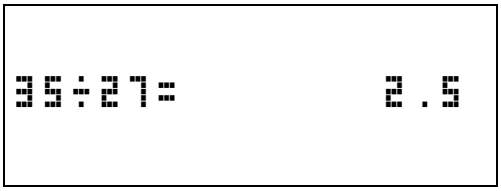
Roll $\frac{1}{4}$-cup portions of dough into balls. Roll each ball in granulated sugar. Place the balls on a parchment-lined cookie sheet. Press the balls flat with the bottom of a large cup to make the cookies about $\frac{1}{4}$-inch thick. Bake at 350 degrees for 20 to 25 minutes, or until the edges are golden brown. Remove cookies to a rack to cool. Makes about 192 cookies.

Using the TI-15

Activity 7

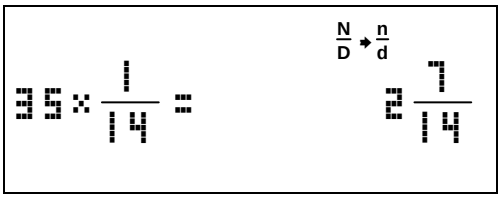
Making Cookies

35 [÷] 14 [Enter]



35 [Int÷] 14

35 [×] 1 [n] 14 [d] [Enter]



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