MATH Can Take You Places

LESSON 16
"The Snack Bar"
by Rhonda Bailey

CONCEPT AREA Patterns

GRADE LEVEL 6

TIME ALLOTMENT 60 minutes

LESSON OVERVIEW Students will solve a real-life application problem involving proportional relationships. Students will work together to devise a problem-solving plan to analyze patterns and determine a reasonable solution to a consumer-related problem based on the restaurant industry.

LESSON ACTIVITIES OVERVIEW The lesson scenario is situated around a school snack bar that is organized and run by students. The students are responsible for ordering food and supplies based upon the different group sizes, such as a class with 25 students, a grade level with 100 students and the entire school body with 800 students. Students will also have to find the cost of purchasing the food and supplies and write equations that describe the totals.

LEARNING OBJECTIVES Students will be able to:
- Use ratios in a real-life problem-solving situation.
- Apply estimation skills to find reasonable results in a problem-solving situation.
- Write equations that describe a problem situation.
- Apply problem-solving strategies to determine the solution to a real-life problem-solving situation and effectively communicate their conclusions.

STANDARDS (TEKS) **From the Texas Essential Knowledge and Skills for Math for grade 6:**

6.2(C), (D), 6.3(A), 6.4(A), 6.5(11)(A), (12)(A)

MEDIA COMPONENTS Video: *Math Can Take You Places* #005 "Patterns"
Internet:
Sample food label and explanation:
U.S. Food and Drug Administration
http://www.fda.gov/FoodIngredientsPackagingLabeling/LabelingNutrition/ucm274593.htm

Student presentations:

Have students create a PowerPoint presentation of their snack bar's "Grand Opening," detailing the behind-the-scenes managerial story, such as ordering the supplies and the food.

Have students create spreadsheets and graphs of the data and write a group report of the problem scenario. Students can also insert the charts or graphs into the PowerPoint presentation.

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MATERIALS
- Activity/Recording sheets
- Chart paper
- Markers
- Meter sticks or ruler
- Calculator (optional)

PREP FOR TEACHERS
• Write serving or package sizes where they are visible to all students or bring in packages of each item and set up stations around the room.

- Hot dogs/franks
- Hot dog buns
- 2-liter soft drinks
- Styrofoam or paper cups
- Mustard (squeeze bottle)
- Ketchup
- Relish or other condiments
- Napkins
- Snacks
- Use pictures of the items listed or empty cleaned packages if the actual items are unavailable. The "Foods, Condiments, and Supplies Descriptions" list also has mock prices and serving sizes, if needed.

Situate students in groups of three to four. Distribute two sheets of chart paper, markers and a meter stick to each group.

Distribute two activity/recording sheets to each student. Each group will be assigned two items from the list on which to work; for example: hot dogs and bottle of ketchup.

Note:
The following concepts will be covered during this lesson: *proportion*, *fractions*, *ratio* and *estimation*. Students may need to review the concepts prior to beginning the activities.

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

INTRODUCTORY ACTIVITY: SETTING THE STAGE
1. Tell students that today they are going to prepare for the "Grand Opening" of a student-run snack bar for their school. Say, "Listen closely to the video as Mrs. Garcia explains what we are going to do today." **Play** the video *Math Can Take You Places* video #005 "Patterns" from the beginning. **Pause** after the blue chart graphic leaves the screen and before Chef Koval begins speaking.
2. Ask students to brainstorm some ideas on what information they will need to know before they buy the food for the snack bar. Then, ask the following questions:

a. Why do you think we should open our snack bar with a limited number of items on the menu versus a large variety of items on the menu?
b. Why do you think that it is important to have an estimate of the amount of food, condiments and supplies before you open the snack bar?
c. What information would be helpful in determining an estimate of the amount of food, condiments and supplies that will be needed to open the snack bar?
d. What information will help your group determine whether you should expand the number of items sold at the snack bar?

4. Students are responsible for ordering the food, condiments and supplies. The snack bar will open for business with limited items on the menu: hot dogs, drinks and various snacks. Their group is responsible for creating a purchase order for the food, condiments and supplies and presenting that information to the class. Students will organize and make projections for growth and the addition of new items to the menu.

5. Each group will create a name for the snack bar, then report to the class how it solved this problem. Additional time for this problem/lesson can be given if students are asked to create a PowerPoint presentation, spreadsheet or extended presentation.

LEARNING ACTIVITIES

1. Work with your group to complete the purchase order for the "Grand Opening" of the school snack bar (on chart paper).

2. Write the ratios, as fractions, for the number of servings (food item, the condiments and the supplies) per package. Have students locate the suggested serving size on each of the condiments. It is important to remember that the package or serving size will vary for each item purchased.

Example: There are eight servings in one package of hot dog buns, so the ratio is 8:1.

3. Using the ratio for each item (food, condiments or supplies) complete each table that shows an estimate of the number of packages (bottles of mustard) of each item needed and the number of servings. Using the cost of each item, find the total cost for purchasing each item for the number of servings given.

Example: The hot dog buns are sold eight to one package, and let's say one package of buns costs $1.50.

Number of Servings	Process to find estimate (based on ratio)	Number of pkgs. or containers	Process to find the total cost	Total cost (dollars)
8	8:1	1	1 * 1.50	1.50
n				$t =$

4. Write an equation that describes the estimated number of packages of each item. In this equation, which quantity causes the other quantity to change? Explain your reasoning.

5. Write an equation that describes the cost of the items to be purchased. In this equation, which quantity causes the other quantity to change? How is this different from

the situation in Question 3?

6. Explain the effect that the number of servings has on the total cost. Write an equation for each item that shows how you find the total cost given the number of servings.

CULMINATING ACTIVITY Each group will use the information from Question 6 to write up its part of the purchase order for the two items that were assigned to the group. If two groups that were assigned the same items do not have the same solutions, the class must come to consensus about ordering the items. The class will combine the information of all the items to write one class purchase order.

CROSS-CURRICULAR EXTENSIONS Health/Science
  Students will investigate nutritional information about the food that will be sold in the snack bar. Have students make modifications to the menu to reflect a nutritionally-balanced menu.

Consumer Awareness
  Have students do comparison shopping using newspaper/grocery store fliers.

REAL-WORLD CONNECTIONS Ask a restaurant manager or chef to visit the class and share how he/she uses mathematics in his/her profession. Have students write a proposal for a fund-raiser that includes information related to the lesson. Have students set a sales goal and discuss how they would decide on a selling price in order to reach that sales goal.

ASSESSMENT Look for the following evidence in the students' work:
1. Students should demonstrate an understanding of using ratios to describe a proportional situation and use that information to solve a real-life problem.
2. Students should be able to write an equation using a variable as an unknown that describes the problem situation.
3. The student should be able to effectively communicate his/her ideas about the problem situation.

STUDENT HANDOUTS Snack Bar Activity Sheet
The Snack Bar Data Sheets
Foods, Condiments, and Supplies Sheet (optional)

The Snack Bar

1. Locate the serving or package size on each item. Write the ratio of serving or package size as a fraction.

2. Using the ratio for each item (food, condiments or supplies), complete the table that shows an estimate of the number of packages (bottles, etc.) of each item needed.

3. The unit cost of the item is _____ per _____.
   Using the unit cost of each item, find the total cost for purchasing each item for the number of servings given.

4. Write an equation that describes the estimated number of packages of each item. In this equation, which quantity causes the other quantity to change? Explain your reasoning.

5. Write an equation that describes the cost of the items to be purchased. In this equation, which quantity causes the other quantity to change? How is this different from the situation in Question 3?

6. Explain the effect that the number of servings has on the total cost. Write an equation for each item that shows how to find the total cost, given the number of servings.

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Data Sheet: Hotdogs and Buns

Hotdogs: Cost per package_____
Servings per package_____
Ratio of servings in one package_____

Number of Packages	Number of Servings per Package	Number of People Serving	Total Cost of the Packages
1		5	
		40	
		120	
		560	
		Any number of people (n)	C =

Buns: Cost per package_____
Servings per package_____
Ratio of servings in one package_____

Number of Packages	Number of Servings per Package	Number of People Serving	Total Cost of the Packages
1			
		40	
		120	
		560	
		Any number of people (n)	C =

Data Sheet: Drinks/Cups/Plates

Drinks: Cost per container_____

Servings per package_____

Ratio of servings in one package_____

Number of Containers	Number of Servings per Container	Number of People Serving	Total Cost of the Containers
1			
		40	
		120	
		560	
		Any number of people (n)	C =

Cups: Cost per package_____

Servings per package_____

Ratio of servings in one package_____

Number of Packages	Number of Servings per Package	Number of People Serving	Total Cost of the Packages
1			
		40	
		120	
		560	
		Any number of people (n)	C =

Plates: Cost per package_____

Servings per package_____

Ratio of servings in one package_____

Number of Packages	Number of Servings per Package	Number of People Serving	Total Cost of the Packages
1			
		40	
		120	
		560	
		Any number of people (n)	C =

Data Sheet: Ketchup and Relish

Ketchup: Cost per bottle_____
Servings per package_____
Ratio of servings in one package_____

Number of Bottles	Number of Servings per Bottle	Number of People Serving	Total Cost of the Bottles
1			
		40	
		120	
		560	
		Any number of people (n)	C =

Relish: Cost per jar_____
Servings per package_____
Ratio of servings in one package_____

Number of Jars	Number of Servings per Jar	Number of People Serving	Total Cost of the Jars
1			
		40	
		120	
		560	
		Any number of people (n)	C =

Data Sheet: Cookies

Cookies #1: Cost per package_____
Servings per package_____
Ratio of servings in one package_____

Number of Packages	Number of Servings per Package	Number of People Serving	Total Cost of the Packages
1			
		40	
		120	
		560	
		Any number of people (n)	C =

Cookies #2: Cost per package_____
Servings per package_____
Ratio of servings in one package_____

Number of Packages	Number of Servings per Package	Number of People Serving	Total Cost of the Packages
1			
		40	
		120	
		560	
		Any number of people (n)	C =

The Snack Bar
Food, Condiments, and Supplies Descriptions

Item	Cost	Servings Per Package
Hot Dogs	$2.00	10
Buns	$1.68	8
Juice	$1.92	6
Cups	$1.87	50
Plates	$.94	40
Ketchup	$.92	23
Relish	$1.22	22
Cookies #1	$2.46	8
Cookies #2	$1.50	30

Purchase Order

Item	Quantity	Unit Cost	Total Cost
Hot dogs/franks			
Hot dog buns			
Bottles of ketchup			
Bottles of mustard			
Relish			
2-liter bottles of soft drinks			
Cups			
Napkins			
Snacks			
Total Order			

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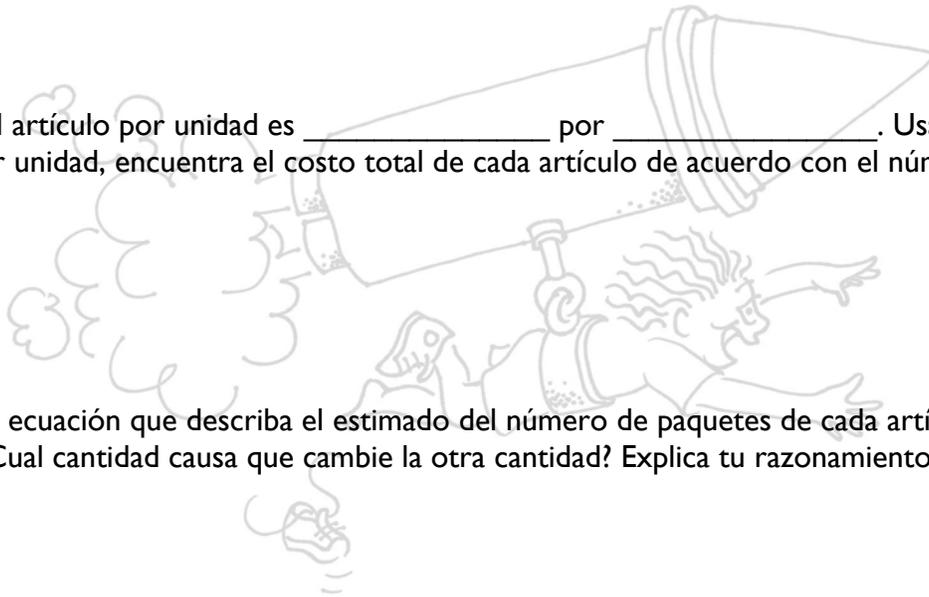**Te Lleva a Muchos Lugares**

LECCIÓN 16
"El Kiosco de Meriendas"
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El Kiosco de Meriendas

1. Encuentra la porción o el tamaño del paquete de cada artículo. Escribe la razón de la porción ó el tamaño del paquete como una fracción.

2. Usando la razón para cada artículo (comida, condimentos u otros elementos necesarios), completa la tabla que muestra un estimado del número de paquetes (botellas, etc.) de cada artículo que se necesita.

3. El costo del artículo por unidad es _____ por _____. Usando el costo del artículo por unidad, encuentra el costo total de cada artículo de acuerdo con el número de porciones dadas.

4. Escribe una ecuación que describa el estimado del número de paquetes de cada artículo. En esta ecuación ¿Cual cantidad causa que cambie la otra cantidad? Explica tu razonamiento.

5. Escribe una ecuación que describa el costo de los artículos para comprar. En esta ecuación ¿Cual cantidad causa el que la otra cantidad cambie? ¿Cómo se diferencia esta situación a la de la situación en la Pregunta 3?

6. Explica el efecto que el número de porciones tiene en el costo total. Escribe una ecuación para cada artículo que muestra cómo encontrar el costo total, de acuerdo al número de porciones.

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Orden de Compra

Artículo	Cantidad	Costo por Unidad	Costo Total
Salchichas/franks			
Pan para salchichas			
Botellas de ketchup			
Botellas de mostaza			
Condimento			
Refrescos en botellas de 2- litros			
Vasos			
Servilletas			
Bocadillos			
Total de la orden			