

# Eating Up the Lunchroom Budget

## *A Solidify Understanding Task*



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In *Cafeteria Consumption and Costs* you created a matrix to represent the number of food items Elvira planned to order this year for the soccer team and drama club celebrations. Your matrix probably looked something like this: (Note: labels have been added to keep track of the meaning of the rows and columns)

$$\begin{array}{l}
 \text{chips} \quad \text{cookies} \quad \text{drinks} \\
 \text{Soccer} \quad \begin{bmatrix} 8 & 7 & 4 \end{bmatrix} \\
 \text{Drama} \quad \begin{bmatrix} 10 & 4 & 4 \end{bmatrix}
 \end{array}$$

You were also given information about the cost of purchasing each food item at two different stores, *Mainstreet Market* and *Grandpa's Grocery*. That information could also be represented in a matrix like this:

$$\begin{array}{l}
 \text{Mainstreet Market} \quad \text{Grandpa's Grocery} \\
 \text{Cost per package of chips} \quad \begin{bmatrix} 2.50 & 2.00 \end{bmatrix} \\
 \text{Cost per dozen cookies} \quad \begin{bmatrix} 3.00 & 4.00 \end{bmatrix} \\
 \text{Cost per gallon of drink} \quad \begin{bmatrix} 2.00 & 1.50 \end{bmatrix}
 \end{array}$$

In question 4 of the previous task you were asked to determine how much each event would cost if all of the food for the event was purchased at *Mainstreet Market* or *Grandpa's Grocery*. These total amounts could be recorded in a matrix that looks like this:

$$\begin{array}{l}
 \text{Mainstreet Market} \quad \text{Grandpa's Grocery} \\
 \text{Soccer} \quad \begin{bmatrix} a & b \end{bmatrix} \\
 \text{Drama} \quad \begin{bmatrix} c & d \end{bmatrix}
 \end{array}$$

1. Calculate the values of  $a$ ,  $b$ ,  $c$ , and  $d$  in the matrix above.
2. Explain, in detail, how you would use the numbers in the first two matrices above to obtain the values for the third matrix.



3. In addition to the soccer team and drama club, Elvira plans to host events for the chess club, the cheerleaders and the football team. She gives you the following matrix to represent food items that need to be ordered for each of the events. Can you use matrix multiplication with the cost matrix given above to determine the total cost of each event if items are purchased at each store? If yes, show how. If no, explain why not.

	<i>chips</i>	<i>cookies</i>	<i>drinks</i>
<i>Soccer</i>	8	7	4
<i>Drama</i>	10	4	4
<i>Chess</i>	3	4	2
<i>Cheerleaders</i>	2	3	2
<i>Football</i>	14	12	8

4. In addition to chips, cookies and drinks, Elvira plans to add rolls and cold cuts to the events' menu. She gives you the following matrix to represent all of the food items that need to be ordered for each of the events. Can you use matrix multiplication with the cost matrix given above to determine the total cost of each event if items are purchased at each store? If yes, show how. If no, explain why not.

	<i>chips</i>	<i>cookies</i>	<i>drinks</i>	<i>rolls</i>	<i>cold cuts</i>
<i>Soccer</i>	8	7	4	6	4
<i>Drama</i>	10	4	4	8	5
<i>Chess</i>	3	4	2	2	2
<i>Cheerleaders</i>	2	3	2	2	2
<i>Football</i>	14	12	8	12	10

