

Algebra Activity 4: Problem Solving and Matrices

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CALCULATORS: Casio: *fx-9750G Plus* • Casio: *CFX-9850G Series*

Teaching Notes/Lesson Plan Level: Algebra 1

Objective

The students will be able to add matrices and store them in a new matrix, perform scalar multiplication to a matrix, move the columns of the matrix into separate lists, and answer questions involving the results.

Engage

Discuss with students how a matrix can be used to represent data for a company in terms of inventory, hours spent on projects, and other various areas of business. Discuss how being able to put the information into a list helps in finding statistical data.

Explore

1. Using the calculator, model how to set up and enter data into matrices.
2. Demonstrate how to perform scalar operations on the matrices.
3. Demonstrate how to move the columns of data from the matrix into lists so that it can be analyzed.

Explain

Students will enter the data into matrices and manipulate the information in order to answer the given questions.

Elaborate

Students will be able to expand the use of data in matrices to other functions such as finding equations of lines and graphing the results of statistical data.

Evaluate

The student will be able to enter the given data into the matrices and answer the given questions.

Extension

1. Have the students find the equation of the line for a given column of data.
2. Have students discuss other areas outside of business in which matrices could be used.

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Student Worksheet Activity 4

Objectives

Given three separate tables of data, the students will put the information into matrices, add the three matrices together, perform scalar multiplication on the resulting matrix, and answer questions using the resulting matrix.

Introduction

A matrix is a rectangular array (organization) of numbers that can be used as a means of organizing data into a usable table. It can be used to compare hours spent on different aspects of work, find the value of items in an inventory, and solve linear programming problems.

In this activity, you will work with matrices to determine the average hours worked on several projects, the cost for those projects, and answer questions relating to the results.

Materials

a. Table Showing Time in Minutes to Cook 500 Cookies:

Factory 1			
	Cookies A	Cookies B	Cookies C
Mix	28	32	24
Cook	27	34	28
Wrap	10	12	9

Factory 2			
	Cookies A	Cookies B	Cookies C
Mix	32	26	30
Cook	27	32	29
Wrap	9	13	10

b. Graphing Calculator

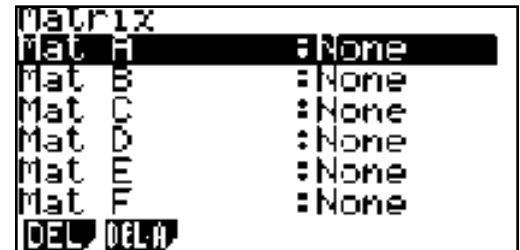
Algebra Activity 4: Problem Solving and MatricesCALCULATORS: Casio: *fx-9750G Plus* • Casio: *CFX-9850G Series***Student Worksheet Activity 4 (continued)****Problems**

1. A bakery has two factories that produce cookies. The tables shown above give the time in minutes for mixing, cooking, and wrapping 500 cookies for each machine. Enter the information for Factory A into Matrix A and information for Factory B into Matrix B. Add Matrix A and Matrix B and multiply the results by .5, then store the result in Matrix C. This will be the average for each machine to prepare their type of cookie.
 - a. What is the average time for mixing the cookie A? _____
Cookie B? _____
 - b. Which cookie, on the average, takes the longest to cook? _____
To mix? _____
To wrap? _____

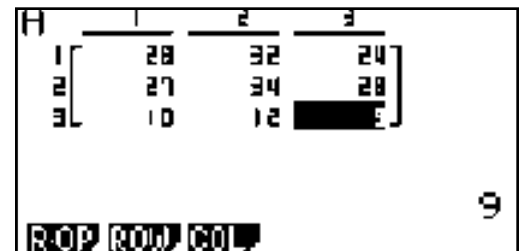
2. Enter the columns of Matrix C into List 1, List 2, and List 3 respectively. Find the sum of each list.
 - a. What is the total time it takes to make Cookie A? _____
Cookie B? _____
Cookie C? _____
 - b. How many hours does it take to make a single batch of each cookie?
Cookie A? _____
Cookie B? _____
Cookie C? _____
 - c. If the machines run for 8 hours each day, calculate how many of each cookie can be made during a single day.
Cookie A? _____
Cookie B? _____
Cookie C? _____

Calculator Notes for Activity 4: Problem Solving and Matrices

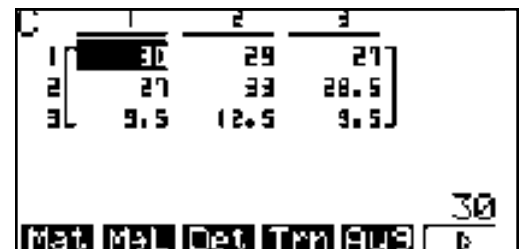
1. Turn on the calculator, go to the MAT Menu and press **EXE**. The screen should look like the one on the right.



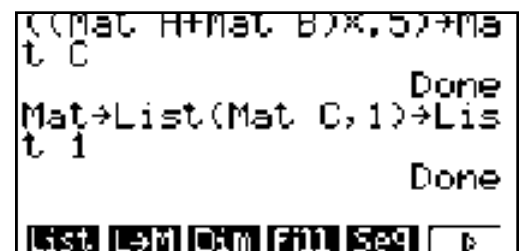
2. Press the **Right Arrow** key. Enter **3 EXE 3**. The screen should be ready for you to enter the first matrix into the calculator. Enter each element as indicated and press **EXE** after each one. The screen should look like the one on the right. Press **EXIT Down Arrow Right Arrow 3 EXE 3** and **EXE** and enter the second matrix the same way. Press **Menu** to get back to the main screen.



3. Highlight **RUN** and press **EXE**. To find the average of two items, you add them together and divide by 2. Enter **((OPTN F2 F1 ALPHA A + F1 ALPHA B) x 0.5) → F1 ALPHA C** and **EXE**. The screen should look like the one on the right. This shows the sum of the two matrices divided by two (multiplied by .5).



4. To enter a column of a matrix into a List, press **F2 F1 ALPHA C , 1) → EXIT F1 F1 1 EXE**. The screen should look like the one on the right. Press **EXIT** and **F2**. Repeat for List 2 by entering the same line but entering the number 2 for 1. Repeat for List 3 by entering the same line but entering the number 3 for 1.



5. Press **AC/on F1 F6 F6 F1 F6 F 1 EXE** to get the sum of List 1. The screen should look like the one on the right. Repeat the sequence to find the sum of List 2 and List 3.

