

“Let’s Get Organized!”

Objective:

By the end of the activity, the students will be able to:

- Understand and organize real world data as a matrix.
- Add and subtract matrices to analyze data.

Materials:

- Math notebook

Teacher Preparation:

- Provide copies access to various basketball statistics.

South Carolina College- and Career-Ready Standards for Mathematics:

8.DSP.5 Organize data in matrices with rational numbers and apply to real-world and mathematical situations.

Introduction:

Allow the students to look at a basketball statistics sheet.

Question(s):

Does the information appear to be organized or disorganized? Justify your answer.

Organizing Data into a Matrix:

A **matrix** is a rectangular arrangement of numbers in rows and columns. Each individual number is called an **entry**, **element**, or **cell**. The rows and columns describe the matrix. When describing the matrix, the number of rows must precede the number of columns.

$$\text{Matrix Y: } \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$$

Matrix Y has 3 rows and 2 columns. Therefore, it is a 3 x 2 (pronounced “3 by 2”) matrix.

$$\text{Matrix Z: } \begin{bmatrix} 7 & 8 & 9 \\ 10 & 11 & 12 \end{bmatrix}$$

Matrix Z has 2 rows and 3 columns. Therefore, it is a 2 x 3 (pronounced “2 by 3”) matrix.

You can use a table to make a matrix.

Table A

University of South Carolina Basketball (All Games)		
	Women	Men
Total Free Throws	547	603
Total Free Throw Attempts	820	883

Matrix A

$$\begin{array}{c} \text{ft} \\ \text{fta} \end{array} \begin{array}{cc} \text{W} & \text{M} \\ \left[\begin{array}{cc} 547 & 603 \\ 820 & 883 \end{array} \right] \end{array}$$

Question(s):

- Based on the transformation from Table A to Matrix A, what are some benefits of using matrices?
- From the information, what can you conclude about Woman vs. Men free throws and attempted free throws?

Adding and Subtracting Matrices:

You can only add or subtract two matrices if they have the same **dimensions** (number of rows and columns). When performing the operations, always use corresponding entries. For example:

$$\text{Matrix X: } \begin{bmatrix} 14 & 15 & 16 \\ 17 & 18 & 19 \end{bmatrix} \quad \text{Matrix Y: } \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix} \quad \text{Matrix Z: } \begin{bmatrix} 7 & 8 & 9 \\ 10 & 11 & 12 \end{bmatrix}$$

Question(s):

- Which of the matrices above can be combined through addition or multiplication? Justify your answer.

Teacher Model:

Matrix X - Matrix Z

Add the corresponding entries.

$$\begin{bmatrix} 14 & 15 & 16 \\ 17 & 18 & 19 \end{bmatrix} - \begin{bmatrix} 7 & 8 & 9 \\ 10 & 11 & 12 \end{bmatrix} = \begin{bmatrix} 14-7 & 15-8 & 16-9 \\ 17-10 & 18-11 & 19-12 \end{bmatrix} = \begin{bmatrix} 7 & 7 & 7 \\ 7 & 7 & 7 \end{bmatrix}$$

Guided Practice:

Matrix X + Matrix Z

Add the corresponding entries.

$$\begin{bmatrix} 14 & 15 & 16 \\ 17 & 18 & 19 \end{bmatrix} + \begin{bmatrix} 7 & 8 & 9 \\ 10 & 11 & 12 \end{bmatrix} = \begin{bmatrix} 14+7 & 15+8 & 16+9 \\ 17+10 & 18+11 & 19+12 \end{bmatrix} = \begin{bmatrix} 21 & 23 & 25 \\ 27 & 29 & 31 \end{bmatrix}$$

Activity:

- Have the students create a matrix based on the number of wins and loses for **conferences** in comparison to **all** games.

University of South Carolina Basketball (Conference Games)		
	Men	Women
Wins	16	11
Loses	0	7

University of South Carolina Basketball (All Games)		
	Men	Women
Wins	25	33
Loses	9	1

- 1st Matrix: Rows will represent the total number of wins and loses during the **all** games. Columns will represent the Men and Women.
- 2nd Matrix: Rows will represent the total number of wins and loses during the **conference** games. Columns will represent the Men and Women.
- The students will need to subtract the **conference** games matrix from the **all** games matrix. Have the students discuss what their results mean for the Women and Men basketball teams.

Extensions:

- The students can gather additional statistics from different statistical sheets. They can choose what data to rewrite as a matrix, compare, and draw conclusions from their results. (Make sure the students' rows and columns display the same information.)