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Course/Subject: Algebra 2

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Grade Level 11

**Performance Standard Focus:** To analyze situations using algebraic symbols and use models to understand relationships.

**Lesson Objective:** Students will learn how to perform the basic matrix operations by adding or subtracting matrices and multiplying a matrix by a scalar.

**Warm Up:** (5 minutes) let's do the warm up problems on the board on page 187 in your book, and your take home quiz is due today.

**Topic/Time/Initiation:** 10 minutes: Before you performed operations with real numbers. Now you will perform operations with matrices. So that you can organize sports data as in Ex. 34.

**PROCEDURE:** Please write these terms down in your notebook or on a piece of paper. You must remember them and they are quite different. A **matrix** is a rectangular arrangement of numbers in rows and columns. For example, matrix A shown on page 187 has two rows and three columns. The **dimensions** of a matrix with m rows and n columns are  $m \times n$ ; (read "m by n"). So, the dimensions of matrix A are  $2 \times 3$ . The numbers in a matrix are its **elements**.

Two matrices are **equal** if their dimensions are the same and the elements in corresponding positions are equal. Let us look at **the key concept**. Adding and Subtracting Matrices. To add or subtract two matrices, simply add or subtract elements in corresponding positions. You can add or subtract matrices only if they have the same dimensions.

Let us look at Example 1. Please note that to avoid errors, be sure to verify that the dimensions of two matrices are equal before adding or subtracting them. Let us look at Example 1. And let us do the guided practice.

In **scalar multiplication**-in matrix algebra, a real number is often called a scalar. To multiply a matrix by a scalar, you multiply each element in the matrix by the scalar. This process is called **scalar multiplication**. Please note that the order of operations for matrix expressions is similar to that for real numbers. In particular, you perform scalar multiplication before matrix addition and subtraction.

Let us look at Example 2 and let us do the guided practice. **For matrix properties:** many of the properties you have used with real numbers can be applied to matrices as well. So the **concept summary** is as follows:

**Properties of Matrix Operations:** Let A, B, and C be matrices with the same dimensions and let k be a scalar.

Associative Property of addition:  $(A + B) + C = A + (B + C)$

Commutative Property of addition:  $A + B = B + A$ .

Distributive Property of Addition  $k(A + B) = kA + kB$ .

Distributive Property of Subtraction:  $k(A - B) = kA - kB$ .

**Organizing data:** Matrices are useful for organizing data and for performing the same operations on large numbers of data values.

Let us look at Example 3. You can also evaluate  $\frac{1}{2}(A + B)$  by first using the distributive property to rewrite the expression as  $\frac{1}{2}A + \frac{1}{2}B$ .

**Solving Matrix Equations:** You can use what you know about matrix operations and matrix equality to solve an equation involving matrices.

Let us look at Example 4. And let us do the guided practice.

**CLOSURE:** In closing this lesson, student did learn how to perform the basic matrix operations. To add or subtract matrices, the matrices must have the same dimensions. You can multiply each element of a matrix by a real number called a scalar. To add or subtract matrices, you add or subtract corresponding elements or matrices with the same dimensions. To perform scalar multiplication, you multiply each element of a matrix by the scalar.

**ASSESSMENT/HOMEWORK: PAGES 190-192, #s 1-31 odd.**

**RESOURCES/MATERIALS AND EQUIPMENT:** Power point software, Algebra 1 book.