Algebra 2A Notes Name: _____

12-1 Adding and Subtracting Matrices

Date: _____ Hr: _____

Objectives: To add and subtract matrices and to solve matrix equations

Common Core Content Standards:

N.VM.8 Add, subtract, and multiply matrices of appropriate dimensions.

N.VM.10 Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 ...

A _____ is a rectangular array of numbers.

The _____ of a matrix are the numbers of rows and columns.

Each number in a matrix is an _____. In matrix A, a_{12} is the element in row 1 and column 2.

You can add or subtract two matrices with equal dimensions by adding or subtracting their _____ elements.

Take Note

Key Concept Matrix Addition and Subtraction

To add matrices A and B with the same dimensions, add corresponding elements. Similarly, to subtract matrices A and B with the same dimensions, subtract corresponding elements.

$$A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \qquad B = \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix}$$

$$A + B = \begin{bmatrix} a_{11} + b_{11} & a_{12} + b_{12} \\ a_{21} + b_{21} & a_{22} + b_{22} \end{bmatrix} \qquad A - B = \begin{bmatrix} a_{11} - b_{11} & a_{12} - b_{12} \\ a_{21} - b_{21} & a_{22} - b_{22} \end{bmatrix}$$

Example 1: Adding and Subtracting Matrices

$Given\ A = \begin{bmatrix} -9 & -3 \\ 9 & 0 \\ 4 & 3 \end{bmatrix}\ and\ B = \begin{bmatrix} -7 & -2 \\ 4 & 6 \\ 9 & -3 \end{bmatrix},\ what\ are\ a.)\ A + B\ and\ b.)\ A - B?$

A _____ is an equation in which the variable is a matrix. You can use one to solve the problem below.

Example 2: Solving a Matrix Equation

The tables show the number of hours two math students spent on homework in Math and Science classes.

Fall Semester Hours

	Math	Science
Student A	166	133
Student B	140	120

Fall and Spring Semester Hours

	Math	Science
Student A	300	227
Student B	282	231

Using a matrix equation, determine which student spent more hours on homework in the Spring Semester.

For m x n matrices, the additive identity matrix is the _____ matrix with all elements zero.

The _____ or _____ of an m x n matrix A is –A where each element is the opposite of the corresponding element of A.

Example 3: Using Identity and Opposite Matrices

What are the following sums?

a. $\begin{bmatrix} 3 & 2 \\ -4 & 5 \end{bmatrix} + \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

b. $[-6 \quad 7 \quad 0] + [6 \quad -7 \quad 0]$

TAKE NOTE

Properties Properties of Matrix Addition

If A, B, and C are $m \times n$ matrices, then

Example	Property
$A + B$ is an $m \times n$ matrix	Closure Property of Addition
$A + B = B + A$	Commutative Property of Addition
$(A + B) + C = A + (B + C)$	Associative Property of Addition
There is a unique $m \times n$ matrix O such that $O + A = A + O = A$	Additive Identity Property
For each A, there is a unique opposite, $-A$, such that $A + (-A) = O$	Additive Inverse Property

_____ matrices have the same dimensions and equal corresponding elements. You can use algebra to find unknown values in matrix elements.

Example 4: Finding Unknown Matrix Values

What values of x and y make the equation true?

$$\begin{bmatrix} 8 & -2x - 7 \\ 11 & 9 \end{bmatrix} = \begin{bmatrix} 8 & -5 \\ 11 & 3y \end{bmatrix}$$