### Algebra 2

# Lesson 4-2: Adding and Subtracting Matrices Mrs. Snow, Instructor

Plain and simple, matrices are rectangular arrangements of numbers. These numbers may be data or they may be numbers from an equation. Today, matrices are used in many areas of work and research. Some of the many areas include electrical circuits, battery power outputs, and 2-dimensional and 3-dimensional screen images that create realistic movements. In geology matrices are used in seismic surveys. Real world data like banking, profit and loss, movie ticket sales, and on a big level, gross domestic profit! The base element for robot movement is matrices.

## Vocabulary

matrix - rectangular arrangement of numbers in rows and columns

element — each individual number in a matrix is an element

dimensions — describes the number of rows and columns that are the given matrix

ROW X COLUMN - R X C - This tells us how many rows and how many columns. An element

has an address in the form of RC.

2×3 => 2 rows 11 1,2 1,3 Rxc. 3 columns 21 22 2,3

Rules for Matrix Addition/Subtraction:

- 1. To add two matrices, they must have the same dimensions.
- 2. Add corresponding elements together.

3. A number outside the brackets is scalar multiplication treat it as distribution to all elements

# Example

Find the sum or difference 
$$\begin{bmatrix} 2 & -4 & 3 \\ 0 & 1 & 12 \end{bmatrix} + \begin{bmatrix} 0 & 7 & -2 \\ 13 & -1 & 5 \end{bmatrix}$$

$$2\begin{bmatrix} 6 & 5 \\ 10 & 0 \end{bmatrix} - \begin{bmatrix} -4 & 3 \\ 0 & -1 \end{bmatrix}$$

$$= \begin{bmatrix} 16 & 7 \\ 20 & 1 \end{bmatrix}$$

### **Properties of Matrix Addition:**

If A, B, and C are m x n matrices (m rows and n columns) then:

1. A + B is an m x n matrix

Closure Property

2. A + B = B + A

Commutative Property of Addition

3. (A + B) C = A + (B + C)

Associative Property of Addition

There is a unique matrix
 O such that O + A = A + O = A

Additive Property of Addition

5. For each A there exists a unique

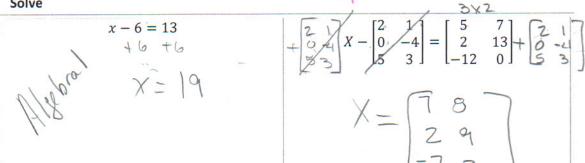
Additive Inverse Property

opposite, - A, A + (-A) = O

## Matrix equations

Matrix equations are solved much like an equation in one variable, only the variable is an Capital letter=>Matrix Name unknown matrix and the numbers are matrices!!

Solve



$$\begin{bmatrix} 2 & 1 \\ 0 & -3 \end{bmatrix} = \begin{bmatrix} 4 & 5 \\ -10 & 2 \end{bmatrix} - X$$

$$-\begin{bmatrix} +2 & +4 \\ -10 & +5 \end{bmatrix} = + \times$$

$$\begin{bmatrix} 2 & 4 \\ -10 & 5 \end{bmatrix} = X$$

$$3 \times 1$$

$$\begin{pmatrix} 6 \\ -8 \\ -8 \end{pmatrix} = \begin{bmatrix} 7 \\ -5 \\ -1 \end{bmatrix} - \begin{bmatrix} -1 \\ 3 \\ 5 \end{bmatrix}$$

$$\begin{pmatrix} 1 \\ 2 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 7 \\ -5 \\ -1 \end{bmatrix} - \begin{bmatrix} -1 \\ 3 \\ -5 \end{bmatrix}$$

$$\begin{pmatrix} 1 \\ 2 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 6 \\ -8 \\ -6 \end{bmatrix} \begin{pmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$$

$$\left\langle -\begin{bmatrix} 3 \\ -4 \\ -3 \end{bmatrix} \right|$$

Finding the value of a variable

$$\begin{bmatrix} a & 2b \\ c-2 & d+3 \end{bmatrix} = \begin{bmatrix} 5 & -7 \\ 10 & 10 \end{bmatrix}$$

$$a = 5 \qquad 2b = 7 \qquad c-2 = 10 \qquad d+3 = 10^{-3}$$

$$b = -7 \qquad c = 12 \qquad d = 7$$

$$\begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix} + \begin{bmatrix} 2 & -13 \\ -10 & -10 \end{bmatrix} = \begin{bmatrix} 2x+1 & -4x \\ 5z & 2.5z-x \end{bmatrix} \qquad 8+3 = 22x 
2.5z-x 
$$\begin{bmatrix} 7 & -12 \\ -10 & -9 \end{bmatrix} = \begin{bmatrix} 2x+1 & -4x \\ 5z & 2.5z-x \end{bmatrix} \qquad 8+3 = 22x 
111 = 22x (1/2) 
22 = x = 1 
21 = x = 1 
22 = x = 1 
23 = x = 2 
24 = 22 
25 = -10/5 
3=x 
2 = -2$$$$

