NOTES: SECONDARY 2 HONORS

UNIT 6 – MATRICES

STARTER

1. What are three goals you have for this quarter? (in this class)	2. Solve for x and y. $\begin{bmatrix} 4x \\ 5 \end{bmatrix} = \begin{bmatrix} 15+x \\ 2y-1 \end{bmatrix}$ $4x=15+x$ $3x=15$ $x=5$ $5=2y-1$ $6=2y$ $y=3$

DESCRIBE how you would find your seat in a stadium when you go to a sports game or a concert. Don't forget to write your response in complete sentences.☺

WHAT IS A MATRIX? A matrix is a rectangular array of numbers. Matrices are named using capital letters.

Example: $A=\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

The **dimensions** of a matrix are the number of rows and number of columns in the matrix.

Example: Write the dimensions of the following matrices.

$A=\begin{bmatrix} 2 & 0 & 7 \\ -4 & 5 & 1 \end{bmatrix}$ 2x3 $\qquad B=\begin{bmatrix} 2 \\ -3 \\ 4 \\ 12 \end{bmatrix}$ 4x1

The numbers inside a matrix are called entries or elements. Two matrices are equal if and only if they have identical dimensions and all corresponding entries are equal.

ADDING AND SUBTRACTING MATRICES

It is only possible to add or subtract two matrices, they have identical dimensions. To find the sum, add corresponding entries. To find the difference, subtract the corresponding entries.

Example 1: Given $A=\begin{bmatrix} 2 & 0 & 7 \\ -4 & 5 & 1 \end{bmatrix}$, $B=\begin{bmatrix} 3 & 7 & 9 \\ 6 & -4 & 10 \end{bmatrix}$, $C=\begin{bmatrix} -6 & 8 & -2 \end{bmatrix}$.

a. Find $A+B$ $\begin{bmatrix} 5 & 7 & 16 \\ 2 & 1 & 11 \end{bmatrix}$

b. Find $B-A$ $\begin{bmatrix} 1 & 7 & 2 \\ 10 & -9 & 9 \end{bmatrix}$

c. Find $A+C$ impossible

SCALAR MULTIPLICATION

→ outside of matrix

A scalar is a real number. To multiply a scalar by a matrix, multiply the scalar by every entry in the matrix.

Example:

$$3\begin{bmatrix} 2 & 0 & 7 \\ -4 & 5 & 1 \end{bmatrix} = \begin{bmatrix} 6 & 0 & 21 \\ -12 & 15 & 3 \end{bmatrix}$$

MATRIX MULTIPLICATION

It is only possible to multiply two matrices when the number of columns in the first matrix is equal to the number of rows in the second matrix.

Example:

1. $\begin{bmatrix} 2 & 0 & 7 \\ -4 & 5 & 1 \end{bmatrix} \cdot \begin{bmatrix} 6 & 0 & 21 \\ -12 & 15 & 3 \end{bmatrix} =$ impossible

$2\times3 \cdot 2\times3$

$2\times\boxed{4 \cdot 4}\times1$ → have to be the same.

2. $\begin{bmatrix} 3 & 1 \\ 7 & 2 \end{bmatrix} \cdot \begin{bmatrix} 6 & 0 & 21 \\ -12 & 15 & 3 \end{bmatrix} = \begin{bmatrix} 3\cdot6+1\cdot-12 & 3\cdot0+1\cdot15 & 3\cdot21+1\cdot3 \\ 7\cdot6+2\cdot-12 & 7\cdot0+2\cdot15 & 7\cdot21+2\cdot3 \end{bmatrix}$

$2\times2 \cdot 2\times3$

$= \begin{bmatrix} 6 & 15 & 66 \\ 18 & 30 & 153 \end{bmatrix}$

3. $\begin{bmatrix} 2 & 4 \\ -1 & 3 \end{bmatrix} \cdot \begin{bmatrix} 5 & 1 \\ 2 & -3 \end{bmatrix} = \begin{bmatrix} 2\cdot5+4\cdot2 & 2\cdot1+4\cdot(-3) \\ -1\cdot5+3\cdot2 & -1\cdot1+3\cdot(-3) \end{bmatrix}$

$2\times2 \cdot 2\times2$

$= \begin{bmatrix} 18 & -10 \\ 1 & -10 \end{bmatrix}$