Name: _____ Date: _____ Period: _____

Sec 1H Unit 7 Day 1 - Matrix Operations Classwork

A small toy company has introduced some action figures. The figures below give the number (in thousands) of *male* figures, *female* figures, and *monster* figures shipped to retail stores and the dollar value (in thousands) of those shipments (at suggested list prices).

2012 Number of Figures – *male*: 20; *female*: 15; and *monster*: 24
Dollar Value – *male*: 240; *female*: 180; and *monsters*: 360

2013 Number of Figures – *male*: 24; *female*: 18; and *monster*: 30
Dollar Value – *male*: 288; *female*: 216; and *monsters*: 450

1. Write a matrix for each year. Label 2012 data as Matrix A and label 2013 data as Matrix B.

2. Write a matrix that gives the change in figures shipped and dollar value from 2012 to 2013.

3. Suppose the company projects that the number of units sold in 2014 was *double* the amount shipped in 2012. Use your matrices from part a, to find out how many of each were shipped, and what the dollar value would be for each item in 2014.

4. How do you add or subtract matrices? How do you multiply a matrix by a scalar?

Do the following matrix arithmetic, if possible:

5. $\begin{bmatrix} 2 & 3 \\ 0 & 7 \end{bmatrix} - \begin{bmatrix} 5 & 9 \\ \frac{1}{2} & 4 \end{bmatrix}$

6. $-10\begin{bmatrix} 8.9 & 0 & \frac{1}{2} \\ -1 & \sqrt{37} & 6 \end{bmatrix}$

7. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix} + \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

8. In regular arithmetic, 27 + 0 = 27. We call 0 the "additive identity."
   What matrix would act like the additive identity?

Verify that $\begin{bmatrix} -1 & 4 \\ 6 & -3 \end{bmatrix} + \begin{bmatrix} \quad & \quad \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 6 & -3 \end{bmatrix}$

This matrix is called the "zero matrix."

Verify that $\begin{bmatrix} -1 & 4 & 5 \\ -9 & 0 & 3 \\ 1 & 2 & 8 \end{bmatrix} + \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} = \begin{bmatrix} -1 & 4 & 5 \\ -9 & 0 & 3 \\ 1 & 2 & 8 \end{bmatrix}$

9. In regular arithmetic, when two numbers added together equal 0 (the additive identity), they are called <u>additive inverses</u>. Find the additive inverse of $\begin{bmatrix} -1 & 4 & 5 \\ -9 & 0 & 3 \\ 1 & 2 & 8 \end{bmatrix}$:

Verify that $\begin{bmatrix} -1 & 4 & 5 \\ -9 & 0 & 3 \\ 1 & 2 & 8 \end{bmatrix} + \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

Remember that the dimensions of a matrix are always given as Row x Column.

10. What are the dimensions of this matrix?

M = $\begin{bmatrix} 12 & 7 & 21 & 31 & 11 \\ 45 & -2 & 14 & 27 & 19 \\ -3 & 15 & 36 & 71 & 26 \\ 4 & -13 & 55 & 34 & 15 \end{bmatrix}$

11. What is element $M_{4,2}$?