5.3H Matrix Multiplication   **Name:** _____**Per:** _____

SHOW YOUR WORK. WORK IN PENCIL.

1. Given the matrices: $A = \begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 4 & 0 \\ -2 & -1 \end{bmatrix}$ $C = \begin{bmatrix} 1 & 3 \\ -2 & 6 \end{bmatrix}$

   a. Find AB

   b. Find BA

   c. Does $3(4) = 4(3)$? _____ Does $AB = BA$? _____ Is matrix multiplication is commutative?
       Explain: _____

   d. Find $3(AB)$

   e. Find $(AB)3$

   f. What is the difference between the multiplication of questions a and b and questions d and e?
   g. Find $(AB)C$

   h. Find $A(BC)$

   i. Is matrix multiplication associative?_____ Explain: _____
       _____

   j. Find $A(B + C)$.

   k. Find $AB + AC$

   l. Is matrix multiplication distributive?_____ Explain: _____
       _____

   m. Determine whether the equation is true using the matrices above. $(AB)3 = 3(AB)$.

Complete the following matrix operations:

2. $3\begin{bmatrix} 2 & 5 & 3 \\ 6 & 4 & -2 \\ 1 & 8 & 12 \end{bmatrix} + 4\begin{bmatrix} 1 & 4 & 3 \\ -3 & 6 & 5 \\ 5 & -2 & 3 \end{bmatrix} =$

3. $\frac{1}{2}\begin{bmatrix} 2 & 4 & -8 \\ 6 & 10 & -2 \\ -4 & 8 & 12 \end{bmatrix} - 2\begin{bmatrix} 2 & 5 & -2 \\ 4 & 6 & -7 \\ 10 & -8 & 3 \end{bmatrix} =$

4. Joseph orders 13 pairs of socks, 15 pants, and 7 helmets for the baseball team. He orders an additional 20 helmets for the football team as well as 24 pairs of socks and 45 pairs of pants. Organize all the data in one matrix and label.

5. Joseph can order from East Pond Sports at $3.50 for socks, $35 for pants, and their helmets are on sale for $22. Play it Now only charges $3 for socks, $45.50 for helmets, and $40 for pants. Organize this data into a matrix.

6. Create a total cost matrix using the matrices above so that Jared can compare the cost for the items from the two different stores.

7. Given the matrices below, find the following products (if possible). **If not, possible explain why**.

$A = \begin{bmatrix} -3 & -4 \\ 1 & -1 \\ -4 & -2 \end{bmatrix}$ $B = \begin{bmatrix} -7 & 0 & 0 \\ 3 & 7 & -4 \end{bmatrix}$ $C = \begin{bmatrix} -1 & 4 \\ 6 & -3 \end{bmatrix}$ $D = \begin{bmatrix} -7 & -3 & -6 \\ 5 & 2 & 4 \end{bmatrix}$ $E = \begin{bmatrix} 4 & -4 & 5 \end{bmatrix}$

a. EA
c. AC
e. DA

b. CD
d. AD
f. AB

8. Syrus buys 3 candy bars and 1 fruit roll-ups for $1.79. Chase buys 3 candy bars, but buys 3 more fruit roll-ups than Syrus (because of the nutritional value) and spends $2.84. Write a system of equations. Find the cost of the candy bars and fruit roll-ups using the **elimination method**. SYW.

9. What is the equation of a line that is **perpendicular** to the line that passes through the points (3, 5) and (−5, 9) **AND** goes through the point (2, 7).