Name _____ Date _____

Add, Subtract, and Multiply Matrices - Guided Lesson Explanation

Explanation #1

Step 1) When subtracting matrices, we subtract numbers in the same row and column. We need to find the numbers that are to be subtracted.

Step 2) The missing number is the difference between 7 and 5, which is 2.

$$\begin{bmatrix} \mathbf{7} & 13 \\ 5 & 9 \end{bmatrix} - \begin{bmatrix} \mathbf{5} & 10 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix}$$

Explanation #2

Step 1) We are finding the sum between two matrices. We will add the numbers in the same row and column. We need to find the numbers that are to be added.

Step 2) The missing number is 4 + 4, which is 8.

$$\begin{bmatrix} \mathbf{4} & 2 \\ 6 & 8 \end{bmatrix} + \begin{bmatrix} \mathbf{4} & 12 \\ 3 & 8 \end{bmatrix} = \begin{bmatrix} ? & 14 \\ 9 & 16 \end{bmatrix}$$

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Explanation #3

Multiplication of matrices is a bit more involved than simple sums and differences.

The formula for multiplying matrices is:

$$\begin{bmatrix} a & c \\ b & d \end{bmatrix} \times \begin{bmatrix} \boldsymbol{e} & g \\ f & h \end{bmatrix} = \begin{bmatrix} ae + cf & ag + ch \\ be + df & bg + dh \end{bmatrix}$$

Step 1) To remember how to multiply two matrices, first imagine the two matrices with the second matrix moved up.

$$\begin{bmatrix} 4 & 5 \\ 5 & 4 \end{bmatrix}$$

$$\begin{bmatrix} 4 & 8 \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} ? & 52 \\ 22 & 23 \end{bmatrix}$$

Imagine the product of the two matrices sitting to the right of the first matrix and below the second matrix. The product will have the same number of rows as the first matrix and the same number of columns as the second matrix.

The blank is in row 1, column 1.

Step 2) Using the formula we need to find ae + cf

$$\begin{bmatrix} \mathbf{4} & 5 \\ \mathbf{5} & 4 \end{bmatrix}$$

$$\begin{bmatrix} \mathbf{4} & \mathbf{8} \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} ? & 52 \\ 22 & 23 \end{bmatrix}$$

In this case:

(4 x 4) + (8 x 5)

16 + 40 = 56

It should be written as:

$$\begin{bmatrix} \mathbf{56} & 52 \\ 22 & 23 \end{bmatrix}$$