

Write your questions and thoughts here!

What is a matrix?

A matrix is...

Pizza Delivery Problem:

	Gina's	Vin's	Toni's	Sal's
Pizza	\$12	\$10	\$11	\$13
Drinks	\$1.50	\$1	\$0.50	\$1
Salad	\$4	\$4.50	\$3.50	\$3

The same information can be organized into a matrix:

$$A = \begin{bmatrix} & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \end{bmatrix}$$

Matrix Dimensions:

The dimensions of a matrix are read _____ by _____.

What are the dimensions of the following matrices?

$$\begin{bmatrix} 5 & -9 & 5 & 1 \\ -2 & 7 & -6 & 1 \\ 11 & -15 & 0 & 4 \end{bmatrix}$$

_____ x _____

$$\begin{bmatrix} 1 & -1 \\ x & 5 \end{bmatrix}$$

_____ x _____

$$\begin{bmatrix} 2 & 5 & -1 \\ -5 & 1 & 100 \end{bmatrix}$$

_____ x _____

$$\begin{bmatrix} 5 & -1 \\ 1 & x \\ y & 2 \\ 4 & 5 \end{bmatrix}$$

_____ x _____

**Elements (or entries):**If the following matrix is called matrix A , then $A_{1,2}$ is the element in row 1 column 2.

$$A = \begin{bmatrix} 5 & -9 & 5 & 1 \\ -2 & 7 & -6 & 1 \\ 11 & -15 & 0 & 4 \end{bmatrix}$$

$A_{2,1} =$

$A_{3,2} =$

$A_{1,4} =$

$A_{2,3} =$




12.1 Matrix Operations

Write your questions and thoughts here!

Adding and Subtracting Matrices:

1. To add or subtract two matrices, the dimensions _____.
2. Add (or subtract) the corresponding _____.

Evaluate.

1. $\begin{bmatrix} -3 & 5 \\ 0 & -1 \end{bmatrix} + \begin{bmatrix} 2 & -7 \\ -4 & 9 \end{bmatrix}$ 2. $\begin{bmatrix} -2 \\ 8 \end{bmatrix} - \begin{bmatrix} 3 \\ -5 \end{bmatrix}$  3. $\begin{bmatrix} 4 & -2 \\ 2 & -6 \end{bmatrix} + \begin{bmatrix} 4 \\ -1 \end{bmatrix}$

Multiplying by a scalar:

This is very simple...just _____ the scalar to each element.

Evaluate.

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

Solving for an unknown MATRIX:

6. $\begin{bmatrix} 10 & -2 \\ 4 & 0 \end{bmatrix} + \mathbf{X} = \begin{bmatrix} 6 & -5 \\ -3 & 7 \end{bmatrix}$

Solving for an unknown ELEMENT:

7. $\begin{bmatrix} 7 & \mathbf{y} \\ \mathbf{x} & -6 \end{bmatrix} + \begin{bmatrix} -9 & \mathbf{x} \\ 0 & 2 \end{bmatrix} = \begin{bmatrix} -2 & -6 \\ 4 & -4 \end{bmatrix}$



8. $\begin{bmatrix} -6 & 6 \\ 9 & -6 \end{bmatrix} + \mathbf{X} = \begin{bmatrix} -1 & -4 \\ 6 & 4 \end{bmatrix}$

9. $2 \begin{bmatrix} 4 & -3 \\ -5 & \mathbf{y} \end{bmatrix} + \begin{bmatrix} \mathbf{x} & \mathbf{y} \\ -5 & -6 \end{bmatrix} = \begin{bmatrix} 15 & -5 \\ -15 & -4 \end{bmatrix}$

Now summarize what you learned!

12.1 Practice – Matrix Operations

Name: _____

Algebra 2

Simplify.

1) $[4 \ 5] + [6 \ -4]$

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

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

4) $\begin{bmatrix} -5 \\ 4 \end{bmatrix} - \begin{bmatrix} -4 \\ 2 \end{bmatrix} - \begin{bmatrix} -2 \\ 1 \end{bmatrix}$

5) $[3 \ -3] + 5[2 \ -5]$

6) $\begin{bmatrix} -6 \\ -4 \\ -2 \end{bmatrix} - \begin{bmatrix} 6 \\ 5 \\ 4 \end{bmatrix} - \begin{bmatrix} 2 \\ -1 \\ -2 \end{bmatrix}$

7) $2 \begin{bmatrix} 4 & 4 \\ 1 & 4 \\ -6 & 3 \end{bmatrix} - \begin{bmatrix} -1 & -3 \\ -5 & 0 \\ 5 & -6 \end{bmatrix}$

8) $-3 \left(\begin{bmatrix} -1 \\ -4 \\ 5 \end{bmatrix} + \begin{bmatrix} 5 \\ -6 \\ -2 \end{bmatrix} \right)$

9) $\begin{bmatrix} 10 \\ -2 \\ 5 \end{bmatrix} + \begin{bmatrix} -5 \\ 2 \\ 3 \end{bmatrix} - \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

Solve the matrix equation.

10) $4C + [0 \ -9 \ -4] = [20 \ -1 \ 20]$

11) $\begin{bmatrix} -7 \\ 1 \\ -14 \end{bmatrix} = X + \begin{bmatrix} 3 \\ -1 \\ -8 \end{bmatrix}$

Solve for x and y .

12) $\begin{bmatrix} -10 & -4 \\ x & -1 \end{bmatrix} + \begin{bmatrix} -5 & 8 \\ y & -10 \end{bmatrix} = \begin{bmatrix} -15 & x \\ 16 & -11 \end{bmatrix}$

13) $2 \begin{bmatrix} 1 & -8 \\ 6 & y \end{bmatrix} - x \begin{bmatrix} 3 & 1 \\ 7 & -2 \end{bmatrix} = \begin{bmatrix} -4 & -18 \\ -2 & -6 \end{bmatrix}$

14) $x \begin{bmatrix} -5 & 3 \\ y & 3 \end{bmatrix} - \begin{bmatrix} -2 & 4 \\ x & -1 \end{bmatrix} = \begin{bmatrix} -13 & 5 \\ -3 & 10 \end{bmatrix}$

15) $\begin{bmatrix} 2 & x \\ y & -1 \end{bmatrix} + \begin{bmatrix} -3 & 2 \\ x & 4 \end{bmatrix} = \begin{bmatrix} -1 & 10 \\ -5 & 3 \end{bmatrix}$

12.1 Application and Extension

- In 1993, Mr. Sullivan participated in several clubs in high school. The math club, the chess club, and the *I Want to Be a Math Teacher and Wear Pocket Protectors* club. He did not play any sports that year, but he practiced all summer and the following year participated in basketball and the sport of building houses with a deck of cards. He still participated in all three clubs from the previous year as well. Create one matrix that organizes this information for 1993 and 1994. Label the rows and columns accordingly.
- The St. Louis Cardinals defeated the Texas Rangers in the 2011 World Series in a thrilling 7-game series. The matrices below show the statistics for runs, hits, and errors for each team in each game.

		Game 1					Game 2					Game 3					Game 4		
		R	H	E			R	H	E			R	H	E			R	H	E
St. Louis	Texas	3	6	0	St. Louis	Texas	1	6	1	St. Louis	Texas	16	15	0	St. Louis	Texas	0	2	0
		2	6	0			2	5	1			7	13	3			4	6	0

		Game 5					Game 6					Game 7		
		R	H	E			R	H	E			R	H	E
St. Louis	Texas	2	7	1	St. Louis	Texas	10	13	3	St. Louis	Texas	6	7	1
		4	9	2			9	15	2			2	6	0

- Write one matrix that gives the total statistics for runs, hits, and errors for the series.
- Which team had the most total runs?
- Which team had the most hits?
- Which team had the most errors?

Algebra Skills

Simplify.

1. 3^2

2. $(5x)^2$

3. $(x + 5)^2$

4. $(2x - 1)^2 + 4$