SOLVING SYSTEMS OF EQUATIONS BY MATRICES

1. On a map of downtown, 12th Street is perpendicular to Avenue J. The equation y = -4x + 3 represents 12th Street. What is the equation representing Avenue J if it passes through the point (8, 16)?
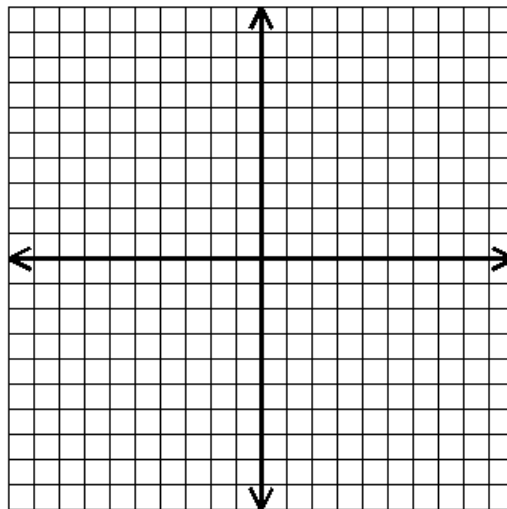
A. y = -4x + 48

B. y = -4x + 14

C. y = $\frac{1}{4}$x + 3

D. y = $\frac{1}{4}$x + 14

Review: Solve the system of equations by graphing.

1) 2x + y = -8
   x − 3y = 3

Solution:_____

We can solve this same system of equations by another method using matrices.

A **matrix** is a rectangular arrangement of numbers in rows and columns.
The number of **rows** (horizontal) and the number of **columns** (vertical) determine the **dimensions** of the matrix. The dimensions of a matrix are always written in **rows X columns**.

What are the dimensions of these matrices?

A. $\begin{bmatrix} 2 & 0 \\ 7 & 15 \\ -3 & 19 \end{bmatrix}$ _____

B. $\begin{bmatrix} 3 & 0 & 9 \\ 0 & -2 & 0 \end{bmatrix}$ _____

C. $\begin{bmatrix} -3 & 3 \\ 8 & -1 \end{bmatrix}$ _____

Systems can be solved using matrices in your calculator using the same mathematical principle used to solve this equation:

$$2x = 14$$

To solve, you can _____ by 2 or _____ by the **_inverse_** of 2, which is _____.

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Calculator Steps to Solving a System of Equations using Matrices:

Step 1: Make sure equations are in standard form (ax + by = c)
Step 2: Press ALPHA F3 (to go to Matrix)
Step 3: Choose row dimension, press ENTER
Step 4: Arrow down and choose column dimension, press ENTER
Step 5: Arrow down to OK, press ENTER
Step 6: Type the numbers into the matrix using the arrow buttons (this is Matrix A)
Step 7: Arrow to the right of the matrix and press x^{-1}
Step 8: Press ALPHA F3 and enter matrix B following Steps 2-6
Step 9: Arrow to the right of the matrix and press ENTER

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Solve each system below using matrices.

2) 2x + y = -8
 x − 3y = 3

$$[x] \qquad [A]^{-1} \qquad [B]$$

$$\begin{bmatrix} \underline{} \\ \underline{} \end{bmatrix} = \begin{bmatrix} \underline{} & \underline{} \\ \underline{} & \underline{} \end{bmatrix}^{-1} \begin{bmatrix} \underline{} \\ \underline{} \end{bmatrix}$$

Solution:_____

3) -x + y = -4
   2x − y = 11

$$\begin{bmatrix} \underline{} \\ \underline{} \end{bmatrix} = \begin{bmatrix} \underline{} & \underline{} \\ \underline{} & \underline{} \end{bmatrix}^{-1} \begin{bmatrix} \underline{} \\ \underline{} \end{bmatrix}$$

Solution:_____

4)   15x − 12y = 13
   30x + 9y = 4

Solution:_____