Find this product without a graphing calculator.

$$\begin{bmatrix} 3 & 2 & -6 \\ 1 & -4 & 7 \end{bmatrix}\begin{bmatrix} -5 & 0 \\ 9 & -2 \\ 10 & -8 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} -57 & 44 \\ 29 & -48 \end{bmatrix}$$

2x3 3x2 2x2

a = Row 1 x Col 1 → $a = -15 + 18 + -60 = -57$

b = Row 1 x Col 2 → $b = 0 - 4 + 48 = 44$

c = Row 2 x Col 1 → $c = -5 - 36 + 70 = 29$

d = Row 2 x Col 2 → $d = 0 + 8 - 56 = -48$

Display the following data in a matrix. Label the rows and columns.

West High School enrollment by grade:
9th: 105 10th: 116 11th: 97 12th: 121

East High School enrollment by grade:
9th: 88 10th: 104 11th: 101 12th: 117

Jefferson High School enrollment by grade:
9th: 130 10th: 129 11th: 118 12th: 135

	WHS	EHS	JHS
9	105	88	130
10	116	104	129
11	97	101	118
12	121	117	135

What are the dimensions of your matrix? 4x3

What element is a_{23}? 129 soph @ JHS

State the location of 12th graders At West HS.

a_{41}

Find the value of each variable

$$\begin{bmatrix} 3 & 2 & -6 \\ 1 & -4 & w-3 \end{bmatrix} - \begin{bmatrix} -10 & x+6 & -4 \\ -8 & 6-z & -1 \end{bmatrix} = \begin{bmatrix} 2y+5 & -3 & 7 \\ -9 & 13 & -6 \end{bmatrix}$$

$w - 3 + 1 = -6$

$w - 2 = -6$

$+2 \quad +2$

$w = -4$

$2 - (x+6) = -3$

$2 - x - 6 = -3$

$-4 - x = -3$

$+4 \quad +4$

$-x = 1 \rightarrow x = -1$

$-4 - (6 - z) = 13$

$-4 - 6 + z = 13$

$-10 + z = 13$

$z = 23$

$3 - -10 = 2y + 5$

$13 = 2y + 5$

$8 = 2y$

$y = 4$

Regardless of dimensions, to solve the following matrix equation:

$$A \cdot X = B$$

You will always find matrix X by doing the following:

$$X = A^{-1} \cdot B$$

Solve this matrix equation.

this is one method

$$3\begin{bmatrix} -5 & 1 \\ 10 & 3 \end{bmatrix} - 4\begin{bmatrix} -2 & 6 \\ -8 & -1 \end{bmatrix} X = \begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix}$$

$3A - 4BX = C$

$-4BX = C - 3A$

$X = (-4B)^{-1}(C - 3A)$

$\begin{bmatrix} 0 & -2 \\ 7 & 4 \end{bmatrix}$

here is another method

DISTRIBUTE SCALARS

$$3\begin{bmatrix} -5 & 1 \\ 10 & 3 \end{bmatrix} - 4\begin{bmatrix} -2 & 6 \\ -8 & -1 \end{bmatrix} X = \begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix}$$

$$\begin{bmatrix} -15 & 3 \\ 30 & 9 \end{bmatrix} + \begin{bmatrix} 8 & -24 \\ 32 & 4 \end{bmatrix} X = \begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix}$$

$A + BX = C$

$BX = C - A$

$X = B^{-1}(C - A) = \begin{bmatrix} 0 & -2 \\ 7 & 4 \end{bmatrix}$

DISTRIBUTE SCALARS

simplify down to just $AX = B$

$$3\begin{bmatrix} -5 & 1 \\ 10 & 3 \end{bmatrix} - 4\begin{bmatrix} -2 & 6 \\ -8 & -1 \end{bmatrix} X = \begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix}$$

$$\begin{bmatrix} -15 & 3 \\ 30 & 9 \end{bmatrix} + \begin{bmatrix} 8 & -24 \\ 32 & 4 \end{bmatrix} X = \begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix}$$

$$\begin{bmatrix} 8 & -24 \\ 32 & 4 \end{bmatrix} X = \begin{bmatrix} -168 & -112 \\ 28 & -48 \end{bmatrix}$$

$AX = B$

$\begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix} - \begin{bmatrix} -15 & 3 \\ 30 & 9 \end{bmatrix}$

$X = A^{-1}B$

$= \begin{bmatrix} 0 & -2 \\ 7 & 4 \end{bmatrix}$

When using matrices to solve a system of equations both equations must be in Standard Form.

When you solve you will always do this:

$$\begin{bmatrix} X \\ Y \end{bmatrix} = A^{-1} \cdot B$$

Solve each system of equations. State solutions as orderd pairs or triples. If using matrices write down the two matrices you used.

$$4x + 9y = 11$$
$$-7x + 11y = 61$$

$$\begin{bmatrix} 4 & 9 \\ -7 & 11 \end{bmatrix} X = \begin{bmatrix} 11 \\ 61 \end{bmatrix}$$

A: 2x2 B: 2x1

$$A^{-1}B = \begin{bmatrix} -4 \\ 3 \end{bmatrix}$$

$(-4, 3)$

Rewrite into standard form

$$y = 4.75x + 16.3 \longrightarrow -4.75x + y = 16.3$$
$$6.1x - 1.08y = -20.126 \longrightarrow 6.1x - 1.08y = -20.126$$

$$\begin{bmatrix} -4.75 & 1 \\ 6.1 & -1.08 \end{bmatrix} X = \begin{bmatrix} 16.3 \\ -20.126 \end{bmatrix}$$

A B

$$A^{-1}B = \begin{bmatrix} -2.6 \\ 3.95 \end{bmatrix}$$

$(-2.6, 3.95)$

$$4a + 9b - c = -65$$
$$0a - 6b + 7c = 83$$
$$8c - 5a + b = 17$$
$$\hookrightarrow -5a + b + 8c = 17$$

$$\begin{bmatrix} 4 & 9 & -1 \\ 0 & -6 & 7 \\ -5 & 1 & 8 \end{bmatrix} X = \begin{bmatrix} -65 \\ 83 \\ 17 \end{bmatrix}$$

3x3 A 3x1 B

$$X = A^{-1}B = \begin{bmatrix} 3 \\ -8 \\ 5 \end{bmatrix}$$

$(3, -8, 5)$