Encoding Worksheet

Use the following table to compose a secret message to your friend. Write the letters of your message on the top line and the corresponding numbers below each letter. Use 27 for any spaces.

| a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10| 11| 12| 13| 14| 15| 16| 17| 18| 19| 20| 21| 22| 23| 24| 25| 26| 27 |

Now take the numbers and, starting in the upper left corner and moving down the column and then to the next column, fill in the 3 x whatever grid with your numerical message. You don't have to use all the columns, but every column you use needs to be full. Add a 27 to any empty blocks (max 2) to finish up the column.

Now choose your encrypting matrix. To encode a 3 x whatever matrix, your matrix needs to be 3 x 3. Check to be sure the matrix you picked is invertible, or no one will be able to decode your note!

Encoding Matrix:
(pick any matrix, as long as it's invertible)

Decoding Inverse:
(checking invertibility - don't give this to your friend!)

Use your calculator to multiply your encoding matrix and your message matrix.

Encoded message:

Now starting in the upper left corner and working down, copy the numbers into a long strip. This is what you will give your partner, along with the encoding matrix (make them find the decoding matrix for themselves!)

(more space, if you need it)
Decoding Worksheet

Name: ____________________________

Encoded Message:

(Encoded message space)

(more space, if you need it)

Encoding Matrix:
(Your friend should give this to you)

Decoding Inverse:
(You need to figure this out for yourself!)

Take the numbers in your friend's secret message and, starting in the upper left corner and moving down the column and then to the next column, fill in the 3 x whatever grid with your numerical message.

Use your calculator to multiply the inverse decoding matrix times the coded message matrix to get your decoded message matrix. Write it here:

Starting in the upper left corner and moving down the column and then to the next column, take the numbers from the secret message and write them along the top row of the grid. Below them, write the letter equivalents so you can read the secret message!