use the inverse of the matrix.

Puzzles" and you see many like to decode this type of code for fun. If you take three letters at a time, you can multiply it with a 3×3 matrix (on the right, of course), and repeated letters in the message will be different numbers after the matrix multiplication. To decode,

A	В	С	D	Е	F	G	Н	Ι	J	K	L	Μ
1	2	3	4	5	6	7	8	9	10	11	12	13
N	0	Р	Q	R	S	Т	U	V	W	X	Y	Ζ
14	15	16	17	18	19	20	21	22	23	24	25	26

1. Using A to encode, and A^{-1} to decode:

(b) Show how to decode $[37 - 9 \ 32]$

- $A = \begin{bmatrix} 1 & -1 & 1 \\ 0 & 1 & -1 \\ 1 & 0 & 1 \end{bmatrix} A^{-1} = \begin{bmatrix} 1 & 1 & 0 \\ -1 & 0 & 1 \\ -1 & -1 & 1 \end{bmatrix}$
- (a) Show how to encode "JOY" [10 15 25]

Seat:

Use the inverse of the provided matrix to answer the riddles:

2. You use a knife to slice my head and weep beside me when I am dead. What am I? use A^{-1} to decode $\begin{bmatrix} 1 & 13 & -13 \end{bmatrix} \begin{bmatrix} 24 & -1 & 10 \end{bmatrix} \begin{bmatrix} 15 & -1 & 1 \end{bmatrix}$

3. I am weightless, but you can see me. Put me in a bucket, and I'll make it lighter. What am I? use A^{-1} to decode: $[9 - 1 \ 9] \ [20 - 3 \ 8]$

4. I'm light as a feather, yet the strongest man can't hold me for much more than a minute. What am I? use A^{-1} to decode: $\begin{bmatrix} 7 & 16 & -11 \end{bmatrix} \begin{bmatrix} 9 & 19 & -11 \end{bmatrix}$

$$B = \begin{bmatrix} 3 & 0 & 1 \\ 1 & 1 & -3 \\ 1 & -1 & 1 \end{bmatrix}$$

5. At night they come without being fetched, and by day they are lost without being stolen. What are they? use B^{-1} to decode: [78 19 - 40] [73 19 - 39] [63 18 - 39] [35 13 - 45] [35 - 6 - 19]

$$C = \left[\begin{array}{rrrr} -1 & 4 & 8 \\ 2 & 0 & -3 \\ 1 & 2 & 1 \end{array} \right]$$

8. Whoever makes it, tells it not. Whoever takes it, knows it not. Whoever knows it, wants it not. What is it? use C^{-1} to decode: [48 54 0] [31 66 57] [-1 82 131] [31 36 12] [31 80 73] [45 20 - 35]

- 6. I'm where yesterday follows today, and tomorrow's in the middle. What am I? use B^{-1} to decode: [7 -4 5] [50 -17 20] [56 1 -22] [46 -7 -28]
- 9. What is it that, after you take away the whole, some still remains? use C^{-1} to decode: [8 122 175] [17 86 100] [16 70 86]

- 10. What can you catch but not throw? use C^{-1} to decode: [2 10 11] [13 68 88]
- 7. What stinks while living but in death smells good? use B^{-1} to decode: [19 - 16 17] [34 7 - 12]

A	В	С	D	E	F	G	H	I	J	K	L	M
1	2	3	4	5	6	7	8	9	10	11	12	13
Ν	0	Р	Q	R	S	Т	U	V	W	Х	Y	Z
14	15	16	17	18	19	20	21	22	23	24	25	26