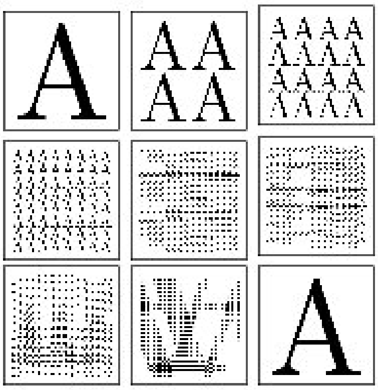
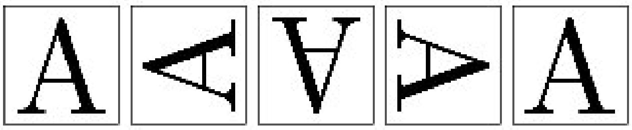
Pixel Shuffle



Shuffling the pixels in a bitmap image sometimes yields random looking images. However, by repeating the shuffling enough times, one finally recovers the original images. This should be no surprise, since "shuffling" means applying a one-to-one mapping (or permutation) over the cells of the image, which come in finite number.

Your program should read a number n , and a series of elementary transformations that define a "shuffling" ϕ of n * n images. Then, your program should compute the minimal number m (m > 0) , such that m applications of ϕ always yield the original n * n image.

For instance if ϕ is counter-clockwise 90^o rotation then m = 4.



Input

Test cases are given one after another, and a single 0 denotes the end of the input. For each test case:

Input is made of two lines, the first line is number n ($2 <= n <= 2^{10}$, n even). The number n is the size of images, one image is represented internally by a n * n pixel matrix (a^j_i) , where i is the row number and j is the column number. The pixel at the upper left corner is at row 0 and column 0.

The second line is a non-empty list of at most 32 words, separated by spaces. Valid words are the keywords **id**, **rot**, **sym**, **bhsym**, **bvsym**, **div** and **mix**, or a keyword followed by **-**. Each keyword **key** designates an elementary transform (as defined by Figure 1), and **key-** designates the inverse of transform **key**. For instance, **rot-** is the inverse of counter-clockwise 90^o rotation, that is clockwise 90^o rotation. Finally, the list $k_1, k_2, ..., k_p$ designates the compound transform $\phi = k_1 o k_2 o ... o k_p$. For instance, "bvsym rot-" is the transform that first performs clockwise 90o rotation and then vertical symmetry on the lower half of the image.

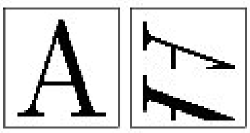
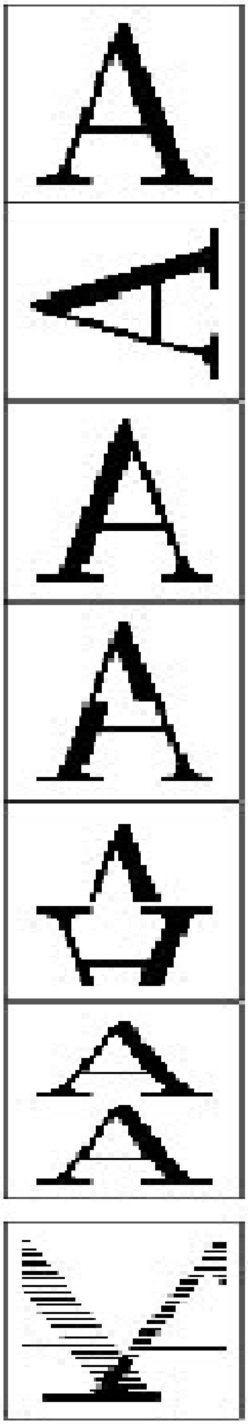


Figure 1: Transformations of image (a^j_i) into image (b^j_i)



id , identity. Nothing changes : $b_i^j = a_i^j$.

rot , counter-clockwise 90° rotation

sym , horizontal symmetry : $b_i^j = a_i^{n-1-j}$

bhsym , horizontal symmetry applied to the lower half of image : when $i \geq n/2$, then $b_i^j = a_i^{n-1-j}$. Otherwise $b_i^j = a_i^j$.

bvsym , vertical symmetry applied to the lower half of image ($i \geq n/2$)

div , division. Rows $0, 2, \ldots, n-2$ become rows $0, 1, \ldots n/2 - 1$, while rows $1, 3, \ldots n-1$ become rows $n/2, n/2+1, \ldots n-1$.

mix , row mix. Rows $2k$ and $2k+1$ are interleaved. The pixels of row $2k$ in the new image are $a_{2k}^0, a_{2k+1}^0, a_{2k}^1, a_{2k+1}^1, \cdots a_{2k}^{n/2-1}, a_{2k+1}^{n/2-1}$, while the pixels of row $2k+1$ in the new image are $a_{2k}^{n/2}, a_{2k+1}^{n/2}, a_{2k}^{n/2+1}, a_{2k+1}^{n/2+1}, \ldots, a_{2k}^{n-1}, a_{2k+1}^{n-1}$.

Output

For each test case:

Your program should output a single line whose contents is the minimal number m (m > 0) such that ϕ is the identity. You may assume that, for all test input, you have m < 2^{31}.

Example

Input:
256
rot- div rot div

256
bvsym div mix
0

Output:
8
63457