

4361 Tobo or not Tobo

The game of Tobo is played on a plastic board designed into a 3×3 grid with cells numbered from 1 to 9 as shown in figure (a). The grid has four dials (labeled “A” to “D” in the figure.) Each dial can be rotated in 90 degrees increment in either direction. Rotating a dial causes the four cells currently adjacent to it to rotate along. For example, figure (b) shows the Tobo after rotating dial “A” once in a clockwise direction. Figure (c) shows the Tobo in figure (b) after rotating dial “D” once in a counterclockwise direction.

Kids love to challenge each other playing the Tobo. Starting with the arrangement shown in figure (a), (which we’ll call *the standard arrangement*,) one kid would randomly rotate the dials, X number of times, in order to “shuffle” the board. Another kid then tries to bring the board back to its standard arrangement, taking no more than X rotations to do so. The less rotations are needed to restore it, the better. This is where you see a business opportunity. You would like to sell these kids a program to advise them on the minimum number of steps needed to bring a Tobo back to its standard arrangement.

Input

Your program will be tested on one or more test cases. Each test case is specified on a line by itself. Each line is made of 10 decimal digits. Let’s call the first digit Y . The remaining 9 digits are non-zeros and describe the current arrangement of the Tobo in a row-major top-down, left-to-right ordering. The first sample case corresponds to figure (c).

The last line of the input file is a sequence of 10 zeros.

Output

For each test case, print the result using the following format:

$k \cdot _ R$

where k is the test case number (starting at 1,) ‘ $_$ ’ is a single space, and R is the minimum number of rotations needed to bring the Tobo back to its standard arrangement. If this can’t be done in Y dials or less, then $R = -1$.

Sample Input

```
3413569728
1165432789
0000000000
```

Sample Output

```
1. 2
2. -1
```

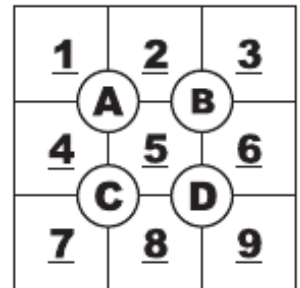


Figure (a)

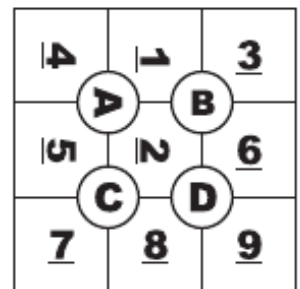


Figure (b)

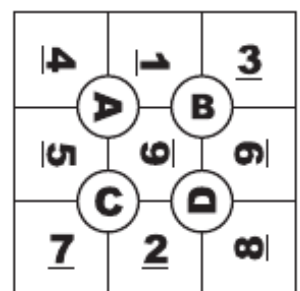


Figure (c)