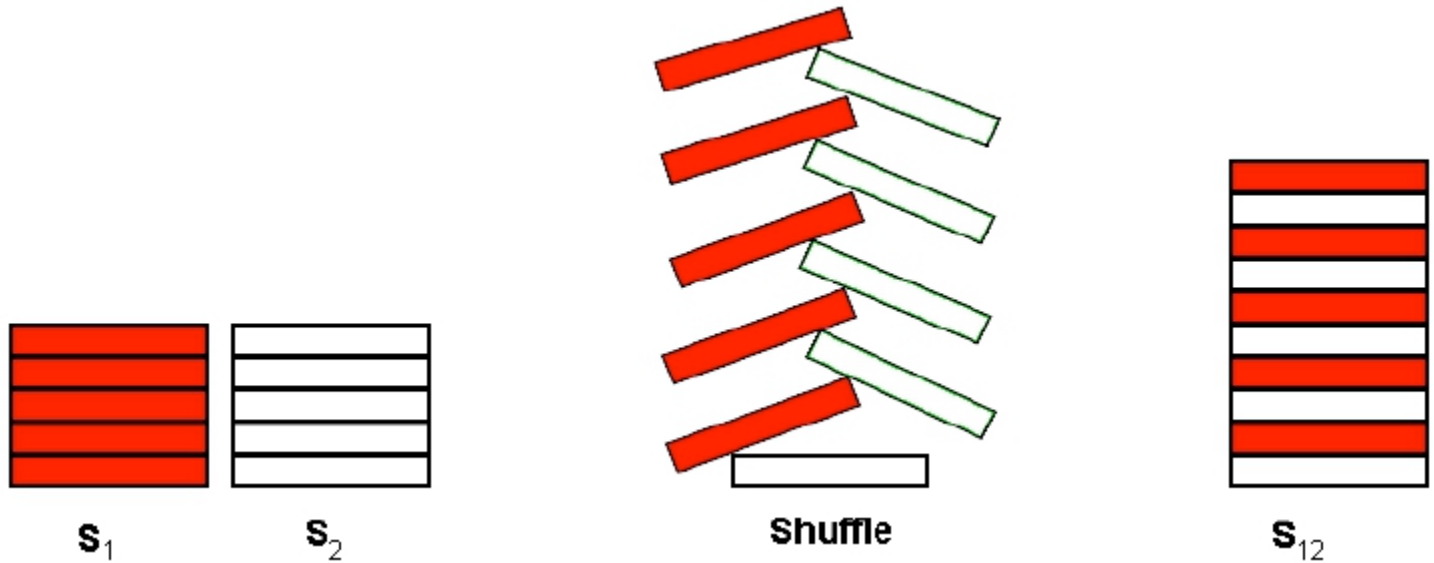


# A • Shuffle'm Up

A common pastime for poker players at a poker table is to shuffle stacks of chips. Shuffling chips is performed by starting with two stacks of poker chips,  $S_1$  and  $S_2$ , each stack containing  $C$  chips. Each stack may contain chips of several different colors.

The actual shuffle operation is performed by interleaving a chip from  $S_1$  with a chip from  $S_2$  as shown below for  $C=5$ :



The single resultant stack,  $S_{12}$ , contains  $2 \cdot C$  chips. The bottommost chip of  $S_{12}$  is the bottommost chip from  $S_2$ . On top of that chip, is the bottommost chip from  $S_1$ . The interleaving process continues taking the 2<sup>nd</sup> chip from the bottom of  $S_2$  and placing that on  $S_{12}$ , followed by the 2<sup>nd</sup> chip from the bottom of  $S_1$  and so on until the topmost chip from  $S_1$  is placed on top of  $S_{12}$ .

After the shuffle operation,  $S_{12}$  is split into 2 new stacks by taking the bottommost  $C$  chips from  $S_{12}$  to form a new  $S_1$  and the topmost  $C$  chips from  $S_{12}$  to form a new  $S_2$ . The shuffle operation may then be repeated to form a new  $S_{12}$ .

For this problem, you will write a program to determine if a particular resultant stack  $S_{12}$  can be formed by shuffling two stacks some number of times.

## Input

The first line of input contains a single integer  $N$ , ( $1 \leq N \leq 1000$ ) which is the number of datasets that follow.

Each dataset consists of four lines of input. The first line of a dataset specifies an integer  $C$ , ( $1 \leq C \leq 100$ ) which is the number of chips in each initial stack ( $S_1$  and  $S_2$ ). The second line of each dataset specifies the colors of each of the  $C$  chips in stack  $S_1$ , starting with the bottommost chip. The third line of each dataset specifies the colors of each of the  $C$  chips in stack  $S_2$  starting with the bottommost chip. Colors are expressed as a single uppercase letter (**A** through **H**). There are no blanks or separators between the chip colors. The fourth line of each dataset contains  $2 \cdot C$  uppercase letters, (**A** through **H**), representing the colors of the desired result of the shuffling of  $S_1$  and  $S_2$  zero or more times. The bottommost chip's color is specified first.

## Output

Output for each dataset consists of a single line that displays the dataset number (1 through **N**), a space, and an integer value which is the *minimum* number of shuffle operations required to get the desired resultant stack. If the desired result can not be reached using the input for the dataset, display the value negative 1 (-1) for the number of shuffle operations.

Sample Input	Sample Output
2	1 2
4	2 -1
AHAH	
HAHA	
HHAAAAHH	
3	
CDE	
CDE	
EEDDCC	