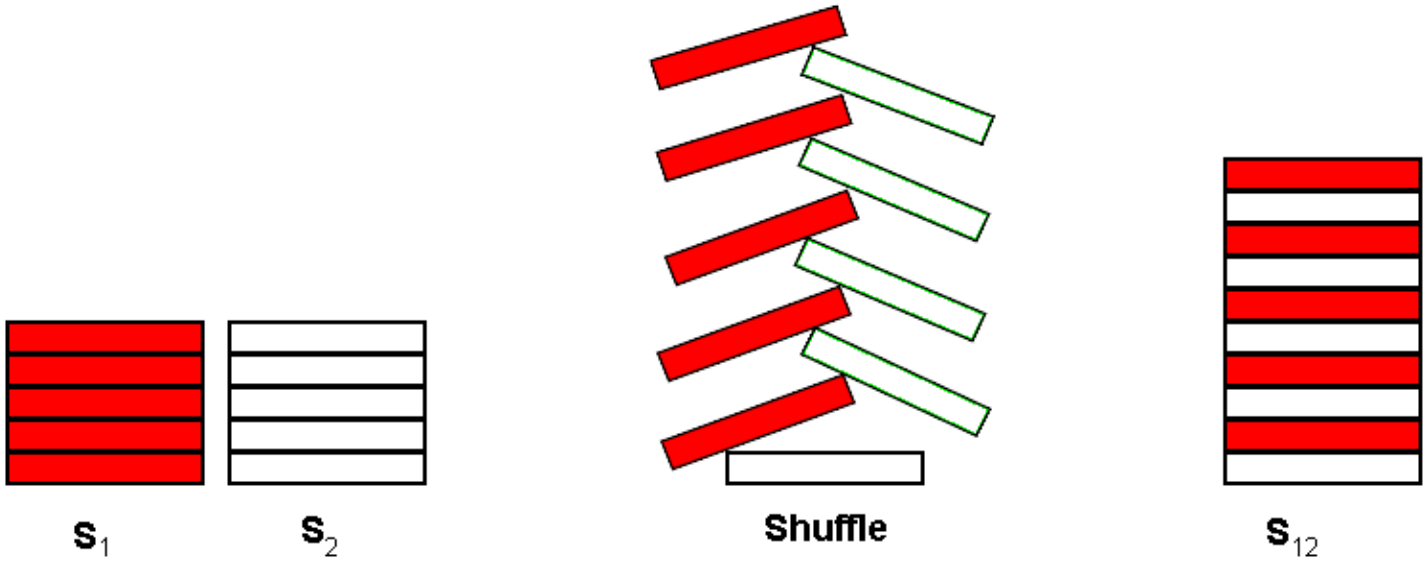
C • Shuffle'm Up

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, $\mathbf{S_1}$ and $\mathbf{S_2}$, 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 $\mathbf{S_1}$ with a chip from $\mathbf{S_2}$ as shown below for **C**=5:



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

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

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

Input

The first line of input contains a single integer **N**, ($1 \le \mathbf{N} \le 1000$) 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**, ($1 \le \mathbf{C} \le 100$) which is the number of chips in each initial stack ($\mathbf{S_1}$ and $\mathbf{S_2}$). The second line of each

dataset specifies the colors of each of the **C** chips in stack $\mathbf{S_1}$, starting with the bottommost chip. The third line of each dataset specifies the colors of each of the **C** chips in stack $\mathbf{S_2}$ 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***C** uppercase letters, (**A** through **H**), representing the colors of the desired result of the shuffling of $\mathbf{S_1}$ and $\mathbf{S_2}$ 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 though **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 4 AHAH HAHA HHAAAAHH 3 CDE CDE EEDDCC	1 2 2 -1