

Generalized Collatz Conjecture

Input file: standard input
Output file: standard output
Time limit: 12 seconds
Memory limit: 1024 megabytes

You are a bright-eyed young undergrad who has ~~watched a Youtube video about~~ done extensive research into the Collatz conjecture, and have been struck with inspiration for several *brilliant* ideas of how to solve it! You can picture it now—for your undergraduate thesis, you will solve the Collatz conjecture, cementing your name in the textbooks as a genius on the level of von Neumann, Terence Tao, and Ramanujan. Your thesis advisor thinks this is a bad idea; they warn you that many others before you have tried and failed taking this path. But they just don't get it—that's them, and you're you. This is *different*. *You're special*.

Due to your persistence, your thesis advisor reluctantly agrees to support you, but *on the condition* that you prove yourself by solving this problem featuring an **even more difficult and generalized version** of the setup in the Collatz conjecture!

You are given a set M of distinct integers and an integer n . Your goal is to *transform* n into 1 using only operations of the following two kinds:

1. Choose an $m \in M$, and replace $n \rightarrow mn + 1$
2. Choose a prime factor p of n , and replace $n \rightarrow n/p$

What is the minimum number of operations needed to transform n into 1? If it is impossible to transform n to 1, say so as well.

Input

The first line of input contains an integer t , the number of test cases. The descriptions of t test cases follow.

Each test case consists of one line containing $2 + |M|$ space-separated integers, where $|M|$ denotes the size of M . The first two integers are n and $|M|$, and the remaining $|M|$ ones are the elements of M .

- $1 \leq t \leq 262144$
- $2 \leq n \leq 2097152$
- $1 \leq |M| \leq 8$
- $1 \leq m \leq 64$ for each m in M
- No two cases in each file are exactly the same.
- The elements of M are given in increasing order.

Output

For each test case, output one line containing either:

- a single integer denoting the minimum number of operations needed to transform n to 1, or
- the string `FIELDS MEDAL` if it is impossible to transform n to 1.

Important Note: The output is **case-sensitive**, so you need to output in all-capital letters. Also, don't put leading or trailing spaces, two consecutive spaces, or tabs, in the output.

Example

standard input	standard output
2	3
84 2 3 6	4
18588 3 18 25 44	

Note

- In the first test case, one possible sequence of 3 operations could be: $84 \rightarrow 12 \rightarrow 37 \rightarrow 1$.
- In the second test case, one possible sequence of 4 operations could be: $18588 \rightarrow 12 \rightarrow 301 \rightarrow 5419 \rightarrow 1$.