Problem C. Supermutations

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	512 mebibytes

You are given a sequence of $5n$ numbers $A_1, A_2, \ldots, A_{5n}$. You are also given a sequence of queries of three types:

1. "? x y"

   Here, x and y are integers such that $1 \le x \le y \le 5n$. Find the sum of numbers at positions from x to y inclusive: $A_x + A_{x+1} + \cdots + A_y$.

2. "< x"

   Here, x is an integer such that $1 \le x \le 5n - 1$. Cyclically shift the sequence to the left x times, i.e. replace sequence A with sequence $A_{x+1}, A_{x+2}, \ldots, A_{5n}, A_1, \ldots, A_x$.

3. "# P"

   Here, P is a permutation of length 5. Split the sequence into consecutive 5-element segments and apply permutation P to each of the segments. Each segment $A_{5k+1}, \ldots, A_{5k+5}$ is replaced with $A_{5k+P_1}, \ldots, A_{5k+P_5}$.

Input

The first line contains an integer n ($1 \le n \le 2 \cdot 10^4$). The second line contains $5n$ integers A_i ($|A_i| \le 10^4$).

The third line contains an integer m ($0 \le m \le 10^5$) — the number of queries. The next m lines contain queries in the format described above.

Output

For each "?" query, print the sum on a separate line.

Example

standard input	standard output
2 1 2 3 4 5 6 7 8 9 10 10 ? 1 10 < 3 ? 2 6 # 3 1 2 5 4 ? 3 4 ? 5 5 < 8 ? 2 9 # 5 4 3 2 1 ? 5 6	55 35 13 7 42 13