Problem E. Pass the Ball!

There are n children playing with n balls. Both children and balls are numbered from 1 to n.

Before the game, n integers $p_1, p_2, \cdots, p_n$ are given. In each round of the game, child i will pass the ball he possesses to child p_i. It is guaranteed that no child will pass his ball to himself, which means $p_i \neq i$. Moreover, we also know that after each round, each child will hold exactly one ball.

Let b_i be the ball possessed by child i. At the beginning of the game, child i ($1 \leq i \leq n$) will be carrying ball i, which means $b_i = i$ initially. You're asked to process q queries. For each query you're given an integer k and you need to compute the value of $\sum_{i=1}^{n} i \times b_i$ after k rounds.

Input

There is only one test case for each test file.

The first line of the input contains two integers n ($2 \leq n \leq 10^5$) and q ($1 \leq q \leq 10^5$), indicating the number of children and the number of queries.

The second line contains n integers $p_1, p_2, \cdots, p_n$ ($1 \leq p_i \leq n$) indicating how the children pass the balls around.

For the following q lines, the i-th line contains one integer k_i ($1 \leq k_i \leq 10^9$) indicating a query asking for the result after k_i rounds.

Output

For each query output one line containing one integer indicating the answer.

Example

standard input	standard output
4 4 2 4 1 3 1 2 3 4	25 20 25 30

Note

The sample test case is explained below.

Round	b_1	b_2	b_3	b_4	**Answer**
1	3	1	4	2	25
2	4	3	2	1	20
3	2	4	1	3	25
4	1	2	3	4	30