

Game II: The Rematch

| Time Limit | Memory Limit |
|------------|--------------|
| 2 seconds | 256 MB |

Statement

Bazza and Shazza are playing a game with GCD again. Bazza gives Shazza an array of length N , $A_1 \dots A_N$, and asks him to compute the sum of the greatest common divisors of all subarrays of A . Bazza calls this the *GCD aggregate*.

Formally, the greatest common divisor, denoted as GCD, of a set of numbers is the largest number which divides all of them. For example, $\text{gcd}(6, 8) = 2$. Bazza requires Shazza to compute the following sum on A :

$$\sum_{l=1}^N \sum_{r=l}^N \text{gcd}(A_l, A_{l+1}, \dots, A_r) \quad (1)$$

Shazza wants you to help him compute the GCD aggregate, and will give you most of the points in this problem for solving this task (see constraints). For the remaining points, Bazza also will perform Q updates to the values of individual elements in the array. After each of the updates, help Shazza compute the GCD aggregate as well.

Input

The first line contains 2 integers N and Q . The next line contains N integers $A_1 \dots A_N$, the initial values of the array. The next Q lines each contain an update, described as 2 integers $p_i v_i$ which states to change the value of A_{p_i} to v_i .

Output

Write $Q + 1$ lines, each containing 1 integer. The first should contain the GCD aggregate before any updates. The next lines should contain the GCD aggregate after each successive update in order.

Sample Input

```
3 2
1 2 4
1 2
3 2
```

Sample Output

```
11
14
12
```

Explanation

- Before updates: $\gcd(1)+\gcd(2)+\gcd(4)+\gcd(1,2)+\gcd(2,4)+\gcd(1,2,4) = 1+2+4+1+2+1 = 11$.
- After update 1: $\gcd(2)+\gcd(2)+\gcd(4)+\gcd(2,2)+\gcd(2,4)+\gcd(2,2,4) = 2+2+4+2+2+2 = 14$.
- After update 2: $\gcd(2)+\gcd(2)+\gcd(2)+\gcd(2,2)+\gcd(2,2)+\gcd(2,2,2) = 2+2+2+2+2+2 = 12$

Constraints

- $1 \leq N \leq 10^5$
- $0 \leq Q \leq 10^4$
- $1 \leq A_i, v_i \leq 10^5$ for all i
- $1 \leq p_i \leq N$ for all i

Subtasks

| Number | Points | Max N | Max Q | Other Constraints |
|--------|--------|---------|---------|------------------------------|
| 1 | 10 | 100 | 0 | None |
| 2 | 21 | 1000 | 0 | None |
| 3 | 22 | 10^5 | 0 | All A_i , are powers of 2. |
| 4 | 23 | 10^5 | 0 | None |
| 5 | 24 | 10^5 | 10^4 | None |

Note

You may find a C++ stub implementation of a solution with a GCD function already implemented on CMS.