GCD Equality

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	1024 megabytes

Evirir the dragon found n positive integers $a_1, a_2, \ldots, a_n$. They want to answer q queries of the form (l, r) $(1 \le l \le r \le n)$, which means:

- Construct the array $b = [b_1, b_2, \ldots, b_{r-l+1}] = [a_l, a_{l+1}, \ldots, a_r]$. In one operation, Evirir can choose two adjacent integers in b, say b_i and b_{i+1} $(1 \le i < r - l + 1)$, and replace them with one integer $\gcd(b_i, b_{i+1})$. What is the minimum number of operations needed to make all elements in b equal?

Can you help them answer the queries fast?

Note: $\gcd(x, y)$ denotes the greatest common divisor (GCD) of integers x and y. For example, $\gcd(18, 12) = 6$, $\gcd(14, 6) = 2$, and $\gcd(9, 14) = 1$. See `https://en.wikipedia.org/wiki/Greatest_common_divisor`

Input

The first line contains two space-separated integers n and q $(1 \le n \le 60\,000,\ 1 \le q \le 100\,000)$.

The second line contains n space-separated integers $a_1, a_2, \ldots, a_n$ $(1 \le a_i \le 60\,000)$.

Each of the following q lines contains two integers l and r $(1 \le l \le r \le n)$, representing a query.

Output

For each query in order, output an integer (the answer) on a line.

Scoring

Subtask 1 (8 points): $n \le 15$, $q \le 120$.

Subtask 2 (10 points): $n, q \le 300$.

Subtask 3 (13 points): $n, q \le 3000$.

Subtask 4 (17 points): For all $1 \le i \le n$, $a_i \le 2$.

Subtask 5 (9 points): For all $1 \le i \le n$, $a_i = 2^k$ for some integer $k \ge 0$.

Subtask 6 (7 points): $q = n$. For all $1 \le i \le q$, the i-th query is $(1, i)$.

Subtask 7 (26 points): For all $1 \le i \le n$, $a_i \le 36$.

Subtask 8 (10 points): No additional constraints.

Example

standard input	standard output
10 6 36 24 120 24 36 60 48 24 24 9 1 7 2 4 6 10 6 8 8 9 10 10	4 1 4 2 0 0

Note

Example 1

For the first query (`1 7`), $b = [36, 24, 120, 24, 36, 60, 48]$. One optimal solution is (chosen elements are underlined, the new element from the last operation is **bolded**):

- $[36, 24, \underline{120, 24}, 36, 60, 48]$: $\gcd(120, 24) = 24$
- $[36, 24, \mathbf{24}, 36, \underline{60, 48}]$: $\gcd(60, 48) = 12$
- $[\underline{36, 24}, 24, 36, \mathbf{12}]$: $\gcd(36, 24) = 12$
- $[\mathbf{12}, \underline{24, 36}, 12]$: $\gcd(24, 36) = 12$
- $[12, \mathbf{12}, 12]$

It can be proven that one cannot make all elements equal in fewer than 4 operations.

For the second query (`2 5`), $b = [24, 120, 24]$. One optimal solution is $[24, \underline{120, 24}] \to [24, \mathbf{24}]$.

For the third and fourth query, one can keep merging until one element is left.

For the fifth and sixth query, all elements of b are already equal.