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## STUDENT REPORT

### DETAILS

**Name**

AYESHA TARANNUM D

**Roll Number**

3BR23CS020

### EXPERIMENT

**Title**

SUM OF NUMBERS AT PRIME FACTORS

**Description**

Prime factors of a positive integer are the prime numbers that divide that integer exactly.

Given an array arr of n integers and a positive integer num.

Let's suppose prime factorization of num is:  $p^a \times q^b \times r^c \times \dots \times z^f$ , where p,q,r,...z are prime numbers.

Sum of numbers in array arr at indices of prime factors of number num is:  $a \times \text{arr}[p] + b \times \text{arr}[q] + c \times \text{arr}[r] + \dots + f \times \text{arr}[z]$ .

You are given an array arr of size n and a positive integer num. You are required to calculate the sum of numbers in arr as mentioned above, and print the same.

**Note:**

- If arr is empty, print -1.
- If prime factor of num not found as indices, print 0.

**Input Format:**

The input consists of three lines:

- The first line contains an integer, i.e. n.
- The second line contains an array arr of length of n.
- The third line contains an integer num

The input will be read from the STDIN by the candidates.

**Output Format:**

Print the sum that was mentioned in the problem statement.

**Example:**

**Input:**

6

[11 21 32 45 1 23](#)

6

Output:

77

Explanation:

$6 = 2^1 \times 3^1$

$sum = 1 \cdot arr[2] + 1 \cdot arr[3] = 1 \cdot 32 + 1 \cdot 45 = 77$

#### Source Code:

```
from collections import defaultdict

def prime_factors(num):
    factors = defaultdict(int)

    while num % 2 == 0:
        factors[2] += 1
        num //= 2
    for i in range(3, int(num**0.5) + 1, 2):
        while num % i == 0:
            factors[i] += 1
            num //= i
    if num > 2:
        factors[num] += 1

    return factors

def calculate_prime_index_sum(arr, num):
    if not arr:
        return -1

    factors = prime_factors(num)
    total_sum = 0
    valid_prime_found = False

    for prime, power in factors.items():
        if prime < len(arr):
            total_sum += power * arr[prime]
            valid_prime_found = True

    return total_sum if valid_prime_found else 0

if __name__ == "__main__":
    n = int(input())
    arr = list(map(int, input().split()))
    num = int(input())

    result = calculate_prime_index_sum(arr, num)
    print(result)
```

## RESULT

4 / 5 Test Cases Passed | 80 %