



STUDENT REPORT

DETAILS

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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: $a \times arr[p] + b \times arr[q] + c \times arr[r] + \dots + f \times arr[z]$.

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*arr[2]+1*arr[3]=1*32+1*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("Enter the size of array: "))
    arr = list(map(int, input("Enter array elements: ").split()))
    num = int(input("Enter the number: "))

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

RESULT

0 / 5 Test Cases Passed | 0 %