EX-1.4

Title :

Given a 0-indexed integer array nums of length n and an integer k, return the number of pairs (i, j) where 0 <= i < j < n, such that nums[i] == nums[j] and (i * j) is divisible by k.

Aim:

To design and implement a Python program to count the number of valid pairs (i, j) in an array where nums[i] = nums[j] and (i * j) is divisible by k.

Procedure:

1. Read the input values:
    - Array length n.
    - Array elements `nums`.
    - Integer k.
2. Iterate through all possible pairs `(i, j)` where `0 <= i < j < n`.
3. For each pair, check:
    - If `nums[i] == nums[j]`.
    - If `(i * j) % k == 0`.
4. If both conditions hold, increment a counter.
5. Print the final count as output.

Algorithm:

1. Start
2. Initialize `count = 0`
3. For `i` from 0 to `n-1`:
    - For `j` from `i+1` to `n-1`:
        - If `nums[i] == nums[j]` and `(i * j) % k == 0`, increment count
4. Print `count`
5. Stop

Input:

7

3 1 2 2 2 1 3

2

Output:

4

Program :

```
def countPairs(nums, k):
    n = len(nums)
    count = 0
    for i in range(n):
        for j in range(i+1, n):
            if nums[i] == nums[j] and (i * j) % k == 0:
                count += 1
    return count
n = int(input("Enter size of array: "))
nums = list(map(int, input("Enter array elements: ").split()))
k = int(input("Enter value of k: "))

result = countPairs(nums, k)
print("Number of valid pairs:", result)
```

Performance Analysis:

Time Complexity: $O(n^2)$, since all pairs are checked.

Space Complexity: O(1), using only a counter.

program output:

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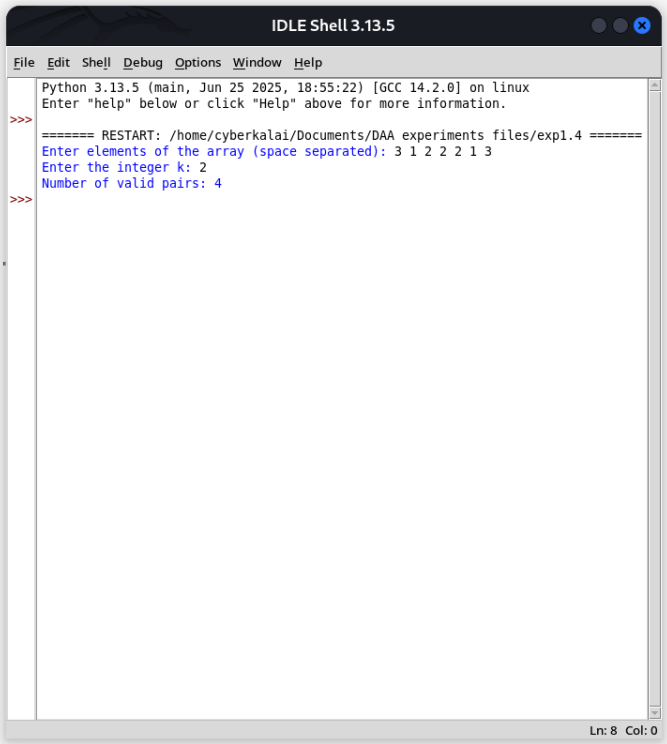
```
from collections import defaultdict

def count_valid_pairs(nums, k):
    indices_map = defaultdict(list)

    for idx, val in enumerate(nums):
        indices_map[val].append(idx)

    count = 0

    for indices in indices_map.values():
        length = len(indices)
        for i in range(length):
            for j in range(i + 1, length):
                if (indices[i] * indices[j]) % k == 0:
                    count += 1

    return count

nums = list(map(int, input("Enter elements of the array (space separated): "
k = int(input("Enter the integer k: "))

result = count_valid_pairs(nums, k)
print("Number of valid pairs:", result)
```



Result :

Thus the given program to count the number of valid pairs (i, j) in an array where nums[i] = nums[j] and (i * j) is divisible by k is executed and got output successfully.