

# **MAXIMUM GCD AND SUM**

**Crack a Hack**

**Course: Algorithmic Problem Solving**

**Course Code: 17ECSE309**

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## Problem Statement:

You are given two arrays  $A$  and  $B$  containing  $n$  elements each. Choose a pair of elements  $(x, y)$  such that:

- $x$  belongs to array  $A$ .
- $y$  belongs to array  $B$ .
- $\text{gcd}(x, y)$  is the maximum of all pairs  $(x, y)$ .

If there is more than one such pair  $(x, y)$  having maximum gcd, then choose the one with maximum sum. Print the sum of elements of this maximum-sum pair.

## Solution:

The Sieve property would prove more efficient for this problem. Here we are supposed to calculate the sum of maximum gcd of the elements in the array  $A$  and array  $B$ .

### Code:

```
#include "bits/stdc++.h"

using namespace std;

const int N = 1e7;

int cnt[N];

int alar[N];

int blar[N];

int n;
```

```
int A[N];
```

```
int B[N];
```

```
int maximum=0;
```

```
int main() {
```

```
    int i,j;
```

```
        scanf("%d" , &n);
```

```
        for(i = 1; i <= n; ++i) {
```

```
            scanf("%d" , A + i);
```

```
        }
```

```
        for(i = 1; i <= n; ++i) {
```

```
            scanf("%d" , B + i);
```

```
        }
```

```
        for( i = 1; i <= n; ++i) {
```

```
            ++cnt[A[i]];

```

```
        }
```

```
        for(i = 1; i < N; ++i) {
```

```
            for(int j = i; j < N; j += i) {
```

```
                if(cnt[j]) {
```

```
                    alar[i] = max(alar[i] , j);
```

```

        }
    }
}

for(i = 1; i <= n; ++i) {
    --cnt[A[i]];
}

for(i = 1; i <= n; ++i) {
    ++cnt[B[i]];
}

for(i = 1; i < N; ++i) {
    for(j = i; j < N; j += i) {
        if(cnt[j]) {
            blar[i] = max(blar[i] , j);
        }
    }
}

for(i = 1; i < N; ++i) {
    if(alar[i] && blar[i]) {
        maximum = i;
    }
}

```

```
}  
  
printf("%d\n", alar[maximum] + blar[maximum]);  
  
return 0;  
  
}
```

## References:

- <https://www.geeksforgeeks.org/sieve-of-eratosthenes/>
- <https://www.quora.com/What-are-other-extensions-of-Sieve-of-Eratosthenes>
- <https://www.geeksforgeeks.org/pair-maximum-gcd-two-arrays/>
- [https://en.wikipedia.org/wiki/Sieve\\_of\\_Eratosthenes](https://en.wikipedia.org/wiki/Sieve_of_Eratosthenes)