

# Problem I

## Rectangle Tiling

Time limit: 1 second

Consider a rectangle with integer side lengths. A square tiling of the rectangle is a covering of the entire region using non-overlapping squares whose sides are parallel with those of the rectangle. In a square tiling, no square may overhang (extend beyond the rectangle's boundary).

You have a collection of squares with side lengths being powers of 2. Find a square tiling of the rectangle using the fewest squares possible, or, indicate that it cannot be done.

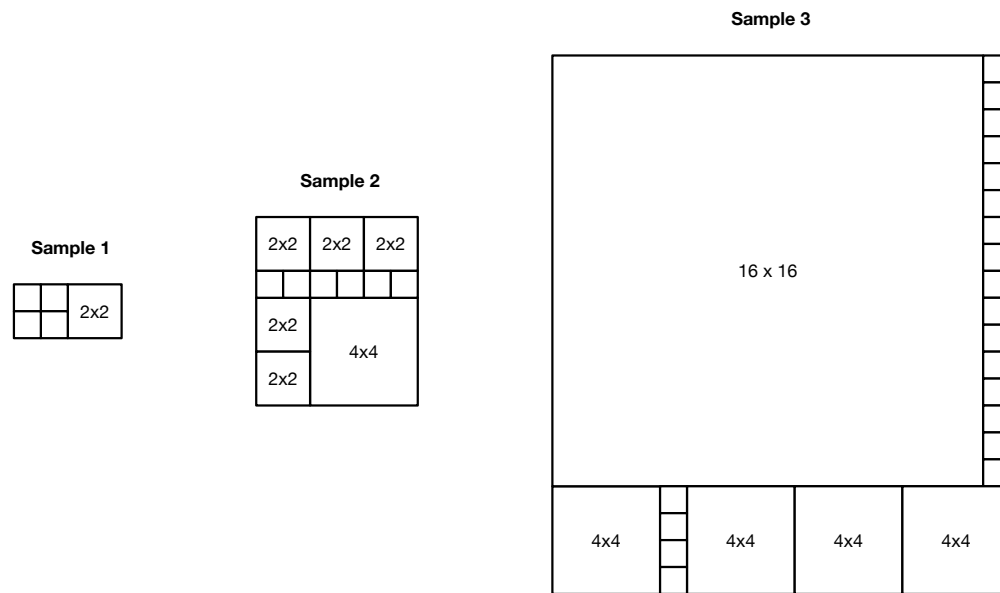


Figure I.1: Optimal square tilings for the first three sample inputs. The small unlabelled tiles are  $1 \times 1$  tiles.

### Input

The first line of input contains three integers  $W$ ,  $H$  and  $N$  ( $1 \leq W, H \leq 2^{50}$  and  $1 \leq N \leq 51$ ). Here,  $W$  and  $H$  indicate the dimensions of the rectangle. The next line contains  $N$  integers  $a_0, a_1, \dots, a_{N-1}$  where  $a_i$  ( $0 \leq a_i \leq 2^{51}$ ) is the number of  $2^i \times 2^i$  squares you own.

### Output

If there is a square tiling of a  $W \times H$  rectangle using the squares you own, output the minimum number of squares needed in such a square tiling. Otherwise, output  $-1$  if there is no square tiling of the rectangle using the squares you own.

### Sample Input 1

```
4 2 2
5 1
```

### Sample Output 1

```
5
```

### Sample Input 2

```
6 7 3
10 10 10
```

### Sample Output 2

```
12
```

### Sample Input 3

```
17 20 5
20 0 4 0 1
```

### Sample Output 3

```
25
```

### Sample Input 4

```
4 2 3
3 1 10
```

### Sample Output 4

```
-1
```