Hackerland Radio Transmitters

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Hackerland is a one-dimensional city with n houses, where each house i is located at some x_i on the x-axis. The Mayor wants to install radio transmitters on the roofs of the city's houses. Each transmitter has a range, k, meaning it can transmit a signal to all houses $\leq k$ units of distance away.

Given a map of Hackerland and the value of k, can you find and print the minimum number of transmitters needed to cover every house in the city? (Every house must be covered by at least one transmitter) Each transmitter *must* be installed on top of an existing house.

Input Format

The first line contains two space-separated integers describing the respective values of n (the number of houses in Hackerland) and k (the range of each transmitter).
The second line contains n space-separated integers describing the respective locations of each house (i.e., $x_1, x_2, \ldots, x_n$).

Constraints

- $1 \leq n, k \leq 10^5$
- $1 \leq x_i \leq 10^5$
- There may be more than one house at the same location.

Subtasks

- $1 \leq n \leq 1000$ for 50% of the maximum score.

Output Format

Print a single integer denoting the minimum number of transmitters needed to cover all the houses.

Sample Input 0

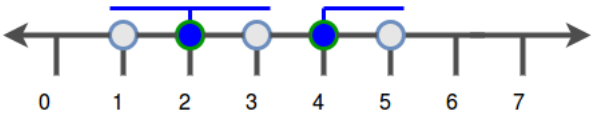
```
5 1
1 2 3 4 5
```

Sample Output 0

```
2
```

Explanation 0

The diagram below depicts our map of Hackerland:



We can cover the entire city by installing transmitters on houses at locations 2 and 4. Thus, we print 2 on a new line.

Sample Input 1

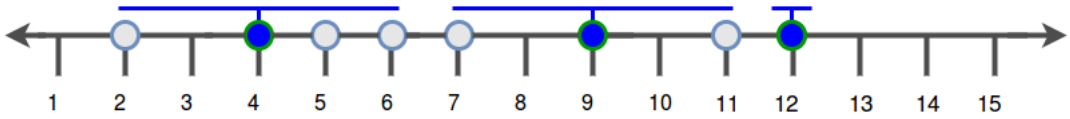
```
8 2
7 2 4 6 5 9 12 11
```

Sample Output 1

```
3
```

Explanation 1

The diagram below depicts our map of Hackerland:



We can cover the entire city by installing transmitters on houses at locations 4, 9, and 12. Thus, we print 3 on a new line.

Medium Submitted 15304 times
Max Score 25

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Suggest Edits

Current Buffer (saved locally, editable) C++14

```
#include <iostream>
#include <vector>
#include <algorithm>

int main()
{
    int n; std::cin >> n; //the number of houses
    int k; std::cin >> k; //the range of each transmitter

    std::vector<int> vec(n);
    for(auto &it: vec) std::cin >> it;

    std::sort(vec.begin(), vec.end());

    int numTransmitters = 0, location = 0, i = 0;

    while(i < n)
    {
        /** Key is to use greedy algorithm
```

```
20          *1. To always place the transmitter at the house furthest
21          *   to the right possible to cover the range.
22          *2. Let this i be i_orig go to right as far as we cover
23              i_orig as well
24          *3. Then go to the right of vec[i] by k because transmitter
25              at vec[i] covers houses to its right as well*/
26
27          numTransmitters++;
28          location = vec[i] + k;
29          while(i < n && vec[i] <= location)  i++;
30
31          i--;    //this is where we place the transmitter
32
33          location = vec[i] + k;
34          while(i < n && vec[i] <= location)  i++;
35      }
36      std::cout << numTransmitters << std::endl;
37
38      return 0;
39  }
40
```

Line: 40 Col: 1

Upload Code as File Test against custom input Run Code Submit Code

Congrats, you solved this challenge!

Challenge your friends:

- ✔ Test Case #0
- ✔ Test Case #1
- ✔ Test Case #2
- ✔ Test Case #3
- ✔ Test Case #4
- ✔ Test Case #5
- ✔ Test Case #6
- ✔ Test Case #7
- ✔ Test Case #8
- ✔ Test Case #9
- ✔ Test Case #10
- ✔ Test Case #11
- ✔ Test Case #12
- ✔ Test Case #13
- ✔ Test Case #14
- ✔ Test Case #15
- ✔ Test Case #16
- ✔ Test Case #17
- ✔ Test Case #18
- ✔ Test Case #19
- ✔ Test Case #20
- ✔ Test Case #21
- ✔ Test Case #22
- ✔ Test Case #23
- ✔ Test Case #24
- ✔ Test Case #25
- ✔ Test Case #26
- ✔ Test Case #27
- ✔ Test Case #28
- ✔ Test Case #29
- ✔ Test Case #30

You've earned 25.00 points. Next Challenge