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C++ (g++ 5.4) ▾

Average Time: 25m

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## Minimize the Heights II

Difficulty: Medium Accuracy: 15.06% Submissions: 604K+ Points: 4

Given an array `arr[]` denoting heights of `N` towers and a positive integer `K`.

For **each** tower, you must perform **exactly one** of the following operations **exactly once**.

- **Increase** the height of the tower by `K`
- **Decrease** the height of the tower by `K`

Find out the **minimum** possible difference between the height of the shortest and tallest towers after you have modified each tower.

You can find a slight modification of the problem [here](#).

**Note:** It is **compulsory** to increase or decrease the height by `K` for each tower. **After** the operation, the resultant array should **not** contain any **negative integers**.

### Examples :

**Input:** `k = 2, arr[] = {1, 5, 8, 10}`

**Output:** 5

**Explanation:** The array can be modified as `{1+k, 5-k, 8-k, 10-k} = {3, 3, 6, 8}`. The difference between the largest and the smallest is `8-3 = 5`.

**Input:** `k = 3, arr[] = {3, 9, 12, 16, 20}`

**Output:** 11

**Explanation:** The array can be modified as `{3+k, 9+k, 12-k, 16-k, 20-k} -> {6, 12, 9, 13, 17}`. The difference between the largest and the smallest is `17-6 = 11`.

**Expected Time Complexity:**  $O(n \cdot \log n)$

**Expected Auxiliary Space:**  $O(n)$

### Constraints

$1 \leq k \leq 10^7$

$1 \leq n \leq 10^5$

$1 \leq arr[i] \leq 10^7$

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```
1- //{ Driver Code Starts
2- // Initial template for C++
3-
4- #include <bits/stdc++.h>
5- using namespace std;
6-
7-
8- // } Driver Code Ends
9-
10- class Solution {
11- public:
12-     int getMinDiff(vector<int> &arr, int k) {
13-         int n = arr.size();
14-         if (n == 1)
15-             return 0;
16-         sort(arr.begin(), arr.end());
17-         int ans = arr[n - 1] - arr[0];
18-         int smallest = arr[0] + k;
19-         int largest = arr[n - 1] - k;
20-         for (int i = 0; i < n - 1; i++) {
21-             int minHeight = min(smallest, arr[i + 1] - k);
22-             int maxHeight = max(largest, arr[i] + k);
23-             if (minHeight < 0)
24-                 continue;
25-             ans = min(ans, maxHeight - minHeight);
26-         }
27-         return ans;
28-     }
29- };
30-
31- //{ Driver Code Starts.
```

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