(1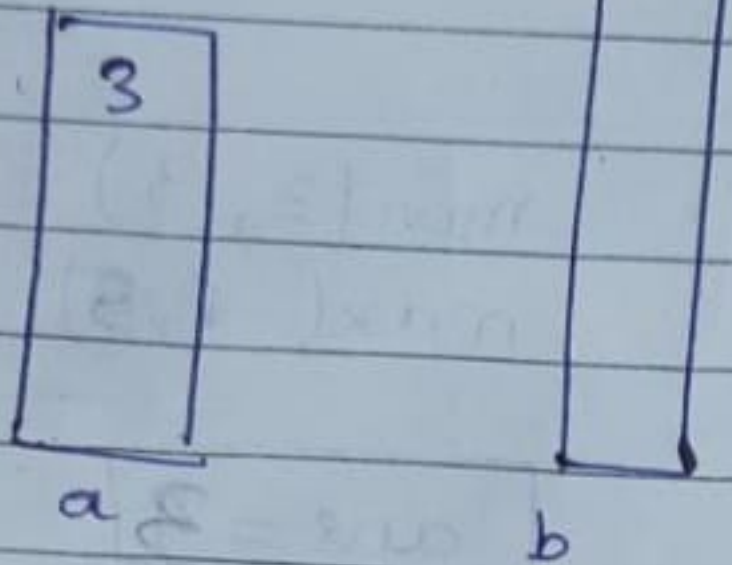) Maan lo, do touver hai. Ab tumhe un dono touver ke beech me, kam se kam height nikalni hai par disectly nahi, +k, -k operations karenge ke baad.

$$k = 2$$

3

a

8

b

$$\begin{matrix} + \\ - \\ - \\ + \end{matrix} \qquad \left.\begin{matrix} + \\ + \\ - \\ - \end{matrix}\right\} \begin{matrix} \text{yani } 4 \\ \text{options} \\ \text{hai} \end{matrix}$$

(1)

$$a = 3 + 2$$
$$a = 5$$

$$b = 8 + 2$$
$$b = 10$$

$$\text{height} = b - a$$
$$= 10 - 5$$
$$= 5$$

Dono ko increase karke, height me koi diffrence nahi nikala.

$$= 8 - 3$$
$$= 5$$

(2)
$$a = 3 - 2 \qquad\qquad b = 8 + 2$$
$$a = 1 \qquad\qquad\qquad b = 10$$

$$\text{height} = 10 - 1 = 9 \qquad \times$$

maximise ho gayi.

(3)
$$a = 3 - 2 = 1 \qquad\qquad b = 8 - 2 = 6$$

$$= b - a$$
$$= 6 - 1$$
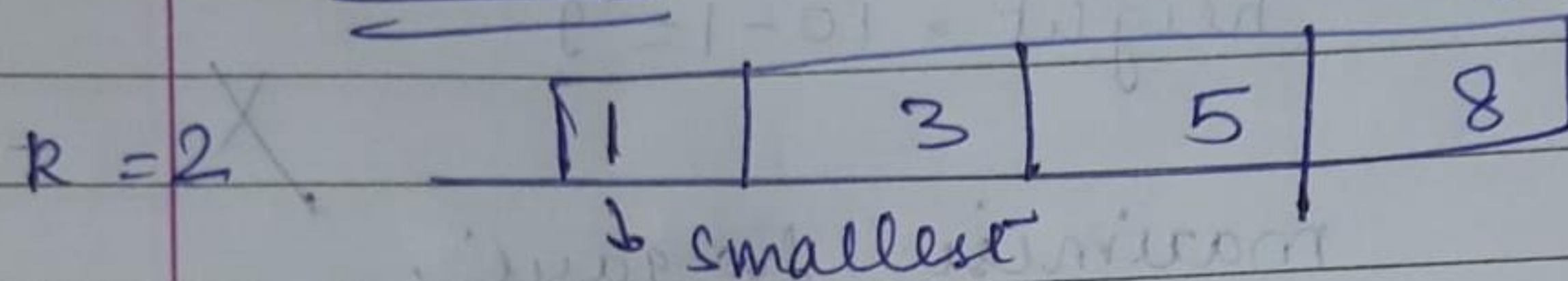$$= 5 \qquad\qquad \times$$

(4)
$$a = 3 + 2 = 5 \qquad\qquad b = 8 - 2 = 6$$

$$\text{height} = b - 5 = 1$$

Ab nikali minimum height

Iska matlab jab minimize karni ho heights tab smallest tower be me + k and longest tower me - k karna.

Example →

$$R = 2$$

↗ longest

| 1 | 3 | 5 | 8 |

↓ smallest

$$x = 1 + k = 1 + 2 = 3$$
$$y = 8 - k = 8 - 2 = 6$$

Ans   Approach

step 1 :-   Sort the array so that we can find smallest & largest tower.

$$x \neq a[0], \quad a[n-1]$$
$$y \neq \quad \uparrow \quad\quad\quad \uparrow$$
$$\text{small} \quad\quad\quad \text{large}$$

step 2 :-   find ans b/w largest tower and smallest tower.

$$ans = a[n-1] - a[0]$$
$$\uparrow$$

This is important to compare with other answers after adding or subtracting k from towers.

step 3 :-   Make a for loop starting from 1 to n.

Then we will make 2 variables
mini
maxi
in which we will store min &
max tower height

And will compare & find
min value of ans, maxi-mini.

```cpp
#include <iostream>
# include <algorithm>
using namespace std;
int minimize ( int a[], int n, int k);
int main()
{
    int arr[] = { 5,10,1,8 }, m, k=2;
    m = sizeof (arr) / sizeof ( arr[0]);
    cout << endl << " Minimum height between
    smallest & longest tower is : " <<
    minimize (arr, m, k);

}

int minimize( int a[], int n, int k)
{
    int x, y, ans, i, mini, maxi;
    sort ( a, a+n);
    x = a[0] + k;
    y = a[n-1] - k;
    ans = a[n-1] - a[0];
```

```
for ( i = 1 ; i < n ; i++ )
{
    mini = min ( x , a[i] - k );
    maxi = max ( y , a[i-1] + k );
    if ( mini < 0 )
        continue ;
    ans = min ( ans, maxi - mini );
}
    return ans ;
}
```

visualization

$$a[0] = \cancel{5} \ 1 \qquad a[1] = 5 \qquad a[2] = 8 \qquad a[3] = 10$$
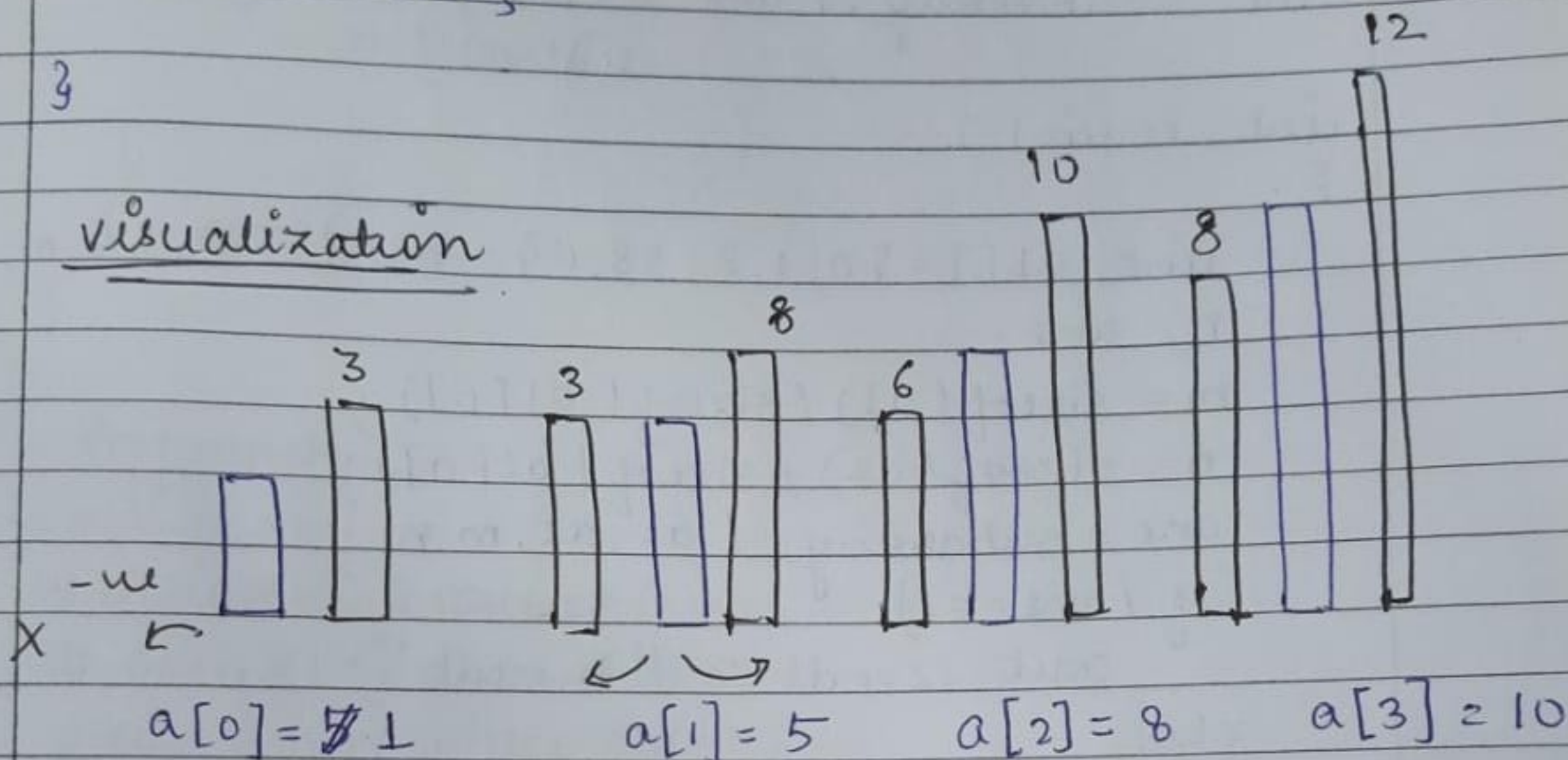
Har tower ki +k, -k heights aaegi
(if > 0)

(smallest & longest)

Isse bahut sari min & max hogi
but sirf 1 hi answer aisa hoga
jo sabse chhota hoga smallest &
longest tower ke beech me. Wahi
answer hoga.