

PROBLEM 5

Prime Minister

Time and memory limits: 1 second, 256 MB

The next federal election is approaching in Oddland and the prime minister is looking for a new way to make her re-election even more appealing. She decides to announce a new campaign promise:

“The median¹ wealth of the citizens in our country shall be maximised!”

To that end, the prime minister decides to distribute a total of K dollars to the N citizens of Oddland. The i th citizen initially has A_i dollars to their name and the prime minister can distribute the K dollars in any way she sees fit, as long as each citizen receives a non-negative integer amount of money.

As Oddland’s chief technical advisor, you must help the prime minister by reporting the maximum obtainable median wealth of the citizens after the distribution.

Subtasks and Constraints

Your program will be graded using many secret tests. Every test follows some rules:

- $1 \leq N \leq 200\,000$.
- N is odd.
- $0 \leq K \leq 1\,000\,000\,000$.
- $0 \leq A_i \leq 1\,000\,000\,000$ for all i .
- The A_i are given in sorted order. That is, $A_1 \leq A_2 \leq \dots \leq A_N$.

The secret tests are divided into subtasks. Your program must correctly solve **every test** within a subtask to earn the marks for that subtask:

- For Subtask 1 (10 points), $K = 0$.
- For Subtask 2 (20 points), $A_i = 0$ for all i .
- For Subtask 3 (25 points), $N, K \leq 1\,000$.
- For Subtask 4 (20 points), $K \leq 200\,000$.
- For Subtask 5 (25 points), no special rules apply.

Input

Your solution must read input and print output. We recommend using the solution templates (which you can find on the competition website) to help you with input and output.

The input follows a specific format:

- The 1st line contains the integers N and K .
- The 2nd line contains N integers $A_1, A_2, \dots, A_N$ in sorted order, where A_i is the initial wealth of the i th citizen.

Output

Your program must output the maximum obtainable median wealth of the citizens.

¹The median of a list with an odd number of elements is the middle element after sorting the list. Luckily, Oddland has an odd number of citizens. For example, sorting $[2, 1, 2]$ gives $[1, 2, 2]$, so its median is 2.

Sample Input 1

5 4
1 2 5 6 9

Sample Output 1

7

Sample Input 2

5 0
4 6 6 9 10

Sample Output 2

6

Sample Input 3

3 5
0 0 0

Sample Output 3

2

Explanation

- In the 1st sample case, the list of initial wealth is $[1, 2, 5, 6, 9]$.
The prime minister could distribute the $K = 4$ dollars available by giving 1 dollar to the 2nd citizen, 2 dollars to the 3rd citizen and 1 dollar to the 4th citizen.
The final list is $[1, 3, 7, 7, 9]$, which has median 7. This is the largest median possible.
- In the 2nd sample case, $K = 0$ dollars are to be distributed, so the answer is the initial median, which is 6.
- In the 3rd sample case, the citizens each have 0 dollars initially.
The prime minister could distribute the $K = 5$ dollars so that the final list is $[2, 1, 2]$, which has median 2. This is the largest median possible.