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# Fair Cut

 by [tunyash](#)

Problem

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Li and Lu have  $n$  integers,  $a_1, a_2, \dots, a_n$ , that they want to divide fairly between the two of them. They decide that if Li gets integers with indices  $I = \{i_1, i_2, \dots, i_k\}$  (which implies that Lu gets integers with indices  $J = \{1, \dots, n\} \setminus I$ ), then the measure of unfairness of this division is:

$$f(I) = \sum_{i \in I} \sum_{j \in J} |a_i - a_j|$$

Find the minimum measure of unfairness that can be obtained with some division of the set of integers where Li gets exactly  $k$  integers.

**Note**  $A \setminus B$  means [Set complement](#)

## Input Format

The first line contains two space-separated integers denoting the respective values of  $n$  (the number of integers Li and Lu have) and  $k$  (the number of integers Li wants).

The second line contains  $n$  space-separated integers describing the respective values of  $a_1, a_2, \dots, a_n$ .

## Constraints

- $1 \leq k < n \leq 3000$
- $1 \leq a_i \leq 10^9$
- For 15% of the test cases,  $n \leq 20$ .
- For 45% of the test cases,  $n \leq 40$ .

## Output Format

Print a single integer denoting the minimum measure of unfairness of some division where Li gets  $k$  integers.

## Sample Input 0

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

## Sample Output 0

```
6
```

## Explanation 0

One possible solution for this input is  $I = \{2, 4\}$ ;  $J = \{1, 3\}$ .  $|a_2 - a_1| + |a_2 - a_3| + |a_4 - a_1| + |a_4 - a_3| = 1 + 2 + 2 + 1 = 6$

## Sample Input 1

```
4 1
3 3 3 1
```

## Sample Output 1

2

## Explanation 1

The following division of numbers is optimal for this input:  $I = \{1\}$ ;  $J = \{2, 3, 4\}$ .

[f](#) [t](#) [in](#)


Submissions: 910

Max Score: 40

Difficulty: Medium

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Java 8



```
1 import java.io.*;
2 import java.util.*;
3 import java.text.*;
4 import java.math.*;
5 import java.util.regex.*;
6
7 public class Solution {
8     public static void main(String args[] ) throws Exception {
9
10         BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
11         String[] num = br.readLine().split("\\s");
12
13         int n = Integer.parseInt(num[0]);
14         int k = Integer.parseInt(num[1]);
15
16         num = br.readLine().split("\\s");
17
18         long[] arr = new long[n];
19         long sum = 0;
20
21         for(int i = 0 ; i < n ; i++){
22             arr[i] = Long.parseLong(num[i]);
23             sum += arr[i];
24         }
25
26         Arrays.sort(arr);
27         ArrayList<Integer> listA = new ArrayList<Integer>();
28         ArrayList<Integer> listB = new ArrayList<Integer>();
29
30         if(k > n / 2){
31             k = n - k;
32         }
33
34         if(n % 2 == 0){
35
36             int index;
37             long value = sum / n;
38
39             index = (n/2);
40
41
42             if(k % 2 == 0)
43             {
44                 listB.add(index);
45                 int a = 1;
46
47                 while(true)
48                 {
49                     if(listB.size() == k )
50                     {
```

```

51         break;
52     }
53
54     if(listB.size() == k - 1){
55
56         int intA, intB;
57
58         if((index + (2*a)) < n){
59             intA = index + (2*a);
60         }
61         else{
62             intA = Integer.MAX_VALUE;
63         }
64
65         if((index - (2*a)) >= 0){
66             intB = index - (2*a);
67         }
68         else{
69             intB = Integer.MAX_VALUE;
70         }
71
72         if(intB < intA){
73             listB.add(index - (2*a));
74         }
75         else{
76             listB.add(index + (2*a));
77         }
78
79         break;
80     }
81
82
83     if((index + (2*a)) < n){
84         listB.add(index + (2*a));
85     }
86
87     if((index - (2*a)) >= 0){
88         listB.add(index - (2*a));
89     }
90
91     a++;
92 }
93
94 }
95 else
96 {
97
98     int a = 1;
99     listB.add(index);
100
101     while(true)
102     {
103         if(listB.size() == k)
104         {
105             break;
106         }
107
108         if((index + (2*a)) < n){
109             listB.add(index + (2*a));
110         }
111
112         if((index - (2*a)) >= 0){
113             listB.add(index - (2*a));
114         }
115
116         a++;
117     }
118 }
119 }
120 }
121 else{
122
123     if(k % 2 == 0)

```

```
124 {
125     int index = n/2;
126     int a = 0;
127     while(true)
128     {
129         if(listB.size() == k)
130         {
131             break;
132         }
133
134         if((index + (2*a + 1)) < n){
135             listB.add(index + (2*a + 1));
136         }
137
138         if((index - (2*a + 1)) >= 0){
139             listB.add(index - (2*a + 1));
140         }
141
142         a++;
143     }
144 }
145 else
146 {
147     int index = n/2 ;
148     listB.add(index);
149     int a = 1;
150     while(true)
151     {
152         if(listB.size() == k)
153         {
154             break;
155         }
156
157         if((index + (2*a)) < n){
158             listB.add(index + (2*a));
159         }
160
161         if((index - (2*a)) >= 0){
162             listB.add(index - (2*a));
163         }
164
165         a++;
166     }
167 }
168 }
169
170 for(int i = 0 ; i < n ; i++){
171     if(!listB.contains(i)){
172         listA.add(i);
173     }
174 }
175
176
177 long output = 0;
178
179 for(int i = 0 ; i < listA.size() ; i++){
180     for(int j = 0 ; j < listB.size() ; j++){
181         output += (Math.abs(arr[listA.get(i)] - arr[listB.get(j)]));
182     }
183 }
184
185
186 System.out.println(output);
187
188 }
189 }
190 }
191 }
```

Line: 1 Col: 1

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