

Problem A. Random Points on the Circle

Input file: *standard input*
Output file: *standard output*
Time limit: 1.7 seconds
Memory limit: 512 mebibytes

Consider a circle of length L and pick a point on the circle which we will call the origin. In this problem, the coordinate of a point on the circle is the length of the counter-clockwise arc from the origin to this point. So, each point on the circle has a coordinate from 0 (inclusive) to L (exclusive). The distance between two points with coordinates a and b on the circle is the length of the smallest arc between them, that is, $\min(|a - b|, L - |a - b|)$.

You are given n ($1 \leq n \leq 1\,000\,000$) houses with integer coordinates on this circle. The coordinates of the houses are generated by a special pseudorandom generator. The code of the generator is given below. Note that there may be multiple houses at the same position.

You have to choose k ($1 \leq k \leq n$) points with integer coordinates on the circle and place collectors at these points. Again, there may be multiple collectors and/or houses at the same position.

After that, you have to assign a collector to each of the given n houses. Finally, for each collector, calculate the sum of all distances to the houses assigned to this collector. Your task is to place collectors and assign houses to them so that the maximum of these sums is as small as possible. Calculate and print this value.

Input

In this problem, $L = 2^{30}$.

The first line contains two integers n and k ($1 \leq k \leq n \leq 1\,000\,000$). There is also a special condition: if $n \geq 100$, then $10 \leq k \leq \frac{n}{10}$ and $n \bmod k = 0$.

The second line contains two integers *seed* and *add* ($1 \leq \text{seed}, \text{add} < L$). In all tests, these numbers are chosen uniformly at random. If we denote coordinate of the i -th point as a_i , the coordinates can be calculated using the following pseudocode:

```
1. for (i = 0; i < n; i++) {  
2.     seed = (seed * 239017 + add) mod L;  
3.     ai = seed;  
4. }
```

Output

Output a single integer: the smallest possible maximum over all collectors of the sum of all distances from this collector to the houses assigned to it.

Examples

standard input	standard output
10 2 13 123	626098570
10 3 13 123	302532222
10 10 13 123	0

Note

The generator produces the following points: 3107344, 752440587, 778714046, 266135273, 241409356, 201905063, 489905338, 937040197, 1024665608, 579507651.

Be careful with your implementation. The time limit is quite tight.