# **Mining**



There are n gold mines along a river, and each mine i produces  $w_i$  tons of gold. In order to collect the mined gold, we want to redistribute and consolidate it amongst exactly k mines where it can be picked up by trucks. We do this according to the following rules:

- You can move gold between any pair of mines (i.e., i and j, where  $1 \le i < j \le n$ ).
- All the gold at some pickup mine i must either stay at mine i or be completely moved to some other mine, j.
- ullet Move w tons of gold between the mine at location  $x_i$  and the mine at location  $x_j$  at a cost of  $|x_i-x_j| imes w$ .

Given n, k, and the amount of gold produced at each mine, find and print the minimum cost of consolidating the gold into k pickup locations according to the above conditions.

#### **Input Format**

The first line contains two space-separated integers describing the respective values of n (the number of mines) and k (the number of pickup locations).

Each line i of the n subsequent lines contains two space-separated integers describing the respective values of  $x_i$  (the mine's distance from the mouth of the river) and  $w_i$  (the amount of gold produced in tons) for mine i.

**Note:** It is guaranteed that the mines are will be given in order of ascending location.

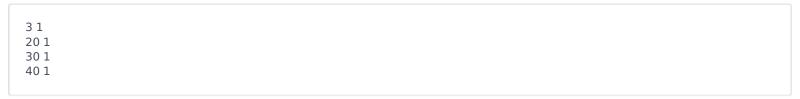
#### **Constraints**

- $1 \le k < n \le 5000$
- $1 < w_i, x_i < 10^6$

# **Output Format**

Print a single line with the minimum cost of consolidating the mined gold amongst k different pickup sites according to the rules stated above.

# Sample Input 0



### Sample Output 0

20

# **Explanation 0**

We need to consolidate the gold from n=3 mines into a single pickup location (because k=1). The mines are all equidistant and they all produce the same amount of gold, so we just move the gold from the mines at locations x=20 and x=40 to the mine at x=30 for a minimal cost of x=20.

# Sample Input 1

3 1		
11.2		
11.5		
12 2		
11 3 12 2 13 1		

#### Sample Input 1

4

#### **Explanation 1**

We need to consolidate the gold from n=3 mines into a single pickup location (because k=1). We can achieve a minimum cost of 4 by moving the gold from mines x=12 and x=13 to the mine at x=11.

# Sample Input 2

```
6 2
10 15
12 17
16 18
18 13
30 10
32 1
```

#### **Sample Output 2**

182

#### **Explanation 2**

We need to consolidate the gold from n=6 mines into k=2 pickup locations. We can minimize the cost of doing this by doing the following:

- 1. Move the gold from the mines at locations x=10, x=16, and x=18 to the mine at x=12.
- 2. Move the gold from the mine at location x=32 to the mine at x=30.