Scarecrows 2

There is a vast field in JOI Village. The field is represented by the infinite xy-plane, where the positive direction of the x-axis is East and the positive direction of the y-axis is North.

The mayor of JOI Village plans to place several scarecrows in the field in order to protect it from enemies. Each scarecrow protects a certain region of the plane depending on its position and direction.

Currently, N placement plans have been proposed, numbered from 1 to N. Executing plan i ($1 \leq i \leq N$) requires a cost of C_i. Each plan is described by three integers T_i, X_i, Y_i as follows.

- If $T_i = 1$, a scarecrow is placed at the point (X_i, Y_i) facing West. This scarecrow protects all points on the plane satisfying $x \leq X_i$.
- If $T_i = 2$, a scarecrow is placed at the point (X_i, Y_i) facing East. This scarecrow protects all points on the plane satisfying $x \geq X_i$.
- If $T_i = 3$, a scarecrow is placed at the point (X_i, Y_i) facing South. This scarecrow protects all points on the plane satisfying $y \leq Y_i$.
- If $T_i = 4$, a scarecrow is placed at the point (X_i, Y_i) facing North. This scarecrow protects all points on the plane satisfying $y \geq Y_i$.

The mayor wants to select and execute some of these N plans so that every point on the plane is protected by at least K scarecrows. Among all such choices, the total cost should be minimized. It is guaranteed that the coordinates (X_i, Y_i) are pairwise distinct among the N plans.

Given the information of the N plans, determine whether it is possible to select plans so that every point on the plane is protected by at least K scarecrows. If it is possible, output the minimum possible total cost of the selected plans.

Input

Read the following data from the standard input.

N K
T_1 X_1 Y_1 C_1
T_2 X_2 Y_2 C_2
$\vdots$
T_N X_N Y_N C_N

Output

Output the minimum total cost required so that every point on the plane is protected by at least K scarecrows. If there is no way to choose the plans so that the condition is satisfied, output `-1`.

Constraints

- $1 \leq K \leq N \leq 200\,000$.
- T_i is one of $1, 2, 3$, or 4 $(1 \leq i \leq N)$.
- $0 \leq X_i \leq 10^9$ $(1 \leq i \leq N)$.
- $0 \leq Y_i \leq 10^9$ $(1 \leq i \leq N)$.
- $(X_i, Y_i) \neq (X_j, Y_j)$ $(1 \leq i < j \leq N)$.
- $0 \leq C_i \leq 10^9$ $(1 \leq i \leq N)$.
- Given values are all integers.

Subtasks

1. (4 points) $K = 1$.
2. (6 points) $K \leq 2$.
3. (11 points) $N \leq 500$, $K \leq 300$.
4. (27 points) $N \leq 6\,000$.
5. (19 points) $N \leq 75\,000$.
6. (33 points) No additional constraints.

Sample Input and Output

Sample Input 1	Sample Output 1
7 1 2 45 21 96 1 5 85 70 1 36 73 78 1 28 12 80 2 15 49 21 1 45 11 96 2 63 26 19	99

For example, suppose that plans 3 and 5 are executed. Then the scarecrows are placed as follows.

- In plan 3, one scarecrow is placed at the point $(36, 73)$ facing West. The cost is 78.
- In plan 5, one scarecrow is placed at the point $(15, 49)$ facing East. The cost is 21.

In this case, every point on the coordinate plane is protected by at least one scarecrow. For example, the point $(0, 0)$ is protected by the scarecrow placed at $(36, 73)$ facing West in plan 3. The total cost is $78 + 21 = 99$. It is impossible to protect every point on the plane with at least one scarecrow with a smaller total cost, so the output should be 99.

This sample input satisfies the constraints of all subtasks.

Sample Input 2	Sample Output 2
7 3 2 45 21 96 1 5 85 70 1 36 73 78 1 28 12 80 2 15 49 21 1 45 11 96 2 63 26 19	-1

This example differs from Sample Input 1 only in the value of K. Since it is impossible to protect every point on the coordinate plane with at least 3 scarecrows, the output should be -1.

This sample input satisfies the constraints of subtasks $3, 4, 5, 6$.

Sample Input 3	Sample Output 3
19 5 2 36 42 64 2 7 89 74 1 0 15 82 1 10 63 55 2 58 28 19 2 45 91 3 2 2 34 97 1 7 55 82 1 17 12 17 2 59 76 82 1 7 4 68 2 51 98 47 1 51 21 38 2 19 0 72 1 73 73 11 2 62 19 74 1 45 7 94 1 79 32 21 1 85 50 21	315

This sample input satisfies the constraints of subtasks 3, 4, 5, 6.

Sample Input 4	Sample Output 4
8 3 4 4 21 80 2 59 65 69 4 63 36 3 2 29 13 23 1 37 45 95 2 79 14 89 3 91 54 76 1 85 46 62	328

This sample input satisfies the constraints of subtasks 3, 4, 5, 6.