

3717 Education Radio Programme

After the very exciting 2006 ICPC finals in San Antonio (Texas), ACM has decided to start a new radio station that will broadcast news, music and useful programming tricks to the farmers in Texas. The radio station itself will not be in Texas; it will be located at Saratov State University (Russia), whose team won the 2006 finals. Who else could give better programming advice than the winners?

In order to reach every ranch in Texas, powerful antennas have to be installed at the radio station. These antennas are very expensive, and they can broadcast only at a limited angle. More precisely, the price of an antenna is proportional to the *square* of the angle. The cheapest antenna can broadcast across a 1-degree range and costs 1 unit of money; the second cheapest broadcasts across a 2-degree range and costs 4 units, etc. For example, if the radio station is at (0,0) and there are two ranches at (0, 2) and (2, 2), then a 45-degree antenna (costing 2025) can broadcast to both ranches at the same time, but a 44-degree antenna (costing 1936) can broadcast to at most one of the ranches. The angle of the antenna is always an integer, thus there are 360 different types of antennas.

Your task is to optimize the type and position of the antennas such that every ranch is reached and the total cost is minimized.

Input

The input contains several blocks of test cases. Each block begins with a line containing two integers: $1 \leq n \leq 5000$ is the number of ranches and $1 \leq m \leq 40$ is the maximum number of antennas that you can install. The next n lines contain 2 integers each; they describe the coordinates of the n ranches (these numbers are between 0 and 100000). The location of the radio station is always (0, 0).

The input is terminated by a block with $n = m = 0$.

Output

For each test case, you have to output a single line containing an integer, the minimum cost of broadcasting to all the ranches using at most m antennas.

Sample Input

```
3 2
0 2
2 0
2 2
3 3
0 2
2 0
2 2
0 0
```

Sample Output

```
2026
3
```