

D Delft Distance

Time limit: 5s

You are currently in your hotel at the north-west corner of Delft, and want to go to the contest site at the university in the south-east corner of Delft. To get there, you have to go right through the historical centre of the city. Like Manhattan, the city consists of a grid of $h \times w$ buildings. But unlike Manhattan, the city does not only contain square residential buildings but also some round medieval towers. All the square buildings are axis aligned with a side length of 10 m and all round towers have a diameter of 10 m. There is just enough space for a small alley of negligible width between two neighbouring buildings.



Delft water tower.
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on Wikipedia

Since you are already late for the contest start, you need to find a shortest path from your hotel to the contest site. Fortunately, you have a map of the city. See Figure D.1 for an example.

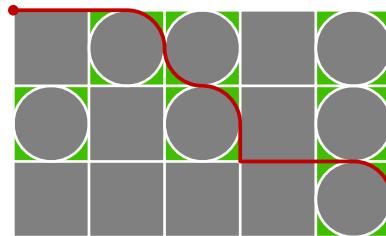


Figure D.1: Illustration of Sample Input 1, with a shortest path shown in red.

Input

The input consists of:

- One line with two integers h and w ($1 \leq h, w \leq 700$), the number of rows and the number of columns of buildings shown on the map of the city.
- h lines, each with w characters which are either ‘O’ (for round towers) or ‘X’ (for square buildings) describing the shapes of the buildings.

The map is oriented with the north side up.

Output

Output the length of a shortest path from the north-west corner to the south-east corner of Delft in metres. Your answer may have a relative or absolute error of at most 10^{-6} .

Sample Input 1

```
3 5
XOOXO
OXOXO
XXXXO
```

Sample Output 1

```
71.4159265359
```

Sample Input 2

```
1 4
XOOX
```

Sample Output 2

```
45.7079632679
```