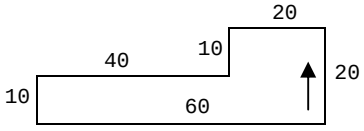
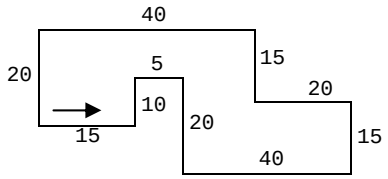
Problem 9: The Wall Walker

Frugal Floors is in the business of selling and installing carpet and hardwood floors. Part of their job is to accurately determine the amount of material needed to cover the floor in a room. Because many rooms aren't simple rectangles, Frugal Floors employs a small robot to record the outline of the floor. Assuming the room is empty (or at least has all the furniture moved away from the walls), the robot starts at the intersection of two walls. It then moves along a wall, always staying in contact with a wall, recording its path, until it returns to the starting point. Frugal Floors – as part of being frugal – always requires their customer's rooms to have square corners. Their employees are also careful to close the doors to the rooms being measured to avoid having their robot wander into other rooms!

Once the robot completes its trip around the room's periphery, the data it recorded is downloaded to a computer and used to compute various items. In particular, the area of the floor is an important value. In this problem you will write a program that will compute that area from the robot's route.

The route data is simple: it consists of a sequence of pairs (distance,direction), where "distance" is the distance the robot travels along a wall, and "direction" is left or right, indicating the way the robot turned to continue along the next wall. Let's consider a few examples.





In the room on the left, the robot begins in the lower right corner and travels 20 feet, as indicated by the arrow. It then turns left and travels another 20 feet. It turns left again and travels 10 feet. After a right turn it travels 40 feet. Another left turn, 10 feet more, another left turn, and 60 feet more bring the robot back to its starting point.

To illustrate the input data format, let's consider the robot's data for the room on the right. It will be this:

15 L 10 R 5 R 20 L 40 L 15 L 20 R 15 L 40 L 20 X

The input is an integer giving the number of distance units[1] the robot moved, a space, the letter L or R, a space, another integer distance, and so forth until the robot reaches its starting point, at which point it emits the letter X and the end of line (instead or L or R).

The problem, of course, is to determine the area of the room measured by the robot. You are assured that the robot's data is correct, and that only real rooms with positive non-zero areas are being measured. You may also safely assume the area of each room is no greater than 100,000 square feet, and that no wall is longer than 1,000 feet.

[1] We use the foot as the unit of measurement in this problem, but the real robot can be configured to use much smaller units, like centimeters, for accuracy.

Input

There will be multiple cases to consider. The input for each case is contained entirely in a single input line, and consists of an alternating sequence of integers and capital letters (L or R or X), beginning with an integer and ending with the letter X. Adjacent items are separated by exactly one space. The end of line immediately follows the X. A line containing only an X and the end of line follows the input for the last case.

Output

For each input case, display the case number (1, 2, …) and the area of the room. The sample input and output illustrates the appropriate format. Display a blank line after the output for each case.

Sample Input	Output for the Sample Input
20 L 20 L 10 R 40 L 10 L 60 X 15 L 10 R 5 R 20 L 40 L 15 L 20 R 15 L 40 L 20 X X	Case 1: 800 sq. ft. Case 2: 1250 sq. ft.