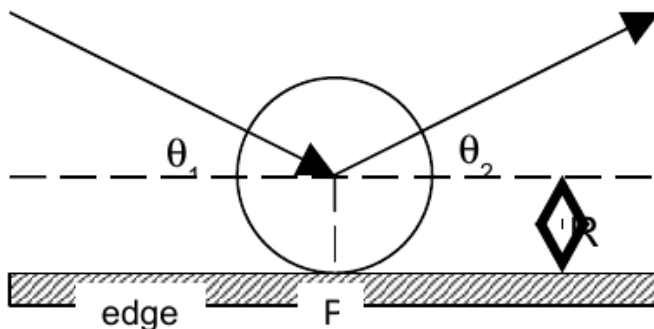
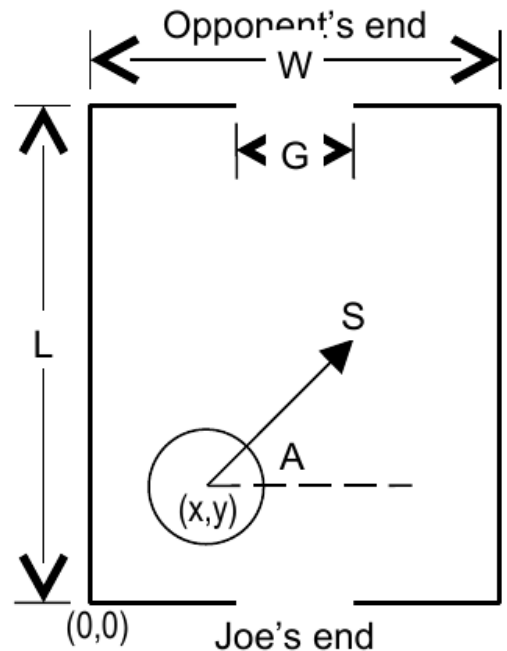


### 3316 Joe's Air-Hockey Game

Joe wants to make a simple air-hockey simulation game. Playing the game, Joe launches the puck giving it an initial position  $(x, y)$  (measured relative to the bottom-left of the table, in the diagram on the right), speed  $S$ , and direction  $A$  (measured relative to the  $x$ -axis) whereupon it bounces around the table until it either drops into the goal at the opponent's or at Joe's end, or stops. The table has length  $L$ , width  $W$ , and has two goals each of width  $G$ , centered on the ends of the table. The puck has radius  $R$ .

The physics is simple. The arrows on the diagram on the left represent the path of the center of the puck as it bounces off one of the table edges, touching the table edge at  $P$ . The angle of incidence,  $\theta_1$  is equal to the angle of reflection,  $\theta_2$ . The initial "speed" ( $S$ ) of the puck is actually the maximum number of edges the puck can bounce off before it immediately comes to rest. If, after bouncing less than  $S$  times, the puck touches any part of either goal, it falls into that goal.



Given a set of Joe's puck launch specifications, we want to determine how many score a goal for Joe (i.e., land in the opponent's goal at the top of the diagram) and how many score a goal for the opponent. The remainder will just come to rest without scoring and not be counted.

#### Input

Each data set starts with a line containing table specifications: respectively, table length  $L$  ( $5.0 \leq L \leq 30.0$ ), table width  $W$  ( $4.0 \leq W \leq 12.0$ ), goal width  $G$  ( $1.0 \leq G \leq 2.0$ ), and decimal puck radius  $R$  ( $0.5 \leq R \leq G$ ).

The next line contains a single value, being the number of launch specifications,  $n$  ( $0 \leq n \leq 100$ ). A value of zero here represents the last data set, which should not be processed.

The next  $n$  lines each contain a single launch specification: respectively, the  $x$ - and  $y$ -coordinates of the initial puck position ( $R \leq x \leq W - R$  and  $R \leq y \leq L - R$ ), direction in degrees  $A$  ( $0 \leq A \leq 180$ ), and "speed"  $S$  ( $0 \leq S \leq 12$ ).

Other than  $n$  and  $S$ , which are integer, all values are real numbers with at most 4 decimal places.

#### Output

Each data set should produce a line in the form

Game  $g$ : Joe  $n$ , opponent  $m$ .

where  $g$  is the game (data set) number, starting at 1,  $n$  is the number of goals scored by Joe, and  $m$  is the number of goals scored by the opponent.

### Sample Input

```
12 12 2 1
4
10.9 3.0 68.5 9
6.0 1.01 12.53 11
6.6 3.0 68.5 7
5.4 3.0 111.5 3
22 12 2 1
2
5.4 5.0 101.14 10
5.4 5.0 101.14 2
12 12 2 1
0
```

### Sample Output

```
Game 1: Joe 1, opponent 2.
Game 2: Joe 1, opponent 0.
```