**General Statement:** Matt Darby is traveling through space attempting to hack the universe. Using code he found on Wikipedia, Darby calculates the location of the center of the universe. Upon arriving in the center of the universe, a black hole sucks him in to an alternate dimension. After a rough trip through the black hole, Darby discovers a strange new reality. Wormholes connect different paths throughout this strange new world, and there is only one way to escape. Since Darby’s Wiki code is useless at this point, he turns to you for help. Help Darby solve the puzzle of the wormholes and escape the center of the universe!

**Input:** The first line in the data file is an integer that represents the number of data sets to follow. Each data set will contain two integers, r and c, and a wormhole maze, which consists of one or more lines of various characters. The two integers in the data set specify the size of the maze. r, the first integer, represents the height of the wormhole maze, and c, the second integer, represents the width. The maximum size of the matrix is 60x60 and the minimum size is 1x3 (rows x columns).

The following are the only symbols that will be used:

@ - starting position

! - exit

# - wall

. - space

Aa - wormholes

Inside the mazes are pairs of wormholes. Each pair of wormholes has an entry wormhole and an exit wormhole, meaning the wormholes are one-way paths. Uppercase letters represent the entry wormholes, and lowercase letters represent the exit wormholes. Matt cannot pass through exit wormholes, he may only move out of them.

**Name of Data File :** pr96.dat

**Name of Program :** pr96.java

**Output:** Your program should produce n lines of output, n representing the number of data sets. Each output line should contain one sentence stating the shortest number of steps it takes to go through the wormhole maze, like so: "ESCAPED THE WORMHOLES IN x STEPS!", where x is the shortest number of steps.

**Assumptions:** The starting position will always be spot (0,0) of the maze. Matt will always be able to escape. For every entry wormhole, there will be an exit wormhole. **Moving/warping from an entry wormhole to an exit wormhole does not count as a step**. It will always take more than 1 step to escape the maze. Matt cannot move diagonally.

**Sample Input**: (page 2 of 2)

3

1 7

@.A#a.!

5 5

@####

....#

#..## A.###

##a.!

11 10

@#########

.#a#b#d.##

.#.#.#..##

.#.#.#..##

.#.#.#E.e#

.#.#C#f.F#

.#.###G.g#

.#.#c#h.H#

.#.#.#I.i#

.#.#.#j.J#

A#B#D#K.k!

**Sample Output:**

ESCAPED THE WORMHOLES IN 4 STEPS! ESCAPED THE WORMHOLES IN 7 STEPS! ESCAPED THE WORMHOLES IN 36 STEPS!