**AP Computer Science - Merlin Program - 30 Points**

Merlin is a game that is played on a 5 x 5 board, consisting of a light at each position on the board.

When a space on the board is selected, the light on that space, as well as every space above, below, to the right and to the left will change from either "off" to "on", or vice-versa. The goal of the game is to turn off all 25 lights on the board.

Your java implementation of this will use "O" to represent lights that are on and "-" for those lights that are on.

You program will begin by randomly displaying a **solvable** Merlin board. A minimum of 10 lights must be turned on to start the game.

The user will enter coordinates, similar to Battleship to designate the location on the board they wish to choose. The program will respond by switch that space and all non-diagonal space to their opposite light setting(on or off).

The program should detect when the game is won and output the number of moves it took to solve the board.

Sample Board:

ABCDE ABCDE

1 OO--O 1 OO--O

2 ---O- 2 ---O-

3 -OOO- User selects (C4) 3 -O-O- C4 and all adjacent spaces change

4 -O-O- 4 --O--

5 O-O-- 5 O----

**Merlin Rubric**

|  |  |  |
| --- | --- | --- |
| **Objective** | **Points Possible** | **Points Earned** |
| Does your program output a board representing a 5 x 5 Merlin board? | 2 |  |
| Does your output include row letters and column numbers, stupendously formatted? | 1 |  |
| Does your program begin with a minimum of 10 "on" spaces? Run several times to verify. | 5 |  |
| Does your program convert the user's input into a coordinate on the board? | 2 |  |
| Does your program correctly switch the chosen space from on to off or vice-versa? | 2 |  |
| Does your program correctly switch the four surrounding spaces? | 4 |  |
| Does your switching method work properly on border spaces? | 4 |  |
| Is your Merlin program always produce a solvable board? | 5 |  |
| Does your program detect when the player wins? | 3 |  |
| Does your program output the number of moves taken to win after a win? | 2 |  |
| Total |  |  |

Solving Merlin

1. For each light on row 1, press the button beneath it on row 2 to turn the light off. This way row 1 is completely unlit.
2. Repeat step a for rows 2-4, so that now you only have lights on row 5. This is usually called 'chasing the lights'.
3. If the light at A5 is on, press D1 and E1.   
   If the light at B5 is on, press B1 and E1.   
   If the light at C5 is on, press D1.
4. Repeat steps a-b, chasing the lights down and it will be magically solved.