Lab: Chapter 5A

* ***Please read the directions in their entirety before starting the lab.***
* Please work with a partner following Paired Programming guidelines.
* When you are finished with every part of the lab, call the instructor over for signoff.
* Both partners should submit separately the required files to Canvas.
* Both partners should each save a copy of the project files to their Google Drives or external media

## Part 1

### Prerequisite: Lecture or Reading on Chapter 5 GridWorld

* Create a new document called **Lab-Ch5.docx**. You will use this document to answer questions throughout the lab.
* Download and extract the [GridWorld](https://apstudent.collegeboard.org/apcourse/ap-computer-science-a/about-the-exam/gridworld-case-study) zip. Put the extracted GridWorldCode folder in your CMPS 10A folder (or wherever you are saving your labs and assignments).
* Then in BlueJ click on Tools→Preferences→Libraries→Add and navigate to the GridWorldCode folder and choose GridWorld.jar. Restart BlueJ, then choose Open>Non BlueJ Project and navigate to the GridWorldCode folder open projects and choose firstProject.
* Read Part 1 of the [narrative](https://secure-media.collegeboard.org/ap-student/course/gridworld/AP_Computer-Science-A-Grid-World-Narrative-Part1.pdf), and type in your answers to the questions in the space below.
* Make a bug, take several steps and observe its behavior. Then add more rocks and bugs by clicking on empty cells and selecting the actors of your choice. Answer the following questions in **Lab-Ch5.docx** based on your observations using the Step and Run buttons.



1. **Does the bug always move to a new location? Explain.**

Each time that the program runs, the bug starts in a different position. It is randomized.

1. **In which direction does the bug move?**

The bug moves in the direction it is facing. It starts facing North and continues to go North unless another object or the edge interferes with it’s path.

1. **What does the bug do if it does not move?**

If the bug can’t move then it will rotate until it can move

1. **What does a bug leave behind when it moves?**

When a bug moves it leaves behind a flower

1. **What happens when the bug is at an edge of the grid? (Consider whether the bug**

**is facing the edge as well as whether the bug is facing some other direction when answering this question.)**

If the bug is facing the edge and is at one of the edge squares, then it will rotate and change the direction. If is on an edge and isn’t facing the edge as well then it will continue on the edge until the direction it is facing is the edge.

1. **What happens when a bug has a rock in the location immediately in front of it?**

The bug can’t continue the path it was going on. It will rotate and change directions, traveling towards the direction that it has previously rotated to.

1. **Does a flower move?**

No, flowers do not move. Once it is left by the bug, it doesn’t move.

1. **What behavior does a flower have?**

A flower gets darker as new flowers are placed, but turns back to bright red once a bug moves back to the square where the flower is placed.

1. **Does a rock move or have any other behavior?**

Rocks do not move and bugs can’t move onto the spots where the rocks are placed.

1. **Can more than one actor (bug, flower, rock) be in the same location in the grid at the same time?**

Not at the same time. Bugs can move to a square where a flower is placed. The flower will be replaced with the bug until the bug moves. Once the bug is off the square, then a flower will be replaced where the bug was.

## Part 2

Complete the following activities from Part 1 of the GridWorld Narrative and write your answers in **Lab-Ch5.docx**.

By clicking on a cell containing a bug, flower, or rock, do the following.

1. Test the setDirection method with the following inputs and complete the table, giving the compass direction each input represents.

|  |  |
| --- | --- |
| Degrees | Compass Direction |
| 0 | North |
| 45 | North-East |
| 90 | East |
| 135 | South-East |
| 180 | South |
| 225 | South-West |
| 270 | East |
| 315 | North-West |
| 360 | North |

1. **Move a bug to a different location using the moveTo method. In which directions can you move it? How far can you move it? What happens if you try to move the bug outside the grid?**

You can move the bug to any space that’s in the grid. If you try to move the bug off the grid, bigger than (9,9), you get a error message saying that the location is not valid.

1. **Change the color of a bug, a flower, and a rock. Which method did you use?**

setColor()

1. **Move a rock on top of a bug and then move the rock again. What happened to the bug?**

When a rock moves on top of a bug the bug disappears.

## What to Submit

**Lab-Ch5.docx**