GridWorld
Chicken Coop 1

Objective: To create a chicken and egg simulation in GridWorld.

Background: Chickens like to lay eggs, and eggs hatch into new chickens. Unfortunately, chickens get older and eventually die. You are going to use GridWorld to simulate the chicken and egg cycle.

Assignment:
You will make three new **Actors**: a **Chicken**, an **Egg**, and a **Tombstone**. **Chicken**s run around frantically, turning this way and that. As they age, they get slower and turn gray. Eventually, they die and are removed from the grid.

Young **Chicken**s lay **Egg**s which incubate over time and hatch into young **Chicken**s.

When a **Chicken** dies, a **Tombstone** appears in its place for a short while, then it disappears.

1. Create a **Tombstone** class that extends the **Actor** class. A **Tombstone** has a lifetime of 20 steps by default. One "Step" is a call to the **act()** method. Create a private variable **lifetime** that is used to countdown the life of a **Tombstone**. Create a constructor that initializes **lifetime** to 20. Override its **act()** method to decrement **lifetime**. When **lifetime** reaches zero, remove the **Tombstone** from the grid. Create a runner class to place **Tombstone**s on the grid, then run through a simulation.

2. Create a **Chicken** class that extends the **Critter** class. In the constructor, the **Chicken** should be set to the color **WHITE**. For each step, the **Chicken** randomly chooses between moving to the adjacent **Location** (in the direction it is facing) or making a random turn in any one of the eight compass directions. Create a runner class to place **Chicken**s on the grid, then run through a simulation.

3. Enhance the **Chicken** class to include aging. A **Chicken** keeps track of how many steps it has taken. It reaches middle age after 200 steps. During middle age, it moves or turns only every other step. After 280 total steps, the **Chicken** turns elderly and starts to gray gradually. Elderly chickens only move every fourth step. When a **Chicken** reaches 300 total steps, it dies and is replaced by a **Tombstone**. Test your enhanced **Chicken** class using the runner from part 2 above.
(Hint: Put the **Tombstone** on the grid in the **Chicken**'s **makeMove()** method, not its **processActors()** method. You do not have to remove the **Chicken** since it is automatically removed when you put something else in its location.)

4. Create an **Egg** class that extends the **Actor** class. An Egg never moves. It starts as **Color.WHITE** and darkens in color with each step. When the number of steps reaches 45, the **Egg** turns **Color.RED**. When the **Egg** reaches 50 steps, it is replaced by a new **Chicken**.

5. Modify the **Chicken** class so that it has a 1 in 20 chance of laying an **Egg** when it moves. This only can happen while the **Chicken** is young. **Chicken**s in middle age or elderly do not lay eggs.