Class Exercise - Creating a Class

Define a class named RandomWalker. A RandomWalker object should keep track of its (x, y) location. All walkers created with the zero argument constructor start at the coordinates (0, 0). Include a constructor to set the initial x and y of a walker.

When a walker is asked to move, it randomly moves either left, right, up or down. Each of these four moves should occur with equal probability. The resulting behavior is known as a "random walk." (A 2-dimensional random walk example is pictured at right.)

Each RandomWalker object should have the following public methods. You may add whatever fields or methods you feel are necessary to implement these methods:

- RandomWalker()
  Create a random walker with x, y of 0, 0.

- RandomWalker(int x, int y)
  Create a random walker with x, y equal to the given parameters.

- move()
  Instructs this random walker to randomly make one of the 4 possible moves (up, down, left, or right).

- getX()
  Returns this random walker's current x-coordinate.

- getY()
  Returns this random walker's current y-coordinate.

- getSteps()
  Returns the number of steps this random walker has taken.
Random walks have interesting mathematical properties. For example, given infinitely many steps, a random walker approaches 100% chance of reaching a particular (x, y) coordinate. To learn more about random walks, visit http://mathworld.wolfram.com/RandomWalk.html.

Test your RandomWalker by running it with the TestRandomWalker test class, found on the problems web site. The TestRandomWalker will run your random walker in a loop and animate its position as it moves.

Write another program to test your RandomWalker. How many steps does it take for the RandomWalker to end up a distance of 500 steps (units) away from its starting point? Write code to repeat the experiment 1000 times.

What is the average number of steps it takes a random walker to end up a distance of 500 steps (units) away from its starting location?