

```
1import java.awt.Color;
2import java.awt.Dimension;
3import java.awt.Graphics;
4import java.util.Random;
5
6import javax.swing.JPanel;
7import javax.swing.JFrame;
8
9public class DartDropping extends JPanel {
10
11    // Unique version ID for this class to ensure saved objects
12    // can be loaded safely
13    private static final long serialVersionUID = 1L;
14
15    // main method to launch the program as a standalone
16    // application – no need to modify
17    public static void main(String[] args) {
18        DartDropping panel = new DartDropping();
19        panel.setPreferredSize(new Dimension(1000, 1000)); // content
12        size window dimensions
20
21        JFrame frame = new JFrame("DartDropping"); // Title of
22        frame
23        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
24        frame.add(panel);
25        frame.pack();
26        frame.setVisible(true);
27    }
28
29    public void calculate(Graphics g) {
30        int count = 0;
31        double darts = 1000000.0; //Note that with graphics, the
32        // code is slower. It will take a much longer time for 100 million or
33        // 1 billion although it is possible. Currently will take 10-20
34        // Seconds for 10 million
35        int i = 1;
36        Random rand = new Random();
37        System.out.println("Calculating. Please wait.");
38        while (i<=darts) {
39            double randx = rand.nextDouble(2)-1;
40            double randy = rand.nextDouble(2)-1;
41            double distance = Math.sqrt((randx-0)*(randx-0) +
42                (randy-0)*(randy-0));
43            if (distance <=1) {
44                count++;
45                g.setColor(Color.GREEN);
46            }
47            else
48                g.setColor(Color.BLUE);
49        }
50    }
51}
```

```
42             g.fillOval((int)((randx+1)*500), (int)((randy+1)*500),  
43             1, 1);  
44         i+=1;  
45     }  
46     double pi = count / darts*4.0;  
47     System.out.println("Pi according to " + (int)darts + "  
48     darts: " + pi + "\n");  
49 }  
50  
51 @Override  
52 protected void paintComponent(Graphics g) {  
53     super.paintComponent(g); // Clears the panel before drawing  
54     calculate(g);  
55 }  
56 }  
57 }
```