

Lab 9

Jars of Marbles

Objective

To use classes that simulates a real-world object.

Background

Imagine a class that simulates a jar of marbles, which is defined as follows:

```
class MarbleJar
{
    public:

        MarbleJar();                // default jar of 10 each color
        MarbleJar(int black, int white); // initializes jar contents
        string DrawMarble( );        // draws and returns color
        void AddMarble (string color); // adds marble to jar
        bool IsEmpty ();             // returns true(1) if empty
    private:
        int myNumberBlack, myNumberWhite; // marbles in the jar
        int myRandom ();                 // returns random number
};
```

This class provides, through its member functions, the only operations that can be performed on the jar. That is, a person can only remove a marble, add a marble, and check to see if the jar is empty.

Assignment

Before you begin, you will need to copy the file `marble.h` to your directory and include it in your program. The include statement is as follows: `#include "marble.h"`

Suppose a jar contains the same number of black and white marbles. If you reach in and pull out two random marbles, are they more likely to be the same color or different colors? Using the `MarbleJar` class, write a C++ program that will help you answer this question. Your program should prompt the user for the initial number of marbles of each color and create an appropriate `MarbleJar` object. Then it should repeatedly draw two marbles from the jar, keeping track of how many times they are the same color and how many times they are different (make sure you replace the marble after each draw). Do this 1000 times, and then display the results.

Analysis

Once you have your program working, answer the following questions:

- What is the answer to this puzzle? Are the two marbles more likely to be the same color or different colors? Can you explain why?
- Does increasing the total number of marbles in the jar affect the results in any way?

Sample Run

```
Enter number of black and white marbles: 4 4
They were the same 43.4% of the time, different 56.6% of the time.
```

```
Enter number of black and white marbles: 100 100
They were the same 43.6% of the time, different 56.4% of the time.
```