

People sometimes call literals that are sprinkled around in code "magic numbers" because their purpose is often mysterious to those reading the code.

Good Practice: except for literals that are very unlikely to change and whose purpose is obvious, use a class constant with a meaningful name instead.

For example,

```
for (int i=2; i<=12; i++)    // What are these numbers?
```

is less clear than

```
for (int i=MIN_DICE_ROLL; i<=MAX_DICE_ROLL; i++)
```

- 1) Rewrite the following code, replacing literals with class constants unless the literals have an obvious purpose and are very unlikely to change. Running your code should output a number close to 1/36.

```
// Roll 2 dice labeled 0-5 many times, tally their sums
// Print fraction of times max possible value is seen

import java.util.Random;

public class SimulateRolls {

    public static void main(String[] args) {
        Random rand = new Random();
        // 11 possible outcomes, 0-10, "new" auto inits to 0
        int count[] = new int[11];
        for (int i=0; i<100000; i++) {
            // Each nextInt yield a value 0-5
            int roll = rand.nextInt(6) + rand.nextInt(6);
            count[roll] += 1;
        }
        // Without a typecast here, would do integer division
        System.out.println("Probability largest value = " +
            count[10]/(double)100000);
    }
}
```

Discussion item: What are some examples of literals that are very unlikely to change and whose purpose is obvious?

Java predefines some class constants in many of its built-in classes. For example, the `Math` class defines constants for π and e .

- 2) Search the internet for "Java 11 Math"¹. The first result should be the Java documentation ("javadoc") for the `Math` class. Find the "Fields" section and read the definition for the constants for π and e .

When class `X` defines a public static constant `Y`, code in other classes can access the constant using the notation `X.Y`. For example, `Math.PI` and `Math.E` can be used to access these constants.

- 3) Write a small program that prints the values of all the class constants (except the one named `TYPE`) from the `Integer` class. Your program's output should include the constant, its value, and a very short explanation of what it means. For example, if you were doing this for the `Math` class, one of your outputs might look like:

```
Math.PI = 3.141592653589793 (ratio of circumference/diameter)
```

¹ I search for "Java 11 Math" when looking for the `Math` class documentation because I have Java version 11 on my computer. If you know your Java version, you can use that instead of 11.