

The purpose of this project is to begin to use Java variables and methods. There are four kinds of variables: static, instance, local, and parameter. We explore each of these, first using only the main method, then using methods as functions.

Create a new directory **Geometry** to hold all of the source files for this project.

Program 1. Type, compile, and run the program **FirstCircle**.

```
public class FirstCircle
{
    private static float PI = 3.14159f;

    public static void main(String[] args)
    {
        float r = 3;
        float C = 2 * PI * r;
        float A = PI * r * r;

        System.out.println("Circle Data");
        System.out.println("Radius: " + r);
        System.out.println("Circumference: " + C);
        System.out.println("Area: " + A);
    }
}
```

In this program, 2, 3, and 3.14159f are constants; the f at the end of 3.14159f tells the compiler that we are using a floating point constant.

The variables **r**, **C**, and **A** are local variables.

The variable **PI** is a static (class) variable.

Program 2. Copy this program into **FirstSphere.java**. Modify the program to output sphere data, including the volume and surface area.

Program 3. Copy this program into **FirstCone.java**. Modify the program to output cone data, including the volume and surface area.

Program 4. Copy `FirstCircle.java` into a new program `SecondCircle`. Refactor this program so that the computational methods are separate from the calling `main` method.

```
public class SecondCircle
{
    private static float PI = 3.14159f;

    public static float circumference(float r)
    {
        return 2 * PI * r;
    }

    public static float area(float r)
    {
        return PI * r * r;
    }

    public static void main(String[] args)
    {
        float D = 6;
        float C = circumference(D / 2);
        float A = area(D / 2);

        System.out.println("Diameter: " + D);
        System.out.println("Circumference: " + C);
        System.out.println("Area: " + A);
    }
}
```

This separates the actual logic for the computations from the code which tests these computations.

The variable `r` is a parameter for the circumference and for the area methods. NOTE: the variable `r` in the `circumference` method *is a different variable* from the variable `r` in the `area` method.

Program 5. Create the class `SecondSphere` in an analogous manner.

Program 6. Create the class `SecondCone` in an analogous manner.