public class Rectangle extends Object {
    // We have a notion of inheritance, and of Object class
    /*
     * Fields
     */
    private double width;
    private double length;
    /*
     * Constructors
     */
    public Rectangle(double width, double length) {
        this.width = width;
        this.length = length;
    }
    public Rectangle() {
        this.width = 0;
        this.length = 0;
    }
    // Java will know which one we are calling using the signature
    // (name + input type and order of the method)
    /*
     * Getters and setters
     * There are no properties in Java.
     */
    // Getters, defined manually
    public double getLength() {
        return length;
    }
    public double getWidth() {

return width;
}

// Setters, defined manually
public void setLength(double l) {
    length = l;
}
public void setWidth(double width) {
    this.width = width; // We can use the "this" keyword to overcome shadowing.
}

/*
 * Other methods
 */

public final double getArea() {
    // final makes that this method can't be overridden, even by methods in class extending this one
    return length * width;
}

public String toString() {
    return ("This rectangle is " + width + " x " + length + " (" + getArea() + ")");
}

// This is a really compact equals method.
public boolean equals(Rectangle r) {
    return r.length == this.length && r.width == this.width;
}

Demo.java

/*
 * Clément Aubert
 * https://spots.augusta.edu/caubert/teaching/general/java/
 * 5th November 2019
 */

import java.util.Scanner; // Importing a java API to read from the keyboard.
import java.io.File; // Importing a java API to manipulate files.

public class Demo { // Class header
    public static void main(String[] args) { // Method name
        System.out.println("Hi"); // "System" is a Class, "out" an object in this class,
        "println" a method, and "Hi" a String literal.
    }

    /*
     * Datatypes
     */
int number_of_students = 6; // Variables start with lower case.
boolean myFlag = true;
char letter = 'c';
double tax = 3.2;
// There is no "decimal" datatype in Java: for monetary amounts, use the BigDecimal class.

/*
 * If-else-if
 */
if (!myFlag) {
  System.out.println("Hi to all " + number_of_students + " of you" + "\n \t" + letter);
  // Escape sequences: \n for new line, \t for tabulation
} else if (tax > 4) {
  System.out.printf("%d, %f, %s, %c \n", 3, 2.5, "Cle", 'C');
  // Cf. below for string formatting
} else {
  System.out.printf("%f \n", (++tax));
  // prefix increment operator: increment, and then display on the screen
}

/*
 * Displaying on the screen
 * The syntax is %[flags][width][.precision]conversion
 * Where a flag is
 * * , to use comma separators
 * * 07, to pad with e.g. seven "0"s.
 * * -, to left justify
 * width is the width of the field printed
 * precision is when the value should be rounded
 * and the conversion is
 * * f for floating point
 * * d for integer
 * * s for string
 * * c for character
 */
System.out.printf("%07d \n", 1234);  // 0001234
System.out.printf("%09.2f \n", 1.234);  // 000001.23
System.out.printf("%.1f \n", 78.427);  // 78.4
System.out.printf("%20f \n", 12.4);  // 12.400000
System.out.printf("%-10s %10s \n", "Bob", "Jane");  // Bob  Jane
System.out.printf("%s \n", 1234);  // 1234 -- We can use type casting.

/*
 * String
 */
String name = "Totoro";
int size = name.length();  // length is a method in the String class.
```java
if (name.equals("Clément")) { // We can’t use equal sign to compare strings, we have to ❂ use a method.
    System.out.print("We have the same name!");
}

/*
 * Reading from keyboard
 */
Scanner key = new Scanner(System.in); // We first create a Scanner object.
System.out.print("Enter your name:\n");
String your_name = key.nextLine(); // And then use the nextLine() method to read ❂ a String.
System.out.print("Enter your age:\n");
int your_age = key.nextInt(); // Reading an Int can be done with nextInt()
System.out.print(your_name + " entered " + your_age + ".\n");

/*
 * While loops
 */
int y = 0;
while (y < 3 && myFlag) {
    System.out.printf("y is %d, let’s increment it.\n", y);
    y++;
}

/*
 * Array and for loops.
 */
int[] numbers; // Declares array reference variable.
numbers = new int[6]; // Actually creates the array and assign its adress to numbers.
for (int i = 0; i < numbers.length; i++) {
    numbers[i] = i;
    System.out.println(numbers[i]);
}

for (int z = 4; z > 2; z--) {
    System.out.printf("z is %d, let’s decrement it.\n", z);
}

// We can use the shorthand notation:
int[] intArray = {
    1,
    2,
    3,
    4,
    5,
    6,
    7,
    8,
};
```

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try {
    for (int i = 0; i < intArray.length; i++) // try to replace the < with <= to raise the
        // exception.
        System.out.print(intArray[i] + " ");
} catch (StringIndexOutOfBoundsException e) {
    System.out.print("StringIndexOutOfBoundsException");
}
System.out.println("\n");

/*
   try-with-resources is close to C#'s using statements.
   The main idea is that:
   - Java will try to execute the statements between the parenthesis, and create
     objects in that part,
     we call those objects "resources".
   - If everything goes fine, it will execute the body of the try-with-resource, and,
     once it is done,
     it will "destroy" the resources.
   - If something goes wrong, it will raise the exception.
   You can read more at
   <https://docs.oracle.com/javase/tutorial/essential/exceptions/tryResourceClose.html>
   to be a resource, the class must implement java.lang.AutoCloseable.

   Note that there are many benefits to using try-with-resources instead of "simply" a
   try-catch-finally block. You can find them discussed at
   https://stackoverflow.com/a/17739403
   and
   https://www.journaldev.com/592/java-try-with-resources
   In short:
   - More readable and shorter code,
   - Automatic resource management,
   - Support multiple resources.
*/

try {
    Scanner scanner = new Scanner(new File("test.txt"); // This statement opens the file
        // "test.txt".
    ) {

        while (scanner.hasNext()) // as long as there is a line that have not been read, move
            // the cursor...
            {
            System.out.println(scanner.nextLine()); // read it.
        } // and loop.
    } catch (Exception e) { // If opening the file did not work, execute this block.
        e.printStackTrace();
    }
// When we reach this point, the scanner object does not exist anymore!

/*
 * Creating objects created in a different class.
 * You have to compile Rectangle.java in the same folder for this to work.
 */

Rectangle box1 = new Rectangle(2, 4);
Rectangle box2 = new Rectangle();

/*
 * Using methods.
 */

System.out.println(box1 + "\n"); // Implicitely call the toString() method.
System.out.println(box1.equals(box2) + "\n"); // Gets evaluated to false. We can't use
   equal sign to compare those objects.
System.out.println(box1.getArea() + "\n"); // Example of another method.

/*
 * Of course, you can also have lambda expressions, tuples, ArrayList ("resizable
   arrays"), interfaces, polymorphism, etc.
 * If you can write a program in an object-oriented programming language, then you can
   write it in Java.
 */