Classes in Java have 2 parts

1. Attributes – properties or a class. It describes a range of values that the property may hold in objects (that is, in instances) of that class.

Ex.

WashingMachine

brandName

modelName

serialNumber

capacity

Person

firstName

lastName

address

email

phoneNumber

Operations – something a class can do and something that you or another class can ask the class to do.

Ex.

WashingMachine

acceptClothes()

acceptDetergent()

turnOn()

turnoff()

Person

changeFirstName()

changeLastName()

changeAddress()

changeEmail()

changePhoneNumber()

getFirstName()

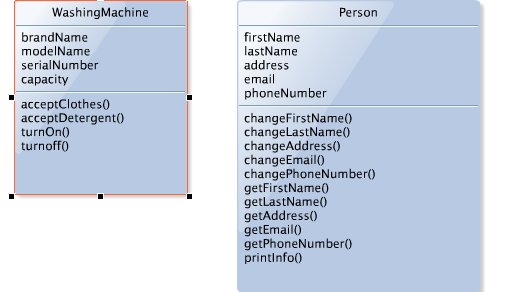
getLastName()

getAddress()

getEmail()

getPhoneNumber()

printInfo()



1. Write a person class based on the information listed above.

2. Below is the outline for a **Book** class. The outline already defines two fields and a constructor to initialize the fields. In this and the next few exercises, you will add features to the class outline.

Add two accessor methods to the class—**getAuthor** and **getTitle**—that return the **author** and **title** fields as their respective results. Test your class by creating some instances and calling the methods.

**/\*\***

**\* A class that maintains information on a book.**

**\* This might form part of a larger application such**

**\* as a library system, for instance.**

**\***

**\* @author (Insert your name here.)**

**\* @version (Insert today’s date here.)**

**\*/**

**public class Book**

**{**

**// The fields.**

**private String author;**

**private String title;**

**/\*\***

**\* Set the author and title fields when this object**

**\* is constructed.**

**\*/**

**public Book(String bookAuthor, String bookTitle)**

**{**

**author = bookAuthor;**

**title = bookTitle;**

**}**

**// Add the methods here...**

**}**

3. Add two methods, **printAuthor** and **printTitle**, to the outline **Book** class. These should print the **author** and **title** fields, respectively, to the terminal window.

4. Add a field, **pages**, to the **Book** class to store the number of pages. This should be of type **int**, and its initial value should be passed to the single constructor, along with the **author** and **title** strings. Include an appropriate **getPages** accessor method for this field.

5. Add a method, **printDetails**, to the **Book** class. This should print details of the author, title, and pages to the terminal window. It is your choice how the details are for- matted. For instance, all three items could be printed on a single line, or each could be printed on a separate line. You might also choose to include some explanatory text to help a user work out which is the author and which is the title, for example

**Title: Robinson Crusoe, Author: Daniel Defoe, Pages: 232**

6. dd a further field, **refNumber**, to the **Book** class. This field can store a reference number for a library, for example. It should be of type **String** and initialized to the zero length string (**""**) in the constructor, as its initial value is not passed in a parameter to the constructor. Instead, define a mutator for it with the following header:

**public void setRefNumber(String ref)**

The body of this method should assign the value of the parameter to the **refNumber** field. Add a corresponding **getRefNumber** accessor to help you check that the mutator works correctly.

7. Modify your **printDetails** method to include printing the reference num- ber. However, the method should print the reference number only if it has been set—that is, the **refNumber** string has a non-zero length. If it has not been set, then print the string **"ZZZ"** instead. *Hint:* Use a conditional statement whose test calls the **length** method on the **ref- Number** string.

8. Modify your **setRefNumber** mutator so that it sets the **refNumber** field only if the parameter is a string of at least three characters. If it is less than three, then print an error message and leave the field unchanged.

9. Add a further integer field, **borrowed**, to the **Book** class. This keeps a count of the number of times a book has been borrowed. Add a mutator, **borrow**, to the class. This should update the field by 1 each time it is called. Include an accessor, **getBorrowed**, that returns the value of this new field as its result. Modify **printDetails** so that it includes the value of this field with an explanatory piece of text.

10. Add a further **boolean** field, **courseText**, to the **Book** class. This re- cords whether or not a book is being used as a text book on a course. The field should be set through a parameter to the constructor and the field is immutable. Provide an accessor method for it called **isCourseText**.

11. *Challenge exercise* Create a new project, *heater-exercise*. Create a class, **Heater**, that contains a single field, **temperature** whose type is *double.*  Define a constructor that takes no parameters. The **temperature** field should be set to the value 15.0 in the constructor. Define the mutators **warmer** and **cooler**, whose effect is to increase or decrease the value of temperature by 5.0° respectively. Define an accessor method to return the value of **temperature.**

12. *Challenge exercise* Modify your **Heater** class to define three new *double* fields: **min**, **max**, and **increment**. The values of **min** and **max** should be set by parameters passed to the constructor. The value of **increment** should be set to 5.0 in the constructor. Modify the definitions of **warmer** and **cooler** so that they use the value of **increment** rather than an explicit value of 5.0. Before proceeding further with this exercise, check that everything works as before.

Now modify the **warmer** method so that it will not allow the temperature to be set to a value greater than **max**. Similarly modify **cooler** so that it will not allow **temperature** to be set to a value less than **min**. Check that the class works properly. Now add a method, **setIncrement**, that takes a single parameter of the appropriate type and uses it to set the value of **increment**. Once again, test that the class works as you would expect it to by creating some **Heater** objects. Do things still work as expected if a negative value is passed to the **setIncrement** method? Add a check to this method to prevent a negative value from being assigned to **increment**.