**4.3 – Understanding Object**

**Oriented Programming Theory**

For this assignment we will be using A Guide to Programming in JAVA by Beth Brown. Please type your answers in this document. When you are done, upload the file to your GitHub account in a repo called “Assignment 4-3” available at:

<https://bbarrettchs.weebly.com/uploads/3/7/7/8/37782575/lvp_java_text.pdf>

**Who are you?**

0. What is your name? Serena Bi

**What is an Object?**

Read page 179-180 and answer the following questions:

1. The textbook describes an object as a collection of state and behaviour. What is meant by state and behaviour?

The state means the data the object stores. The behaviour is how the object acts and communicates.

2. Define Encapsulation / Information Hiding.

Protecting an object’s data so that you cannot access the data from outside the class.

3. Define client code.

A class that uses other classes

**Designing and Writing a Class**

Read page 180-182 and answer the following questions:

4. Define Functional Decomposition.

The act of making clearly defined functions (behaviour)

5. What three things does the class declaration contain?

Access level, the keyword class, class name

6. What three things does the class body contain?

Variables, constructors, methods

7. Access levels: what does it mean to make a variable or method public? What does it mean to make a variable or method private?

Public: can be accessed from outside the class

Private: can only be accessed from within the class

8. What is an interface?

It is defined by the public methods of a class. How client code interacts with an object.

9. Define accessor method, modifier method, and helper method. Which one of these types of methods is NOT part of the interface?

Accessor: used to figure out the value of a variable

Modifier: changes value of variable

Helper: Called from within a class by other methods; used to help a method complete a task; not part of interface

10. Do the problem "Review: Circle - part 1 of 4" on page 182

Return 2\*radius\*PI

**Writing Constructors**

Read page 183 and answer the following questions:

11. What does it mean for an object to be instantiated?

It means for the object to be executed and for its methods to be available to be called on in any order.

12. What is a constructor method and what does it do?

It’s a method where variables are initialized.

13. What two things are always true about constructor methods?

It doesn’t have a return type and it always has the same name as the class.

13. What does it mean to "overload" a constructor method?

It means to create more than one constructor.

14. Do the problem "Review: Circle - part 2 of 4" on page 184

Public circle (int r) {

This.radius = r;

}

**Instance and Class Members**

Read page 184-185 and answer the following questions:

15. What is the difference between an instance variable and a class variable?

Each object has its own set of instance variables. Instance variables are created each time a class is instantiated. Class variables contain the keyword static and only one copy is maintained for all objects. Class variables are created once in the class and all objects maintain the same copy of a class variable.

How do you declare a variable as an instance variable?

Private/public variable name variable type;

Private double radius;

How do you declare a variable as a class variable? Give an example of each from the Circle class.

Private/public static variable name variable type;

Private static double PI = 3.14;

16. What is the difference between an instance method and a class method? How do you declare a method as an instance method? How do you declare a method as a class method? Give an example of each from the Circle class.

Instance methods must be called from an instance (an object) of the class. Class methods are called from the class itself.

Instance:

Method () {

}

public double area() {

double circleArea;

circleArea = PI \* radius \* radius;

return(circleArea);

}

Class:

Static method () {

}

public static void displayAreaFormula() {

System.out.println ("The formula for the area of a circle is a=Pi\*r\*r");

}

17. Do the problem "Review: Circle - Part 3 of 4" on page 185.

Public static void displayAreaFormula() {

System.out.println(“The area formula is PI\*r\*r);

}