**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? **Julian Wei**

**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? **State is the information an object stores, and behaviour is the method it preforms**

2. Define Encapsulation / Information Hiding**. The use of private variables to hide and protect information and the accessing of information through client code and through public methods.**

3. Define client code. **Code outside the class that refers to that class**

**Designing and Writing a Class**

Read page 180-182 and answer the following questions:

4. Define Functional Decomposition. **Breaking down a larger problem into smaller ones. Like breaking a class’ behaviours into simple methods**

5. What three things does the class declaration contain? **Public/private, keyword, name**

6. What three things does the class body contain? **Variables, constructors and 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? **Private, only accessible through the specific class. Public, able to be accessed through client code.**

8. What is an interface?

**The public collection of methods for a class. These are the methods you can use to interact with objects of that class.**

9. Define accessor method, modifier method, and helper method. Which one of these types of methods is NOT part of the interface? **Accessor gives you information about the class’ private variables. Mutator methods change the class’ variables and helper helps the task with private classes. Helper class private so not seen on interface.**

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

public double circumference () {

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? **The making of a new object, involves the new keyword and a call from the constructor.**

12. What is a constructor method and what does it do? **Involved in instantiation and initializes instance variables.**

13. What two things are always true about constructor methods? **Same name as the class and no return statement.**

13. What does it mean to "overload" a constructor method? To have multiple constructors with the same name but different parameters.

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

public Circle(double radius) {

this.radius = radius;

}

**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? How do you declare a variable as an instance variable? How do you declare a variable as a class variable? Give an example of each from the Circle class. **Class variables have static keyword. The difference is that each instance of the class maintains its own independent copy of each instance variable, whereas there is only 1 copy of a class variable for all instances of that class. In the Circle class, radius is an instance variable whereas PI is a class variable.**

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 operate on the state of an object and must be called from an instance of a class. Class methods are static and are called from the class itself, rather than an object of the class, to perform a task. Area(), getRadius(), and setRadius() are all instance methods, whereas displayAreaFormula is a class method.**

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

public static void displayAreaFormula() {

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

}