**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?**

1. What is your name?

Lily Chang

**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 what data is stored in the object (what it’s defines as, radius for circle). The behavior of an object means what is the function of this object (it can change the state of an object).

1. Define Encapsulation / Information Hiding.

Encapsulation (also called information hiding) is the protection of an object’ data, it hides certain code from the outside class.

1. Define client code.

Client cold refers to an application that uses one or more classes. The client can access the methods of the class, but cannot directly access the data defined in the class. This reinforces that the state of an object can only be changed through its behavior.

**Designing and Writing a Class**

Read page 180-182 and answer the following questions:

1. Define Functional Decomposition.

Functional decomposition is the process of creating clearly defined functions for a class is sometimes called. A well-written class has been functionally decomposed into a set of methods that cannot be simplified further.

1. What three things does the class declaration contain?

The class declaration contains access level, the keyword class, and the class name

1. What three things does the class body contain?

The class body contains variables, constructors and methods.

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

When a variable is public, it’s visible to other classes and can be used to instantiate objects in other class. When a variable is private, it’s visible to other class, but not visible to client code.

1. What is an interface?

Interface is defined as the public methods of a class of an object. The interface is how client code can interact with an object.

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

Accessor method’s job is to determine the value of a variable. A modifier methodis called to change the value of a variable. Helper methods are called from within a class by other methods. They are used to help complete a task and have access level private. Helper methods are not part of the interface.

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

public double circumference (){

double cir= Math.PI \*radius \*2;

return cir;

}

**Writing Constructors**

Read page 183 and answer the following questions:

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

After an object is instantiated, the object is no longer null and can be called by other method members of the class.

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

When a class or struct is created, its constructor is called. We initialized a variable in the constructor.

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

A constructor doesn’t return anything and has the same name as the class

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

When you have more than one options for instantiating an object.

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

public Circle (double r) {

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? 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.

An instance variable has more than one copies while the class only has one copy for all object refer to. Instance variables are created each time an object is declared, but a class variable are created once for the class can the objects can use it. The class variable is declared with the word “static”.

Instance variable: private double radius

Class variable: private static double PI;

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 method can change the state of an object and it’s called by an object of the class, a class method is called from the class itself. You declare a instance method if is a accessor and modifier. You declare a class method by adding the world “static”.

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

public String displayAreaFormula () {

String formula= “the formula for the area of a circle is a= Pi\*r\*r”;

Return formula;

}

System.out.println(spot. displayAreaFormula);