**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??????

Thomas Culham

**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 book refers to state as what an object holds (value wise) and refers to behaviour as what that object does (action/communication).

2. Define Encapsulation / Information Hiding.

Encapsulation is when you hide data that effects an object’s state from the rest of the code outside of the class.

3. Define client code.

Client code is the code outside of an object class that calls on that class to either mutate or access data.

**Designing and Writing a Class**

Read page 180-182 and answer the following questions:

4. Define Functional Decomposition.

Functional decomposition is when you write functions in a class whose tasks cannot be simplified or broken up further.

5. What three things does the class declaration contain?

A class definition contains an access level, the key word “class” and the class name.

6. What three things does the class body contain?

A class body can 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?

A private variable or method can only be accessed or called from inside the class whereas a public variable or method can be called or accessed from outside the class.

8. What is an interface?

An interface is defined by the public methods of a class because it is through those methods that the client code interacts with the class.

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

An accessor method is a method that returns a (usually private) variable that the client code needs. A mutator method changes variables in the class and does not have to return anything although it can. Helper methods are private methods called within the class and have a similar function to mutator methods.

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

public double circumference(){

return this.radius\*2\*Math.PI();

}

**Writing Constructors**

Read page 183 and answer the following questions:

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

An object is instantiated when its object variable points to something in memory and its contained variables are declared and assigned values.

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

A constructor gives the class variables their initial values.

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

A constructor never has a return type and always has the same name as the class.

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

A constructor is overloaded when it assigns values dictated by the client code to the variables that it’s declared.

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

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 is a variable that every object of the same class type has. An example of this in the circle class is the radius variable that is declared at the beginning of the class in the constructor. These variables cannot be static.

A class variable is a temporary variable that is created when a variable is declared to be static. This variable is only created once and is used by every object of that class. It is declared with the word static preceding it.

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.

Accessor and mutator methods are instance methods because they change the state of an object and because they must be called from an instance of the class. Class methods are methods that use the keyword static and can be called from the class and not from an instance of the class.

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”);

}