Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**CS139 Programming Fundamentals**

**ACT 12B – Introduction to objects**

Objective:

At the conclusion of this activity, students will begin to understand how a Java class is organized.

Important terms:

|  |  |
| --- | --- |
| Class | constructor |
| Object | visibility modifiers (public / private) |
| member | accessor method |
| attributes (instance variables) | mutator method |
| methods | non-static methods |

**Part 1 - Given the following code for a Die class, answer the questions on the next page.**

/\*\*   
 \* Simulates a Die object.  
 \*   
 \* @author Nancy Harris  
 \* @version V1 - 11/27/06  
 \*/  
public class Die  
{  
 private int face;  
  
 /\*\*

\* Constructs a new die object, initializing face to a random value.  
 \*/  
 public Die()  
{  
 roll();  
 }  
  
 /\*\*

\* Simulates the roll of the die.  
 \*  
 \* @return The new face value of the die  
 \*/  
 public int roll()  
 {  
 face = (int) (Math.random() \* 6) + 1;  
 return face;  
 }  
  
 /\*\*

\* Gets the current face value of the die.  
 \*  
 \* @return The current face value of the die  
 \*/  
 public intgetFace()  
 {  
 return face;  
 }  
}

1. This is a class from which we can build Die objects. Objects contain two types of members at the class level: attributes (or data) and methods (or actions). For this class, name one attribute for the class and one of the methods in the class: Attribute: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Method: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. There is a visibility modifier associated with the data member, face. What is the modifier? What would happen if I tried to access face from another class?
3. Each of the methods in this file have a public visibility modifier. What does it mean for them to be public?
4. Notice inside of the roll() method that we are referring to face, yet it is not declared inside of the method. Why do you think that you can use this variable in this method? What does that mean as we change its value via the roll() method?
5. Let’s say we are in another class with a main method and want to declare a Die object namedlucky. What would that declaration statement look like?
6. Now what would the statement look like to instantiate the Die object?
7. When we instantiate an object, we are actually calling a method that is referred to as a constructor. The method has the same name as the class that we are making a new instance of. What method did you call in step 6 via the *new* operator?
8. In general terms, what does this constructor method do?
9. In addition to the constructor, there are two methods in this class. One of these methods is termed an accessor method and one of these is a mutator method. Thinking about what the terms access and mutate mean, which method do you think is an accessor method and which do you think is a mutator method and why?
10. Finally, the term static that we have seen in other methods refers to the class. Any member with the term static can be referred to by the class name. None of the methods or attributes of the Die class are labeled as static. So how must we call these methods? What happens if we try to call Die.roll()? Why?

**Part 2 – Now it’s your turn.**

1. Finally, build a small class from the following specification (use another piece of paper):

A Circle is a geometric shape that is defined by a radius value. We need to be able to set the radius, get the radius, and get the circumference and area of the circle. When we set the radius, we should ensure that the value is not negative; if it is, make the radius 0. Create a constructor for the Circle that accepts a radius value as a parameter.

1. Given a main method, how would you declare a Circle object? How would you instantiate it?
2. How would you call the method that returns the circumference?How about the area?