**AP Java Marine Biology Simulation**

**Worksheet Ch 2 Pages 27-33**

1. Read pg 27 and the segment of code, **Methods in the Fish Class**

a. How many attributes (sometimes called state or instance variables) are there for each

Fish object? \_\_\_\_

b. Using one word for each, list them: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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c. How many Fish constructors are there? \_\_\_\_\_

d. Is one of them the default constructor? \_\_\_\_\_ Which one? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e. Why is the id number not listed in any of the Fish constructors? (Where do you suppose it is coming from?) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

f. In the first constructor there are only two parameters. What do you suppose happens

to the values of the other attributes? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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g. Other than the constructors, how many public methods are available to a client of

the Fish class? \_\_\_\_\_\_\_\_\_\_

h. Several of the methods have a void return type. Since each of these must be changing

something, what are they changing? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. Continue reading the bottom of page 27 and on through page 28.

3. Why do you suppose that the class variable nextAvailableID is initialized to 1

instead of 0? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. In a class, some methods are called constructors, some are called accessors and others

are called modifiers.

a. List the methods that appear to be modifiers (that is, methods that change something).

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b. The private method initialize is also referred to as a(n)

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5. On pg 28 the implementation of the three Fish constructors has something in common.

What is it? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. In the first Fish constructor, look at the call to the initialize method. Why is the

env.randomDirection() method preceded by “env.” and randomColor is not?

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7. Look at the implementation of the initialize method.

a. What is the statement that actually puts ths fish into the pond? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. Could the statement theEnv.add(this) have been written as env.add(this)?

Why or why not? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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c. What do you suppose the parameter “this” refers to? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. What type is “this”? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e. If the call to the add method were moved to just after the statement myLoc = loc;

what problem does this cause? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

f. Setting which attribute(s) make a fish a Locatable object? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. Suppose the programmer created another class variable called FISH\_COLOR, set it to the

color gold and then used it in the initialize method to set myColor.

a. What would be the effect on the constructed fish? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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b. Can you think of a reason why this would not be a good way to initially set all fish to

all newly constructed fish this way? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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9. What changes would you have to make if all fish IDs were supposed to be only 3 digit

integers, incremented by 5? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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10. Continue reading pages 29 and 30.

11. Let’s say you are asked to create a method for the class Fish called randomLocation. This

would randomly generate a location within the environment within which a fish object

would be placed.

a. What would the methods heading (signature) look like? (hint: look on page 30)

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b. In the space provided, write the statements necessary to randomly create a location

within the current environment and return that location. (The constructor for

Location is documented on pages 25 and 50. You’ll also need to use two methods from the Environment Interface documented on page 48 to determine the number

of rows and columns. Use the implementation of randomColor as a guide).

c. What would a new Fish constructor look like which would construct a fish with

a random location? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. Modify either SimpleMBSDemo1 or SimpleMBSDemo2 and the Fish class and test

your modifications.

12. Write your answers to Analysis Question Set 3 (pg 31) on the back or another sheet. Then

do Exercise Set 2 (pg 32).

13. Read the rest of page 32. Following the example of the implementation of the method id,

write an implementation of the method location in the space below.

14. Continue reading the top half of page 33.

15. Study the return statement in the implementation of the method isInEnv.

a. What is the type returned? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. What is the type of this? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. Why is environment() used instead of the fish object’s attribute theEnv?

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d. Why didn’t the author use isEquals instead of ==? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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e. Why do we need the method isInEnv? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

16. The isInEnv method contains a single, rather complex statement. Rewrite this

implementation to avoid the multiple method calls by calling each method in a simple

statement and returning either true or false. Use the space below. The first statement

is done for you.

Environment env = environment();

17. Do Analysis Question Set 4 (pg 33) either on the back or on another sheet.