

A. Use the code below. Assume it runs.

1. Draw arrows and annotate the following code as modeled in class.
2. Write what will show in the terminal window when the program below is executed.
3. Answer the following questions:

- a. What is the class being written here? \_\_\_\_\_
- b. What is the non-main method being written here? \_\_\_\_\_
- c. What method runs first? \_\_\_\_\_
- d. Because one method runs first and another runs second, there is (circle one)

Sequence

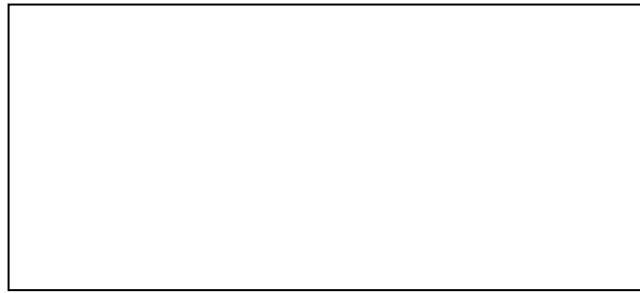
Selection

Iteration

- e. What is the return type of main? \_\_\_\_\_
- f. What is the parameter of the abra()? \_\_\_\_\_
- g. What access specifiers are being used (all the same)? \_\_\_\_\_

h. Complete the picture for abra(), using Java-like functional notation as modeled in class (Algorithm design). You should have to change how your function is written, to NOT use magic numbers (so show extra code to handle the otherwise magic numbers).

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```
public class GuessIt
{
    public static char abra(char ch)
    {
        char cadabra = '?';
        cadabra = (char) ((int) ch % 65 + 97);
        return cadabra;
    }
    public static void main(String[] args)
    {
        String str = "cat";
        System.out.println(str);
        str = "" + abra('A');
        str = str + abra('H');
        System.out.println(str);
    }
}
```

Terminal:



B. The following uses two classes. One class, `CylinderTester`, has been written for you at the bottom. You will write a class `Cylinder` that has the following.

**1. Now write the program. You will need:**

**a. Class variables:**

```
private double radius, height, volume, surfaceArea;
```

**b. A constructor that initializes the class variables.**

**c. A method `getDimension()` that prompts the user to enter the values for the radius and height of a cylinder. These values should be doubles.**

**d. A method `findSAandV()` that calculates the values of the volume and surface area of the cylinder, given the following formulas  $V = \pi r^2 h$  and  $SA = 2 \pi r h + 2 \pi r^2$ . Be sure to use the `Math` class where appropriate (this is a requirement).**

**e. A method `printToScreen()` that prints out the dimensions of the cylinder according to the user input. Also print out the volume and surface area. Use `printf` to format all of your results to the fourth decimal place, and be sure to line up both the equals signs and the decimal places in your output using `printf`, not spaces or tabs.**

**Here is a sample run output (with user input shown in bold):**

```
Enter the radius (a double) -> 3.5
Enter the height (a double) -> 9.34211
```

```
Cylinder information:
radius          =   3.5000
height          =   9.3421
volume          = 359.5265
surface area    = 282.4127
```

**The main testing class that uses `Cylinder` is shown on the next page (you can assume this is already written and is complete). Add your code after it, writing the entire second class.**

```
public class CylinderTester
{
    public static void main (String [] args)
    {
        Cylinder mycan = new Cylinder();
        mycan.getDimension();    // input radius and height
        mycan.findSAandV();    // calculate surface area & volume
        mycan.printToScreen();    // print results
    }
}
```