

# Loop Structures

Decide who will be what role for today's activity. List the names of your team members next to their role.

Manager:
Spokesperson:
Quality Control/Recorder:
Process Analyst:

If you have only three people, one may serve as both manager and spokesperson. If you have five team members, then assign two people to process analyst.

## Model 1: While Loops (10 min)

A loop is a set of instructions that are to be repeated. All loops have three main components: *initialize*, *test*, and *update*. Label each of these components in the two example loops below.

```
// pre-test loop
number = 1;
while (number <= 5) {
    System.out.println(number);
    number++;
}
```

```
// post-test loop
number = 1;
do {
    System.out.println(number);
    number++;
} while (number <= 5);
```

## Questions

1. Why is the while loop called a pre-test and the do while loop called a post-test?
2. What is output (to the screen) by each loop?

3. What is the final value of number after each loop?

4. What is output if you swap the `println` and `number++` statements?

5. What is the output if you remove the `number++` statement?

6. What is printed when this loop executes?

```
number = 99;
do {
    System.out.println(number);
    number++;
} while (number <= 10);
System.out.println(number);
```

7. What is printed when this loop executes?

```
i = 0;
while (i < 3)
    System.out.println("the number is " + i);
    i = i + 1;
```

8. What is printed when this loop executes?

```
i = 0;
while (i < 10) {
    System.out.println("the number is " + i);
    i += 2;
    return i;
}
```

9. What is the difference between a `while` statement and an `if` statement?

## Model 2: For Loops (15 min)

The for loop combines *initialize*, *test*, and *update* into one line of code. Label each of these components in the two example loops below.

```
// A. count forwards
for (number = 0; number < 8; number++) {
    System.out.println(number);
}
```

```
// B. count backwards
for (number = 8; number > 0; number--) {
    System.out.println(number);
}
```

```
// C. ??
for (number = 10; number < 8; number++) {
    System.out.println(number);
}
```

```
// D. horror!
for (number = 0; number < 8; number++) {
    number++;
    System.out.println(number);
}
```

## Questions

10. What do each of these for loops output to the screen?

A.                      B.                      C.                      D.

11. Why is the final for loop labeled horror? What is horrible about it?

12. Write a for loop that prints all of the odd numbers from 1 to 11.

13. Write a for loop that prints all of the odd numbers in decreasing order from 11 to 1.

14. Write a for loop that prints each character of a string on a separate line. You will need to call the `length()` and `charAt()` methods. Assume the string variable is named `word`.

15. Complete the following method:

```
/** Counts the number of 'X' characters in a String.
 *
 * @param text    The string to analyze
 * @return        The number of time 'X' appears in text
 */
public static int countX(String text) {
```

## Team Reflection

**Process Analyst:** Provide one piece of positive feedback to each member of the team. Then complete the *Report Form* included in your folder.

**Quality Control:** Summarize for your team the main concepts you learned in this week's activity. Make sure everyone's worksheets are correct and complete.

**Everyone:** Review the job description on your role card. Evaluate privately on how well you performed in your role. Write down what you need to improve: