

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: