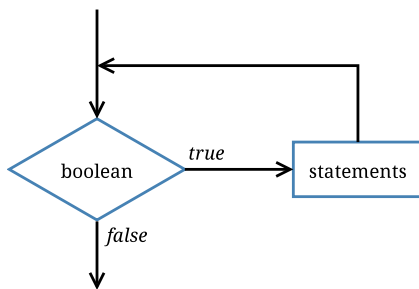


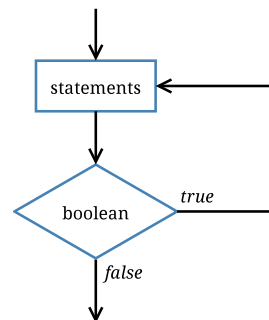
Model 1 While Loops

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

```
// pre-test loop
number = 1;
while (number <= 10) {
    System.out.println(number);
    number++;
}
```



```
// post-test loop
number = 1;
do {
    System.out.println(number);
    number++;
} while (number <= 10);
```



Questions (20 min)

Start time:

1. Which loop component always happens first? Why?

The initialize step; you need to tell the loop where to begin. And variables cannot be updated until they have an initial value.

2. Explain why the `while` loop is called a *pre-test* and the `do while` loop is called a *post-test*.

The `while` tests its condition before the loop body, whereas the `do while` tests its condition after the loop body.

3. What is output to the screen by each loop? Predict the output first, and then run the code to check your answer.

They both print the numbers 1 through 10, with each number on its own line.

4. What is the final value of number at the end of each loop? Make a prediction first, and then add print statements to the code to check your answer.

At the end of each loop, the value of number is 11.

5. How does the output change if you swap the `println` and `number++` statements?

Both loops print the values 2 through 11 instead.

6. What is the output to the screen if you remove the `number++` statement?

Both loops will print the value 1 forever, since number never reaches the stopping condition.

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

They identical syntax and a similar meaning; the only difference is a `while` statement repeats the code between its braces as long as the condition is true.

8. What is output by the following loop? Explain how the code works.

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

It will print the numbers 99 and 100; the `do while` loop does not repeat since 99 is greater than 10.

9. What is output by the following loop? And what mistake was made?

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

It will print "`i = 0`" forever. Without braces, the loop only executes the first statement, and `i = i + 1`; is never reached.