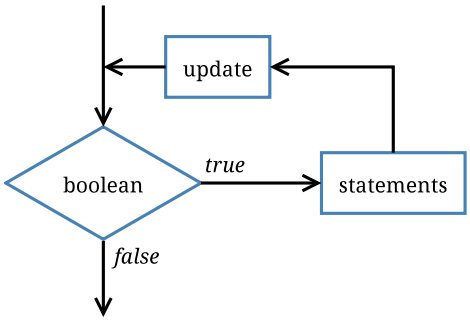
Model 1 For Loops

The `for` loop combines ***initialize***, ***test***, and ***update*** into one line of code.

```
// Loop A: count forwards
for (i = 1; i <= 10; i++) {
    System.out.println(i);
}

// Loop B: count backwards
for (i = 10; i >= 1; i--) {
    System.out.println(i);
}
```



Questions (10 min) Start time:

1. Identify the components of each `for` loop.

Loop A:

a) initialize

b) test

c) update

Loop B:

a) initialize

b) test

c) update

2. Rewrite each `for` loop as a `while` loop.

Loop A: **Loop B:**

3. What do each of the `for` loops output to the screen? Be specific.

4. Describe how to change the `for` loops to print even numbers only (i.e., the output should be 2 4 6 8 10 and 10 8 6 4 2).

5. In mathematics, the factorial of an integer n (denoted by $n!$) is the product of all positive integers less than or equal to n. For example, the factorial of 5 is:

$$5! = 5 * 4 * 3 * 2 * 1 = 120$$

The following code computes the factorial of 5:

```
fact = 1;
i = 5;
while (i > 1) {
    fact *= i;
    i--
}
```

a) Rewrite the code above using a `for` loop instead of a `while` loop.

b) How would you change the code to compute the factorial of 12?