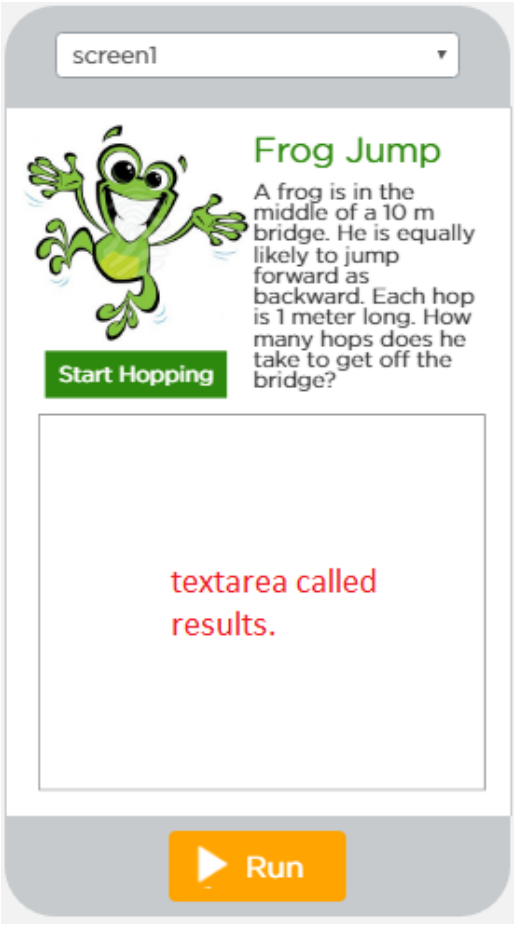
B4 – Frog Jump

A major use of computers is to run simulations. This scenario is that:

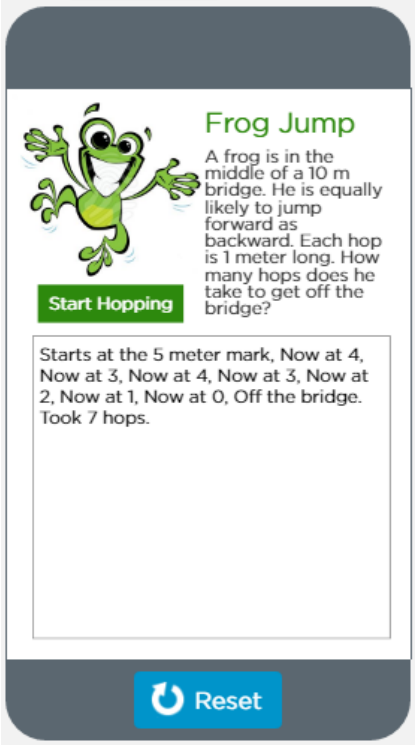
> A frog is in the middle of a 10 m bridge. He is equally likely to jump forward as backward. Each hop is 1 meter long. How many hops does he take to get off the bridge?

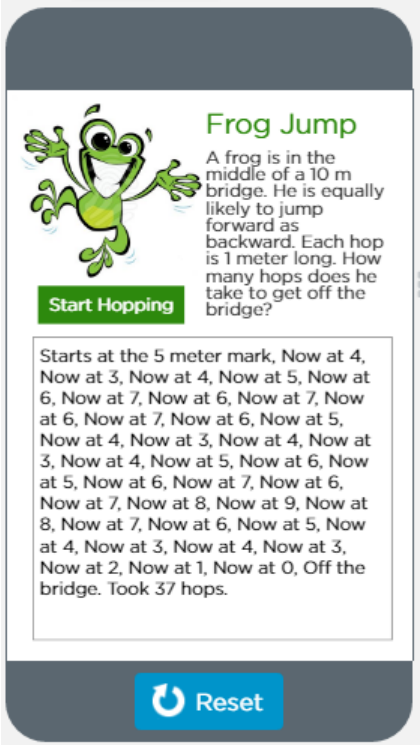
If you use a loop, you can simulate this on the screen easily.

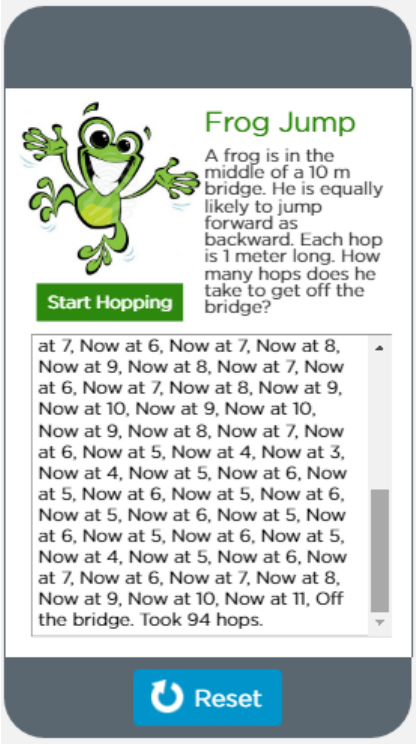
However, a for loop won't work because this loop runs many different times. Instead, we are going to use a fancy loop called a "while" loop.



Some example runs of the program:







1. Start with an OnEvent for the button.
2. Clear the screen and start the frog off again:

```
setText("results", "Starts at the 5 meter mark");
```

3. Make two variables. Spot tracks the frog's location. Count tracks the number of steps taken so far.

```
var spot = 5;
var count = 0;
```

4. Add a while loop. It's Boolean expression is spot>0 && spot<11 (on the bridge).

```
while ((spot>0 && spot<11)) {

}
```

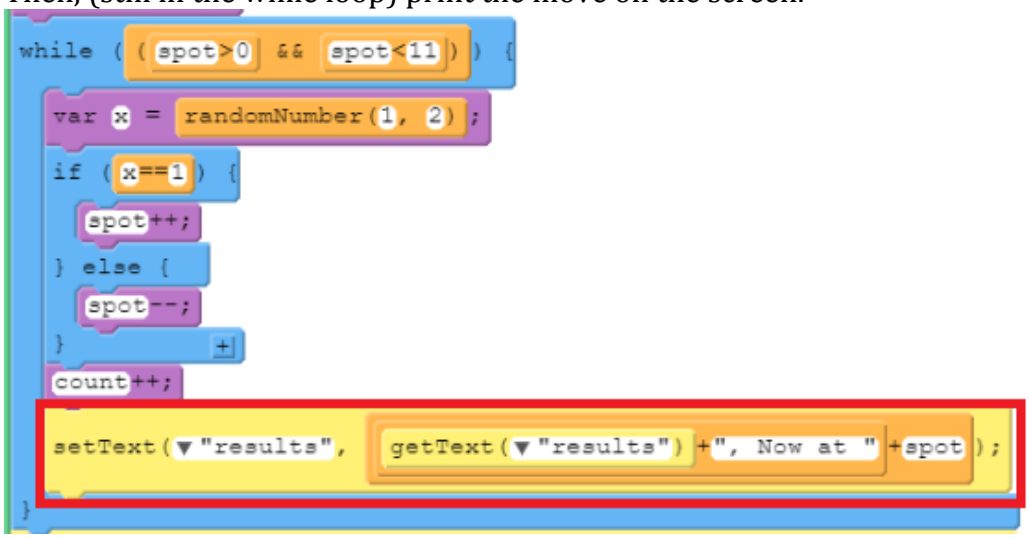
5. Inside the while loop, add a random number. If it is one, make the frog jump forward. Otherwise, he jumps backwards.

```
while ((spot>0 && spot<11)) {
  var x = randomNumber(1, 2);
  if (x==1) {
    spot++;
  } else {
    spot--;
  }
}
```

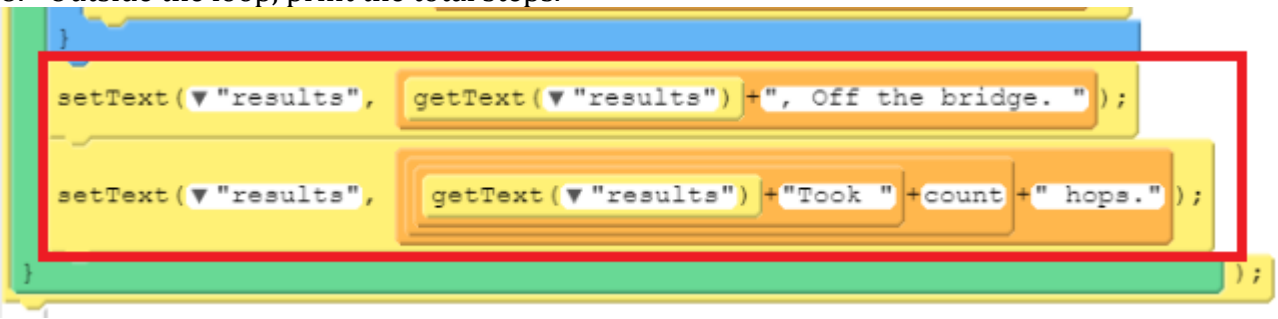
6. Then, (still inside the while loop) add one to the count – he's taken a step: `count++;`

```
while ((spot>0 && spot<11)) {
  var x = randomNumber(1, 2);
  if (x==1) {
    spot++;
  } else {
    spot--;
  }
  count++;
}
```

7. Then, (still in the while loop) print the move on the screen.



8. Outside the loop, print the total steps.



This is much easier to do in text mode:

```
onEvent("start", "click", function(event) {
  setText("results", "Starts at the 5 meter mark");
  var spot = 5;
  var count = 0;
  while ((spot>0 && spot<11)) {
    var x = randomNumber(1, 2);
    if (x==1) {
      spot++;
    } else {
      spot--;
    }
    count++;
    setText("results", getText("results")+", Now at "+spot);
  }
  setText("results", getText("results")+", Off the bridge. ");
  setText("results", getText("results")+"Took "+count+" hops.");
});
```

An additional challenge is to add another button that calculates the average moves taken by the frog. You will need to:

- Remove all of the `setTexts`.
- Add another variable called `average` at the top.
- Add a for loop that runs about 2000 times around EVERYTHING.
- Inside the for loop, at the bottom, write `average += count;`
- Outside the for loop, calculate the average by writing, `average /= 2000;`
- Then, `setText` the average out on the screen.