3

Your First Web App

Now that you've gotten your feet wet, let's wade a bit deeper into the JavaScript language. In this chapter, we'll go into more detail about the basic elements of JavaScript and introduce you to other aspects of the JavaScript language, such as loops, arrays, and more about functions (don't let your eyes glaze over; we promise that it'll be easy).

You'll see how you can use JavaScript to write your Web pages for you, learn how JavaScript handles errors that the user makes, and much more.

TABLE 3.1 Just Enough HTML—Tables

Tag	Meaning
`table`	Presents tabular data on a Web page
`tr`	Begins a row inside the table
`th`	Heading cells for the columns in the table
`td`	Contains each cell in the table

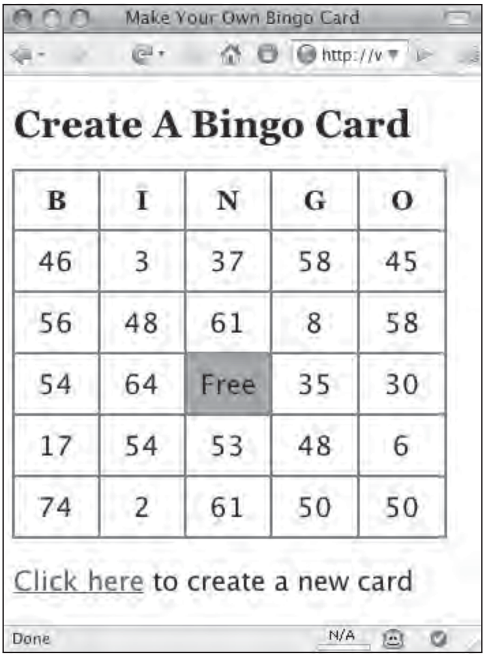
In This Chapter

Around and Around with Loops

It's common in programming to test for a particular condition and repeat the test as many times as needed. Let's use an example you probably know well: doing a search and replace in a word processor. You search for one bit of text, change it to a different text string, and then repeat the process for all of the instances of the first string in the document. Now imagine that you have a program that does it for you automatically. The program would execute a *loop*, which lets it repeat an action a specified number of times. In JavaScript, loops become a vital part of your scripting toolbox.

More about loops

The kind of loop that we mostly use in this book is the **`for`** loop, named after the command that begins the loop. This sort of loop uses a *counter*, which is a variable that begins with one value (usually 0) and ends when a conditional test inside the loop is satisfied.



Create A Bingo Card

B	I	N	G	O
46	3	37	58	45
56	48	61	8	58
54	64	Free	35	30
17	54	53	48	6
74	2	61	50	50

Click here to create a new card

A This Bingo card has randomly generated numbers, but it isn't a valid Bingo card. Yet.

Listing 3.1 This HTML page creates the skeleton for the Bingo card.

```
<!DOCTYPE html>
<html>
<head>
     <title>Make Your Own Bingo Card</title>
     <link rel="stylesheet"
     → href="script01.css">
     <script src="script01.js"></script>
</head>
<body>
<h1>Create A Bingo Card</h1>
<table>
     <tr>
        <th>B</th>
        <th>I</th>
        <th>N</th>
        <th>G</th>
        <th>O</th>
     </tr>
     <tr>
        <td id="square0">&nbsp;</td>
        <td id="square5">&nbsp;</td>
        <td id="square10">&nbsp;</td>
        <td id="square14">&nbsp;</td>
        <td id="square19">&nbsp;</td>
     </tr>
     <tr>
        <td id="square1">&nbsp;</td>
        <td id="square6">&nbsp;</td>
        <td id="square11">&nbsp;</td>
        <td id="square15">&nbsp;</td>
        <td id="square20">&nbsp;</td>
     </tr>
     <tr>
        <td id="square2">&nbsp;</td>
        <td id="square7">&nbsp;</td>
        <td id="free">Free</td>
        <td id="square16">&nbsp;</td>
        <td id="square21">&nbsp;</td>
     </tr>
     <tr>
        <td id="square3">&nbsp;</td>
        <td id="square8">&nbsp;</td>
        <td id="square12">&nbsp;</td>
        <td id="square17">&nbsp;</td>
        <td id="square22">&nbsp;</td>
     </tr>
     <tr>
        <td id="square4">&nbsp;</td>
        <td id="square9">&nbsp;</td>
        <td id="square13">&nbsp;</td>
        <td id="square18">&nbsp;</td>
        <td id="square23">&nbsp;</td>
     </tr>
</table>
<p><a href="script01.html" id="reload">
→ Click here</a> to create a new card</p>
</body>
</html>
```

The command that starts the loop structure is immediately followed by parentheses. Inside the parentheses you'll usually find the counter definition and the way the counter is incremented (i.e., the way the counter's value is increased).

In the next several examples we're going to build a simple yet familiar application, a Bingo card. We'll use each example to show you a new aspect of JavaScript. We'll begin with an HTML page, **Listing 3.1**. It contains the table that is the Bingo card's framework **A**. Take a look at the script, and you'll see that the first row contains the letters at the top of the card, and each subsequent row contains five table cells. Most cells contain just a non-breaking space (using the HTML entity **`&nbsp;`**); however, the third row contains the Free space, so one table cell in that row contains the word "Free". Note that each cell has an **`id`** attribute, which the script uses to manipulate the cell contents. The **`id`** is in the form of **`square0`**, **`square1`**, **`square2`**, through **`square23`**, for reasons that we'll explain below. At the bottom of the page, there's a link that generates a new card.

Listing 3.2 is the CSS file that we're using to style the contents of the Bingo card. If you don't know CSS, don't worry about it, as it doesn't matter much here anyway. The HTML and CSS pages won't change for the rest of the Bingo card examples, so we're only going to print them once here.

This example shows you how to set up and use a loop to populate the contents of the Bingo card with randomly generated numbers. **Listing 3.3** contains the JavaScript you need to make it happen. The card that is generated from this script is not a valid Bingo card, because there are constraints on which numbers can be in particular columns. Later examples add to the script until the resulting Bingo card is valid.

Listing 3.2 This CSS file adds style to the Bingo card.

```
body {
     background-color: white;
     color: black;
     font-size: 20px;
     font-family: "Lucida Grande", Verdana,
     → Arial, Helvetica, sans-serif;
}

h1, th {
     font-family: Georgia, "Times New Roman",
     → Times, serif;
}

h1 {
     font-size: 28px;
}

table {
     border-collapse: collapse;
}

th, td {
     padding: 10px;
     border: 2px #666 solid;
     text-align: center;
     width: 20%;
}

#free, .pickedBG {
     background-color: #f66;
}

.winningBG {
     background-image:
     → url(images/redFlash.gif);
}
```

Listing 3.3 Welcome to your first JavaScript loop.

```
window.onload = initAll;

function initAll() {
     for (var i=0; i<24; i++) {
        var newNum = Math.floor
        → (Math.random() * 75) + 1;

        document.getElementById
        → ("square" + i).innerHTML = newNum;
     }
}
```

What's in a Bingo Card?

Sure, you've seen them, but maybe you haven't looked carefully at a Bingo card lately. Bingo cards in the United States are 5 x 5 squares, with the columns labeled B-I-N-G-O and with spots containing numbers between 1 and 75. The center square typically is a free spot and often has the word "free" printed on it. Each column has a range of allowable numbers:

- Column B contains numbers 1–15
- Column I contains numbers 16–30
- Column N contains numbers 31–45
- Column G contains numbers 46–60
- Column O contains numbers 61–75

To use a loop to create the table's contents:

1. **`window.onload = initAll;`**

   This is in Listing 3.3. This line calls the **`initAll()`** function when the window finishes loading. It's common to use an event handler to call a function.

2. **`function initAll() {`**

   This line begins the function.

3. **`for (var i=0; i<24; i++) {`**

   This line begins the loop. Programmers traditionally use the variable **`i`** to denote a variable used as a counter inside a loop. First **`i`** is set to 0. A semicolon signals the end of that statement and allows us to put another statement on the same line. The next part is read as "if **`i`** is less than 24, do the following code inside the braces." The final bit (after the second semicolon) adds 1 to the value of **`i`**. Because this is new, let's break that down a bit. The **`i++`** part uses the **`++`** operator you saw in Chapter 1 to increment the value of **`i`** by 1. The loop will repeat 24 times, and the code inside the loop will execute 24 times. On the first go-through, **`i`** will be 0, and on the last go-through **`i`** will be 23.

continues on next page

4.
   ```
   var newNum = Math.floor
   →(Math.random() * 75) + 1;
   ```

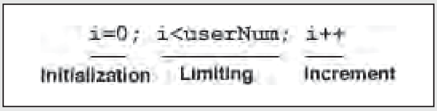
   Inside the loop, we create a new variable, **newNum**, and fill it with the result of the calculation on the right side of the equals sign. The built-in JavaScript command **Math.random()** gives us a number between 0 and 1, such as 0.12345678. Multiplying **Math.random()** by the maximum value (remember, values in Bingo cards can be from 1 to 75) gives us a result between 0 and one less than the max value. The **floor** of that result gives us the integer portion, i.e., an integer between 0 and (one less than the maximum value). Add one, and we have a number between 1 and our maximum value.

5.
   ```
   document.getElementById
   →("square" + i).innerHTML =
   →newNum;
   ```

   This is where we write into the table the value of the random number we just got. We get the element with the **id** named **square** with the current value of **i** concatenated onto it. For example, the first time through the loop, the value of **i** will be zero, so the line gets the element with the **id** of **square0**. Then the line sets the **innerHTML** property of the **square0** object to the current value of **newNum**. Then, because we're still inside the loop, steps 4 and 5 happen again, until the whole Bingo card is filled out.

Looping the Loop

A **for** loop has three parts B:



```
i=0; i<userNum; i++
```

B The three parts of a loop.

1. **The initialization step**. The first time through the loop, this is what the loop variable (**i**, in this case) is set to.
2. **The limiting step**. This is where we say when to stop looping. While normal people count from one to ten, it's common in programming languages to count from zero to nine. In both cases, the code inside the loop is run ten times, but the latter method works better with languages (like JavaScript) where arrays start with a zeroth position. That's why you'll see loops have a limitation of "less than **userNum**" instead of "less than or equal to **userNum**." Let's say that the variable **userNum** is 10, and you want the loop to run ten times. If you count from 0 to 9 (using the "less than" test), the loop runs ten times. If you count from 0 to 10 (using the "less than or equals to" test), the loop runs 11 times.
3. **The increment step**. This is where we say by how much to increase the loop counter on each pass through the loop. In this case, we add one each time through, using **++** to add one to **i**'s value.

Passing a Value to a Function

You'll often want to take some information and give it to a function to use. This is called *passing* the information to the function. For example, look at this function definition:

```
function playBall(batterup)
```

The variable **`batterup`** is a *parameter* of the function. When a function is called, a value can be passed into the function. Then, when you're inside the function, that data is in the **`batterup`** variable. Functions can be passed just about any data you want to use, including text strings, numbers, or even other JavaScript objects. For example, the **`batterup`** variable could be passed a player's name as a text string (**`"Mantle"`**), or his number in the lineup (7) (although mixing the two can be a very bad idea unless you really know what you're doing). Like all variables, give the ones you use as function parameters names that remind you what the variable is being used for.

You can have more than one parameter in a function. Just separate them inside the parentheses with commas like this:

```
function currentScore(hometeam,visitors)
```

so these code fragments are all equivalent:

```
currentScore(6,4);
```

```
var homeScore = 6;
var visitingScore = 4;
currentScore(homeScore,visitingScore);
```

```
currentScore(6,3+1);
```

For all three examples, once we're inside **`currentScore()`**, the value of **`hometeam`** is 6, and the value of **`visitors`** is 4 (which is great news for the home team).

In this example, we'll clean up some of the calculations from Listing 3.3 by taking them out of the **initAll()** function, restating them a bit, and putting them into a function with passed values, in order to make it more obvious what's going on. It all happens in **Listing 3.4**.

To pass a value to a function:

1. **setSquare(i);**

   This is inside the **initAll()** function. We're passing the value of **i** into the **setSquare()** function.

2. **function setSquare(thisSquare) {**

   This defines the **setSquare()** function, and it's being passed the current square number that we want to update. When we pass it in, it's the loop variable **i**. When the function receives it, it's the parameter **thisSquare**. What is a little tricky to understand is that this function is passed **i**, and does stuff with that value, but doesn't actually see **i** itself. Inside the function, all it knows about is the **thisSquare** variable.

3. **var currSquare =**
   →"square" + thisSquare;

   In order to make the **getElementById()** call later in the script clearer, we're creating and setting a new variable: **currSquare**. This is the current square that we're working on. It takes the text string **"square"** and concatenates it with the **thisSquare** variable.

4. **document.getElementById**
   →(currSquare).innerHTML = newNum;

   This line gets the element with the name specified by **currSquare** and changes it to display **newNum**.

Listing 3.4 By passing values to the **setSquare()** function, the script becomes easier to read and understand.

```
window.onload = initAll;

function initAll() {
    for (var i=0; i<24; i++) {
       setSquare(i);
    }
}

function setSquare(thisSquare) {
    var currSquare = "square" + thisSquare;
    var newNum = Math.floor
    →(Math.random() * 75) + 1;

    document.getElementById(currSquare).
    →innerHTML = newNum;
}
```

Detecting Objects

When you're scripting, you may want to check to see if the browser is smart enough to understand the objects you want to use. There is a way to do this check, which is called *object detection*.

What you do is pose a question for the object you're looking for, like this:

```
if (document.getElementById) {
```

If the object exists, the **`if`** statement is **`true`**, and the script continues on its merry way. But if the browser doesn't understand the object, the test returns **`false`**, and the **`else`** portion of the conditional executes. Listing 3.5 gives you the JavaScript you need, and you can see the result in an obsolete browser A.

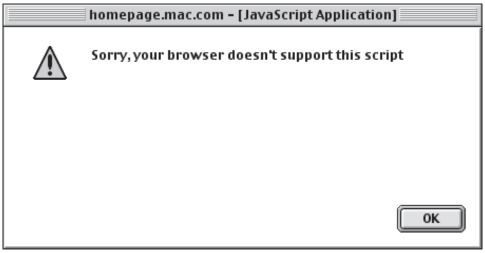
To detect an object:

1. **`if (document.getElementById) {`**

   This line begins the conditional. If the object inside the parentheses exists, the test returns **`true`**, and the rest of this block in the **`initAll()`** function runs.

2.
   ```
   else {
      alert("Sorry, your browser
      → doesn't support this script");
   }
   ```

   If the test in step 1 returns **`false`**, this line pops up an alert, and the script ends.



Sorry, your browser doesn't support this script

A Object detection rejected this ancient browser (Netscape 4 for Mac) and displayed this error message.

Listing 3.5 Object detection is an important tool for scripters.

```
window.onload = initAll;

function initAll() {
     if (document.getElementById) {
        for (var i=0; i<24; i++) {
           setSquare(i);
        }
     }
     else {
        alert("Sorry, your browser doesn't
        → support this script");
     }
}

function setSquare(thisSquare) {
     var currSquare = "square" + thisSquare;
     var newNum = Math.floor
     → (Math.random() * 75) + 1;

     document.getElementById(currSquare).
     → innerHTML = newNum;
}
```

TIP In a production environment, it's better to give users something else to do, or at least some version of the page that doesn't require this capability. Here, though, there's nothing to be done.

TIP It's important to understand that you won't always check for `document.getElementById`. What objects you check for depends on what objects your script uses. If your scripts use objects with less than 100% support, always check first if the browser can handle it—never assume that it can. We aren't showing object detection throughout this book to save space, but in the real world, it's vital.

Washed-Up Detectives

An alternate way to try to figure which objects a browser supports is to do a *browser detect*, which tries to identify the browser being used to view the page. It gets this by requesting the user agent string from the browser, which reports the browser name and version. The idea is that you would then write your scripts to work one way with particular browsers and another way for other browsers. This is an obsolete approach to scripting, because it doesn't work well.

Browser detection relies on you knowing that a particular browser supports the script you're writing, and another browser doesn't. But what about obscure browsers that you've never used? Or browsers that are released after your script is done?

Worse, many browsers try to get around browser detection by intentionally misrepresenting themselves. For example, Apple's Safari browser claims that it is a Mozilla browser, even though it is not. And most browsers, such as Safari, Chrome, and Opera, allow some way for you to set which browser you want it to report itself as.

There's just no way that you can retrofit your script fast enough to keep up with all of the possible browser permutations. It's a losing game.

The same goes for attempting to detect which version of JavaScript a browser supports. We strongly suggest that you do not use these detection methods, and use object detection instead.

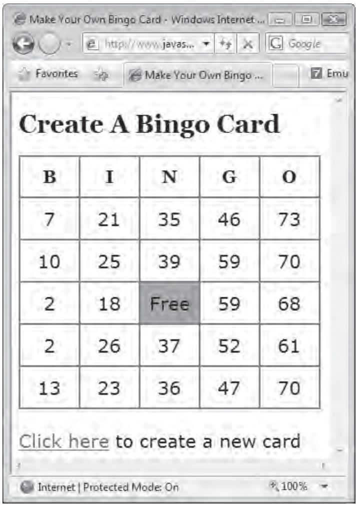
Working with Arrays

In this example, we're introducing another useful JavaScript object, the *array*. An array is a kind of variable that can store a group of information. Like variables, arrays can contain any sort of data: text strings, numbers, other JavaScript objects, whatever. You declare an array with the elements of the array inside parentheses, separated by commas, like so:

```
var newCars = new Array
→("Toyota", "Honda", "Nissan");
```

After this, the **`newCars`** array contains the three text strings with the car makes. To access the contents of the array, you use the variable name with the *index number* of the array member you want to use, in square brackets. So **`newCars[2]`** has the value **`"Nissan"`**, because array numbering, like most other numbering in JavaScript, begins at zero. Notice in the example above we're using text strings as elements of the array. Each text string needs to be contained within straight quotes, and the commas that separate each element of the array go outside of the quotes.

In this example, shown in **Listing 3.6**, we begin making sure the Bingo card is valid. On a real Bingo card, each column has a different range of numbers: B is 1–15, I is 16–30, N is 31–45, G is 46–60, and O is 61–75. If you look back at Ⓐ (in "More about loops"), you'll see that it is not a valid card, because it was generated with a version of the script that simply put a random number between 1 and 75 in each square. This example fixes that, with only three lines of changed or new code. When we're done it's still not a valid Bingo card (note how there are duplicate numbers in some of the columns), but we're getting there Ⓐ.


Make Your Own Bingo Card - Windows Internet ...
http://www.javas...
Google
Favorites
Make Your Own Bingo ...
Emu
Internet | Protected Mode: On
100%

Create A Bingo Card

B	I	N	G	O
7	21	35	46	73
10	25	39	59	70
2	18	Free	59	68
2	26	37	52	61
13	23	36	47	70

Click here to create a new card

Ⓐ This Bingo card is improved, but not quite right yet, because there are duplicate numbers in some of the columns.

Listing 3.6 This script limits the range of values that can go into each column.

```
window.onload = initAll;

function initAll() {
     if (document.getElementById) {
        for (var i=0; i<24; i++) {
           setSquare(i);
        }
     }
     else {
        alert("Sorry, your browser doesn't
        → support this script");
     }
}

function setSquare(thisSquare) {
     var currSquare = "square" + thisSquare;
     var colPlace = new Array(0,0,0,0,0,1,1,
     →1,1,1,2,2,2,2,3,3,3,3,3,4,4,4,4,4);
     var colBasis = colPlace
     →[thisSquare] * 15;
     var newNum = colBasis + Math.floor
     →(Math.random() * 15) + 1;

     document.getElementById(currSquare).
     →innerHTML = newNum;
}
```

To use an array:

1.
   ```
   var colPlace = new Array
   → (0,0,0,0,0,1,1,1,1,1,2,2,2,2,3,3,3,3,
   → 3,4,4,4,4,4);
   ```

   We're concerned with limiting which random numbers go into which columns. The simplest way to keep track of this is to give each column a number (B: 0, I: 1, N: 2, G: 3, O: 4) and then calculate the numbers that can go into each column as (the column number × 15) + (a random number from 1–15).

   The **colPlace** array keeps track of, for each square, which column it's in. It's the numbers 0–4 repeated five times (minus the free space; notice that the digit 2 representing the N column is only used four times).

2.
   ```
   var colBasis =
   → colPlace[thisSquare] * 15;
   var newNum = colBasis + Math.
   → floor(Math.random() * 15) + 1;
   ```

   We start off by calculating the column basis: the number stored in **colPlace[thisSquare]** multiplied by 15. The **newNum** variable still generates the random numbers, but instead of coming up with a number from 1–75, it now calculates a random number from 1–15, and then adds that to the column basis. So, if our random number is 7, it would be 7 in the B column, 22 in the I column, 37 in the N column, 52 in the G column, and 67 in the O column.

Listing 3.7 A function can return a value, which can then be checked.

```
window.onload = initAll;

function initAll() {
     if (document.getElementById) {
        for (var i=0; i<24; i++) {
           setSquare(i);
        }
     }
     else {
        alert("Sorry, your browser doesn't
        → support this script");
     }
}

function setSquare(thisSquare) {
     var currSquare = "square" + thisSquare;
     var colPlace = new Array(0,0,0,0,0,1,1,
     → 1,1,1,2,2,2,2,3,3,3,3,3,4,4,4,4,4);
     var colBasis = colPlace
     → [thisSquare] * 15;
     var newNum = colBasis + getNewNum() + 1;

     document.getElementById(currSquare).
     → innerHTML = newNum;
}

function getNewNum() {
     return Math.floor(Math.random() * 15);
}
```

Working with Functions That Return Values

Up to this point, all the functions that you've seen simply do something and then return. Sometimes, though, you want to return a result of some kind. **Listing 3.7** makes the overall script more understandable by breaking out some of the calculations in previous examples into a function which returns the random numbers for the cells on the Bingo card. Another function then uses this result.

To return a value from a function:

1. `var newNum = colBasis +`
   `→ getNewNum() + 1;`

   This line is again just setting the **`newNum`** variable to our desired number, but here we've moved that random number generator into a function, called **`getNewNum()`**. By breaking the calculation up, it makes it easier to understand what's going on in the script.

2.
   ```
   function getNewNum() {
      return Math.floor
      → (Math.random() * 15);
   }
   ```

   This code calculates a random number between 0 and 14 and returns it. This function can be used anywhere a variable or a number can be used.

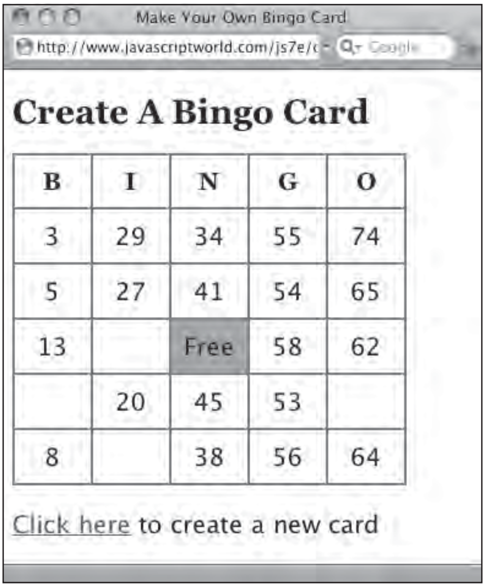
TIP Any value can be returned. Strings, Booleans, and numbers work just fine.

Updating Arrays

As you saw in Ⓐ in "Working with Arrays," the Bingo card script doesn't yet have a way to make sure that duplicate numbers don't appear in a given column. This example fixes that problem, while simultaneously demonstrating that arrays don't have to be just initialized and then read—instead, they can be declared and then set on the fly. This gives you a great deal of flexibility, since you can use calculations or functions to change the values in the array while the script is running. **Listing 3.8** shows you how, with only a few new lines of code.

Listing 3.8 Changing the contents of arrays to store the current situation is a very powerful technique.

```
window.onload = initAll;
var usedNums = new Array(76);

function initAll() {
     if (document.getElementById) {
        for (var i=0; i<24; i++) {
           setSquare(i);
        }
     }
     else {
        alert("Sorry, your browser doesn't
        → support this script");
     }
}

function setSquare(thisSquare) {
     var currSquare = "square" + thisSquare;
     var colPlace = new Array(0,0,0,0,0,1,1,
     → 1,1,1,2,2,2,2,2,3,3,3,3,3,4,4,4,4,4);
     var colBasis = colPlace
     → [thisSquare] * 15;
     var newNum = colBasis + getNewNum() + 1;

     if (!usedNums[newNum]) {
        usedNums[newNum] = true;
        document.getElementById(currSquare).
        → innerHTML = newNum;
     }
}

function getNewNum() {
     return Math.floor(Math.random() * 15);
}
```



Create A Bingo Card

B	I	N	G	O
3	29	34	55	74
5	27	41	54	65
13		Free	58	62
	20	45	53	
8		38	56	64

Click here to create a new card

A We've gotten rid of the duplicate numbers, but some of the spaces are now blank. Time to go back to the drawing board.

To update an array on the fly:

1.
```
var usedNums = new Array(76);
```

   Here is a new way of declaring an array. We're creating **usedNums**, a new array with 76 objects. As mentioned before, those objects can be *anything*. In this case, they're going to be Booleans, that is, true/false values.

2.
```
if (!usedNums[newNum]) {
   usedNums[newNum] = true;
```

   If the **newNum** slot in the **usedNums** array is false (represented by the **!** before the statement, meaning "not"), then we set it to true and write it out to the card. If it's true, we don't do anything at all, leaving us with no duplicates, but possibly blank spaces on our card A. That's not good either, which leads us to the next task.

TIP Why is the array defined as containing 76 items? Because we want to use the values 1 to 75. If we initialized it to contain 75 items, the numbering would go from 0 to 74. 76 lets us use 1 through 75, and we'll just ignore item 0.

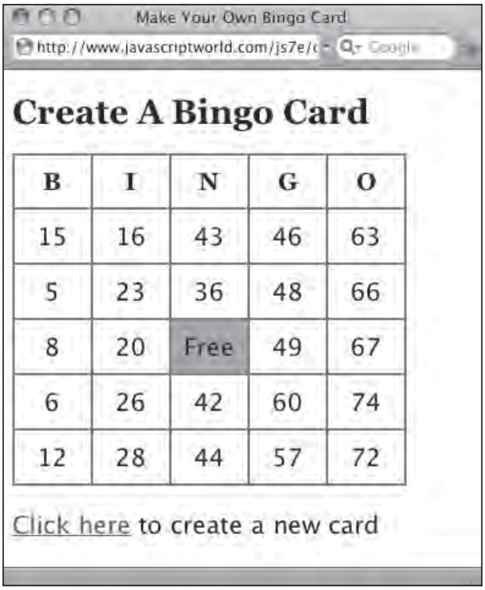
TIP If you don't do anything to initialize Booleans, they'll automatically be false.

Using Do/While Loops

Sometimes you'll need to have a loop in your code that loops around a number of times, but there's no way of knowing in advance how many times you'll want to loop. That's when you'll want to use a **`do/while`** loop: you want to **`do`** something, **`while`** some value is true. **Listing 3.9** writes out each row of numbers as always, but this time it checks first to see if a number has been used already before putting it in a cell. If it has, the script generates a new random number and repeats the process until it finds one that's unique. **A** shows the working, finally valid Bingo card.

Listing 3.9 This script prevents numbers in a given column from being used more than once.

```
window.onload = initAll;
var usedNums = new Array(76);

function initAll() {
    if (document.getElementById) {
        for (var i=0; i<24; i++) {
            setSquare(i);
        }
    }
    else {
        alert("Sorry, your browser doesn't
        → support this script");
    }
}

function setSquare(thisSquare) {
    var currSquare = "square" + thisSquare;
    var colPlace = new Array(0,0,0,0,0,1,1,
    → 1,1,1,2,2,2,2,3,3,3,3,3,4,4,4,4,4);
    var colBasis = colPlace
    → [thisSquare] * 15;
    var newNum;

    do {
        newNum = colBasis + getNewNum() + 1;
    }
    while (usedNums[newNum]);

    usedNums[newNum] = true;
    document.getElementById(currSquare).
    → innerHTML = newNum;
}

function getNewNum() {
    return Math.floor(Math.random() * 15);
}
```



Create A Bingo Card

B	I	N	G	O
15	16	43	46	63
5	23	36	48	66
8	20	Free	49	67
6	26	42	60	74
12	28	44	57	72

Click here to create a new card

A Finally, we've ended up with a valid Bingo card!

To use a do/while loop:

1. `var newNum;`

   In the previous task, we initialized the **`newNum`** variable when we created it. Because we're going to be setting it multiple times, we're instead going to create it just the once, before we get into the loop.

2. `do {`

   This line starts the **`do`** block of code. One of the things you have to remember about this type of loop is that the code inside the **`do`** block will always be executed at least once.

3.
   ```
   newNum = colBasis +
   → getNewNum() + 1;
   ```

   This line inside the loop sets the **`newNum`** variable to our desired number, as in previous examples.

4. `}`

   The closing brace signals the end of the **`do`** block.

5. `while (usedNums[newNum]);`

   The **`while`** check causes the **`do`** block of code to repeat until the check evaluates to **`false`**. In this case, we're checking **`newNum`** against the **`usedNums[]`** array, to see if **`newNum`** has already been used. If it has, control is passed back to the top of the **`do`** block and the whole process starts again. Eventually, we'll find a number that hasn't been used. When we do, we drop out of the loop, set the **`usedNums[]`** item to true, and write it out to the card, as in the last task.

TIP A common use for a `do/while` loop would be to strip blanks or invalid characters off data entered by a user. But again, remember that the `do` block of code always gets executed at least once, whether the `while` check evaluates to true or false.

Calling Scripts Multiple Ways

Up to this point in the book, you've seen scripts that usually run automatically when the page loads. But in the real world, you'll often want to give the user more control over your scripts, even allowing them to run a script whenever they want. In this example (**Listing 3.10**), the script still runs when the page loads. But we also allow the user to click the link at the bottom of the page to rerun the script that generates the Bingo card entirely in their browser, *without* needing to reload the page from the server. This gives the user fast response with zero server load.

To call a script multiple ways:

1. **`document.getElementById("reload").`**
   `→onclick = anotherCard;`
   `newCard();`

   The **`initAll()`** function we've seen before has one change and one addition. All it does that's new is set the link on the HTML page (the one with the **`id`** of **`reload`**; refer back to Listing 3.1) to call the **`anotherCard()`** function when it's clicked. All the calculations that used to be in this function have now been moved to our new **`newCard()`** function—and that's all that's done there, so there's nothing new in that function for us to look at.

Listing 3.10 Give your user the ability to run scripts themselves.

```
window.onload = initAll;
var usedNums = new Array(76);

function initAll() {
     if (document.getElementById) {
        document.getElementById("reload").
        →onclick = anotherCard;
        newCard();
     }
     else {
        alert("Sorry, your browser doesn't
        →support this script");
     }
}

function newCard() {
     for (var i=0; i<24; i++) {
        setSquare(i);
     }
}

function setSquare(thisSquare) {
     var currSquare = "square" + thisSquare;
     var colPlace = new Array(0,0,0,0,0,1,1,
     →1,1,1,2,2,2,2,2,3,3,3,3,3,4,4,4,4,4);
     var colBasis = colPlace
     →[thisSquare] * 15;
     var newNum;

     do {
        newNum = colBasis + getNewNum() + 1;
     }
     while (usedNums[newNum]);

     usedNums[newNum] = true;
     document.getElementById(currSquare).
     →innerHTML = newNum;
}

function getNewNum() {
     return Math.floor(Math.random() * 15);
}

function anotherCard() {
     for (var i=1; i<usedNums.length; i++) {
        usedNums[i] = false;
     }

     newCard();
     return false;
}
```

2.
```
function anotherCard() {
   for (var i=1; i<usedNums.
   →length; i++) {
      usedNums[i] = false;
   }

   newCard();
   return false;
}
```

Here's the **`anotherCard()`** function that's called when someone clicks the link. It does three things:

- Sets all the items in the **`usedNums[]`** array to false (so that we can reuse all the numbers again)
- Calls the **`newCard()`** function (generating another card)
- Returns a value of false so that the browser won't try to load the page in the **`href`** in the link (we covered this in Chapter 2)

TIP If you've gotten this far, you now know how to do something that many people consider to be a fundamental part of Ajax—using JavaScript to reload a part of a page instead of hitting the server and requesting an entirely new page. We'll be going into Ajax in much more detail in Chapters 13 and up.

Combining JavaScript and CSS

If you've been following along this far with the Bingo example, you may well be wondering, "Hey, they said that JavaScript was all about the interactivity—why haven't we seen any user interaction?" That's a reasonable question, and here, we show how to now let the user actually play that Bingo card you generated. To do that, **Listing 3.11** uses some JavaScript to leverage the power of CSS.

To apply a style using JavaScript:

1.
   ```
   document.getElementById
   → (currSquare).className = "";
   document.getElementById
   → (currSquare).onmousedown =
   → toggleColor;
   ```

   Because our Bingo card can be used and reused, we're going to make sure that we start off with a clean slate: for every square that's set in **setSquare()**, we're going to set the class attribute to **""** (the empty string), and the **onmousedown** event handler to call the new **toggleColor()** function.

2.
   ```
   function toggleColor(evt) {
   ```

   If you're a CSS wiz, you may have noticed back in Listing 3.2 that we declared styles that we've never used. Now, inside the new **toggleColor()** function we're going to change that. The user can now click any of the squares on the card, and that square's background will change color to show that that number was called.

Listing 3.11 Adding a class via JavaScript allows our code to leverage the power of CSS.

```
window.onload = initAll;
var usedNums = new Array(76);

function initAll() {
     if (document.getElementById) {
        document.getElementById("reload").
        → onclick = anotherCard;
        newCard();
     }
     else {
        alert("Sorry, your browser doesn't
        → support this script");
     }
}

function newCard() {
     for (var i=0; i<24; i++) {
        setSquare(i);
     }
}

function setSquare(thisSquare) {
     var currSquare = "square" + thisSquare;
     var colPlace = new Array(0,0,0,0,0,1,1,
     → 1,1,1,2,2,2,2,2,3,3,3,3,3,4,4,4,4,4);
     var colBasis = colPlace
     → [thisSquare] * 15;
     var newNum;

     do {
        newNum = colBasis + getNewNum() + 1;
     }
     while (usedNums[newNum]);

     usedNums[newNum] = true;
     document.getElementById(currSquare).
     → innerHTML = newNum;
     document.getElementById(currSquare).
     → className = "";
     document.getElementById(currSquare).
     → onmousedown = toggleColor;
}

function getNewNum() {
     return Math.floor(Math.random() * 15);
}
```

listing continues on next page

Listing 3.11 *continued*

```
function anotherCard() {
    for (var i=1; i<usedNums.length; i++) {
        usedNums[i] = false;
    }

    newCard();
    return false;
}

function toggleColor(evt) {
    if (evt) {
        var thisSquare = evt.target;
    }
    else {
        var thisSquare = window.event.
        → srcElement;
    }
    if (thisSquare.className == "") {
        thisSquare.className = "pickedBG";
    }
    else {
        thisSquare.className = "";
    }
}
```

3.
   ```
   if (evt) {
      var thisSquare = evt.target;
   }
   else {
      var thisSquare = window.event.
      → srcElement;
   }
   ```

   First off, we need to figure out which square was clicked. Unfortunately, there are two ways to do this: the Internet Explorer way, and the way every other browser handles events.

   If a value called **evt** was passed into this function, we know we're in a non-IE browser, and we can look at its target. If we're in IE, we instead need to look at the **event** property of the **window** object, and then at its **srcElement** property. Either way, we end up with the **thisSquare** object, which we can then examine and modify.

4.
   ```
   if (thisSquare.className == "") {
      thisSquare.className =
      → "pickedBG";
   }
   else {
      thisSquare.className = "";
   }
   ```

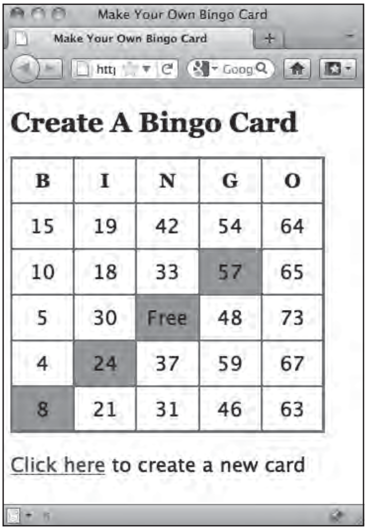
   Here, we check to see if the class attribute of the clicked square has a value. If it doesn't, we want to give it one: **pickedBG**, named because the background of the square shows that the number has been picked.

continues on next page

Now, normally, just changing a **`class`** attribute wouldn't actually change anything visually on the page—but remember the CSS back in Listing 3.2? Any tag with a class of **`pickedBG`** gets the same background color as the free square. Changing the class here automatically makes that style apply to this square, causing it to also have a pink background A.

Of course, squares can be picked accidentally, and we need to make sure there's a way to reset the value. Click the square again, and this time around, **`className`** has a value, so we toggle it to once again be the empty string.

TIP Instead of changing the `class` attribute on the square, we could instead change its `style` attribute, and then we wouldn't have to worry about the CSS file. That's the wrong approach, though—because we're leveraging the CSS file, it's simple to change the page's visual appearance without having to touch its behavior.



Create A Bingo Card

B	I	N	G	O
15	19	42	54	64
10	18	33	57	65
5	30	Free	48	73
4	24	37	59	67
8	21	31	46	63

Click here to create a new card

A Being able to mark squares when numbers are called lets the user interact with the card.

A Bit About Bits

Whenever you use a Boolean, you're dealing with a value that's either **`true`** or **`false`**. Another way to think about these variables is as containing either zero or one, which is how computers handle everything internally (**`true`** being **`1`** and **`false`** being **`0`**).

Those values—**`0`** and **`1`**—are called *bits*. They're single *bits* of information that the computer keeps track of. If it helps, you can instead think of each bit as a light switch that's either on or off.

Because everything on a computer is just a whole bunch of bits, you need to be able to do things with those bits. And in particular, you need to be able to compare them to each other. Here's some of what's going on inside:

- **and** (&)

  When we **and** two bits together, if they're both true (that is, both 1), the result is true. Otherwise, the result is false.

- **`or`** (|)

  When we **`or`** two bits together, if either is true (that is, either is 1), then the result is true. If they're both false, the result is false.

When you use **and** and **`or`** on numbers greater than one, it's referred to as *bitwise arithmetic*. Internally, your computer converts each number to its binary value and then compares the bits against each other. Because it's done internally, you don't have to do the conversion yourself (whew!).

Listing 3.12 Complex math makes this script simple: a winning combination.

```
window.onload = initAll;
var usedNums = new Array(76);

function initAll() {
     if (document.getElementById) {
        document.getElementById("reload").
        → onclick = anotherCard;
        newCard();
     }
     else {
        alert("Sorry, your browser doesn't
        → support this script");
     }
}

function newCard() {
     for (var i=0; i<24; i++) {
        setSquare(i);
     }
}

function setSquare(thisSquare) {
     var currSquare = "square" + thisSquare;
     var colPlace = new Array(0,0,0,0,0,1,1,
     → 1,1,1,2,2,2,2,3,3,3,3,3,4,4,4,4,4);
     var colBasis = colPlace
     → [thisSquare] * 15;
     var newNum;

     do {
        newNum = colBasis + getNewNum() + 1;
     }
     while (usedNums[newNum]);

     usedNums[newNum] = true;
     document.getElementById(currSquare).
     → innerHTML = newNum;
     document.getElementById(currSquare).
     → className = "";
     document.getElementById(currSquare).
     → onmousedown = toggleColor;
}

function getNewNum() {
     return Math.floor(Math.random() * 15);
}
```

listing continues on next page

Checking State

Along with interaction to let the user set a square, we can also check to see if the squares form a winning pattern. In this penultimate example, the user checks off which numbers have been called, and then **Listing 3.12** lets the user know when they've won.

There's some powerful math going on in this example; if you've never had to deal with binary before, you'll want to read the sidebar "A Bit About Bits." And if you want to get into the details, check out the sidebar "Getting Wise About Bits" (but you can skip that one if you feel your eyes glazing over!).

To check for the winning state:

1. **`checkWin();`**

   Any time the user toggles a square, it's possible that the winning status has changed, so here's a call to **`checkWin()`** at the end of **`toggleColor()`**.

2.
   ```
   var winningOption = -1;
   var setSquares = 0;
   var winners = new Array
   → (31, 992, 15360, 507904, 541729,
   → 557328, 1083458, 2162820, 4329736,
   → 8519745, 8659472, 16252928);
   ```

   Three new variables are created at the beginning of **`checkWin()`**:

   - **`winningOption`**, which stores which of the possible winning options the user has hit (if any),
   - **`setSquares`**, which stores which squares have been clicked, and
   - **`winners`**, an array of numbers, each of which is the encoded value of a possible winning line.

continues on next page

3. **`for (var i=0; i<24; i++) {`**

   ```
   var currSquare = "square" + i;
   if (document.getElementById
   → (currSquare).className != "") {
   ```

   For each square on the card, we need to check to see whether or not its number has already been called. We'll use the square's **`class`** attribute as a flag—if it's empty, then it hasn't been clicked. If there is a **`class`** attribute, do the following lines.

4.
   ```
   document.getElementById
   → (currSquare).className =
   → "pickedBG";
   setSquares = setSquares |
   → Math.pow(2,i);
   ```

   The first line here is straightforward, and in fact, should be redundant—the **`class`** attribute should already be set to **`pickedBG`**. However, there's a chance it might not be, such as when someone clicks a square they didn't mean to click, gets a win (resetting the attribute to **`winningBG`** instead of **`pickedBG`**), and then clicks it again to turn it off. If it actually is a winner, that'll be reset later.

   The second line uses *bitwise* arithmetic to set **`setSquares`** to a number based on each possible state of the card. The single bar (**|**) does a bitwise **`or`** of two values: **`setSquares`** itself and the number 2^i, which is the result of **`Math.pow(2,i)`**. That is, 2^0 is 1, 2^1 is 2, 2^2 is 4, and so on. **`Or`**'ing each of these numbers together results in a unique variable storing which of the 16-some million possible states we're in.

Listing 3.12 *continued*

```
function anotherCard() {
     for (var i=1; i<usedNums.length; i++) {
        usedNums[i] = false;
     }

     newCard();
     return false;
}

function toggleColor(evt) {
     if (evt) {
        var thisSquare = evt.target;
     }
     else {
        var thisSquare = window.event.
        → srcElement;
     }
     if (thisSquare.className == "") {
        thisSquare.className = "pickedBG";
     }
     else {
        thisSquare.className = "";
     }
     checkWin();
}

function checkWin() {
     var winningOption = -1;
     var setSquares = 0;
     var winners = new Array(31,992,15360,
     → 507904,541729,557328,1083458,2162820,
     → 4329736,8519745,8659472,16252928);

     for (var i=0; i<24; i++) {
        var currSquare = "square" + i;
        if (document.getElementById
        → (currSquare).className != "") {
           document.getElementById
           → (currSquare).className =
           → "pickedBG";
           setSquares = setSquares |
           → Math.pow(2,i);
        }
     }
```

listing continues on next page

Listing 3.12 *continued*

```
   for (var i=0; i<winners.length; i++) {
      if ((winners[i] & setSquares) ==
      ➝ winners[i]) {
         winningOption = i;
      }
   }

   if (winningOption > -1) {
      for (var i=0; i<24; i++) {
         if (winners[winningOption] &
         ➝ Math.pow(2,i)) {
            currSquare = "square" + i;
            document.getElementById
            ➝ (currSquare).className =
            ➝ "winningBG";
         }
      }
   }
}
```

5.
```
for (var i=0; i<winners.length;
➝ i++) {
   if ((winners[i] & setSquares) ==
   ➝ winners[i]) {
      winningOption = i;
   }
}
```

   Here's the second complex section: now that we know just what state the card is currently in, we want to know if it's a winning state. In a common Bingo game, there are 12 winning states, and this section compares our card's current state to each. We do a bitwise **and** between each winning state and the current state, which results in a new state that only has true values for each square that is in both of the two. Comparing that back to the same winning state allows us to see if we've fully hit this pattern—that is, the result will have no hits outside the winning state (as they aren't found in the winning state) and so long as everything found in the winning pattern is also in the current pattern, we've got ourselves a winner. In that case, set **winningOption** to **i**, the pattern we matched.

continues on next page

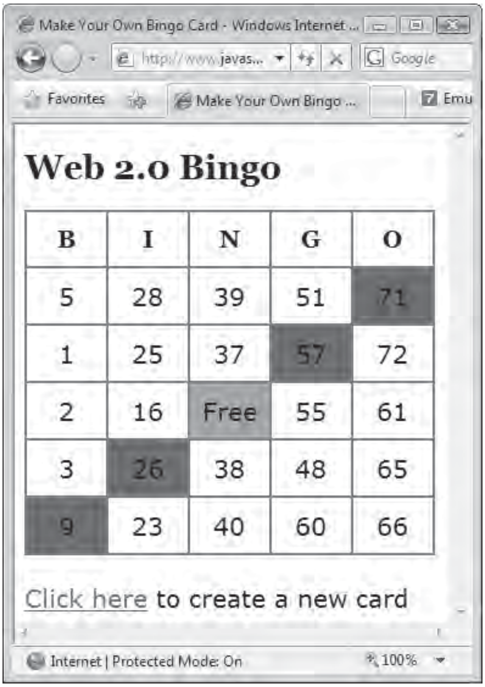
```
6. if (winningOption > -1) {
      for (var i=0; i<24; i++) {
         if (winners[winningOption] &
         → Math.pow(2,i)) {
            currSquare = "square" + i;
            document.getElementById
            → (currSquare).className =
            → "winningBG";
         }
      }
   }
```

Finally, if **winningOption** is a number greater than -1, we know we've got a winner. In that case, we want to loop through each square and check to see if it's found in the winning pattern. If it is, we set the **class** attribute to **winningBG**, and we're done A.

TIP Again, just setting the class attribute of the winning squares to match a particular CSS style is enough to change the card's appearance. Because this is paper, though, you can't see how it truly looks: the winningBG rule sets the background to an animated gif which slowly flashes between red and white. A friend of mine described it as "delightfully obnoxious."

TIP There are a number of different Bingo games, each with different winning patterns. By modifying the single line of code that initializes the winners array, your script can fit any result someone might want.

TIP If you've ever wondered why conditionals use && and || (for and and or, respectively), now you know: the single version of those operators tells JavaScript that you're doing binary math, not decimal math.


Make Your Own Bingo Card - Windows Internet ...
http://www.javas...
Google
Favorites
Make Your Own Bingo ...
Emu
Internet | Protected Mode: On
100%

Web 2.0 Bingo

B	I	N	G	O
5	28	39	51	71
1	25	37	57	72
2	16	Free	55	61
3	26	38	48	65
9	23	40	60	66

Click here to create a new card

A Looks like we've got a winner! (In print, you can't see the pulsing colors.)

Getting Wise About Bits

(As we said above, this is the sidebar for geeks, so please be advised to put on your propeller beanie *and* pocket protector before continuing. If you don't already own these accoutrements, feel free to just skip this section.)

Given that there are (at least in this version of Bingo) only 12 possible winning patterns, we could easily write code that would check for each of those. Because of the many variations of Bingo, though, that would mean that any time you wanted to play a different version you'd have to change the entire way the script checks for wins.

Instead, we're using what's called bitwise arithmetic (see the sidebar "A Bit About Bits") to store the winning patterns. That means that we're taking advantage of the way computers internally keep track of everything as 1s and 0s. So, we create the programming equivalent of making a list:

0	✔	**1**
1		**2**
2		**4**
3		**8**
4		**16**
5	✔	**32**
6		**64**
7		**128**
8		**256**
9		**512**
10	✔	**1024**
11		**2048**
12		**4096**
13		**8192**
14	✔	**16384**
15		**32768**
16		**65536**
17		**131072**
18		**262144**
19	✔	**524288**
20		**1048576**
21		**2097152**
22		**4194304**
23		**8388608**

If you compare the numbers in the left-hand column next to the checked boxes, you'll see that we've picked the top row of the card: **`square0`**, **`square5`**, **`square10`**, **`square14`**, and **`square19`**. The right-hand column is 2 to the power of the left-hand number.

To figure out the numeric equivalent of a winning pattern, we just add up the right-hand numbers that are part of the pattern. In this case, that's 1+32+1024+16384+524288, or 541729—which you'll see is included in the list of winners.

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Getting Wise About Bits *continued*

To calculate what you get with a vertical line in the B column, you add up 1+2+4+8+16, for a result of 31. That's another winner. And so on, for each possible winning pattern.

Here's the secret: if you flip that chart above on its side so that it goes from 23 to 0, replace the check marks with 1s and the blanks with 0s, you'll have a 24-digit binary number. So, you could (if you wanted to) think of our first winning pattern as **000010000100010000100001** and our second as **000000000000000000011111**—although why you'd want to, we have no idea. But take our word for it: the first is the binary representation of 541729, and the latter of 31.

When we go through each square and check to see if it's set, we store the result in **`setSquares`**. That value is the sum of all the squares the player has selected, which, again, you could think of as a line of 24 ones and zeros if you prefer.

We get **`setSquares`** by **`or`**'ing all those values together. When a zero and a zero are **`or`**'ed together (using a single bar **`|`**), the result is a zero. Any other combination, and the result is a one.

Let's say that our end result in **`setSquares`** is 561424—that means that the player set squares 4, 8, 12, 15, and 19, for a binary value of **000010001001000100010000**. Now, 561424 isn't on our list of winners. But when we **`and`** the number above with 557328 (which is a winner), we get:

```
000010001001000100010000  and
000010001000000100010000
------------------------
000010001000000100010000
```

When a one and a one are **`and'`**ed together (using a single ampersand **`&`**), the result is a one. Any other combination, and the result is a zero.

Looking at the code, we then compare the resulting value back to the winning value, and if they're the same (as they are in this case), we've got a winner; here, it's the diagonal going from the bottom left to the top right.

If you're now wondering if this is really easier than calculating everything out manually, think about it this way: in order to play a round where getting all four corners also counts as a win, all you have to do is add the number 8912913 to the array of winners—and everything else just works (that's squares 0, 4, 19, and 23, by the way).

Listing 3.13 A private game of Buzzword Bingo will liven up that next deadly dull staff meeting—just add your own text strings.

```
var buzzwords = new Array ("Aggregate",
     "Ajax",
     "API",
     "Bandwidth",
     "Beta",
     "Bleeding edge",
     "Convergence",
     "Design pattern",
     "Disruptive",
     "DRM",
     "Enterprise",
     "Facilitate",
     "Folksonomy",
     "Framework",
     "Impact",
     "Innovate",
     "Long tail",
     "Mashup",
     "Microformats",
     "Mobile",
     "Monetize",
     "Open social",
     "Paradigm",
     "Podcast",
     "Proactive",
     "Rails",
     "Scalable",
     "Social bookmarks",
     "Social graph",
     "Social software",
     "Spam",
     "Synergy",
     "Tagging",
     "Tipping point",
     "Truthiness",
     "User-generated",
     "Vlog",
     "Webinar",
     "Wiki",
     "Workflow"
);

var usedWords = new Array(buzzwords.length);
window.onload = initAll;
```

listing continues on next page

Working with String Arrays

Up to this point, all the arrays we've dealt with have consisted of Booleans or numbers. As our final Bingo-related example, **Listing 3.13** combines everything we've done previously with a string array to create the popular "Buzzword Bingo" game.

Listing 3.13 *continued*

```
function initAll() {
     if (document.getElementById) {
        document.getElementById("reload").onclick = anotherCard;
        newCard();
     }
     else {
        alert("Sorry, your browser doesn't support this script");
     }
}

function newCard() {
     for (var i=0; i<24; i++) {
        setSquare(i);
     }
}

function setSquare(thisSquare) {
     do {
        var randomWord = Math.floor((Math.random() * buzzwords.length));
     }
     while (usedWords[randomWord]);

     usedWords[randomWord] = true;
     var currSquare = "square" + thisSquare;
     document.getElementById(currSquare).innerHTML = buzzwords[randomWord];
     document.getElementById(currSquare).className = "";
     document.getElementById(currSquare).onmousedown = toggleColor;
}

function anotherCard() {
     for (var i=0; i<buzzwords.length; i++) {
        usedWords[i] = false;
     }

     newCard();
     return false;
}

function toggleColor(evt) {
     if (evt) {
        var thisSquare = evt.target;
     }
     else {
        var thisSquare = window.event.srcElement;
     }
     if (thisSquare.className == "") {
        thisSquare.className = "pickedBG";
     }
```

listing continues on next page

Listing 3.13 *continued*

```
     else {
        thisSquare.className = "";
     }
     checkWin();
}

function checkWin() {
     var winningOption = -1;
     var setSquares = 0;
     var winners = new Array(31,992,15360,
     → 507904,541729,557328,1083458,2162820,
     → 4329736,8519745,8659472,16252928);

     for (var i=0; i<24; i++) {
        var currSquare = "square" + i;
        if (document.getElementById
        → (currSquare).className != "") {
           document.getElementById
           → (currSquare).className =
           → "pickedBG";
           setSquares = setSquares |
           → Math.pow(2,i);
        }
     }

     for (var i=0; i<winners.length; i++) {
        if ((winners[i] & setSquares) ==
        → winners[i]) {
           winningOption = i;
        }
     }

     if (winningOption > -1) {
        for (var i=0; i<24; i++) {
           if (winners[winningOption] &
           → Math.pow(2,i)) {
              currSquare = "square" + i;
              document.getElementById
              → (currSquare).className =
              → "winningBG";
           }
        }
     }
}
```

To use string arrays:

1.
```
var buzzwords = new Array
→ ("Aggregate", "Ajax", "API",
→ "Bandwidth", "Beta",
→ "Bleeding edge", "Convergence",
→ "Design pattern", "Disruptive",
→ "DRM", "Enterprise",
→ "Facilitate", "Folksonomy",
→ "Framework", "Impact",
→ "Innovate", "Long tail",
→ "Mashup", "Microformats",
→ "Mobile", "Monetize",
→ "Open social", "Paradigm",
→ "Podcast", "Proactive", "Rails",
→ "Scalable", "Social bookmarks",
→ "Social graph",
→ "Social software", "Spam",
→ "Synergy", "Tagging",
→ "Tipping point", "Truthiness",
→ "User-generated", "Vlog",
→ "Webinar", "Wiki", "Workflow");

var usedWords = new Array
→ (buzzwords.length);
```

   This game of Buzzword Bingo has a “Web 2.0” theme, but you can put strings based around any topic inside the **`buzzwords`** array. You’ll need to have at least 24 entries (more is better), and you won’t want them to be too lengthy (or they won’t fit in the squares), but other than those restrictions, the only limit is your imagination.

   Along with initializing the string array, we also need to initialize the new **`usedWords`** array of Booleans. Giving it a size of **`buzzwords.length`** means that nothing needs to change when we add new entries—it will automatically be the right length.

continues on next page

2.

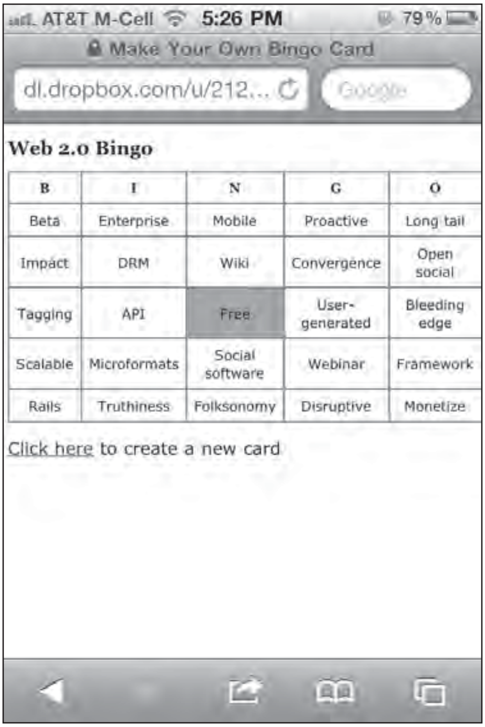
```
do {
   var randomWord = Math.floor
   →((Math.random() * buzzwords.
   →length));
}
while (usedWords[randomWord]);

usedWords[randomWord] = true;
var currSquare = "square" +
→thisSquare;
document.getElementById
→(currSquare).innerHTML =
→buzzwords[randomWord];
```

Figuring out what strings to put in what squares is actually simpler, as any string can go in any square (unlike the number restrictions in standard Bingo). All we're doing here is making sure that we're getting an as-yet-unused word, marking it as used, and then writing it into the square.

3.

```
for (var i=0; i<buzzwords.
→length; i++) {
   usedWords[i] = false;
}
```

When a new card is generated, just like with the standard Bingo card, we have to set all the flags in **usedWords** back to false so they're once again available.



Web 2.0 Bingo

B	I	N	G	O
Beta	Enterprise	Mobile	Proactive	Long tail
Impact	DRM	Wiki	Convergence	Open social
Tagging	API	Free	User-generated	Bleeding edge
Scalable	Microformats	Social software	Webinar	Framework
Rails	Truthiness	Folksonomy	Disruptive	Monetize

Click here to create a new card

A With a mobile browser and a little imagination, you can write a bingo game of your own for almost any occasion.

TIP When Apple still attended the annual Macworld Expo in San Francisco, it was traditional for the opening keynote to be given by Steve Jobs—which was, therefore, referred to as the "SteveNote." Also somewhat traditional was audience members playing "SteveNote Bingo," seeing which of Steve's pet phrases (such as "Boom!" and "One more thing...") were said and which of the rumored products actually appeared.

TIP Because the iPhone comes with the standard Safari browser, I was able to easily come up with an interactive version of this game A for the Macworld following the iPhone's introduction. It was very well received, although no one actually yelled out "Bingo!" during the keynote. I've also adapted this same Bingo example for other breaking news events, such as televised US political debates.