

CT1114

Web Development

HTML, CSS, JavaScript

Section 3:

Expressions, Operators, and Loops in Javascript

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Expressions

- In programming, an expression is a statement that evaluates to a value
- The resulting value could for example be a number, a string, or a Boolean (true/false)

$1 + 6$

"Harry" + " " + "Potter"

$20 > 19$

`var x = y * z;`

`alert("My name is "+"Harry" + " " + "Potter");`



Boolean Variables & Expressions

- A Boolean value may be either **true** or **false**
 - `var a = true;`
 - `var a = (20 > 19);`
- A Boolean expression is one that resolves to either true or false
 - Often, produced by the use of **relational** and **logical** operators (see below)



Relational Operators

- Less than <
- Greater than >
- Less than or equal to <=
- Greater than or equal to >=
- Equal to ==
- Not equal to !=
- These operators all take two values (usually numbers) and produce a Boolean result by comparing them



Conditional Statements

- **if** statement – execute code only if some condition is true
- **if...else** statement – execute some code if the statement is true and another piece if it is false
- **if...else if ... else** statements – used to execute one of many blocks of code
- **switch.. case** statement – used to execute one of many blocks of code
- Use braces (curly brackets) to denote blocks of code



Example

```
<!DOCTYPE html>
<html>
  <head>
    <title>Inequality Demo</title>
    <script>
      function handleClick() {
        // create 2 random numbers
        var a = Math.floor( Math.random()*1000 );
        var b = Math.floor( Math.random()*1000 );

        // build up an output result string from some equality tests
        var res = "a = "+a+"<br>b = "+b;
        if (a<b)
          res += "<br>a is less than b";
        else
          res += "<br>a is not less than b";

        if (a>b)
          res += "<br>a is greater than b";
        else
          res += "<br>a is not greater than b";

        // display the result
        var p = document.getElementById('myParagraph');
        p.innerHTML = res;
      }
    </script>
  </head>
  <body>
    <p id='myParagraph'>
      Results will display here
    </p>
    <button onclick='handleClick();'>Demo</button>
  </body>
</html>
```



Exercise

- Edit the code from the previous slide so that it also indicates if a and b are equal



Logical Operators

- &&
 - Logical 'and'
 - Compares two Boolean values and equates to true if they are both true
- ||
 - Logical 'or'
 - Compares two Boolean values and equates to true if one or the other (or both) is true
- !
 - Logical 'not'
 - Negates the value of a Boolean value



Example

```
<!DOCTYPE html>
<html>
  <head>
    <title>Three random numbers</title>
    <script>
      function handleClick() {
        // create 3 random numbers
        var a = Math.floor( Math.random()*1000 );
        var b = Math.floor( Math.random()*1000 );
        var c = Math.floor( Math.random()*1000 );

        // find the biggest
        var res = "a = "+a+"<br>b = "+b+"<br>c = "+c;
        if (a>b && a>c)
          res += "<br>The biggest value is "+a;
        else if (b>a && b>c)
          res += "<br>The biggest value is "+b;
        else
          res += "<br>The biggest value is "+c;

        // display the result
        var p = document.getElementById('myParagraph');
        p.innerHTML = res;
      }
    </script>
  </head>
  <body>
    <p id='myParagraph'>
      Results will display here
    </p>
    <button onclick='handleClick();'>Demo</button>
  </body>
</html>
```



Loops in JavaScript

- Repeat { block of code }
 - As long as some condition is true

'for' loops

- execute code a specific number of times

'while' loops

- execute code an undetermined number of times



For Loop

- The For Loop repeats a block of code a certain number of times

```
for (var i=1; i<=10; i=i+1) {  
    // Execute this code on each loop iteration  
}
```

Three inner statements:

- for (Initialisation; Test; Loop statement)



Example

```
<!DOCTYPE html>
<html>
  <head>
    <title>Twenty random numbers</title>
    <script>
      function handleClick() {
        // create 20 random numbers and find the biggest
        var biggest = 0;
        for (var i=0; i<20; i++) {
          var num = Math.floor( Math.random()*1000 );
          if (num>biggest)
            biggest = num;
        }

        var res = "Of 20 random numbers, the biggest was
"+biggest;

        // display the result
        var p = document.getElementById('myParagraph');
        p.innerHTML = res;
      }
    </script>
  </head>
  <body>
    <p id='myParagraph'>
      Results will display here
    </p>
    <button onclick='handleClick();'>Demo</button>
  </body>
</html>
```



While Loop

- Executes code an undetermined number of times
- Loops while the condition remains true
 - Which could be zero times

```
var i = 0, j = 10000;
```

```
while ( i < j ) {
```

```
    // Execute this code per loop iteration
```

```
    i++;
```

```
    j /= 1.4;
```

```
}
```



Exercise

- How many times will this loop iterate?
- Write a webpage to find out!
- Use alert() to show your answer

```
var i = 0, j = 10000;
```

```
while ( i < j ) {
```

```
    // Execute this code per loop iteration
```

```
    i++;
```

```
    j /= 1.4;
```

```
}
```



Exercise (not graded – no need to submit)

- Edit the "twenty random numbers" example so that it shows the biggest, smallest, and sum of the numbers
- Bonus! - also display each of the 20 numbers

