

# JavaScript

Powers the web



# JavaScript Core fundamentals - Learn JavaScript Here

This ebook uses <https://developer.mozilla.org/en-US/docs/Web/JavaScript> as a source for examples. Check out more about JavaScript at MDN.

Find out more about my courses at <http://www.discoveryvip.com/>

## JavaScript Core fundamentals

Should be used as a reference point for students of the course

**Course instructor : Laurence Svekis -  
providing online training to over  
500,000 students across hundreds of  
courses and many platforms.**



# Quick introduction to Course and JavaScript

- JavaScript Language Fundamentals
- Explore the course
- Tools and resources used in the course
- How to setup and prepare to write JavaScript



# How to use this course

- Course is modular in design so you can skip lessons if desired.
- Source Code is included so you can try the code.
- Course starts with the basics of JavaScript coding progressively getting more complex and building on knowledge from the earlier lessons.
- Resources and tips are provided throughout the course when appropriate.



# Tools needed

You probably already have all you need to write and run JavaScript

In the course I use brackets.io a free open source text editor. <http://brackets.io/>

Also use Chrome as the browser utilizing the devTools.

<https://developers.google.com/web/tools/chrome-devtools/>

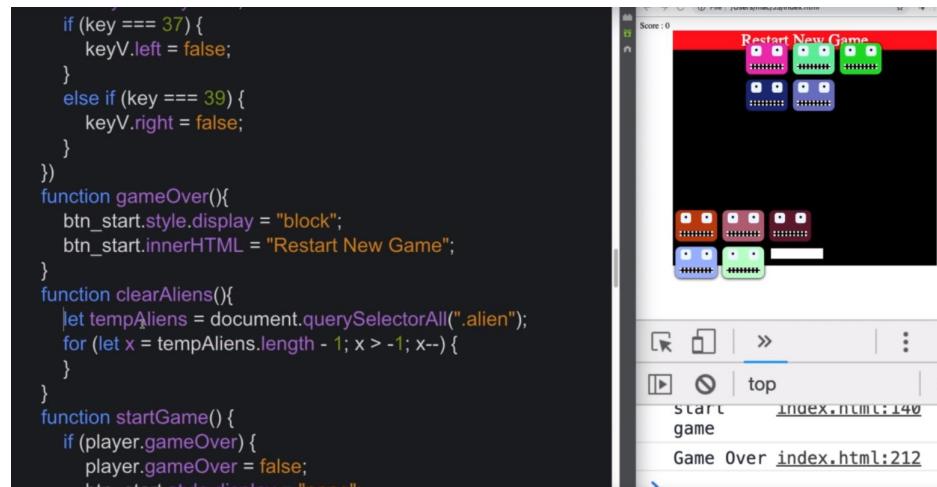


# Layout of Lessons for coding

**Editor** on the left side - showing the code.

**Browser** on the right side - showing what the code does.

**Dev Console** open in the browser on the right side bottom - allowing us to communicate with the code behind the scenes.



The image shows a browser window with a game interface on the right and developer tools on the left.

**Game Interface:** The game is titled "Restart New Game". It features a black background with several alien invaders of different colors (blue, green, red) at the top. A player ship is at the bottom. A score of 0 is displayed.

**Developer Tools:** The DevTools sidebar is open, showing the following details:

- Score: 0
- Elements:
  - btn\_start
  - player
- Script:
  - index.html:214: game
  - Game Over index.html:212

# Resources to reference JavaScript

Modern JavaScript focused means that we do cover current syntax as well as foundational code.

Resources and content will be references within the lessons particularly content from MDN <https://developer.mozilla.org/en-US/docs/Web/JavaScript>

Code converter to older versions <http://babeljs.io/>

Syntax compatibility table <http://kangax.github.io/compat-table/es6/>

No frameworks or JavaScript libraries you can do it all with regular vanilla JavaScript.

# Lesson Challenge

Setup you working development environment and get ready to write some code.

You can use online editors like as well to try the code and run it. <https://codepen.io/>

I'm using Brackets which is a free code editor available at <http://brackets.io/>



# More about JavaScript

- What JavaScript is
- How coding works
- Code example
- Tools to write JavaScript - Browser Console
- Write some code JavaScript



# History Brief

- Originally called LiveScript - in 1995
- Originally made by NetScape to provide interaction and more functionality in the browser
- Renamed to JavaScript December 1995
- JavaScript compared to Java - only in name similar.

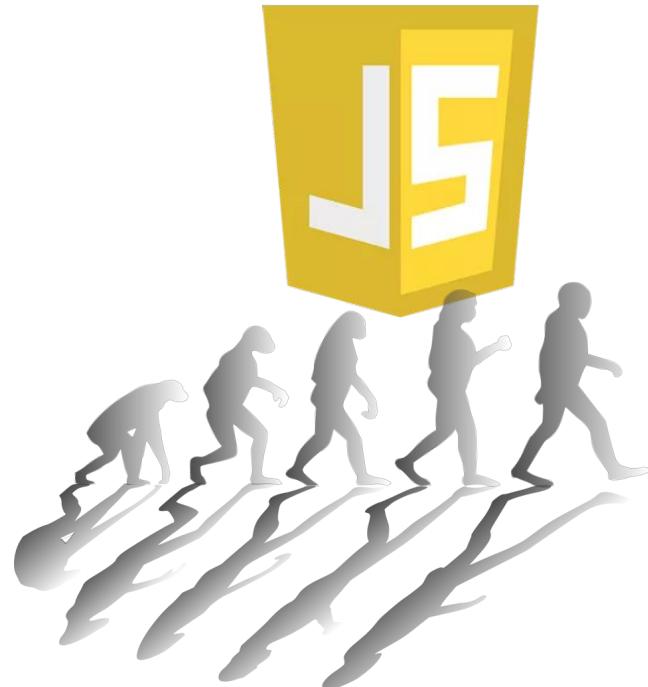


# Versions ECMAScript

ECMAScript is the standardized format of JavaScript. You will see JavaScript referred to as different version of ecmascript or ES.

## ES Version Official name

1	ECMAScript 1 (1997)
2	ECMAScript 2 (1998)
3	ECMAScript 3 (1999)
4	ECMAScript 4 Never released.
5	ECMAScript 5 (2009)
5.1	ECMAScript 5.1 (2011)
6	ECMAScript 2015 <i>*** this is where it gets confusing</i>
7	ECMAScript 2016
8	ECMAScript 2017
9	<b>ECMAScript 2018</b>



# Introduction - Why JavaScript

**JavaScript is everywhere** - all your favorite and also the ones you don't like use JavaScript.

Makes content come to life - allows for interaction with content and makes things happen.

Dynamic programming language that, when applied to an HTML document, can provide dynamic interactivity on websites.



- Used in all browsers
- Most popular language
- Website and web apps - JavaScript RULES

# What is code - What is JavaScript

**Set of instructions for what you want to happen.**

*Example : When a new person comes to your website, ask their name. Show a welcome message with their name.*

What is your name ?

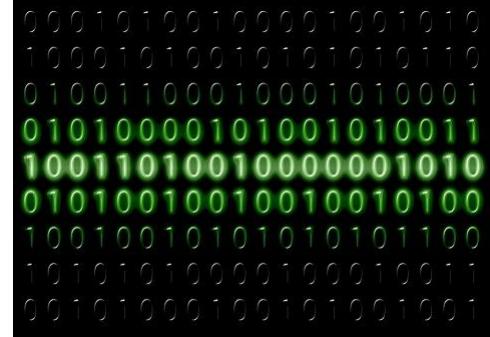
Hello, Laurence



# The code for example

```
<div>What is your name ?  
  <input type="text">  
  <button>Send</button>  
</div>  
  
<script>  
  document.querySelector("button").addEventListener("click", function () {  
    document.querySelector("div").textContent = "Hello, " + document.querySelector("input").value;  
  })  
</script>
```

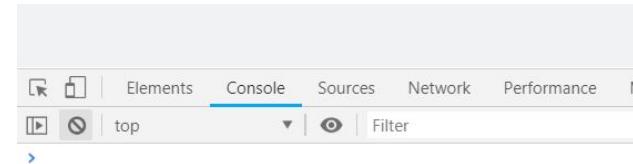
**\*\* Notice the repetition of syntax**

A black rectangular box containing a grid of binary digits (0s and 1s). The digits are arranged in a repeating pattern where each row contains a different sequence of binary digits. The first few rows are: 00010100100001001010, 10001010010101010110, 01001100010001010001, 01010000101001010011, 1001101001000001010, 01010010010010010100, 10010010101010101100, 10101010000100010011, 00101000100101001001.

# Chrome Browser Console

The developer console shows you information about the currently loaded Web page, and also includes a command line that you can use to execute JavaScript expressions in the current page.

**Open try it.**



- Will be used throughout the course.
- Test debug - output content from our code
- Most browsers - you can write and execute javascript from your browser

# Open Dev Tools on Chrome

When you want to work with the DOM or CSS, right-click an element on the page and select **Inspect** to jump into the **Elements** panel. Or press Command+Option+C (Mac) or Control+Shift+C (Windows, Linux, Chrome OS).

When you want to see logged messages or run JavaScript, press Command+Option+J (Mac) or Control+Shift+J (Windows, Linux, Chrome OS) to jump straight into the **Console** panel.

# Try Console console.log

Outputs a message to the Web Console.

Try it: `console.log("Hello");`

`console.log` prints the element in an HTML-like tree

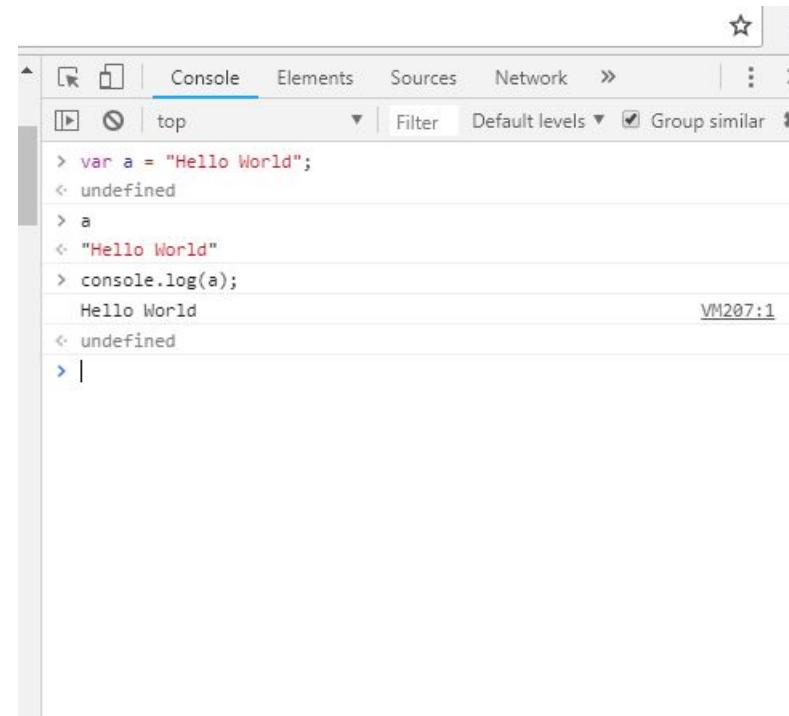
**TIP :** When you reload it goes away

Try it: `console.dir(document);`

\*more about the document Object (DOM) later

`console.dir` prints the element in a JSON-like tree

**TIP :** Undefined means nothing got returned and function expect a return within the console.



The screenshot shows the Chrome DevTools Console tab. The command `> var a = "Hello World";` is entered, followed by the result `< undefined`. Then, the variable `a` is checked, showing the value `< "Hello World"`. Finally, the command `> console.log(a);` is run, and the output is displayed as `Hello World` in green text, with the status `VM207:1` indicating the script source. The console interface includes tabs for Console, Elements, Sources, and Network, along with various filter and settings options.

# More Console Output

*Numbers blue in the console*

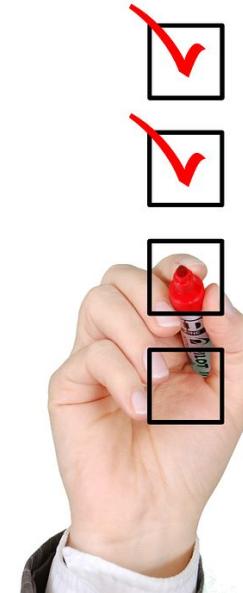
*Strings are black*

```
console.log("Hello World")
```

```
console.dir(document)
```

```
console.table({first:"test",val:9});
```

```
console.error("Hello World")
```



**TIP** clear() or press clear button to clear without refresh

# Lesson Challenge

Open browser console

Type `console.log("Hello World");`

Type more than one line

`var a = "Hello";`

`console.log(a);`

```
> console.log("hello")
  hello
<- undefined
> var a = "hello"
<- undefined
> a
<- "hello"
> console.log(a);
  hello
<- undefined
```



# More about JavaScript

- Create index.html and app.js file
- Write some code JavaScript
- Run the file in your browser



# Alert

The Window.alert() method displays an alert dialog with the optional specified content and an OK button.

```
window.alert("Hello world!");
```

```
alert("Hello world!");
```

**TIP :** You don't need to include the window object as it is assumed

```
window.alert(message);
```



# Code Snippet

```
var myName = "Laurence";
var myCourse = "JavaScript";
console.log(myName);
alert("welcome");
var myAge = 40;
console.log(myAge);
```

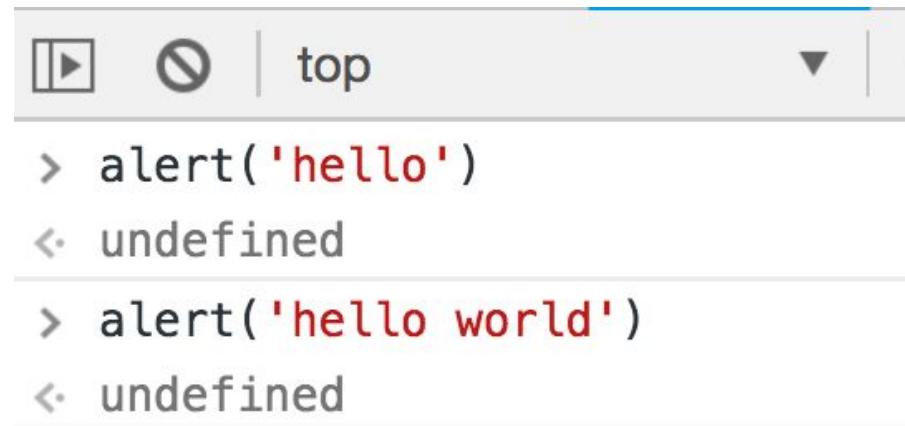
# Try in the console then in the index.html file

Write an alert in your browser.

Try it in your browser console.

```
alert("hello");
```

Say hello to visitors



A screenshot of a browser developer tools console. At the top, there are icons for play/pause, stop, and top. Below that, the command line shows two alerts being run. The first alert is 'alert('hello')' and its response is 'undefined'. The second alert is 'alert('hello world')' and its response is also 'undefined'. The console has a scroll bar on the right side.

```
> alert('hello')
<- undefined
> alert('hello world')
<- undefined
```

**TIP** Double quotes and single quotes computer  
doesn't care, the standard is style that is commonly  
used. Double for strings.

# The language - syntax

How does the browser know what to do????

`alert("hello");`

Function - `alert()` - more about this in the later lessons

Message - "hello"

End of statement - ;

**TIP:** A semicolon is not necessary after a statement if it is written on its own line. But if more than one statement on a line is desired, then they must be separated by semicolons. It is considered best practice, however, to always write a semicolon after a statement, even when it is not strictly needed.



# Add JavaScript to website html file

Inside html file or linked to script file

```
<script src="code.js"></script>
```

```
<script>
```

```
///
```

```
</script>
```

```
<!-- HTML4 -->
<script type="text/javascript" src="javascript.js"></script>

<!-- HTML5 -->
<script src="javascript.js"></script>
```



**TIP :** Alert stops the code execution, if in top does not output the content until the button is clicked. Place JavaScript at the bottom so the rest of the code can render.

# Run your index.html file in the browser

Getting started with JavaScript is easy: all you need is a modern **Web browser**.

Create index html file and open it in a browser

Add JavaScript



# Comments in Code JavaScript

- How values are used and assigned
- What variables are
- Var



# Comments and Whitespace

Comments // for single line

/\* for multiple line comments \*/

Comments in JavaScript

TIP : whitespace is ignored in JavaScript, you can use it for writing code that is more readable and understandable



# Code Snippet

```
var myName = "Laurence";
var myCourse = "JavaScript";
console.log(myName);
alert("welcome");
var myAge = 40; // Shhh I don't give my real age
console.log(myAge);
/*
```

You can write a bunch of stuff here and nothing will be rendered out. Secret for web developers.

```
 */
```

# Lesson Challenge

`console.log("Hello World");`

Type more than one line

`var a = "Hello"; console.log(a);`

*Add some comments and an alert.*

*Create an index.html file run the code , add a js file run the code. Add javascript to your webpage both in the script tags and as a linked file. Use alert. Create a welcome message.*



# Declarations Variables JavaScript

- How values are used and assigned
- What variables are
- var



# Why use Variables?

Symbolize the values within your applications

Example

*“I really really enjoy working with JavaScript”*

```
var message = “I really really enjoy working  
with JavaScript”;
```

*message = “Look I can change this value”;*

Assign a value to your variables with = sign



# Declare your Variables

The var statement declares a variable, optionally initializing it to a value.

```
var x = 1;
```

```
console.log(x);
```

```
x = 2; - update value
```

```
console.log(x);
```

Hello World

Welcome Back

Laurence

John



# Lesson Challenge

Declare a variable that holds a welcome message. Change the welcome message to a NEW message. Output it in the console.

Declare a variable that holds your name, change it to your friends name and output it into the console.



# Code Snippet

```
//console.log(a);
var a = "Hello World";
console.log(a);
a = "Welcome Back";
console.log(a);
var myName = "Laurence";
console.log(myName);
myName = "John";
console.log(myName);
```

# Variables Let and Const with ES6

- Boolean data type
- Let
- Const
- Code Block with condition



# Condition Check

Variables can have another data type boolean

Boolean can be either true or false;

Like a switch, commonly used for conditions

```
if(true){
```

/// Runs this code only if the check comes back as true

```
}
```



# Code Snippet

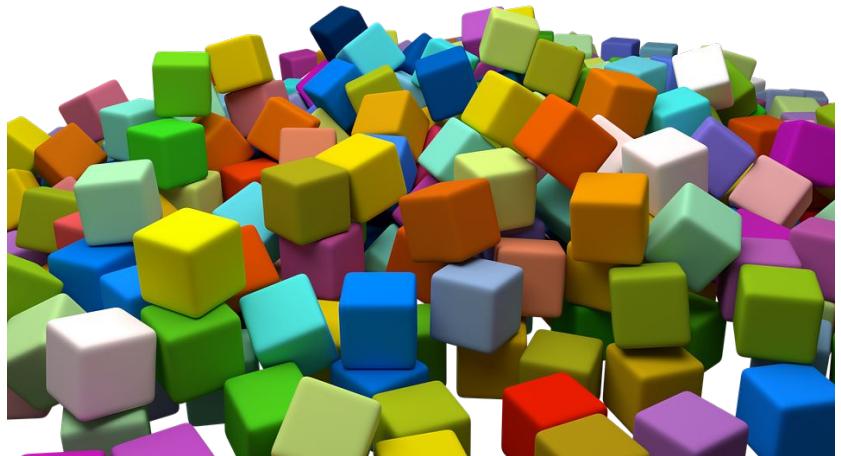
```
var message;
console.log(message);
message = null;
console.log(message);
var myLight = false;
console.log(myLight);
myLight = true;
if (myLight) {
    console.log(myLight);
}
var score1, score2, score3, score4;
var a = "Hello";
var b = 10;
var c = false;
console.log(a);
```

# Variable Types

`var` - Declares a variable, optionally initializing it to a value.

`let` - Declares a block-scoped, local variable, optionally initializing it to a value.  
Blocks of code are indicated by {}

`const` - Declares a block-scoped, read-only named constant. Cannot be changed.



# Variables ES6

`let a = "Hello World";` - initialize variables  
within **the scope**

`const a = "Hello World";` - initialize variables  
within the scope cannot be changed

More on scope later in the course!



# Variables - let

new keyword to declare variables: let

'let' is similar to var but has scope. Only accessible within the block of code that it is defined. let restricts access to the variable to the nearest enclosing block.

## Example

```
let message = "I really really enjoy working with JavaScript";
```

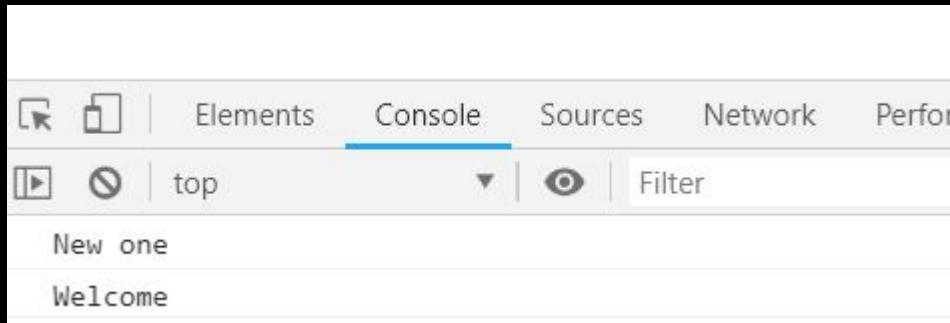
```
message = "Look I can change this value";
```

```
1 <script>
2 // Lesson 1
3 console.log(a); // WRONG
4 var a = "Hello world";
5 console.log(a);
6
7 if(a){
8     console.log(a);
9     let b = 'Only available in this block';
10    console.log(b);
11 }
12 console.log(b);
13 </script>
```

lesson1.html:3 undefined  
lesson1.html:5 Hello world  
lesson1.html:8 Hello world  
Only available in this block  
lesson1.html:10  
lesson1.html:12  
lesson1.html:12  
● Uncaught ReferenceError: b is not defined  
at lesson1.html:12

# Code Snippet

```
let myMessage = "Welcome";
if(true){
  let myMessage = "New one";
  console.log(myMessage);
}
console.log(myMessage);
```



# Code Snippet

```
var message;
console.log(message);
message = null;
if (myLight) {
    let message1 = "Hello";
}
console.log(message1);
```

# Variables - const

new keyword to declare variables: const

‘const’ is similar to var but has scope. Only accessible within the block of code that it is defined. Also for values that are not going to be changed and are fixed with a read-only reference to a value.

const message = “I really really enjoy working with JavaScript”;

message = “Oh no not going to work”;

The screenshot shows a browser's developer tools console. On the left, there is sample JavaScript code:if(a){  
 console.log(a);  
 const c = 'Only available in this block';  
 console.log(c);  
}  
console.log(c);  
</script>On the right, the console output is shown in three columns. The first column lists the output of each `console.log` statement. The second column shows the file path for each log entry. The third column shows the line number where each log was produced. A red error box highlights the last log entry, which is an `Uncaught ReferenceError` because `c` is not defined outside its block scope.

Output	File	Line
undefined	lesson1.html:1:5	5
Hello world	lesson1.html:1:8	8
Hello world	lesson1.html:1:10	10
Only available in this block	lesson1.html:1:15	15
Hello world	lesson1.html:1:17	17
Only available in this block	lesson1.html:1:19	19
✖ Uncaught ReferenceError: c is not defined	at lesson1.html:19	19

The screenshot shows a browser's developer tools console. On the left, there is sample JavaScript code:let e = 100;  
e++;  
const d = 100;  
d++;On the right, the console output is shown in three columns. The first column lists the output of each `console.log` statement. The second column shows the file path for each log entry. The third column shows the line number where each log was produced. A red error box highlights the last log entry, which is an `Uncaught TypeError` because `d` is a constant and cannot be reassigned.

Output	File	Line
Only available in this block	lesson1.html:17	17
✖ Uncaught TypeError: Assignment to constant variable.	at lesson1.html:24	24

# Variables

## Const rules

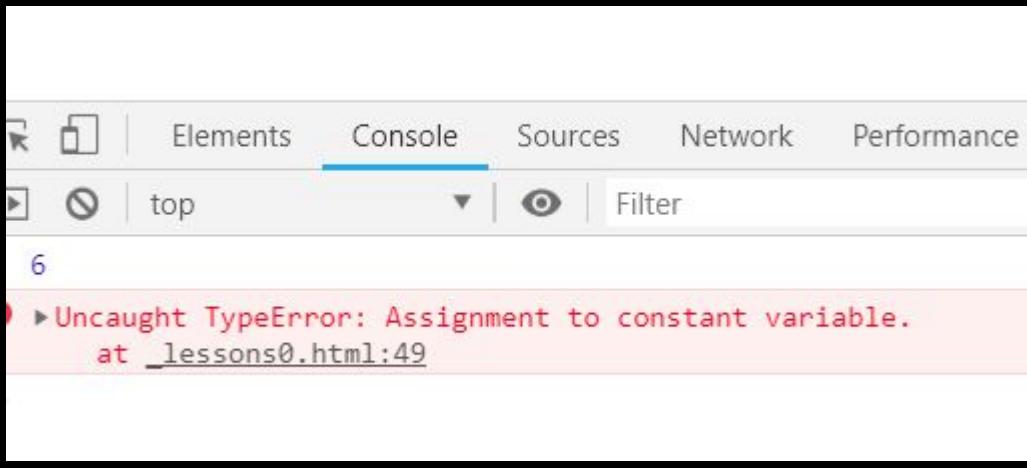
- const cannot be reassigned a value
- const variable value is immutable
- const cannot be redeclared
- const requires an initializer

TIP : variables must be declared before you use them.



# Code Snippet

```
let counter1 = 5;  
counter1++;  
console.log(counter1);  
const counter2 = 10;  
counter2++;  
console.log(counter2);
```



# Lesson Challenge

Declare a variable called message with let. Check to see if it exists and if it does update the value. Output the variable value to the console.



# Code Snippet

```
let message = "Welcome";
console.log(message);
if (message) {
  message = "Updated Message";
}
console.log(message);
```

# Data Types Variable setup

- Null
- Undefined
- Declare multiple variables
- CamelCase
- Variable naming rules



# Variables declaring null vs undefined

`var a;` - initialize as undefined

A variable declared using the var or let statement with no assigned value specified has the value of undefined.

Undefined data type

`var test;`

`console.log(test);`



# Declare multiple variables in one statement

Comma separate to declare multiple variables.

```
var a,b,c,d;
```



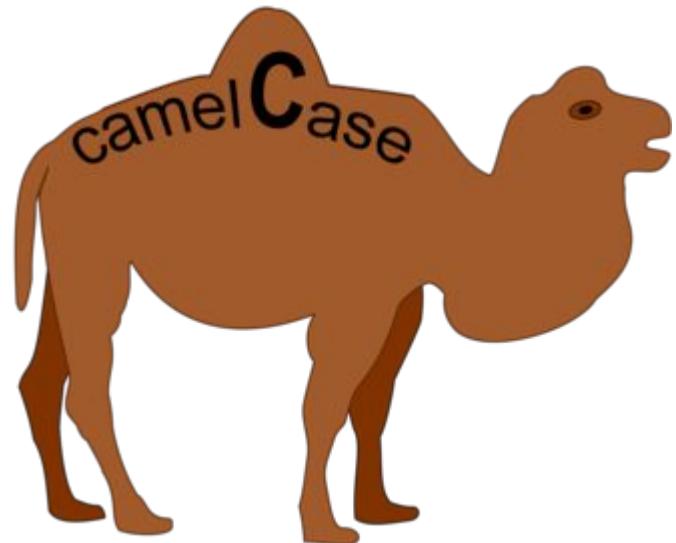
# TIP camelCase

camel case is more readable

```
var userfirstname = "Laurence";
```

Or

```
var userFirstName = "Laurence";
```



# Variable naming

must start with a letter, underscore (\_), or dollar sign (\$). Subsequent can be letters or digits. Upper or lower case. No spaces

no limit to the length of the variable name.

variable names are case sensitive

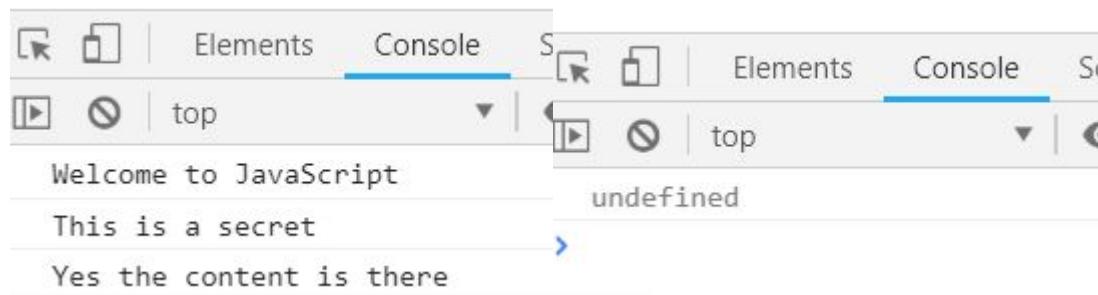
Cannot use reserved words.

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Lexical\\_grammar#Keywords](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Lexical_grammar#Keywords)



# Lesson Challenge

Create some variables update values and output them in the console. Also use the code block checking for a true value to output a console message as a secret message. Then change to false and check again see the different output.



```
Welcome to JavaScript
This is a secret
Yes the content is there
```

```
undefined
```



# Code Snippet

```
const test = true;
let message = "Welcome to JavaScript";
let moreStuff;
if(test){
    console.log(message);
    moreStuff = "Yes the content is there";
    let inBlock = "This is a secret";
    console.log(inBlock);
}
console.log(moreStuff);
```

# JavaScript prompt

- How to get user input as variable
- Prompt function



# Prompt

The Window.prompt() displays a dialog with an optional message prompting the user to input some text.

```
let userName = window.prompt("What is your Name?");
```

**TIP :** You don't need to include the window object as it is assumed

```
result = window.prompt(message, default);
```

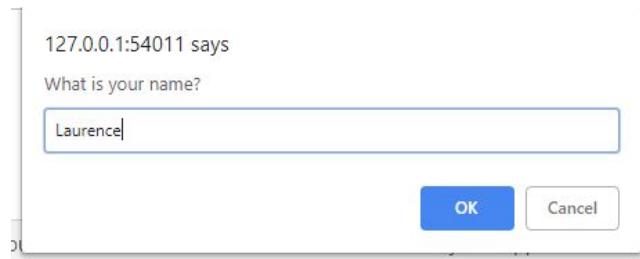


# Lesson Challenge

Add a value to a variable using prompt

Create a variable with a welcome message add the new input from the prompt to the string using + between the variables.

Output the result in the console.



# Code Snippet

```
let userName = prompt("What is your name?");  
let message = "Welcome to my site, ";  
console.log(message + userName);
```

# JavaScript Template literal

- How to use quotes
- Backticks for templates
- Variables within strings
- Double and single quotes



# Challenge #1 - Template literals

*Use prompt to ask the user's name*

*Create a template show message.*

*Output the value in the console.*

<https://developer.mozilla.org/en-US/docs/Web/API/Window/prompt>

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Template\\_literals](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Template_literals)

This page says

What is your name?

laurence

OK

Cancel



# Challenge #1 Code

```
<script>
  let userName = prompt("What is your name?");
  let message = `Welcome ${userName}`;
  console.log(message);
</script>
```

# Data Types

- Data Types combining variables together
- + and strings vs numbers
- Type conversion
- Type coercion



# Data Types of ECMAScript standard

`var a = true; // true or false = Boolean`

`var b = 100; // can be written with or without decimal point = Number`

`var c = 'Hello World'; // can be inside single or double quotes = String`

`var d = null; // It is explicitly nothing. = Null`

`var e; // has no value but is declared = Undefined`

`var f = Symbol("value"); // represents a unique identifier. = Symbol` (new in ECMAScript 2015). A data type whose instances are unique and immutable.

**and Object everything else :)**



# type conversion

```
let temp;  
  
temp = 10;  
temp = String(10);  
temp = String([1,2,3,4])  
temp = (100).toString();  
  
temp = Number('10');  
temp = Number(true);  
temp = Number([1,2,3,4]) //NaN not a number  
  
console.log(temp);
```



# type coercion

when the type is converted by JavaScript

```
let temp;
```

```
temp = 10;
```

```
temp = temp + 5;
```

```
temp = temp + "five";
```

```
console.log(temp);
```



# Fun with Types

“Hello” + “world”

“5” + 5

“10” - 5

TIP JavaScript quirk - dynamic types changes the type

“Hello” - “world” = NaN

Convert data type with Number() or String()



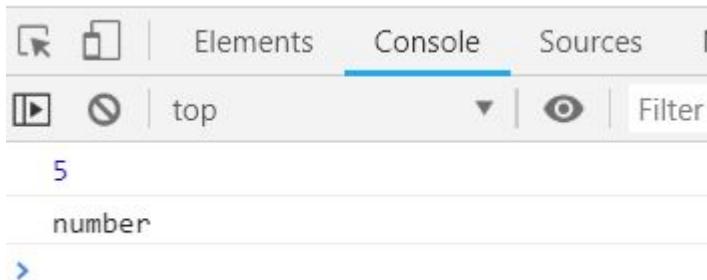
# Lesson Challenge

*Create a string*

*Convert to different data types*

*Get data type of variable*

*Output data type to console*



# Lesson Challenge Code

```
<script>
  let myNum = "5";
  myNum = Number(myNum);
  console.log(myNum);
  console.log(typeof myNum);
</script>
```

# Lesson Challenge

*Fix this code to output 15 not 510*

```
let a = "5";
```

```
let b = "10";
```

```
console.log(a+b);
```



# JavaScript Operators

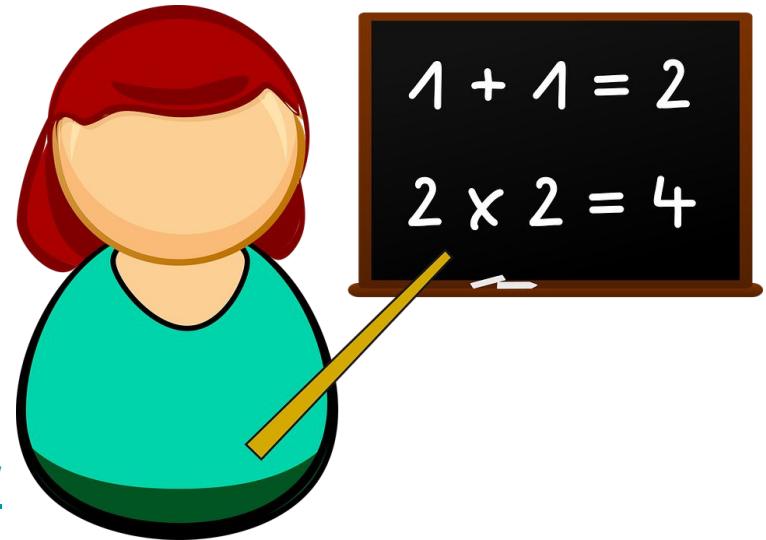
- How to use operators
- What are the available operators
- Order of Arithmetic operators



# Arithmetic operators do the math

Arithmetic operators take numerical values (either literals or variables) as their operands and return a single numerical value. The standard arithmetic operators are addition (+), subtraction (-), multiplication (\*), and division (/). standard arithmetic operations (+, -, \*, /),

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Operators/Arithmetic\\_Operators](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Operators/Arithmetic_Operators)



# Operator precedence - The order of things

Operator precedence determines the way in which operators are parsed with respect to each other.

Operators with higher precedence become the operands of operators with lower precedence.

**Multiplication   Division   Addition   Subtraction**

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Operators/Operator\\_Precidence](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Operators/Operator_Precidence)



# Modulus

Remainder (%)    Binary operator. Returns the integer remainder of dividing the two operands.    12 % 5 returns 2.

```
console.log(50%6); //  
a++;  
b--;  
console.log(a);  
console.log(b);  
  
let tester = 500;  
console.log(tester++);  
console.log(++tester);
```

# JavaScript Operators

- Comparison operators
- Assignment operators



# Operators with arithmetic and Assignments

Math operators + - \* /

Increment ++ --

**Assignment operators**

= += == \*= /=



# Assignment Operators

Operators can be used to assign values and perform calculations. An assignment operator assigns a value to its left operand based on the value of its right operand.

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Operators/Assignment\\_Operators](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Operators/Assignment_Operators)

```
var x = 2;
var y = 3;

console.log(x);
// expected output: 2

console.log(x = y + 1); // 3 + 1
// expected output: 4

console.log(x = x * y); // 4 * 3
// expected output: 12
```

# Shorthand = += -= \*= /= ++ --

## Meaning and shorthand

-= += -= \*= /= ++ --

```
console.log(50%6); //  
a++;  
b--;  
console.log(a);  
console.log(b);  
  
let tester = 500;  
console.log(tester++);  
console.log(++tester);
```

Name	Shorthand operator	Meaning
Assignment	x = y	x = y
Addition assignment	x += y	x = x + y
Subtraction assignment	x -= y	x = x - y
Multiplication assignment	x *= y	x = x * y
Division assignment	x /= y	x = x / y
Remainder assignment	x %= y	x = x % y

# Assignment Operators multiple variables

You can assign values to more variables within one statement.

## Assigning two variables with single string value

```
1 | var a = 'A';
2 | var b = a;
3 |
4 | // Equivalent to:
5 |
6 | var a, b = a = 'A';
```

# Lesson Challenge

What will the output of the total be for this code

```
let firstNum = 5;  
let secondNum = 10;  
firstNum++;  
secondNum--;  
let total = firstNum + secondNum;  
console.log(total);  
total = 500 + 100 / 5 + total;  
console.log(total);
```

Try some operators for yourself combine and  
guess the output



# Challenge #2 - Miles to Kilometers Converter

Use prompt to ask the number of miles

Convert miles to Kilometers (\*  
1.60934)

Create a template to output the message.

Output the prompt value in the console.

\*Bonus if you convert to number

This page says

How many Miles?

5

OK

Cancel



## Challenge #2 Code

```
<script>
  let numMiles = prompt("How many Miles?");
  let kiloConverter = numMiles * 1.60934;
  kiloConverter = Number(kiloConverter);
  console.log(kiloConverter);
  let message = `${numMiles} Miles is ${kiloConverter}`;
  console.log(message);
</script>
```

# More JavaScript Operators

- Booleans
- Comparison operators
- Truthy values
- Falsy values



# Conditional operators and Comparisons

Evaluation of content whether it's true or false.

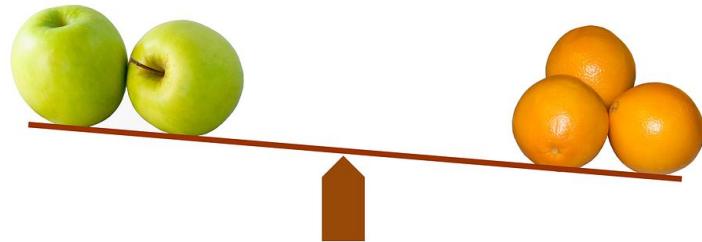
```
let x = 10;
let y = 0;
if (x) {
    console.log('X has a value');
}
if (y) {
    console.log('Y has a value');
}
```

# Operators

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Guide/Expressions\\_and\\_Operators](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Guide/Expressions_and_Operators)

Comparison Operators - used to check equal  
== greater than > less than < returns Boolean value

Logical Operators - used to combine and compare



# Truthy or Falsy

## Falsy values

false

undefined

null

0

NaN

the empty string ("")



# Truthy

Falsy values

True

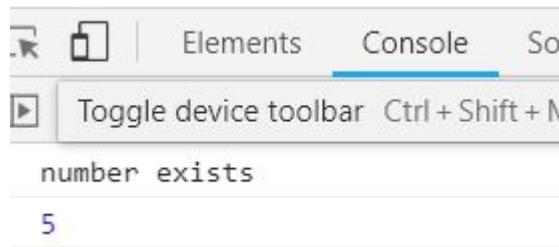
Has value

1



# Lesson Challenge

Check if a number exists and also check if it is greater than 50. Show a message in the console.



```
number exists
5
```



# Lesson Challenge Code

```
<script>
  let checkNum = 5;
  if (checkNum) {
    console.log("number exists");
  }
  if (checkNum > 50) {
    console.log("Its bigger than 50");
  }
  console.log(checkNum);
</script>
```

# JavaScript Conditions

- If statement
- else



# Comparison Operators

Operator	Description	Examples returning true
Equal (==)	Returns <code>true</code> if the operands are equal.	<code>3 == var1</code> <code>"3" == var1</code>  <code>3 == '3'</code>
Not equal (!=)	Returns <code>true</code> if the operands are not equal.	<code>var1 != 4</code> <code>var2 != "3"</code>
Strict equal (===)	Returns <code>true</code> if the operands are equal and of the same type. See also <a href="#">Object.is</a> and sameness in JS.	<code>3 === var1</code>
Strict not equal (!==)	Returns <code>true</code> if the operands are of the same type but not equal, or are of different type.	<code>var1 !== "3"</code> <code>3 != '3'</code>
Greater than (>)	Returns <code>true</code> if the left operand is greater than the right operand.	<code>var2 &gt; var1</code> <code>"12" &gt; 2</code>
Greater than or equal (>=)	Returns <code>true</code> if the left operand is greater than or equal to the right operand.	<code>var2 &gt;= var1</code> <code>var1 &gt;= 3</code>
Less than (<)	Returns <code>true</code> if the left operand is less than the right operand.	<code>var1 &lt; var2</code> <code>"2" &lt; 12</code>
Less than or equal (<=)	Returns <code>true</code> if the left operand is less than or equal to the right operand.	<code>var1 &lt;= var2</code> <code>var2 &lt;= 5</code>

# Lesson Challenge

Use prompt to get a number from the user.

Check if the prompt value equals number 5  
check without data type and then check with the  
data type.

```
Elements Console
Select an element in the page to inspect
Yes they are equal
```



# Lesson Challenge Code

```
<script>
  let checkNum = prompt("Enter a number?");
  if (checkNum == 5) {
    console.log("Yes they are equal");
  }
  if (checkNum === 5) {
    console.log("Yes they are equal and same type");
  }
</script>
```

# JavaScript Conditions

- If statement
- else if
- else



# If else statement

The if statement executes a statement if a specified condition is truthy. If the condition is falsy, another statement can be executed.

```
if (condition_1) {  
    statement_1;  
} else if (condition_2) {  
    statement_2;  
} else if (condition_n) {  
    statement_n;  
} else {  
    statement_last;  
}
```



# JavaScript Conditions

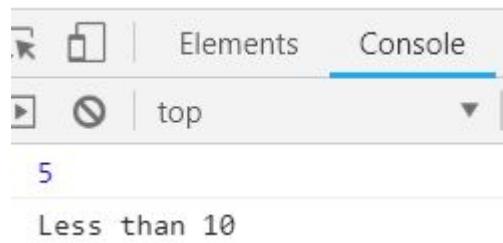
The if statement executes a statement if a specified condition is truthy. If the condition is falsy, another statement can be executed.

```
function check(num){  
    console.log(num);  
    if(num > tempVal){  
        message(num+ ' was mo  
    }else if(num == tempVal){  
        message(num + ' equal to  
    }else{  
        message(num + ' was les  
    }  
}
```

# Lesson Challenge

Check if a number is greater than 10 output message accordingly.

Also have a condition that if it is equal to output a message.



A screenshot of a browser's developer tools interface, specifically the Console tab. The tabs at the top are 'Elements' and 'Console'. Below the tabs, there are icons for back, forward, and search. The status bar shows 'top'. The console area displays the number '5' followed by the text 'Less than 10'.



# Lesson Challenge Code

```
<script>
  let checkNum = 5;
  if (checkNum > 10) {
    console.log("Yes greater than 10");
  }
  else if (checkNum == 10) {
    console.log("It was equal to 10");
  }
  else {
    console.log("Less than 10");
  }
</script>
```

# JavaScript Conditions

- Short ternary operator



# Ternary Operator

The conditional (ternary) operator is the only JavaScript operator that takes three operands. This operator is frequently used as a shortcut for the if statement.

```
condition ? val1 : val2
```

```
var status = (age >= 18) ? 'adult' : 'minor';
```



# Lesson Challenge

Check if variable value is odd or even use modulus to determine the output.



# Lesson Challenge Code

```
<script>
  let tempNumber = 2;
  let modCalulation = (tempNumber % 2) ? "odd" : "even";
  console.log(modCalulation);
  console.log(tempNumber % 2);
</script>
```

# JavaScript Conditions

- Multiple conditions
- Logical operators



# Logical Operators

## Logical operators

Operator	Usage	Description
Logical AND ( <code>&amp;&amp;</code> )	<code>expr1 &amp;&amp; expr2</code>	Returns <code>expr1</code> if it can be converted to <code>false</code> ; otherwise, returns <code>expr2</code> . Thus, when used with Boolean values, <code>&amp;&amp;</code> returns <code>true</code> if both operands are true; otherwise, returns <code>false</code> .
Logical OR ( <code>  </code> )	<code>expr1    expr2</code>	Returns <code>expr1</code> if it can be converted to <code>true</code> ; otherwise, returns <code>expr2</code> . Thus, when used with Boolean values, <code>  </code> returns <code>true</code> if either operand is true; if both are false, returns <code>false</code> .
Logical NOT ( <code>!</code> )	<code>!expr</code>	Returns <code>false</code> if its single operand that can be converted to <code>true</code> ; otherwise, returns <code>true</code> .

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Operators/Logical\\_Operators](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Operators/Logical_Operators)

# Lesson Challenge

Ask the users age via a prompt

Check if they are of age to enter 18+

Show message to allow or deny depending on the age using ternary operator.

Set a membership boolean value and add second check to ensure the user is a member and output a message to them if they are or are not allowing or denying entry.



# Lesson Challenge Code

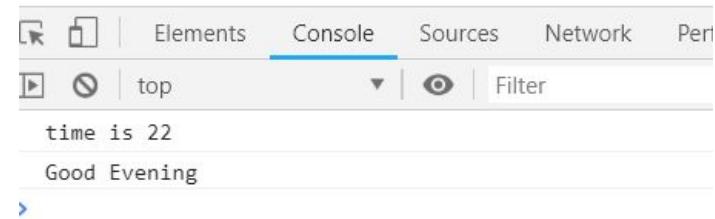
```
<script>
    let userAge = prompt("How old are you?");
    let usermember = true;
    userAge = Number(userAge);
    let message = userAge >= 17 ? "Allowed" : "Denied";
    console.log(message);
    if (userAge >= 17 && userMember) {
        console.log("Yes this person can enter");
    }
    else {
        console.log("No Not Allowed");
    }
</script>
```

# Challenge #3 - Hello Greeter

Set a default time 24 hour clock

Create a message to be output according to the time. Example Good Morning

Output the message in the console.



# Challenge #3 Code

```
<script>
  let myTime = 22;
  let output;
  if(myTime < 11){ output = "Good Morning";}
  else if(myTime >= 11 && myTime <= 17){ output = "Good AfterNoon";}
  else if(myTime > 17 && myTime < 23){ output = "Good Evening";}
  else {output= "I'm Sleeping";}
  console.log("time is "+myTime);
  console.log(output);
</script>
```

# JavaScript Conditions

- Switch statement



# JavaScript Switch

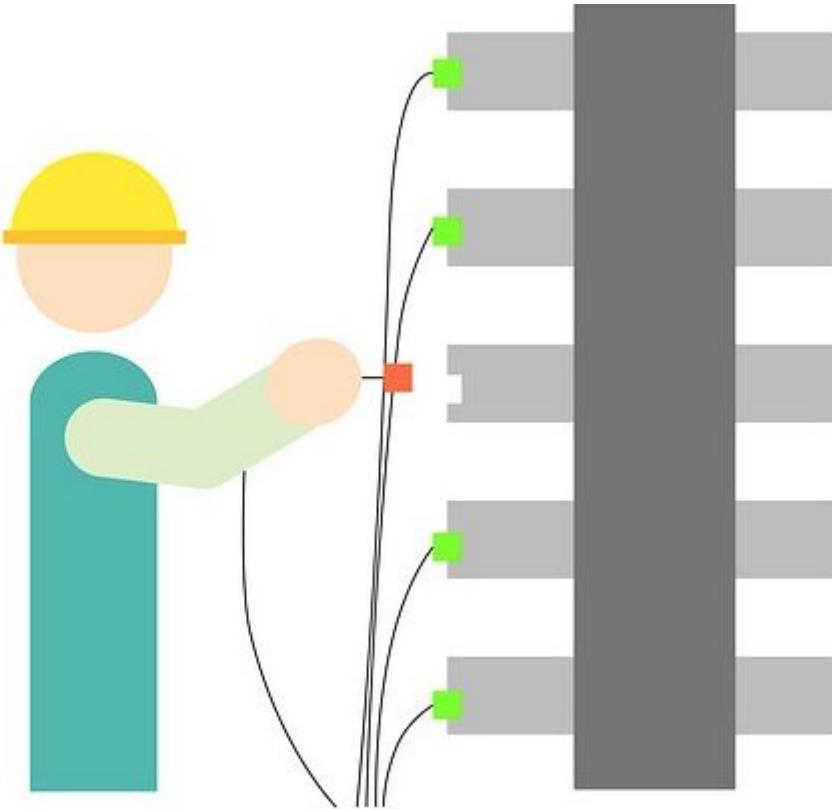
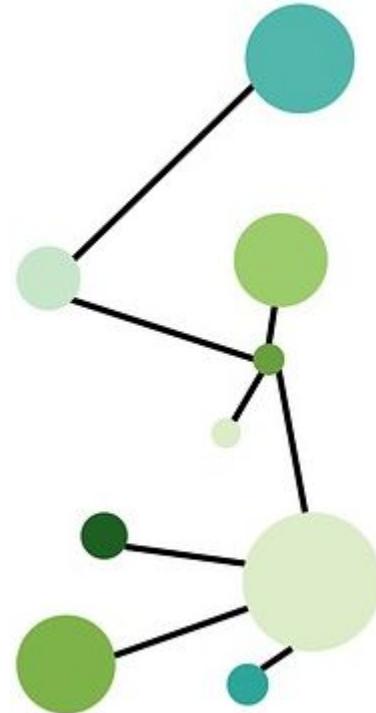
The switch statement evaluates an expression, matching the expression's value to a case clause, and executes statements associated with that case, as well as statements in cases that follow the matching case.

<https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Statements/switch>

```
function check(val){  
    console.log(val);  
    switch (val){  
        case 'one':  
            message('was one');  
            break;  
        case 'hello':  
            message('Say Hello');  
            break;  
        case 'two':  
        case '2':  
            case 2:  
                message('output TW');  
                console.log('was a va');
```

# Switch example

```
switch (expression) {  
    case label_1:  
        statements_1  
        [break;]  
    case label_2:  
        statements_2  
        [break;]  
    ...  
    default:  
        statements_def  
        [break;  
}
```



# Lesson Challenge

Select a response depending on the name of the person in a variable called person.



Screenshot of a browser developer tools console:

- Elements
- Console (highlighted)
- Sources
- Network

top

Filter

Laurence he is the teacher here.

```
let person = "Laurence";
switch (person) {
  case "John":
    console.log(person + " is not my friend.");
    break;
  case "Jane":
    console.log(person + " I don't know that person.")
  default:
    console.log(person + " is my teacher.")
```

# Lesson Challenge Code

```
<script>
    let person = "Laurence";
switch (person) {
  case "John":
    console.log(person + " is not my friend.");
    break;
  case "Jane":
    console.log(person + " I don't know that person.");
    break;
  case "Laurence":
    console.log(person + " he is the teacher here.");
    break;
  case "Steve":
    console.log(person + " is a good friend.");
    break;
  default:
    console.log("Don't know that person.");
}
</script>
```

# JavaScript Functions

- What are functions and how to use them
- Create functions



# Functions

- Functions are blocks of reusable code - a set of statements that performs a task or calculates a value.
- One of the fundamental building blocks in JavaScript.
- To use a function, you must define it somewhere in the scope from which you wish to call it.



<https://developer.mozilla.org/en-US/docs/Web/JavaScript/Guide/Functions>

# Functions

```
function name(parameters) {  
    // code to be executed  
}
```



# Lesson Challenge

#1 Create a function to output a message from a variable into the console.

Invoke the function 3 times every time increasing the value of a global variable that counts the number of times the function runs.

#2 Create a function to output into the console the results of adding 10 to a number that is passed into the function.



---

Hello World

---

1 times run

---

Hello World

---

2 times run

---

Hello World

---

3 times run

---

60

---



# Code Snippet

```
let output = "Hello World";
let counter = 0;
welcome(output);
welcome(output);
welcome(output);

function welcome(message) {
    counter++;
    let temp = counter + " times run";
    console.log(message);
    console.log(temp);
}
let myNum = 50;
addTen(myNum);

function addTen(num) {
    let temp = Number(num);
    console.log(temp + 10);
}
```

# JavaScript Functions

- Parameters
- Multiple arguments
- Default argument value



# Functions

**Function parameters** inside the parentheses () in the function definition.

**Function arguments** values received by the function when it is invoked.

```
function  
name(parameter1,parameter2,parameter3) {  
  
    // code to be executed  
  
}
```

```
function message(a){  
    var b = 0;  
    b++;  
    var output = a + '' + b;  
    document.querySelector('h2').inne  
    console.log(a);  
}  
  
function add(a,b){  
    return a + b;  
}
```

# Function Default Arguments

Pass values into function to be used within the code.

Default parameters use ternary operator or condition.

**Default function parameters** allow named parameters to be initialized with default values if no value or undefined is passed.

```
adder1(10);
adder1(10, 50);
adder2(10);
adder2(10, 50);
adder3(10);
adder3(10, 50);

function adder1(numOne, numTwo = 5) {
    console.log("number 1 " + numOne);
    console.log("number 2 " + numTwo);
}

function adder2(numOne, numTwo) {
    numTwo = numTwo || 5;
    console.log("number 1 " + numOne);
    console.log("number 2 " + numTwo);
}

function adder3(numOne, numTwo) {
    numTwo = typeof numTwo !== 'undefined' ?
    numTwo : 5;
    console.log("number 1 " + numOne);
    console.log("number 2 " + numTwo);
}
```

# Lesson Challenge

Using your knowledge from earlier lessons  
create 3 different ways to set a default value if a  
function is missing an argument value.

They should all produce the same output.



number 1	10	JavaScript context
number 2	5	
number 1	10	
number 2	50	
number 1	10	
number 2	5	
number 1	10	
number 2	50	
number 1	10	
number 2	5	
number 1	10	
number 2	50	

# Code Snippet

```
adder1(10);
adder1(10, 50);
adder2(10);
adder2(10, 50);
adder3(10);
adder3(10, 50);
function adder1(numOne, numTwo = 5) {
    console.log("number 1 " + numOne);
    console.log("number 2 " + numTwo);
}
function adder2(numOne, numTwo) {
    numTwo = numTwo || 5;
    console.log("number 1 " + numOne);
    console.log("number 2 " + numTwo);
}
function adder3(numOne, numTwo) {
    numTwo = typeof numTwo !== 'undefined' ? numTwo : 5;
    console.log("number 1 " + numOne);
    console.log("number 2 " + numTwo);
}
```

# JavaScript Functions

- Return value



# What functions need

Functions have 3 parts

1. Input - data that is sent into the function
2. Code - block of code that is run by the function
3. Output - value that is returned by the function

```
let adder = function (a, b) {  
    return a + b;  
};  
console.log(adder(2, 6));
```



# Return value of add or multiply

Create a quick math function that will take two numbers and return the value.

```
function multiply(x, y) { return x * y; }  
// there is no semicolon here
```

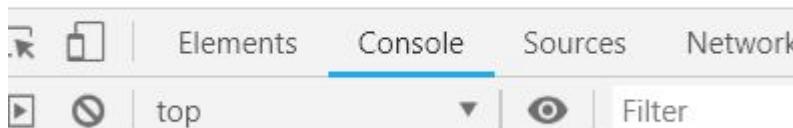


# Lesson Challenge

Create a function that multiplies two values and returns the result.

Use this statement to output the result

```
console.log(multiplier(num1, num2));
```



# Lesson Challenge Code

```
<script>
  let num1 = 5;
  let num2 = 10;
  function multiplier(a, b) {
    let total = a * b;
    return total;
  }
  console.log(multiplier(num1, num2));
</script>
```

# JavaScript Functions

- Execute from HTML elements



# Functions as attributes

onclick="message()" in element

Runs the block of code in the function. There is a much better way to do this when you use the DOM but for now try this.



# Lesson Challenge

Create 3 buttons that will each update a different global variable. Output the current values of each variable in the console.

```
<button type="button" onclick="message1()">Click 1</button>
```

```
<button type="button" onclick="message2()">Click 2</button>
```

```
<button type="button" onclick="message3()">Click 3</button>
```



Click 1

Click 2

Click 3

# Lesson Challenge Code

```
<button type="button" onclick="message1()">Click 1</button>
<button type="button" onclick="message2()">Click 2</button>
<button type="button" onclick="message3()">Click 3</button>
<script>
  let var1, var2, var3;
  var1 = var2 = var3 = 0;
  function message1() {
    var1++;
    message();
  }
  function message2() {
    var2++;
    message();
  }
  function message3() {
    var3++;
    message();
  }
  function message() {
    console.log(var1 + '' + var2 + '' + var3);
  }
</script>
```

# JavaScript declaration vs expression

- Function expression
- Function declaration



# How to create a function

// Function declaration

```
function test(num) {  
    return num;  
}
```

// Function expression

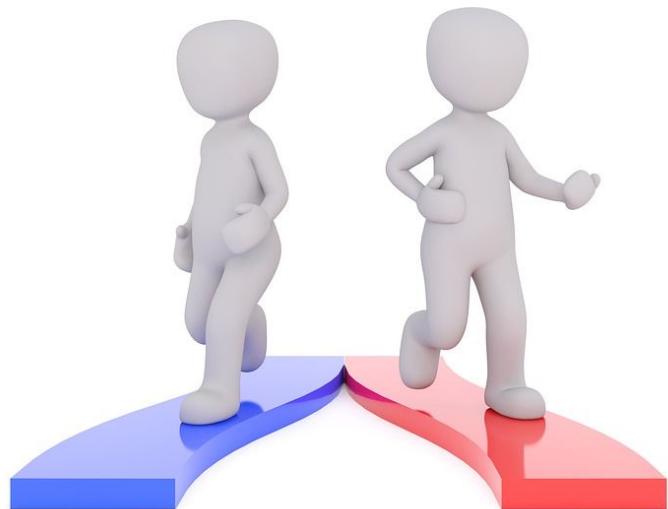
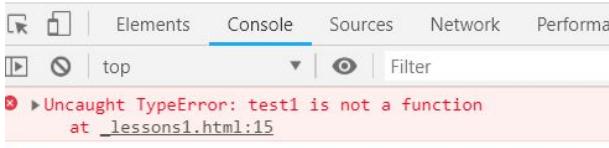
```
var test = function (num) {  
    return num;  
};
```



# What's the difference, hoisting.....

**TIP :** function declarations are hoisted to the top of the code by the browser before any code is executed. If you need to call a function before it's declared, then, of course, use function declarations.

```
test1(5); // will not work not hoisted
var test1 = function (num) {
    return num;
};
test2(5); // will work
function test2(num) {
    return num;
}
```

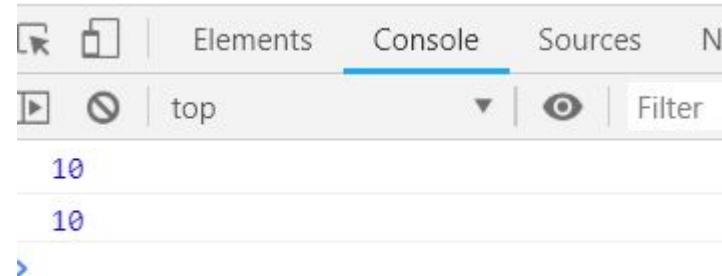


# Lesson Challenge

Create two functions one as Function declaration and the other as Function expression. They can both add a value to a number. They both should work the same way.

```
console.log(test1(5));
```

```
console.log(test2(5));
```



# Lesson Challenge Code

```
<script>
  var test1 = function (num) {
    return num + 5;
  };
  console.log(test1(5));
  console.log(test2(5));

  function test2(num) {
    return num + 5;
  }
</script>
```

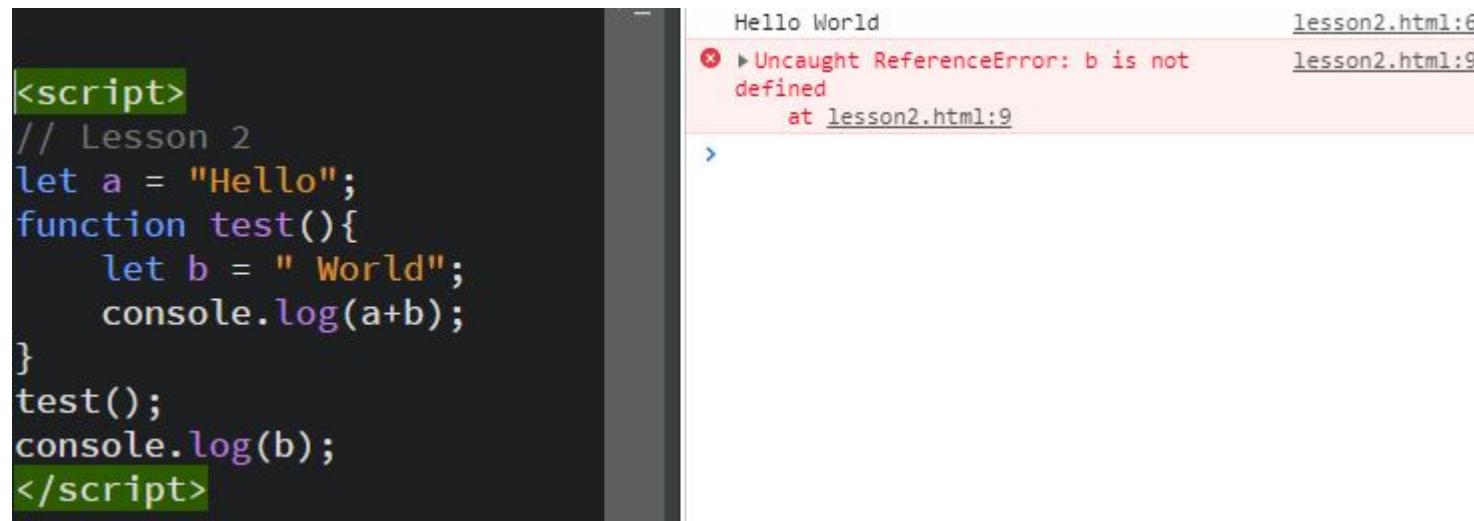
# JavaScript Function scope

- Global Scope values
- Local scope



# Functions and Scope

## Global vs. Local Variables



The image shows a screenshot of a browser's developer tools, specifically the JavaScript console. On the left, there is a code editor window containing the following JavaScript code:

```
<script>
// Lesson 2
let a = "Hello";
function test(){
    let b = " World";
    console.log(a+b);
}
test();
console.log(b);
</script>
```

On the right, the browser's address bar shows the URL `lesson2.html`. The main content area displays the output of the console logs: "Hello World". Below this, an error message is shown in red text:

Uncaught ReferenceError: b is not defined  
at lesson2.html:9

The file path `lesson2.html:9` is highlighted in blue, indicating the line number where the error occurred.

# JavaScript function recursion

- Create a quick loop of content
- Function within itself



# Recursion

A function can refer to and call itself.

```
function loop(x) {  
    if (x >= 10) return;  
    console.log(x);  
    loop(x + 1); // the recursive call  
}  
loop(0);
```



# Lesson Challenge

Create a function that asks for a guess from the user. Use the guess value to compare to see if the user guessed correctly let them know if correct or incorrect. Call the function again until the guess is correct.

Bonus : using a ternary operator provide suggestion for the next guess when the user is wrong.



```
let secretNumber = 5;
let guess;
guesser();

function guesser() {
  let guess = prompt("Guess the Number");
  let guessNumber = Number(guess);
```

# Lesson Challenge Code

```
let secretNumber = 5;
let guess;
guesser();
function guesser() {
  let guess = prompt("Guess the Number");
  let guessNumber = Number(guess);
  if (guessNumber == NaN) {
    console.log("You need to guess a number, try again.");
    guesser();
  }
  else if (guessNumber === secretNumber) {
    console.log("Great you guessed correctly");
    return;
  }
  else {
    console.log((guessNumber < secretNumber));
    let message = (guessNumber < secretNumber) ? "higher" : "lower";
    console.log("Wrong try again. Try " + message);
    guesser();
  }
}
```

# JavaScript IIFE

- What are IIFE
- How IIFE work



# IIFE functions

An IIFE (Immediately Invoked Function Expression) is a JavaScript function that runs as soon as it is defined. (function () { statements })(); It is a design pattern which is also known as a Self-Executing Anonymous Function and contains two major parts.

```
(function () {  
    statements  
})();
```

```
(function () {  
    console.log('Welcome IIFE');  
})();  
(function () {  
    let firstName = "Laurence"; // can't access outside  
})();  
let result = (function () {  
    let firstName = "Laurence";  
    return firstName;  
})();  
console.log(result);  
(function (firstName) {  
    console.log("My Name is " + firstName);  
})("Laurence");
```

# Code Snippet

```
(function () {
    console.log('Welcome IIFE');
})();

(function () {
    let firstName = "Laurence"; // can't access outside
})();

let result = (function () {
    let firstName = "Laurence";
    return firstName;
})();
console.log(result);

(function (firstName) {
    console.log("My Name is " + firstName);
})("Laurence");
```

# Lesson Challenge

Use an anonymous IIFE to output your name in the console.

```
(function (firstName) {  
    console.log("My Name is " + firstName);  
})("Laurence");  
|
```



# JavaScript new ES6 Arrow format

- How to shorthand functions



# Arrow functions

An arrow function expression (previously, and now incorrectly known as fat arrow function) has a shorter syntax compared to function expressions and lexically binds the this value. Arrow functions are always anonymous. <https://babeljs.io/repl>

```
var test10 = function (x) {
    return x * 5;
}
const test11 = (x) => x * 5;
console.log(test10(5));
console.log(test11(5));
```

# Arrow functions

1. Declare variable - name of function to invoke it
2. Define body within {}

## Default parameters

```
const test12 = (x=15) =>{
  return x * 10;
}
console.log(test12()); //150
console.log(test12(5)); //50
```

```
const test13 = (num, x = 15) => {
  return x * 10;
}
console.log(test13(1, 1)); //10
console.log(test13(5)); //150
```

# Lesson Challenge

Convert one of the earlier functions used in the course to arrow function format.

```
let test2 = (num) => num + 5;  
console.log(test2(14));  
  
var addFive1 = function addFive1(num) {  
    return num + 2;  
};  
  
let addFive2 = (num) => num + 2;  
console.log(addFive1(14));
```



# JavaScript Objects and Arrays

- How objects work
- What are arrays
- How to output the value of an object or array
- Using let and const with objects



# JavaScript Objects

Contain **more values in a single variable.**

The values are written as **name:value** pairs

***Property : Property Value***

Property doesn't need quotes **same naming rules as variables.**

Objects **can contain functions** which are referred to as methods when inside an object.

```
var person = {};  
person.first = "Laurence";  
person.last = "Svekis";  
person.message = function(){  
    return 'hello ' + person.first;  
}  
person.age = 30;  
person.alive = true;
```

# Code Snippet

```
const car = {  
  color : 'red',  
  year:2010,  
  make:'Corvette',  
  brand:'Chevrolet',  
  price:50000  
};
```

# Objects

<https://developer.mozilla.org/en-US/docs/Learn/JavaScript/Objects/Basics>

Get property values.

```
const person = {age:25};
```

person.age - Dot notation

person['age'] - Bracket notation - *more dynamic  
can use variables to hold the property name.*



# Code Snippet

```
let a = 1;
const test = {
  a1:"test 1",
  a2:"test 2"
}

function tester(){
  console.log(test['a'+a]);
  a++;
}
```

# Lesson Challenge

## Favorite Things Object

Select something, your computer, car, house, friend and describe them as a JavaScript object. What are their properties and what are those values?

Add to the values with dot notation and bracket notation. Output to console.



A screenshot of a browser's developer tools Console tab. The tab bar shows 'Console' is active. Below the tabs, there are buttons for 'Elements', 'Sources', 'Network', 'Performance', and 'Memory'. A dropdown menu shows 'top' and a 'Filter' input field. The main area displays a collapsed object with four properties: 'brand: "Ford"', 'make: "Explorer"', 'color: "Black"', and 'year: 2013'. An arrow points to the 'brand' property. At the bottom, there is a line of code: 'brand: "Ford"' followed by a small explanatory note.

```
{brand: "Ford", make: "Explorer", color: "Black", year: 2013}
  brand: "Ford"
  color: "Black"
  make: "Explorer"
  year: 2013
▶ __proto__: Object
```

# Lesson Challenge Code

```
<script>
  let myCar = { brand: "Ford" , make: "Explorer" };
  myCar.color = "Black";
  myCar["year"] = 2013;
  console.log(myCar);
</script>
```

# JavaScript Object Method

- How objects work
- What are arrays
- How to output the value of an object or array
- Using let and const with objects



# Object Methods

You can run functions within objects.

```
const person = {};
person.first = "Laurence";
person.last = "Svekis";
person.message = function () {
  return 'hello ' + person.first;
}
person.age = 30;
person.alive = true;
console.log(person.message());
```



# Lesson Challenge

Make a car that has methods to do things, setup as an object.

Add methods to turn on and drive.

Output console messages for the actions



# Lesson Challenge Code

```
<script>  
const myCar = {  
    color:"red",  
    topSpeed:300,  
    model:"mustang",  
    company:"ford",  
    year:2015,  
    price:50000,  
    turnOn: function(){console.log('started')},  
    drive() {console.log('You are driving')}  
}  
</script>
```

# JavaScript functions to create Objects

- Functions can be used to construct Objects



# Functions to create Objects

```
function Car(miles,company,color,price){  
  
    this.color=color;  
  
    this.miles=miles;  
  
    this.price=price;  
  
    this.company=company;  
  
}  
  
const myCar1 = new Car(100,"Honda","Pink",60000);  
  
const myCar2 = new Car(500,"Ford","Yellow",30000);
```



# Lesson Challenge

Make some objects using functions to return the values.



# JavaScript Objects and Arrays

- Memory reference Objects and Arrays
- Can be written as const as they reference data



# Reference Types

Objects

Array

```
const lessons = ['first', 'second'];
```

Object Literal

```
const myInfo =  
{first:'Laurence',last:'Svekis'}
```

**Accessed from memory as the value  
- reference to the value**

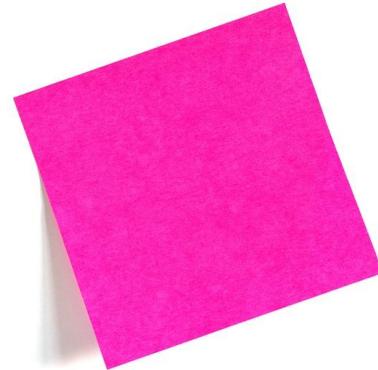


# Objects and Arrays

`const obj = {"one":1,"two":2}` - you can  
**change values but not assign the object value**

`const array = [1,2,3,4,5];` - you can **reassign but not redeclare** the array value

TIP Const indicates that it should not change.



# JavaScript Arrays

- What are arrays and how to use them



# Arrays

JavaScript arrays are used to store multiple values in a single variable similar to objects

```
const shopping = ['bread', 'milk',  
'cheese', 'hummus', 'noodles'];
```

```
console.log(shopping);
```

```
const theList = ['Laurence', 'Svekis',  
true, 35, null, undefined,  
{test:'one',score:55},['one','two']];
```



# Get the values

You access an array element by referring to the index number. 0 based index values start at 0.

theList[3];

arrayName[indexValue];

```
const theList = ['Laurence', 'Svekis', true, 35, null, undefined, {test:'one',score:55},['one','two']];
undefined
thelist
▼(8) ["Laurence", "Svekis", true, 35, null, undefined, {}, Array(2)]
  0: "Laurence"
  1: "Svekis"
  2: true
  3: 35
  4: null
  5: undefined
  ▼6:
    score: 55
    test: "one"
    ► __proto__: Object
  ▼7: Array(2)
    0: "one"
    1: "two"
    length: 2
    ► __proto__: Array(0)
  length: 8
  ► __proto__: Array(0)
```

# Lesson Challenge



Create an array with different data types, return the values of those data types.

Get the values into the console of the below array.

```
const theList = ['Laurence', 'Svekis', true, 35, null, undefined, {  
  test: 'one'  
  , score: 55  
}, ['one', 'two']]
```

```
▼ {test: "one", score: 55} ⓘ
```

```
  score: 55
```

```
  test: "one"
```

```
▶ __proto__: Object
```

```
▼ (2) ["one", "two"] ⓘ
```

```
  0: "one"
```

```
  1: "two"
```

```
  length: 2
```

```
▶ __proto__: Array(0)
```

```
55
```

```
two
```



# Lesson Challenge Code

```
<script>
const theList = ['Laurence', 'Svekis', true, 35, null, undefined, {
    test: 'one'
    , score: 55
}, ['one', 'two']];
console.log(theList[0]);
console.log(theList[6]);
console.log(theList[7]);
console.log(theList[6].score);
console.log(theList[7][1]);

</script>
```

# JavaScript Array are Powerful

- Array memory reference
- Array Length
- Check if its an array
- Get indexOf array item
- Add and remove items from array Methods
- Splice remove from array at index value



# Arrays and Array methods

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global\\_Objects/Array](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Array)

```
var myArray1 = ['Laurence','Svekis',30,  
var val1 = myArray1.push('test');  
console.log(myArray1);  
var val2 = myArray1.pop();  
console.log(val2);  
var val3 = myArray1.shift();  
myArray1.unshift('First');  
var val4 = myArray1.splice(1,1);
```

# Lesson Challenge



Update your array using various methods

Transform the array below.

```
const theList = ['Laurence', 'Svekis', true, 35, null, undefined,  
{test: 'one', score: 55}, ['one', 'two']];
```

into

```
['make me first', 35, null, undefined, { test: 'one'  
    , score: 55 }, ['one', 'two']]
```

```
0: "make me first"  
1: 35  
2: null  
3: undefined  
► 4: {test: "one", score: 55}  
► 5: (2) ["one", "two"]  
length: 6
```

# Code Snippet

```
const theList = ['Laurence', 'Svekis', true, 35, null, undefined, {
  test: 'one'
  , score: 55
}, ['one', 'two']];

theList.length;
Array.isArray(theList);
theList[1] = "hello World";
theList.indexOf('Laurence');
theList.push("new one push");
theList.pop();
theList.shift();
theList.unshift("make me first");
theList.splice(1, 2);
```

# JavaScript Arrays even more

- Sort arrays
- Reverse arrays
- Concat array together
- Find in array
- indexOf



# Array Methods

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global\\_Objects/Array](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Array)



# Code Snippet

```
const myArray = ["a", "hello", 4, 8, 2, "world", "javascript", "course", 99, 1];
const myArray2 = [5, 12, 8, 130, 44];
console.log(myArray);
myArray.sort();
console.log(myArray);
myArray.reverse();
console.log(myArray);
console.log(myArray.indexOf(50));
if (myArray.indexOf(50) === -1) {
    console.log("not found");
}
let newArray = myArray.concat(myArray2);
console.log(newArray);
let found = myArray2.find(function (element) {
    return element > 10;
});
console.log(found);
```

# Array find

The `find()` method returns the value of the first element in the array that satisfies the provided testing function. Otherwise `undefined` is returned.

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global\\_Objects/Array/find](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Array/find)



```
const numArray = [77, 44, 2, 162, 18, 244, 71];
const over100 = numArray.find(function (el) {
    console.log(el);
    return el > 100;
});
```

# Lesson Challenge

1. Transform your array with different methods.
2. Try to combine two arrays
3. Search an array with numbers return the value that matches the find.

```
const numArray = [77, 44, 2, 162, 18, 244, 71];
const over100 = numArray.find(function (el) {
  console.log(el);
  return el > 100;
});
console.log(over100);

const myArray = ["a", "hello", 4, 8, 2, "world", "javascript", "course", 99, 1];
const myArray2 = [5, 12, 8, 130, 44];
let newArray = myArray.concat(myArray2);
console.log(newArray);
```



# JavaScript filter

- Array filter



# Array Filter

The filter() method creates a new array with all elements that pass the test implemented by the provided function.

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global\\_Objects/Array/filter](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Array/filter)

```
const numArray = [77, 44, 2, 162, 18, 244, 71];
let result = numArray.filter(function (numArray) {
    return numArray > 75;
});
console.log(result);
***
```

# Lesson Challenge

Use filter to create a new array with numbers greater than 75.  
Output it into the console.

```
const numArray = [77, 44, 2, 162, 18, 244, 71];
let result = numArray.filter(function (numArray) {
    return numArray > 75;
});
console.log(result);
```



# JavaScript Loops and iteration

- For loop
- Do While Loop
- While Loop
- Break and continue in loop



# JavaScript Loops

For loop - most common for iterations

Do Loop -

While Loop - will run at least once

**TIP : Avoid infinite loops.** Make sure the condition in a loop eventually becomes false; otherwise, the loop will never terminate. The statements in the following while loop execute forever because the condition never becomes false:



# Code Snippet

```
for (let counter = 0; counter < 5; counter++) {  
    console.log('For Loop Count at ' + counter);  
}  
let x = 0;  
while (x < 5) {  
    x++;  
    console.log('While Loop Count at ' + x);  
}  
let i = 0;  
do {  
    i += 1;  
    console.log('Do While Loop Count at ' + i);  
} while (i < 5);  
let y = 10;  
while (y < 5) {          //will run once even if condition is not true  
    y++;  
    console.log('While Loop Count at ' + y);  
}  
let z = 10;  
do { //will not run if not met  
    z++;  
    console.log('Do While Loop Count at ' + z);  
} while (z < 5);
```

# JavaScript Loop Break

break statement

Use the break statement to terminate a loop, switch, or in conjunction with a labeled statement.

```
for (let w = 0; w < 100; w++) {  
    console.log(w);  
    if (w === 5) {  
        console.log("BREAK");  
        break;  
    }  
    console.log(w);  
}
```



# JavaScript Loop Continue

The continue statement can be used to restart a while, do-while, for, or label statement. **TIP : not best practice for testing**

```
for (let w = 0; w < 10; w++) {
    if (w === 3) {
        console.log("CONTINUE");
        continue;
    }
    console.log(w);
}
for (let w = 0; w < 10; w++) {
    if (w != 3) {
        console.log(w);
    }
    else {
        console.log("CONTINUE");
    }
}
```

```
1
2
CONTINUE
4
5
6
7
8
9
0
1
2
CONTINUE
4
5
6
7
8
9
```



# Lesson Challenge

Create a loop output a counter using all 3 different iteration options.

```
for (let counter = 0; counter < 5; counter++) {  
    console.log('For Loop Count at ' + counter);  
}  
  
let x = 0;  
while (x < 5) {  
    x++;  
    console.log('While Loop Count at ' + x);  
}  
  
let i = 0;  
do {  
    i += 1;  
    console.log('Do While Loop Count at ' + i);  
} while (i < 5);
```



# Challenge #4 - Loops Array builder

Create an array that contains objects created dynamically using a loop. Output the content into the console so it looks like the example on the right.

Use filter to create a new array with only the items that have a value of true.

```
▼ (9) [{}], [{}], [{}], [{}], [{}], [{}], [{}], [{}], [{}]
  ► 0: {name: "Lesson 1", status: true}
  ► 1: {name: "Lesson 2", status: false}
  ► 2: {name: "Lesson 3", status: true}
  ► 3: {name: "Lesson 4", status: false}
  ► 4: {name: "Lesson 5", status: true}
  ► 5: {name: "Lesson 6", status: false}
  ► 6: {name: "Lesson 7", status: true}
  ► 7: {name: "Lesson 8", status: false}
  ► 8: {name: "Lesson 9", status: true}
```

# Challenge #3 Code

```
const myWork = [];
for(let x=1;x<10;x++){
    let stat = x%2 ? true : false;
    let temp = {name:`Lesson ${x}`,status:stat};
    myWork.push(temp);
}

console.log(myWork);
const getTrue = myWork.filter(function (el) {
    return el.status
})
console.log(getTrue);
```

# JavaScript Loops and iteration

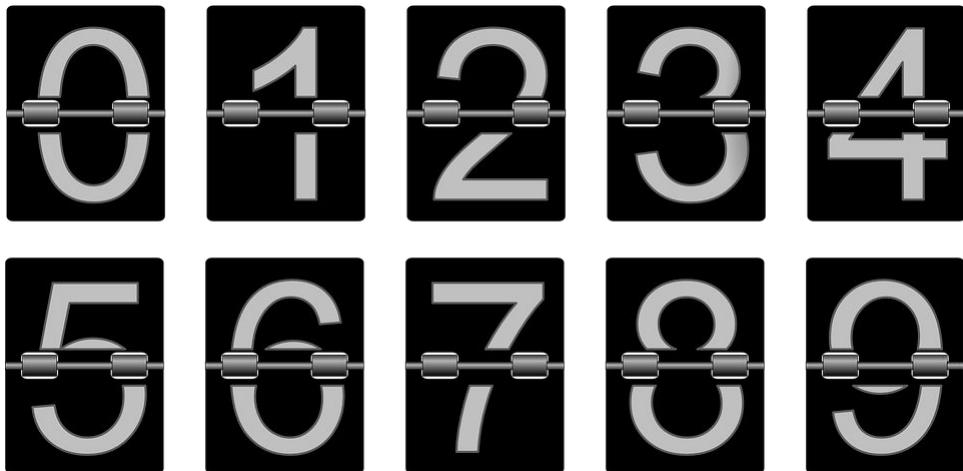
- Loop Array objects forEach
- Loop Object contents for in



# forEach looping array contents

The `forEach()` method executes a provided function once for each array element.

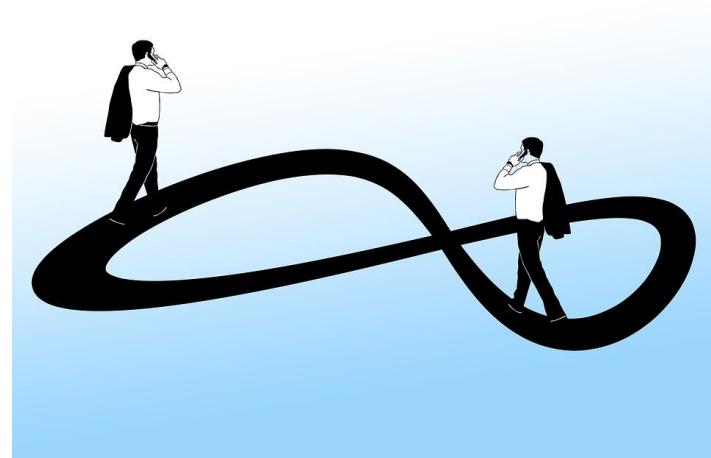
```
const array1 = ['a', 'b', 'c'];
for (let w = 0; w < array1.length; w++) {
  console.log(array1[w]);
}
array1.forEach(function (element, index, array) {
  console.log(element);
});
for(el in array1){
  console.log(el);
}
```



# For in looping object contents

The for...in statement iterates over all non-Symbol, enumerable properties of an object.

```
let string1 = "";
const obj = {
  a: 1
, b: 2
, c: 3
};
for (let property in obj) {
  console.log(property);
  string1 += obj[property];
}
console.log(string1);
```



# Lesson Challenge

Output the contents of an array in the console showing each item and index.

Output the contents of an object in the console showing each value and property.

```
const obj = {a: 1, b: 2 , c: 3};  
for (let property in obj) {  
    console.log(property, obj[property]);  
}  
const array1 = ['a', 'b', 'c'];  
for (let w = 0; w < array1.length; w++) {  
    console.log(w,array1[w]);  
}  
for(el in array1){  
    console.log(el, array1[el]);  
}  
array1.forEach(function (element, index, array) {  
    console.log(index,element);  
});
```



# JavaScript Map

- Using map method in JavaScript



# forEach looping array contents

The map() method creates a new array with the results of calling a provided function on every element in the calling array.

```
var array1 = [1, 4, 9, 16];
// pass a function to map
const map1 = array1.map(x => x * 2);
console.log(map1);
// expected output: Array [2, 8, 18, 32]
```



# Lesson Challenge

Build a new array of values from existing that have all the numbers multiplied by 50

Use Map to return values of array items that are objects using the previous array of lessons

```
const numArray = [77, 44, 2, 162, 18, 244, 71];
let mapArray = numArray.map(function (x) {
    return x * 50;
});
console.log(mapArray);
```



# JavaScript Math

- Generate Random Numbers
- Rounding up
- Rounding down
- Rounding



# Math floor and ceil

The `Math.floor()` function returns the largest integer less than or equal to a given number.

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global\\_Objects/Math/floor](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Math/floor)

The `Math.ceil()` function returns the smallest integer greater than or equal to a given number.

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global\\_Objects/Math/ceil](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Math/ceil)

```
console.log(Math.floor(5.95));
// expected output: 5
```

```
console.log(Math.floor(5.05));
// expected output: 5
```

```
console.log(Math.floor(5));
// expected output: 5
```

```
console.log(Math.floor(-5.05));
// expected output: -6
```

```
console.log(Math.ceil(.95));
// expected output: 1
```

```
console.log(Math.ceil(4));
// expected output: 4
```

```
console.log(Math.ceil(7.004));
// expected output: 8
```

```
console.log(Math.ceil(-7.004));
// expected output: -7
```

# Math Random

Let you generate a random value. A floating-point, pseudo-random number between 0 (inclusive) and 1 (exclusive).

[https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global\\_Objects/Math/random](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Math/random)

```
function getRandomInt(min, max) {
  min = Math.ceil(min);
  max = Math.floor(max);
  return Math.floor(Math.random() * (max - min)) + min;
//The maximum is exclusive and the minimum is inclusive
}
```

```
function getRandomInt(max) {
  return Math.floor(Math.random() * Math.floor(max));
}

console.log(getRandomInt(3));
// expected output: 0, 1 or 2

console.log(getRandomInt(1));
// expected output: 0

console.log(Math.random());
// expected output: a number between 0 and 1
```

# Lesson Challenge

Recursion Random Number Exclude

Generate 50 random numbers from 1 to 20  
excluding from a list.

10, 15, 7, 1, 4, 2, 5

Output the results into the console.

13  
14  
13  
11  
6  
② 13  
8  
11  
6  
3  
11  
8  
6  
8  
② 14  
9  
8  
12  
1



# Code Snippet

```
const excludeNumbers = [10, 15, 7, 1, 4, 2, 5];
function generateRandom(min, max) {
  let num = Math.floor(Math.random() * (max - min + 1)) + min;
  return excludeNumbers.includes(num) ? generateRandom(min, max) : num;
}
for (let x = 0; x < 20; x++) {
  let min = 1;
  let max = 15;
  let num = generateRandom(min, max);
  console.log(num);
}
```

# Congratulations on completing the section!

## Thank you

This ebook uses <https://developer.mozilla.org/en-US/docs/Web/JavaScript> as a source for examples. Check out more about JavaScript at MDN.

Find out more about my courses at <http://www.discoveryvip.com/>

Course instructor : Laurence Svekis -  
providing online training to over  
500,000 students across hundreds of  
courses and many platforms.

<https://www.udemy.com/javascript-course-projects>

