



Introduction to JavaScript

JavaScript



Client Side Language (Vanilla JS, jQuery, React, etc)

Server Side Language (Node.js, MongoDB etc)

Easy to Learn

ES6 (ECMAScript 6) introduced and standardized in 2015

JavaScript



JavaScript was invented by Brendan Eich in 1995, and became an ECMA standard in 1997.

ECMAScript is the official name of the language.

ECMAScript versions have been abbreviated to ES₁, ES₂, ES₃, ES₅, and ES₆.

Since 2016, versions are named by year (ECMAScript 2016, 2017, 2018, 2019, 2020).

The 15th edition, ECMAScript 2024, is published in July 2024.

JS Syntax

```
var x, y, z;           // How to declare variables
x = 5; y = 6;          // How to assign values
z = x + y;              // How to compute values
```



"John Doe"

'John Doe'

- Very similar to other programming languages
- JavaScript uses the **var** keyword to declare variables.
- Universal principle for identifiers
- **Strings** are text, written within double or single quotes
- Output on console using **console.log**

JS Variables



- Can create uninitialized variables or variable declaration (undefined)
- Change type of same variable anytime
- Recreate same variable again

```
var a; //undefined
var b = a + 10; // NaN
var x = 10
var x = 100
console.log(x) // 100
var x = "I am one hundred"
console.log(x) // I am one hundred
```

JS Operators



- Similar to other programming languages except `===` and `!==`

```
var a = 10
var b = '10'

console.log("a == b:", a == b)
console.log("a === b:", a === b)
```

```
a == b: true
a === b: false
```

Operator	Description
<code>==</code>	equal to
<code>===</code>	equal value and equal type
<code>!=</code>	not equal
<code>!==</code>	not equal value or not equal type
<code>></code>	greater than
<code><</code>	less than
<code>>=</code>	greater than or equal to
<code><=</code>	less than or equal to
<code>?</code>	ternary operator

JS DataTypes

Number, String, Object etc.

- Decimal

```
var x = 15.56
```

- Exponential

```
var x = 10e5
```

- Object

```
var person = { firstName:"John",  
  lastName:"Doe", age:50 };
```



JS typeof Operator



- You can use the JavaScript typeof operator to find the type of a JavaScript variable.
- The typeof operator returns the type of a variable or an expression:

```
typeof ""           // Returns "string"  
typeof "John"       // Returns "string"  
typeof "John Doe"   // Returns "string"
```

```
typeof 0             // Returns "number"  
typeof 314           // Returns "number"  
typeof 3.14          // Returns "number"  
typeof (3)           // Returns "number"  
typeof (3 + 4)       // Returns "number"
```


JS undefined vs null



In JavaScript null is "nothing". It is supposed to be something that doesn't exist.

- Unfortunately, in JavaScript, the data type of null is an object.
- You can empty an object by setting it to null

undefined and null are equal in value but different in type:

```
typeof undefined    // undefined
typeof null          // object

null === undefined   // false
null == undefined    // true
```

Primitive Data



A primitive data value is a single simple data value with no additional properties and methods.

The typeof operator can return one of these primitive types:

- string
- number
- boolean
- Undefined

```
typeof "John"  
typeof 3.14  
typeof true  
typeof false  
typeof x
```

```
// Returns "string"  
// Returns "number"  
// Returns "boolean"  
// Returns "boolean"  
// Returns "undefined" (if x has no value)
```

Complex Data



The typeof operator can return one of two complex types:

- function
- object

The typeof operator returns "object" for objects, arrays, and null.

The typeof operator does not return "object" for functions.

```
typeof {name: 'John', age: 34} // Returns "object"  
typeof [1, 2, 3, 4]           // Returns "object" (arrays are objects)  
typeof null                   // Returns "object"  
typeof function myFunc(){}    // Returns "function"
```

ES6 Variables



	var	let	const
Scope	Function	Block	Block
Can change value after creation?	Yes	Yes	No

Variables:

```
var x = 5;  
let y = 5;  
const PI = 3.14;  
w = 5;
```

```
var x = 10;  
// Here x is ?  
  
{  
  var x = 2;  
  // Here x is ?  
}  
  
// Here x is ?
```

- Camel Case: In this naming convention you should write the first word all lowercase and then the next words first letter should be capital.

```
var fullName;
```

- Snake Case: In this naming convention you should write the first word in lowercase followed by a underscore and then second word. If there are more than two words use underscore between every word.

```
var full_name;
```

Points to Remember

- ▶ Variables should be initialized before accessing it. Unassigned variable has value undefined.
- ▶ JavaScript is a loosely-typed language, so a variable can store any type value.
- ▶ let and const have block scope.
- ▶ let and const can not be redeclared.
- ▶ let and const must be declared before use(not hoisted).

JavaScript with HTML

```
<!DOCTYPE html>
<html lang="en">
  <head>

    <title>Our Main Page</title>
    <link rel="stylesheet" href="style.css">
  </head>
  <body>
    <input type="text" name="name" id="numOne" value="0" />
    <br/>
    <input type="text" name="name" id="numTwo" value="0" />
    <br/>
    <button type="button" onclick="add()">Add</button>
    <br>
    <div id="result"></div>

    <script src="main.js"></script>
  </body>
</html>
```

Example

- In you main.js make function add() which will be called when we click the button.

```
function add(){  
  var numOne = document.getElementById("numOne").value;  
  var numTwo = document.getElementById("numTwo").value;  
  result = parseInt(numOne) + parseInt(numTwo)  
  document.getElementById("result").innerHTML = "Result "+ result;
```



A screenshot of a web application interface. It features two text input fields stacked vertically, both containing the number '4'. Below the second input field is a button labeled 'Add'. Underneath the button, the text 'Result 8' is displayed, indicating the output of the addition operation.

Conditional Statement:

```
// if(condition){  
  
//   code to run if the condition is true  
// }  
// else{  
  
//   code to run if the condition is false  
// }
```

Conditional Statement:

```
if(condition){  
    code to run if the condition is true  
}  
if (condition2){  
    code to run if the condition2 is true  
}  
else if(contidion3){  
    code to run if the condition3 is true  
}  
else{  
    code to run if the condition is false  
}
```

```
var numOne = document.getElementById("numOne").value;  
var numTwo = document.getElementById("numTwo").value;  
result = parseInt(numOne) + parseInt(numTwo)  
  
if (result > 10){  
    document.getElementById("result").innerHTML = result;  
}  
else{  
    document.getElementById("result").innerHTML = "less than 10";  
}
```

nested if

```
if(condition){  
  if (condition2){  
    This code will run if condition is true and then condition2  
    is true  
  }  
}  
else{  
  This code will run if condition is false  
}
```

Switch Statement:

- For cases where you just want to set a variable to a certain choice of value or print out a particular statement depending on a condition, the syntax can be a bit cumbersome, especially if you've got a large number of choices.
- In such a case, we use switch statements.
- They take a single expression/value as an input, and then look through a number of choices until they find one that matches that value, executing the corresponding code that goes along with it.

```
var a = 2

switch (a) {
  case 1:
    alert("1")
    break;

  case 2:
    alert(a)
    break;

  // include as many cases as you like
  default:
    alert("This is default case")
}
```

String Concat

```
let x = "This is a string";  
let y = 'Here is another exapmle of String';  
let z = new String('This is an String object. ');  
document.getElementById("test").innerHTML = z;
```

- String primitives and string objects can be used interchangeably in most situations.
- There different way you can join two or more than two string.
- This is also known as concatenation.

```
newString = x + y;
```

- You can concatenate two or more string with + operator. For strings + will join two strings.
- Or you can use concat() which joins two or more strings

```
newString = x.concat(y)
```

String get specific character

```
newString[0]
```

```
let letter = newString.charAt(0)
```

- To find out the length you can use *length*

```
newString.length
```

String replace...

- The `replace()` method replaces a specified value with another value in a string:

```
let text = "Lets complete this task tommorow";  
let newText = text.replace("complete", "finsh");
```

```
let newTextUpper = text.toUpperCase()  
let newTextLower = text.toLowerCase()
```

- The `trim()` method removes whitespace from both sides of a string.

```
let newTextTrim = text.trim()
```

String split

- A string can be converted to an array with the split() method.
- If the separator is omitted, the returned array will contain the whole string in index [0].
- If the separator is "", the returned array will be an array of single characters:

```
let text = " Lets complete,this task tommorow ";  
let newtext =text.split(",");
```


Logical Operator:

Logical operators very same as used in other languages.

&&	logical and
	logical or
!	logical not

```
if (x < 8 && y > 1) is true  
if (x == 5 || y == 5) is false  
if !(x == y) is true
```

Arrays:

```
let student = ["Ali" , "Jona" , "Sarthak" , "Tim" , "Shahid"];  
let student = new Array("Ali" , "Jona" , "Sarthak" , "Tim" , "Shahid")
```

- You can access the values by just passing index value in the [] brackets.
- Also you can change the element of same index

```
student[2]  
student[3] = "Adeem"
```

- toString() converts an array to a string of (comma separated) array values.

```
student.toString()
```

- push() is a method that will add element at the end.
- pop() is a method that will remove the last element from the array.

```
student.push("Anish");  
student.push("Jona");
```

Arrays:

- You concatenate two array. By using concat() methods.

```
let student1 = ["Ali" , "Jona" , "Sarthak" , "Tim" , "Shahid"];  
let student2 = ["Sameen", "Rashid", "Sam"]
```

```
let allStudents = student1.concat(student2)
```

- You can also sort() array in different fashion which can be very handy in different context.
- The reverse() method reverses the elements in an array.

```
let student1 = ["Ali" , "Jona" , "Sarthak" , "Tim" , "Shahid"];  
student1.sort()  
student1.reverse()
```

Loops:

- Loops that we can implement in JavaScript are for, do while, while

for statement:

- A for loop repeats until a specified condition evaluates to false. The JavaScript for loop is similar to the Java and C for loop.

```
for ([initialExpression]; [conditionExpression]; [incrementExpression])  
  statement
```

- Inside a for statement there are three parts. First is to initialize a variable. Second is on what condition it should stop. Third is how much to increment or decrement step. It can also define how long step can be.

```
let student1 = ["Ali", "Jona", "Sarthak", "Tim", "Shahid"];  
for (var i = 0; i < student1.length; i++){  
  console.log(student1[i])  
}
```

for in:

- In this statement you loop over an object
- Use **for** keyword followed by parenthesis and inside the parenthesis use a loop variable then **in** keyword and then object.

```
for (key in object) {  
  // code block to be executed  
}
```

Loops:

do while statement:

- This statement repeats until a specified condition evaluates to false
- In this statement the loop is run first and then the condition is read.

```
let i = 0;  
do {  
  i++;  
  console.log(i);  
} while (i < 10);
```

while loop

- This statement executes its statements as long as a specified condition evaluates to true.
- In this condition is read first then the loop is executed.

```
let i = 0;  
let j = 0;  
while (i < 10) {  
  i++;  
  j += i;  
}
```

Loops:

break statement

- This is used to terminate the loop at any given time.
- Usually we check a condition then apply break to terminate the loop. This comes in handy in a lot of cases.

```
for (let i = 0; i < x.length; i++) {  
  if (x[i] === val) {  
    break;  
  }  
}
```

continue statement

- This statement can be used to move on next iteration.

```
let i = 0;  
let j = 0;  
for (i = 0; i < x.length; i++) {  
  i++;  
  if (i === 3) {  
    // continue;  
  }  
  j += i;  
  console.log(n);  
}
```