W1 *PRACTICE*

From C++ to JS

At the end of this practice, you can

- Run JS code
- Create **variables** and **constants**
- Call and define **functions**
- Use JS **loops** and **conditions**
- Manipulate **arrays**, **objects**, **strings**, **Boolean** and **numbers**

Get ready before this practice!

- **Read** the following documents to understand JS syntax:

https://cstart.mines.edu/web/Day2/2-JavaScriptBasicSyntax.pdf
https://www.integral-domain.org/lwilliams/mis462/JavaScript.pdf

You can also go further with the following books:
https://www.gurukultti.org/admin/notice/javascript.pdf
https://www.w3schools.com/js/default.asp

- **Complete the quiz** (*you can re-do it until you have 100% score*)

How to submit this practice?

- **Complete** this document
- Once finished, join this document to the MS Team assignment and **turn it in**

*3 WAYS TO **RUN JS CODE***

For beginners

To start with, you can just connect to an **online JavaScript editor**, such as this one:

https://playcode.io/javascript

For front-end ninjas

Chrome or any other **Web Browser** can execute JavaScript code while loading HTML

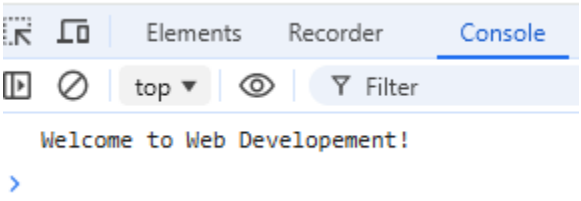
Just create a simple `index.html` file, that links to a `index.js` file:

```
<!DOCTYPE html>
<html>
<head>
    <title>Let s run JS on a Browser</title>
    <script src='index.js'></script>
</head>
<body>
</body>
</html>
```

Then just write some JS code, as example here, we print a message on the Browser console

```
// Example of JS code, printing on console
const courseName = "Web Developement";
console.log("Welcome to " + courseName + "!");
```

Finally open your index.html on a browser and check the console view



For back-end gurus

Node.js is also able to **execute JavaScript** code **outside a web browser.**
You will need first to install Node JS on your computer.

You can then just open a terminal on the folder containing your index.js file and run

```
node ./index.js
```

*PART 1 - UNDERSTAND **JS SYNTAX***

Note: you can use the C++ to JS converter to compare C++ and JS syntax.

EXERCISE 1- TYPES, OUTPUTS

Analyze the differences between the provided C++ and JavaScript code.

C++	JS

`#include <iostream>`
`using namespace std;`
 	
`int main() {`
`  const int num = 5;`
`  for (int i = 0; i < num; i++) {`
`  cout << i << " ";`
`  }`
`  return 0;`
`}`
	`const num = 5;`
	`for (let i = 0; i < num; i++) {`
	`  console.log(i);`
	`}`

Q1 - What does the **const** key word mean in JS code?

According to the code above the **const** key word in JS code mean that the value of variable **num** can't be change

Q2 - Why is it necessary **to specify the type** of variables in C++ but not in JavaScript?

The reason it is necessary to specify the type of variables in C++ but not in JavaScript because C++ is a compiled language and unlike JavaScript that data types can automatically converted as-needed during script execution, C++ need a specific variable in order to manage the memory usage.

Q3- How to **print in the console** in JS?

console.log();

Q4- Is there any difference in the **loop syntax** between C++ and JS?

The difference in the **loop syntax** between C++ and JS:
- C++: declare **i as integer(int)** and use **std::cout** for an output
- JavaScript: use **let or var** instead of **int** and use **console.log()** for an output.

EXERCISE 2 - LOOPS, FUNCTIONS

C++

```cpp
#include <iostream>
using namespace std;

int calculateSum(int array[], int size)
{
    int sum = 0;

    for (int i = 0; i < size; i++) {
      // Add here the calculation logic
      sum += (i+1);
    }
    return sum;
}

int main() {
    int arr[] = {1, 2, 3, 4, 5};
    cout << calculateSum(arr, 5);
    return 0;
}
```

JS

```js
function calculateSum(array) {
    let sum = 0;

    for (let i = 0; i < array.length; i++) {
       // Add here the calculation logic
       sum += (i+1);
    }
    return sum;
}

let arr = [1, 2, 3, 4, 5];
console.log(calculateSum(arr));
```

Q1 - Complete the given codes (`see comments`) to compute the sum of all elements in an array

Q2 – Why the function calculateSum in JS code **does not have the size** parameter?

The function calculateSum in JS code does not have size parameter because functions that work with arrays **do not need a size parameter** in JavaScript because JavaScript arrays are **dynamic** and provide a built-in length property.

EXERCISE 3 - CONDITIONS, EQUALITY

JS

```
function myFunction(min, max) {
  var result = "";
  for (let number = min; number <= max; number++) {
    if (number % 2 === 0) {
      result += number + " - ";
    }
  }
  return result;
}
```

Q1 – Look at the above code

- Highlight all **variables in blue**
- Underline all **loops in red**
- Highlight all **conditions in green**

Q2 – What is the significance of the modulo operator % in these programs?

The significance of the modulo operator % in these programs is used to find the **remainder** of a division operation.

Q3 – What is the difference between === and == in JS? *Highlight the right answer*

4 == 9	TRUE / FALSE
4 == 4	TRUE / FALSE
4 == ''4"	TRUE / FALSE
4 === ''4"	TRUE / FALSE

Q4 – What will this code will print on console?

```
console.log(myFunction(9, 14))
```

10 – 12 – 14 -

Q5 – What will this code will print on console?

```
console.log(myFunction(7, 3))
```

undefined

EXERCISE 4 – MEMORY ALLOCATION

Both codes are performing the same job:

C++

```cpp
#include <iostream>
using namespace std;

int main() {
    int size = 5;
    int* arr = new int[size];
    for (int i = 0; i < size; i++) {
        arr[i] = i * 2;
    }

    for (int i = 0; i < size; i++) {
        cout << arr[i] << " ";
    }
    delete[] arr;
    return 0;
}
```

JS

```javascript
let size = 5;
let arr = [];
for (let i = 0; i < size; i++) {
    arr[i] = i * 2;
}

for (let i = 0; i < size; i++) {
    console.log(arr[i]);
}
```

Q1 – In both codes, are we using a **static** or a **dynamic** array? Explain why…

+ For C++:
  -The array is allocated using new int[size], meaning it is stored on the **heap**.
  -The size can be set at **runtime**.
  -We must manually **free memory** using delete[] arr;.
+ For JavaScript:
  -The array arr can **grow and shrink dynamically** without manual memory management.
  -JavaScript automatically handles memory allocation and garbage collection.
  -No need for delete or manual deallocation.

Q2 – Explain why JavaScript **does not** need explicit **memory allocation** or **deallocation**, as C++ need it

JavaScript **automates** memory management using **garbage collection** (GC).
- **You don't allocate memory explicitly** (new is not needed for basic types).
- **You don't deallocate memory manually** (delete is not needed).
- **JavaScript detects unused objects and frees memory automatically.**

*PART 2 - CODE **JS CHALLENGES***

Good job!

Now you should know the [basic syntax of JavaScript!]
Let's solve some problem now.

Each challenge is structured the same way:

- **Goal** What the function shall do
- **Inputs**: the function parameters
- **Output** the function return

As example, for the challenge 1, you will provide the following function:

```
function challenge1(width, height) {
    let rectangleString = '';
    // Your code
    return rectangleString;
}
```

CHALLENGE 1	**EASY**
Draw a rectangle in the console using stars	

INPUT	**OUTPUT**
width 3 height 4	*** *** *** ***

width 5 height 2	***** *****
width 5 height -2	

CHALLENGE 2	MEDIUM
Reverse an array	

INPUT	OUTPUT
array [14,15,16,20]	[20,16,15,14]
array [5,4,3,2,1]	[1,2,3,4,5]
array []	[]

Any help on arrays with JavaScript? Check here.

CHALLENGE 3	MEDIUM
Calculate the average grade of a list of students.	

INPUT	OUTPUT
array [85, 90, 78, 92]	86.25
array [10,20,30]	20
array []	0

CHALLENGE 4	MEDIUM
Write a function to count how many times a character appears in a string.	

INPUT	OUTPUT
text "hello world" char = 'o'	2

text "aaa bbb a" char = 'a'	4
text "abc" char = 'd'	0

CHALLENGE 5	HARD
Count the number of words in a sentence	

INPUT	OUTPUT
text "hello world"	2
text "this is the best day"	5
text "a bb ccc ddddddd e"	5

CHALLENGE 6	HARD
Simulate a voting system for three candidates (A / B/ C). Count votes and declare a winner	

INPUT	OUTPUT
votes ['A', 'B', 'A', 'C', 'A']	A is the winner
votes ['A', 'B', 'B', 'C', 'A']	A and B are both winners
votes []	There is not vote yet