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Java Script Topics

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* Introduction :

→ Java Script is one of the most popular programming language in the world.

→ It is Not only used as Frontend technology but also as a Backend technology.

Frontend → React Js

Backend → Node Js, Express Js.

→ Java Script is a Scripting Language that is used to add functionalities to our webpages.

* History Of JavaScript :-

→ Earlier in 1990's A company Name Netscape wanted to built a Scripting language for their Browser called Netscape Navigator.

→ They hired a person called Brendon Eich and asked him to devolop a Scripting Language.

→ He developed within 10 days and Named it as Mocha in the year 1995.

→ Later It was Named as LiveScript ; But as a Marketing Startegy they changed it's name to JavaScript.

→ To make JavaScript as Open Source they handed it to ECMA (European Computer Manufacturing Association) in the year 1997. So, it is also called as "ECMA Script".

→ To Run the JavaScript code Outside the browser a person named Ryan Dahl introduced NodeJs.

* Key features :-

emp Java Script is a Scripting Language.

emp Each and Every code written in Java Script can be read, analyze and Executed in the Browser itself.

→ Java Script is a Weekly/Loosely Typed Language.

> Even if the semicolon is missing or the datatype is not specified It doesn't provide any Error.

Java	Java Script
int a=10;	a=10 & Datatype
S.O.pln (a) ;	clg (a) semicolon

→ JavaScript is a Dynamically Typed Language.

> If we declare a variable storing a numerical value, can be later reassigned with any other type of value.

Java	JavaScript
int a = 10; ✓	a = 10 ✓
✗ a = true;	a = true ✓

→ JavaScript is a Sychronous Single Threaded / Interpreted Language.

> Because, it reads the code line by line & executes and creates. if there is any errors occurs it will stop it's Execution without moving to the next line.

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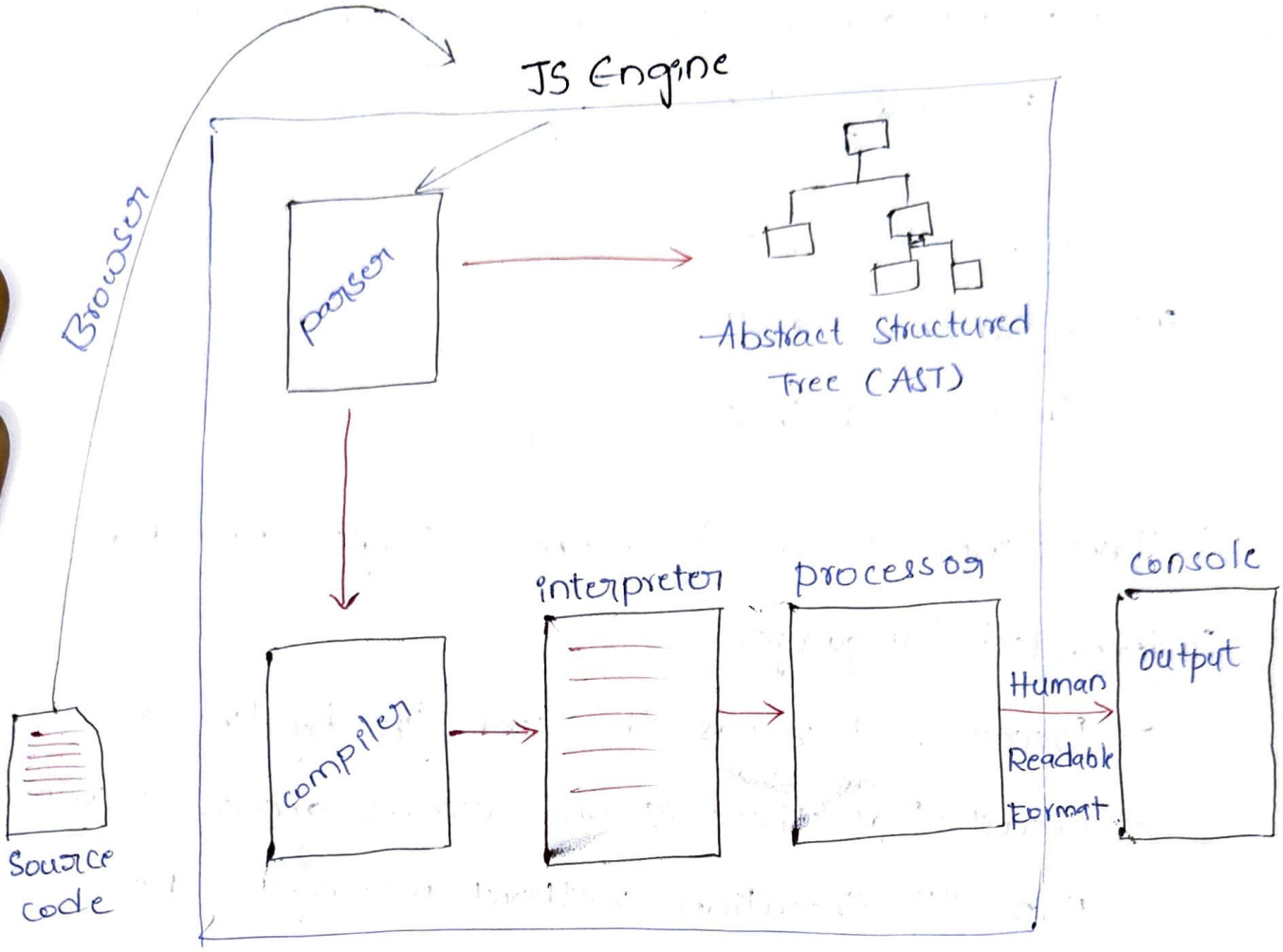
* Java Script Engine :=



→ Browser	JS Engine
Chrome	V8
Firefox	Spider Monkey
IE → Internet explorer.	Chakra
Brave	Blink + V8

→ when the JavaScript file (source code) is executed on the browser, It is sent to the JavaScript engine.

→ In this process the source code is first sent to the parser. which stores the Original code into tree like structure known as "Abstract Structured Tree" (AST) & also divides our code it into parts (Tokens) and sents one by one to the Compiler.

→ The Compiler will check for the Syntax Errors and converts the source code into Binary codes (0's & 1's) and Sents it to the interpreter.

→ the Interpreter checks the binary code line by line and Sents it to the processor.

→ the processor will convert the binary code into Human Redable format & Prints the output inthe browsers Console.

* Way Of Adding JS :

→ There are 2 ways of adding JS, they are

1) Internal JS
2) External JS.

1) **Internal JS** : It refers to the writting of java script code inside the body tag by maintaing a script tag

Ex:

```
<body>
  <script>
    console.log("I AM INTERNAL JS");
  </script>
</body>
```

2) **External JS** : It refers to writting of the javaScript code by maintaing a seperate file saved with a Extension .js.

→ To link JavaScript and html file we use script tag along with src attribute which takes in the path of the JS file.

Ex:

```
<body>
<script src = "path of Js file"> </script>
</body>.
```

* Comments :-

→ comments are the piece of code i.e, not executed on the browser.

→ It is mainly used to provide (improve) the redability of the code.

Types :

There are 2 types of comments in JS,

1) Single line comment (//)
2) Multi line comment (/* -- */)

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* Tokens :

→ Tokens are the smallest part of any programming language.

Types :

Tokens are divided into 3 categatories i.e,

1) Keywords
2) Identifiers
3) Literals.

1. **Keywords** : These are predefined (or) reserved words.

→ they should always be written in lowercase.

Ex: Console, log, if, else, const, var, let --- etc,

2. Identifiers : These are names given for the components like variables & functions.

Rules :

1) Identifier should not be same as keyword.

2) It should not start with a number, but it can contain a number.

3) Except $ & _ no other spl characters should not be used.

Ex: skills, name, age1 ---etc.

3. Literals : These are the values that are stored in a variable.

Ex: 10, true, "javaScript" ---etc.

* Data Types :

It tells us the type of data stored in a variable.

Types : Datatypes are divided into 2 categories.

1) primitive Datatypes

1) Number
2) String
3) boolean
4) undefined
5) Null
6) BigInt
7) Symbol

2) Non-primitive D.T

1) Object.

Primitive Data types :

1. Number : It represents both integers & Decimals.

Ex
```
var Num1 = 10
var num2 = 10.25
var num3 = 10000000.56
console.log (num3) // 10000000.56
console.log (typeof num3) // number
```

2. String : It represents a character or the sequence of characters enclosed in '', "", ``.

Back ticks

Ex :
```
let str1 = 'JavaScript'
let str2 = "R"
let str3 = `10`
console.log (str2) // R
console.log (typeof str2) // String
```

3. Boolean : It represents a logical value either true/ false.

Ex
```
let bool1 = true
let bool2 = false
console.log (bool1) // true
console.log (typeof bool1) // boolean
```

4. Undefined : It refers to uninitialized variable or absence of a value for a variable.

Ex:
```
let val
console.log(val) // undefined
console.log(typeof val) // undefined
```

} diff b/w * them

5. Null : It is the intensional absence of a value for a variable

Ex:
```
let name = null
console.log(name) // null
console.log(typeof name) // object
name = "Nandu"
console.log(name) // Nandu
console.log(typeof name) // string.
```

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6. BigInt : This datatype is used to store a large number without loosing the precision.
↓ exact value

→ To convert a number to a BigInt value specify 'n' at the end of a number.

Ex:
```
let sym = Symbol()
console.log(sym)
```
eof

```
let bigInt = 1676543219778n
console.log(bigInt)
console.log(typeof bigInt)
```

7. Symbol : This datatype is used to Generate unique id's for an object.

Ex: let sym = Symbol(1)
console.log(sym) // Symbol(1)
console.log(typeOf sym) // Symbol.

* Scopes :-

It is the Region in which the variable are accessible.

Types

They are 3 types of scopes in JS -:

1) Global Scope
2) Local / Function Scope
3) Block Scope.

1. Global Scope : Variables declared at the top level should be accessible in the same JS file.

→ Variables declared with Var keyword follows Global Scope, whereas let & const keyword follows Script Scope.

Note : Script Scope is similar to Global Scope which was introduced along with the creation of let & const keywords in ES6 version of JavaScript released in 2015.

2. Local / Function Scope :

→ Variables declared inside the function should be accessible only inside the function.

→ Variables declared with var, let & const follows local/function Scope.

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3. Block / Scope :-

→ Variables declared Inside the block should be accessible only Inside the block.

→ Variables declared with let & const keywords follows Block Scope, whereas variables declared with var keyword desn't follow Block Scope.

	Global	Script	Local	Block
var	✓	✗	✓	✗
let	✗	✓	✓	✓
const	✗	✓	✓	✓

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* Hoisting :

→ It is the process of moving the variable declarations to the top of the scope.

(or)

→ It is the process of Accessing the variable even before it's declaration.

→ Hoisting is Completely dependent on Memory Allocation, But Not the output.

→ If Memory Allocation is done for a Variable then Hoisting is done else Hoisting is not done.

→ Variables Declared with var, let & const keywords are Hoisted and the values are initialized as follows.

var → undefined
let → value unavailable
const → value unavailable

Note : Values are Not Initialized for let & const because of temporal Dead Zone (TDZ).

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* Temporal Dead Zone (TDZ) :

→ It is the time duration between the creation of a Variable & it's utilization.

Ex: // Variables

```
console.log(a); // undefined
var a = 10;

console.log(b) // Uncaught RefError : Cannot access 'b' before initialization.
let b = 20; // value unavailable

console.log(c)
const c = 30;
```

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* Diff B/w var / let & Const.

	var	let	const
Scopes:	Global, Local	Script, Local, Block	Script, Local, Block.

→	Declaration without initialization is possible
	var a;
	console.log(a);
	// Undefined
		Declaration without initialization is possible
		let b;
		console.log(b);
		// Undefined.
			Declaration without initialization is Not possible.
			const c;
			console.log(c);
			// Uncaught Syntax Error:

→	ReAssigning the variables is possible
	var a = 10;
	a = "saturday"
	console.log(a) // Saturday
		→ ReAssigning the variables is possible.
		let b = 20;
		b = false;
		console.log(b); // false.
			→ ReAssigning the variables is not possible. const c = 30;
			c = "stupid";
			console.log(c); // Uncaught Syntax Error: ---

→ Redeclaration of the variables is possible.

```
var a = 10;
var a = 20;
console.log(a) // 20
```

→ Hoisting is done and value is initialized as Undefined.

```
console.log(a); // undefined
var a = 10;
```

→ Redeclaration of the variable is not possible

```
let a = 20;
let b = false;
console.log(b);
// uncaught Error:
```

→ Hoisting is done But the value is not initialized as var because of (TDZ).

```
console.log(b); //
uncaught Ref Error:
let b = 20;
```

→ Redeclaration of the variables is not possible.

```
const c = 30;
const c = "Java"
console.log(c);
// uncaught Syntax Error:
```

→ Hoisting is done But the value is not initialized because of (TDZ).

```
console.log(c); //
Uncaught Ref Error
see const c = 30;
```

* Operators :=

→ Operators are the predefined Symbols used to perform a Specific task.

→ operands are the values upon which the operation is performed.

→ The combination of operators & operands is known as "Expression".

Types :

There are 5 types of Operators in JavaScript.

1) Arithmatic Operators (+, -, *, /, %)

2) Comparision / Relational Operators (>, <, >=, <=, !=, ==, ===)

3) Logical Operator (||, &&, !)

4) Assignment Operator (=, +=, -=, *=, /=, %=)

5) Conditional / Ternary Operator.

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1) Arithmetic operations.

(+ Addition)

```
console.log(2+3) // 5
console.log(typeOf (2+3)) // number
console.log (2+"3") // 23
console.log (typeOf (2+"3")) // string
console.log ("2" + '3') // 23
console.log (2+true) // 3  (2+1)
console.log (2+ false) // 2  (2+0)
console.log (2+"2"+false) // 22false
console.log (2 + 5 +"2"+ true) // 72 true
console.log (2+ 10 + 'abc') // 12 abc
```

// Substraction

```
c.log (2-3) //-1
c.log (typeof (2-3)) //numba
c.log (2-"3") //-1
c.log (typeof (2-"3")) //number
c.log ("2"-"3") //-1
c.log (2-true) //-1
c.log (2-false) //2
c.log (2-"2"-false) //0
c.log (2-5-"2"-true) //-6
console.log (2-10-'abc') // Nan - not a number
```

// Multiplication.

```
c.log (2*3) //6
c.log (typeof (2*3)) //number
c.log (2*"3") //6
c.log (typeof (2*"3")) //number
c.log ("2" * "3") //6
c.log (2* true) //2
c.log (2* false) //0
c.log (2* "2" * false) //0
c.log (2 * 5 * "2" * true) //20
clog (2*10 * 'abc') // Nan
```

// Division

```
clog (4/2) //2
c.log (typeof (4/2)) //number
c.log (4/"2") //2
c.log (typeof (4/"2")) //number
c.log ("10" /"5") //2
c.log (2/true) //2
c.log (2/false) // Infinity
c.log (2/"2"/false) // Infinity
c.log (10/5 /"1"/true) //2
c.log (2/10/'abc') // Nan
```

// Modulus

```
c.log (4%2) //0
c.log (typeof (4%2)) // number
c.log (4%"2") //0
c.log (typeof (4%"2")) // number
c.log ("10" %"5") //0
c.log (2%'abc') //NaN (Not-a-Number)
```

// Comparision (or) Relational Operators.

// (>, <, >=, <=, ==, !=, ===)

```
let p=1;
let q=2;
let r="2";

console.log (p>q) // false
c.log (p>r) // false
c.log (p<r) // true
c.log (q>=r) // true
c.log (q<=p) // false
c.log (p!=q) // true
c.log (r!=q) // false
c.log (p==r) // false
c.log (q==r) // true
c.log (q===r) // false.
```

// Logical Operators

(||, &&, !)

```
let a=1
let b=2
let c="2";
c.log (a>b || b>c) // false
c.log (a>b || b==c) // true
c.log (a>b && b>c) // false
c.log (a>b && b==c) // false
```

```
c.log (a<b && b==c) // true
c.log (!(a==b)) // true
c.log (!(b==c)) // false
```

// Assignment Operators

(=, +=, -=, *=, /=, %=)

```
let a = 20;
let b = "10";

c.log (a+=b) // 2010
c.log (a-=b) // 2000
c.log (a*=b) // 20000
c.log (a/=b) // 2000
c.log (a%=b) // 0
```

// Conditional / Ternary Operator

// Ex-1

```
let pellichesukuntava = true;

pellichesukuntava ? c.log ("Mi NaNNa tho
    eppudu matladadali ?") : c.log
        ("Mi amma tho eppudu
            matladuthav");
```

// Ex-2

let weekend = false;

weekend ? c.log("Thaguadam") : c.log("consider it as a weekend & Drink");

* what is NaN?

Nan → stands for Not a Number which is used to represent a invalid Mathematical Operation.

c.log (2+"2"+"false"); // Nan

* (==) :

Diff B/w == & === :-

'==' is used to compare the values whereas '===' compare both the values wrt & datatype.

Ex c.log (1 == "1") // true

c.log (1 === "1") // false.

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* Decision Statements :

They helps to Execute the statements based on the condition.

Types :

There are 4 main types of Decision Statements in java script.

1) if
2) ifelse
3) elseif
4) switch case

1) if : Syntax :

```
if (condition)
{
// Block of code to be executed if condition is true
}
```

Ex :

```
let area = "Ibnagar"
if (area == "chaitanyapuri")
{
    console.log ("Amma Thodu Addamga Narikestha");
}
```

2> if else: Syntax – if (condition)

```
{
// Block of code to be executed if cond is true
}
else {
// Block of code to be executed if cond is false
}
```

Example:

```
if (area == "chaitanyapuri")
{
  c.log ("Amma Todu Adanga Narikesta")
}
else {
  c.log ("Debalu padtayi")
}
```

3> elseif : Syntax : if (condition 1)

```
{
//Block of code to be executed if cond1 is true
}
else if (condition 2)
{
// Block of code tobe executed if cond1 is false & cond2 is true
}
else {
// Block of code to be executed if cond 2 is false.
}
```

Example : let amount = 50;

```
if (amount >= 350)
  {
c.log ("Pista House Biryani")
  }
else if {
   c.log ("Raghavendra Tiffins")
   }
 else if {
    c.log ("Go and eat some tiffins")
    }
  else{
    c.log ("Muskoni pg lo thinu")
   }
```

4) Switch : Syntax - switch (Expression)

```
{
case value 1: code block ;
              break;
case value 2 : code block ;
              break;
case value 3 : code block;
              break;
case value N : code block;
              break;
default :  code block;
           break;
}
```

Example-1 :

```
let trainer = "Rahul";

switch (trainer)
   {
case "Abbas" :  c.log ("Programming trainer");
                break;
case "pavan" :  c.log ("core java trainer");
                break;
case "Monty" :  c.log ("python trainer");
                break;
case "Yasin" :  c.log ("Sql trainer");
                break;
case "Shubham" : c.log ("web trainer");
                 break;
default : console.log ("Not a trainer");
}
```

Example-2 :

```
let amount = 250;

swith (true)
   {
case (amount >= 350) : c.log ("Pista House Biryani");
                       break;
case (amount > 200 && amount <=300) : c.log ("Raghavendra
                       break;
```

```
case amount >100 && amount <= 200 :
                    c.log ("Go and eat Some Tiffins");
    break;
default : c.log ("Mooskoni pg lo thinu");
}
```

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* Loops :

→ Loops are used to perform a task repeatedly 'n' no.of times based on a condition.

Types : i> for loop
ii> while loop
iii> Do-while loop

i> for loop :
```
for (initialization ; condition ; updation)
{
 //code
}
```

Ex:
```
for (let i=1 ; i<=5 ; i++)
{
document.writeln ("<h1> Hello </h1>")
}
```

ii> while loop :
```
initialization
while (condition)
{
//code
 updation
}
```

Eg:-

```
let j=1;
while (j<=10)
  {
document.writeln ("<h1> Somethingggg </h1>")
  j++
  }
```

iii) do-while loop :

```
initialization
do {
  //code
  updation
  } while (condition)
```

Eg:-

```
let j=1
do {
document.writeln ("<h1> frustated---- </h1>")
  j++
  } while (j<=10)
```

Note : The difference between while loop & Do-while loop is that, while loop will only execute if the condition is satisfied whereas do-while loop atleast one time even if the condition is Not-satisfied.

Functions :

→ Functions are the block of code i.e., used to perform a specific task.

→ To Execute a function we need to call the function.

Advantages :

→ It improves the Readability of the code

→ It increases the Reusability of the code by calling it multiple times.

Types :

In General They are 2 types of functions in Java Script.

1) Function Declaration

2) Function Expression.

1) Function Declaration : 1/5/25

i) Noamal / General / common function :

Syntax :

```
function identifier (parameter)
{
    //code
}
```

function Declaration part

```
function identifier (arguments);
```

function calling statement.

Ex :
```
function anything()
{
 let a = 10;
 let b = 20;
c.log (a+b);
}
anything(); // 30
anything(); // 30
```

Behaviour of function :

1) function without parameter without return keyword

```
function greet()
 {
 c.log ("Good Evening");
 }
greet() ⟶ calling function.
```

2) function with parameter & without return keyword

```
function add (a,b)
 {
 c.log (a+b)
 }
add (10,20) // 30
add (30,40) // 70
```

3) function with parameter with return keyword

```
function mul (a,b) {
    return a*b
}
```

```
c.log(mul(2,3)) // 6
c.log (mul (10,20)) // 200
```

4> function without parameter with return keyword

```
function expressyourFeelings()
 {
    return "I Love You"
 }
c.log (expressyourFeelings()) // I Love You
```

// Extra Parameters.

```
function extraParam(a,b,c)
 {
 c.log (a+b+c) // Nan          (10+20+a)
 }
extraparam(10,20)
```

// Extra arguments

```
function extraArgs(a,b)
 {
 c.log (a+b) // 30
 }
extraArgs(10,20,30)
```

② Function Expression : It provides way to create the function without specifying the identifier (name of the Identifier).

→ Generally these type of function needs to be stored in a variable to be execute.

i) Anonymous function : These are the function that doesn't have any name for it.

syntax : variable = function (parameter)

```
{
    //code
}
variable (arguments)
```

Ex-1 :

```
let anonymous1 = function ()
{
c.log ("I am anonymous function")
}
anonymous1()
```

Ex-2 :

```
let anonymous2 = function (val1, val2)
{
return val1 - val2
}
c.log (anonymous2 (20, 10))
```

ii) Arrow Function :

→ It is a function that does not have function keyword as well as identifier.

→ It is a type of function introduced in ES6 version of JS.

Syntax : Variable = (parameters) =>

```
{
// code
}
Variable (arguments)
```

Eg :-

```
Let greet = (msg) =>
{
console.log (msg) // Good Evening
}
greet ("Good Evening")
```

Types : Based on the return, arrow function is divided into 2 types.

1) Explicit return arrow function
2) Implicit return arrow function.

1) Explicit return arrow function : It is a type of arrow function that involves the use of return keyword wantedly. (wantedly specifying return keyword)

Eg :-

```
let product1 = (a,b)=>
{
return a*b
}
c.log (product1 (10,10)); //100
```

2> implicit return arrow function : It says that if there is only one line statement to be executed then we can skip the return keyword as well as curly braces ({}).

Eg 1 :- let product2 = (a, b) => a*b

c.log (product2 (10,10)); //100

Eg 2 :- let add1 = (a,b) =>

c.log (a+b) //30

add1 (10,20)

* Behaviour of Arrow function :

1) Single Parameter :- whenever there is a single parameter in the Arrowfunction, we can skip the paranthesis (()) for it.

Eg :- let singleParam = msg =>

{

c.log (msg); // Hello

}

Single param ("Hello")

2) No parameter :- whenever there is no parameter in the Arrow function, we can skip the paranthesis ('()') and replace it with the underscore ('_').

3) Immediate Invoked Function Expression (IIFE):

→ these are the functions that should be executed immediately after it's declaration.

→ these functions will execute only one.

→ these functions can be normal / anonymous / Arrow but should be wrapped inside the paradthesis ('()').

Syntax : (
normal / anonymous / Arrow
)();

Eg :-
```
// Normal
(function normal (){
console.log ("Normal function")
})
();
// Anonymous
(function () {
c.log ("Anonymous function")
})
();
```

// Arrow function

```
(()=> {
  c.log ("Arrow function")
})
();
```

* Higher Order Functions (HOF):

Higher Order Functions are those functions that take another function as its argument and return a new function.

call Back Function :

call Back functions are the values that are being passed as an argument to HOF.

Eg :-

```
let add = (a, b) =>
    {
     return a+b
    }

let sub = (a,b) =>
    {
     return a-b
    }

let mul = (a,b) =>
    {
    return a*b
    }
```

```
let calculator = (a,b, task ) =>
    {
    return task (a,b)
    }

c.log (calculator (20, 20, add)) // 40
c.log (calculator (40, 20, sub)) // 20
c.log (calculator (10, 5, mul)) // 50
```

Note : In the above example calculator acts like a higher order function and the functions like add, sub, mul acts like the call back functions.

Hoisting in Functions

→ It is the process of calling or accessing the function even before it's declaration.

→ Hoisting is completely dependent on Memory Allocation but not on the output.

→ If memory allocation is done for a function then Hoisting is done else Hoisting is not done.

→ Functions like normal, Anonymous and Arrow are Hoisted But the values in Function Expression completely depend on the keywords like var, let & const.

value :

normal ⟶ entire function

anonymous, arrow > var - undefined, let, const } value unavailable.

Eg :- normal() // iam normal function

```
function normal(){
clg("I am Normal Function")
}
```

```
//* Anonymous
anonymous() // Uncaught Type Error : anonymous is not a function
var anonymous = function(){
c.log("I am Anonymous Function")
}
```

```
//* Arrow
arrow() // Uncaught TypeError : cannot access "arrow' before initializatio
let arrow = ()=>{
c.log("I am Arrow Function")
}
```

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* Function currying :-

imp → It is the process of transforming a function taking multiple arguments into nested series of function taking single argument.

function taking multiple arguments

```
function add1 (a,b,c)
 {
 return a+b+c ;
 }
c.log (add1 (10,20,30));
```

→

Nested Series of function taking single argument

```
function add2 (a)
  {
 return function (b)
   {
  return function (c)
   {
  return a+ b+c ;
   }
 }
}
c.log (add2 (10)(20)(30));
```

implicit return arrow function

→

```
let add3 = (a) => (b) => (c)=> a+b+c ;

c.log (add3 (10) (20) (30)) ;
```

(or)

```
let add3 = a => b => c => a+b+c
```

→ returning single value we can remove bracets.

```
c.log (add3 (10) (20) (30)) ;
```

* Execution Context :-

→ It is a area (or) the environment that holds the information about the memory Allocation for the variables & functions, regarding the scope, Execution statements etc//.

→ JavaScript code will run twice in which it undergoes the variable phase followed by Execution phase.

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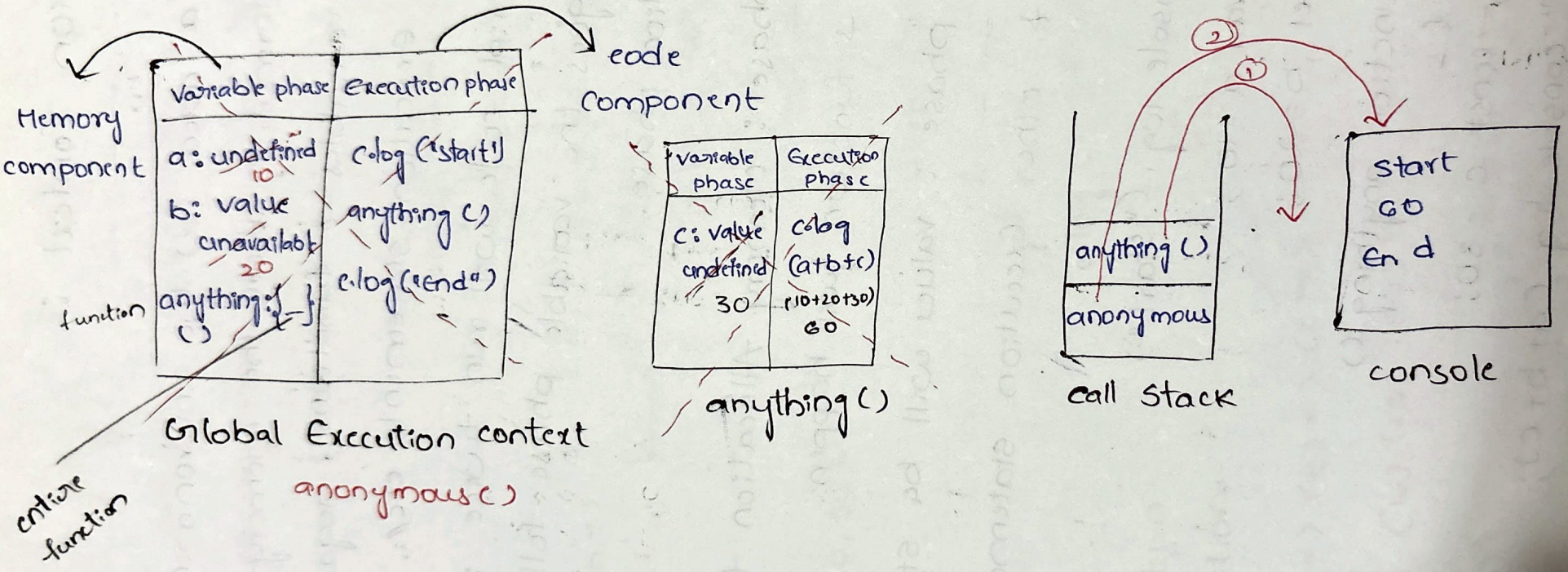
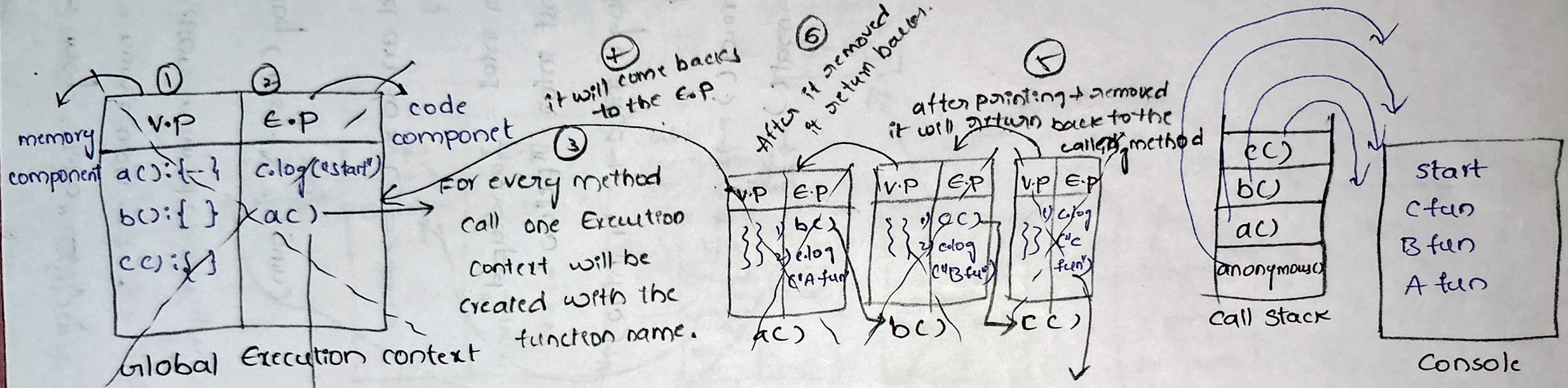
Variable phase : Memory Allocation for variables & function will happen.

Execution phase : values will be stored into the variables & other Execution statements.

```
e → console.log ("start")
    → var a = 10;
    → let b = 20;
      function anything ()
      {
        → const c = 30;
        → console.log (a+b+c);
      }
    → anything ()
e → console.log ("End");
```

①


Memory component
Variable phase
Execution phase
a: undefined
10
b: value unavailable
20
anything: { }
function
console.log("start")
anything()
console.log("end")
entire function
Global Execution context
anonymous()
code component
Variable phase
Execution phase
c: value undefined
30
console.log(a+b+c)
(10+20+30)
60
anything()
2
1
anything()
anonymous
Call Stack
start
60
End
console

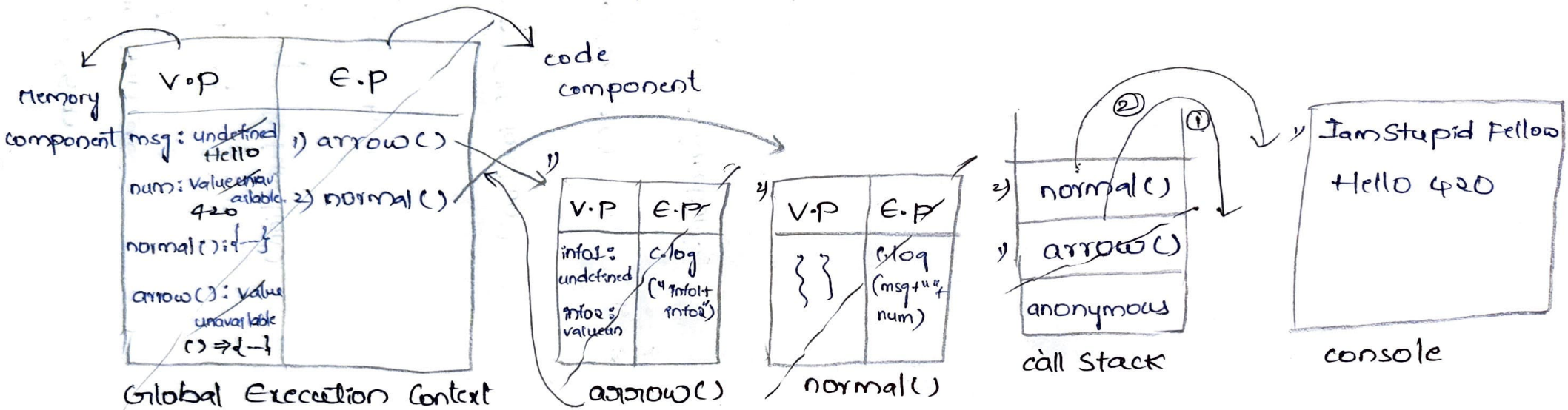


(8) so if there is next lines of code after a() it will execute the codes else it will stop the execution & removes the anonymous from the call stack.

after printing c-fun then it will be removed from the call stack (4)

```
c.log("start")
function a()
{
  b();
  c.log("A function")
}
function b()
{
  c();
  c.log("B function")
}
function c()
{
  c.log("c function")
}
a();
```

→ click on source
→ target on first line
→ check scope & V.P & E.P
→ By clicking ↑ → this will move




```
var msg = "Hello" ⟶ 1 ✓
let num = 420 ⟶ 2 ✓
function normal() ⟶ 3 ✓
{
  c.log( msg+" "+num )
}  ⟶ 1 ✓
let arrow = () => ⟶ 4 ✓
{
  var info1 = "I am Stupid" ⟶ 1 ✓
  const info2 = "Fellow" ⟶ 2 ✓
  c.log( info1 + " " + info2 ) ⟶ 1 ✓
}
arrow() ⟶ 1 ✓
normal() ⟶ 2 ✓
```

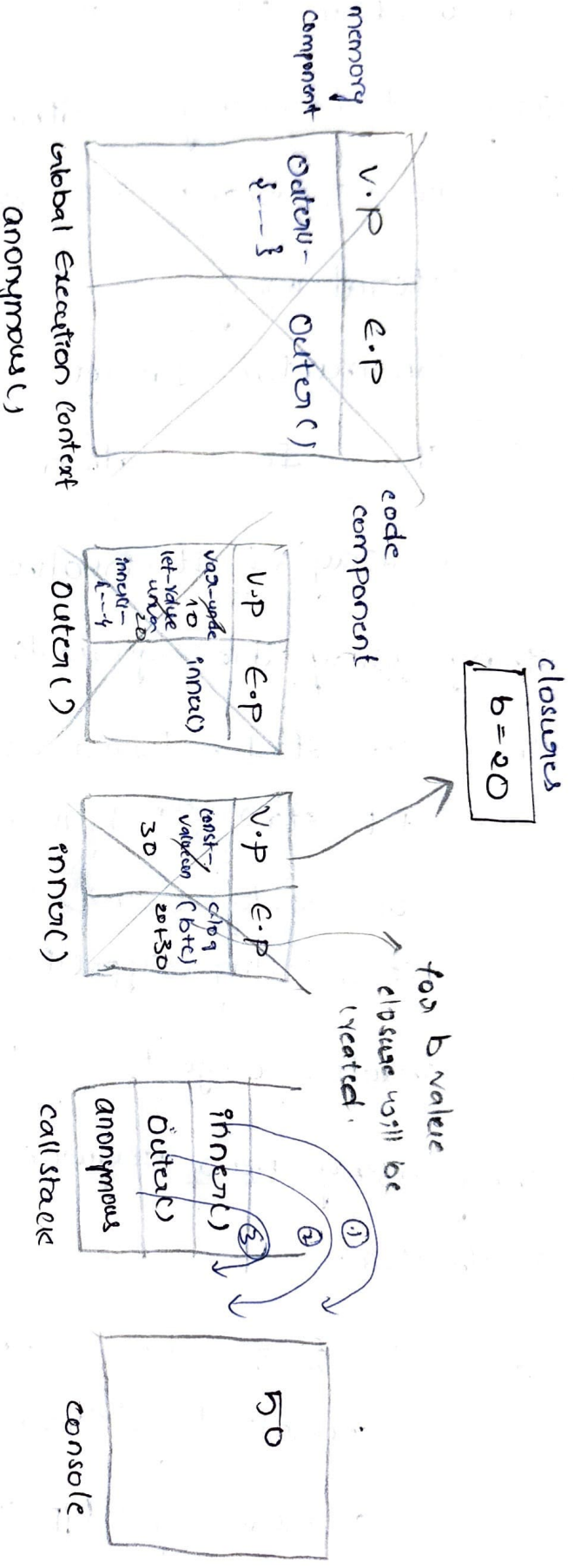
* imp

* closurs : closurs are the functions that stores the value of a outer function i.e, required by the inner function even after the completion of the execution of the outer function.

```
c.log ("start")
function outer()
{
var a = 10;
let b = 20;
function inner()
   {
   const c = 30;
   c.log (b+c);
   }
inner()
}
outer().
```

outer fun

inner fun



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* Strings :

→ It is a character or Sequence of characters enclosed in '' / "" / `` (backticks).

ways of creating a String :

There are 3 ways of creating a String in JS.

1) Literal way
2) Constructor Object
3) String Interpolation (or) Template Strings.

1) **Literal way** : It involves the creation of a string using the symbols '' / "".

Ex:
```
let str1 = 'JavaScript'
let str2 = "Hyderabad".
console.log (str2) // Hyderabad
console.log (typeOf str2) // String
```

2) **Constructor Object** : It involves the creation of a String using new keyword followed by String Constructor.

Ex:
```
let str3 = new String ("Something")
console.log (str3) // String {'something'}
console.log (typeof str3) // Object.
```

→ ES6 version introduced.

3) String Interpolation / Template Strings : It involves the creation of a string using a symbol backticks which helps to dynamically render the variables inside the string using symbol $ & { }

Ex:
```
let firstName = 'Virat'
let lastName = 'Kohli'
let age = 37

c.log (`My name is ${firstName} ${lastName}
and My age is ${age}`) // My name is Virat Kohli
                          and my age is 37.
```

* Accessing the Characters Of a String :

→ To access the characters of a String we go with the concept of Indexing.

→ Index always starts with '0'.

Eg:
```
let str = "BIRYANI"
console.log (str[1]) // I
console.log (`str[5]) // N
```

Note : 1) Specifying the greater index value than the existing one. Or if the index value is -ve it returns undefined.

```
c.log (str[8]) // undefined
c.log (str[-1]) // undefined
```

2) To find the total no.of characters present in the given string we use length property:

```
c.log(str.length) // 7
```

* Built-In Methods :

1) charAt(index) : This method returns a character present at the th specified index.

→ Specifying the greater index value than the existing one or if the index value is -ve then it returns empty string "".

eg:
```
let str1 = "Mobile"
           012345
console.log(str1.charAt(0)) // M
c.log(str1.charAt(4)) // l
c.log(str1.charAt(6)) // ""
c.log(str1.charAt(-1)) // ""
```

2) charCodeAt(index) : This method returns the ascii value of a character present at the given index.

eg:
```
let str2 = "abc"
c.log(str2.charCodeAt(0)) // 97
c.log(str2.charCodeAt(2)) // 99
```

3) toUpperCase() & toLowerCase() : These methods converts the given characters of a string to UpperCase & LowerCase respectively.

eg: let str3 = "SoMeThiNg"

```
c.log (str3.toUpperCase()) // SOMETHING
c.log (str3.toLowerCase()) // something
```

4) repeat (count) : this method repeates the given string 'n' no.of times based on the count value.

eg: let str4 = "chai"

```
console.log (str4.repeat (3)) // chaichaichai
```

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5) concat (...strings) : This method is used to combine two or more strings and return a new string.

Ex:

```
let sub1 = "html"
let sub2 = "css"
let sub3 = "JS"

c.log (sub1.concat (" ", sub2, " ", sub3))
```

6) replace (old string, new string) & replaceAll (old string, new string)

- replace() method is used to replace only the first occurance of the given string with a new string where as replaceAll method replaces all the occurance of the given string with a new string.

Ex: let str6 = "I love you only you"

```
c.log (str6.replace("YOU", "Myself")) // I Love Myself only you
c.log (str6.replaceAll("you", "Myself")) // I Love Myself only Myself.
```

7) Split (Seperator) : this method is used to divide the string into substring based on the separator and return the output in the form of array.

Eg: let str7 = "nag ♡ sam"

```
c.log (str7.split("♡")) // ['nag', 'sam']
c.log (str7.split("g")) // ["na', '♡sam']
```

8) includes (Search string, start index) : This method checks if the character or the string is present in the given string or not.

→ If the character is present it returns true else it returns false.

→ It also takes in the index value from where it should start searching for the given character or string.

→ negative start index are converted to zero.

```
let str8 = "market";
c.log (str8.includes('a')) // true
c.log (str8.includes('z')) // false
c.log (str8.includes("r", 0)) // true
c.log (str8.includes("r", 3)) // false
c.log (str8.includes("e", -100)) // true.
```

9) slice (start Index, End Index) : This method is used to extract the portion of a string and return a new string based on start and end index value.

→ End index is not included.
→ Negative index values are considered.
→ if the start index > end index then it returns Empty string

Eg:-
```
let strq = "JavaScript"
c.log (strq.slice(2)) // vascript
c.log (strq.slice(3,8)) // ascri
c.log (strq.slice(-6,-3)) // scr
c.log (strq.slice(4,-1)) // scrip
c.log (strq.slice(8,2)) // ""
```

10) Substring (start index, end index): This method is used to extract the portion of a string and returns a new string based on start and end Index.

→ End index is not included.
→ Negative index values are converted to Zero.
→ If the start Index > End Index then index values will be Swaped.

```
let str10 = "JavaScript"
c.log (str10.Substring(2)) // Vascript
c.log (str10.Substring(3,8)) // Ascri
c.log (str10.Substring(-6,-3)) // ""
c.log (str10.Substring(4,-1)) // Java
c.log (str10.Substring(8,2)) // vasc
```

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* Arrays :

→ Arrays are used to store both homogeneous as well as hetrogeneous type of data.

→ homogeneous refers to similar type of data whereas hetrogeneous refers to diff type of data.

→ Arrays are denoted by the Symbol `[ ]`.

Creation of Array :

There are two ways of creating an Array in JS

1) Literal way
2) constructor object.

1) **Literal way** : It involves the creation of an array using the Symbol `[]`.

Eg:
```
let frontendSub = ["HTML", "CSS", 'JS', 'React']
let details = ["Pavan", 20, false]

c.log (frontendSub) // ['HTML', 'CSS', 'JS', 'REACT']
c.log (typeof frontendSub) // object
c.log (details) // ["Pavan", 20, false]
c.log (type of details) // object.
```

2) **Constructor Object** : It involves the creation of an Array using **new** keyword followed by **Array** constructor which accepts the **size of an Array** / Array length.

→ Array length is not fixed.

Eg:- let recentMovies = new Array(4)

recentMovies[0] = "Hit 3"

recentMovies[1] = "#Single"

recentMovies[2] = "Shubham"

recentMovies[3] = "Court"

recentMovies[4] = "chaava"

c.log(recentMovies) // ['Hit3', '#Single', 'Shubham', 'Court', 'chaava']

Accessing Elements Of an Array :

To Access the individual elements of an Array we use the concept of indexing.

→ Index values always starts with '0'.

Eg:- let chickenItems = ["65", "Biryani", "Butter Masala", "Mandi"] → size/length = 4
(0, 1, 2, 3)

c.log(chickenItems[0]) // Butter Masala

c.log(chickenItems[3]) // Mandi

Note : If the index value is greater than the existing index or less th· if the index value is negative it returns undefined.

c.log(chickenItems[5]) // undefined

c.log(chickenItems[-1]) // undefined.

* Length : Length property is used to find the total number of elements present in an Array.

```
c.log(chickenItems.length) // 4
```

* Multi-Dimension / Nested Array : It is the way of writting one-Array inside another Array.

eg:

```
let trainer = [
    ["Monty", "Python", 27],
    ["Pavan", "Core Java", 25],
    ["Yasin", "Sql", 28]
]
c.log(trainer[1][2]) // 25
c.log(trainer[2][1]) // Sql
c.log(trainer[0][1]) // Python.
```

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* Adding (or) Deleting the Elements at Starting or Ending of the Array :

→ To perform the above Operation there are 4 methods in Java Script.

1) push()
2) pop()
3) unshift()
4) shift()

Eg:- let snacks = ["samosa", "Egg puff"]

c.log (snacks) // ['samosa', 'Egg puff']

i> push() : This method is used to add the elements at the Ending of the array.

Eg:- snacks.push ("Eggdosa", "chips", "Punugulu")

c.log (snacks) // ['samosa', 'Eggpuff', 'Eggdosa', 'chips', 'Punugulu']

ii> pop() : This method is used to delete the element at the end of an Array.

Eg:- snacks.pop()

c.log (snacks) // ['samosa', 'Eggpuff', 'Eggdosa', 'chips']

iii> Unshift() : This method is used to add the elements at the starting of an Array.

Eg:- snacks.unshift ("pani puri", "French fries", "Mirchi")

c.log (snacks) // ['Pani Puri', 'French fries', 'Mirchi', 'samosa', 'Egg puff', 'Egg dosa', 'chips']

iv> shift() : This method is used to delete the element at the starting of an Array.

Eg:- snacks.shift()

c.log (snacks)

	start	end
Add	unshift()	push()
Delete	shift()	pop()

* Methods :

1) toString() : This method is used to convert Array to String.

Eg:- let arr1 = ["Marker", "charger", "remote", "laptop"]

console.log(arr1.toString()) // Marker, charger, remote, laptop

console.log(typeof arr1.toString()) // string.

2) Concat(...arr) : this method is used to combine one or more array and return a new array.

Eg: let frontend = ["HTML", "CSS", "JS"]

let backend = ["Java", "Python"]

let database = ["sql"]

let fullstack = []

c.log(fullstack.concat(frontend, backend, database))

// ['HTML', 'CSS', 'JS', 'Java', 'Python', 'sql']

3> Join (seperator) : It is used to combine the array elements based on the seperator and return in the form of string.

Eg: let arr3 = ["RCB", "SRH", "DC", "PBKS", "GT"]

c.log (arr3.join ("♡")) // RCB♡SRH♡DC♡PBKS♡GT

c.log (arr3.join (" ")) // RCB SRH DC PBKS GT

c.log (typeof arr3.join()) // string

4> flat (depth value) : This method is used to convert multi-demension / Nested Array into single ~~Arr~~ Dimension Array based on the depth value.

By default upto 1 it will take.

Eg: let arr4 = [1,2,3,[4,5,[6,7,[8,[9,[10,[11]]]]]]]

c.log (arr4.flat()) // [1,2,3,4,5, Array(3)]

c.log (arr4.flat(2)) // [1,2,3,4,5,6,7, Array(0)]

c.log (arr4.flat(Infinity)) // [1,2,3,4,5,6,7,8,9,10,11]

5> at (index) : This method returns the Array elements for the specified index.

→ If the index value is greater than the existing index it returns undefined.

→ ~~If the index is~~ It will also accepts the negative index value.

Eg:- let arr5 = ["65", "Biryani", "Butter Masala", "Mandi"]

c.log (arr5 . at (3)) // Mandi.

c.log (arr5 . at (1)) // Biryani

c.log (arr5 . at(4)) // undefined

imp *** c.log (arr5 .at(-2)) // ButterMasala.

6) Slice (start index, end index):

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This method is used to extract the portion of an Array and returns a new array based on Start index and end index value.

→ End index is not included.

→ Negative index values are considered.

→ If the start index is greater than end index it return empty array.

→ It doesn't affect the Original array.

From left to right extract

Ex:- let arr3 = ["Mansion House", "Magic Moments", "Oaksmith", "Blender's pride", "Teachers"]

(indices: 0, 1, 2, 3, 4; negative: -5, -4, -3, -2, -1)

c.log (arr3 . slice (2)) // ['Oaksmith', 'Blenders pride', 'Teachers']

c.log (arr3. slice (1,4)) // ['Magic Moments', 'Oaksmith', 'Blenders pride']

c.log (arr3. slice (-3,-1)) // ['OakSmith', 'Blenders Pride']

c.log (arr3. slice (0,-2)) // ['Mansion House', 'Magic Moments', 'OakSmith']

c.log (arr3. slice (4,0)) // []

7) includes (search element, startIndex) : This method will check if the element is present in the Original array or not.

→ If the element is present it returns true else it returns false.

→ It also takes in the index value from where it should start searching for the given ~~character~~ element or ~~string~~ array.

→ Negative start index values are considered.

Ex: let arr7 = ["chicken Pakoda", "Mango Pickle", "Omlet", "Fish Fry", "Crispy Corn"]

(0, 1, 2, 3, 4 / -5, -4, -3, -2, -1)

```
c.log (arr7.includes("Omlet")) // true
c.log (arr7.includes("Soya Sticks")) // false
c.log (arr7.includes("Mango pickle", 1)) // true
c.log (arr7.includes("Mango pickle", 2)) // false
c.log (arr7.includes("Fish Fry", -4)) // true.
```

8) reverse() : This method converts the given array in reverse order.

Ex: let arr8 = ["Curd Rice", "Biryani", "Dal Kichdi", "Pulav"]

```
c.log (arr8.reverse()) // ['Pulav', 'Dal Kichdi', 'Biryani', 'Curd Rice']
```

9) Sort() : This method sorts the given array in ascending order based on the left first digit of a numerical value.

Ex: let arr9 = [5, 2, 7, 1, 4, 3, 10, 30, 15]

c.log(arr9.sort()) // [1, 10, 15, 2, 3, 30, 4, 5, 7]

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Diff B/w slice & splice

~~10~~) splice (start Index, delete Count, Elements to Be added) —

→ This method is used to modify (add (or) Delete) the Original Array.

Ex: let arr10 = ["putharekhulu", "kajukatli"]

Ex-1 :

arr10.splice(1, 1, "kakinadakhaja", "Jalebi"]

c.log(arr10) // ['putharekhulu', 'kakinadakhaja', 'Jalebi']

Ex-2 :

arr10.splice(0, 2, "Rasamalai")

c.log(arr10) // ["Rasamalai"]

Ex-3 :

arr10.splice(1, 0, "Laddu", "Soanpapdi")

c.log(arr10) // ['putharekhulu', 'Laddu', 'Soanpapdi', 'kaju katli']

* Array Higher Order Methods :

1) forEach() — It is the 'a' higher Order method that is used to Iterate Upon the Array Elements and perform a specific Operation.

→ foreach method takes in another function (call back fun) as its Argument which in return takes 3 parameters i.e, element, Index, Array.

Ex 1) forEach (function (element, index, Array))

Ex-1 :

```
let arr1 = ["Monty", "Pavan", "Yasin"]
arr1.forEach ((element, index, array) => {
    console.log(`${element} Sir`) // Monty Sir
                                  // Pavan Sir
                                  // Yasin Sir
    console.log(index) // 0
                       // 1
                       // 2
    console.log(array) // ["Monty", "Pavan", "Yasin"]*3
})
```

(string interpolation)

Ex-2 :

```
let arr2 = [1,2,3]
arr2.forEach ((element) => {
    console.log (`2 * ${element} = ${2*element}`)
})
```

// 2 * 1 = 2

2 * 2 = 4

2 * 3 = 6

// Note :

// !forEach() cannot return the values if returned gives undefined.

```
let forEachOutput = arr1.forEach((element, index, array)=>
  {
    return element
  })
console.log(forEachOutput) // Undefined
```

2) map() — It is the Higher Order ~~function~~ method that is used to Iterate upon the Array Elements and perform a Specific Operation.

→ map method takes in another function (call back fun) as its Argument which in return takes 3 parameters i.e., element, Index & Array.

Ex:

```
2) map(function(element, index, array))
   let arr2 = ["Monty", "pavan", "yasin"]
   arr2.map((element, ind, arr) =>
     {
     c.log(element + " ♡") // Monty ♡
     c.log(ind) // 012                pavan ♡
     c.log(arr) // ["Monty", "Pavan", "yasin"] *3   yasin ♡
   })
```

// Note :

// $map() returns the O/p in the form of array.

```
let mapOutput = arr2.map((element)=>
  {
  return element.charAt(0)
  })
console.log(mapOutput) // ['M', 'P', 'Y']
```

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3) filter(function(element, index, array)) — It is a higher order method that is used to Iterate upon the array elements and returns the array of values that satisfies the condition.

→ filter method takes in another fun (call back fun) as it's argument which in return takes 3 parameters i.e., element, index & array.

Ex: filter(function(element, index, array))

```
let arr3 = [5, 1, 4, 2, 3]
let filteredOutput = arr3.filter((element)=>{
    return element>3
})
console.log(filteredOutput) // [5, 4]
```

→ here instead of return keyword if we use console.log statement then the o/p will be in the form of boolean type.

this method is like (or) operator OR

4> Some (function (element, index, array)) – It is a higher Order method that iterates upon the array elements and returns boolean value based on a condition.

→ If atleast one of the array element satisfy the condition it returns true else it returns false.

Ex- let arr4 = [5, 1, 4, 2, 3]

let someMethodOutput = arr4.some(celement) =>
{
return element > 2
})

c.log (someMethodOutput) // true

this method is like AND operator.

5> every (function (element, index, array)) – It is a higher Order method that is used to iterate upon the array elements and return a boolean value based on a condition.

→ If all of the array elements satisfy the condition then it returns true else it returns false.

Ex- let arr5 = [5, 1, 4, 2, 3]

let everyMethodOutput = arr5.every(celement) => {
return element > 2
})

clog (everyMethodOutput) // false

6) reduce (function (accumulator, element, index, array), initial value)
(is like an empty variable to store value/result.)

→ It is a Higher Order Method that is used to iterate upon the array elements and return a single value.

→ It takes in a function (reducer function) and initial value at the top-level.

→ The function in return takes 4 values i.e., accumulator, element, index & array.

Ex- let arr6 = [1, 2, 3, 4, 5]

let reducedOp = arr6.reduce (accumulator, element, index, array) =>
{
    0+=1
return accumulator += element

}, 0)
→ if we don't specify the initial value for accumulator the by default it considered the first element in the array as accumulator & element1 starts from ① which is present in 0th index.

c.log (reducedOp) // 15

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* Objects :

→ Objects are used to store the data in the form of key-value pairs.

→ The combination of key & value is known as a property

→ Objects are denoted by the symbol '{ }'.

* Creation of a Object :

There are two ways of creating an object in Js,

1) Literal way

2) Constructor Object.

1) **Literal Way** : It involves the creation of a object using symbol '{}'.

ex :

```
let bioData1 = {
    name : "pavan",
    age : 05,
    hasGirlfriend : true,
    exGirlfriend : undefined,
    hasAttitude : null,
    skills : ["Flirting", "Singing", "Eating"],
    fun : ()=> {
        console.log("CORE JAVA TRAINER")
    },
    address : {
        place : "Chaitanyapuri",
        pincode : 500065
    }
}
c.log (bioData1)
c.log (typeOf bioData1)
```

2) Constructor Object : It involves the creation of a Object using new keyword followed by Object() constructor.

Ex:
```
let bioData2 = new Object()
bioData2.name = "Monty"
bioData2.age = 27
bioData2.hasGirlfriend = true
bioData2.exGirlfriend = undefined
bioData2.hasAttitude = null
bioData2.skills = ["Dancing", "Singing", "Travelling"]
bioData2.fun = () => c.log("PYTHON TRAINER")
bioData2.address = {
    place : "Dilsukhnagar"
    pincode : 500064
}
```

* Accessing the properties of an Object :

There are 2 ways of Accessing the properties of an Object. 1> Dot Notation (.)

2> Box Notation ([])

1> (.) -
```
c.log (bioData1.name) // Pavan
c.log (bioData2.skills) // ['Dancing', 'Singing', 'Travelling']
bioData1.fun() // CORE JAVA TRINER
c.log (bioData2.address.place) // Dilsukhnagar
```

2) ([]) — c.log (bioData1 ["name"]) // pavan

c.log (bioData2 ["skills"]) // ['Dancing', 'Singing', 'Travelling']

bioData1 ["fun"]() // CORE JAVA TRAINER

c.log (bioData2 ["address"] ["place"]) // Dilsukhnagar

* Methods :

```
let obj = {
    name : "XYZ",
    age : 18,
    isMarried : false
}
```

1> Object.keys (obj) — It is used to extract the key names of an object and return the o/p in the form of Array.

Ex: console.log (Object.keys (obj)) // ['name', 'age', 'isMarried']

2> object.values (obj) — It is used to Extract the values of an object and return the o/p in the form of Array.

Ex: console.log (Object.values (obj)) // ['XYZ', 18, false]

3> Object.entries (obj) — This method is used to extract the properties of an Object and return the o/p in the form of nested Array.

Ex: console.log(Object.entries(obj)) // [['name', 'xyz'],
['age', 18'],
['isMarried', false]]

4) Object.fromEntries(nestedArray) – This method is used to convert nested array to an Object.

Ex:
```
let nestedArray = [
    ["name", "Abc"],
    ["age", 25],
    ["isMarried", true]
]

console.log(Object.fromEntries(nestedArray)) // {name: 'Abc'
                                                age: 25, isMarried: true
```
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5) object.assign(target, source) – this method is mainly used to copy the values from string, array & object and place it into the targetted object.

Ex:
```
// obj to obj
let obj = {
    name: "Someone",
    age: 18,
};
let target1 = {};
Object.assign(target1, obj);
console.log(target1); // {name: 'Someone', age: 18}
```

// Array to Object

```
let arr = ["Html", "Css", "Js"];
let target2 = {};
Object.assign(target2, arr);
console.log(target2); // {0:'Html', 1:'Css', 2:'Js'}
```

// String to Object

```
let str = "Hello";
let target3 = {};
Object.assign(target3, str);
console.log(target3); // {0:'H', 1:'e', 2:'l', 3:'l', 4:'o'}
```

6) Object.seal() — This method prevents adding & deletion of ~~the~~ an Object but allows to modify the existing property.

Ex:

```
let simpleObj1 = {
    name: "Someone",
    age: 18,
};
Object.seal(simpleObj1)

// Add (Not possible)
simpleObj.place = "Hyd"
c.log(simpleObj1) // {name: 'Someone', age: 18}
// Modify (possible)
simpleObj1.name = "Monty"
c.log(simpleObj1) // {name: 'Monty', age: 18}
```

// Delete (Not possible)

a keyword.

delete simpleObj1.age

console.log(simpleObj1) // {name: 'Monty', age: 18}

7) Object.freeze() - This method prevents from adding, deleting & Modification of the properties of an Object.

Ex:

```
let simpleObj2 = {
        name: "SomeOne",
        age: 18,
    };
Object.freeze(simpleObj2)
// Add (Not possible)
simpleObj2.place = "Hyd"
console.log(simpleObj2) // {name: 'SomeOne', age: 18}
// Modify (Not possible)
simpleObj2.name = "Monty"
console.log(simpleObj2) // {name: 'SomeOne', age: 18}
// Delete (Not possible)
delete simpleObj2.age
console.log(simpleObj2) // {name: 'SomeOne', age: 18}
```

* Math Object :-

→ Math is an in-built Object that provides methods to perform Mathematical Operations like finding the max & min value, rounding of numbers, Generating random numbers etc".

1) PI — It is the ratio of the circumference of a circle to it's diameter.

Ex: c.log (Math.PI) // 3.141592653589793

2) max (... values) — This method finds the max number from the given range of values.

multiple values

ex: c.log (Math.max (2,5,3,1,4)) // 5

3) min (... values) — This method finds the min number from the given range of values.

ex: c.log (Math.min (2,5,1,3,4)) // 1

4) sqrt (number) — This method finds the Square root of the given number.

Square root

ex: c.log (Math.sqrt (81)) // 9

c.log (Math.sqrt (16)) // 4

5) cbrt (number) — This method finds the cube root of the given number.

cube root

ex: c.log (Math.cbrt (125)) // 5

c.log (Math.cbrt (8)) // 2

6) pow (base, power) – this method finds the power value for a given number.

Ex: c.log (Math.pow (2, 3)) // 8

c.log (Math.pow (8, 2)) // 64

7) trunc (number) – this method removes the decimal part & returns the integer part for a given number.

Ex: c.log (Math.trunc (10.04)) // 10

c.log (Math.trunc (-0.05)) // -0

8) abs (number) – this method converts the negative value to a positive value.

Ex: c.log (Math.abs (-5.05)) // 5.05

c.log (Math.abs (10)) // 10

9) sign (number) – this method checks whether the given number is +ve, -ve or zero.

→ If the nbr is +ve it returns 1, if -ve returns -1 & if it is zero it returns zero.

Note: If the value is -0 it returns -0.

Ex: c.log (Math.sign (-10.05)) // -1

c.log (Math.sign (05)) // 1

c.log (Math.sign (0)) // 0

c.log (Math.sign (-0)) // -0

10> round (number) – This method performs the rounding of Operation based on a specific condition.

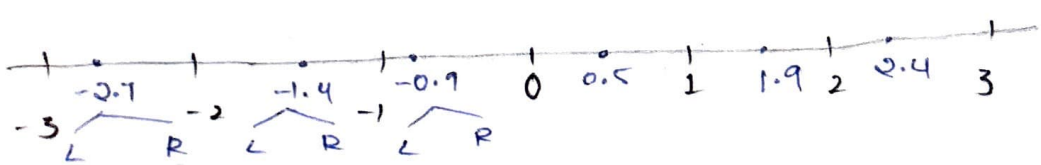
≥ 0.5 // 5
< 0.4 // 0

→ if the decimal part of a number is greater than or equal to 0.5 it returns the upcoming integer value. & if the decimal part is less than 0.5 it returns the previous integer value.

Ex: c.log (Math.round (4.56)) // 5
c.log (Math.round (4.49)) // 4

11> ceil () – This method returns the upcoming integer towards right side.

Ex: c.log (Math.ceil (0.5)) // 1
c.log (Math.ceil (1.9)) // 2
c.log (Math.ceil (2.4)) // 3
c.log (Math.ceil (-0.9)) // -0
c.log (Math.ceil (-1.4)) // -1
c.log (Math.ceil (-2.7)) // -2



12> floor () – This method returns the previous integer towards left side.

Ex: c.log (Math.floor(0.5)) // 0

c.log (Math.floor(1.9)) // 1

c.log (Math.floor(0.4)) // 0

c.log (Math.floor(-0.9)) // -1

c.log (Math.floor(-1.4)) // -2

c.log (Math.floor(-0.7)) // -3

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mostly used to generate OTP

13) random() – This Method Generates a random value b/w the range 0 to 1.

Ex: → console.log (Math.random())

→ To Generate a random number b/w the range 0 to 10 we specify as

Ex: → console.log (Math.random()*10)

→ To Deal with the decimal part we can make use of the following methods.

ex:→ c.log (Math.round (Math.random()*10))

c.log (Math.trunc (Math.random()*10))

c.log (Math.floor (Math.random()*10))

c.log (Math.ceil (Math.random()*10))

Note : To Generate Random values B/w A Specific range use the below formula.

Math.random()* (End Range - Start Range) + Start Range

100 – 105

```
console.log (Math.random()*(105-100)+100)
console.log (Math.round (Math.random()*(105-100)+100))
```

* **Date Object** — Date is a object in Java Script, that provides the information wort date & time.

```
let date = new Date()
console.log (date)  → displays the Current date

// Date Methods
console.log (date.toDateString())
console.log (date.getDate())
console.log (date.getMonth())
console.log (date.getFullYear())
console.log (date.getDay())

// Time Methods
console.log (date.toTimeString())
console.log (date.getHours())
console.log (date.getMinutes())
console.log (date.getSeconds())
console.log (date.getMilliseconds())

// Set Methods
date.setDate (30)
date.setMonth (7, 15)
```

```
date.setFullYear(1947, 7, 15)
console.log(date).
```

* for-in & for-of Loop :

→ These are the loops that are used to iterate upon strings, arrays and object based on a condition.

```
let str = "RCB"
let arr = ["EE", "SALA", "CUP", "NAMBU"]
let obj = {
    name : "Someone",
    age : 18
}
```

* **for-in loop** – It is a loop when iterated upon

String → index

array → index

Objects → ~~in~~ key

Syntax :
```
for (variable in str/arr/obj)
{
  // codes
}
```

Ex :
```
// Strings
for ( let output in str) {
  c.log (output) //012
  c.log (str [output]) // R C B
}
```

```
// Arrays

for (let output in arr)
  {
    c.log (output) // 0 1 2 3
    c.log ( arr [output]) // 'EE' 'SALA' 'CUP' 'NAMBU'
  }

// objects
for (let output in obj)
    {
    c.log ( output) // name age
    c.log (obj [output]) // SomeOne 18
    }
```

* for-of loop – It is a loop when Iterated upon

  strings ⟶ characters

  arrays ⟶ elements

  objects ⟶ error

syntax : for (variable of str / arr / obj)

```
{
// code.....
}
```

Ex :

```
// Strings
for ( let output of str)
  {
   c.log (output) // 'R' 'C' 'B'
  }
```

```
// Arrays
for (let output of arr)
  {
  c.log (output) // 'EE'  'SALA'  'CUP'  'NAMBO'
  }

// Objects
 for (let output of obj)
    {
    c.log (output) // Uncaught Type Error : obj is not iterable.
    }
```

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* Spread Operator & Rest Parameter :

→ These are bol features in ES6 version of JavaScript that involves the use of ... (three dots).

* Spread Operator — It is mainly used to copy the values from one or more array / Object and place it into another array / Object.

Ex:

```
// Arrays
let frontend = ["Html", "Css", "Js", "React"]
let backend = ["Java", "Python"]
let database = ["Sql"]
let fullStack = [...frontend, ...backend, ...database]
c.log (fullStack) // ['Html', 'Css', 'Js', 'React', 'Java',
                     'Python', 'Sql']
```

// Objects

```
let Obj1 = {
    name : "SomeOne",
    age : 18
    }
let obj2 = {
    place : "Somewhere"
    }
let Obj3 = {
    ...obj1
    ...obj2
    }
c.log (obj3) // { name: 'Someone', age : 18, place : 'Somewhere' }
```

// String to Object (obj.assign) method to convert str into obj

```
let str = "Hello"
let obj = {... str}
c.log (obj) // {0: 'H', 1: 'e', 2: 'l', 3: 'l', 4 : 'o'}
```

// String to Array

```
let arr = [... str]
c.log (arr) // fna ['H', 'E', 'L', 'L', 'O']
```

// Array to Object

```
let array = [ "Red", "Green", "Blue"]
let object = {...array}
c.log (object) // { 0 : 'Red', 1: 'Green', 2 : 'Blue'}
```

* Rest Parameter : It is used to gather the function arguments into an array.

→ Rest parameter should always be specified as the last value in the parameter list.

Ex: function display (a,b,c,... rest)
↳ can be any name

```
{
 c.log (a) //1
 c.log (b) //2
 c.log (c) //3
 c.log (rest) // [4,5,6,7,8,9]
}
display (1,2,3,4,5,6,7,8,9)
```

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* Set Time Out & Set Interval :-

→ These are the higher Order Methods that are used to perform asynchronous Operations..

→ Asynchronous Operations are those that take some time to perform the task.

→ These both methods takes in 2 arguments i.e., function, time duration, in milliseconds.

* Set time Out — Settime Out (fn, time)

→ This method will execute the function only once after completion of the Given time Interval/Duration.

Ex: Set Time Out (()=>{
 c.log ("Hello") → only one time it will print
},5000)

* clearTimeOut (id) — This method is used to cancel out the time out method before it is being executed.

→ here the id refers to the variable which stores the timeout.

ex: let nottoGreet = SetTimeOut (()=> {

clearTimeOut (wishHim)

console.log ("Not to Wish Him")

}, 3000)

let wishHim = SetTimeOut (()=> {

c.log ("Good Morning")

}, 5000)

2> Set Interval (fn, time) — This method executes the function multiple times after the completion of Given time Interval.

ex: Set Interval (()=> {

document.writeln ("<h1> Bye </h1>")

}, 1000)

* clearInterval (id) — This method cancels out the function created through Set Interval.

→ here the id refers to the variable which stores the Interval.

Ex :

```
let count = 0
let askForBike = setInterval (() => {
document.writeln ("<h1> Gift Me A Bike </h1>")
count ++
if (count == 5)
{
clearInterval (askForBike)
document.writeln ("<mark> Mooskon; First
}        Engineering Complete Chey </mark>")
}, 2000)
```

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* Browser Object model (BOM) :-

→ The Browser Object Model (BOM) is a programming interface that provides objects and methods to interact with browser window.

→ To access the properties of browser we have window object.

* Window — The top-level browser window object.

→ It represents the entire browser window and provides methods and properties to control and interact with it.

```
console.log (window)
```

* alert() — The alert() method in JavaScript is used to display a dialog box with a specified message and an OK button.

→ It is commonly used to provide users with information or to prompt them for input in a simple and straightforward manner.

→ The syntax for the alert() method is as follows:

Syntax: alert(message)

Ex: let bom1 = ()=>{
    alert("ALA VELAKU CHASTAVU")
}

* Confirm() — The confirm() method in Js is used to display a dialog box with a specified message and two buttons: OK & Cancel.

→ It is commonly used to prompt users for a binary choice, typically to confirm or cancel an action.

→ The syntax for the confirm() method is as follows:

Syntax: confirm(message)

Ex: let bom2 = ()=>{
    confirm("Do You Really Love Me")
}

* Combining alert() & confirm()

```
let bom3 = ()=> {
let output = confirm("Do You Really Love Me")
                    ↳ boolean value
if (output)
  {
alert ("Thank You For Confirming")
 }
else {
 alert ("Just Get Lost")
 }
}
```

* prompt() — The prompt() method in JavaScript is used to display a dialog box that prompts the user for input.

→ It typically consists of a message, an input field, and two buttons : OK & Cancel.

→ The user can input text into the field and then choose to submit or cancel the input.

→ The value collected from the user will be by default taken as String.

Syntax : prompt (message)

Ex :
```
let bom4 = ()=> {
    let num1 = Number( prompt ("Enter a number"))
    let num2 = Number (prompt("Enter another number"),
} console.log (num1 + num2)
```