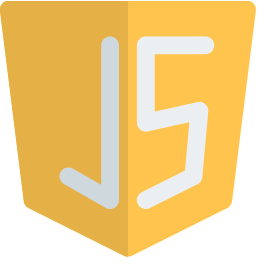


# What is JavaScript?



JS is a programming language. We use it to give instructions to the computer.



# Setting up VS Code </>

It is a free & popular code editor by Microsoft

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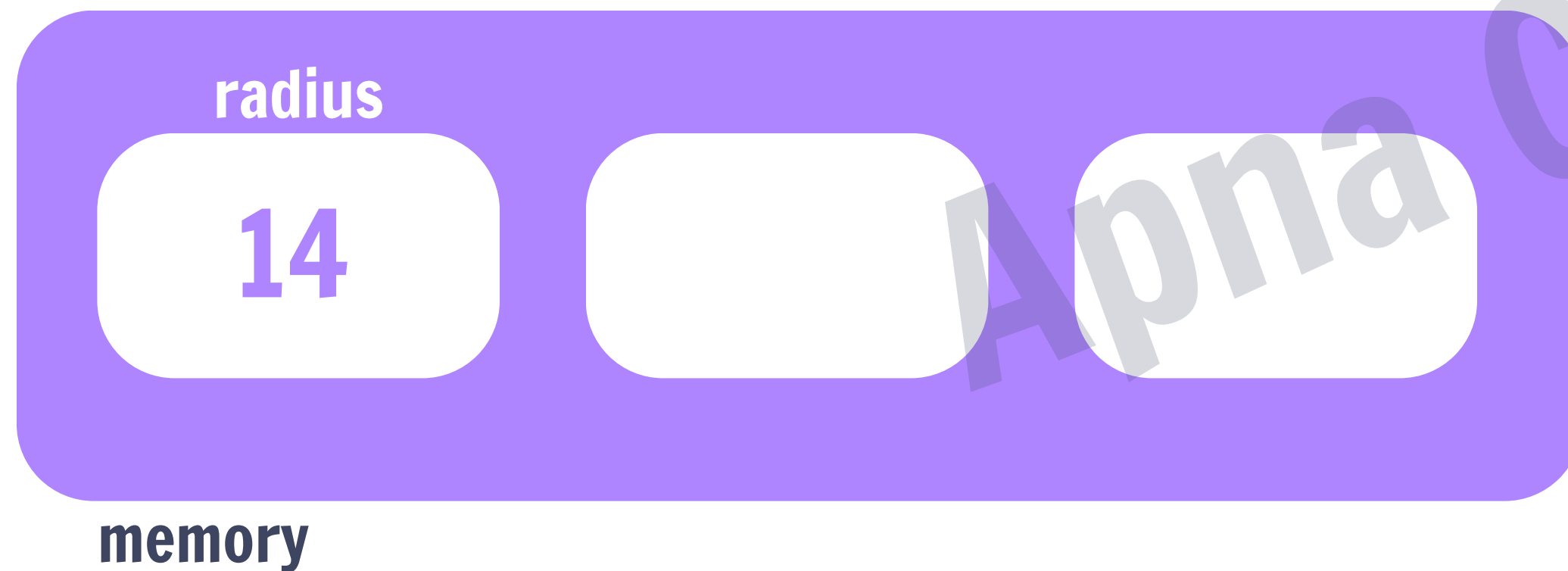
# Our 1st JS Code

Console.log is used to log (print) a message to the console

```
console.log("Apna College");
```

# Variables in JS

Variables are containers for data



# **Variable Rules**

---

- Variable names are case sensitive; “a” & “A” is different.
- Only letters, digits, underscore( \_ ) and \$ is allowed. (not even space)
- Only a letter, underscore( \_ ) or \$ should be 1st character.
- Reserved words cannot be variable names.

# let, const & var

**var** : Variable can be re-declared & updated. A global scope variable.

**let** : Variable cannot be re-declared but can be updated. A block scope variable.

**const** : Variable cannot be re-declared or updated. A block scope variable.

# Data Types in JS

**Primitive Types : Number, String, Boolean, Undefined, Null, BigInt, Symbol**

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To **educate** someone is the highest privilege



4.3 Million



510K



String

**Shradha Khapra**



Apna College

Co-founder, Apna College | Ex-Microsoft | Tedx Speaker |  
Google SPS'20

441K followers · 500+ connections

Follow

LinkedIn

Number

Boolean



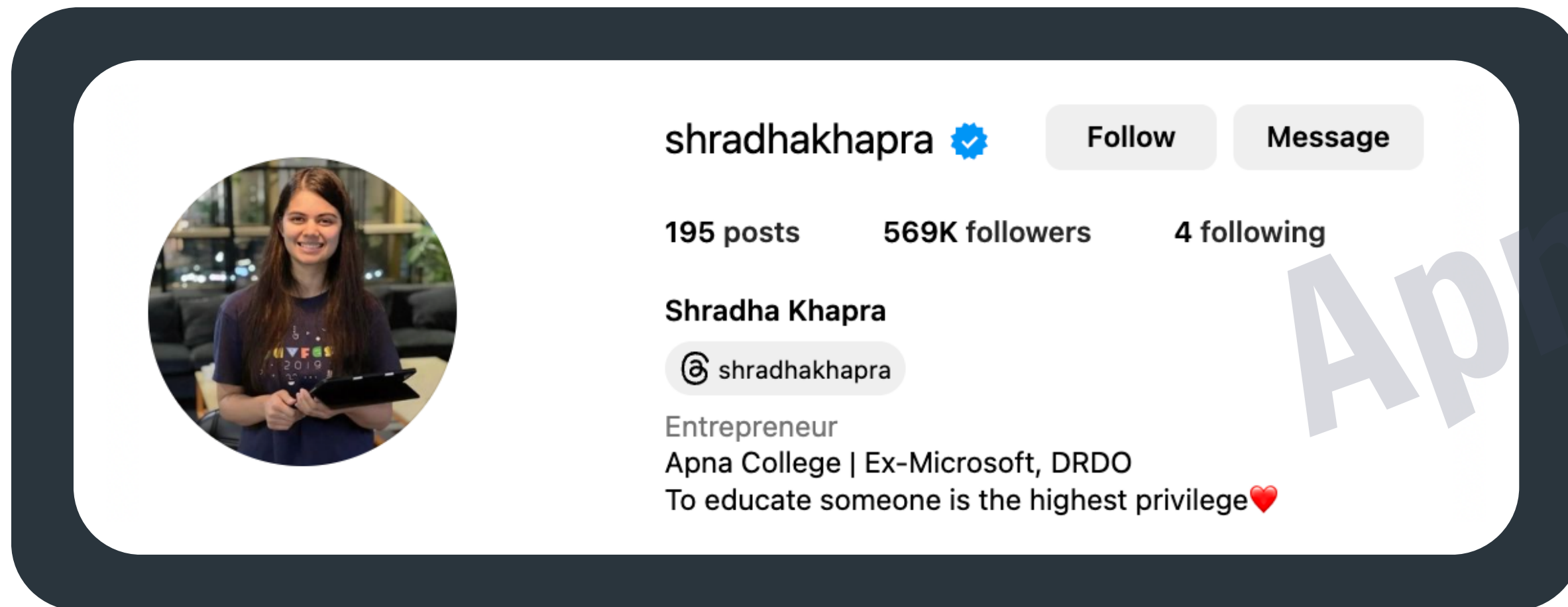
# Let's Practice

Qs1. Create a const object called “product” to store information shown in the picture.



# Let's Practice

Qs2. Create a const object called “profile” to store information shown in the picture.



# Comments in JS

---

Part of Code which is **not executed**

```
1  //This is a single line comment
2
3  /* This is a multi-line
4  |   comment. */
```

# Operators in JS

Used to perform some **operation** on data

## Arithmetic Operators

**+, -, \*, /**

- **Modulus**
- **Exponentiation**
- **Increment**
- **Decrement**

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# Operators in JS

## Assignment Operators

**=   +=   -=   \*=   %=   \*\*=**

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# Operators in JS

## Comparison Operators

Equal to **==**

Not equal to **!=**

**>, >=, <, <=**

Equal to & type **===**

Not equal to & type **!==**

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# Operators in JS

## Logical Operators

Logical AND    **&&**

Logical OR    **||**

Logical NOT    **!**

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# Conditional Statements

---

To implement some condition in the code

if Statement

```
let color;  
if(mode === "dark-mode") {  
  color = "black";  
}
```



# Conditional Statements

---

## if-else Statement

```
let color;  
if(mode === "dark-mode") {  
  color = "black";  
} else {  
  color = "white";  
}
```

# Conditional Statements

---

## else-if Statement

```
if(age < 18) {  
    console.log("junior");  
} else if (age > 60) {  
    console.log("senior");  
} else {  
    console.log("middle");  
}
```

# Operators in JS

## Ternary Operators

condition ? true output : false output

```
age > 18 ? "adult" : "not adult";
```

**MDN Docs**

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# Let's Practice

**Qs1. Get user to input a number using prompt("Enter a number:"). Check if the number is a multiple of 5 or not.**

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# Let's Practice

**Qs2. Write a code which can give grades to students according to their scores:**

- **80-100, A**
- **70-89, B**
- **60-69, C**
- **50-59, D**
- **0-49, F**

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# Loops in JS

---

Loops are used to execute a piece of code again & again

for Loop

```
for (let i = 1; i <= 5; i++) {  
    console.log("apna college");  
}
```

# Loops in JS

---

**Infinite Loop : A Loop that never ends**

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# Loops in JS

---

## while Loop

```
while (condition) {  
    // do some work  
}
```

# Loops in JS

---

## do-while Loop

```
do {  
    // do some work  
} while (condition);
```

# Loops in JS

---

## for-of Loop

```
for (let val of strVar) {  
    //do some work  
}
```

# Loops in JS

---

## for-in Loop

```
for (let key in objVar) {  
    //do some work  
}
```

# Let's Practice

**Qs1. Print all even numbers from 0 to 100.**

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# Let's Practice

Qs2.

**Create a game where you start with any random game number. Ask the user to keep guessing the game number until the user enters correct value.**

# Strings in JS

---

String is a sequence of characters used to represent text

## Create String

```
let str = "Apna College";
```

## String Length

```
str.length
```

## String Indices

```
str[0], str[1], str[2]
```

# Template Literals in JS

A way to have embedded expressions in strings

```
`this is a template literal`
```

## String Interpolation

To create strings by doing substitution of placeholders

```
`string text ${expression} string text`
```



# String Methods in JS

---

These are built-in functions to manipulate a string

- `str.toUpperCase( )`
- `str.toLowerCase( )`
- `str.trim( )` // removes whitespaces

# String Methods in JS

- `str.slice(start, end?)` // returns part of string
- `str1.concat( str2 )` // joins str2 with str1
- `str.replace( searchVal, newVal )`
- `str.charAt( idx )`

# Let's Practice

**Qs1. Prompt the user to enter their full name. Generate a username for them based on the input. Start username with @, followed by their full name and ending with the fullname length.**

**eg: user name = “shradhakhapra” , username should be “@shradhakhapra13”**

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# Arrays in JS

## Collections of items

### Create Array

```
let heroes = [ "ironman", "hulk", "thor", "batman" ];
```

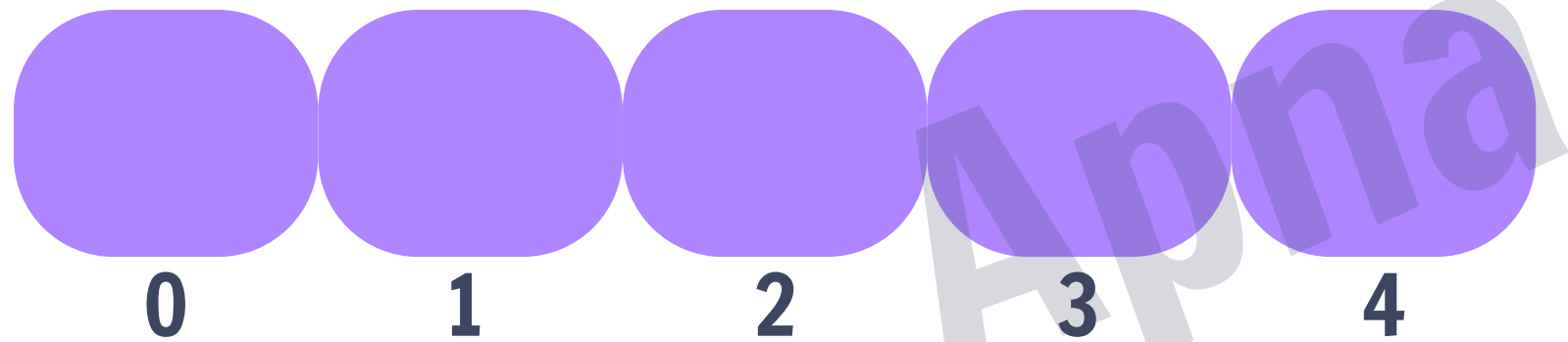
```
let marks = [ 96, 75, 48, 83, 66 ];
```

```
let info = [ "rahul", 86, "Delhi" ];
```

# Arrays in JS

## Array Indices

arr[0], arr[1], arr[2] ....



# Looping over an Array

Print all elements of an array

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# Let's Practice

Qs. For a given array with marks of students -> [85, 97, 44, 37, 76, 60]  
Find the average marks of the entire class.

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# Let's Practice

**Qs. For a given array with prices of 5 items -> [250, 645, 300, 900, 50]**

**All items have an offer of 10% OFF on them. Change the array to store final price after applying offer.**

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# Arrays in JS

## Array Methods

**Push( ) : add to end**

**Pop( ) : delete from end & return**

**toString( ) : converts array to string**

# Arrays in JS

## Array Methods

**Concat( )** : joins multiple arrays & returns result

**Unshift( )** : add to start

**shift( )** : delete from start & return

# Arrays in JS

## Array Methods

**Slice( )** : returns a piece of the array

`slice( startIdx, endIdx )`

**Splice( )** : change original array (add, remove, replace)

`splice( startIdx, delCount, newEl1... )`

# Let's Practice

**Qs. Create an array to store companies -> "Bloomberg", "Microsoft", "Uber", "Google", "IBM", "Netflix"**

**a. Remove the first company from the array**

**b. Remove Uber & Add Ola in its place**

**c. Add Amazon at the end**

# **Functions** in JS

---

**Block of code that performs a specific task, can be invoked whenever needed**

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# Functions in JS

## Function Definition

```
function functionName( ) {  
  
    //do some work  
  
}
```

```
function functionName( param1, param2 ...) {  
  
    //do some work  
  
}
```

## Function Call

```
functionName( );
```

# Arrow Functions

Compact way of writing a function

```
const functionName = ( param1, param2 ...) => {  
  
    //do some work  
  
}
```

```
const sum = ( a, b ) => {  
  
    return a + b;  
  
}
```

# Let's Practice

**Qs. Create a function using the “function” keyword that takes a String as an argument & returns the number of vowels in the string.**

**Qs. Create an arrow function to perform the same task.**

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# forEach Loop in Arrays

arr.**forEach**( callbackFunction )

**CallbackFunction** : Here, it is a function to execute for each element in the array

*\*A callback is a function passed as an argument to another function.*

```
arr.forEach( ( val ) => {  
    console.log(val);  
})
```

# Let's Practice

**Qs. For a given array of numbers, print the square of each value using the forEach loop.**

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# Some More **Array Methods**

---

## Map

Creates a new array with the results of some operation. The value its callback returns are used to form new array

`arr.map( callbackFnx( value, index, array ) )`

```
let newArr = arr.map( ( val ) => {  
    return val * 2;  
} )
```

# Some More **Array Methods**

---

## Filter

Creates a new array of elements that give true for a condition/filter.

Eg: all even elements

```
let newArr = arr.filter( ( val ) => {  
    return val % 2 === 0;  
})
```

# Some More **Array Methods**

## Reduce

Performs some operations & reduces the array to a single value. It returns that single value.

### JavaScript Demo: Array.reduce()

```
1 const array1 = [1, 2, 3, 4];
2
3 // 0 + 1 + 2 + 3 + 4
4 const initialValue = 0;
5 const sumWithInitial = array1.reduce(
6   (accumulator, currentValue) => accumulator + currentValue,
7   initialValue,
8 );
9
10 console.log(sumWithInitial);
11 // Expected output: 10
```

# Let's Practice

**Qs. We are given array of marks of students. Filter out of the marks of students that scored 90+.**

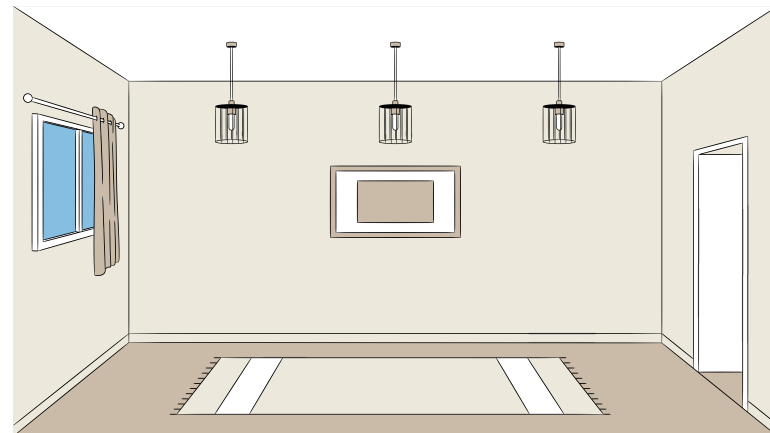
**Qs. Take a number n as input from user. Create an array of numbers from 1 to n.**

**Use the reduce method to calculate sum of all numbers in the array.**

**Use the reduce method to calculate product of all numbers in the array.**

# The 3 Musketeers of Web Dev

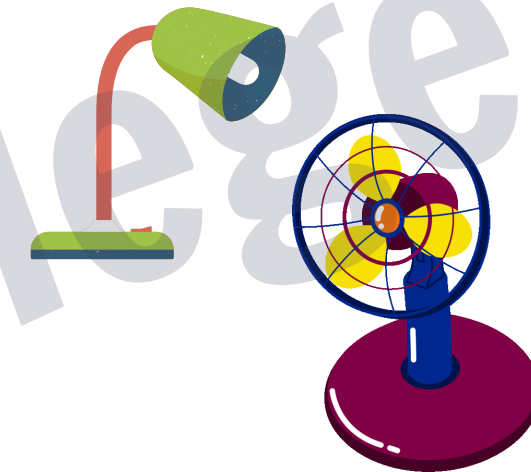
**HTML**  
(structure)



**CSS**  
(style)



**JS**  
(logic)



# Starter Code

**<style>** tag connects HTML with CSS

**<script>** tag connects HTML with JS

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```
<html>
```

```
  <head>
```

```
    <title> Website Name </title>
```

```
  </head>
```

```
  <body>
```

```
    <!-- Content Tags -->
```

```
  </body>
```

```
</html>
```

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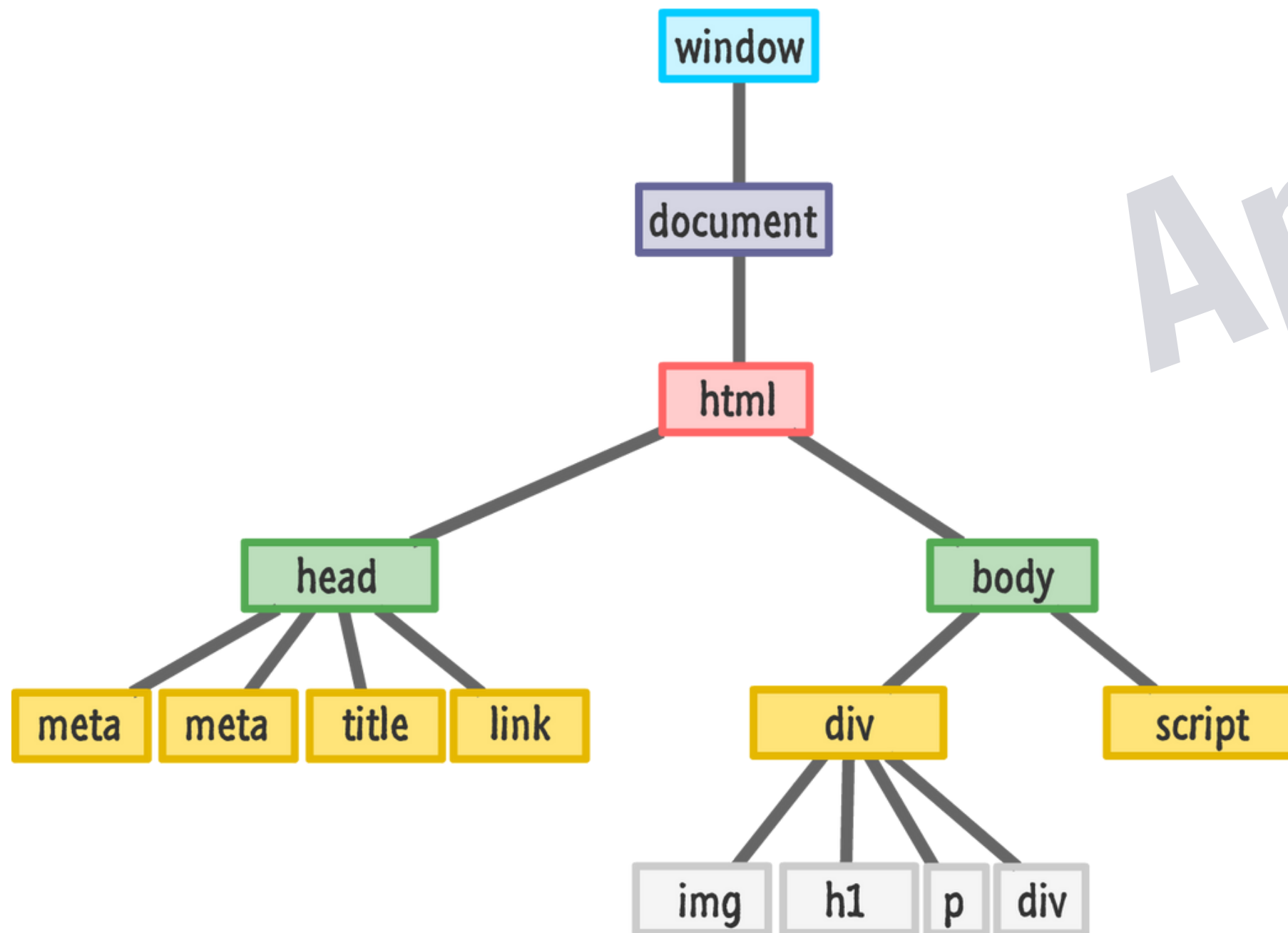
# Window Object

The window object represents an open window in a browser. It is browser's object (not JavaScript's) & is automatically created by browser.

It is a **global** object with lots of properties & methods.

# What is DOM?

When a web page is loaded, the browser creates a **Document Object Model (DOM)** of the page



# DOM Manipulation

## Selecting with id

```
document.getElementById("myId")
```

## Selecting with class

```
document.getElementsByClassName("myClass")
```

## Selecting with tag

```
document.getElementsByTagName("p")
```

# DOM Manipulation

---

## Query Selector

```
document.querySelector("#myId / .myClass / tag")  
//returns first element
```

```
document.querySelectorAll("#myId / .myClass / tag")  
//returns a NodeList
```

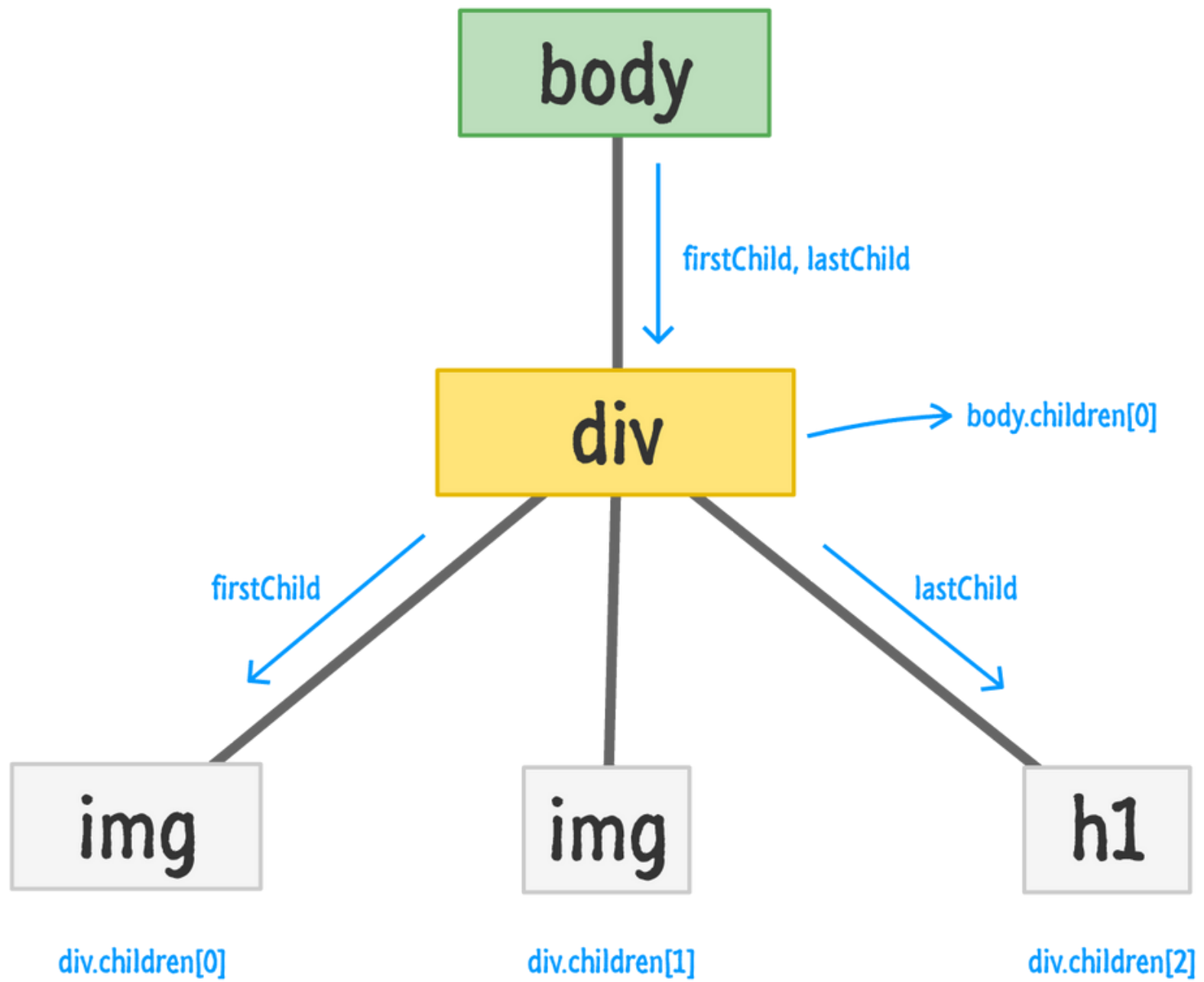
# DOM Manipulation

---

## Properties

- **tagName** : returns tag for element nodes
- **innerText** : returns the text content of the element and all its children
- **innerHTML** : returns the plain text or HTML contents in the element
- **textContent** : returns textual content even for hidden elements

# Homework



# Let's Practice

**Qs. Create a H2 heading element with text - “Hello JavaScript”. Append “from Apna College students” to this text using JS.**

**Qs. Create 3 divs with common class name - “box”. Access them & add some unique text to each of them.**



# DOM Manipulation

---

## Attributes

- `getAttribute( attr )` //to get the attribute value
- `setAttribute( attr, value )` //to set the attribute value

## Style

- `node.style`

# DOM Manipulation

---

## Insert Elements

let el = document.createElement("div")

- `node.append( el )` //adds at the end of node (inside)
- `node.prepend( el )` //adds at the start of node (inside)
- `node.before( el )` //adds before the node (outside)
- `node.after( el )` //adds after the node (outside)

## Delete Element

- `node.remove( )` //removes the node

# Let's Practice

**Qs. Create a new button element. Give it a text “click me”, background color of red & text color of white.**

**Insert the button as the first element inside the body tag.**

**Qs. Create a `<p>` tag in html, give it a class & some styling.**

**Now create a new class in CSS and try to append this class to the `<p>` element.**

**Did you notice, how you overwrite the class name when you add a new one?  
Solve this problem using classList.**

# **Events in JS**

---

**The change in the state of an object is known as an Event**

**Events are fired to notify code of "interesting changes" that may affect code execution.**

- **Mouse events (click, double click etc.)**
- **Keyboard events (keypress, keyup, keydown)**
- **Form events (submit etc.)**
- **Print event & many more**

# Event Handling in JS

```
node.event = ( ) => {  
  //handle here  
}
```

## example

```
btn.onclick = ( ) => {  
  console.log("btn was clicked");  
}
```

# Event Object

It is a special object that has details about the event.

All event handlers have access to the Event Object's properties and methods.

```
node.event = (e) => {  
  //handle here  
}
```

e.target, e.type, e.clientX, e.clientY

# Event Listeners

node.addEventListener( event, callback )

node.removeEventListener( event, callback )

**\*Note : the callback reference should be same to remove**

# Let's Practice

**Qs. Create a toggle button that changes the screen to dark-mode when clicked & light-mode when clicked again.**

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# Classes & Objects

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# Prototypes in JS

A JavaScript object is an entity having state and behavior (properties and method).

JS objects have a special property called prototype.

We can set prototype using `__proto__`

**\*If object & prototype have same method,  
object's method will be used.**

# Classes in JS

Class is a program-code template for creating objects.

Those objects will have some state (variables) & some behaviour (functions) inside it.

```
class MyClass {  
    constructor( ) { ... }  
    myMethod( ) { ... }  
}
```

```
let myObj = new MyClass( );
```

# Classes in JS

Constructor( ) method is :

- automatically invoked by new
- initializes object

```
class MyClass {
```

```
    constructor( ) { ... }
```

```
    myMethod( ) { ... }
```

```
}
```

# Inheritance in JS

inheritance is passing down properties & methods from parent class to child class.

```
class Parent {  
  
}
```

```
class Child extends Parent {  
  
}
```

**\*If Child & Parent have same method, child's method will be used. [Method Overriding]**

# super Keyword

The super keyword is used to call the constructor of its parent class to access the parent's properties and methods.

`super( args )` // calls Parent's constructor

`super.parentMethod( args )`

## Let's Practice

Qs. You are creating a website for your college. Create a class User with 2 properties, name & email. It also has a method called `viewData()` that allows user to view website data.

Qs. Create a new class called Admin which inherits from User. Add a new method called `editData` to Admin that allows it to edit website data.

# Error Handling

## try-catch

```
try {
```

```
    ... normal code
```

```
} catch ( err ) { //err is error object
```

```
    ... handling error
```

```
}
```



# What this chapter is about?

**async await >> promise chains >> callback hell**

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# Sync in JS

## Synchronous

**Synchronous means the code runs in a particular sequence of instructions given in the program. Each instruction waits for the previous instruction to complete its execution.**

## Asynchronous

**Due to synchronous programming, sometimes imp instructions get blocked due to some previous instructions, which causes a delay in the UI. Asynchronous code execution allows to execute next instructions immediately and doesn't block the flow.**

# Callbacks

**A callback is a function passed as an argument to another function.**

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# **Callback Hell**

**Callback Hell : Nested callbacks stacked below one another forming a pyramid structure.  
(Pyramid of Doom)**

**This style of programming becomes difficult to understand & manage.**

# Promises

Promise is for “eventual” completion of task. It is an object in JS.

It is a solution to callback hell.

```
let promise = new Promise( (resolve, reject) => { .... } )
```



Function with 2 handlers

**\*resolve & reject are callbacks provided by JS**

# Promises

A JavaScript Promise object can be:

- Pending : the result is undefined
- Resolved : the result is a value (fulfilled) `resolve( result )`
- Rejected : the result is an error object `reject( error )`

**\*Promise has state (pending, fulfilled) & some result (result for resolve & error for reject).**

# Promises

`.then( ) & .catch( )`

`promise.then( ( res ) => { .... } )`

`promise.catch( ( err ) => { .... } )`

# Async-Await

async function always returns a promise.

```
async function myFunc( ) { .... }
```

await pauses the execution of its surrounding async function until the promise is settled.



# **IIFE** : Immediately Invoked Function Expression

---

IIFE is a function that is called immediately as soon as it is defined.

```
(function () {  
    // ...  
})();
```

```
((() => {  
    // ...  
}))();
```

```
(async () => {  
    // ...  
})();
```

# fetch API

The Fetch API provides an interface for fetching (sending/receiving) resources.

It uses **Request** and **Response** objects.

The **fetch()** method is used to fetch a resource (data).

```
let promise = fetch( url , [options] )
```

# Understanding Terms

**AJAX** is Asynchronous JS & XML

**JSON** is JavaScript Object Notation

**json()** method : returns a second promise that resolves with the result of parsing the response body text as JSON. (Input is JSON, output is JS object)

# Requests & Response

HTTP Verbs

Response Status Code

**\*HTTP response headers also contain details about the responses, such as content type, HTTP status code etc.**

# Homework Task

**Sending POST Request**

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