**JavaScript Crash Course**

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**1. Introduction**

JavaScript is the programming language of the web. It makes websites interactive by:

* Responding to user actions (clicks, form submissions).
* Dynamically updating content without page reloads.
* Fetching data from servers (e.g., loading tweets).

**Key Concepts Covered:**

* Syntax fundamentals.
* Working with data (variables, objects, arrays).
* Controlling program flow (loops, conditionals).
* DOM manipulation (changing webpage content).
* Async operations (fetching data).

**2. Setting Up Your Environment**

**Tools You Need:**

1. **Browser:** Chrome/Firefox (for running JS).
2. **Code Editor:** VS Code (free, with extensions like Live Server).
3. **Optional:** Node.js (to run JS outside the browser).

**Steps:**

1. Install VS Code: [https://code.visualstudio.com](https://code.visualstudio.com/).
2. Create an index.html file and link a script.js file:

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

**3. Basic Syntax & console.log**

**First Program:**

console.log("Hello, CPU AGENCY!"); *// Prints to browser console*

* console.log(): Used for debugging/output.
* **Semicolons (**;**)**: Optional but recommended.

**4. Variables: var, let, const**

**Variable Types:**

| **Keyword** | **Scope** | **Reassignable** | **Hoisting** | **Example** |
| --- | --- | --- | --- | --- |
| var | Function | Yes | Yes | var x = 10; |
| let | Block | Yes | No | let name = "Ali"; |
| const | Block | No | No | const PI = 3.14; |

**Best Practice:** Use const by default, let if reassigning, avoid var.

**5. Data Types**

JavaScript has dynamic types (no need to declare types).

| **Type** | **Example** | **Description** |
| --- | --- | --- |
| String | "Hello" | Text (use '' or ""). |
| Number | 42, 3.14 | Integers/decimals. |
| Boolean | true, false | Logical values. |
| Null | null | Intentional empty value. |
| Undefined | undefined | Variable not assigned. |

**Check Type:**

console.log(typeof "Hello"); *// "string"*

**6. Operators**

**Arithmetic:**

let sum = 5 + 3; *// 8*

**Comparison:**

5 == "5" *// true (loose equality)*

5 === "5" *// false (strict equality)*

**Logical:**

if (age > 18 && hasLicense) { ... }

**7. Control Flow**

**if/else:**

if (score >= 90) {

grade = "A";

} else if (score >= 80) {

grade = "B";

} else {

grade = "C";

}

**8. Loops**

**for Loop:**

for (let i = 0; i < 5; i++) {

console.log(i); *// 0, 1, 2, 3, 4*

}

**while Loop:**

let i = 0;

while (i < 5) {

console.log(i);

i++;

}

**9. Functions**

**Declaration:**

function greet(name) {

return `Hello, ${name}`;

}

**Arrow Function (ES6+):**

const greet = name => `Hello, ${name}`;

**10. Objects**

const person = {

name: "Ali",

age: 25,

greet() {

console.log(`Hi, I'm ${this.name}`);

}

};

person.greet(); *// "Hi, I'm Ali"*

**11. Arrays & Methods**

const fruits = ["apple", "banana"];

fruits.push("cherry"); *// Adds to end*

fruits.forEach(fruit => console.log(fruit)); *// Logs each item*

**12. ES6+ Features**

**Destructuring:**

const { name, age } = person; *// Extract properties*

**Spread Operator:**

const newArr = [...fruits, "orange"];

**13. DOM Manipulation**

document.getElementById("title").textContent = "New Heading";

**14. Events**

button.addEventListener("click", () => {

alert("Button clicked!");

});

**15. JSON**

const json = JSON.stringify(person); *// Object → String*

const obj = JSON.parse(json); *// String → Object*

**16. Async JavaScript**

**Promises:**

fetch("url")

.then(response => response.json())

.then(data => console.log(data));

**async/await:**

async function fetchData() {

const response = await fetch("url");

const data = await response.json();

}

**17. Mini Project: To-Do List**

**HTML:**

<input id="task" placeholder="Enter task">

<button id="add">Add Task</button>

<ul id="list"></ul>

**JavaScript:**

const input = document.getElementById("task");

const btn = document.getElementById("add");

const list = document.getElementById("list");

btn.addEventListener("click", () => {

const task = input.value.trim();

if (!task) return; *// Ignore empty input*

const li = document.createElement("li");

li.textContent = task;

li.addEventListener("click", () => li.remove()); *// Click to delete*

list.appendChild(li);

input.value = ""; *// Clear input*

});

**18. Next Steps & Resources**

* **MDN Web Docs:** [https://developer.mozilla.org](https://developer.mozilla.org/)
* **JavaScript.info:** [https://javascript.info](https://javascript.info/)
* **Practice:** Build small projects (calculator, weather app).

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