📝 JavaScript Strings – Complete Guide

✅ What is a String?

A **string** is a sequence of characters used to represent text. You can use:

- **Single quotes (`'`)** – `let name = 'dp';`
- **Double quotes (`"`)** – `let name = "dp";`

```
let name = "dp";
console.log(name[3]); // 👉 Output: undefined (index out of bounds)
```

🔥 Template Literals (ES6+)

Introduced in ES6 using **backticks (`)** for multiline strings and **interpolation**.

```
let boy1 = "hmm";
let boy2 = "ok";
let sentence = `${boy1} nice ${boy2}`;
console.log(sentence); // 👉 Output: hmm nice ok
```

You can also include escape characters like:

```
let fruit = `Bana\'na`;
console.log(fruit); // 👉 Output: Bana'na
```

> ### 💡 Escape Characters

- `\'` → Single quote
- `\n` → New line
- `\t` → Tab
- `\r` → Carriage return

🧰 String Methods & Properties

🔍 Access Characters

```
const message = "Hello";
console.log(message[0]); // 👉 H
console.log(message[3]); // 👉 l
```

➕ String Concatenation

```
const firstName = "John";
const lastName = "Doe";
console.log(firstName + ' ' + lastName); // 👉 John Doe

console.log(firstName.concat(' ', lastName)); // 👉 John Doe
```

🧩 Search Substrings

```
const welcome = "Hello, world!";
console.log(welcome.indexOf("world")); // 👉 7
console.log(welcome.indexOf("open"));  // 👉 -1
```

✂️ Extract Substrings

```
console.log(welcome.slice(0, 5)); // 👉 Hello
console.log(welcome.slice(7));    // 👉 world!
```

♻️ Replace Substrings

```
const msg = "Hello, John!";
console.log(msg.replace("John", "Alice")); // 👉 Hello, Alice!
```

```
const repetitive = "John is good. John is kind.";
console.log(repetitive.replaceAll("John", "Alice")); // 👉 Alice is good. Alice is kind.
```

> ☑ `replaceAll()` is supported from **ES2021**

🧠 Check Inclusion

```
console.log(welcome.includes("World")); // 👉 true
console.log(welcome.includes("open"));  // 👉 false
```

📏 String Length

```
console.log(welcome.length); // 👉 13
```

🔤 Case Conversion

```
console.log(welcome.toUpperCase()); // 👉 HELLO, WORLD!
console.log(welcome.toLowerCase()); // 👉 hello, world!
```

🧼 Trim Whitespace

```
const messy = "   Hello, World!   ";
console.log(messy.trim());       // 👉 Hello, World!
console.log(messy.trimStart());  // 👉 Hello, World!
console.log(messy.trimEnd());    // 👉    Hello, World!
```

🎛 Padding

```
const padded = "Hello";
console.log(padded.padStart(10, '*')); // 👉 *****Hello
console.log(padded.padEnd(10, '-'));   // 👉 Hello-----
```

🔢 Character Info

```
console.log(message.charAt(0));      // 👉 H
console.log(message.charCodeAt(0));  // 👉 72
```

🔪 Split String

```
console.log(welcome.split(","));  // 👉 ["Hello", " world!"]
```

🧾 Method Summary

Method	Description
`.length`	Returns length of string
`.slice(start, end)`	Extract part of string
`.substring(start, end)`	Similar to slice but no negative index
`.substr(start, length)`	Deprecated, similar to slice
`.replace()` / `.replaceAll()`	Replace substrings
`.toUpperCase()` / `.toLowerCase()`	Convert case
`.concat()`	Join strings
`.trim()` / `.trimStart()` / `.trimEnd()`	Remove whitespace
`.padStart()` / `.padEnd()`	Pad string
`.charAt(index)`	Character at index
`.charCodeAt(index)`	Unicode at index
`.split(delimiter)`	Split into array

🧪 Practice Set – Ch. 4: Strings

1️⃣ Count Characters

```
const str = "Hello, World!";
console.log(str.length); // 👉 13
```

2️⃣ Check Substring

```
const str = "Hello, World!";
console.log(str.includes("World")); // 👉 true
```

3️⃣ Convert to Uppercase

```
const str = "Hello, World!";
console.log(str.toUpperCase()); // 👉 HELLO, WORLD!
```

4️⃣ Extract Substring

```javascript
const str = "Hello, World!";
console.log(str.slice(7, 12)); // 👉 World
```

5️⃣ Replace Substring

```javascript
const str = "Hello, John!";
console.log(str.replace("John", "Alice")); // 👉 Hello, Alice!
```

6️⃣ Split String

```javascript
const str = "Hello, World!";
console.log(str.split(",")); // 👉 ["Hello", " World!"]
```

7️⃣ Starts With

```javascript
const str = "Hello, World!";
console.log(str.startsWith("Hello")); // 👉 true
```

8️⃣ Ends With

```javascript
const str = "Hello, World!";
console.log(str.endsWith("World!")); // 👉 true
```

9️⃣ Trim Whitespace

```javascript
const str = "   Hello, World!   ";
console.log(str.trim()); // 👉 Hello, World!
```

🔟 Check if String is Empty

```javascript
const str = "";
console.log(str.length === 0); // 👉 true
```
