



30 Days Roadmap - Can you master JavaScript?

Week 1 — Foundations & Core Behavior

Day 1 — Values, Types, and Coercion

Tags:

 DON'T DARE TO SKIP

Difficulty:  Beginner

Category: Internals / Types

What to Study (Time Budget: ~2 Hours)

- **A. Main Concept**

Understand JavaScript's primitive types, objects, value vs. reference, and how coercion works.

- **B. Subtopics / Gotchas / Patterns**

- `undefined` vs. `null`
- Strict (`===`) vs. loose (`==`) equality
- Truthy and falsy values
- Typeof limitations
- Object wrappers (e.g., `new Number(5)`)
- **C. Optional Nuance or Edge Case**
 - Behavior of `NaN` (self-inequality), Symbol uniqueness, `Object.is` edge cases

? Sample Interview Questions

1. How does JavaScript handle equality between different types (e.g., `==` vs `===`)?
2. Why is `typeof null` equal to `"object"` ?

Practical Task

- Create a table for all JS types with sample values and results of `typeof` checks.
- Write a function that reliably checks for "plain" objects.

17 Day 2 — Variable Declarations, Hoisting, and TDZ

Tags:

 DON'T DARE TO SKIP

Difficulty:  Beginner

Category: Internals / Scope

What to Study

- **A. Main Concept**
 - Differences between `var` , `let` , and `const`
 - Understanding hoisting and TDZ (Temporal Dead Zone)

- **B. Subtopics / Gotchas / Patterns**
 - Shadowing
 - Mutations of const objects/arrays
 - Re-declarations
- **C. Optional Nuance or Edge Case**
 - Block vs. function scope with `var`

? Sample Interview Questions

1. Describe variable hoisting in JavaScript.
2. What happens if you access a `let` variable before its declaration?

Practical Task

- Conceptual tracing: Draw a timeline diagram for hoisting/TDZ in a code sample.

17 Day 3 — Functions: Declarations, Expressions, and Arrow Functions

Tags:

 DON'T DARE TO SKIP

Difficulty:  Beginner

Category: Functions / Scope

What to Study

- **A. Main Concept**
 - Function declaration vs. expression vs. arrow function (syntax and behavior)
- **B. Subtopics / Gotchas / Patterns**
 - Hoisting with function declarations

- Arrow functions and lexical `this`
- No `arguments` object for arrow functions
- **C. Optional Nuance or Edge Case**
 - Arrow functions as methods – what breaks?
 - Returning object literals from arrow functions

? Sample Interview Questions

1. How does the `this` keyword behave differently in arrow functions compared to traditional functions?
2. What would happen here?

```
jslet obj = {
  num: 5,
  arrow: () => this.num,
  regular: function() { return this.num; }
}
```

Practical Task

- Write or trace code highlighting `this` in arrow vs. traditional functions.

17 Day 4 — Scope, Closures, and the LEGB Model

Tags:

 DON'T DARE TO SKIP

Difficulty:  Moderate

Category: Scope / Closures / Internals

What to Study

- **A. Main Concept**
 - Lexical scoping in JavaScript
 - Closure formation and its role in callbacks/loops
- **B. Subtopics / Gotchas / Patterns**

- Block vs. function vs. global scope
- Common closure bugs (e.g., capturing loop variables)
- IIFEs (Immediately Invoked Function Expressions)
- **C. Optional Nuance or Edge Case**
 - Memory leaks with closures retaining large scopes

? Sample Interview Questions

1. Explain how closures work. Why are they important?
2. How do you ensure that callbacks inside loops capture the correct value of an iterator?



Practical Task

- Code exercise: Implement a counter using closures.



Day 5 — The `this` Keyword Deep Dive



Tags:

Difficulty: 🟡 Moderate

Category: Runtime / Context / Internals



What to Study

- **A. Main Concept**
 - How `this` is determined (call-site based, not author-time)
 - The four binding rules (implicit, explicit, new, default)
- **B. Subtopics / Gotchas / Patterns**
 - Function vs. method context
 - Arrow functions and `this`
 - Loss of binding in callbacks
- **C. Optional Nuance or Edge Case**

- Binding priority when combined (`bind` + `new`)
- `this` in strict mode

? Sample Interview Questions

1. Explain the different rules for how `this` is bound in JavaScript.
2. What happens to `this` inside a regular function when called as a callback?

Practical Task

- Diagram: For several call-sites, annotate which `this` binding rule applies.

Day 6 — Prototypes and Inheritance

Tags:

 DON'T DARE TO SKIP

Difficulty:  Moderate

Category: Internals / Objects / Patterns

What to Study

- **A. Main Concept**
 - Prototypal inheritance, the prototype chain, `__proto__`, `Object.create`, `class` sugar
- **B. Subtopics / Gotchas / Patterns**
 - Shared mutable state via prototypes
 - Overriding vs. shadowing
 - The difference between prototype and instance properties
- **C. Optional Nuance or Edge Case**
 - Customizing inheritance via `Object.setPrototypeOf`, `super` keyword

? Sample Interview Questions

1. How does JavaScript's prototype chain resolve property access?
2. What's the difference between `prototype` and `__proto__` ?

Practical Task

- Trace a property lookup across an inheritance chain with a drawn diagram.

17 Day 7 — Objects: Creation, Property Descriptors, and Modern Patterns

Tags:

Difficulty:  Moderate

Category: Objects / Patterns / Internals

What to Study

- **A. Main Concept**
 - Object literal shorthand, computed properties, property descriptors
- **B. Subtopics / Gotchas / Patterns**
 - Enumerability, configurability, and writability
 - Using `Object.freeze` , `Object.seal`
 - Shallow vs. deep copy
- **C. Optional Nuance or Edge Case**
 - Using symbols as property keys

Sample Interview Questions

1. How do you make an object property read-only?
2. Describe the difference between enumerable and non-enumerable properties in practice.

Practical Task

- Write or analyze code using `Object.defineProperty` and compare properties created via shorthand.

Week 2 — Asynchrony & Data Structures

Day 8 — Execution Context and Event Loop

Tags:

 DON'T DARE TO SKIP

Difficulty:  Moderate

Category: Internals / Async / Runtime

What to Study

- **A. Main Concept**
 - How JavaScript executes code: call stack, event loop, microtasks vs. macrotasks
- **B. Subtopics / Gotchas / Patterns**
 - Starvation (microtask queue growth)
 - `setTimeout` , `Promise.resolve` , `queueMicrotask`
 - Blocking the event loop
- **C. Optional Nuance or Edge Case**
 - Prioritization differences between micro/macro tasks

Sample Interview Questions

1. Explain the differences between microtasks and macrotasks.
2. What will the output be?

```
jsconsole.log(1);
setTimeout(() => console.log(2));
Promise.resolve().then(() => console.log(3));
console.log(4);
```

Practical Task

- Draw a call stack and queue trace for given async code.

Day 9 — Promises and Async/Await

Tags:

 DON'T DARE TO SKIP

Difficulty:  Moderate

Category: Async / Patterns

What to Study

- **A. Main Concept**
 - How Promises work, chaining, error handling, and the async/await abstraction
- **B. Subtopics / Gotchas / Patterns**
 - Promise chaining — return vs. side effect
 - Error propagation and missed `catch`
 - Sequential vs. parallel async flows
- **C. Optional Nuance or Edge Case**
 - Await-ing non-Promise values; resolving with another Promise

? Sample Interview Questions

1. How does async/await make working with Promises easier, and what pitfalls remain?
2. What happens if you forget to return a Promise in a `.then` chain?

Practical Task

- Refactor a callback-based async function to Promise and then to async/await.

17 Day 10 — Arrays: Methods, Iterability, and Mutation

Tags:

 DON'T DARE TO SKIP

Difficulty:  Beginner

Category: Data Structures / Patterns

What to Study

- **A. Main Concept**
 - Arrays as objects, mutative vs. non-mutative array methods, iteration protocols
- **B. Subtopics / Gotchas / Patterns**
 - Array holes vs. undefined values
 - Spread and destructuring with arrays
 - `Array.from`, array-likes, and iterables
- **C. Optional Nuance or Edge Case**
 - Creating sparse arrays vs. `new Array(size)`

? Sample Interview Questions

1. What's the difference between `.forEach`, `.map`, and `.reduce`?
2. How would you convert an array-like object to a true array?

Practical Task

- Given an "array-like" object, implement a generic function to make it iterable.

17 Day 11 — Maps, Sets, WeakMaps, WeakSets

Tags:

Difficulty: 🟡 Moderate

Category: Data Structures / Patterns

What to Study

- **A. Main Concept**
 - Key differences between traditional objects and Maps/Sets, use cases for weak collections
- **B. Subtopics / Gotchas / Patterns**
 - Key types allowed in Map vs. Object
 - Garbage collection with WeakMap/WeakSet
 - Uniqueness guarantee and performance considerations
- **C. Optional Nuance or Edge Case**
 - Weak collections and non-enumerability

? Sample Interview Questions

1. When should you use a Map instead of an Object in JavaScript?
2. What are the memory management implications of WeakMap?

Practical Task

- Table: Compare use-cases and methods between Map, Set, WeakMap, and WeakSet.

Day 12 — String & Number Methods, Template Literals

Tags:

Difficulty: 🟢 Beginner

Category: Core / Patterns

What to Study

- **A. Main Concept**
 - Modern string and number methods, interpolation, and immutability
- **B. Subtopics / Gotchas / Patterns**
 - Method chaining on strings
 - Numeric separators (`1_000_000`)
 - Tagged templates
- **C. Optional Nuance or Edge Case**
 - Unicode and surrogate pairs in strings

? Sample Interview Questions

1. How are template literals different from traditional string concatenation?
2. Give an example where method-chaining on string values would fail.

Practical Task

- For a sample tagged template, explain how interpolation and tag functions interact.

Day 13 — Destructuring and Spread/Rest

Tags:

 DON'T DARE TO SKIP

Difficulty:  Moderate

Category: Patterns / Modern JavaScript

What to Study

- **A. Main Concept**
 - Array and object destructuring; using spread and rest (...syntax) for copies/parameters
- **B. Subtopics / Gotchas / Patterns**

- Default values in destructuring
- Nested destructuring with renaming
- Shallow vs. deep copy issues
- **C. Optional Nuance or Edge Case**
 - Performance/footguns with large spreads

? Sample Interview Questions

1. Explain how object destructuring assignment works in function parameters.
2. What's the difference between shallow and deep copy when using spread syntax?

Practical Task

- Practice: Write a function with destructuring and rest for arguments, then explain the destructured values.

Day 14 — Modern ES Features (from ES2021 to ES2025)

Tags:

Difficulty:  Moderate

Category: Modern JavaScript

What to Study

- **A. Main Concept**
 - Key recent features: optional chaining, nullish coalescing, logical assignment, top-level await, records & tuples (if available)
- **B. Subtopics / Gotchas / Patterns**
 - Safe property access with `?.`
 - When `??` differs from `||`
 - Potential runtime surprises with new features

- **C. Optional Nuance or Edge Case**
 - How would legacy code react to modern patterns? Polyfill issues?

? Sample Interview Questions

1. Describe a scenario where optional chaining solves a real bug.
2. What's the difference between `??` and `||`?

Practical Task

- Refactor a "deep property access" code block using optional chaining and nullish coalescing.

Week 3 — Internals, Performance, and Advanced Patterns

17 Day 15 — Memory Management & Garbage Collection

Tags:

Difficulty:  Advanced

Category: Internals / Runtime

What to Study

- **A. Main Concept**
 - How garbage collection works, memory leaks in JS, reference counting vs. mark-and-sweep
- **B. Subtopics / Gotchas / Patterns**
 - Retaining references via closures or DOM
 - Leaks in event listeners, timers, and caches
- **C. Optional Nuance or Edge Case**
 - Weak references, `FinalizationRegistry`

? Sample Interview Questions

1. Explain a real-world cause and fix for a memory leak in JS.
2. What is the difference between strong and weak reference?

Practical Task

- Diagram: Trace object reachability and GC eligibility in a complex sample.

Day 16 — Error Handling, Try/Catch, and Defensive Code

Tags:

Difficulty:  Moderate

Category: Internals / Patterns

What to Study

- **A. Main Concept**
 - Error propagation with try/catch/finally, `throw`, custom Error classes, Promise rejection
- **B. Subtopics / Gotchas / Patterns**
 - Errors inside async functions
 - Synchronous vs. asynchronous throw/catch
 - Defensive coding patterns (guard clauses, assertions)
- **C. Optional Nuance or Edge Case**
 - Re-throwing errors, error boundary patterns

? Sample Interview Questions

1. How does error handling differ between synchronous and asynchronous JavaScript code?
2. What's the risk of swallowing errors in a promise chain?



Practical Task

- Write a resilient function that always logs but never completely swallows unexpected errors.



Day 17 — Immutability, Copy Patterns, and Functional Practices



Tags:

Difficulty: 🟡 Moderate

Category: Patterns / Modern JavaScript



What to Study

- **A. Main Concept**
 - Value vs. reference, copying arrays/objects, functional JS basics
- **B. Subtopics / Gotchas / Patterns**
 - Shallow copy pitfalls
 - `Object.assign` vs. spread vs. `structuredClone`
 - Immutability enforcement patterns
- **C. Optional Nuance or Edge Case**
 - Risks around deeply nested objects

? Sample Interview Questions

1. How would you perform a deep clone in JS, and when is it needed?
2. When does modifying one object unintentionally affect another?



Practical Task

- Code: Demonstrate structured cloning, explain what fails with non-cloneable objects.



Day 18 — Iterators, Generators, and Custom Iteration



Tags:

Difficulty: ● Advanced

Category: Internals / Async / Patterns



What to Study

- **A. Main Concept**
 - Protocols for iterable/iterator/generator. Use-cases for custom iteration patterns.
- **B. Subtopics / Gotchas / Patterns**
 - Implementing Symbol.iterator
 - Lazy evaluation with generators
 - Async iteration basics
- **C. Optional Nuance or Edge Case**
 - When would you use a generator vs. a traditional function?

? Sample Interview Questions

1. How do you make an object iterable in JS?
2. Write a simple generator for a custom data source.



Practical Task

- Implement and trace a custom iterator or generator function.



Day 19 — Modules, Imports/Exports, and Scope Privacy



Tags:

🔥 DON'T DARE TO SKIP

Difficulty: 🟡 Moderate

Category: Modern JavaScript / Patterns

📖 What to Study

- **A. Main Concept**
 - ES modules, named vs default exports, import patterns, top-level await
- **B. Subtopics / Gotchas / Patterns**
 - Module scope vs. global scope
 - Live bindings and circular dependencies
 - Static analysis and tree-shaking
- **C. Optional Nuance or Edge Case**
 - How module caching works

? Sample Interview Questions

1. What is the difference between CommonJS and ES modules?
2. How does top-level await affect module loading?

🔧 Practical Task

- Diagram: Visualize module load order and update on exports.

📅 17 Day 20 — Symbols, Hidden Properties, and Meta-programming

🏷️ Tags:

Difficulty: 🔴 Advanced

Category: Internals / Patterns / Modern JavaScript

📖 What to Study

- **A. Main Concept**
 - Using symbols for property keys, hiding properties, customizing behavior with meta-programming
- **B. Subtopics / Gotchas / Patterns**
 - Global vs. private symbols
 - Well-known symbols (`Symbol.iterator` , `Symbol.toStringTag`)
 - Uses for symbol properties in libraries
- **C. Optional Nuance or Edge Case**
 - Enumeration and property/key visibility

? Sample Interview Questions

1. How would you make a property non-enumerable and non-guessable in JS?
2. What are "well-known" symbols and why are they important?

Practical Task

- Trace: Create an object with mixed string and symbol keys, show the results with `for...in` and `Object.getOwnPropertySymbols` .

Day 21 — Proxy, Reflect, and Runtime Traps

Tags:

Difficulty:  Advanced

Category: Runtime / Patterns / Modern JavaScript

What to Study

- **A. Main Concept**
 - Proxy handler traps, Reflect API, use-cases (logging, validation, reactive patterns)
- **B. Subtopics / Gotchas / Patterns**

- The "get" and "set" traps
- Proxy over arrays, classes, and functions
- Performance and debugging challenges
- **C. Optional Nuance or Edge Case**
 - Revocable proxies, proxy invariants

? Sample Interview Questions

1. Give a real-world example of using a Proxy in JavaScript.
2. What happens if you break an invariant (e.g., set a non-writable property via Proxy)?



Practical Task

- Implement a logging proxy that tracks property reads and writes on an object.



Week 4 — Mastery, Patterns, and Interview-Ready Edge-cases



Day 22 — Event Delegation, Propagation, and Custom Events



Tags:

Difficulty: 🟡 Moderate

Category: Patterns / Runtime / Async



What to Study

- **A. Main Concept**
 - Event bubbling, capturing, delegation, and emitting custom events
- **B. Subtopics / Gotchas / Patterns**
 - `stopPropagation` , `preventDefault`

- Pattern: using delegation for performance
- Creating and dispatching CustomEvent
- **C. Optional Nuance or Edge Case**
 - Reentrancy and event queue timing with custom events

? Sample Interview Questions

1. How does event delegation work, and why is it important?
2. What would happen if you call stopPropagation() in a capturing handler?

Practical Task

- Visualization: Map event propagation path for a nested DOM structure.

Day 23 — Async Patterns: Debouncing, Throttling, and Queues

Tags:

Difficulty:  Moderate

Category: Patterns / Async

What to Study

- **A. Main Concept**
 - Debounce and throttle patterns for handling async flows and performance
- **B. Subtopics / Gotchas / Patterns**
 - Difference between debounce and throttle
 - Queueing promises for concurrency control
- **C. Optional Nuance or Edge Case**
 - Edge-case: leading/trailing calls and cancellation

? Sample Interview Questions

1. Describe the difference between throttling and debouncing with examples.
2. How would you implement a concurrency-limited promise queue?

Practical Task

- Implement: Write a debounce function and show when it fires.

17 Day 24 — Defensive Coding, Guard Patterns, and Type Resilience

Tags:

Difficulty:  Moderate

Category: Patterns / Modern JavaScript

What to Study

- **A. Main Concept**
 - Building fail-safe code (type checks, guards, input validation)
- **B. Subtopics / Gotchas / Patterns**
 - Pattern: Defensive “bail-out” (early return)
 - Making code robust to “invalid” inputs
 - Avoiding Type Coercion Surprises
- **C. Optional Nuance or Edge Case**
 - Pitfalls of overly-defensive code

Sample Interview Questions

1. How do you make a function robust against bad input?
2. What’s the trade-off between fail-fast vs. fail-silent in a reusable JS utility?

17 Day 25 — Composition, Higher-Order Functions, and Reusability

Tags:

Difficulty:  Advanced

Category: Patterns / Functional JS

What to Study

- **A. Main Concept**
 - Function composition, map/filter/reduce, higher-order function patterns
- **B. Subtopics / Gotchas / Patterns**
 - Currying and partial application
 - Passing functions and closures safely
 - Chaining and compositionality
- **C. Optional Nuance or Edge Case**
 - Law of Demeter in JS context

? Sample Interview Questions

1. What is a higher-order function? Give examples from built-in JS methods.
2. How can composition make code more testable and modular?

Practical Task

- Code: Compose several simple utilities for data transformation.

Day 26 — Defensive Async: Race Conditions & Deadlocks

Tags:

Difficulty:  Advanced

Category: Async / Patterns

What to Study

- **A. Main Concept**
 - Understanding race conditions, avoiding double-resolutions, atomic operations in async code
- **B. Subtopics / Gotchas / Patterns**
 - Locking patterns (JS-only, with references)
 - Idempotency — making promises safe for repeats
 - Deadlocks with chained or cyclic async code
- **C. Optional Nuance or Edge Case**
 - Using `AbortController` for cancellation and cleanup

? Sample Interview Questions

1. How do you prevent race conditions in async JavaScript code?
2. What tools exist (in JS) to safely cancel or abort in-progress async work?

Practical Task

- Code: Implement a simple mutex/lock using promises.

Day 27 — Defensive Patterns for Security and Robustness

Tags:

Difficulty:  Advanced

Category: Patterns / Defensive JS

What to Study

- **A. Main Concept**
 - Secure JS coding: injection risks, prototype pollution, and safe property access
- **B. Subtopics / Gotchas / Patterns**
 - Reading/writing only “own” properties

- Defensive input handling (escaping, filtering)
- Immutability for security
- **C. Optional Nuance or Edge Case**
 - Attacks via prototype chain manipulation

? Sample Interview Questions

1. What is prototype pollution, and how can you defend against it?
2. How do you ensure you only interact with your own object's properties in JS?

Day 28 — Edge-Case Marathon: "What Actually Happens?"

Tags:

 DON'T DARE TO SKIP

Difficulty:  Advanced

Category: Edge Cases / Interview Practice

What to Study

- **A. Main Concept**
 - Rapid-fire review of "gotchas", runtime quirks, and rarely tested behaviors
- **B. Subtopics / Gotchas / Patterns**
 - Edge-case coercions (`[] == ![]` , etc)
 - Scoping surprises (`for (var i...)` , closure bugs)
 - Async scheduler edge cases (chained promises inside `setTimeouts`)
- **C. Optional Nuance or Edge Case**
 - Odd interactions between new JS features and legacy patterns

? Sample Interview Questions

1. Predict the output:

```
jslet a = [];  
if(a == !a) { console.log("true"); } else { console.log("false"); }
```

2. What happens if you call `resolve` and `reject` in the same Promise executor?

Practical Task

- Collect and solve at least 5 "weird output" JS snippets. Annotate your reasoning.

Day 29 — (Soft Skill) Product/Systems Thinking

Tags:

Difficulty:  Moderate

Category: Product Thinking / Soft Skill

What to Study

- **A. Main Concept**
 - Thinking beyond code: how does your JS logic serve actual product/business goals?
- **B. Subtopics / Gotchas / Patterns**
 - User impact through code decisions
 - Trade-offs in code choices (performance, accessibility, team velocity)
- **C. Optional Nuance or Edge Case**
 - Bias toward action vs. avoidance of risk

? Sample Behavioral Interview Question

- Tell me about a time when your code decision improved a product outcome.

Mental Model

- Use the “Five Whys” technique to trace proposed features/bugs from design to code. Exercise: Trace a recent bug root-cause down to your code design.

Day 30 — (Soft Skill) Technical Ownership + Communication

Tags:

Difficulty: 🟡 Moderate

Category: Ownership / Soft Skill

What to Study

- **A. Main Concept**
 - Communicate decisions to stakeholders, defend technical trade-offs, take ownership of bugs
- **B. Subtopics / Gotchas / Patterns**
 - Explain code clearly (“why not just ...?”)
 - Techniques for raising issues early
 - Demonstrating accountability and continued learning
- **C. Optional Nuance or Edge Case**
 - Navigating when you are “not the expert”

? Sample Behavioral Interview Question

- Tell me about a time you missed a bug in JS—how did you take ownership? How did you ensure it didn’t happen again?

Mental Model

- Use the “Ask for Feedback Early” exercise: Draft an email or post for code review, asking for feedback on a tricky design, showing transparency and openness.

Congratulations!

This roadmap focuses only on high-impact, interview-relevant skills and patterns. Spend time on the daily “what to study” and practical/diagramming tasks. Rigorously rehearse both your explanations and code reasoning to stand out in elite interview pipelines.