**05-02-2024**

**JavaScript**

1. Introduction, Variables*, Comments*
2. Datatypes – Number, BigInt, Boolean, null, undefined, strings, objects, arrays
3. Interaction methods – alert, prompt, confirm
4. Type Conversion – String conversion, Numeric conversion *– auto conversion, undefined, null, true and false, string,* Boolean conversion – *0, 1, “”, “ “*
5. Operators – *Basic – unary, binary, arithmetic, precedence, assignment, increment/decrement,* Comparison – *number, string, equality, strict equality*
6. Conditional statements *– if, else, else if, conditional operator*
7. Logical operators – *OR (truthy & short-circuit), AND (falsy & short-circuit), NOT*
8. Nullish coalescing operator
9. Loops – *while, do…while, for, break, continue*
10. Switch statement – *case-sensitive, grouping*
11. Functions, Function expressions, Arrow functions, Callbacks
12. Objects – *object reference, Object.assign(), nested pro cloning, structuredClone(), object methods, method short-hand, this, constructor function, methods in constructor, optional chaining, Object.keys(), Object.values(), Object.entries()*
13. toFixed(), Math – *floor, ceil, round, trunc, random, max, pow,* Number.isNaN, Number.isFinite, parseInt, parseFloat
14. Strings – *immutable, Search – indexOf, includes, startsWith, endsWith, Sub-string – slice (positive and negative index), substring (interchange – start and end), substr (positive and negative index, length), localeCompare, trim, repeat*
15. Arrays – *index, length, last element, pop, push, shift, unshift, performance, loops, multi-dimensional, splice (positive and negative index)- insert, remove, replace, slice, concat, forEach, Search – indexOf, lastIndexOf, includes, find, findIndex, findLastIndex, filter, Transform – map, sort, reverse, split, join, reduce*
16. Map and Set

**1. Introduction, Variables:**

1. Declare a variable named `name` and assign your name to it.

2. Create a variable `age` and assign your age to it.

3. Declare a constant `PI` and assign the value of π (pi) to it.

4. Write a comment explaining the purpose of your code.

5. Combine two variables, `firstName` and `lastName`, and store the result in a variable called `fullName`.

6. Swap the values of two variables, `a` and `b`, without using a third variable.

7. Use the `typeof` operator to determine the type of a variable named `exampleVar`.

8. Create a variable named `isStudent` and assign a boolean value to it.

9. Declare a variable `myArray` and assign an array with three elements to it.

10. Use the `console.log` method to print the value of a variable named `output`.

**2. Datatypes – Number, BigInt, Boolean, null, undefined, strings, objects, arrays:**

1. Perform arithmetic operations (addition, subtraction, multiplication) on two number variables.

2. Create a BigInt variable and assign a large integer value to it.

3. Declare a boolean variable `isRaining` and assign its value based on the weather.

4. Assign `null` to a variable named `nullVariable`.

5. Create a variable `undefinedVar` without assigning any value to it.

6. Concatenate two strings and store the result in a new variable.

7. Create an object representing a person with properties like name, age, and address.

8. Define an array with at least five different data types.

9. Access the second element of an array and store it in a variable.

10. Convert a number to a string and vice versa.

**3. Interaction methods:**

1. Use `prompt` to ask the user for their name and store it in a variable.

2. Display an alert with a custom message using `alert`.

3. Get input from the user using `confirm` and store the result in a variable.

4. Use `prompt` to get a number from the user, convert it to a numeric type, and perform an arithmetic operation.

5. Create a simple webpage with a button, and use `onclick` to trigger a function.

6. Use `prompt` to get two numbers from the user and display their sum using an alert.

7. Create an input field and use `oninput` to update another element dynamically.

8. Ask the user a yes/no question using `confirm` and display the result in the console.

9. Use `prompt` to get a string from the user and display it reversed.

10. Create a countdown timer that starts when the page loads using `setTimeout`.

**4. Type Conversion:**

1. Convert a string to a number and perform an arithmetic operation.

2. Convert a number to a string and concatenate it with another string.

3. Convert a boolean to a string and check its type using `typeof`.

4. Convert a string to a boolean and evaluate its truthiness.

5. Convert a number to a boolean and check its type using `typeof`.

6. Use `parseInt` and `parseFloat` to convert a string with a numeric value to a number.

7. Convert a string representing a date to a `Date` object.

8. Convert a number to a BigInt.

9. Use the `String` constructor to convert a number to a string.

10. Convert a boolean to a number and check its value.

**5. Operators – Arithmetic, Comparison:**

1. Perform addition and multiplication on two variables.

2. Calculate the remainder of a division operation.

3. Use the increment and decrement operators on a variable.

4. Compare two variables using the equality operator (`==`).

5. Use the strict equality operator (`===`) to compare two variables.

6. Check if a number is greater than or equal to another number.

7. Combine two comparison operators with the logical AND operator (`&&`).

8. Check if two variables are not equal using the inequality operator (`!=`).

9. Use the ternary operator to assign a value based on a condition.

10. Compare two strings lexicographically using the greater than operator (`>`).

**6. Conditional statements:**

1. Write an if statement to check if a number is positive.

2. Use an if-else statement to determine if a user is logged in or not.

3. Write a series of if-else statements to determine a person's age group (child, teen, adult).

4. Use a switch statement to handle different cases based on a variable's value.

5. Write an if-else statement to check if a year is a leap year.

6. Combine multiple conditions using logical operators in an if statement.

7. Use the conditional (ternary) operator to assign a value based on a condition.

8. Write an if statement to check if a string has more than 10 characters.

9. Use nested if statements to check multiple conditions.

10. Implement a simple grading system using if-else if-else statements.

**7. Logical operators:**

1. Use the logical AND operator to check if two conditions are true.

2. Implement an OR condition to check if a user is either an admin or a moderator.

3. Use the NOT operator to negate a boolean variable.

4. Combine logical operators to create a complex condition.

5. Write an expression using the ternary operator that mimics an AND condition.

6. Use logical operators to check if a number is outside a specific range.

7. Implement an XOR (exclusive OR) condition using logical operators.

8. Check if a number is divisible by both 2 and 3 using logical operators.

9. Use logical operators to check if a user is either logged in or has a guest role.

10. Combine logical operators to create a condition that checks if a variable is a number and greater than 10.

**8. Nullish coalescing operator:**

1. Use the nullish coalescing operator to provide a default value for a variable that may be null or undefined.

2. Check if a variable is null or undefined and use the nullish coalescing operator to assign a default value.

3. Implement a function that accepts parameters and uses the nullish coalescing operator to handle default values.

4. Use the nullish coalescing operator to safely access nested properties in an object.

5. Combine the nullish coalescing operator with other operators to handle multiple fallback scenarios.

6. Create a scenario where the nullish coalescing operator is useful in dealing with user input.

7. Use the nullish coalescing operator to check if a variable is defined before accessing its property.

8. Implement a function that returns a value from an array based on an index, with a default value using the nullish coalescing operator.

9. Handle a situation where a function parameter may be null or undefined using the nullish coalescing operator.

10. Use the nullish coalescing operator in a condition to check if a variable is either null or has a specific value.

**9. Loops:**

1. Use a for loop to print numbers from 1 to 10.

2. Iterate over an array and print each element using a for-of loop.

3. Create a while loop to print even numbers up to 20.

4. Use a do-while loop to prompt the user for input until a valid value is provided.

5. Iterate over an object and print key-value pairs using a for-in loop.

6. Write a for loop to calculate the sum of all numbers from 1 to 100.

7. Use a for-of loop to capitalize the first letter of each string in an array.

8. Create a loop to find the index of a specific element in an array.

9. Write a loop to generate a Fibonacci sequence up to a certain number of terms.

10. Implement a nested loop to print a pattern of stars or numbers.

**10. Switch statement:**

1. Use a switch statement to determine the day of the week based on a numerical input.

2. Implement a switch statement to categorize fruits into different types (citrus, berry, etc.).

3. Write a switch statement to convert a numeric month into its corresponding name.

4. Use a switch statement to perform different actions based on a user's role (admin, moderator, guest).

5. Implement a switch statement to handle different cases for a traffic light (red, yellow, green).

6. Write a switch statement to determine the season based on the current month.

7. Use a switch statement to assign different points to different grades (A, B, C, D, F).

8. Implement a switch statement to classify a person's BMI category.

9. Write a switch statement to determine the type of a shape based on the number of sides.

10. Use a switch statement to handle different cases for a user's preferred programming language.

**11. Functions, Function expressions, Arrow functions:**

1. Create a function that adds two numbers and returns the result.

2. Write a function expression to calculate the square of a number.

3. Implement an arrow function to find the length of a string.

4. Create a function that checks if a number is even and returns true or false.

5. Write a function expression to calculate the area of a rectangle.

6. Use an arrow function to concatenate two strings and return the result.

7. Create a function that takes an array as a parameter and returns the sum of its elements.

8. Write an arrow function that converts a string to uppercase.

9. Implement a function that accepts two parameters and returns the larger one.

10. Use a function expression to check if a given year is a leap year.